Dr Richard Schomburgk
and Adelaide Botanic Garden
1865 - 1891

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For Jean Mary Schomburgk

with affection and gratitude
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Abbreviations

A.B.G.  Adelaide Botanic Garden
CWT.  hundredweight (weight)
FT.  foot/feet
LB.  pounds (weight)
M.L.C.  Member of the Legislative Council
N.S.W.  New South Wales
N.T.  Northern Territory
Qld.  Queensland
S.A.  South Australia
SP.  species
SPP.  species (plural)
Tas.  Tasmania
VAR.  variety
Vic.  Victoria
W.A.  Western Australia
Dr Richard Schomburgk and Adelaide Botanic Garden
1865-91

Abstract

Dr. Schomburgk's period as Director of Adelaide's Botanic Gardens 1865-1891 was a 'golden age' producing some major site developments which have survived to the present day. The Botanic Gardens functioned as a multi-purpose institution, carrying out functions later performed by the Adelaide Zoological Gardens, the Waite Institute, Roseworthy Agricultural College, the Woods and Forests Department and the C.S.I.R.O. Schomburgk was involved in important applied botanical research in horticulture, forestry and agriculture and contributed to South Australia having the first forestry department and first agricultural college in Australia: two of the earliest in the British Empire. His Museum of Economic Botany is the only one of its kind in an Australian Botanic Garden. His fine Palm House, unrivalled in Australia, is now considered to be of world heritage importance.

The Schomburgk era provides us with a case-study of colonial pragmatism in the field of institutional development. It will be argued that Schomburgk's success in obtaining considerable resources for site development, his capacity to work cooperatively with local businessmen (including nurserymen) and farmers, and the way he became 'the people's pet' in Adelaide were all developments that arose out of his own particular balance of knowledge and attitudes. He combined overseas experience with local experience, scientific knowledge with practical expertise, research skills with entrepreneurial flair, and had a capacity to balance the different functions of a botanic garden, (scientific and utilitarian, educational and recreational). His own very practical training taught him to work for a client, important when working for a colonial government, and facilitated cooperation with local nurserymen and farmers.
It will be argued that there were certain cultural factors in Adelaide society that played an important part in the support given to Schomburgk and the gardens. This case study demonstrates how the cultural milieu affected the work of a colonial scientist. Of these factors relating to cultural milieu, three stand out: openness to new ideas, a desire to obtain 'the best available' for South Australia and alongside this a desire for 'respectability'.

A further theme of the thesis relates to the transfer of plant material: its importance to Australia and its place in British imperial development. Schomburgk's approach was an international one. Probably the largest importer of plant material in Australia in his day he used international botanical contacts to obtain plant material (e.g. for wheat, sultanas, almonds) which benefited all Australian colonies. His contacts with colleagues in Germany, where he had been a protégé of the great nineteenth century geographer and scientist, Alexander von Humboldt, provided a link between scientific developments in Australasia and research in Germany. While scientific links with British colleagues were of great importance, Schomburgk's pragmatic approach saw him forging extra-imperial links with colleagues in continental Europe, North and South America and Java.

The Botanic Garden, one of the earliest scientific institutions in Australia, provided a beachhead for scientific development. A study of Schomburgk's career provides some insight into the role of one of Australia's first professional scientific workers and into a worldwide network of exchange for information and plant material.
Declaration

This thesis contains no material that has been accepted for the award of any other degree of diploma in any university, and to the best of my knowledge and belief it contains no material previously published or written by another person, except where due reference is made in the text.

Should this thesis fulfill the requirements for the degree of Doctor of Philosophy I consent to it being made available for photocopying and loan.

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INTRODUCTION

When European settlers came to Australia they came to a country with no tradition of agriculture or horticulture as practised in other continents. The plants they brought with them were the first of a series of introduced species which were to transform the landscape. Playing a vital role in the introduction of such species were the botanic gardens that were established in Sydney, Melbourne, Adelaide, Hobart, Brisbane, Townsville and Cairns as well as in regional centres such as Geelong. These botanic gardens were in the care of botanists and horticulturists who were part of a worldwide network of people involved in plant exchange.

It has been said that in Australia the most important role of colonial botanic gardens was as acclimatization centres.\(^1\) A whole host of activities were associated with experiments in the cultivation of plants in order to produce goods such as fruit and vegetables, tobacco, sugar, grains, pharmaceutical items, fibre products and plants for forage and timber products. For when European settlers came to Australia they brought an economic flora new to the continent.\(^2\) The importance of these introductions and our dependence on them in everyday life is little recognized and has received little attention from historians. Michael Cannon, one historian who has commented on changes in the environment resulting from introduced plants, writes in *Life in the country* about introduced weeds such as

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Paterson's Curse or Salvation Jane, the scotch thistle, Cape clover, and prickly pear. Cannon then notes that 'some foreign plants proved helpful to the settler', commenting in one short paragraph on introduced grasses such as buffel grass, subterranean clover and rye grass.\(^3\) It is a welcome change to have a historian paying attention to pasture grasses. However, one would have thought that plants as important as wheat, maize, beans, peas, salad vegetables, apples, citrus fruit and other varieties, products found today in our refrigerators and kitchen cupboards, might be considered worthy of attention, not to mention the shiraz and chardonnay in our cellars or the barley used for our beer. There are also the plane trees and jacaranda in city streets, the roses in domestic gardens and the introduced lawn grass species, such as couch, in ovals and playing fields. The important part that introduced plants play in the lives of millions of Australians is manifested not only in agriculture but in horticulture and the forestry industry.

In recent years considerable attention has been given to environmental problems associated with the spread of plant species which were not appropriate for the regions to which they were introduced. However, the process of introducing species that did prove to be economically valuable or provided popular ornamental plants has received comparatively little attention.

Botanists and horticulturists working in botanic gardens were helping to develop some of the earliest scientific institutions in Australia. Some studies of botanic gardens have examined their

contribution as part of a network of institutions supporting colonial expansion. That of Lucile Brockway, *Science and colonial expansion: the role of the British Royal Botanic Gardens*, is the most noteworthy in recent times. Was the scientific work done in Adelaide broader than that involved in the acquisition and study of a collection of plants for economic ends? In this study of the Adelaide Botanic Garden we need to examine the scientific contribution of botanic gardens not only in terms of pure science but in terms of the contribution to problem solving in the applied plant sciences of horticulture, agriculture and forestry. Problems encountered by settlers ranged from diseases in wheat and vines and the disappearance of native pasture grasses to variations in soil quality and the search for species appropriate for street-planting. One might expect a colonial botanic garden to provide support for such studies when available scientific expertise was quite limited. And if there were such support then there is another aspect to examine. How was the information disseminated? How were links established between those who had knowledge and skills? Did problem solving in the plant sciences involve not only the development of practical solutions but also the task of gaining acceptance for such solutions?

There are other questions to be answered. How were the new plants obtained? Were they sent from the Royal Botanic Gardens, Kew, in a routine fashion? Was the Botanic Garden in Adelaide some kind of clone of that at Kew, with work being similar to that in other Australasian cities? Were the links of Adelaide Botanic Garden primarily with Kew and other places in the British Empire? Records from the Schomburgk era provide answers to such questions.
A study of the work of Adelaide Botanic Garden in the nineteenth century should provide some insight into the work of nineteenth-century scientists and their contacts with colleagues. In recent years there has been an upsurge of interest in Australia's colonial scientists, reflected in such publications as Ann Moyal's *A Bright and Savage Land*, the bi-centennial publication *Australian Science in the Making* and the Royal Society of South Australia's *Ideas and Endeavours - the Natural Sciences in South Australia*. Roy MacLeod, in his introduction to the centenary history of ANZAAS, the Australian and New Zealand Association for the Advancement of Science, wrote in 1988 that while we await works of synthesis 'today the exploration of Australian science forms part of our rediscovery of Australia's cultural and technological heritage'. In his view this exploration was occurring after years of neglect of urban Australian middle class culture, under-estimation in social history of the role of learned societies, universities and liberal movements and neglect of the role of men of science and leaders in manufacturing industry.

Work done by Ann Moyal, Michael Hoare and Geoffrey Serle in the 1970s, and more recently by such researchers as Rod Home, Roy Macleod, Lindsay Farrall, Boris Shedvin and Ian Inkster has shed light on the political, economic and professional dimensions of Australian

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science⁶ and this provides a background to developments in the plant sciences. In *Australian Science in the Making*, Robert Stafford and Sybil Jack both refer to the major role played by science in British colonial expansion in the nineteenth century.⁷ Discussing the concept of cultural imperialism, Stafford refers to metropolitan technologies, standards, institutions, modes of organization and patterns of thought that were exported to the non-European periphery. Stafford refers to the seminal essay of Basalla on the diffusion of Western science and Basalla's three-phase model for understanding the development of independent scientific institutions and habits of mind in peripheral cultures.⁸ Using Australian science to reappraise this, both Inkster and Macleod have made modifications to this model. However, Stafford argues that it may be premature to try to provide fine weightings of internal over external influence in assessing colonial and imperial science while we are still deficient in rudimentary analysis and even basic facts concerning large areas of the history of Australian science. Such a plea for a study of basic facts and analysis echoes Susan Faye Cannon's plea a decade earlier for a study of both unpublished and published papers of nineteenth-century scientists rather than 'more studies of the same old figures and events based on the same old sources and arranged in the same old way'.⁹

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Inkster and Todd's valuable essay 'Scientific enterprise 1850-1900' in *Australian Science in the Making* provides a framework for studies of colonial scientific societies in Australia, a framework which also has relevance to colonial scientific institutions. They note that 'for pre-eminently utilitarian reasons, natural history loomed far larger than in the European science of the period', that 'specifically colonial pressures added to the local economic imperatives of a region of recent settlement to hammer out a utilitarian and initially subservient scientific programme', and that 'natural history provided psychological as well as material and social rewards to intellectuals settled in such regions'; these three forces combining to create the utilitarian and localized profile of Australian science in the nineteenth century.¹⁰ Whereas the earliest scientific endeavour had been concerned with reconnaissance, the middle years of the nineteenth century saw an emphasis on acclimatization, activities aimed to support resource management. With a dramatic increase of population and economic prosperity came the gradual development of bureaucratic participation and support, and the employment of surveyors, geologists, engineers, chemists and botanists.

From the 1850s plant and animal acclimatization provided some focus for the emergent scientific community in Australia. Such activities saw the involvement of W. L. Martin, A. R. C. Selwyn, A. A. C. Le Souef, Ferdinand von Mueller, Frederick McCoy, Dr Thomas Black in Victoria, George Bennett, W. B. Clarke and W. J. Stephens in New South Wales and George William Francis and Richard Schomburgk in

¹⁰ Ian Inkster and Jan Todd, 'Scientific enterprise 1850-1900', in *Australian science in the making*, pp. 102-3.
South Australia. Inkster and Todd argue that in the absence of large-scale manufacturing in Australia, natural history took the part played by mechanical engineering or industrial chemistry in large, industrial economies in the nineteenth century. Furthermore, they assert that while the acclimatization movement provided a focus for scientific activity, 'it was not until the last two decades of the nineteenth century that Australian science began clearly to respond to local imperatives, rather than to "imperial demands"'. Until then, Australian scientific development was 'intermittent, heroic, dependent and pragmatic'.

An examination of the work of Richard Moritz Schomburgk, second Director of the Adelaide Botanic Garden from 1865-1891, provides a valuable case-study with 'basic facts' sought by Stafford and Cannon. It also enables us to see how acclimatization studies provided a focus for scientific activities in colonial South Australia. Such a study is especially valuable because so many of the previous studies derive entirely from the Eastern seaboard of Australia and many have been concerned with British born scientists rather than scientists from continental Europe. For example, Stafford himself has studied the influential role played by the British geologist Sir Robert Murchison on geological research in the Eastern seaboard colonies of Australia. Ian Inkster and Jan Todd’s essay has as its primary focus developments in New South Wales and Victoria, although there is a

11 ibid., p. 120.
12 ibid., p. 125.
useful section on the development of scientific institutions in South Australia and other events and places are discussed.\textsuperscript{14} The considerable detail available on Schomburgk’s work at the Botanic Garden, which is provided by a set of detailed annual reports, Board Minutes, receipts for purchases and his own publications, means that the present case-study can appraise his work not only in the context of events that took place but his own rationale for the work. There are available for comparison very different reports from directors of colonial botanic gardens at Sydney, Melbourne, Brisbane and Hobart, the nature and content of which throw light on the difference in their situation in the period 1865-1890 from that in Adelaide.

In the early stages of the development of an institution, resources are sought and priorities are established. In a situation of scarce resources not all groups in the community can be satisfied. In colonial Adelaide there were different interest groups with different expectations about long term goals and short term goals. In my study I examine some of the choices that had to be made. Previous studies of botanic gardens, such as R. T. M. Pescott’s \textit{Royal Botanic Gardens, Melbourne}, Lionel Gilbert’s \textit{The Royal Botanic Gardens, Sydney: a History 1816-1985}, F. N. Hepper (ed.), \textit{The Royal Botanic Gardens Kew, Gardens for Science and Pleasure}, Sir Wilfrid Blunt’s \textit{In for a Penny - a Prospect of Kew Gardens} and Phillida Ballard’s \textit{An Oasis of Delight: the History of the Birmingham Botanic Gardens} \textsuperscript{15}, have pointed to a

\textsuperscript{14} Ian Inkster and Jan Todd, ‘Scientific enterprise 1850-1900’, pp. 102-132.

perennial dilemma faced by Directors and Boards in Melbourne, Sydney, Kew and Birmingham concerning the contrasting demands of the 'ornamental' and the 'scientific'. Conflicting demands could lead to serious friction developing between Director and Board or government. In this study of Adelaide Botanic Garden it will be important to examine factors which help or hinder the resolution of such problems.

As a backdrop to the study of problem solving in the plant sciences there are two other aspects to colonial botanic garden development. One is that a nineteenth-century director worked not only in a colonial context but also as a scientist who was part of dramatic worldwide developments in science. Some accounts of the development of natural history in South Australia, for example Ideas and Endeavours - the Natural Sciences in South Australia, pay very little attention to the broader world of science outside this State. However, one cannot understand the work of a scientist without considering his contacts with professional colleagues. Secondly, one cannot understand the development of an institution in Adelaide without considering its role in a new British colony; in a city which was intended to be a model city in a model colony.\textsuperscript{16} We might also find elements of British life in Victorian times with its enterprise, its belief in scientific progress and its support for social respectability. In the course of the study, it will be necessary to pay

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special attention to the position of Schomburgk, a German-born naturalist working in Anglo-Australian society.

Finally, given the important role of the Royal Botanic Gardens, Kew in the nineteenth century, some clue to our investigation may be provided by words of the eminent botanist and Director at Kew, Sir Joseph Hooker when he wrote to James Hector in Wellington, New Zealand:

I am heartily glad you have started the Museum at Wellington; there is nothing like a Museum & Gardens to screw money out of the public for science. Every shilling we have had here has been through the popularity of the Gardens & Museum & diverted thence on pure Science.¹⁷

Chapter 1

THE ROLE OF THE BOTANIC GARDEN

In Australian colonial society, the botanic garden was an institution which could excite the imagination. It could be a place for relaxation and enjoyment in a community which had only limited recreational resources and at the same time a place for study and education. Its very existence demonstrated that the settlement was no mere camp and the plants that were grown demonstrated what might be achieved in future development.

In assessing a nineteenth century botanic garden, we need first of all to define the characteristics of such an institution. Typically those writing about botanic gardens today refer to the scientific, educational, and recreational role of a botanic garden and may refer to the importance of 'study, education and enjoyment'. The definition used by the I.U.C.N. Botanic Gardens Secretariat in 1989 was of a botanic garden as 'a garden containing scientifically ordered and maintained collections of plants, usually documented and labelled, and opened to the public for the purposes of recreation, education and research'. It was noted that there is often an associated botanical or similar institution, often including a herbarium. The following characteristics were outlined: that there is a reasonable degree of permanence, an underlying scientific basis for the collection, proper documentation of the collection, adequate

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labelling, monitoring of plant material, the garden is open to the public, there is communication of information to other gardens, institutions and the public and there is exchange of seed or other materials with other botanic gardens, arboreta or research stations. Further features are that scientific or technical research is undertaken on plants in the collection, and that research in plant taxonomy is maintained in associated herbaria. Such a definition, although written in quite recent times, is relevant to a study of expectations of nineteenth century botanic gardens in Australia.

The terms 'botanic garden', 'botanic gardens' and 'botanical gardens' are all used. It was common in the Schomburgk era, as it is today, for Adelaide Botanic Garden to be referred to as 'the Gardens'. Today the title 'Botanic Gardens of Adelaide' refers not only to Adelaide Botanic Garden but also to other Botanic Garden sites, Wittunga Botanic Garden, Mount Lofty Botanic Garden, Beechwood at Stirling and Black Hill Flora Centre. These other sites have been acquired in the twentieth century and do not form part of this study.

Community expectations of a colonial Australian botanic garden were based not only on concepts of a botanic garden current in those days but on more general ideas about what a garden should be like: for over the centuries botanic gardens, while having special functions, also have had features typical of the gardens of their day.

A botanic garden has a utilitarian role. This is the fundamental role of a garden and is seen in the first gardens known to civilization: walled or fenced enclosures with shade-casting trees and plants deliberately placed, enabling food to be grown. From an etymological viewpoint a 'garden' is defined by its fence: 'the garden is generally defined as an enclosed piece of ground devoted to the cultivation of flowers, fruit or vegetables, while the word 'gardens' stands for ornamental grounds or parks such as botanical gardens'. From a functional viewpoint a garden can be viewed as a collection of resources - soil, water and plants - which within the limits of climate can be exploited and orchestrated by human ideas about what a garden should be like.

From ancient times plants have been grown not only for their culinary value but for medicinal purposes. Medicinal herbs are known to have been grown in gardens in ancient Sumeria and China and herbal records date from the third millenium B.C. There are records of five hundred herbs being grown in ancient Egypt in 2700 B.C. and seven hundred a thousand years later; literature dating back to Anglo Saxon times enables us to identify five hundred herbs grown in Britain at that period. In medieval times in Europe monks helped to conserve

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6 Huxley, *Illustrated history of gardening*, p. 11.
and develop earlier knowledge of plants and herbal lore, exchanging plants and ideas with pilgrims and travellers. In the university cities the tradition of the physic garden of medicinal herbs was developed further and the earliest European botanic gardens had their roots in teaching gardens which developed from physic gardens.

Medieval monks also grew flowers to use for decoration in churches. Such a use of ornamental plants for decoration goes back to ancient times when communities had raised themselves above subsistence level. Decorative gardening is known to have existed in Egypt by about 1500 B.C. Material from funeral garlands and recipes for perfumes indicate that the Egyptians were familiar with flowers known to us today as iris (probably Iris florentina), jonquil (Narcissus tazetta), cornflower (Centaurea cyanus), anemone (Anemone coronaria), crown daisy (Chrysanthemum coronarium), jasmine (probably Jasminum officinale) and the rose (Rosa sancta).\(^7\)

Inscriptions recording the activities of Rameses III (1198-1166 B.C.) indicate that flowers and exotic trees were actively cultivated in his day, that is, there were flowers that were deliberately planted, in contrast to flowers that grew wild. In contrast to the enclosed gardens of the Egyptians, the Babylonians and Assyrians made vast parks used for hunting and as pleasure gardens - an idea developed further by the Persians.\(^8\)

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\(^8\) Huxley, *Illustrated history of gardening*, p. 11.
During medieval times pilgrims and crusaders brought back to Europe ideas about decorative gardening and the pleasure gardens that had been developed by the Islamic and Byzantine civilizations; these civilizations had in turn absorbed ideas about design and knowledge about plant material from the Romano-Hellenistic and Persian gardens. The tradition of pleasure gardens can be seen in Europe in medieval times: for example illustrations show 'gardens of pleasure' with elaborate fences and arbors, turf seats, fountains and grassy areas surrounded by flowers. Such a pleasure garden could provide shade and coolness, as well as the beauty of ornamental plants and flowers. This tradition of the pleasure garden continued in European history and elements of this can be seen in the expectations of European settlers who came to Australia.

Gardens design over the centuries had elements of both the practical and what was considered to be beautiful. What is seen to be beautiful may not only delight the eye but bring peace of mind making a garden a place for meditation and relaxation. Furthermore, design owed much to ancient symbolism; this can be seen in the formality and symbolism of the Chinese and Japanese garden tradition, and in the development of the romantic landscape. In Western Europe many gardens designs are based on the cosmic cross with the garden

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9 The Arabs had considerable technical knowledge about such matters as manures, soil preparation, seed sowing and grafting, and some of this knowledge filtered to European gardeners through the Moorish occupation of Spain, thereby promoting garden development in Europe, Huxley, Illustrated history of gardening, pp. 33-4.

10 Huxley, Illustrated history of gardening, p. 32.

divided into four parts. Such a design was also very practical. Square garden beds, seen in such varied settings as ancient Egyptian designs, Indian gardens through the centuries, medieval herb gardens or early Australian colonial gardens, have the practical advantage of ease of cultivation, generally enabling the person who did the planting or weeding to reach the centre of a bed from a pathway. Quite elaborate designs for garden beds could evolve with the use of plant edgings made of wood, stone, tiles or living plants. Such designs could be seen in the fifteenth century knot garden which were succeeded by the ornamental 'parterre' of the sixteenth and seventeenth century in Britain and continental Europe. In this way the practical necessities of providing separate sections for different types of useful plants led to purely decorative features found in the nineteenth-century gardens of Europe and Australia. Similarly, paths are needed to provide access from one part of a garden to another. Yet a path need not just connect two places but can meander to provide visual interest. Meandering walks were popular in eighteenth century European gardens and the Chinese were particularly skilled at making paths part of their overall garden design. In this part of the garden tradition the functional and the decorative are closely linked. Again, this is reflected in nineteenth-century Australian colonial gardens.

12 ibid. p. 26. This is seen in Persian carpets depicting a garden divided into four by canals or rivers and in the four-square Tudor garden.

13 Huxley, Illustrated history of gardening, pp. 61 & 75. A parterre is a patterned garden, its design usually worked in low-growing evergreens, its compartment filled with flowers, turf or coloured earths. Berrall, The Garden, p. 383.

14 Huxley, Illustrated history of gardening, p. 70.
The combination of the decorative with the utilitarian is also shown in the use of water. In countries with warm climates water used for irrigation of plants can also be used as a decorative feature and add to an atmosphere of coolness and tranquility. Fountains and pools were found in the gardens of ancient Rome, and in the Islamic and Byzantine styles of gardening. The Chinese tradition made good use of lakes, ponds, streams and waterfalls, both for decorative purposes and to provide an atmosphere conducive to meditation.¹⁵

By the sixteenth century there is recorded evidence of gardens where plants were grown not only for utilitarian and decorative purposes but also so that they could be studied. In pre-Colombian South America the Inca civilization had been based on successful horticulture rather than widespread agriculture. Utilitarian plants for medicine, contraception, dyes and poisons were grown as well as a wide variety of vegetables and fruits. The Spaniards who came to South America wrote of finding elaborate gardens provided for rulers and high officials.¹⁶ In the royal gardens of the Aztecs in the Valley of Mexico (Tenochtitlan) plants were collected from different regions within the empire and arranged according to a system for the purposes of study. Descriptions by the Spanish conquistadores refer to the horticultural skill, the vast gardens and the systematic collections of the Aztecs which facilitated the comparison of genera and the understanding of the properties of plants. There is, however, no real evidence that knowledge of the existence of these Aztec gardens contributed significantly to the development of the first

¹⁵ Huxley, Illustrated history of gardening, p. 82.
¹⁶ ibid., p. 36.
botanic gardens of the modern world in Europe.\textsuperscript{17} Rather, it seems that both in Western Europe and in Mexico interest in the study of plants developed in a fairly sophisticated civilization. In both there was access to new plant material from trading partners or empire, an awareness of the potential value of such plant material and at least some concept of the science of botany.

To maintain a garden for purposes of study adds an extra dimension to the long established tradition of gardening for utility and pleasure. The study of plants in a botanic garden involves both the acquisition and dissemination of botanical knowledge. The elements of this are seen in the first recorded botanic gardens of the modern world, founded in the sixteenth century. The earliest European botanic gardens were designed to have examples of all the plants known in the world. Writers of the period alluded to recreating the Garden of Eden so that man might understand God's creation.\textsuperscript{18} Understanding God's creation meant understanding God better, since God revealed himself in his creation.\textsuperscript{19} Such a belief was expressed by seventeenth-century author, John Evelyn, who had travelled in continental Europe visiting botanic gardens and the gardens of royalty and the nobility. He wrote of gardens being made 'as near as


\textsuperscript{19} \textit{ibid.}, p. 55. 'Since God had revealed a part of himself in each thing that he had created, a complete collection of all the things created by God must reveal God completely'. 
we can contrive them' to resemble the garden of Eden.\textsuperscript{20} G.B. Andreini, in an illustration to \textit{L'Adamo sacra rapresentione} of 1617, shows the Garden of Eden as a typical enclosed garden of the period, with many small trimmed beds and a variety of wild animals.\textsuperscript{21}

Behind the philosophy of such gardens was the concept that by collecting both plants and animals from all parts of the world and gathering them into one place, man could acquire knowledge and attain power over nature.\textsuperscript{22} Scholars discussed the issue of whether Man could improve his condition by his own efforts, thus helping to regain what he had lost in the Fall. Evelyn wrote that '...men began, with the indulgence of heaven, to recover that, by Art and Industrie, which was before, produced to them spontaneously'.\textsuperscript{23}

The development of the 'physic garden', the collection of 'simples' (plants employed for medicinal purposes), and their naming, enabled the special nutritive and medicinal qualities of plants to be communicated. It was hoped that this would lead to a cure for all ills. The establishment of the Chelsea Physic Garden in 1673 in Britain by the Apothecaries Company in London illustrates this

\textsuperscript{20} In \textit{Kandelarium} (1664), quoted by Prest, \textit{Garden of Eden}, p. 47, Evelyn refers to a proposed garden in the context of those at Padua, Pisa, Leyden, Montpellier, Paris and Oxford.

\textsuperscript{21} Prest, \textit{Garden of Eden}, p. 54.

\textsuperscript{22} By bringing all the plants and animals into one place one could name them, and by naming them men could communicate the nutritive and medicinal properties of the plants to each other, and render the animals both docile and serviceable. Prest, \textit{Garden of Eden}, p. 54.

\textsuperscript{23} Prest notes that 'John Cassian and Isidore of Seville seem to have believed that men could still raise themselves by their own efforts, and Roger of Wendover believed in the gradual rehabilitation of the human race through the just deeds of Adam's descendents', Prest, \textit{Garden of Eden}, p. 54.
development.\textsuperscript{24} This tradition was well accepted by the mid-nineteenth century and Richard Schomburgk's brother, Robert, promoting a botanic garden at Georgetown, British Guiana in 1844, argued that a major reason for having a botanic garden there was that it would aid medical science.\textsuperscript{25}

In time medicinal herb gardens, often associated with places of learning, were replaced by gardens in which plants were grown for their intrinsic interest rather than their medicinal value. The early botanic gardens of the modern world were often attached to the Faculty of Medicine of a university.\textsuperscript{26} 'Botanical' or 'botanic' gardens typically had plants arranged in some kind of system for study.\textsuperscript{27} Plants could be arranged in sections of the garden according to habit or region of origin. Eventually a system of labelling based on botanical characteristics was devised to enhance study. Classification and labelling of plants were two features that distinguished a botanic garden from other gardens. The idea of a scientific collection of plants rather than a mere physic garden is first documented in the 'Orti Botanici' of Pisa and Padua developed between 1545 and 1550. Those of Florence, Ferrara and Sassari were established some five to ten years later, Bologna was established by 1567, Leyden by 1587, Leipzig by 1580 and Montpellier and

\textsuperscript{24} ibid., p. 57.

\textsuperscript{25} J. Rodway, 'The Schomburgks in Guiana', \textit{Tiemhri}, New Series, No. 8, III, June 1889, p. 24. The brothers had just completed a three year expedition to the interior of British Guiana.


\textsuperscript{27} Hyams & MacQuilty, \textit{Great botanical gardens}, p. 23.
Heidelberg by 1593. All of these were University centred.\textsuperscript{28} The Leyden garden was created by Charles de L'Ecluse, known as Carolus Clusius, 'the father of scientific botany', and its name is also linked with the great Linnaeus.\textsuperscript{29} In Paris the garden first known as the Jardin royal des plantes medicinales, now known as the Jardin des Plantes, dates from 1635. Until about 1718 it functioned primarily as a physic garden before becoming a scientific centre involved in taxonomic and experimental botany. In Britain, a Physic Garden started in 1690 led to the Royal Botanic Garden of Edinburgh, functioning in its early years on a level comparable to that of the Jardin royal in Paris. The Chelsea Physic Garden dates back to 1673 while the older Hortus Botanicus of Oxford University can be said to have been founded in 1621. The Royal Botanic Gardens, Kew with garden development dating back to the seventeenth century, are considered to have functioned as a true botanic garden from 1759 when William Aiton became Superintendent.\textsuperscript{30}

In the seventeenth century botany had started to become a scientific study. Efforts were being made to classify plants on a systematic basis rather than describing them and referring to their recommended use in medicine in the way that occurred in the late medieval and late Renaissance herbals and \textit{Materia Medica}.\textsuperscript{31} Global exploration saw

\textsuperscript{28} \textit{ibid.}, pp. 23 and 35.

\textsuperscript{29} Hyams & MacQuitty, \textit{Great botanical gardens}, p. 37-8. Linnaeus was befriended by a later Curator, Gronovius, through whom he came to know Hermann Boerhaave, a famous naturalist and former Professor of Botany and Medicine at Leyden.

\textsuperscript{30} \textit{ibid.}, 82-3, 102 and 104. Garden development of the Royal Botanic Gardens, Kew, dates back to the seventeenth-century Kew House garden planted by Richard Bennet.

\textsuperscript{31} Brockway, \textit{Science and colonial expansion}, p. 73; \textit{Encyclopaedia Britannica Micropaedia}, vol. VI, p. 244 & \textit{Macropaedia}, vol. 4, p. 685.
the number of known plants increasing and great confusion arose from the lack of a standardised system of nomenclature. The solution found was a binomial system with each species of plant being given a name consisting of two parts; the first was a generic name (an example would be *Eucalyptus*) and this was followed by a one-word specific epithet (such as *citriodora*) - thus we have *Eucalyptus citriodora*, the lemon scented gum. The Swedish botanist, Carl Linné (known best by the latinized name of Carolus Linnaeus), who is usually regarded as the founder of modern taxonomy, was the first person to use binomial nomenclature consistently. His *Species Plantarum* was published in 1753.\(^{32}\)

Collections of plants in European botanic gardens were greatly enhanced in the seventeenth century by introduction of plants from other continents. The European discovery of America led to the introduction of completely new species. People became aware of the possibility of having flowers blooming all year round and new foodstuffs were introduced.\(^{33}\) The American discoveries helped revive the search for new plants in Asia and elsewhere; thousands of specimens, both as plants and seed, were brought back to Europe for study and culture.\(^{34}\) Plant gatherers greatly extended the living

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\(^{33}\) Prest, *Garden of Eden*, p. 68.

\(^{34}\) For example in the seventeenth century, plants from South Africa were being grown in Leyden where Linnaeus worked. Hyams and MacQuitty, *op cit.*, p. 36; M. Karsten, *The old Company's garden at the Cape and its superintendents, involving an historical account of early Cape botany*, Maskew Miller Ltd, Capetown, 1951, xiii.
collections in both botanic gardens and private gardens. The much enlarged range of plant materials produced tremendous optimism in seventeenth-century gardeners. There was great interest in horticulture as an activity and in techniques such as the grafting of trees, together with enthusiasm for the idea that gardening was a spiritually good and healthy activity.\(^{35}\)

Along with this interest in horticulture, contrasts were being drawn with the uncultivated 'wilderness' outside cultivated areas. In the eighteenth century dense plantings outside a garden might be contrasted with the parterres within a pleasure garden.\(^{36}\) Such a tradition had considerable relevance when European style gardens were introduced in colonial Australia. Those who contrasted the cultivated garden with the 'wilderness' of natural bushland were echoing eighteenth-century ideas.

As new plants continued to be introduced from abroad during the eighteenth century, interest grew in the provision of conservatories and greenhouses where 'exotic' plants from tropical parts of the world could be grown, with the aid of areas of glass and the provision of heat from stoves.\(^{37}\) Plants were grown under cover in a kind of greenhouse in the Padua Botanic Garden in the sixteenth century and simple orangeries were being used by that time.\(^{38}\) By the mid-seventeenth century, John Evelyn, who appears to have been the first

\(^{35}\) Prest, *Garden of Eden*, p. 70.

\(^{36}\) Prest, *Garden of Eden*, p. 98.


to use the words 'greenhouse' and 'conservatory', was giving instructions as to how they could be built. The university gardens, such as those of Padua, Florence, Leyden and Leipzig, were pioneers in the use of the hot-house. Later, the orangeries of the French and the great hot-house of the Duke of Devonshire at Chatsworth were followed by the magnificent Temperate House and Palm House at Kew. These became models for the great botanic gardens in the world. Such developments were made possible by new technologies in the use of glass and iron, and improvements in heating systems - just two of many technical advances in the nineteenth century which contributed to horticulture.

By the nineteenth century there was a considerable increase in the number of botanic gardens that had developed and in the scope of the work being done. European capitals, in particular those of the colonial powers, typically had a botanic garden of some standing. In Britain there were three state-funded botanic gardens: the Royal Botanic Gardens at Kew near London, the Royal Botanic Garden, Edinburgh and Dublin's Royal Botanic Garden, Glasnevin, now the National Botanic Garden of the Republic of Ireland. Outside Europe the European powers established Botanic Gardens along the sea-routes of their Orient and New World possessions. In 1694 the Dutch had started a garden in Capetown that was to evolve into a botanic garden. The French founded the Pamplemousse Gardens on Mauritius in 1735; this became a British possession in 1810. The British had established botanic gardens at St Vincent and St Thomas in the West


Indies in 1764. In the nineteenth century they maintained six botanic gardens in the West Indies and one at Singapore in 1859, all directed and staffed by Europeans. The Botanic Gardens that developed in Calcutta an Ceylon (Peradeniya, established 1810) became like that of the Dutch at Java (Buitenzorg, established 1817) - research centres rather than just collecting stations for tropical plants. Also of importance was the Real Horto, now the Jardim Botanico, of the Portuguese at Rio de Janeiro. By 1812 this was receiving important consignments of Asiatic plants and became the principal channel through which east Asiatic plants of commercial and medicinal value were introduced into South America.

In the British Empire, colonial expansion had produced a whole network of botanic gardens with the Royal Botanic Gardens, Kew as the coordinating organization. Typically directors and superintendents were personally known to the most influential botanists in Britain and very often recommended by them. For example, this was the situation when Richard Cunningham was appointed as Colonial Botanist and Superintendent of the Sydney Botanic Gardens in 1832. Such influence was one way of ensuring that the research work carried out was of the same high standards as that expected by senior botanists in Britain.

By the middle of the nineteenth century when Adelaide Botanic Garden was established, it was expected that a botanic garden of

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41 Brockway, *Science and colonial expansion*, p. 73.
some standing would carry out comparative study of plants, both of live plants growing in the garden and dried material collected in what is known as a herbarium, thus furthering the development of taxonomic and experimental botany. Experimental botany and horticulture had forged ahead during the period 1780-1810, followed in the latter half of the nineteenth century by important developments in the study of plant physiology. The work of Darwin, Wallace, Huxley and Hooker led to further investigation of the whole issue of plant distribution and plant geography from 1850-1875. This was followed by the work of the German school of Grisebach, Drude, Engler and others such as Schimper in the latter part of the nineteenth century, providing new theoretical understanding of plant distribution.

44 Hyams & MacQuitty, Great botanical gardens, p. 12.

45 Taxonomy is concerned with the system of classification and nomenclature, whereas experimental botany is concerned with establishing the anatomy, cytology and metabolism of plants.

46 Hyams & MacQuitty, Great botanical gardens, p. 47.

47 Alfred Russel Wallace was a naturalist living in an isolated area in the Malay Archipelago whose work on the geographical distribution of species paralleled the development of Darwin's ideas. See Mea Allen, Darwin and his flowers: the key to natural selection, Faber and Faber, London, 1977, pp. 155 & 163.

The development of botanic gardens and other scientific institutions in Australia

Ann Moyal, describing the nineteenth century as one of the great ages of scientific advance, comments that it was a period when massive accumulation of data combined with the testing of hypotheses led to very considerable changes in the biological and geological sciences. Australian material played an important part in this accumulation of data. Naturalists from Britain and continental Europe used material acquired both through their own travels and observations and through those of naturalists living in Australia. Australia's scientific tradition was established under British guidance with Sir Joseph Banks playing a very powerful role. His remarkable herbarium and library attracted both British and foreign naturalists. Botanical and zoological specimens were sent in large numbers to both British herbaria and museums and to institutions in countries such as France, Germany, Austria, and the United States. Moyal sees Australia as:

the centrepiece of a vast collecting empire whose boundaries stretched from South America to the Pacific, India and Africa, and whose hub was the Kew Gardens and Bank's home in Soho Square... In Australia itself, the thrust that Banks imparted to the study of botany and zoology set the stage for the great natural history reconnaissance, that, for the length of the century [the nineteenth] characterised and dominated the development of Australian science.

In 1840 and 1841 Joseph Dalton Hooker visited Tasmania while serving on H.M.S. Erebus. Son of Sir William Jackson Hooker, Director of the Royal Botanic Gardens, Kew from 1841-1865, Joseph was himself to become Director in the period 1865-1885. The

49 Moyal, Bright and savage land, p. 8.
50 ibid., pp. 23 and 28.
51 Hepper (ed.), Kew, Gardens for science and pleasure, p. 16.
relationship which the Hookers established with colonial botanists contributed to a strong tradition of cooperation.\(^{52}\) We will see later that this was reflected in relations between the Hookers and the first two Botanic Garden directors in Adelaide, George Francis and Richard Schomburgk.

Australian collectors of natural history specimens included a very wide range of people - from governors, naval officers, surveyors, doctors and clergymen to trained botanists and geologists and ordinary settlers. Women collectors also made a valuable contribution. As population and wealth grew in Australia in the period after 1860 there was increasing government support for geological and mineralogical surveys and for institutions involved in research and education. Such institutions included universities\(^ {53}\), natural history museums\(^ {54}\) and botanic gardens. At the same time, interest in scientific matters was fostered by the promotion of libraries, Mechanics' Institutes, learned societies, exhibitions, and publications.\(^ {55}\) Such developments enabled Australian settlers to increase their understanding of the natural environment. At the same time they were learning to utilize the resources of their country. Although in the nineteenth century the universal scientist was gradually giving way to the specialist scientist, a much more general approach was evident than exists today. Specialist scientific

\(^{52}\) Moyal, *Bright and savage land*, pp. 51-52.

\(^{53}\) University of Sydney 1852, University of Melbourne 1859 and University of Adelaide 1875.

\(^{54}\) Moyal, *Bright and savage land*, p. 100.

training was in its infancy and a colonial scientist might be dependent on self-tuition and contact with peers to develop specialist knowledge.

Membership of learned societies played an important role in this process of self-tuition. People interested in scientific matters formed themselves into small groups which developed into such organizations as the Royal Society of Tasmania\textsuperscript{56}, the Philosophical Society of N.S.W. (1856)\textsuperscript{57} (later to become the Royal Society of N.S.W.), the Philosophical Society of Victoria and the Victorian Institute for the Advancement of Science (1854), the Queensland Philosophical Society (established 1859, later to amalgamate with the Royal Society of Queensland) and in South Australia, the Adelaide Philosophical Society (established in 1853 and later to become the Royal Society of S.A.).\textsuperscript{58} In addition, there were agricultural and horticultural societies which followed the first Australian Agricultural Society, formed at Parramatta in 1822, and first Horticultural Society formed about 1826.\textsuperscript{59} There were active horticultural societies in Melbourne, Hobart and Sydney by the 1840s. Societies such as the Agricultural and Horticultural Society in S.A.,

\begin{itemize}
  \item \textsuperscript{56} The Van Diemens Land Scientific Society; the Tasmanian Society of Natural History; the Royal Society for Van Diemen's Land for Horticulture, Botany and the Advancement of Science, see Moyal, \textit{Bright and savage land}, pp. 88-9.
  \item \textsuperscript{57} \textit{Ibid.}, p. 90. This had been preceeded by the Philosophical Society of Australasia (1820-1822) and the Australian Philosophical Society in 1850.
  \item \textsuperscript{58} \textit{Ibid.}, p. 103.
  \item \textsuperscript{59} Beatrice Bligh, \textit{Cherish the earth, the story of gardening in Australia}, David Ell Press in association with the National Trust of Australia, (N.S.W.), Sydney, 1980, p. 38.
\end{itemize}
while having a very practical orientation, published papers on broader scientific issues.

Through libraries and organizations such as these, those interested in botany and horticulture had access to articles and discussion notes in a wide variety of journals. As well as the journals of scientific societies, there were journals, such as the British Gardener's Chronicle, publishing material which by twentieth century standards is extraordinarily broad in its range. It included such diverse topics as new horticultural techniques, the development of new hybrids, discussion about the theories of Darwin and the need for a national training scheme for foresters. There were regular reports from colonial botanic gardens alongside news of well known professional gardeners. In their involvement with overseas colleagues Australian scientists in the nineteenth century tended to be linked to British learned societies. However, also working in Australia were scientists from France and Germany whose links were with the learned institutions of continental Europe and who thus provided a valuable link with scientific endeavour in Europe. In turn, local scientific activity was stimulated as ideas filtered through to a wider group of people.

The scientific role of a colonial botanic garden involved the exchange of information and plant material, such as seeds, with other gardens as well as the study of plant growth, of both native and introduced plants. Nineteenth-century views on the scientific role of a botanic

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60 Moyal, Bright and savage land, p. 90.

garden are well exemplified by Ferdinand von Mueller (1825-96) who was Director of Melbourne Botanic Gardens when he wrote in 1871:

The objects of a botanic garden must necessarily be multifarious, nor need they be, in all instances, precisely the same; they may be modified by particular circumstances and local requirements, yet, the objects must be mainly scientific and predominantly instructive. ...it is primarily the aim of such an institution to bring together with its available means the greatest possible number of select plants from all the different parts of the globe; and this is done to utilise them for easy inspection ... for systematic, geographical, medical, technical or economic information, and to render them accessible for original observation and careful records. By this means not only the knowledge of plants in all its branches is to be advanced through local independent researches, but also phytologic instruction...; while simultaneously, by the introduction of novel utilitarian species, local industries are to be extended, or new resources to be originated; and, further, it is an aim to excite thereby a due interest in the general study and ample utilisation of any living forms of vegetation, or of important substances derived therefrom. All other objects are secondary or the institution ceases to become a real garden of science'.

So for von Mueller, the objects were 'mainly scientific and primarily instructive' and he brought together the aims of both pure and applied science. In his view collection and display of plants from all over the world enabled observations to be made which were part of the teaching and research function of the garden. For von Mueller, the task was also to 'excite' interest in the way that vegetable substances could be used. This aspect of the work of a botanic garden, that of inspiration, is one which has not always received attention. However, if people are inspired to take an active stance in the community, the educational role of a botanic garden acquires a much greater importance.

Reporting on colonial botanic gardens Annual Reports, a writer in the Gardener's Chronicle in 1882 says that colonial botanic gardens

62 Ferdinand von Mueller, 'The objects of a botanic garden in relation to industries', a lecture delivered at the Industrial and Technological Museum, Melbourne on 23 November 1871. (Phytology is the study of plants).

should be great educational institutions, not just concerned with pure science, for which there is 'limited demand and means' but also to the applied use of botany of interest to merchant, agriculturist and horticulturist. This is spelt out as follows:

Science looks to these establishments for aid in the discovery, determination and distribution of the native plants, for investigation as to the conditions, climatal or otherwise, under which their cultivation can be carried on - in fact, for the elucidation of all matters connected with the flora of the country, its geographical distribution, its natural history, and its use for horticultural or economic purposes. Services such as these are available for the whole civilised world, and to render them, is, in a degree, to repay the advantages and benefits conferred by our common civilisation.64

The colonial botanic garden is thus to 'repay' the European countries for the 'advantages and benefits' received by the colony.

A vast amount of plant material was received by the larger nurseries and wealthy private collectors in the nineteenth century. Through these sources new kinds of plants were passed on to other gardeners by sale, exchange, gift or through employees' 'helping themselves'.65 Acquisition and dispatch records demonstrate that the larger and more important nurseries were involved in exchanges with colonial botanic gardens and sale of plant material to them, to the mutual advantage of both groups. The work of botanic gardens overlapped with that of nurseries in providing a specifically horticultural service in the trial, selection, hybridization and distribution into horticultural commerce of new or improved kinds of both useful and ornamental garden plants.66

64 Gardner's Chronicle, 15 July 1882, p. 80.
66 Hyams & MacQuitty, Great botanical gardens, p. 13; Brockway, Science and colonial expansion, p. 7.
The *Gardener's Chronicle* continued:

Of more restricted but still vast importance are the experiments which should always be carried out in such gardens - experiments having as their object the determination of what plants can profitably be introduced into cultivation with a view to increase, not only the local resources and wealth of the country, but the advantage of the world at large.⁶⁷

The role of economic botany was a vital one for the development of a new European colony. Lucile Brockway, who has written on the role of botanic gardens in colonial expansion, comments that the Royal Botanic Gardens, Kew and the network of colonial Botanic Gardens, together with other botanical and scientific institutions, played 'a critical role in generating and disseminating useful scientific knowledge which facilitated transfers of energy, manpower and capital on a world-wide basis and on an unprecedented scale'.⁶⁸ Kew and the colonial Botanic Gardens had an 'extraordinary impact in parts of the world which were subject of western imperial hegemony' by the encouragement and facilitation of plant transfers.⁶⁹ For example, plant material for crops such as cinchona, rubber and sisal were sent from South America, their natural habitat, to Asian and African colonies. Scientists at Kew and at the British government botanical stations in geographically widespread points of the Empire, worked on improving species and on improving methods of cultivation and harvest.

Such botanical information was of great commercial importance. This is seen in the case of the tropical plantation crops that created

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⁶⁹ *ibid.*, p. 7.
so much wealth for the Empire.\textsuperscript{70} In the case of Australia, crops such as cotton, tobacco, sugar-cane, sunflower, nuts and pasture grasses were among just a few of the many potential crops that could be tested for growth under local conditions. Such plants not only provided food, but fibres, dyes, waxes and oils, latexes and drugs.

Expectations in Britain for the establishment and running of a colonial botanic garden are illustrated by some guidelines which were laid out in an 1883 memorandum from the Royal Botanic Gardens, Kew, to James Hector at Wellington, N.Z.\textsuperscript{71} The memorandum states that the Superintendent should be 'occupied in the duties of the garden in the interests of the colony and the mother country.' These duties included not only care of the plants but also 'correspondence with other gardens in the colony and elsewhere, and activity in procuring from travellers, visitors, ships' officers and others, plants that it might be desirable to introduce, whether for use or ornament, and botanical information generally'.\textsuperscript{72} Such correspondence, hand-written and usually without the aid of secretarial help, enabled the directors of colonial botanic gardens to be involved in a remarkable exchange system. The importance of correspondence with overseas botanical institutions is referred to in a memorandum of Allan Cunningham of 1829 regarding the function

\textsuperscript{70} Brockway, \textit{Science and colonial expansion},

\textsuperscript{71} The guidelines were 'Suggestions for the information of Colonial Governments about to appoint Superintendents of Botanic Gardens, and for the guidance of Superintendents', held in the National Museum, Wellington and reproduced in Winsome Shepherd and Walter Cook, \textit{The Botanic Garden Wellington. A New Zealand history 1840-1987}, Millwood Press, Wellington, New Zealand, 1988, p. 67. It is not known how widely this memorandum was circulated in the British Empire.

\textsuperscript{72} \textit{ibid.}, p. 67.
and work of the Superintendent of the Sydney Botanic Garden. The role of the Royal Botanic Gardens, Kew, in this exchange of material and information was of inestimable importance. Kew's role has been seen as pivotal for botanic gardens all over the Empire, the exchange system embracing the rest of Europe and every continent. In many cases colonial botanic garden directors were protégés of directors from Kew, Edinburgh or Dublin. For those settling in South Australia, Kew provided the predominant model even though many colonists would have been familiar with botanic gardens in other places.

Hooker's Guidelines make it clear that the provision of a library was part of the role of a colonial botanic garden. Books and journals should complement the collection of plants and this collection of plants was to include dried material as well as living plants. The Guidelines make it clear that a Superintendent or Director should endeavour to provide a herbarium. In Sydney, where a botanic garden can be said to have existed from 1816, Allan Cunningham referred in an 1829 memorandum to the importance of a herbarium being part of a Botanic Garden service. In this case he was referring to a herbarium of the plants 'cultivated in the Garden'. In Melbourne the Botanic Garden, founded in 1846, is known to have had herbarium material as early as 1849 when Ferdinand von Mueller began sending


74 Charles Moore, director of the Sydney Botanic Gardens from 1848 to 1896, was the brother of Glasnevin director, David Moore, and a protégé of Dr. John Lindley. Moore was appointed with the support of Lindley (first Professor of Botany at the University of London (University College) and Secretary of the Horticultural Society) although Sir William Hooker favoured John Bidwill and Bidwill was at first told he had the position. Gilbert, *Royal Botanic Gardens, Sydney*, pp. 71-73.

new specimens for its collection from Adelaide. The development of the Melbourne collection under von Mueller's direction made it the most important Australian herbarium in colonial times and the place to which collectors would send new material for identification. Hooker's Guidelines spell out the need for the collection of live plants to include shrubs and trees of the colony and for this collection to be 'conspicuously ticketted'. Cunningham's memorandum refers to the need to group plants according to some botanic division, such as that known to botanists of the day as 'the natural arrangement', with separate areas for experimental cultivation and nursery quarters.

Trials of economic plants were to be a vital part of the role of the Australian colonial botanic gardens in the period under study as different species were scrutinised for their potential use as food, fibre, timber, dye-stuffs and medicine. The importance of a colonial botanic garden reflected the way of life in the nineteenth century, when the petrochemical industry was in its infancy, where primary industry was paramount, and where plant material was vital in the economy. At the same time that these developments were occurring in economic botany, views were being expressed that plants ought to be exploited for the benefit of the human race. In Australia, botanist Rev. William Woolls claimed in 1879 that although people could not necessarily discover the uses of every plant 'in the present state of science ... there is every reason to believe that nature had made

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nothing in vain'.77 Ferdinand von Mueller in a speech in 1871 stated that:

All the plants of the globe build up together a great harmonious system in nature; they are all referable to distinct, specific forms, all created by design of an Almighty power for special purposes; they are moreover, all endowed with well-defined qualities, all interesting and beautiful in themselves, and eligible for our varied wants.78

Charles Smith, a landscape gardener writing 'Practical Notes' in *Parks and Pleasure Grounds* in 1852 saw botanic gardens as enabling inspection of:

the individual members which the wise and beneficent Creator has endowed with constitutional peculiarities suited to every habitable region of the earth and 'fitted to house, clothe and feed the inhabitants of the earth.'79

In this view, plants could and should be used by people to provide for their material needs in life. To aid this process was thus not only an intrinsically worthy purpose but an activity destined, in the fullness of time, to succeed.

It was acknowledged by nineteenth century writers that the botanic garden had a recreational role as well as a scientific and utilitarian one. Von Mueller wrote that

the limits between real botanic gardens and ordinary public horticultural places are, as a rule, not clearly drawn, the former being more essentially establishments for science, the others more particularly places of recreation and


amusement, although the former may secondarily be pleasure grounds also, and the latter afford likewise secondarily some means of study.\textsuperscript{80}

Francis Abbott Jnr., appointed Superintendent of the Botanical Gardens in Hobart in 1859, is quoted as saying:

Establishments of this kind I hold should be educational, scientific and practical in its tendencies, its mere maintenance as a place of public resort or promenade should be of secondary consideration...\textsuperscript{81}

In providing 'recreation and amusement', the colonial botanic garden was seen to provide for the 'welfare' of residents and aid in that process of self-improvement so beloved of writers of the Victorian era. The \textit{Gardener's Chronicle} tells its readers:

In the third place, these gardens should contribute to the welfare and gratification of the residents. [The gardens] should furnish evidences of taste and culture, such as cannot fail to be beneficial, and which go far in the eyes of the public to justify the expenditure. Public appreciation is likely to be aroused by the sight of a well-organised, well-maintained establishment, which while contributing to the recreation of the people, and cultivating their sense of beauty, has, at the same time, a business-like aspect, which appeals more directly to their sense of what is fitting.\textsuperscript{82}

Thus in developing the site the director of a colonial botanic garden had to ensure that the garden appeared well maintained and appropriate to the life-style of the day; it was important that people should consider it run in a 'business-like' way and it should appeal to 'their sense of what is fitting'. If public taste was satisfied it was more likely that the public purse would provide funds for maintenance and development. Therefore it was crucial in the


\textsuperscript{82} \textit{Gardener's Chronicle}, 15 July 1882, p. 80.
administration of a botanic garden to achieve a balance between the work appreciated by scholars and those with a specialist interest on the one hand and those whose interest was more general on the other - to balance public involvement with scientific achievement.\footnote{83}

Von Mueller observed that the extent of the operation must depend on the natural facilities and monetary resources available and that there are special problems in a new country where institutions must be developed from which a later generation will finally benefit. Yet in planting operations designed for scientific demonstration, 'we can still find full scope for tasteful ornamentation and picturesque grandeur'.\footnote{84}

The community demanded that a nineteenth-century botanic garden director take considerable account of both the 'picturesque' and the 'scientific'. To fail to do so could cause dangerous dissatisfaction. Von Mueller was a scientist with an international reputation for his work as a taxonomist. However, prominent citizens brought about his dismissal from his position as Director of the Royal Melbourne Botanic Garden in 1873 on the grounds of alleged lack of attention to the provision of a pleasure ground for recreation; that is, lack of attention to ornamental horticulture.\footnote{85} He continued to be Government Botanist and 'head of the scientific branch' but was

\footnote{83}{Patrick, 'Gardenscape', p. 64.}

\footnote{84}{F. von Mueller,'The objects of a botanic garden in relation to industries'.}

\footnote{85}{J. Norton, in his Presidential address to the Linnean Society of N.S.W. in 1901 wrote, 'Like most systematic botanists, Mueller seems to have had little or no love of horticulture', \textit{Proceedings of the Linnean Society of New South Wales}, vol. 25, no. 190, p. 780.}
bitterly resentful about the decision. The Director who ignored the public sense of 'what is fitting' did so at his peril.

Von Mueller had referred to the botanic garden as a 'great educational institution'. We can estimate from the resources invested in that whole group of institutions in the broad category of museum (botanic gardens, zoological gardens, art galleries and natural history museums) just how much importance was attached to them. Gardening itself was seen as a healthy amusement - on the one hand it enabled one to study God's creation; on the other it kept people away from less healthy amusements. An article in Adelaide's *The Garden and the Field* 1875 refers to the practice of gardening as 'having an elevating tendency':

The man who can take delight in tending and watching the progress of the plants under his care has a simple and innocent form of recreation not enjoyed by that one whose only past-time consists of loitering about the public-house bar, wasting precious time, frittering away the money which ought to help in making his home comfortable, and putting himself in training for the Hospital or Desitute Asylum - if not for the Gaol.

The view of a botanic gardens as having a worthy educational and recreational role is reflected in the comment of Robert Schomburgk that a botanic garden should provide 'a healthy and innocent amusement for the poor' and that it would 'désennuyer the rich by giving them new amusement'. In England, Germany and the United

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87 *The Garden and the Field*, 5 October 1875.

States in the mid-nineteenth century arguments were also being put forward that public parks were needed as a recreational resource in an increasingly urban society. A botanic garden could thus be seen as socially valuable, providing for the health, edification and moral uplift of the population. Education in relation to natural history had special importance in the nineteenth century, an era when the study of natural history was considered a 'rational amusement' which combined pleasure with an element of useful instruction and moral uplift.

By the middle of the nineteenth century when Adelaide Botanic Garden was established there were botanic gardens in Britain, such as those of Belfast and Manchester, which were privately funded through subscribers and the contributions of casual visitors, but such a venture was fraught with difficulties as far as long term financial viability was concerned. Although there might be enthusiasm for establishing a botanic garden, development and maintenance demanded ongoing finance.

A government-funded botanic garden might be expected to raise a considerable part of its operational budget from the sale of plants,


as was the case in Cape Town in the nineteenth century. This, however, detracted from its perceived role as an institution for teaching and research. The *Gardener's Chronicle* berated the Cape Town authorities for wasting the talents of the Director of its Botanic Garden in such parsimony\(^{93}\), just as it chastised the New Zealand authorities for their apathy and lack of adequate funding for botanic gardens.\(^{94}\) There was also the argument that botanic gardens should not compete with the trade of privately run nurseries if these existed in a colony.

In the words of Sir George Taylor, a former director of the Royal Botanic Gardens at Kew, 'Botanical Gardens should, in most civilised countries, aim to be sources of aesthetic and intellectual delight, and they have become a proud part of national heritage...' In the mid nineteenth century it was argued that Adelaide should have a botanic garden if it aimed to be a city of some standing in the British Empire. It was a matter of civic pride.

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\(^{93}\) 'But what strikes us with nothing less than disgust is the fact that the authorities have so little appreciation of what duties a botanic garden should perform, and what the work of its Director should be, that we find the State neglecting its proper business and undertaking that of a nurseryman.' It was '...the more to be deplored because from the peculiar opportunities of furthering botany and horticulture, scientific and economic, which a properly organised and equipped establishment as the Cape has'. *Gardener's Chronicle*, 15 July 1882, p. 80.

\(^{94}\) *Gardener's Chronicle*, 16 August 1884, p. 204.
Chapter 2

A NEW SETTLEMENT AND A NEW BOTANIC GARDEN

To create a garden is to search for a better world ... This hope for the future is at the heart of all gardening. Anyone who toils away at the soil must think a few weeks ahead or envision next year's garden, for most gardeners are convinced that improvement is on the way. Thus gardening is an exercise in optimism. Sometimes it is the triumph of hope over experience.¹

New settlements - New plants

When the First Fleet arrived in Sydney in 1788, Australia was the only continent with no tradition of agriculture. The continent to which they came had been colonized by the ancestors of Australian Aboriginal people at least 40,000 years ago. By about 25,000 years ago Aboriginal people had occupied every major ecological zone, having mastered the key problems for subsistence. Utilizing plants and animals they organized their activities on a seasonal basis. To do so would have required a considerable knowledge of plants and their properties. In addition, Aboriginal people modified their environment through systematic firing of the country (both to clear the land for travel and to facilitate hunting and gathering activities). While Aboriginal people appear to have had considerable knowledge of the nutritional and pharmaceutical properties of plants European settlers

in Australia appear to have made only limited use of such knowledge.² Their unwillingness to see the Aboriginal culture as one which might contribute to the European culture being established in Australia combined with a failure to accept the need to adapt themselves to the land. The colonists sought to impose their own outlook and attitudes on an environment unsuitable for many of their practices.³

The Europeans brought a new economic flora.⁴ Agriculture and horticulture were established using plants and seeds brought from Europe and such places as the Cape of Good Hope and Rio de Janeiro. The earliest settlers had seed for grain crops, broadly known as corn and including wheat varieties, from Britain. They had brought from Rio de Janeiro plants and seeds of oranges, lemons, guavas, banana, tamarind, prickly pear, eugenia⁵, ipecacuanha, jalap,⁶ indigo, coffee, cocoa and cotton; and from the Cape of Good Hope, quince, apple, pear, strawberry, a fig-tree, sugar-cane, vines of various sorts, Spanish reed, bamboos, together with oaks and myrtles and 'all sorts of grain'.⁷ Some plants were decorative rather than utilitarian - it is known that Surgeon Bowes Smith had geranium in flower in his cabin


⁵ Probably E. jambos.

⁶ Probably a Mexican species of Ipomoea. Jalap was popular for medicinal purposes.

when he came out with the First Fleet. By September, 1788, Governor Phillip could write that he had excellent cauliflower and melons in his garden and that orange, fig and vines were growing well. There were early problems of survival while farms and gardens were established, with such difficulties as poor soil, reluctant convict workers and lack of supplies. However by 1798, when Sir Joseph Banks prepared a list of plants to be sent on the Porpoise, the time had come for ornamental and decorative features in colonial gardens. His recommendation included the following: lavender, laurel and sweet bay; cactus and willows for hedges, as well as a variety of flower seeds for cottage flowers - cockscomb, convolvulus, larkspur, stock, chrysanthemum, aster, calendula, candytuft, heartsease, nasturtium, sunflower and antirrhinum, and such biennials and perennials as Canterbury bell, hollyhock, polyanthus, primrose, sweet scabious and sweet William.

Although much material was brought by early settlers, nurserymen were also active. George Suttor advertised fruit trees and ornamental trees for sale in the Sydney Gazette as early as 20 May, 1804, offering also to plant orchards for clients. Up to about 1810 European trees and flowering shrubs were rare and prized specimens but by the middle decades of the nineteenth century the variety and availability of seeds and plants had increased considerably.

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9 Tanner & Begg, The great gardens of Australia, p. 10.
10 ibid., p. 11.
11 ibid, pp. 22, 24 & 30.
Early plants grown successfully in New South Wales included hibiscus, oleanders, yuccas and agapanthus which made a good contrast with the blue-grey and bronze of native eucalypts, melaleucas or callitris (native pines). Also successful were imported weeping willows, which grew large in Australia, Robinia (the Locust tree from North America), English Elm and Lombardy poplar. Melons and grapes grew well while apples, peaches and melons grew to a size seldom seen before by colonists. Herbs were grown by early Australian settlers for both culinary and medicinal purposes. Some introduced plants grew so well that they soon escaped into the surrounding paddocks: lantana, from South Africa, popular because it was drought resistant; Governor Phillip's prickly pear cactus; the cotton thistle (the Scottish emblem) and the Illyrian thistle. These were the first of a series of problems that arose from the introduction of plant material unsuitable, for environmental and ecological reasons, for Australian conditions.

An important development in the provision of plant material for Australian gardeners came in the 1840s with the Camden Park Nursery of William Macarthur (later Sir William). William Macarthur made an outstanding contribution to horticulture, possibly comparable to that made by his parents John and Elizabeth to the wool industry. Extensive catalogues were produced; Macarthur's ornamental and experimental gardens gained a considerable

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12 Many from came from St. Helena where ships called in for water.
13 Bligh, Cherish the earth, pp. 21-2.
15 Tanner & Begg, Great gardens of Australia, p. 11.
reputation for pioneering work with vines and camellias. William, who with and brother James imported a wide variety of plants from Japan and China, did not confine his attention to introduced plants and grew native plants for ornament.\textsuperscript{16} A great believer in the medicinal value of \textit{Eucalyptus globulus} (the Tasmanian blue gum), he distributed this species to many other parts of the world. His interest in natural history and horticulture led him to become a member of both the first Committee of Superintendence of the Australian Museum and the management committee of the Botanic Gardens, Sydney, in 1836, where he served alongside other outstanding gardeners and collectors such as Alexander Macleay, Sir John Jamison, Phillip Parker King and George Macleay (son of Alexander).\textsuperscript{17} He was also a leading member of the Acclimatization Society of New South Wales, the Agricultural Society of New South Wales and the New South Wales Vineyard Association. He is known to have been generous with both advice and plant material to other enthusiasts, including vigneron in the Hunter Valley, Victoria and South Australia.\textsuperscript{18}

The interest of Sir Joseph Banks in Australian native plants helped to make them better known in England where they were much prized by both botanists and nurserymen. It is thought that as many as 2000-3000 species were grown in Great Britain in the first half of the nineteenth century, the collecting craze lasting until about 1835.\textsuperscript{19}

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\textsuperscript{17} \textit{ibid.}, p. 39-40.
\textsuperscript{18} \textit{Australian dictionary of biography}, vol. 5, pp. 123-124.
\textsuperscript{19} Tony Cavanagh, 'New Holland exotics: Australian plants cultivated in England and Europe from 1771', \textit{Australian Garden History}, vol. 2, no. 3, Nov/Dec 1990,
\end{flushleft}
Such interest produced a great deal of enthusiasm for exchanges of plant material. A collection of plants acquired through the exchange process for acclimatization and propagation was established at the Governor's farm and garden near Farm Cove. As the Rose Hill and Hawkesbury lands were opened up for farming, Farm Cove no longer had a vital role in agricultural production. Under Governor Macquarie's leadership the land surrounding Farm Cove was improved and an area was then established as a Botanic Garden with Charles Frazer (or Fraser) appointed as Superintendent and Colonial Botanist in 1816. That same year Alan Cunningham was sent from Britain to New South Wales as King's Botanist. Australia's first botanic garden included the area which had been used for the very first agricultural production by European settlers. By 1828 half-yearly reports were being sent to the Colonial Office in London to give an indication of the plants which could be cultivated. Combined with communication between the leading botanists, nurserymen and plant collectors in New South Wales with their counterparts in the British Isles, this led to a considerable exchange of information on plant material. These links between botanists, nurserymen and plant collectors were of great importance and are crucial to an understanding of the role of colonial botanic gardens.


20 Margaret Steven, First impressions: the British discovery of Australia, British Museum (Natural History), London, 1988, p. 56.


In Britain the Royal Botanic Gardens, Kew, were for a time in some decline after the death of Sir Joseph Banks in 1820. Leadership in matters horticultural was to a large extent provided by those associated with London's Horticultural Society. This group included both amateur and professional gardeners, some of them members of such prestigious organizations as the Linnean Society and other scientific bodies.23

Introduction of new species along the eastern seaboard of Australia took a further step forward in 1828 when Frazer was directed to establish a public garden in Brisbane. This became a base for both the study of indigenous vegetation and the introduction of seeds and cuttings of economic plants. Walter Hill, Superintendent and later Director from 1855-1881, collected indigenous flora and had a great interest in exotic tropical and subtropical vegetation. By the 1870s the Brisbane Botanic Garden supplied settlers with sugar cane, tea and coffee plants, white mulberry and tobacco, Hill reporting that demand for cinchona, mangoes, cocoa, oil palm and plants yielding spices exceeded supply.24 Smaller Botanic Gardens were also established in northern Queensland: Rockhampton (where land was gazetted in 1869 and first curator, Edgar, appointed in 1873), in Townsville (established in 1870) and Cairns (dating back to 1881).25


In New South Wales infant horticultural and agricultural societies played a role in the exchange of information and ideas: an Agricultural Society at Parramatta in 1822, and a Horticultural Society in 1826 (later known as the Agricultural and Horticultural Society of New South Wales). The agricultural and horticultural societies encouraged their members to support all forms of gardening. In 1834 nurseryman and garden designer, Thomas Shepherd, agreed to give a series of lectures on horticulture and landscaping, but unfortunately died having given only the first one. His lectures were published posthumously and this provided one of the first books known to have been published in this continent on gardening relating to Australian conditions. It followed a small gardening guide published by George Howe in his New South Wales Pocket Almanack and Colonial Remembrance of 1806 which had brief notes, possibly written by George Suttor, on the cultivation of vegetables and fruit-trees.

In Tasmania a scientific approach to horticulture was encouraged by Daniel Bunce, both through his nursery at Denmark Hill, Launceston, and his publications. He produced The Manual of Practical Gardening Adapted to the Climate of Van Diemen's Land in twelve monthly parts during the period 1837-8, later published as a book A Manual of Horticulture in Melbourne (1850), and two books on indigenous

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26 Bligh, Cherish the earth, p. 38.
27 Bligh, Cherish the earth, p. 42; Tanner & Begg, Great gardens of Australia, p. 22.
28 Howe, Observations on gardening.
plants, *Hortus Tasmaniensis* and *Hortus Victoriensis*. His *Manual of Practical Gardening* includes a section on native plants. In 1839 Bunce moved to the new settlement of Port Phillip where he practised as a nurseryman and landscape gardener. He gained further knowledge of native vegetation while travelling with the explorer Leichhardt and later became director of the Geelong Botanic Garden. Bunce's career and his varied interests and skills as nurseryman, botanist, landscape designer and writer, not to mention his managerial and research interests, provide a good example of the contribution which a capable and energetic person could make to colonial horticulture.

Sydney and Hobart were, by 1839, well-established cities with attractive parks and gardens. Although Melbourne and Adelaide were at this time still in their infancy, plans were made early on to provide space for public parks and gardens in both places. The introduction of plant material and the spread of information about its cultivation were to follow a smoother path in both these cities than

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29 *Australian dictionary of biography*, vol. 1, p. 176.


31 Nevertheless he was recognized to have limitations as indicated by the considerable criticism said to have been leveled at *Hortus Tasmaniensis* and *Hortus Victoriensis* by contemporary writers for inaccuracies and plagiarism. Bunce applied unsuccessfully for the Directorship of the Adelaide Botanic Garden in 1865 at the time when Richard Schomburgk was appointed.

32 He managed a Bendigo mine and wrote a book on the Aboriginal language.

had been the case in Sydney some fifty years earlier. Early settlers in Melbourne and Adelaide had greater expertise and more favourable land available to them for cultivation.\textsuperscript{34}

The development of the human race has been that of an essentially grassland dependent civilization, the staple food of almost all people being some kind of grain. The six most important are wheat, barley, rye, oats, maize and rice.\textsuperscript{35} Broadly speaking, the first four are crops of temperate regions and there are parts of South Australia which proved very suitable for them. When George Fife Angas and his colleagues of the South Australian Company made their plans for the settlement of South Australia they saw the profitable use of land and primary resources as the basis for their task of 'peopling the earth' and expanding the Empire.\textsuperscript{36} Close to where they disembarked was land where they could grow the cereal crops with which they were already familiar and in addition there was grassland suitable for grazing animals. Land on the Adelaide plains and adjacent hills proved to be both fertile and easily cleared.\textsuperscript{37}

\textsuperscript{34} Roma Hodgkinson, 'Gardens and gardening in Adelaide in the nineteenth century', forthcoming article for the \textit{Journal of the South Australian Historical Society} [1991], notes that a further factor was that Launceston was within six day's sailing distance, and Hobart and Sydney ten to twelve days when Adelaide was established.


\textsuperscript{36} Rob Linn, The discovery and settlement of the Fleurieu Peninsula, paper given at the Australian History Association Conference, September 1986.

\textsuperscript{37} J. J. Pascoe, (ed.), \textit{History of Adelaide and vicinity, with a general sketch of the province of South Australia and biographies of representative men}, Adelaide, 1901, p. 64.
Establishing farms and gardens in South Australia

The first settlers in South Australia, in contrast to those in New South Wales fifty years earlier, had comparatively easy access to land where they could establish gardens and mixed farming. Nevertheless, although they were fortunate in finding land suitable for agriculture within a short distance of the sea, South Australian coastal areas do not have especially fertile soil by world standards: '...the recurring theme of Australian soils is old age and poverty' and the subsurface and upper subsoil are often especially poor.38 Much of South Australian coastal soil is deficient in nitrogen and phosphorus and, like many Australian soils, tends to have higher levels of sodium and magnesium than American or British soil. This causes soil management problems for Australian agriculture.39 The nature of South Australian coastal soils affected not only the types of crops that could be grown initially but also the yield of crops after a period of use. The low nitrogen content of soils meant that after several seasons of cropping, nitrogen from the original organic matter was often exhausted and yields then fell. In Europe basic knowledge about what might grow on a certain patch of land had been handed down over generations but such knowledge had to be acquired by trial and error in Australia. One factor regarding soil conditions was especially important. The alkaline nature of much of the soil on the Adelaide plains produced conditions that few settlers had


experienced. In the Government House grounds, for example, the pH of 9 gave conditions that few settlers from the British Isles would have experienced unless they had gardened or farmed in the vicinity of the English chalk downs, and even so this would have been in a cool climate not a Mediterranean climate.

Efficient land use required understanding of such factors as soil conditions and terrain (elevation and slope in particular). It also required knowledge of the pattern of rainfall (frequency and reliability as well as total rainfall), humidity, evaporation, wind patterns, and temperature variation. Had the settlers come from Calabria or southern Spain rather than northern Europe they would have been more familiar with the weather factors encountered, in particular the low humidity, high rate of evaporation in the summer months and the lack of summer rain.

The immediate potential of the land was also affected by the nature of existing vegetation, particularly in areas where farmers had to clear dense growth of bushes and trees. When European settlement was first established in South Australia, the Adelaide plains were covered with open, savannah-type woodland with eucalypts and grass beneath, and there was dense stringy-bark (sclerophyll) forest on the highlands of the ranges. The first settlers used existing vegetation as an initial guide to land quality. They were attracted by the fringing coastal plains of the Fleurieu Peninsula, the Mount Lofty Ranges, the Barossa Valley, and the land stretching through the central hill country of the northern areas and the Flinders Ranges

beyond. Early cereal growing was concentrated on the Adelaide plains, and localized sections of the Mount Lofty ranges. Places such as Mount Barker, Blakiston, Echunga and Angaston were centres for early agriculture.\(^41\) In the northern areas where there was native tussock grass, clearing of timber was not necessary and crops could be planted after ploughing was completed.\(^42\) Land in the Lower South East, particularly between Naracoorte and Mount Gambier, appeared limited in its potential by poor natural drainage and the area around Bordertown was not settled until the 1880s. Soils in the plains that stretched through Yorke Peninsula, the Murray Mallee, the Upper South East and the greater part of Eyre Peninsula were sandy, lacking in moisture, low in phosphorus and deficient in organic matter. Initially the main problem was the dense cover of mallee woodland and scrub; however, with the development of methods for clearing this vegetation by rolling after 1868 and the improvement of fertility by the use of superphosphate after the late 1880s this land became valuable for agricultural development.

There were other areas where high rainfall and fairly dense vegetation suggested fertile soils. Yet for all that, attempts to cultivate and stock the areas failed after a comparatively short time. This was the case with parts of the eastern side of Eyre Peninsula, Fleurieu Peninsula, Kangaroo Island and the low ranges of the South-East. We know today that the soils were infertile due to a lack of

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\(^{41}\) For example, by 1842 John Barton Hack had a dairy and farm with twelve acres of garden and orchard and about one thousand vines and fruit-trees at Echunga, Derek Whitelock, *Adelaide: from colony to Jubilee, a sense of difference*, Savvas publishing, Adelaide, 1985, p. 59.

trace elements such as copper, cobalt and zinc and that the natural vegetation had adapted to these soil conditions, but the early settlers had no way of knowing this. A similar situation existed in the Ninety Mile Desert area of the Upper South-East where stunted vegetation was due to trace element deficiency.\(^{43}\)

The preconceptions of the early settlers affected their assessment of the potential of the land as they appraised the landscape. Their European-trained eyes tended to perceive landscape that was quite different from that in Europe as something 'dreary' or 'hostile' or needing to be civilized. Many were familiar with a landscape of closely-spaced villages, well-tended farms, neat hedges, and the 'landscaped' estates of the wealthy. The early settlers were attracted to the open savannah woodland of the Adelaide Plains but were anxious to break up the landscape with fences, roads and farmhouses to lessen the effect of a 'raw', 'uncivilized' land.\(^{44}\)

When they established domestic gardens the European settlers did not understand the importance of the shelter which the native vegetation provided from the hot summer sun and from prevailing winds.\(^{45}\) As Beatrice Bligh wrote in *Cherish the Earth*, '...Australia's new settlers worked continually against Nature rather than with her.' They did not understand that features such as the long thin leaves of blue-grey and bronze trees, so peculiar to European eyes, had evolved from

\(^{43}\) Williams, *The changing rural landscape of South Australia*, p. 3.


\(^{45}\) Bligh, *Cherish the earth*, p. 7.
adaptation to the climate. They had no understanding of what large scale clearing would do to the land in terms of soil erosion; for example in sandy areas the soil tended to drift once vegetation was cleared. It may have been that the mania for clearing was influenced by those who, seeing an 'alien' land, wanted to leave their mark on the landscape. The effect could be disastrous: the clearing of trees and large bushes exposed young plants to hot, drying winds, to searing summer sun and to the effects of sudden downpours of rain. Grazing sheep and cattle ate down natural grasses and did not allow them time to recover. Their hooves flattened native grass and caused the soil to harden. The clearing of vegetation caused alteration of patterns of water flow which could cause serious erosion. Soil erosion also occurred after agricultural land was left fallow. Clearing vegetation near rivers removed the shrubs and trees that held the banks together so that the soil fell away and the banks became unsightly. Such changes were described by an Adelaide resident who recalled that in 1837 the banks of the River Torrens had been covered with 'beautiful shrubs of all sorts' and platypus might be seen.

When settlers did try to cultivate native plants their lack of knowledge of how to grow them could cause disappointment. In some cases the application of heat was required for seeds to germinate.

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46 Bligh, Cherish the earth, p. 6.
47 Cuffley, Cottage gardens in Australia, p. 29.
49 Helen Mantegani, Recollections of the early days of South Australia, Proceedings of the Royal Geographical Society of Australasia (South Australian Branch), vol. v, 1901-2, pp. 70-3.
Some native plants do not thrive if the soil around them is disturbed and thus suffer from being transplanted and having soil around them cultivated. Settlers familiar with conditions in the British Isles with its moist air and frequent rainfall found the climate of South Australia 'capricious'. They had to contend with droughts and extremes of temperature. Earth that had been cleared and tilled could set to a concrete-like hardness under the summer sun once the plants and moisture retaining debris of the natural vegetation was removed. Settlers who were used to growing gardens by streams found to their cost that flash-flooding made this a risky procedure.

In adapting to the new conditions the settlers had much to learn. Although they found that the South Australian climate enabled some plants to grow all year round in a way impossible in Europe, special problems resulted from the heat in summer. There were conditions which made gardening hard for newcomers. For example lack of adequate fencing enabled animals like goats, horses and cows to get into the plantations. Extremes of heat in summer made work difficult. Settlers soon learned that many of their newly-planted exotic trees would have to be hand-watered for the first few years and watering was a major task for gardeners, time-consuming and laborious, especially before the days of hoses or water pipes when water had to be carried in large wooden pails or heavy watering cans.

Eventually E. B. Heyne in The Amateur Gardener for South

50 Bligh, Cherish the earth, p. 5; Bolton, Spoils and spoilers, p.13.
51 Bligh, Cherish the earth, p. 19; Cannon, Life in the country, p. 215.
52 Bligh, Cherish the earth, p. 16.
Australia would be able to write that, 'though frequently, and not without cause, cried down because of its aridity', the South Australian climate offers nevertheless many advantages to the horticulturist, who by a little care and foresight, may not only succeed in cultivating numerous plants which remind him of his European home or other countries in colder regions, but also side by side with them many of the more tender forms belonging to the semi-tropical or even tropical zones.\textsuperscript{54}

However, this was many years after the first settlement. The first gardens were needed for sheer survival. Work was often back-breaking and heart-breaking. Both women and children helped to get early gardens established; diaries and contemporary accounts suggest that women played an important part in establishing gardens around settlers’ cottages.\textsuperscript{55} The failure of plants to survive could be devastating for those who had brought precious seeds and cuttings from Europe to plant in the colony. For many, failure of a crop meant less to eat. Once huts and cottages were erected, a garden could be fenced in to give some protection. The first task was typically to produce vegetables because these were staple foodstuffs and could be raised relatively quickly. Fruit trees and vines were slower to yield a crop and required a more permanent site. Many seem to have been keen to surround themselves with the familiar shapes and colours of plants that they knew in Europe. It has been argued that the geometric approach of squared cottage gardens with a straight path to a central front door illustrated an attempt to create some 'order'.


\textsuperscript{55} Bligh, Cherish the earth, p. 19.
in a disorderly land.\textsuperscript{56} In fact the style of squared bed comes from a long tradition going back as least to ancient Egypt. Howard Tanner has described the 'squared' planning of the earliest Australian gardens as owing more to expediency than design. He comments that the term 'squared' is to be preferred to 'formal', 'for there appears no tendency toward pretentiousness and display or regularity associated with the European traditions of formal gardening'.\textsuperscript{57}

Features of the old cottage gardens, still to be seen in country towns, were neat rows of vegetables, some herbs, vines, some fruit trees and flowers to add a decorative element.\textsuperscript{58} Cottage gardeners have traditionally been active in scouring their district for cuttings, seeds, bulbs and plants, carefully tending their newly-acquired slips and seeds. By practising a selective improvement system, cottage gardeners could also play a part in the collection and distribution of new plants.

As far as crops were concerned the first settlers had to make do with seed material developed in Europe for very different climatic conditions. The wheat varieties first grown in South Australia were not particularly suited to South Australian conditions.\textsuperscript{59} There was much to be learned about the times of the year for planting crops - typically spring in Europe for crops such as wheat and barley, whereas autumn is the time for these crops to be planted in South

\textsuperscript{56} For example, this view is expressed by Cuffley, \textit{Cottage gardens in Australia}, p. 28.

\textsuperscript{57} Tanner and Begg, \textit{Great gardens of Australia}, p. 17.

\textsuperscript{58} Cuffley, \textit{Cottage gardens in Australia}, p. 22.

Australia. Despite these problems, there were areas of land which were well-suited to cereal growing in other respects. Conditions, such as an annual rainfall of 250-500 mm of rain a year and a short cold season during the early stages of growth, were excellent for crops such as wheat. A crop could be obtained even with seed material not perfectly suited to local conditions. Later, yields could be improved as more suitable strains were obtained. Barley, which does not tolerate acid soils, was well suited for those parts of South Australia which had light, somewhat alkaline soils.

Gardens and orchards were needed in addition to agricultural and pastoral development. Settlers from the British Isles came with a great tradition of enthusiasm and dedication for gardening behind them. Their passion for gardening was a by-word in continental Europe; their climate is kind to horticulture. At a functional level, the British gardening tradition could be said to have provided a poor model in that there was no knowledge of how to deal with consistently dry summers. Yet there had been a strong gardening ethic in all levels of society and a fascination with a diversity of plants. The British tradition supplied a love of gardening and a useful reservoir of plant material. Nevertheless many of the traditions of planting and harvesting had to be reconsidered under Australian conditions. And while many skills taught from one generation to the

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61 Bligh, Cherish the earth, p. 3.

next in Europe could be used in Australia, new skills had to evolve as well.

We need to return now to the establishment of the European gardening tradition in South Australia, which dates back to the 1820s. The first garden and farm known to have existed was established, not at the time of the main settlement of South Australia in 1836, but in about 1820 on Kangaroo Island. The site was a strip of fertile soil at Cygnet Creek about twelve kilometres from Kingscote. Thought to have covered about five acres (2 ha) of very fertile land, the area is still the site of the main market gardening activities on Kangaroo Island today. Henry Wallen or Whalen, known as 'Governor Wally', grew vegetables and fruit in a garden that was surrounded by pointed saplings among huge sugar gums. Wallen grew the typical plants of an English kitchen garden and was quite self-sufficient, making damper from his own wheat and even making tea from native plants found in the nearby bushland. He grew potatoes, corn, tomatoes, cabbages, pumpkin, watermelon and sweet melon. The garden was laid out in the style of a typical English kitchen garden with plants grouped together, with a trellis for climbers, herbs as edging and beds laid out in an oblong shape and watered by means of irrigation channels. Wallen produced so much that he was able to provide supplies for some of the ships that called in to Kangaroo Island. At least an acre (0.4 ha) of wheat, the very first in South Australia, was being grown at Cygnet Creek by 1836.64


64 R. Swinbourne, 1989, Gardens Lost, unpublished manuscript held by the Australian Garden History Society (S.A. branch).
With the arrival of the South Australian Company, Wallen was forced to sell his house and farm for a meagre sum. The main settlement moved to the Adelaide area where water supplies were much better and where more suitable farming land was available. Dr Charles Everard, one of the first residents and father of William Everard who later sat on the Adelaide Botanic Garden Board, wrote approvingly in May 1837 of the 'beautiful grassy plains' around Adelaide surrounded with 'a sufficiency of timber to make it look well'. He made his first home about a mile from the landing site at Holdfast Bay and 'dug a bit of land for a garden' in which plants flourished. He wrote home describing 'delicious watermelons, some of 10 pound weight, seed of which I procured at the Cape'.

The next decade saw a great development in European gardening and farming traditions in South Australia. Despite the initial advantages, settlers had much to learn about climate and soil. The nineteenth-century historian Edwin Hodder asserted that some of the earliest settlers were doubtful about the agricultural possibilities of the Adelaide plain soils until a trial crop of wheat was grown along North Terrace in 1837. Hodder adds that 'Colonel Light never had any doubt on the subject and was wont to say to grumblers, 'This country will not only produce cereals but all the products of Spain and Portugal'. Rosina Ferguson, after arriving on the Buffalo, wrote home to relatives in Scotland that her husband had seen fine brown soil suitable for barley and 'as fresh as a mole hillock', as well as heavier

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65 Proceedings of the Royal Geographical Society of Australasia (South Australian Branch), vol. v, 1901-2, pp. 77-8.

soils suitable for wheat. Such optimism about the potential of the soil was also expressed by Dr. Woodforde, another early settler.  

For the majority of those trying to establish a farm or garden with little capital and no experience of local conditions, the first year was critical. Many leased with a right to purchase and if the first crop failed they risked forfeiting their right to purchase. Interest on loans might be as high 16-20%. Farmers were at an advantage if they had some capital, some experience and some relatives to assist them. 'Good, practical Scots' were said to do well in the colony and some, such as the Barr Smiths and the Elders, did extremely well. Accounts of the province by George French Angas, Frances Dutton, or the traveller, Friedrich Gerstäcker, refer to the 'frugal and industrious' settlers from Germany who established successful farms and gardens in those difficult early years. Hodder claimed that the early German settlers 'produced an abundant supply of vegetables for Adelaide, where there would otherwise have been a scarcity'. For early horticulturists and farmers alike, having appropriate plant material was of great importance in giving the best chances of success.


68 Hodder, History of South Australia, p. 93.

69 Documents in the South Australian Lands Titles Office indicate that 16% was the rate paid by Richard Schomburgk and his brother for mortgages on their property during the period 1850-1855. Cannon notes that it was common for small farmers to obtain loans from local storekeepers at high rates of interest, and that in some cases farmers were greatly disadvantaged by being forced to sell their produce to the storekeeper and buy provisions and equipment from the storekeeper. Cannon, Life in the country, pp. 148-9 & 245-7.

70 Whitelock, Adelaide from colony to Jubilee, p. 60.

71 Hodder, History of South Australia, vol. 1, p. 137.
From the very start, horticulture was not to be based on mere self-sufficiency as had been the case in New South Wales. In the first edition of the *South Australian Gazette and Colonial Register*, published in London in June, 1836, Thomas Allen and Sons had an advertisement offering their services to 'Gentleman Capitalists' to 'select, enclose, lay out, and plant their gardens in the best manner, both for utility and ornament'\(^7\). Thomas Allen and Son continued to advertise in this newspaper during the first few years of settlement.

Plant material and expert advice available from a commercial nurseryman from the commencement of the settlement of Adelaide greatly aided the development of horticulture. As a result, ornamental horticulture was to be strongly established at the very start and men and women who wanted to be of some standing in the community acquired ornamental plants in a way that was not possible for the early arrivals in Sydney.\(^7\) Such people were also in a strong position, because of their education, material prosperity and personal contacts, to acquire suitable plant material for fruit, vegetables and crops for their farms. In providing custom for nurserymen, the more prosperous settlers supported enterprises that would also serve the poorer settlers.

Many settlers brought plant material with them both from Europe and from places such as Rio de Janeiro or Cape Town, ports of call on the way to Australia. Once their gardens were established the colonists could help each other with cuttings and seeds by informal

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\(^7\) *South Australian Gazette and Colonial Register*, London, 18 June, 1836.

\(^7\) Information from interview with Robert Swinbourne (former staff member of Adelaide Botanic Garden), May 1987.
exchange in the time-honoured way, together with information and advice based on their own experience of successful propagation.

By 1881 Heyne was writing that palms could be grown successfully in South Australia as could

Dracaena, Cordilyna [Cordyline], Yucca, Hedychium, all kinds of Canna, Agave, Aloe, Phormium, many of the finer leaved Aralias and other plants of similar habits;

these, he wrote, when combined

will present not only an exceedingly graceful scene, but also [one] quite new and unexpected to a horticulturist accustomed only to the usual style of gardening carried out in the more northern parts of Europe.74

The role of nurserymen and the commercial sector in the transfer of plant material

The role of the nurserymen and the commercial sector in making available plant material, information and advice, was extremely important. Nevertheless, the topic has received virtually no attention in general historical studies of South Australia.75 Nurserymen such as Heyne played an important role in the introduction of plants to South Australia. A number had trained in big commercial establishments or on large estates in the British Isles. By the early part of the nineteenth century there were in Britain, as in continental Europe, nurserymen with substantial establishments and a considerable reputation. Amongst these were Knight and Perry


75 For example, D. Pike, Paradise of dissent: South Australia 1829-57, Melbourne, 1957, and D. Whitelock, Adelaide from colony to Jubilee: a sense of difference. The work of Robert Swinbourne in documenting their work in Years of endeavour has been of great value.
of the Royal Exotic Nursery, Chelsea, Conrad Loddiges and the famous Veitch family. The earliest nurserymen in Europe were professional gardeners who were employed to supervise other people's gardens. Eventually their interest in plants and the incentive to exchange plants material led to the cultivation of plants for sale.\textsuperscript{76}

South Australia seems to have been fortunate in the quality of the nursery businesses serving the community. The success of these nurserymen resulted from such factors as their capacity to get new plants from distant places, the skill of staff in propagation, the desire for plant material by consumers and the availability of funds for purchases. In contrast, for example, Western Australia is not thought to have had commercial nurseries at a comparable stage of its development.\textsuperscript{77} South Australia settlers were helped by having local nurserymen from whom they could order plant material in the very early days. In turn the success of those establishing farms and gardens helped to provide more custom for the nurserymen.

In the period between 1836 and the early 1850s commercial nurserymen known to have traded include John Bailey; John Wigzell;\textsuperscript{78} Charles Giles and Son at Grove Hill Nursery and at the Exotic Nursery at Kent Town (by 1857); George McEwin at the Glen Ewin Nursery (1844) near Houghton; William Dunn at 'Gordon Bank' at Upper Hermitage (1846); and towards 1850, Alfred Davis at 'Moore Farm', Reedbeds, west of Adelaide. Davis sold fruit trees, vines and exotic

\textsuperscript{76} Oxford companion to gardens, p. 403.

\textsuperscript{77} Swinbourne, 'Gardens Lost'.

\textsuperscript{78} Swinbourne, Years of endeavour, p. 3.
plants such as flowering shrubs and trees. Reedbeds, now part of suburban Fulham, was the site of the first rose garden known to have been established in Adelaide.

With the 1850s and greater economic prosperity there was an upsurge in seed and plant trading in South Australia, as also occurred in eastern Australia. The year 1851 saw the establishment of an important nursery known as 'Clifton Nursery' at Walkerville, conducted by Charles Ware in its formative years. A wide range of plants was advertised, including a number of Australian native species - *Grevillea robusta*, the Bunya Bunya pine, Blue Gum, and Moreton Bay fig. In 1853 this nursery was bought by Edwin Smith, who developed a magnificent rosery with some four hundred of the best available species, and eventually about one thousand camellias. Smith became a leading member of the Agricultural and Horticultural Society of South Australia. Charles Frederick Newman (born Carl Freidrich Neumann) developed an orchard and nursery at 'Water Gully', Highercombe, that was later known as the 'Model Nursery', producing a comprehensive illustrated catalogue and importing and exporting an extensive range of plants and seeds. In the Echunga district George Bailey, William Russell and Jacob Hagen were active in the early 1850s and in Adelaide there were the Hackett brothers, Elisha and Walter, who established a business from 1852 onwards with nursery stock and seed trading, the firm becoming known overseas as well as

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79 Swinbourne, *Years of endeavour*, p. 6.


81 Royal Agricultural and Horticultural Society after Prince Alfred's visit in 1867.

82 Swinbourne, *Years of endeavour*, p. 17.
locally for its range of wheats.\textsuperscript{83} J. F. Wood of the Evandale Nursery in an area near Angaston known as North Rhine, was by the mid-1850s advertising fruit trees, vines and ornamental shrubs.\textsuperscript{84}

Many of the nurserymen were active in special interest groups, such as horticultural and floricultural societies and some wrote for local newspapers or produced their own publications. J. F. Wood was a prolific writer, with articles and notes in local journals and newspapers.\textsuperscript{85} In 1859 he wrote an article in the \textit{Farm and Garden}, extolling the virtues of tetratheca as a border edging, and describing how he had transplanted some plants from their natural habitat into his nursery, a procedure which indicates a fair degree in skill.\textsuperscript{86} That he was promoting an Australian native plant at this time is interesting in view of the idea that is popular in some circles that Australian native plants were not seriously promoted until the twentieth century.\textsuperscript{87} John Foster has written of the significant degree of use of native species in nineteenth-century Victoria, refuting the 'tenacious popular myth' that new settlers ignored and despised native Australian plants.\textsuperscript{88}

\textsuperscript{83} Swinbourne, \textit{Years of endeavour}, p. 11.

\textsuperscript{84} Swinbourne, \textit{Years of endeavour}, p. 17.

\textsuperscript{85} Swinbourne, \textit{Years of endeavour}, p. 17.

\textsuperscript{86} Swinbourne, \textit{Years of endeavour}, p. 18.

\textsuperscript{87} It is noteworthy also that Daniel Bunce in Melbourne encouraged horticulturists to plant indigenous trees as well as hardy imported ones such as the wych elm, pointing out that native evergreens gave valuable shelter in winter months. Bligh, \textit{Cherish the earth}, p. 50.

\textsuperscript{88} John Foster, 'Natives in the nineteenth century garden', in \textit{Australian garden history, Journal}, vol. 2, no. 4, 1991, p. 3.
In Adelaide Wood produced one of the earliest catalogues known to have existed in South Australia. Such catalogues helped further horticultural development as they spread information about the species which could be grown successfully.

The nineteenth century was a golden age for British gardening, producing a vast market for plants, gadgets and written material. An immense variety of plant material was available and great interest was demonstrated in nursery catalogues and gardening magazines. The gardening magazines of the day were widely circulated and, thanks to developments in the printing industry, at prices that made them accessible to large numbers of people. They included the *Gardener’s Magazine*, *Gardener’s Chronicle*, *Floricultural Cabinet*, *Cottage Gardener*, *Gardening Illustrated*, *Journal of Horticulture and Cottage Gardener* (described as a Journal of Horticulture, Rural and Domestic Economy, Botany and Natural History). In South Australia the *Garden and the Field* followed the earlier *Farm and Garden*. John Claudius Loudon, aided by his wife Jane, founded the *Gardener’s Magazine* in 1843, and produced the monumental *Encyclopaedia of Gardening* (first published in 1822) and the four volume *Arboretum et Fruticetum Britannicum* of 1838 with its beautiful illustrations. These became some of the standard reference works for gardening enthusiasts and professional gardeners. Leading writers of the day expressed their belief in the 'agreeableness and utility of gardening'. The utility of kitchen garden, orchard and farm was seen as the most important aspect; the

agreeableness of decorative gardening more of a luxury.\(^{90}\)

Gardening magazines included regular reports of new plant material collected in places as far away as Japan, China and South America by travellers and professional plant collectors, while enthusiasts commented in the correspondence columns about their successes and failures in propagation. In the British Isles and in France, Germany and Belgium seeds, plants, tubers, bulbs and roots were collected by the big nurseries and wealthy private collectors. From these sources plant material was disseminated in various ways whether by sale, gift, exchanges or theft. At the same time there were enthusiastic experiments in plant breeding. New cultivars were created by simple cross-pollination procedures and an astonishing array of flowering plants were sold through nurserymens' catalogues together with a great range of fruit and nut-trees, soft fruits and vegetables.\(^{91}\)

In the period under study technical development aided both professional gardener and keen amateur alike. In the early years of settlement in South Australia improved glasshouses and hothouses or 'heated stoves' were becoming available both as a result of cheaper glass and new technology in the iron and steel industry. Glasshouses and hothouses enabled the care of tropical and tender semi-tropical plants. One of the earliest South Australian settlers known to have brought out a glasshouse was George Stevenson who was at first private secretary to Captain John Hindmarsh, the first Governor of the colony. Stevenson became the local editor of the *South

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Australian Gazette and Colonial Register (which later became the South Australian Register) and a man of influence in the local community. He brought to Adelaide prefabricated glass houses and a prized collection of camellias\textsuperscript{92} - this to a settlement which had no bridges, roads or public buildings. Employing George McEwin, a trained gardener from Scotland, he developed in lower North Adelaide a fine garden with a wide variety of fruit-trees, vines, trees and shrubs. He is known to have been responsible for the extensive garden of his mother-in-law at 'Leawood', near what is now known as the Devil's Elbow turn in the road to Mt Lofty.\textsuperscript{93} McEwin's list of plants growing in Stevenson's North Adelaide garden was published in the Register in 1841 and 1842 and reprinted by Bennett in 1843.\textsuperscript{94} After McEwin went into business for himself he continued to provide botanical and horticultural material for the Register and its Almanack and Directory. Stevenson, 'a most zealous promoter of horticulture'\textsuperscript{95} was in contact with nurserymen and other enthusiasts in the other colonies, acting as an agent for Macarthur's Camden nurseries and other nurseries, and importing plant material from Europe.

Nineteenth-century technology helped such plant transfer by means of new and improved forms of transport. Railways, steamships and improved postal services contributed to the safe transport of plant material. An important development by the 1830s was the use of the

\textsuperscript{92} Swinbourne, interview, May, 1987.

\textsuperscript{93} Swinbourne, Years of endeavour, pp. 4-5.

\textsuperscript{94} Kloot, Studies in the alien flora of the South Australian cereal rotation areas, pp. 11-12.

\textsuperscript{95} Adelaide Observer, Saturday, 23 April, 1881.
closed or Wardian case using the principle of the micro-climate. Attributed to the amateur botanist, Dr. Nathaniel Ward, the case was devised after Ward discovered that sealing a container to maintain relatively constant humidity and temperature greatly aided the transport of plants over long distances. Ward used the Britain-Australia shipping run to test out the case. Its use increased dramatically the percentage of live plants which survived the long voyage between Australia and Europe.

Technology contributing to the successful propagation of plants included the development of chemical pesticides by the middle of the nineteenth century, inventions such as the patent lawn mower of Budding dating back to 1830 and the development of chemical fertilizers. Loudon, writing in 1835, refers to a variety of materials that could be used as fertilizers: animal manure, animal products such as blood, bones, horn, hair, fish, night soil, linseed cake, seaweed, hedge clippings and 'succulent cuttings' which could be dug into the ground as green manure. Manuring and composting techniques had been known to the Greeks and Romans and lime, chalk and marl had been used for centuries.


97 For example a sulphur cure for Aphis is described in the *Garden and Field*, 12 July 1860.

98 Huxley, *An illustrated history of gardening*, p. 276. Budding commented that 'country gentlemen may find, in using the machine themselves, an amusing, useful and healthy exercise'.

Early Australian settlers used traditional techniques of composting and manuring. Settlers in South Australia would have become aware of the value of guano by the mid-1840s after it was first imported into Britain and attracted great interest for its high nitrogen content. There were numerous articles about it in the gardening press.\(^{100}\) In 1817 superphosphate was first produced in Britain and a patent for its production was taken out in 1842 by John Bennet Lawes, Squire of Rothamsted, in England. In 1842 he patented a method for treating phosphate rock to produce superphosphate and thus initiated the synthetic fertilizer industry. It was used in combination with nitrate of soda and sulphate of ammonia, a by-product of gas production. Although superphosphate was being promoted by the 1870s it was not available to the early settlers in South Australia.\(^{101}\)

**Development in South Australia leading up to the establishment of Adelaide Botanic Garden**

As the settled area of South Australia extended, houses were built and gardens established. Whereas vegetables might have been grown on either side of the path to the front door of the early dwellings of settlers, garden beds came to be developed in new ways and vegetables and fruit-trees were banished to the back. There was an expanded range of flowering shrubs and flowers available from which to choose. There might be circular beds with paths on either side of

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\(^{100}\) Carter, *The Victorian garden*, pp. 113-115; an example of the interest existing in South Australia on this topic is indicated by a very detailed letter in the *Farm and Garden*, 11 November, 1858, from 'Abrahame Lincolne' of Moonee Ponds, Victoria.

the main path. Lawns were not a feature of the early gardens and flowers were planted closely together. The front garden was a feature of houses at all levels of society and increasingly this was a flower garden. In contrast to the lack of garden space in the front of terrace houses in large British cities, in Australia the front garden was to become an institution and cities spread out so that all could have one. In Adelaide the flatness of the terrain provided privacy for the area at the back of a house and the front garden could be used for 'show', to give an impression of the social standing and income level of the family. Trevor Nottle has observed that in cottage and villa gardens, visual interest came from prolific and varied planting rather than from walls, steps or waterworks. Italianate gardens have remained a rarity.

Horticulture was affected not only by physical factors such as climate and soil conditions and economic factors such as availability of capital and labour, but also by social factors. Organized groups played an important role in the dissemination of plant material and information. These included the Agricultural and Horticultural Society which was formed with the amalgamation of a horticultural society with an agricultural society in 1844. An agricultural society had been formed by 1839. Agricultural shows were promoted where grain and other products were exhibited. For a time these were

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104 Nottle, The cottage garden revived, p. 5.

105 Caroline Guerin, One hundred years on the land: the history of the Agricultural
held in the Adelaide Parklands and by 1860 there was an Exhibition Building in Frome Road. Ploughing competitions were also held. Agricultural and horticultural shows in colonial times played a valuable role in improving bloodstock and spreading material for plant propagation. They were important social events as well as occasions for information exchange. Later, shows specifically concerned with flowers were run by the South Australian Horticultural and Floricultural Society. There were Farmers Clubs and local agricultural groups such as the Northern Agricultural and Horticultural Society, the Mt Barker Agricultural Association and the Gawler Town Agricultural Association.¹⁰⁶

The Agricultural and Horticultural Society came to perform the function of a pressure group. Its membership included nurserymen and prominent commercial growers, enthusiastic amateurs (many of them prominent citizens with substantial land-holdings), and, as well, some professional gardeners. Many of the professional gardeners had trained in nurseries and large estates in the British Isles, and some would have maintained links with colleagues and friends overseas. Through personal contacts and reading, members knew of the role of the Royal Botanic Gardens, Kew, and other institutions through which botany, agricultural science, forestry and horticulture were promoted in Europe and America.

The spread of information on these subject areas was aided by the use of the printing press. The first settlers to arrive in Adelaide

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¹⁰⁶ See The Farm and Garden and The Garden and the Field for reports on their activities.
brought a printing press with them and a considerable amount of material on horticulture was published, leaving a permanent record of the issues discussed. Later rivalry between publishers led to a variety of material from different writers.\textsuperscript{107} There was great enthusiasm for the ideas of scientific and efficient farming and horticulture. This is seen in an early issue of the \textit{Farm and Garden} which was published under the auspices of the South Australian Agricultural and Horticultural Society, beginning in 1858. The editor declared that agriculture was a science as well as an art, with laws to be studied, as well as practices to be acquired. South Australia was blessed, he wrote, with favourable circumstances in climate, virgin soil and a ready market for products and, as a result, many farmers depended for success on 'accidents and the bounty of mother-earth' and were non-plussed when their luck did not hold; 'It is only under peculiarly favourable circumstances that men of this class could prosper to any degree at all'. The editor argued that this 'unthinking' group, together with those who tried to be observant and thoughtful, would benefit from the systematic agricultural education being developed in the western states in North America, reports of which were to be found in the American press.\textsuperscript{108}

In the nineteenth century, efforts were made to promote agricultural education in most European countries, and chairs in rural economy and agriculture were established at Oxford (1790) and Edinburgh (1797).\textsuperscript{109} Experiments on the effect of manures on crops carried out

\textsuperscript{107} Kloot, Studies in the alien flora of the S. A. cereal rotation areas, pp. 10-11.

\textsuperscript{108} \textit{Farm and Garden}, 12 August, 1858, p. 26.

\textsuperscript{109} Victor Crittenden, introduction to Howe, \textit{Observations on Gardening}, p. 5.
by English agriculturist Sir John Bennet Lawes in the 1830s followed the work on plant physiology and nutrition of the eighteenth century and the work by Sir Humphrey Davy on agricultural chemistry in the early part of the nineteenth century. As the nineteenth century progressed more mineral fertilizers came on the market and, later still, chemical fertilizers. In 1843 Lawes began working with J. H. Gilbert on experiments on crop and animal nutrition. Lawes' Rothamsted agricultural research station became world famous and similar work was then carried out in Germany, France and the United States.\textsuperscript{110} Epidemics of plant disease, in particular in potatoes and vines in Europe in the 1840s provided an important spur to research. Changes in the world of agriculture came also from mechanization. Labour shortages and problems with manual harvesting could provide incentive for innovation. In South Australia Ridley's 'Stripper', a horse drawn combine harvester, was used successfully for the first time in 1843 and brought world-wide interest.\textsuperscript{111} Steam powered equipment was to follow and a revolution in transport and communication through steamships and railways played its part in enabling farm products to be taken to market in an economical way.

What was striking was the tremendous optimism in this period for the potential of primary industry in South Australia. Such optimism arose partly from a belief in the application of science and technology to farming. However, it was also linked to a belief in mankind's capacity to exploit God's creation and that 'progress' was a natural consequence of this. There was something of an evangelical

\textsuperscript{110} Encyclopaedia Britannica Macropaedia, vol.1, p. 337.

flavour to such ideas and, indeed, many of the early settlers in South Australia came with strong evangelical beliefs. South Australia had a substantial group of settlers who had advantages in terms of education, material prosperity and personal contacts. A number of these settlers approached the task of 'taming the wilderness' with an almost evangelical fervour, declaring their belief that it was God's will that through their labours they should multiply and prosper.

In the 1840s and 1850s settlers could see evidence that greater material prosperity was possible. There were already substantial business places, such as flour mills and distilleries and the Bank of South Australia by 1842, together with a customs house, police barracks, a gaol and a hospital. There were churches, shops, schools, and a theatre. A mechanics' institute dated back to 1838 and a subscription library to 1843. A chamber of commerce had been established in 1839, the first one of its kind in Australasia. Its early formation is symbolic of the pride of the business community in its achievements and its hopes for future development. The Philosophical Society (dating from 1853 and to become the Royal Society) provided opportunities for discussion of a wide range of topics at its meetings such as science, philosophy, natural history, education and public health issues.

112 Rob Linn, The discovery and settlement of the Fleurieu Peninsula, pp. 1, 2 & 25.

113 Whitelock, *Adelaide From colony to Jubilee: A sense of difference*, pp. 41 and 60-61.

114 Those in Sydney, Melbourne and Hobart were not established till 1851, Brisbane until 1860 and Perth until 1890. H.G. Viney, *A century of commerce in South Australia, 1836-1936, including a brief history of the Adelaide Chamber of Commerce Inc.*, 1836, p. 20.
The development of these institutions reflected improving economic conditions in South Australia. During the first twenty years of the province, mining developed as one the three staple industries alongside grazing and agriculture and Adelaide boomed between 1845 and 1848 on the strength of the Kapunda and Burra mines. Alongside the expansion of mining, both wool and wheat production continued to grow. Typically it was the squatters who explored the country and pushed into the interior, with wheat farmers following when land had been surveyed and sold.\textsuperscript{115} Compared with the other Australian colonies, South Australia produced an unusual number of successful wheat farmers.\textsuperscript{116} By 1870 the 'settled areas' formed a continuous strip to the south and the north of Adelaide - to the north about eighty miles (129 km) north of Adelaide up to the Clare area, and to the south bounded by the Southern Ocean, the Gulf of St Vincent and the eastern slopes of Mt Lofty.

One of South Australia's distinctive features was the lack of any sizable town outside the capital; at no stage between 1836 and 1911 was there a country town with a population in excess of 10,000 people.\textsuperscript{117} J. B. Hirst has observed that by the period 1870-1917 the proportion of the population in the metropolis was the highest or the second highest in Australia.\textsuperscript{118} It had in fact been part of the original plan of Wakefield that settlement should be concentrated so as to

\textsuperscript{115} It had been a founding principle for South Australia that land should be sold, not be given away, see Pike, \textit{Paradise of dissent}, pp. 80-1.


\textsuperscript{117} \textit{ibid.}, p. 10.

\textsuperscript{118} \textit{ibid.}, p. vii.
avoid some of the problems previously experienced in colonial settlement in Australia such as those of the Swan River settlement.

Accompanying these economic and demographic developments was some remarkable political development. South Australia had been planned to provide for both civil and religious liberties and the founding fathers had, for their times, strong democratic beliefs. A constitution which gave South Australia responsible government was granted, coming into effect in 1856. Decisions about the development of state-funded institutions could then be made by local community members. Proper government departments were formed and administrative expertise developed. There was a growing self-confidence along with growing prosperity. Members of the Adelaide's business and professional community were influential in a legislature which was not dominated by the pastoralists in the way that had occurred in New South Wales. From the beginning, Adelaide itself was the centre for men interested in land and sheep. Many people who made their wealth in business or the professions took up land without moving from their homes in Adelaide, using Adelaide as a base from which the properties were managed. A number of these people, with their substantial houses and gardens, would have had an interest in the idea of the development of a proper botanic garden, partly from a horticultural point of view and partly because of the idea that such an institution was an appropriate one for a well-planned city that was to be a 'model city' in a 'model

119 Whitelock, op. cit. p. 61.

120 Hirst, Adelaide From colony to Jubilee, p. 19.
colony'.¹²¹ Those with country properties would have an interest in the development of crops and pasture grasses. Those with some vision for the development of the city expected that Adelaide should have institutions which would put it on a par with a fine provincial city in the British Isles. The development of parks and public gardens was part of this scheme, as was the development of a good library, museum, and botanic garden. From its inception the Philosophical Society argued strongly for the building of a museum in Adelaide.¹²² An editorial in the Farm and Garden in 1860 argued that if public funds were being used to provide a Law Library then surely funds should be made available to have an agricultural library and museum to promote knowledge and skill in agriculture.¹²³ By the 1850s those involved in running the Agricultural and Horticultural society also actively promoted plans for the formation of a botanic garden for Adelaide.

**Establishment of the Botanic Garden**

In September 1849 an Englishman named George William Francis arrived at Port Adelaide. Born in 1800, Francis had been a writer and scientific illustrator in Britain, producing a monthly Magazine of Science and School of Arts, a book on British ferns and other books, besides lecturing on botany to medical students. A Fellow of the


¹²³ Farm and Garden, 13 September, 1860.
Linnean Society and member of the Botanical Society of London, he had applied both to be Curator of the new gardens established in London by the Royal Botanical Society and to be Professor of Botany at King's College, London in 1842. Unsuccessful in these attempts, he had come to South Australia in search of new opportunities.124

In December 1849, only three months after his arrival, George Francis wrote to the Lieutenant-Governor of South Australia, Sir Henry Fox Young, proposing that a botanic garden be established. He stressed that it was important to teach colonists about 'what the colony naturally produces and what foreign productions have been introduced and are adapted to the climate'. Francis declared that he was

astonished at the ignorance of the generality of gardeners, the paucity of ornamental plants, and the almost total neglect of other and corresponding climes, which yield so large a return, as tobacco, sunflower, indigo, jalap, colocynth, scammony, rhubarb and numerous others. The splendid heaths that abound at the Cape of Good Hope are unknown here. We have scarcely a Palm tree - scarcely a Conservatory of any kind - and now above all things and that which is most necessary in a new colony, there is not a Botanic Garden.125

Francis went on to argue that a botanic garden would instruct the colonists about the plants of their adopted country and about plants from other places that could be grown to their advantage; it would enable 'cuttings, roots and scions of plant' to be distributed to colonists and help them to learn the proper names for plants. It would form a nucleus from which would emanate 'both a knowledge of plants and a taste for botanical and horticultural pursuits' and be a place in which the 'vegetable riches of other climes' could be


125 Best, Francis, p. 24.
acclimatized and distributed. Francis promoted the botanic garden as a place for 'rational amusement' for the general public, and a 'place of instruction for the young', especially if there could be added a 'museum of general curiosities, minerals and objects of Natural History', together with live native animals'. In addition, a botanic garden could be a place of general promenade, added Francis, especially since there was not any substantial public garden at the time. He argued that were the government of the day to provide funds, it would be repaid, not only by the introduction of new plant material of commercial value to the local economy but by the provision of attractive trees and plants for local public squares and the Parklands.

Francis suggested that were the government to help in the establishment of a botanic garden the public would be admitted 'at certain times gratuitously'. The Governor replied in January 1850 that he did not favour a garden being founded at public expense and 'selling in competition with private industry.' He believed that such an institution should be established 'by a Company or private subscribers who would seek to cover its outlay, or perhaps seek to profit by the sake of its product'.

A plan for private subscribers to establish a botanic garden would have followed the example of places such as Belfast, Glasgow, Sheffield and Birmingham. However, South Australia would have lost the potential commercial and utilitarian advantages arising from the existence of a botanic garden had it waited until there were the resources to develop a privately-funded institution. Added to this

126 Best, Francis, pp. 24-25.
many colonists would have known enough about the practical problems associated with privately-funded botanic gardens to have been unwilling to support such a scheme.

Some attempts had already been made to establish a botanic garden, in name at least, in Adelaide. The very first site chosen was one marked on a map in 1837 by Colonel Light. This was in the West Parklands but the site turned out to be subject to flooding and was not ever occupied. The second site adjoined the first and had the River Torrens on its northern boundary. The old Adelaide Gaol buildings are on part of this site. From 1837-1840 Thomas Allen, who had advertised as a nurseryman in the very first edition of the Register, was granted occupancy of this site for a Government garden, growing fruit and vegetables there, despite continuing problems from stock getting into the garden.127 He advertised plants for sale such as 'Lettuce, Cabbage and other plants' as well as 'all kind of Vegetables in the most reasonable terms'.128 It appears that the government paid for the purchase of fruit-trees and some ornamental plants. A list from the Colonial Secretary's Office of 1837 includes dahlia, tiger lily, rose, orange, cherry, mulberry, quince, nectarine, and Japanese loquat, and there are records of the purchase of peach and apricot trees, and Lisbon lemon.129 In allowing Allen to set up this garden, the authorities were promoting the production of basic foodstuffs and the cultivation of useful plants. Despite this the venture eventually lapsed.

127 Best, Francis, p. 28.
128 Swinbourne, quoting S.A. Register, p. 1.
In 1839 a third site was selected, also adjoining the River Torrens.\textsuperscript{130} In May of that year, Governor Gawler appointed John Bailey as Colonial Botanist. Bailey had worked for twenty years at the Loddiges Nursery in London. The gardens of Conrad Loddiges, a German-born nurseryman and keen amateur botanist, became famous for its rare plants and was said to have the best general collection of green-house and hot-house exotics of any commercial garden, including a magnificent collection of palms, camellias and yuccas.\textsuperscript{131} Bailey did not have to pay rent for this site near the Torrens and was paid a salary of eighty pounds a year. He was provided with an office and two cottages. A residence and fencing were at public expense and in addition the sum of two hundred pounds was raised by public subscription and subsidized by the Government.\textsuperscript{132} There is in existence a list of the plants in flower in June, 1841.\textsuperscript{133} Bailey vacated the garden in 1842 after he was retrenched by Governor Grey during times of economic hardship for the colony. He had permission to take what seeds and plants he considered his, and he and his sons moved what they could to their seven acre (2.8 ha) private nursery on the corner of Botanic and Hackney roads. Those who had subscribed to the Gardens must have been disillusioned by the removal of established plants and the occurrence of some vandalism after Bailey left. There appears to have been little support for subsequent efforts

\textsuperscript{130} Swinbourne, \textit{op. cit.}, p. 3.

\textsuperscript{131} Goode and Lancaster(eds.), \textit{Oxford companion to gardens}, p. 342.

\textsuperscript{132} Best, \textit{Francis}, p. 28.

\textsuperscript{133} Kloot, \textit{Studies in the alien flora of the S. A. cereal rotation areas}, p. 8.
to raise funds by public subscription. Bailey was regarded as an authority on botany and horticulture and after he left the Botanic Garden site wrote articles for the *Adelaide Independent*, the *Adelaide Observer* and the *Adelaide Examiner*, local newspapers which were produced in competition to the *Register*.

George Stevenson, former private secretary to Governor Hindmarsh, became the next tenant of the Old Botanic Garden at a rent of £35 per annum. He employed his own gardener, George McEwin, to take charge of the site. Stevenson was relieved of his tenancy in 1843 and William Haines successfully tendered for the Old Botanic Garden, staying there for five and a half years.

In May 1850 George Francis took over the tenancy at £35 per annum, taking up residence there. The charging of rent implied that a profit was to be made from the property. However, by June 1850 Francis drew the attention of the Governor to the state of the fencing between the botanic garden and the police paddocks on the southern bank of the river. He complained that the police horses were driven through the garden to seek water from the river and that serious damage could occur to the cultivated land and the vineyard. In November of that year he complained about the horses and about 'horned cattle' consuming hay and other crops, destroying melons and seedling plants, damaging vines and trees and trampling over every part of the garden. Claiming he had no profit whatsoever from the gardens, Francis petitioned that part of his rent should be

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134 Best, *Francis*, p. 29.
135 Best, *Francis*, p. 29.
remitted.¹³⁶ Such an account gives a picture of the botanic garden being run as farm, vineyard and vegetable garden, and Francis refers to his attempts to run 'a nursery' in a letter to Hooker.¹³⁷ Francis is reported to have produced the first recorded olive oil in the colony in 1850, exhibited in the Great Exhibition at the Crystal Palace in London in 1851.¹³⁸ This showed that olive oil production had commercial potential in South Australia. It also showed how economic crops could be promoted through making plants available to settlers. The Botanic Garden in Hobart at this time depended for some of its revenue on the sale of trees, especially fruit trees; however it also had funds supplied by the Royal Society of Van Diemen's Land and a government grant and thus sales were not the only source of income.¹³⁹

When further efforts were made on behalf of Francis for remission of the quarterly rent it was indicated that the granting of the tenancy to Francis was made more to protect the property than in the expectation of revenue being derived from it. The unresolved problem of fencing, which appears also to have plagued Francis' predecessors, appears to have led him to give up attempts to make the gardens a source of income. He successfully sought work with the City Council and was employed there until 1855.¹⁴⁰

¹³⁶ Best, Francis, p 30.
¹³⁷ Francis to Hooker, 26 May, 1855, Adelaide Botanic Gardens Archival files.
¹⁴⁰ Best, Francis, p. 31.
Francis had been a member of the Agricultural and Horticultural Society (A. & H.S.) from his earliest time in South Australia. In June 1851 the Society appealed to the Colonial Secretary for a grant of twenty four acres of the Park Lands...for the purpose of erecting thereon a permanent building for the Society, the land to be used for climatizing plants from England, for experimental research, for preserving pine seeds, as a station for beautiful and ornamental plants, and affording a healthful and useful recreation to the inhabitants of Adelaide.

Attached to the proposal was a plan prepared by Francis which showed an area bounded by North Terrace and Frome Road, including the area of the present day Royal Adelaide Hospital. The Commissioner of Police would not relinquish such a large amount of the police paddocks and the matter lapsed.

Working for the City Council meant that Francis could consolidate his own position while still being able to lobby those in positions of influence about the need for a proper botanic garden. The efforts of those promoting the plan for a botanic garden were finally having some effect. By May 1853 Lieutenant-Governor Fox Young was supporting the project and was offering land - this included the site of what is now the University of South Australia. However the sub-committee of the A. & H.S. was not impressed, replying that there was 'not more than ten acres of tolerably good land', most of it in an area undermined by the river, and expressing regret that more suitable land, east of Frome Road, had not been made available. In June 1853 the sub-committee again promoted the need for a botanic garden. There was some correspondence between the A. &H.S. and the

141 Best, Francis, p. 22.
142 Best, Francis, p. 34.
143 Best, Francis, p. 50.
Colonial Secretary regarding the development of a site which included an area to the west of Frome Road - the plan was drawn by Francis. The site proposed was some thirty eight acres (15 ha) surrounded by North Terrace, Frome Road, the River Torrens and the Police Barracks and Paddock. By the end of that year, Finnis, the Colonial Secretary, stated that some £3000 had been put aside for a botanic garden, for such costs as buildings, fencing and planting. The project had been approved in principle. Nevertheless, while further efforts appear to have been made to estimate costs, action was not immediate. Francis had written in the latter part of 1853 that

my love of Botany is well known, and also that I have always urged the necessity of such an establishment; have drawn three plans and prepared two years ago a memorial to his Excellency the Governor in Council, and got it signed by a large number of influential Colonists ... and have now promised an estimate in detail to meet the circumstances of the ground to be given...145

The persistent Francis was still working behind the scenes for the establishment of a botanic garden four years after his first interview with Fox Young in 1849.

In 1854 Francis tendered successfully for the laying out and planting of Victoria Square and subsequently of Whitmore, Light, Hurtle and Hindmarsh Squares.146 Correspondence between the Colonial Secretary and the A. & H.S. continued, covering the likely cost of establishment and operation of a botanic garden, the buildings required, the cost of salaries and wages, the cost of purchasing trees, the locality, the number of acres to be reserved and the number

144 Best, Francis, p. 40.
145 Best, Francis, p. 42.
146 Best, Francis, p. 48.
of acres to be fenced and cultivated during the first year.\textsuperscript{147}

By this stage negotiations were on a cooperative basis with the expectation that an appropriate new site would be selected. While members of the Legislative Council were considering the issue, Francis was working on the northern section of Victoria Square. The \textit{Register} report of his design gives some idea of the tastes of the day:

\begin{quote}
a central plot of diamond shape with concave sides, laid down in a permanently green grass, four large beds to be planted with trees along and outside of the central plot, and surrounded by an oval border twenty five feet wide, in which it is intended to form a belt of trees, shrubs and plants.\textsuperscript{148}
\end{quote}

There would be graveled walks and an 'elegant' iron railing around the perimeter with a hedge of Sweetbriar or other roses. The \textit{Register} reported that Francis would be planting both native trees such as 'Gum and She-oak' but also 'Oleander, Olives, Roses, Native Cherry, Cypresses, Broom-trees and others', and a subsequent report referred to the growth of 'poplars, cypresses, acacias, sumachs, olives and various other shrubs' in Victoria Square. It was an eclectic approach using both native and exotic varieties. During this period Francis was appointed as City Valuator, a permanent position on the local government staff. He was also active on the committee which formed the South Australian Institute.\textsuperscript{149}

By 1854 the area that was to become the Botanic Garden was still used for grazing horses but the original pasture grass was steadily deteriorating in quality as weeds became established. In October

\begin{footnotes}
\item[147] Best, \textit{Francis}, p. 49.
\item[148] \textit{S.A. Register}, 6 June 1854, quoted in Best, \textit{Francis}, p. 51.
\item[149] Formed from the South Australian Library and the Mechanics' Institute.
\end{footnotes}
1854 the Lieutenant-Governor indicated to the Legislative Council that he approved in principle the plan for a public botanic garden under government control and that, following correspondence with the A.& H.S. the Government was proposing that forty acres of Police Paddock land be granted for the purpose.

The feeling that a city of some standing should have a botanic garden was expressed by the Hon. Member for Barker, Mr John Baker. In seconding a motion to establish the botanic garden, Baker said with more enthusiasm than accuracy that South Australia was perhaps the only British possession without a Botanic Garden. He was certain its provision would 'materially advance the interests of the Colony.' He expressed the hope that 'the existing ornamental forest timber' in the Police Paddock would be preserved. He hoped that it would not be regarded as an exclusively Government measure, adding optimistically, 'for there was not one man in the Colony who would not be willing to contribute from the rare plants he might possess, toward the stocking of the garden'.

Baker, as Chairman of the A. & H.S., became a member of the first Botanic Garden committee in March 1855 and George Francis became first Secretary. The committee consisted of the Mayor of Adelaide, Joseph Hall, John Bentham Neales, Matthew Moorhouse, Charles Bonney, Dr William Wyatt and John Bristow Hughes, with William

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150 This was something of an exaggeration since, for example, the neighbouring Swan River settlement was a long way from getting a botanic garden and there was a dearth of botanic gardens in Canada.

151 Best, Francis, p. 55.
Younghusband, M.L.C. in the Chair. Hughes, a prominent pastoralist, was together with Younghusband, a nominee of the A. & H.S. Dr Wyatt, a man whose broad interests included natural history and education, was first Inspector of Schools. Matthew Moorhouse, a medical practitioner by training and Vice-President of the Philosophical Society included among his many appointments that of Secretary of the Destitute Board and Protector of Aborigines.

The committee's first task was to consider the final location of the site. Land had been reserved for a hospital site on the corner of Frome Road and North Terrace, the site of the present Royal Adelaide Hospital. Barbara Best, biographer of George William Francis, laments the fact that the site allocated for the hospital on Colonel Light's plan of 1837 was not utilized. It would have enabled the Botanic Garden to extend to the Frome Road corner, providing an interesting hilly area. However this corner was retained for the hospital reserve.

Nevertheless, to be granted a site was a triumph and in April 1855 George Francis, who had fought so long for the establishment of a botanic garden, was appointed Superintendent and Secretary to the Committee, with a salary of three hundred pounds a year. It was then just over five years since he had first discussed with Sir Henry Fox Young the possibility of establishing a permanent botanic garden. The appointment appears to have been made without consultation

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153 Board of Adelaide Botanic Garden Minutes (hereafter Minutes), Meeting 12 April, 1855.
with the Home Government and this was to cause some concern to Francis during the first year as there were precedents in Victoria and New South Wales for an Australian-made appointment being put aside in favour of one recommended in Britain. Despite the concern of Francis, expressed in a letter to Sir William Hooker,\(^{154}\) it seems that with responsible government granted to the province of South Australia, the authorities were of the opinion that a locally made appointment was appropriate and the appointment of Francis appears not to have been seriously questioned.

Francis was fifty five years old in 1855 and although six labourers were appointed to help him, at a cost of seven shillings a day, he did a considerable amount of physical work himself. The first steps in site development involved the trenching necessary to drain the swamps. A preliminary amount of six hundred pounds had been made available in March-April 1855 for such expenses as fencing and labour.\(^{155}\) Francis would have wanted some site development to occur as soon as possible to demonstrate progress and to ensure the allocation of further funds. A temporary wooden fence was proposed to prevent damage to new plants. Plans were prepared by the Colonial Architect, Edward Hamilton, for the construction of a Superintendent's residence and a greenhouse.

An official plan of the grounds was received by the committee from the Surveyor-General's Department on 10 August 1855.\(^{156}\) A report

\(^{154}\) Best, *Francis*, p. 71.

\(^{155}\) Best, *Francis*, pp. 61 & 65.

\(^{156}\) Minutes, 10 August 1855.
dated September 1855, recording the first three months work, refers to seventeen and a half acres (7 ha) having been enclosed and trenched. The soil is described as 'varied excellent soil of beautiful undulation'. A somewhat larger area had been enclosed than the fifteen acres originally intended for the first year - this was in order to avoid the main creek and numerous trees and to take in an extra one and a half acres granted by the government on the eastern side. Substantial developments had occurred during the first three months. There were fifty two chains of new fencing, costing £340. A hedge was planted around the whole ground:

Whitethorn in double rows around the swampy part, Boursault Rose on the western side, Rosa bracteata or the Macartney Rose mixed with Sweetbriar along the front, Dog Roses on the eastern side, Spanish Broom around the fence of the Lunatic Asylum, and a Prickly Cactus for a short distance behind.¹⁵⁷

The Spanish Broom plants were donated by Francis himself; he had already used Broom in his Victoria Square planting. There was, as well, a belt of Lombardy Poplars and 'the common acacia or Robinia' which had been carried about half the way around. These were planted so that other trees could be planted between them but could be removed subsequently in the manner of screening planting. A greenhouse had been completed by December 1855, in which cuttings were raised ready to be planted out later as beds and paths were completed.¹⁵⁸

The watercourse, 'a cause of great Labor and expence'[sic]¹⁵⁹ had been formed and 'the whole drained' - Francis wrote optimistically that

¹⁵⁷ Quarterly statement to 29 September, 1855 in Minutes, September, 1855.
¹⁵⁸ Report, July 1855.
¹⁵⁹ Quarterly statement to 29 September, 1855, in Minutes, September, 1855.
'inundation was no longer to be feared'. Unfortunately there was to be a great deal of trouble from the watercourse in the future, but for the time all was well. The men were cutting the boundaries of the lake, aquatic and marsh plants were planted and Dr Wyatt presented some weeping willows.\textsuperscript{160} Among the achievements of the first three months were the addition of a cart bridge and two footbridges across the creek, a project on which Francis himself had worked with an assistant.\textsuperscript{161} The utilitarian potential of the botanic garden was not forgotten and approximately two acres (0.81 ha) had been trenched in preparation for the planting of an 'Experimental and Fruit Garden'; this was planned to 'harmonize with the ornamental ground beyond', as seen from the eastern side of the gardens.\textsuperscript{162}

There were certain features which would have important influence on landscape design in the Botanic Garden. One of great importance was the watercourse which linked the north-east corner with the south-west corner of the site. A number of other features were developed in relation to it; for example, the widening of some parts into lakes, the cutting away of 'irregularities', the construction of islands to give visual interest, and the planting of willow trees. Water plants could be displayed and the presence of water encouraged the presence of water-fowl as an added attraction to visitors.

\textsuperscript{160} Francis, Progress Report, 5 October, 1855. That Francis was prepared to work alongside the other six men employed on the project must have contributed to the remarkable results achieved in such a short time.

\textsuperscript{161} Best, \textit{Francis}, p. 72.

\textsuperscript{162} Quarterly statement to 29 September, 1855 in Minutes, September, 1855.
The waterway was limited in size. Nevertheless, in the dry Adelaide summer it could provide a feature with a great deal of potential appeal. It also supplied water for irrigation of plants. Water could be taken from the lakes in buckets in the days before piped water was available. However, in the winter, heavy rains could mean considerable problems in management and there were continual problems with pollution. In the first of his annual reports Francis wrote that 'the channel carries off not only the water from the whole of the East Park Land but also that from North Terrace, Rundle, Grenfell and Pirie Streets,' and in August 1856 a letter was sent to the City Council to complain that the lakes of the Garden were contaminated by the impure water flowing from Mr Peacock's tannery. There were to be many more complaints about pollution of the waterway and lakes in the forthcoming years.

The site, though undulating in places, was flat in comparison with those of the botanic gardens in Sydney, Melbourne or Hobart. Adelaide's Botanic Garden site does not have the advantages of Sydney's site with its Harbour background, or that of Melbourne, a large site adjoining the River Yarra, or the hillside and river valley setting of Hobart's Botanic Garden. As a result, there was a need for the garden to be broken up visually into smaller areas. This could be done by planting large trees or using bushes for screening. Visual interest could also be provided by buildings, statues and the shape of garden beds and paths. The first front gates erected in 1855 placed the main entrance in a position opposite East Terrace. This marked the beginning of what came to be known as the Main Walk, a substantial path running north-south and forming an important design

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163 Report, June 1856.
feature along the north-south axis. In the first year Francis
established his 'Great Circle', using paths and circular ornamental
beds along the north-south walk. This was a major design feature
and can be compared to the formal design of the central beds in the
Victoria Square design of Francis which were of a diamond shape
with an oval bed around the outside of the diamond. In the Botanic
Garden design the effect was of a cross surrounded by a circle. The
undulating line of the watercourse and the curved beds of the Great
Circle and various paths provided curved lines to contrast with the
straight line of the Main Walk.

The greenhouse, sheds, store room, and later workshops and a stable
were placed along the western boundary, adjacent to the Adelaide
Hospital site. The location of such buildings near a boundary was a
feature seen in the site plans of the botanic gardens of Birmingham,
Belfast, Edinburgh, Sydney and Hobart during this period.164 In this
part of the garden there was also the attractively designed Director's
residence with its dormer windows and trellis for climbing plants.
In 1857 the Committee successfully applied to the Chief Secretary
for one thousand pounds for the purchase of a Conservatory, an
important acquisition for any botanic garden, and this, too, was
placed along the western boundary.

Once a basic design was established and soil was prepared, 1856 saw
considerable acquisition of plant material. Local nurserymen
supplied 'available forest and ornamental trees, shrubs and hedge

164 See H. R. Fletcher & W. H. Brown, The Royal Botanic Garden, Edinburgh, Her
30-31; L. Gilbert, The Royal Botanic Gardens, Sydney. A history 1816-1985,
plants, bulbs and seeds' and members of the local community were generous with gifts from their own gardens in the way that John Baker had suggested in his speech to the Legislative Council. Francis refers to contributions from 'leading citizens'. The committee minutes records gifts of aloes from Mr. Neales and a further gift of poplars. Those acknowledged in 1857 were Messrs Ayres [sic], Bailey, Black, Bonney, Curnow, Gosse, Heuzenroeder, Hall, G. Hawker, Js. Hawker, Moore, Paisley, Phillips, Schonburck [sic] Turner, Dr. Müller of the Botanic Gardens, Melbourne, Dr. Wyatt, and Hon W. Younghusband\(^{165}\) many of them names which were to recur as contributors in later years. Orders were placed with local nurserymen such as Messrs. Curnow, Bailey, Giles, Hackett and nurseries in other colonies such as those of Shepherd and Macarthur's Camden Nursery in New South Wales. The Minutes record that as early as October 1855 a sum of five pounds was to be sent by Dr. Schomburgk to Germany to purchase seeds on behalf of the Committee. Schomburgk was to select and order these and it appears to be his first recorded involvement with the Botanic Garden.\(^{166}\) Committee members themselves might help to obtain plant material while on trips out of South Australia.\(^{167}\) In June 1856, the Committee was endeavouring to obtain 'interesting seeds and plants from each of the Australian colonies, from the Cape of Good Hope, the British Isles, Germany and Mauritius'. Consignments of plants came from overseas. There are records of orders placed in 1856-7 with Carter and Charlwood, and Henderson of St John's Wood in England,

\(^{165}\) Report, 31 December 1857.

\(^{166}\) Minutes, 20 October 1855.

\(^{167}\) For example, Mr Paisley was requested to make purchases while travelling 'to the other colonies' in November 1856.
with Peter Lawson of Edinburgh, Van Houtte in Belgium and a New Zealand firm.\textsuperscript{168}

By 1857 progress was such that plants could be distributed to colonists. This was on the understanding that they report on their success or failure in growing them and was the beginning of a long period of two-way exchange between community members and the Botanic Garden.\textsuperscript{169} Plant material was also exchanged with institutions in other Australian colonies and overseas, including material sent from the Botanic Garden in Java in 1858.\textsuperscript{170} Within Australia, letters were sent to the Colonial Secretaries for Sydney, Melbourne and Hobart Town with requests for seeds and plants and questions on the management of their botanic gardens.\textsuperscript{171} A letter to the Governor of Hong Kong requesting seeds and plants from China states that the committee was keen to establish correspondence with interested persons in Formosa or Japan. Interest is expressed in both useful and ornamental plants, specifically mentioning the Wax-tree (\textit{Stilligia sebifera}), the Tallow-tree (\textit{Croton sebiferum= Sapium sebiferum}), the Lichi Nut (\textit{Dimocarpus}) and \textit{Cunninghamia lanceolata} in addition to different varieties of tea, yam, palms, cotton, rice-paper plants, ground nut, Trapa nut and edible water chestnut.\textsuperscript{172}

Valuable plant material came from the botanist Ferdinand von Mueller

\textsuperscript{168} Minutes, 1856-7 period.

\textsuperscript{169} Best, \textit{Francis}, p. 84.

\textsuperscript{170} Minutes, June 1858.

\textsuperscript{171} Minutes, April 1856.

\textsuperscript{172} Best, \textit{Francis}, p. 84.
(later Baron Sir Ferdinand) in Melbourne. Von Mueller, who had lived in South Australia immediately after his arrival in Australia from Germany, had been appointed Government Botanist for Victoria in 1853, becoming, in addition, Director of the Melbourne Botanic Gardens from 1857-1873.

As a result of his collecting and publishing activities Francis had already made contact with Sir William Hooker when he was a young botanist in London. He could have expected assistance with plant material and advice from Hooker and the Royal Botanic Gardens, Kew, simply from being in charge of a colonial botanic garden but it was no doubt advantageous to have some personal contact. The tone of Francis in his letters to Hooker is one of considerable deference. In addition, the network of contacts included colleagues in botanical societies such as the Linnean Society and the Botanical Society of London (of which he was a member) and the Horticultural Society of London (of which he became a Fellow in late 1857).

It was in keeping with Francis' previous work and interests that he should encourage the establishment of a library associated with the Botanic Garden. It was considered that a botanic garden of some standing should have a library and given the geographic isolation of South Australia a specialist library was of particular value. As early as October 1855 periodicals such as the Gardener's Chronicle,

173 Best, Francis, Appendix A.
174 Best, Francis, p. 88.
175 Francis had already been active on the committee of the South Australian Library and Mechanics' Institute and involved in the formation of the South Australian Institute.
*Turner's Florist and Fruitist* and *Paxtons' Flower Garden* were ordered.\textsuperscript{176} In 1857 the Committee approved orders of books, some through the London bookseller William Pamplin, a former nurseryman and an old friend of Francis.\textsuperscript{177} Others were purchased from the collection of George Stevenson after his death.\textsuperscript{178}

Francis and the Board also set some limits on what the Gardens would do, as in August 1857 when they rejected the suggestion that the Botanic Garden should grow vegetables for the Lunatic Asylum. Francis would have been aware of considerable controversy in Sydney over early demands that vegetables and fruit be grown for the Governor and local officials.\textsuperscript{179}

Meanwhile work had been going on developing the site and it was decided that the Gardens would be ready for the public by early October 1857. To this end numerous iron-framed seats were placed in position, paths made ready and a summer house erected. There were already some thousands of trees and shrubs, a 'rosarium' and bright flower beds on either side of the Main Walk.\textsuperscript{180} As well as ornamental plants there were 'compartments for medical plants, textile plants, bulbs, grapes etc.'\textsuperscript{181} Opening hours were to be Monday to Friday 9 a.m. to 5 p.m. and Sundays from 2 p.m. to 5 p.m., with no

\textsuperscript{176} Minutes, October 1855.

\textsuperscript{177} Minutes May 1857.

\textsuperscript{178} Minutes, November 1856.


\textsuperscript{180} Best, *Francis*, pp. 87-88.

\textsuperscript{181} Report 1857.
Entrance to the Botanic Garden

Main Walk provided the north-south axis to the original site plan.
Saturday opening at that stage. There was to be no charge for admission. Regulations had been drafted to secure the safety of the plants: visitors were not allowed to smoke, to touch the plants, to deface the seats or ornaments or to carry flowers through the Gardens without the permission of the Superintendent. Immoral conduct or language was to be punishable 'by the utmost severity of the law'.

The Gardens were first opened to the public on 4 October 1857. The Brunswick Band was given permission to play in the Gardens on Wednesday evenings from 5-7 p.m. and the first concert was attended by nearly nine hundred people, including the Governor, Chief Secretary and several members of the Legislative Council. At the end of 1857 Francis could write that although there had been over 12,000 visitors up to 31 December there had been no injury to plants 'by either accident or design'. Such interest and support by the community spurred the Committee into further activity. Two greenhouses were ordered in addition to the Conservatory previously mentioned. Orders were placed in Europe for 'forest and ornamental trees' suitable for avenues and shady walks and efforts were made to improve paths. The need to improve paths is also echoed in the Annual Reports of the botanic gardens in Sydney, Melbourne and Hobart during this period - it would have been especially important to have paths of a kind to keep mud and dirt from the long dresses worn by women visitors.

182 Best, Francis, p. 87.
183 Report 1857.
184 Report 1857.
Francis also turned his attention to the labelling of plants. This was essential for the educational role of a botanic garden but not an easy task, as is implied by the article he published in 1858 on the 'Indestructibility of ink for Zinc labels'.\textsuperscript{185} To add to the attractions available to the public Francis suggested that animals be kept in the garden. By the end of 1858 the Gardens had been presented with 'two swans, four grey geese, two cygnets, two Muscovy ducks and an owl',\textsuperscript{186} a collection which was the nucleus of the Botanic Gardens zoological section.

The plant collection itself was to have 'a proper and scientific arrangement'.\textsuperscript{187} In a Progress Report, December 1855, Francis referred to his intention to have an area for the scientific arrangement of plants.\textsuperscript{188} In the first Annual Report to June 1856 he made it clear that the layout of the garden was according to botanical principles:

other parts ... chiefly on the south side ... are formed into various compartments and beds for general ornamental planting and for certain tribes and groups of plants as one for the Lily tribe, one for Iridaceae, another for oleander, a fourth for annuals. Four large circles for the plants and shrubs of Swan River, South Australia, New South Wales and Van Diemen's Land and Victoria, the whole to be surrounded by a belt of Acacias and other things common to Australia. Next will follow the plants of the Cape of Good Hope, the plants of Europe and of America. The Amaryllis tribe, Medicinal plants, etc. and the general scientific arrangement.

He added that there were already more than 2000 plants, many of

\textsuperscript{185} Farm and Garden, 9 September, 1858.
\textsuperscript{186} Report 1858.
\textsuperscript{187} Report 1857.
\textsuperscript{188} But he adds that the land originally selected for this purpose had proved to be too sandy.
them 'rare and valuable'.\textsuperscript{189} 

By December 1857 Francis reported that 

the whole Monocotyledonous department has now been completed, dividing it into Glumaceous and Cyperaceous: Iris, Lilies, Melanths, Amaryllis, and sundry small orders - the Dicotyledonous is far in advance but cannot be finished this year.

As well as ornamental plants there were 'compartments for medical plants, textile plants, bulbs, grapes, etc'.\textsuperscript{190} 

In 1859 he wrote that that there were in the Garden 

distinct groups of beds of for annuals, perennials, roses, medicinal and agricultural plants, those used in the arts, florists' flowers, wattles, swamp plants, &c., departments for those indigenous to Australia, the Cape of Good Hope and other places.\textsuperscript{191} 

This division of plants into areas according to their type of geographic origin is one of the features that made a botanic garden different from a garden that was merely a park or pleasure garden.

The work was being carried out by six labourers as before. In September 1858 Francis was requested to employ some men who were destitute. Questions he raised about the conditions under which they would work are interesting in that they reveal that the regular employees had to supply their own tools for their first six months of 'probation'. The regular employees received 7 shillings a day, had their tools provided after the first six months and were paid whether or not inclement weather prevented them from working. Francis

\textsuperscript{189} Report June, 1856. 

\textsuperscript{190} Report 1858, in \textit{South Australian Government Gazette}, 21 January 1858. 

reported that he did not allow quarreling or bad language, smoking or talking to visitors, and beer was not to be brought into the Gardens by the men except with his specific permission.\(^{192}\)

By 1858 the recreational value of the Botanic Garden to the community is indicated by the large number of visitors; as many as two thousand on a Sunday and these represented 'all levels of society, from the labourers to the Governor and his lady'.\(^{193}\) The scientific and educational role of the garden was promoted that year by the decision to publish the first catalogue of plants under cultivation. Five hundred copies were printed in 1859 and a copy sent to each member of the Legislature - an excellent public relations exercise. Francis wrote in the introduction that the aim of the catalogue was:

that the Colony may know the number and variety and value of the plants introduced in the first three years since the establishment of the Garden ... that correspondence with other countries may be facilitated ... that the student and visitor may be assisted in their examinations, and more than all, that Botanic Gardens elsewhere, and distant friends may be better enabled to aid by their contributions; or by means of exchange, to ensure an increase in collection to both.

Conditions for exchange were set out:

1. Plants valuable in agriculture, medicine, or the arts, and specimens required for artistic, scientific, educational, or benevolent purposes, gratuitously furnished.

2. No purchased or presented plant to leave the garden.

3. No new ornamental plant to be distributed by root, cutting or slip, until one year after it has flowered, nor then unless four good plants have been secured for the garden.

4. All plants, as they can be spared, are offered in exchange for those not in the Catalogue, no person, however, being entitled to receive more than a single

\(^{192}\) Best, Francis, p. 92.

\(^{193}\) Register, no date given, reported in Best, Francis, p. 95.
specimen, a packet of seed, or two or three cuttings of the same plant.

5. Plants are not cultivated for sale, but only for the supply of the garden, and the above purposes; but superfluity arising from natural increase and ordinary cultivation, is freely distributed for the use of public establishments, upon written application to the Committee, through the Superintendant.\textsuperscript{194}

Such regulations were designed to encourage donations and exchange of plant material while protecting the interests of the nurserymen, who as active members of the Agricultural and Horticultural Society, would have been keeping a watching brief on actions which might be against their commercial interests.

The catalogue, containing 2878 species, marked with an asterisk those plants that were first introduced into the Colony or first brought into cultivation by means of the Botanic Garden; and over half were so marked. There were about 500 'Florists' varieties' which would have included many of the annuals. Francis reminded his readers that many plants were known by more than one name and were often known locally by names not generally used by botanists.\textsuperscript{195} In providing names according to genus and species Francis was providing a valuable educational and scientific service. There was some correspondence in the local press about the use of Latin names together with a plea for common names to be appended and Francis replied to this by commenting on the great variety of common names, explaining that he would not know, in the case of \textit{Viola tricolor}, which of the common names to use - 'Heart-ache',


\textsuperscript{195} Francis, Preface, \textit{Catalogue of the Plants}. 
'Love to Idleness', 'Three faces under once hood' or 'Cuddle me to you'! He warned his readers that since common names varied as to locality they must make some effort to use greater precision in the naming of both plants and animals, and that using European names for native plants could produce great confusion. The existence of the catalogue also gave incentive to the programme of labelling of plants, without which the catalogue had less educational value to local residents. Keen to establish reputation of Adelaide Botanic Garden both in Australia and overseas, he sent a copy of the catalogue to Sir William Hooker at the Royal Botanic Gardens, Kew. Apart from recording the extent of the Adelaide collection the catalogue indicated what plants could be grown in the climatic conditions of the Adelaide plains.

Francis kept a register of plants cultivated in the Gardens during the years 1859 to 1865. By 1860 there were three thousand species. In addition to the growing collection of live plant material a start was made in 1859 on the collection of dried plant material to form the basis for a herbarium. Establishing a herbarium collection was, like the production of a catalogue and the establishment of a botanical library, part of the establishment of a scientific institution that could be taken seriously in international circles. It meant that specimens would be sent to the Botanic Garden by collectors, and the Botanic Garden would become part of an

196 For example he cited plants known as 'Native Peach', 'Native Orange' or 'Native Currant' which were not varieties of the peach, orange or currant known in Europe. Copy of correspondence in Adelaide Botanic Garden Archival files.

197 Best, Francis, p. 98.

198 There is a Minutes reference as early as January 1856 to dried material having been received from a Mr James which had come from a Mr Catlett of Sydney.
international exchange system. The Botanic Garden staff of this early period were not involved in the collection of indigenous plant material and were dependent on having specimens sent to them by collectors.

Important as the herbarium might have been from a scientific viewpoint most visitors would probably have had more interest in the zoological collection. Francis was following the example of Regent's Park in London which he had known well and which combined a botanical garden, park area and zoo. There was an educational role to be provided by the zoological collection and, as we saw in Chapter 1, a long-standing tradition of gathering together examples of God's creation. It was not at all uncommon for nineteenth-century botanic gardens to have a zoological collection, and in the colonial situation it was a sensible administrative arrangement to have one institution provide a number of services. Francis placed advertisements in the Press in 1859 requesting donations of animals and birds. By the end of that year the collection included wallabies, kangaroos, native cats, opossums, wombats, emus, alpacas, deer, llamas, an apteryx, lizards, iguanas, a mooruke (a type of ostrich), owls, water-fowl, Cape Barren geese, parrots, eagles, hawks, plovers, native pheasants, magpies, doves, pigeons, English singing birds, black swans, and six white swans donated by Queen Victoria. Local residents provided specimens, as did visiting sea-captains and their crews. The government made only a token allowance towards the cost of food but Francis and his friends helped with money of their own. The astute Francis and his committee no doubt realized that the collection

199 Letter, 3 March 1860, in Adelaide Botanic Garden archival collection and Best, Francis, p. 102.
increased the popularity of the Garden and thereby increased potential support from the community.

In October 1860 the Botanic Garden Act came into force, placing the Botanic Garden under a Board of Governors and giving it greater power to make decisions about its own affairs although it was still dependent on its annual grant from the government. There had been three Government nominations on the Board whereas there would now be five appointed by the Government in addition to three by ex-officio members. Attendance at meetings increased and the Board displayed more enthusiasm.\(^{200}\) There had been numerous occasions recorded in the Minute Book in 1856-7 when only one or two Board members had attended a meeting. Previously three members were appointed by the Agricultural and Horticultural Society, changing yearly and two others had been appointed by right of office (the Mayor of the City and the senior member for Adelaide in the House of Assembly, the lower house of parliament). Francis had commented in a letter to Sir William Hooker in 1855 that 'this is a very great evil, as new men have new views, and a great disturbance of direction of plan is the result, more especially as the said society are wholly, individually and collectively ignorant of Botany or have little sympathy with science, but have already aimed and will still aim at making the Garden horticultural'.\(^{201}\)

The period 1860-1865 saw the addition of decorative features such as new fountains and rock work, vases, statues, 'new and elegant

\(^{200}\) Best Francis, p. 119.

\(^{201}\) Reprinted in Best, Francis, p. 164.
The first Main Gates in North Terrace

This very early photograph (c. 1863) of the Botanic Garden, shows the extent to which the area near the Botanic Garden had become denuded of trees by the 1860s.
front fencing and wall", amenities such as rustic seats and a drinking fountain as well as animal cages and aviaries, the planting of avenues and the development of trees and shrubs to form 'vistas'. Some of the trees planted in the Francis era have survived until today, a fine example being the old Peppercorn tree, *Schinus molle*, near the North Terrace entrance gates. Additions were also made to the elaborately designed 'Rustic Temple' which functioned as a Wood Museum. This had displays of wood specimens, dried plants, seeds, fibres and various botanical curiosities to make a botanical museum and herbarium. Francis hoped that it would become a class-room as well.

Francis was increasingly unwell in 1864. He died on 9 August 1865, 'after a long illness of dropsy'. In those first ten years he had established the basic site design of the Botanic Garden which included the position of the Main Walk and the stream and lakes. There was a conservatory, greenhouses and glasshouses, a rosery, an Arboretum, paths, shelter houses, bridges, fountains, some statuary and seats for visitors. The plant collection consisted of some 3800 species.\(^2\) There had been trials of plants with economic potential. In addition there was the Wood Museum with the beginning of a herbarium collection. Through his own enthusiasm and determination, and by enlisting the support of members of the local community, Francis had established a collection of animals and birds with only limited official support. The foundations were laid for further developments by the successor of Francis and the difficult early years were over.

The Board now advertised for a new Director and from a number of

\(^2\) R. Schomburgk, Report from the Director of Botanic Gardens 1866, p. 2.
applications chose Dr. Richard Moritz Schomburgk of Buchsfelde, near Gawler, as successor to George William Francis.
Chapter 3

RICHARD MORITZ SCHOMBURGK

Richard Moritz Schomburgk was born on 5 October 1811 at Freyburg on the Unstrut River in Saxony, Germany, the son of Christine Juliane and Johann Friedrich Ludwig Schomburgk. Baptized as Moritz Richard, he appears to have used Richard as his first name in his adult life. From 1801 to 1820 his father was assistant pastor at Freyburg on the Unstrut, about fifty kilometres from Leipzig and from 1820 to 1847 at Voigstaedt, a town some seventy five kilometres east of Leipzig. Richard's paternal grandfather was mayor and head of the local court (Gerichtsdirektor); the family apparently came from the old town of Querfurt, Saxony, south-west of Halle. Richard was the fourth child and the third son. His eldest brother, Robert Hermann, was born in 1804, Richard's sister, Linna Theresia, was born eighteen months later in 1806, followed by Alfred Otto, known as Otto, in 1809. Richard was thus two years younger than Otto and seven years younger than Robert. His role as the 'younger brother' of these two very able young men seems to have stayed with him through his early adult years. The youngest brother Ludwig Julius, known as Julius, eight years younger than Richard was born in 1819.

Richard Schomburgk is thought to have been educated at a Freyburg primary school and by a private tutor.¹ His later writings indicate

¹ Letter from Freyburg archivist, Martin Pietzch to Raoul Middleman, 27 June, 1973. I am indebted to Raoul Middelman (Schomburgk's biographer for Australian dictionary of biography) for his research on Schomburgk's years in Germany, some of which is contained in an unpublished essay on Schomburgk by Middelman.
some knowledge of French. There is a letter from his father to the Royal Geographical Society in London in French, then much used as a language with which educated people could communicate on an international basis. It was written of the four Schomburgk brothers in 1860 that they had all had the advantage of commencing life with a liberal education. The family had moved to Voigstaedt in 1820 and in 1825, when Richard would have been fourteen, he began a gardening apprenticeship at Merseburg, about fifty kilometres east of Voigstaedt. Most of Saxony had fertile soil, and wheat, beet and other vegetables, hops and flowers were grown extensively in the nineteenth century. The oldest brother, Robert, had been sent to work with an uncle, a merchant in Leipzig, and lived there from 1823-1828 while the next brother, Otto, went to university at Halle. Both Halle and Leipzig were within a twenty five kilometre radius of Merseburg. Julius, the youngest son, is thought to have been apprenticed as a goldsmith and silversmith. Sending Richard and Julius, the third and fourth sons of a clergyman from an old


3 Letter by 'E.L.G.' to the *South Australian Register*, 23 Jan., 1860.


5 Information from Schomburgk family, from Raoul Middelman and from the University archivist at Halle.

6 The proximity of the Harz Mountains made work with precious metals an important local industry.
established family, to undergo practical training which provided good employment opportunities, would have been a decision that was socially acceptable and economically prudent at that time.

The Scottish landscape gardener and author J. C. Loudon wrote in 1837 that a German gardening apprenticeship was for three and a half years, followed by travel for three years. The young men were expected to travel and work in different parts of the country or in other countries. Apprentices were taught drawing and were 'furnished with the secrets of gardening by their master', after which the youth

is initiated into what might be called a freemasonry of gardening, and being furnished with a password, he proceeds from one town to another until he can get work. Till this happens, his password, and also a passport from the gardeners society of the place where he was initiated, procures for him, at every gärtner herberge or gardeners' lodging-house, lodging and food, and as much money as will supply his wants, till he arrives at the next inn. In this way he may walk over the whole of the German empire, Denmark and a part of Holland, at the general expense...7

Such an approach would have given a young man broad experience of gardening styles. Loudon writes very positively about the attitudes of the Germans towards horticulture and botany:

The German are a scientific people: they are a reading people; and, in consequence, the science of every art, in so far as developed in books, is more generally known there than in any other country.8

While he made some exception of Scotland he considered the Scots did not travel as much and so did not experience a variety of practices and opinions. Loudon commented on the existence in

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8 ibid., p. 224.
Germany of 'professorships of rural economy' and horticultural societies such as the Altenburg Pomological Society which promoted the culture of fruits. He observed that while the Prussian Gardening Society was comparable with the Horticultural Society in London with regard to 'the number and rank of its members' and the value of its published Transactions, it surpassed the Horticultural Society in London and other comparable bodies as a scientific body. Commenting on the number of societies in Germany concerned with both agriculture and horticulture, he remarked that although the scientific study of horticulture might be greater in France it was 'accumulated in the capital' whereas in Germany knowledge was much more widely spread and therefore available to 'practical men'.

The German gardener is generally a thinking, steady person; the climate in most places requires his vigilant attention to culture and travel has enlarged his views. Hence he becomes a more scientific artisan than the Frenchman, and is more in demand in other countries. All the best gardens in Poland, Russia and Italy are in the care of Germans.\(^9\)

In science the German gardener is decidedly in advance of every other in Europe; and in routine of practice he is surpassed by none in steadiness, or, where he has leisure, and is properly encouraged, in order and neatness.\(^10\)

Loudon believed that German gardens were on the whole 'inferior in the splendour of its productions' to those of Britain, but that German gardening was

pursued with greater ardour in proportion to the wealth of its inhabitants


\(^10\) *ibid*, p. 132.
than in Britain\textsuperscript{11} and that

the taste for plants in Germany is very considerable among the higher classes; and not only public bodies but private gentlemen, and princes of every degree, spend a much greater proportion of their income in the encouragement of this branch of gardening, than is done by the wealthy of England.\textsuperscript{12}

Although German gardeners had to contend with severe winters which made the growth of evergreens and turf difficult\textsuperscript{13}, the culture of flowers and ornamental plants was very general among the wealthy in Germany. Both 'the forcing of flowers' (growing them in glasshouses) and the cultivation of vegetables and fruits during winter appeared to Loudon as advanced as that practised in Britain. He commented on the use of tree-planting along public roads, especially in Prussia; lime and elm were used, and mulberry in the warmer areas, as well as Lombardy poplars near towns, especially in Berlin, Dresden and Leipzig.\textsuperscript{14} It is noteworthy that later in his life Schomburgk used mulberry, elm and Lombardy poplars in Adelaide and was also a great supporter of the idea of tree-planting along public roads in South Australia.

Loudon considered there had been much stimulus from the activities of the Prussian Horticultural Society and contacts between the German princes and the Horticultural Society in London. The Prussian Horticultural Society had established a school for gardeners, where in addition to instruction in techniques of propagation, there was

\begin{itemize}
\item \textsuperscript{11} \textit{ibid}, p. 132.
\item \textsuperscript{12} Loudon, \textit{Encyclopaedia of gardening}, p. 207.
\item \textsuperscript{13} Loudon considered the culture of hedges to be not so advanced as in England and he was a little critical of the lack of evergreens in German gardens.
\item \textsuperscript{14} Loudon, \textit{Encyclopaedia of gardening}, p. 217.
\end{itemize}
training in botany, chemistry, mineralogy, geography, drawing, design and costing. These students then worked in the royal gardens. German aboriculture - the growing of trees - Loudon believed to be in advance of practice in Britain. Loudon's observations are valuable both for the detailed account we have of gardening in Germany in the 1830s, and for the light they throw on the attitudes of British garden enthusiasts towards German gardeners. His views indicate the high regard with which German gardeners were likely to be held in a British colony.

Loudon listed a number of botanic gardens that had been established in Germany: that at Leipzig went back to the seventeenth century and others had been established at Giessen, Stuttgart, Altorf near Nuremberg, Rintel in Westphalia, Ratisbon in Bavaria, Ulm on the Danube River, Jena in Thuringia, and Königsberg in East Prussia. Saxony itself had a small but fine botanic garden at Dresden, referred to by Loudon as one of the 'prettiest in Europe'. Rich in exotics, it had in all nearly 10,000 species when he wrote in the 1830s. There was a Botanic Garden at Munich with a fine collection of Brazilian plants and the famous Nymphenburg gardens were also in Bavaria. The Botanic Garden in Berlin, laid out by Sckell, was considered by Loudon to be the finest in the whole of Germany. Its hot-houses could accommodate Australian, Cape and Mexican plants. In Austria there was the celebrated Schönbrunn gardens which had plants from both the Cape and Australia.

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15 Loudon, Encyclopaedia of gardening, pp. 132-3.
16 Ibid, pp. 199 & 207.
Professional gardeners in Germany could become familiar with a wide variety of exotic plants through such collections and they could also become familiar with a variety of landscape design styles through the examples provided by other important gardens, both public and private. Amongst these were the Hortus Palatinus at Heidelberg in the Renaissance style; gardens in the Baroque style such as Veitshöchheim at Würzburg, Bavaria, with its rococo statuary and hedged walks; the Grosser Garten at Dresden (not far from where Schomburgk grew up) with its fifteen hundred statues; Herrenhausen in Hanover; Favorite at Mainz; and Augustburg in North Rhine-Westphalia, with its network of canals.17

Closer still to Merseburg where Schomburgk trained was the Luisium garden at Halle, laid out by the German landscape designer J. F. Eyserbeck (1734-1818). It was an almost regular garden with particularly fine groves of trees, a long lake and an orangery (a form of conservatory).18 Loudon's descriptions indicate that orangeries could be on a large scale. For example, the gardens of Heidelberg had an orangery 280 feet long (85 m) to house some 430 trees in addition to a great flower garden, parterres, fountains, arbours and a large grotto. Other famous gardens of the period included that of the Grand Duke of Baden at Schwezingen between the Rhine and the Main with its classical temples, broad gravel terraces, parterres, fountains and statues; Wörlitz near Dessau, which had artificial canals and lakes with small islands, grottoes, and buildings in the classical style; and Wilhelmshöhe near Kassel with complex fountains, cascades, statues

17 Oxford companion to gardens, pp. 235 & 582; Loudon, Encyclopaedia of gardening, p. 177.

18 Oxford companion to gardens, pp. 181 & 347.
and grottoes. Wilhelmsöhhe is rare in Germany today in that it shows an Italian baroque influence.\textsuperscript{19} Loudon, impressed by the quality of landscape design shown in the gardens in Munich and the public gardens laid out by Lenné at Magdeburg wrote approvingly that the work of Sckell and Lenné showed that the principles of landscape gardening were understood better in Germany than in England.\textsuperscript{20}

The encouragement given to young gardeners to travel around Germany enabled them to acquire knowledge of a variety of styles and to draw on the knowledge and skills of professional gardeners elsewhere. Moreover the horticultural institutes and the Prussian Horticultural Society's school of gardening provided some formal structures for training. Loudon's very detailed description of the famous German gardens together with accounts of the training and style of work of German professional gardeners provides useful background material to an understanding of Richard Schomburgk's career. This is especially valuable because there is very limited information available about the latter's apprenticeship or early years of work. This is particularly true of the period 1835-1840 when he worked in the gardens of Sanssouci at Potsdam after his military service with the Royal Guard at Berlin from 1831-34.

Loudon wrote that the German princes were generally very interested


\textsuperscript{20} Leliur's \textit{La Pomone Francaise} (1776), quoted in Loudon, \textit{op. cit.}, p. 133.
in their gardens and put them:

under the direction of intelligent men, who, in general, have spent part of their
time in botanic gardens; and in many cases have studied or practised in Holland, or
in the Paris gardens.²¹

Frederick William III was head of the Horticultural Society of
Prussia and is said to have patronized every branch of gardening.²²
His Sanssouci gardens were

in the mixed style of Switzer, with every appendage and ornament of the French,
Italian and Dutch taste... The Sans Souci scenery is more curious and varied than
simple and grand.²³

The palace itself was on a hill and the slope in front of it was laid
out in six terraces, each ten feet (3 m) high, its supporting wall
covered with glass and used for peaches and vines. To the east was
an area with hot-houses for vegetables and slopes or terraces for
fruit-trees. In the grounds below were 'woods, cabinets and statues'.
One 1818 visitor refers to 'the tombs of some of the favourite dogs
of Frederick II', an 'elegant' grotto and a kitchen which 'represents a
Roman ruin';²⁴ the description reflecting a period when ruins were
fashionable as part of the 'picturesque' style of eighteenth century
English landscape design, as exemplified at Höhenheim and Würzburg
in Bavaria and Stowe in Britain.²⁵

There was a trend during the nineteenth century to divide gardens
attached to mansions into numerous small garden rooms, enclosed by

²¹ Loudon, Encyclopaedia of gardening, p. 218.
²² ibid, p. 138.
²³ ibid, pp. 138-9.
²⁴ ibid, p. 138.
²⁵ F. Lith, Parks und Gärten in Deutschland, H.B. Verlags- und Vertrieb mbH
gazebos, trellises and hedges. This trend was apparent at Sanssouci
and Rheinsburg at Potsdam, Mosigkau at Halle, the Solitude near
Stuttgart, Veithöchheim in Bavaria and the Eremitage near Bayreuth.
Chinese buildings in the form of pavilions, tea-houses or pagodas
were also popular and there were examples of this in Sanssouci, in
Mosigkau and Oranienbaum at Halle and in Pillnitz at Dresden. Then
there was a gradual move away from rococo to the English landscape
style, as seen at Wörlitz, Halle, the earliest landscape park in
Germany, laid out between 1765-1817. Peter Josef Lenné produced a
design for Sanssouci along the lines of the English landscape school
but this was implemented after Schomburgk left Potsdam.26

There were other important gardens at Potsdam too; in particular,
the Neuer Garten adjoining the Heiliger See, a 122 ha park with a
great avenue of oaks, winding alleés and an orangery.27

Training for gardeners, as described by Loudon, would have
encouraged the exchange of ideas among Schomburgk and his
colleagues. They would have been exposed to the ideas of Lenné, a
landscape gardener of great imagination and organizational ability.
Lenné had extended Sanssouci by adding Charlottenhof Park and the
Hopfenkrug in 1826-7 and by redesigning the agricultural areas of the
park. The future Frederick William IV had been given an estate
adjoining Sanssouci and this was developed as Charlottenhof Park by
Lenné with classical style buildings, a regular flower garden,
waterworks and long axial vistas. In 1827 a large area of land known
as the Hopfengarten was developed by Lenné as an elaborate

27 Oxford companion to gardens, p. 396.
landscape garden with statuary, canals and a lake. Lenné introduced the very regular form of Italian Renaissance garden design which was to become fashionable in his plans for the Sanssouci park. His aims and ideas were furthered by the establishment of the Association for the Encouragement of Gardening (1822), a Gardening School and a Provincial Tree Nursery (1822).²⁸

A young man like Schomburgk, working at Sanssouci, would get experience in growing vines, fruit-trees and vegetables as well as the care of shrubs and trees and cultivation of the popular flowers of the time, not to mention exposure to design forms that were fashionable. He would have been very familiar with the use of great avenues of trees and classical style buildings as design features (as used in the Charlottenhof Park by Lenné) and with the use of waterways, lakes and statuary in design (as in the Hopfengarten).

There is no definite evidence that Schomburgk received any formal training in botany beyond the little that would be given to an apprentice gardener. On the other hand, he was exposed to a variety of landscape design styles in Berlin and thoroughly trained in techniques of propagation and garden management. There is a statement made in the *Cyclopedia of South Australia* of 1907-1909 and which also appears in a number of nineteenth century biographical sketches that

> making a special study of botany he became associated with the Imperial Garden at Potsdam and to further his taste for this branch of science, sought the tuition of his famous brother, Sir Robert....²⁹

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²⁸ *Oxford companion to gardens*, pp. 333 & 499.

²⁹ *Cyclopedia of South Australia in two volumes: an historical and commercial review*, edited by H. T. Burgess, Austaprint, Hampstead Gardens, S.A. 1978 (originally
Robert was self-taught but very knowledgeable. If the statement is correct it would help explain the development in Richard's career from that of practical gardener to later work as a botanist and naturalist.

Schomburgk had by this time met his future wife, Pauline Kneip, born 1822, the daughter of a Potsdam man described variously as an architect and as a timber merchant. In Pauline's autograph book there is a little verse from Richard, dated January 1838, when Richard was twenty six and Pauline only sixteen. His verse says that fate often gives us a thorny path but that if one walks along it quietly, 'the thorns may blossom into roses'. There is also a postscript, 'Please, remember me also sometimes without these lines'.

The verse is well in keeping with the Romantic mood of the time and it is appropriate to note here that Schomburgk was a contemporary of some of the great figures of the Romantic period. While writers and musicians of this period differed greatly in the nature of their work and their critical approach, they shared an emphasis on natural rights and the importance of the individual; there was also a belief

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31 Autograph book of Pauline Schomburgk in the possession of the Schomburgk family in Adelaide.

32 For example, Schomburgk, born in 1811, was a contemporary of the musicians Richard Wagner (born 1813 in Leipzig), Robert Schumann (born 1810 in Zwickau, Saxony, about 50 kilometres from Schomburgk's birthplace), Felix Mendelssohn-Bartholdy (born 1809 at Hamburg and Franz Liszt (born 1811).
that people became closer to God through understanding Nature. Both individualism and concern for nature were features of Schomburgk's own writing in the decade after the little verse was written.

Marriage to Pauline was to be postponed for many years. Instead, Richard joined his older brother Robert, on an expedition of exploration to British Guiana; one of thousands of young men from Germany who were attracted by the opportunity to travel to the United States, Australia or South America during the 1840s and 1850s. This path, while certainly 'thorny' in its discomforts and dangers, was one which established Richard Schomburgk's reputation as a botanist and explorer.

The British Guiana Expedition 1840-44

Robert Schomburgk had already been active in exploring the interior of British Guiana. Robert had gone to North America in 1822 to further his commercial career. After an unsuccessful episode as a tobacco producer in Richmond, Virginia in 1828-9 he had gone to St Thomas in the West Indies in 1829-30, surveying and mapping at his own expense the area of the Anegada Passage. In an area notorious for shipwrecks and known for both dangerous reefs and pirate activities, he discovered a current which took vessels towards the Anegada reefs. His charts and memoranda brought him to the

33 *Encyclopaedia Britannica Macropaedia*, vol. 10, pp. 1172-4, 1180-87, 1196-98.


35 Anegada is the north-easternmost island of the Virgin Isles of the British West Indies.
attention of both the British Admiralty and the Royal Geographical Society. He was asked to conduct further surveys and subsequently the Royal Geographical Society commissioned him to undertake exploration of the interior of British Guiana during the years 1835-39.\textsuperscript{36} He seems to have been largely self-taught as a naturalist and hydrographer in the manner of the nineteenth-century amateur enthusiasts, especially gentlemen amateurs. In 1834 Dr William Hooker could write that he was 'a very accomplished naturalist' who had made excellent observations of the cultivated plants of the West Indies, published in \textit{Linnaea}.\textsuperscript{37}

Robert Schomburgk's interest in British Guiana had been stimulated both by the writings of Alexander von Humboldt (1769-1859) who travelled in South America during the early part of the nineteenth century, and by the accounts of Robert Hillhouse, a surveyor and correspondent of the Royal Geographical Society.\textsuperscript{38} Von Humboldt had suggested, after returning from Mexico, the direction and routes by which the unknown portion of the South American continent might be explored, between the sources of the Orinoco, the mountain chain of Pacavaima and the seashore near Essequibo.\textsuperscript{39} One purpose of Robert's expedition was to investigate thoroughly the physical geography of British Guiana; another was to determine astronomically a series of fixed points extending across the

\textsuperscript{36} The President recalled in 1865 what a very favourable impression had been made 'by the energy, zeal, and ability displayed by the then unaided Prussian traveller.' \textit{Proceedings of the Royal Geographical Society} 1864-5, p. 208.

\textsuperscript{37} \textit{Journal of Botany}, 1, p. 179, quoted in Rodway, 'The Schomburgks in Guiana', p. 2.


\textsuperscript{39} Letter to the \textit{South Australian Register}, 23 January 1860.
watershed of the rivers of equatorial America, connecting positions thus ascertained with those of Alexander von Humboldt on the Upper Orinoco.\textsuperscript{40}

Any collections were to be at his own disposal except for one set of natural history specimens for the British Museum and a geological collection for the Geological Society.\textsuperscript{41} Although there were many losses from water damage, botanical specimens were subsequently sent to London together with specimens of about sixty birds for the British Museum. Botanical papers were provided for the Linnean Society and astronomical observations were also made as part of a series that were linked with those of von Humboldt. Robert Schomburgk sent regular reports to the Royal Geographical Society and his coloured drawings of the magnificent aquatic lily, which came to be known as the Victoria water-lily, \textit{Victoria regia}\textsuperscript{42}, today known as \textit{Victoria amazonica}, produced great excitement. Descriptions were published in both scientific journals and newspapers.\textsuperscript{43} Robert sent back seeds of the waterlily in 1837, although it was not until 1849 that it was grown successfully in Britain.\textsuperscript{44}

\begin{footnotesize}
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\item \textsuperscript{40} \textit{Proceedings of the Royal Geographical Society}, London, 1862-5, pp. 208-209; Rodway, 'The Schomburgks in Guiana', pp. 2-3.
\item \textsuperscript{41} Rodway, 'The Schomburgks in Guiana', pp. 2-3.
\item \textsuperscript{42} It was also known as \textit{Victoria regina}.
\item \textsuperscript{43} Robert was not the first European to sight the lily, which had been seen previously by Hanke in 1802, Bonpland in 1820, d'Orbigney in about 1827 and then by Poepping who named it \textit{Euryales amazonica}. However the generic name of \textit{Victoria} was accepted by botanists.
\item \textsuperscript{44} Hepper (ed.) \textit{Gardens for science and pleasure}, pp. 56-60; \textit{Friends of the Botanic Garden Gazette}, vol. 9, no. 3, June-July 1986, p. 53.
\end{itemize}
\end{footnotesize}
The middle brother Otto wrote one account of that first expedition on behalf of Robert. Given the close relationship of the three brothers, their common interest in the natural sciences and the great public interest in such explorations in those days, there is every reason to believe that Richard was involved in some way. It is clear that Alexander von Humboldt himself took a considerable interest in Robert Schomburgk's early travels in British Guiana. Von Humboldt had travelled from 1799-1804 in the countries that we know today as Venezuela, Cuba, Colombia, Ecuador, Peru and Mexico. He had travelled to Esmeralda on the Upper Orinoco (a place used as a penal colony and known for its complete isolation and the ferocity of its mosquitoes), and had established the position of the sources of the Orinoco. He was the first European to write an eye-witness account of the preparation of the deadly arrow poison, 'ourrari' (later called curare), after having been taught about methods of distillation by an old Amerindian.45

Richard's writings refer to the enormous respect he had for von Humboldt. Exactly when the contact was first made is not known. In his preface to *Travels in British Guiana* Richard acknowledges von Humboldt's vital role in having him included in the later expedition of 1840-44. Commenting that Robert's 1835-39 expedition had attracted 'men of learning' in his homeland - the geographical, ethnographical, botanical and zoological relationship of British Guiana with the rest of the continent being relatively

unknown - Richard wrote of the support that he had received from von Humboldt:

> When my brother, entrusted with a fresh Commission by Her Majesty the Queen of England, returned to the field of his former labours, it was Alexander von Humboldt through whose means I received the assistance from Our Most Gracious Sovereign, that enabled me to accompany him to Guiana, and there, with its numerous treasures, for the most part still undescribed, do the best I could in the interests of our National Scientific Institute.46

The influence that von Humboldt had on Richard, both directly and indirectly makes it appropriate to include some details of von Humboldt's own career at this point. His reputation as a scientist, humanist and traveller was considerable. A man of private means after the death of his mother in 1796, he was able to give up his public service position as a mining inspector in the Fichtel Mountains area to devote his life to scientific travel and writing.47 He became one of the most widely travelled scientists of his day. The von Humboldt brothers, close in both age and in their personal relationship, were outstanding in their respective fields. Alexander von Humboldt studied public finance and administration with a view to a career in public administration. His scientific work covered the fields of geography, meteorology, geophysics, astronomy, history, anthropology, zoology and botany. He studied mathematics, drawing and etching in Berlin in 1788-89 and during this period developed a friendship with the botanist Carl Ludwig Willdenow (1765-1812) who had a great interest in vegetation geography. Von Humboldt's studies in the vegetation geography field date from this time. His


47 Kellner, *Alexander von Humboldt*, p. 18. The title had come to von Humboldt's family only thirty one years before the time of his birth and the brothers Alexander and Wilhelm can be said to be of 'bourgeois stock', while growing up in the life style of the sons of an aristocratic Prussian landowner.
work is of such importance that he can be said to have founded the science of plant geography. Probably the most important collection of plants ever made in tropical America from a taxonomic viewpoint, was that of von Humboldt and his companion Aimé Bonpland.48 This study of botanical geography was created on the principles of Goethe's morphology, and arose from an intensive study of vegetation on large scale tropical rainforests, savannah and the river systems of tropical Latin America.49

From 1789-90 von Humboldt studied at Göttingen with Heyne the philologist, Lichtenberg the physicist, and Blumenbach the physiologist and comparative anatomist. All were internationally recognized scholars. Blumenbach, a close friend of Goethe had great influence on von Humboldt. Regarded today as the father of physical anthropology, Blumenbach believed that travel research was essential for the study of anthropology and biology. A further source of influence was von Humboldt's period at the Busch Academy, with its international student body and a curriculum including such subjects as business, economics, international trade, modern languages and geography. A period at the Freiberg Academy led to von Humboldt's career in mining administration. His research on terrestrial magnetism laid the foundations for the study of

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48 Rogers McVaugh, 'The American Collections of Humboldt and Bonpland as described in the 'Systema Vegetabilium' of Roemer and Shultes', in W. T. Stearn (ed.), *Humboldt, Bonpland, Kunth and tropical American botany*, J. Cramer, Stuttgart, 1968, p. 32. Some 7000-8000 specimens collected by Bonpland and von Humboldt were brought back to Europe. Part of this collection went to Berlin where it was studied first by Willdenow and, after his death, by Karl Sigismund Kunth. The Willdenow herbarium came into the possession of the Berlin Botanical Garden in 1818.

geophysics. He aimed to collect knowledge and to synthesize it. This is seen in the *Kosmos*, where he set out to encompass all areas of human knowledge; to portray the whole material world 'from the nebulae of stars to the distribution of mosses on granite rocks, all in one work'. The fifth and last volume of this was completed three weeks before he died. Presenting a fundamental unity that encompassed the universe required a study of the environment combined with philosophical reflection, this undertaken at a time when an eminent scientist could encompass in his work all known scientific knowledge.

Having independent means, von Humboldt could act independently of sponsors or employers; paying himself for the costs of his five year research expedition to South America and for the printing and fees of a scientific treatise on the journey, some thirty volumes in length. His interests were extraordinarily broad. He was, in addition, a man of 'genial personality', a bachelor, who, in his seventies had considerable physical and intellectual energy. Generous to friends, supportive to able young men of his acquaintance and an indefatigable correspondent, von Humboldt was 'as generous with his time in the pursuit of unrecognized merit as he was generous with unofficial


52 Von Humboldt's 'poetic, synthesizing zeal' has been described as something which allied him with his friend Goethe and the natural philosophers. W. T. Stearn, 'Humboldt and Bonpland's Travels in America', in *Humboldt, Bonpland, Kunth and Tropical American Botany*, p. 45.


assistance for his protégés from his own pockets..."55 Although sometimes criticized for his pride, von Humboldt was revered for his wide talents, originality and the universality of his interests. For the Schomburgk brothers he was someone who acted as protector and supporter and also a guide for their scientific endeavours. Von Humboldt was a diplomat of some skill and his father had been Chancellor to the royal court. He spent the last three decades of his life in Berlin as a Chamberlain in the royal court. This task, while exasperating to him, provided him with some practical advantages, including some financial bonuses useful for a man who had spent most of his fortune in the cause of scientific matters.56 Serving as scientist and consultant in administrative affairs, he was scientific adviser to Frederick William IV of Prussia. His position, experience and reputation enabled him to intervene on behalf of his protégés even at a time when his own political leanings towards a more liberal and democratic system were not in line with the the more conservative views of those in power.

Through his contact with von Humboldt and von Humboldt's colleagues and friends, Richard came to know a group of German scientists whose enthusiasm and broad interests must have provided an extraordinarily stimulating atmosphere. His network of contacts included his brothers' friends. Otto Schomburgk is said to have numbered among his friends such outstanding scholars as Ehrenberg and Ritter as well as Alexander von Humboldt's friend Leopold

55 Kellner, Alexander von Humboldt, p. 166.
56 Kellner, Alexander von Humboldt, p. 127; Meyer-Abich, Alexander von Humboldt, p. 11.
von Buch and the publisher J.F. Cotta. These were influential people. The geographer Carl Ritter (1779-1859), Professor of Geography in Berlin from 1820, can be regarded as a founder with von Humboldt of modern geographical science and with him provided a geographical interpretation of history. The naturalist, microscopist and scientific traveller Christian Gottfried Ehrenberg (1795-1876), who wrote a foreword to the section on microscopic life-forms in the third volume of Richard Schomburgk's *Reisen in Britisch Guiana* (the volume on the flora and fauna of British Guiana) is regarded as the founder of micropaleontology, the study of fossil organisms. Born in Prussian Saxony and a member of the Berlin Academy of the Sciences and the Deutsche Akademie der Naturforscher Leopoldina, he had accompanied von Humboldt on an expedition to Central Asia and Siberia and was appointed full professor of natural science at the University of Berlin in 1839. Johann Friedrich Cotta was a publisher, his firm publishing works by Schiller, Goethe and the von Humboldts, and Cotta was a champion of constitutional democracy in the Württemberg Diet. The wealthy geologist Leopold von Buch, a friend of both Alexander and Wilhelm von Humboldt from their student days at the great mining academy at

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57 *Kosmopolit*, 15 September, 1857. Information from Tom Darragh, Museum of Victoria [original not seen].

58 Born in Quedlinburg, about fifty kilometres from Halle, Ritter studied at the university in Halle where Otto Schomburgk was later a student.


Freiberg\textsuperscript{61}, is known to have been generous in his assistance to the Schomburgk brothers.

This was a period when the arts and sciences flourished and when the idea of being a citizen of Europe could be a reality, both politically and intellectually. Von Humboldt had known Metternich as a student at Göttingen and was also a fellow student with the Duke of Sussex who later became the President of the Royal Society in Britain. Von Humboldt worked with the Duke of Sussex in 1836 on a venture which proposed international collaboration for the establishment of a world wide circle of magnetic records, to be sent to the Royal Society.\textsuperscript{62} He had travelled to Great Britain where German scientists were held in high esteem. The influence of Prince Albert, who had a great interest in scientific and technical matters, also aided scientific cooperation between Britain and Germany, cooperation demonstrated by the Schomburgk brothers' British Guiana expedition. Enthusiasm for scientific developments meant that those who were interested in natural science had every reason to encourage young men who were prepared to travel in South America in order to collect more data on the natural world. Von Humboldt had a further reason for encouraging the Schomburgk brothers' plans to go to British Guiana. As a man who devoted many years to the service of the Prussian state, he would have appreciated the value of opportunities to collect material for Prussian scientific institutions and to provide new knowledge for natural scientists. So there were a number of reasons for encouraging Richard Schomburgk to accompany the

\textsuperscript{61} This Freiberg was a manufacturing and mining city twenty one miles south-west of Dresden whereas Richard Schomburgk was born in the much smaller town of Freyburg on the Unstrut.

\textsuperscript{62} Kellner, \textit{Alexander von Humboldt}, p. 171.
expedition on behalf of the Prussian Government when Robert was being sponsored by the British Government and the Royal Geographical Society in London.

While it is not known how much contact existed between Robert Schomburgk and von Humboldt before Robert's first expedition to British Guiana, they certainly collaborated between the two expeditions. Von Humboldt wrote an introduction to Robert's *Reisen in Guiana und am Orinoko während der Jahre 1835-1839*.\(^{63}\) His influence on the planning of an expedition was likely to have fostered excellent preparations and recording techniques. The length of time that von Humboldt spent preparing for his own expedition and the thoroughness of his planning was almost unheard of in his day. He was immensely thorough in selecting surveying instruments and read narratives of other journeys and voyages with great care.\(^{64}\) His written records of his travels were vivid and attractive, combining technical detail with interesting anecdotal material. Von Humboldt was remarkable for his botanical collection and for the way in which, together with Kunth and Bonpland, he made the results known comparatively quickly through a number of publications.\(^{65}\) His belief in the value of writing well impressed young men such as the Schomburgks, whom he befriended. His style of writing greatly influenced men of the calibre of Charles Darwin and Alfred Russel

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\(^{63}\) Robert Schomburgk's *Reisen in Guiana und am Orinoko während der Jahre 1835-1839*, Leipzig, 1841 was translated as *Travels in Guiana on the Orinoco* (1931) by William Roth.

\(^{64}\) Some useful accounts of Humboldt's preparations for his travels are found in W. T. Stearn (ed.) *Humboldt, Bonpland, Kunth and tropical American botany*, especially pp. 47, 116-7 & 121.

\(^{65}\) Rogers McVaugh in *Humboldt, Bonpland, Kunth and tropical American botany*, p. 32.
Wallace. Darwin acknowledged the effect on his own career of von Humboldt's *Personal Narrative of Travels* (1819).\(^6\)\(^6\) Von Humboldt's work was also remarkable for its breadth. He collected plants and animals, made astronomical, geographical and topographical observations, and studied the chemistry of the air.\(^6\)\(^7\) He had spent a whole winter with von Buch making magnetic, geographical and meteorological observations, learning to use a twelve inch sextant, and taking regular readings of barometric pressure, temperature, humidity, oxygen and carbon dioxide content of the air and electric charge of the air. On the basis of this, von Humboldt formulated a programme for meteorological observations which became an accepted procedure in later years.\(^6\)\(^8\) By the use of instruments measuring altitude, temperature and pressure, plant zones could be related with physical factors. The Schomburgk brothers were in turn trained to take meteorological observations for their British Guiana expedition and, as will be seen later, Richard used this knowledge in South Australia.

Robert Schomburgk's early expeditions in the period 1835-39 were notable for tracing the Essequibo River to its source and the discovery of Roraima - thus throwing light on the interior of British Guiana. Astronomical observations were made to connect with those made by von Humboldt in the region. Schomburgk was given credit for the founding of the Pirara Mission on Lake Ammacu which is on

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\(^6\)\(^7\) W. Stearn, 'Humboldt and Bonpland's Travels in America', in *Humboldt, Bonpland, Kunth and Tropical American Botany*, p. 45.

the Rupunni and the Brazilian frontier. During these extensive travels in British Guiana he had proved himself to be a reliable and knowledgeable leader. The Royal Geographical Society had awarded him their highest award, the Gold Medal for the year 1839 for his services to geography, zoology and botany. There were strong arguments in favour of a further expedition being sent and when this occurred Robert Schomburgk was bound to be put forward as a potential leader. His interest in the economic resources of the country, helped by his own commercial training, would have made him an attractive candidate to those with the economic interests of the British Empire at heart. In addition, his writings refer to the customs, characteristics and culture of the Amerindians (American Indians) and reveal great concern for them. He had daily contact with Amerindians who were guides on the previous expedition. Robert pleaded that the boundary of British Guiana be defined 'for the benefit of the Indians'. His 'constant pleas' on behalf of the Indians led to the Colonial Office and Governor Light (father of South Australia's first Surveyor-General Colonel William Light) being made aware 'that the Indian cause concerned 'British honour and humanity' '. One of the reasons for the importance of establishing the correct boundary was that Brazilian military press-gangs were said to be forcibly taking away Amerindians for the service of the


70 The indigenous people of North and South America are often referred to today as Amerindians to distinguish them from inhabitants of India. The Portuguese and Spanish commonly use the word 'Indios' and since this translates naturally as 'Indians' it is often used for the tribes of places such as British Guiana and Brazil. The term Amerindian was not used in Schomburgk's day.

Brazilian navy, for military service and for work in mines.\textsuperscript{72} Robert was greatly concerned that numbers in Amerindian tribes in the interior of British Guiana were steadily decreasing due to diseases introduced by the settlers (such as smallpox, influenza, measles and tuberculosis) and due to feuds. He was, therefore, especially eager that any expedition sent to British Guiana should include an artist who could paint members of the different tribal groups and their artefacts.\textsuperscript{73}

When Robert was finally commissioned by the British Government, in association with the Royal Geographical Society, to lead the 1840-44 expedition, Richard was commissioned by the Prussian Government to make collections for the Royal Prussian Museum and the Botanical Gardens at Berlin as both collector and historian.\textsuperscript{74} He later acknowledged that this appointment occurred through the efforts of von Humboldt. Richard's selection provided a loyal second-in-command for Robert. He was physically strong, had a good knowledge of horticulture and would have had some botanical training, although it is impossible to establish exactly how much. Richard refers in \textit{Reisen} to the instructions he received from the Museum in Berlin\textsuperscript{75} and it would have been in the interests of those at the Museum to provide some training in procedures for collection of specimens from such such a little known region.


\textsuperscript{73} Another factor was thought to be demoralization which caused social disintegration and a fall in the birth-rate. This is discussed in Hemming, \textit{Amazon Frontier}, p. 5.

\textsuperscript{74} Rodway, 'The Schomburgks in Guiana', p. 17.

\textsuperscript{75} Richard Schomburgk, \textit{Travels}, vol. 2, p. 70.
Richard's account of the British Guiana expedition in *Travels in British Guiana* makes it clear that his own position was very much that of the younger brother. Robert is presented as the expert in the field of British social mores and the more dominant person. In accounts written by Robert for the Royal Geographical Society and in Robert's correspondence with the Royal Botanic Gardens, Kew and Royal Geographical Society he refers to Richard rarely and, when he does, uses a slightly condescending tone. One might expect to find references to 'my brother and I...' but they do not occur.

An account of the Boundary Expedition (the name often given to the 1840-44 expedition) indicates the importance to Richard Schomburgk's career of his adventurous youth - the challenging years when he collected natural history specimens under such dangerous conditions. It is worth going into some detail because it provides some background to a man who developed a calm and balanced personality and who demonstrated good-tempered reactions and equanimity in dealing with problems that arose in his administrative career.

The ten European members of the party included the young artist Edward Goodall and W. J. Freyer, described as 'Assistant Surveyor'.

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76 For example, in describing an incident where Richard woke up in the night to find that heavy rain had raised the level of the stream beside which they were sleeping Robert said that his brother had behaved 'in a most comical way'.

77 Correspondence in Royal Geographical Society, London, archives.

78 Goodall became the artist for the expedition after the originally commissioned artist of the expedition, W. L Walton, took fright at the risk of yellow fever, resigned and went back to Britain. Edward Goodall's Diary, 23 December 1841-June 1842 in *Journal of the British Guiana Museum and Zoo*, no. 36, 31 Dec., 1962, p. 47.
by Robert Schomburgk\(^79\) and as 'Mr. Schomburgk's secretary' by Goodall. Freyer also acted as medical officer for the party. Both Goodall and Freyer replaced expedition members who resigned when they became alarmed at the possible difficulties and dangers.\(^80\) Richard Schomburgk, Goodall and Freyer seemed to have formed a friendly young trio.\(^81\)

Richard's account of the expedition reveals how as a Pastor's son from a small town he learnt to become more worldly-wise. Learning to accept other people's values was important in anthropological work. Richard's descriptions of the Amerindians, which display interest and careful observation are now of great value from both an historical and anthropological point of view. There are descriptions of the manner of dress, hair styles and body painting; personal ornament and artefacts; games that were played; the building and design of dwelling places; rules and rituals of marriage, puberty and death; spiritual beliefs; the use of medicines; and the preparation of foodstuffs and drink, especially the drinking bouts associated with the great troughs of an alcoholic drink known as 'pawairi'. As a 'participant observer' he had to learn to accept offers of pawairi (the preparation of which involved the women chewing cassava bread and spitting it into the trough to facilitate fermentation), just as he had


\(^{80}\) Freyer replaced Lieutenant Glascott who had resigned after the early part of the expedition.

\(^{81}\) Richard Schomburgk was fortunate to have in Goodall a companion who is revealed in his diaries as sociable, intelligent and with broad interests. Richard learnt much about both the English language and British customs in the course of the three year expedition. Apart from the Schomburgks there appear to have been five other Germans in the expedition (in a support role) in addition to Robert's servant Roden, a man named Hendrick, a cook and an Amerindian interpreter.
to learn to accept the preparation of foodstuffs to which he was not accustomed, as in the case of the smoking of howling monkeys (*Mycetes seniculus*, Kuhl), which were not skinned, merely singed, and it was a long time before I could rid myself of the idea that these singed monkeys were negro children who had died in convulsions.  

At the time of the expedition illness was causing catastrophic losses among the Amerindian tribes. Robert Schomburgk's writings show his constant concern about the fast-decreasing tribes in the interior of British Guiana. After his return from the Boundary Expedition, he described the process by which many of the Amerindian tribes were moving towards extinction, even in the early 1840s. The Schomburgk brothers' detailed descriptions of the Amerindians and their way of life and Goodall's paintings have left an anthropological record of great importance.

It is clear that great hardships were endured during the expedition. Goodall was very critical of Robert Schomburgk's authoritarian and sometimes quite overbearing attitudes and his bad temper. After his first impression of Robert as 'a nice little man but rather petulant'...
the relationship between two became stormy and Goodall was soon referring to 'the little man' derisively.\textsuperscript{85} Nevertheless, the Royal Geographical Society Journal refers to Robert's 'admirable judgement and courage' without which the whole group might have perished. The President of the Royal Geographical Society described him as 'firm', 'cool in judgment, prompt in action, undaunted by difficulty and danger, zealous and persevering'.\textsuperscript{86} Goodall might grumble at the 'damnable bad temper', but it is clear that Robert was ultimately responsible for the success of the expedition and was acutely aware of the dangers in a situation where one careless slip could mean loss of life. In Robert's first expedition to British Guiana a man named Reiss drowned when a corial overturned in the rapids of the Berbice River.\textsuperscript{87} In the 1840-44 expedition there were other very dangerous situations: Goodall in danger of drowning when the expedition shot the Aratiari rapids,\textsuperscript{88} the group being threatened in a savannah fire\textsuperscript{89} and dangers associated with having to climb up a crumbling sandstone cliff-face some five hundred feet above a great abyss.\textsuperscript{90} There were accidents involving carelessness with firearms. \textsuperscript{91} So it

\textsuperscript{85} Goodall's Diary, pp. 55 and 58 and Menezes in Sketches of Amerindian Tribes, p. 14.

\textsuperscript{86} Mr Murchison's Address, Journal of the Royal Geographical Society of London, 1844, vol. 14, pp. xcv and xcvi.

\textsuperscript{87} Rodway, 'The Schomburgks in Guiana', p. 7.

\textsuperscript{88} Menezes, Sketches of Amerindian Tribes, p. 17.

\textsuperscript{89} Schomburgk, Travels, vol. 2, p. 8.

\textsuperscript{90} Schomburgk, Reminiscences, pp. 48-49.

\textsuperscript{91} In one of these a man was seriously injured when a gun accidentally discharged through careless handling during an unauthorized hunting expedition. The victim had to be carried to the nearest settlement and the whole group suffered from the diversion of party members, including Freyer, to care for him. Richard suffered in particular because Freyer took a medical kit containing the party's supplies of
was little wonder that Robert was impatient with lapses of discipline by inexperienced members of the party. The native fauna of British Guiana brought its own hazards: there were dangers from encounters with snakes, and sting ray and Pirai (piranha) in local rivers. Richard recorded that

one of our Indian boy followers had a big bit of flesh bitten out of his foot by a ravenous Pirai (Pygocentrus).

Jaguars brought further dangers. Richard encountered a jaguar snarling 'ten to twelve paces away' and Adams the cook woke up in his hammock to find a jaguar sniffing him from top to toe.

Describing his departure from his home town Richard admitted that he wondered if he would ever see his family again. Yellow fever was one of the greatest dangers in British Guiana and Richard contracted it soon after his arrival. Miraculously he survived, for twenty years the only European in Georgetown who had survived the 'black vomit' stage of the illness, at that time usually fatal.

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92 For example, with impulsive behaviour such as setting a huge tree on fire for fun, an escapade which just seemed amusing to the young Goodall. Goodall's Diary, p. 49.


94 *Travels*, vol. 2, p. 26 and vol. 2, p. 7. Richard described how his brother had once leaned out of his hammock and 'given a jaguar a sound slap' thinking it was a dog.

95 *Travels*, vol. 1, p. 1.

96 *Travels*, vol. 1, p. 59. His recovery was attributed partly to the excellent care of a German political exile, Dr Koch of Nurenberg who stayed with him day and night. Treatment included packing the patient in ice and administering two bottles of champagne within an hour in an unsuccessful attempt to stave off the terrible haemorrhaging typical of the illness. In Schomburgk's case the haemorrhaging lasted for six hours.
Apart from the serious physical dangers there were the discomforts of sunburn and heat exhaustion in temperatures of 125°-130° F, under which a seventeen miles per day march was considered to be good progress.\(^97\) and periods of lack of food or water. There were the effects of insects such as sandflies\(^98\) and sand fleas or chigoes (\textit{Pulex penetrans}) which burrowed into the soles of the feet and under toenails and had to be dug out causing such inflammation that the victim could scarcely walk. Then there was an insect known as bête rouge, a species of \textit{Acarus}, which burrowed into genital and abdominal areas, not to mention 'blood-thirsty fleas' in native villages or 'myriads of mosquitoes' in others.\(^99\) After his shoes wore out, Richard was forced to used Amerindian sandals for 200 miles at one stage of the expedition;\(^100\) the strings of these went between the toes and caused daily bleeding to which were added incidents such as treading on a three inch long \textit{Melocactus} spine as they trekked across a savannah area.\(^101\) All this time he was having episodes of fever, thirty two bouts in a period of two months. The fever could not be controlled until he met up with Freyer, who had the medical kit and their quinine, at Tenette:

Freyer was barely able to make me out, a mere skeleton, fatigued and emaciated by fever.\(^102\)

\(^{97}\) \textit{Travels}, vol. 2, p. 5.
\(^{98}\) \textit{Travels}, vol. 2, p. 20.
\(^{99}\) \textit{Travels}, vol. 1, p. 98.
\(^{100}\) \textit{Travels}, vol. 2, p. 38.
\(^{101}\) \textit{Travels}, vol. 2, pp. 48-9.
\(^{102}\) \textit{Travels}, vol. 2, p. 79.
In the two months they were away from Pirara they had travelled 500 miles; Richard had covered 200 miles of this in his Amerindian sandals and the state of his feet was such that he recorded that Freyer 'gladly and willingly' offered him a spare pair of shoes.

As well as collecting botanical and zoological specimens, Richard had to keep written records for the subsequent published account of the expedition since he held the position of historian and botanist for the Prussian Government. The three volume *Reisen in Britisch Guiana* was published in 1847-48. This includes Richard's *Flora of British Guiana* which was his most important work in the field of taxonomy.\(^\text{103}\) This third volume covered the flora and fauna of British Guiana with each section being introduced by an eminent natural scientist of the day; Dr F. H. Troschel on molluscs and on amphibians, Prof. W. F. Erichson on insects, Dr J. Müller and Dr F. H. Troschel on fish, and J. Cabanis on birds and on mammals. In the preface to the section on the flora of British Guiana Richard acknowledges the considerable help he had received from 'Herrn Dr. Klotsch, Nees von Esebeck, Bartling, Griesebach, and C.H. Schultz'. A two volume English translation translated by Roth was published 1922 without the *Flora*. Roth described the Schomburgk work as a 'monumental and valuable' one which deserved to rank with the best works on South America travel and adventure. Some fine botanical illustrations from the expedition, drawn by Robert, are now in the Natural History Museum in London. No drawings by Richard have yet been located although it was usual for a person interested in botany to have some skill in this field.

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\(^{103}\) *Journal of Botany*, vol xxix, 1891, p. 224.
Writing about life in Georgetown and British Guiana generally in the early part of *Reisen in British Guiana* he concerns himself with the economic aspects of coffee and sugar plantations. The brothers made numerous observations about the economic potential of British Guiana in their writings with detailed accounts of costs and procedures.\(^{104}\) Richard's observations covered varied fields of knowledge. There were the anthropological descriptions of the dress, physical features, living conditions, food, customs, language and legends of the Amerindians. Detailed accounts were given of Amerindian hieroglyphic writing found on rocks and their latitude and longitude. There were geological observations of the terrain, some of which have been used by geological survey parties in recent years as a way of locating minerals.\(^{105}\) There were observations about fish, bird life and animals and accounts of their behaviour. Richard wrote that he did not consider any of his observations of animal life to be valid, and did not record them, unless they corresponded with those of the 'backwoodsmen' whom he described as 'the most excellent empirical naturalists to be found anywhere'. The Amerindians he found less reliable because they sometimes said what they believed their listener wanted to hear.\(^{106}\) Given the limitations of his training in natural history, a preparedness to seek information from local informants was of considerable value. Careful meteorological observations were also made. The important task of setting the boundary of British Guiana involved carrying two chronometers,


\(^{105}\) Interview with Mr Ian Schomburgk of North Adelaide whose informant was a geological colleague in London.

\(^{106}\) *Travels*, vol. 2, p. 71.
which were kept in a small tin canister and slung over the shoulder of one of the most careful of the canoe-men.\textsuperscript{107}

Richard Schomburgk's descriptive passages were vivid and detailed in the Humboldtian tradition. In \textit{Botanical Reminiscences in British Guiana}, written some thirty years after the expedition, he recalls the view at sunrise of the Sandstone Mountains, Humirida:

\begin{quote}
Was it enchantment which thus transported us from a wilderness into a fairy land? A sea of mist was moving slowly and gradually over the valley, lying in ring-like circles on the luxuriant tops of the trees ...\textsuperscript{108}
\end{quote}

Near the River Zuappi he found new plants:

\begin{quote}
The same astonishment, the same surprise, the same sentiment which had mastered my feelings when I set foot on the South American soil rose in my breast ... I hardly knew where to look first.\textsuperscript{109}
\end{quote}

He described coming across luxuriant vegetation near the area of Roraima. There was a great profusion of brilliantly coloured flowers and 'delightful fragrance'. He recalled being dazzled by the display of

\begin{footnotes}
\item[107] \textit{Journal of the Royal Geographical Society}, 1843, vol. 13, p. 19. Florenz Blesor, the German lad assisting Richard, recalled in his old age how he had held the lantern when the bearing was taken. This was done in the middle of the night for fear of Brazilian retaliation. Newspaper clipping in Schomburgk family collection.
\item[108] Schomburgk, \textit{Botanical Reminiscences}, p. 42.
\item[109] \textit{Reminiscences}, p. 50.
\end{footnotes}
colours and the variety of species, commenting:

I must confess that during the first hour in this botanical El Dorado I became bewildered and saw nothing.\textsuperscript{110}

and

there were so many new objects presenting themselves that I was unable to give my attention to one and the same plant for even a single minute.\textsuperscript{111}

The great cataracts of Roraima defy description for him compared with the 'truly-imposing, unspeakably grand reality' while he recalled the excitement of finding tree ferns, the 'fairy-like genera \textit{Cyathea} and \textit{Alsophila}' - 'no plant had yet excited in me such a peculiar feeling - such a deep enthusiasm'.\textsuperscript{112} His enthusiasm for tropical flora was to last until the end of his life.

In the last year of the expedition the brothers had travelled separately with Robert and the artist Goodall working together while Richard went on a separate route to replace some of the specimens lost or damaged since collection. Robert's party reached Georgetown 'like walking skeletons' from the effects of fatigue and lack of food\textsuperscript{113} but the Schomburgk brothers had by then completed thousands of miles of exploration. They had explored the rivers Waini, Barima and Amacura, the Barama and the Cuyuni: a 700 mile (1127 km) trip taking three and a half months in 1841. In December 1841 they had left Georgetown again to explore and define the Brazilian frontier, journeying from Pirara to the river Takutu, navigating the river

\textsuperscript{110} \textit{Reminiscences}, p. 68.

\textsuperscript{111} \textit{Reminiscences}, p. 70.

\textsuperscript{112} \textit{Reminiscences}, pp. 66 & 51.

Cotinga to its source near Roraima, before splitting into two groups with Robert striking across country to the Cuyuni and returning to Georgetown in January 1843. Meanwhile Richard had gone collecting in the savannahs near Pirara. Meeting again, they went up the Rupununi, and split up again, when Robert and Goodall left to explore the region from the sources of the Essequibo to the sources of the Corentyn during the period June to October. The dangers of their expedition are illustrated by the fact that four of the Europeans who had gathered at Pirara in March of 1842 had died of fever in the ensuing five months - the German Reuter, the missionary Youd, Lieutenant Bush and Dr. Bolby of the military Fort at Pirara. There had also been the death of Robert's former secretary Hancock. Richard himself had been fortunate to survive yellow fever contracted in Georgetown; it is some indication of his physical resilience that he did so.

The expedition had made a great contribution to British Guiana, increasing available knowledge of the interior, the people and geographical features but also making British Guiana better known in Europe, where Guiana was still being confused with Guinea or a country in Africa. Richard was described as 'one of the heroes of Guiana' by a writer in the British Guiana journal *Timehri* in the 1880s. The Schomburgks' reports and those of Hillhouse, the missionaries Youd, Bernau and Brett and the administrator, McClintock, told people what the interior was like; to Europeans

114 By this time they must have learnt to work successfully with each other and Menezes notes that Robert commented very favourably on Goodall's industry and amiable conduct in his report of 25 August, 1842. Menezes in Sketches of Amerindian Tribes, p. 17.

115 Occasional Notes in *Timehri*, vol. 1, 1882, p. 295.
interested in commercial ventures or administrative practicalities the Schomburgks' explorations were of inestimable value and could be regarded as comparable in importance to the expeditions of Charles Sturt or Major Mitchell in Australia. Roderick Murchison, in a presidential address to the Royal Geographical Society stressed the Humboldtian connection of the brothers in describing Robert as:

one of the first travellers of the day - one of those ...formed in the school of Humboldt, whose researches and observations extend alike over every subject of interest and make us fully acquainted with the regions they explore.116

To the British Government the expedition consolidated Britain's position in relation to that of Venezuela and Brazil, this being of special importance because of the problems of Brazilian raids on Amerindian tribes. Robert's reward of a knighthood and diplomatic appointments reflects that Government's appreciation, as does the pension granted to him in old age.

Richard could not accompany other members of the Boundary Expedition who returned to Europe by steamer in May, 1844. The large number of specimens, including living palms, orchids and animals, which he had to take with him meant that he had to go separately by merchant ship a month later. There were terrible frustrations and disappointments as salt water damage, climatic changes and other factors led to the loss of specimens on the return trip to Europe. The menagerie had included a rare eagle, monkeys, live snakes and electric eels in tubs. By the end of the eight weeks voyage 'I had almost daily to bewail the death of one of my menagerie'.117 Although he had taken large quantities of earthworms


and fresh water for the electric eel his last two specimens died in the Channel. The electric eels taken by Robert had survived as far as Southampton only to die after being dropped by sailors who received shocks through the tubs while unloading them. On board ship the salt winds played havoc with the live plant collection. Richard's limited funds enabled him to have only a few Wardian cases made and although some 300 of his prized orchid collection, covering 60 species, did survive, only 60 of 200 palms were alive when they reached Berlin. Other travellers, such as von Humboldt, had similarly suffered considerable losses of specimens. While they were in British Guiana days of continuous damp weather or an accident in a corial could lead to specimens collected under conditions of hardship and great personal discomfort becoming quite valueless.

Despite the losses which had occurred in transit, the Schomburgk brothers returned to Europe with a remarkable collection of natural history specimens. Rodway records that, besides specimens supplied to private collectors, 2500 specimens were contributed to the British Museum: a hundred specimens of timber, a number of seeds and fruits, collections of bird skins, a hundred specimens of fishes, a geological collection and an ethnological collection. There were specimens for the Royal College of Surgeons, a hundred and six specimens of woods for the Model room of the Admiralty and a number of living plants, including several new orchids, for the Royal Botanic Gardens, Kew. Rodway's account appears to refer to

119 Kellner, Alexander von Humboldt, p. 51.
specimens taken back to Britain by Robert Schomburgk; the exact number of specimens taken back to Berlin by Richard is not easy to ascertain. The botanical journal *Botanische Zeitung* reported that he had brought back a very valuable collection of specimens, including living orchids and palms, both highly prized species at this time.\(^{121}\) Ethnological specimens included items for anatomists in Berlin. Important in medical history were the specimens of curare. This was the arrow poison, known by the Amerindians by such names as ourrari or urari: a skeletal-muscle-relaxant drug. Richard obtained specimens after much effort, using information provided by a tribal medicine man together with experiments with plant material. One of the first known anaesthetic compounds, it is still used as an auxiliary in general anaesthesia.\(^{122}\)

One of the most newsworthy items from a botanical and horticultural viewpoint was material relating to the classification and propagation of the giant water-lily, *Victoria amazonica*. The Schomburgks were not the first to sight it and there were problems about nomenclature. Eventually their wish that it be named in honour of the young Queen Victoria was fulfilled - the lily was known as *Victoria regia* during the Queen's lifetime and in more recent times correctly known as *Victoria amazonica*.\(^{123}\) The water-lily was

\(^{121}\) *Botanische Zeitung*, Berlin, 20 September, 1844, p. 672


\(^{123}\) Although the 'amazonica' referred to the river not the legendary tribe of warrior women, Sir William Hooker thought it quite unsuitable that the word 'amazonica' be associated with Her Majesty and the conspiracy of silence was kept up until after
associated with the Schomburgk brothers and cultivation of the Schomburgks' 'vegetable wonder' was to produce an extraordinary degree of interest and excitement with tens of thousands of people travelling to Kew to see it and later, large numbers also in Adelaide.  

From British Guiana Richard brought back wood for an inlaid sewing cabinet for his 'lady-love', Pauline Henriette Kneip. He did not forget his young assistant, the lad Bleesor. He helped Bleesor to attend an educational institution in Berlin and many years later Florenz Bleesor took his advice to emigrate to South Australia.

Return to Germany

On his return to Germany Richard had the task of writing an account of the expedition. The preface to the first volume of Travels in British Guiana, the English translation of Reisen in Britisch Guiana, contains this comment on the task:

And although conscious of my weakness, and in spite of the want of scientific training, I have ventured to make my observations public, the necessary pluck was due to the encouragement and sacrificing support rendered me by men of learning, as I realize only too well the claims that science makes on works of this kind, and that I am the last person to satisfy them. The fact is that as a gardener I was not familiar with every essential scientific problem connected with the branches of Natural Knowledge foreign to my profession, and that whatever success I may have achieved was gained as the result of direct experience with


'Memories of a famous expedition', newspaper clipping in Schomburgk family papers dated 1909.
Nature, the most stimulating of teachers, and of the earnest determination to understand and learn to grasp everything that she put in my way.\textsuperscript{126}

In this preface he made it clear that his profession is that of a gardener and that his scientific training is limited. Nevertheless, he had the help of a formidable list of colleagues: not only Alexander von Humboldt, but also 'Dr Klotsch, Professors Johannes Müller, Ehrenburg, Erichson, Dr Troschel, Mr Cabanis and others.' He acknowledged the help of 'several of our most famous learned men in connection with the technical portion of my book'. Thus, in producing the three volumes in the period 1844-48, he had scientific tuition from some of the best scientists in his country. In the preface to the second volume, written in March 1848 in Berlin, he thanked the subscribers to the series for their support for the first volume, the production of which had entailed 'sacrifices and troubles of every description'. The subscribers, listed in the beginning of the German edition, include the following: the university libraries of Göttingen, Heidelberg, Leipzig, Halle, Copenhagen, Rostock, Utrecht, Kiel; the Royal Library of Brussels and that of Stettin; libraries in Berlin, Altenburg, Breslau, Darmstadt, Düsseldorf, Hamburg, Munich, Wiesbaden, Oldeburg, Gotha, Greifswald, St. Petersburg, academics in Berlin, Leipzig, Leyden and Kiev; the Crown Prince of Prussia and the King of Prussia, Prince Luitpold of Bavaria, the Kaiser of Austria, Prince George of Hesse and Prince Wilhelm of Württemberg, as well as other organizations, private individuals, officials and booksellers all over Europe. For a young scientific writer to have his work in the hands of a group such as this was a real achievement.

\textsuperscript{126} Schomburgk, \textit{Travels}, vol. 1, p. i.
Richard Schomburgk acknowledged in his Preface the guidance and inspiration provided by Alexander von Humboldt,

whose name like a guiding star will lead the way in Science for all time, and through whose friendly consideration I was enabled with my slender resources, to add my contribution to the knowledge of the surface structure of the planet.

He also acknowledged that it was through von Humboldt that he gained the sponsorship from King Frederick William IV, 'that liberal-minded patron of the sciences', which had enabled him to accompany Robert on the Boundary expedition.

The British Guiana journey was a landmark in the life of the Schomburgk brothers. It was a journey which lasted nearly four years from October 1840, when they left their homeland, until their return to Europe in 1844; a journey that involved daily scientific observations, painstaking collection of research material, great personal hardships and exposure to very different cultures. In addition, there was the experience of the terrain of British Guiana with its tropical flora and fauna and natural wonders such as great waterfalls and rapids. An ordinary journey may be a landmark in a person's life; this extraordinary journey set the stage for developments which led all four Schomburgk brothers and their sister to leave Germany and make a life overseas. Robert, knighted for his services by Queen Victoria on his return to Britain in 1843, became a career diplomat for the British Government. He was in Barbados from 1846-1847 where he gathered material for a history of Barbados, went to St Domingo as British Consul until 1857 and was posted to Bangkok as Consul General from 1857-64. Of the four brothers Robert was the only one who retired to Germany, but he returned in broken health and did not live long to enjoy his retirement. He died
near Berlin on 11 March, 1865 at Schöneburg, where the Botanic
Garden was situated.¹²⁷

The letters of J. F. L. Schomburgk, father of Otto and Richard, show
that Otto, who had been at the university at Halle in the tumultuous
years of the early 1830s,¹²⁸ had been indicted for political activities
and was imprisoned in 1837 for being a 'demagogue' and member of a
progressive student fraternity (Burschenschaft).¹²⁹ He was
incarcerated in the Magdeburg citadel and it seems that
von Humboldt, who knew of him through Robert, was influential in
securing his release. In one of his letters von Humboldt suggested
wryly that one solution to the problem of what to do with Otto might
be to have him go as a missionary to South America to preach to the
Indians.¹³⁰ This may have been a forerunner to the final solution of
helping him to emigrate to Australia where he was to preach to his
countrymen rather than to the Amerindians. Otto is thought to have
been released after five years of imprisonment and he subsequently
practised medicine in Berlin.¹³¹ After the return of Robert and
Richard from British Guiana he was involved in veterinary
experiments on the effect of curare on animals in cooperation with
Professor Peters in Berlin. It may not be coincidental that Alexander
von Humboldt had published a work on the irritability of the

¹²⁷ Rodway, 'The Schomburghks in Guiana', p. 25.
¹²⁸ The Archivist of the University at Halle reports that he was a student there from
1831-1835 although the exact date when he left is not known to them.
¹²⁹ Letter from Martin Pietzch, archivist of Freyburg on the Unstrut, to Raoul
Middleman.
¹³⁰ Briefe, Alexander von Humboldt's an Ignaz v. Olfers, Hrsg von E.W.M. v. Olfers,
Nurnberg, Leipsig [1913], s. 40-41. Original not seen.
¹³¹ Letter to the S.A. Register, 23 Jan., 1860.
muscular and nervous fibres of animals in 1799\textsuperscript{132}, and would have had some interest in this area of research.

However, there were political events to distract Otto from scientific research. Disaffected groups in the community were expressing both their opposition to the established order and their desire for liberal reforms. The liberals and moderates drew their support from the bourgeoisie, the industrialists, merchants, financiers, civil servants and university teachers. These groups, opposing a form of government in which privilege and power came from birth rather than talent, wanted a parliament elected by the propertied classes. In addition, there were the democrats or radicals, whose following included small businessmen, shop-keepers, skilled workers, independent farmers, journalists, publishers, and professional men such as lawyers and physicians as well as students. They favoured popular sovereignty with a parliament elected by manhood suffrage.\textsuperscript{133} Otto Schomburgk, as a student, was recorded as having been involved in a radical student group and Richard as an apprentice was in an occupational group which was exposed to the new ideas and the prevailing unrest of the day.

In March 1848 revolution broke out in Berlin. Describing this period many years later in a letter to Mrs Manget of Zeelandia, Richard referred to the people trying to obtain what had been promised to them, that is, a constitution. He wrote:

\begin{quote}
You can think that my late brother Otto, with whom I was living, and I aided the people's cause. Alas! the dream of liberty was of only a short duration, the reaction gained in ground again and the leaders of the people's cause became
\end{quote}

\textsuperscript{132} \textit{Chamber's Encyclopaedia} 1895, vol. VI, p. 1. 

marked men. As the Schomburgk brothers belonged also to the black sheep, our protector Baron Humboldt advised us to emigrate.\footnote{134}

Von Humboldt had already made clear his own liberal persuasions. It is recorded that he actually marched as one of the leaders of the funeral procession of the 'March victims'.\footnote{135} Although he was himself under surveillance by the secret police by the end of his life and his power to intervene for others was greatly curtailed, his position at the Court was strong enough for him to be able to continue to sit opposite the king at meal-times, reading aloud to him after dinner and accompanying him on journeys as a confidential companion and scientific adviser.\footnote{136} He was thus in a position to speak to the king on behalf of his protégés.

In proposing migration overseas as a solution to the problem of the Schomburgk brothers, von Humboldt was suggesting something that was increasingly attracting energetic and restless people. Many individuals of liberal persuasion, disillusioned at the slow progress of gaining reforms and bitterly disappointed at the outcome of the 1848 unrest, became interested in the possibility of a new life overseas. Lack of economic opportunities for ambitious and energetic people in their home country was a key factor in this. Letters held at Freyburg suggest that Richard had emigrated to

\footnote{134} Schomburgk to Mrs Manget, 19 Nov. 1881. [Copy supplied by Professor M.N. Menzes of the University of Guyana. Letter appears to be reprinted in Occasional Notes, \textit{Timehri}, 1 December, 1882, pp. 294-297 but original not seen]. The letter indicates that Mrs Manget was the 'beautiful Miss Ross', who helped Richard with his English during his convalescence from yellow fever and was his confidant during his stay with her family.

\footnote{135} Kellner, \textit{Alexander von Humboldt}, p. 217.

\footnote{136} Kellner, \textit{Alexander von Humboldt}, p 190.
Australia because he could not find a position that corresponded with his knowledge and abilities\textsuperscript{137} which, according to writers such as van Abbé and Harmstorf, was a common reason for migration.\textsuperscript{138} For someone like Richard Schomburgk, who had experienced travel and adventure, there were special problems in settling down to life in Europe with its social, political and economic restrictions. His brother Robert was already living abroad, his mother had died in 1827 and his sister and younger brother could take responsibility for their elderly father.

Discussion between a group of young men interested in settling in Australia led to the formation of a South Australian Colonization Society. The leaders met at Leipzigerstrasse, one of the main streets in Berlin.\textsuperscript{139} Otto Schomburgk was president and Carl Wilhelm Mücke (known in South Australia as Muecke) was a leading member. Muecke had provoked the wrath of the Prussian authorities by controversial articles and activities in the educational field and had taken part in the 1848 rebellion. Its failure helped move him to work to organize people interested in migration.\textsuperscript{140} The group which finally set out on the *Princess Louise* included a number of people with a professional or business background.


\textsuperscript{139} A. Lodewyckx, *Die Deutschen in Australien*, Stuttgart, 1932, p. 50.

\textsuperscript{140} *Australian dictionary of biography*, vol. 5, p. 306.
Descendants of Richard Schomburgk had always believed that both Otto and Richard had fled from Germany to avoid political persecution. However according to the archivist of Freiburg on the Unstrut, the Schomburgks' home town, letters held in the Freiburg archives indicate that Richard left Germany because he could not find a position in his home country that corresponded with his knowledge and capabilities.\footnote{Pietzch to Middleman, 27 June, 1973.} The archivist, Martin Pietzsch, believed that as the Queen of Prussia gave him a toilet bag for travelling (Reisenecessaire) with a personal dedication and the King of Prussia gave him a gift of money prior to his departure, he did not have to flee from Germany. Nevertheless, Richard Schomburgk's letter to Mrs. Manget makes it clear he and Otto, having supported the liberal cause, were among the 'black sheep'. The two views need not be incompatible. It is possible that, as with so many people, there were numerous reasons for migration to Australia: economic reasons, a desire for greater political freedom and the problems of being associated with a political cause that was very unpopular in some official circles. The King and Queen could value both the prestige brought to Prussia from the explorations of Robert and Richard Schomburgk in British Guiana and the specimens brought back while at the same time realizing that conservative elements in their country viewed the political activities of Otto as dangerous. The correspondence of von Humboldt indicates that although valuing Otto's abilities, he could see wisdom in his migrating elsewhere. For people in powerful positions it might be preferable to help their protégés to make a new life elsewhere than to become involved in extricating them from a dangerous situation in their homeland. Richard Schomburgk was not as forceful a personality in the political
sense as Otto and was never imprisoned. However he lived with Otto, and his liberal sympathies may well have made him an embarrassment to his royal masters, delighted as they had no doubt been with the scientific prestige and collections which had come to Prussia.

Both Alexander von Humboldt and Leopold von Buch helped to further the plans of the young men to come to Australia. Von Buch gave the brothers 480 thaler, enough to build a house.¹⁴² He is reported to have said that he was too old himself to make a new life in a new country, but that one day he hoped he might come to visit them and, if so, he hoped there would be a room for him.¹⁴³

On 8 January 1849 von Humboldt wrote to Master Builder Herr H. Holzerland, of Tangermünde who was considering emigrating to Australia:

> On the whole I prefer North America because of the proximity and inexpensive crossing. But Australia has the greater advantage of a smaller influx of settlers, greater esteem by the attention of the British Government, a wonderful climate which induces fertility and excellent timbers.¹⁴⁴

Such views would doubtless have been expressed to the Schomburgk brothers regarding any plan to come to Australia. He wrote of the Schomburgks themselves:

> both of the brothers Schomburgk are known to me as excellent and very knowledgeable men, and I have had a friendly acquaintance with both for a long

¹⁴² A letter from Carl Linger indicates that 400 thaler was enough to build Linger’s first house when he began farming in 1849-1850. L. A. Triebel (ed.), 'A Carl Linger letter', *South Australiana*, vol. II, no. 1, March 1963.

¹⁴³ Von Buch family history, *Leopold von Buch*, as translated by descendent Herr Leopold von Buch [no publication details], personal communication.

¹⁴⁴ Humboldt to Holzerland, in 'Extracts from 'The Emigrant to South Australia' by George Doeger, Tangermünde, 1849', translated by Peter Overlack, in Lutheran Church Yearbook, 1980, p. 52.
time. ... it is always an advantage to attach oneself to a community of fellow-countrymen.145

Ian Harmstorf, who has made a study of the early German community in South Australia, has said of the passengers of the *Princess Louise* that they formed the single most important group of German intellectuals to come to Adelaide.146 They can be contrasted both with previous emigrant groups such as those that came with Pastor Kavel (which included a large number of peasant farmers and others with more modest education), and similarly with the large groups of German migrants in the 1870s (which included skilled tradesmen such as plumbers, bricklayers, saddlemakers, joiners and carpenters).147 There were nearly two hundred passengers on the *Princess Louise*. Besides the Schomburgk and Muecke families there were the musician and composer Carl Linger of Berlin, who later wrote *Song of Australia*, Hermann von Rieben, who became a successful businessman, G. Listermann, a school teacher, and Friedrich Adolph Büring, a Berlin businessman and father of the vigneron Hermann Büring of the subsequent Buring and Sobels commercial partnership. As intending settlers, the Schomburgks were eminently suitable in terms of the kind of emigrants originally sought for the colony. They were young, determined, 'of good character', with some capital behind them and work skills that were appropriate for a new settlement. In addition, interest in wider community issues was to make them local leaders in their district after a comparatively short time.

145 *ibid*, p. 52.

146 Interview with Ian Harmstorf, 1985.

147 Ian Harmstorf, *Guests or fellow-countrymen*, p. 50.
Both Schomburgk brothers were married by the time they left Hamburg; Otto had married Maria von Selchow, whose family came from Dessau, and four weeks before the voyage Richard married his fiancée Pauline Kneib of Potsdam.\textsuperscript{148} It was eleven years since Richard had written his sentimental verse in Pauline's autograph book when she was sixteen; he was now thirty eight and she was twenty seven.

The Gawler years

The \textit{Princess Louise} reached Adelaide after an unusually long voyage of five months on 7 August 1849.\textsuperscript{149} There is no evidence to support the view expressed in Lamshed's \textit{Centenary history of the Botanic Garden} that the Schomburgks had intended to go to British Guiana but had been unable to land because of bad weather\textsuperscript{150}, unless this was intended as a visit only. The evidence is clear that they were part of a larger group which had planned to make a new life in South Australia.\textsuperscript{151} The Schomburgks were naturalized soon after their arrival which would have assisted their position in such matters as land purchase. They brought a property adjoining the Para River in the Gawler area on 11 September 1849, purchasing 81 acres (33 ha) of section 44 from a man named F. W. Temme and taking out a mortgage of 150 pounds the following August to help with

\textsuperscript{148} Schomburgk family records; Schomburgk to Mrs Manget.

\textsuperscript{149} Linger gave as the reason for the lengthy voyage the 'captains carelessness' and 'the quarrel between him and the helmsman,' Triebel, 'A Carl Linger letter', p. 7.

\textsuperscript{150} Lamshed, \textit{The Botanic Garden, Adelaide, 1855-1955}, p. 94.

\textsuperscript{151} This is confirmed by Richard's letter to Mrs Manget.
expenses.\textsuperscript{152} The settlement, which they named Buchsfelde after Leopold von Buch, was about four miles (6 km) west of the town of Gawler. Writing to Alexander von Humboldt at the time of their first Christmas in Australia, Otto Schomburgk described their settlement:

The name [Buchsfelde] seems to have been a blessing to this piece of land. Soon five friendly looking white coloured huts sprang up. They were all built by the inhabitants without the help of a mason, a carpenter, a cabinet-maker or a glazier from the foundations to the chimney. Shortly luxurious cucumbers, melons, beans, lettuce and even the German apple-trees Borsdörfer, Gravensteiner and others shot forth. They came with us from Berlin. From Rio we bought Brasilian ornamental bushes...\textsuperscript{153}

Otto wrote that since their means did not allow them to buy the whole section of land, he and Richard had taken sixty three acres (25 ha), the Kloy family from Berlin had taken seven acres (2.8 ha) and a family named Piper or Peiper from Tangermünde had taken fourteen acres (5.6 ha).\textsuperscript{154} This gave the Buchsfelde settlement twenty five persons. The twenty five included the new baby daughter just born to Richard and Pauline but there is no further record of this child who must have died in infancy.\textsuperscript{155} Amongst the Schomburgks' possessions were a set of engravings of the Goodall scenes of British Guiana as well as the inlaid-wood sewing cabinet made of the timber brought back from British Guiana for Pauline: a finely-made piece that must have been a prized possession in their simple cottage and one which has survived to the present day. Other possessions were hand embroidered sheets and sterling silver spoons and the little

\textsuperscript{152} Records in South Australian Lands Titles Office.

\textsuperscript{153} From a translation of the letter of Otto Schomburgk to Alexander von Humboldt in a history of the von Buch family made by Herr Leopold von Buch, personal communication.

\textsuperscript{154} South Australian Lands Titles Office records give the name as Otto Peiper.

\textsuperscript{155} The death of an infant was not always registered in those early days of the colony. The birth certificate is dated in June/July of 1850 suggesting that she survived until the age of at least seven months.
autograph book with its sentimental verses and circles of hair\textsuperscript{156}, a reminder of friends and relatives that Pauline would not see again.

The Schomburgk's selection of land with fertile soil and ready access to water, together with Richard's practical training in horticulture, enabled development of a successful farm.\textsuperscript{157} Some of their less experienced ship-mates tried farming at first but encountered great difficulties. For example, the musician Carl Linger, who also came on the \textit{Princess Louise}, later described how he had been sold land at Munno Para by a gardener who 'claimed to know his business perfectly and promised me the world', but the quality of the water in the two wells proved to be bad and Linger was in debt after eighteen difficult months at his farm.\textsuperscript{158} In time, Linger managed to find work in the musical field in Adelaide and to establish himself there. The school teacher Listermann and his family decided to return to Germany in 1850 before their finances and health failed entirely, and in 1851 Listermann published a book in which he described his experiences in Australia as a 'word of warning' to intending migrants.\textsuperscript{159} In contrast, the Schomburgks, like the Mueckes and von Riebens, appear

\textsuperscript{156} Information from Schomburgk family.

\textsuperscript{157} The German traveller and writer Friedrich Wilhelm Gerstaecker described the Schomburgks' farm in an article in \textit{Grenzboten Zeitschrift für Politik und Literatur}, 1853, the article being re-published in \textit{Botanische Zeitung}, March, 1853, p. 167. Features typical of German settlements such as Buchsfelde are described in Lester, Firth, Murton Pty Ltd, \textit{Barossa Valley Heritage Study}, District Council of Angaston, 1981, p. 27 and G. Young, Early German settlements in South Australia, \textit{Australian Historical Archaeology}, vol. 3, 1985, p. 43.


\textsuperscript{159} Information and translation of part of this work (G. Listermann, \textit{Meine Auswanderung nach Südaustralien und Rückkehr zum Vaterlande. Ein Wort zur Warnung und Belehrung für alle Auswanderungslustigen}, 1851) provided by Pastor P. Scherer of the Lutheran Archives.
to have been determined to settle in Australia without expecting to return to Germany, even for a trip.

In December 1850 Julius and Linna migrated to Australia, following the death of their father.\textsuperscript{160} Linna married Dr Carl Muecké as his second wife, thereby combining the existing close friendship between the Schomburgk and Mueckes with a family relationship. Muecké who became, after a brief spell of farming, pastor of the Tabor Church at Tanunda, was much concerned with educational and scientific matters.\textsuperscript{161} Another of the German intellectuals, M. P. F. Basedow, who was to become Muecké's son-in-law, was a partner in the newspaper business. Otto Schomburgk was another who wrote for \textit{Süd Australian Zeitung}. Basedow and Muecké, linked with the Schomburgk through marriage, business and intellectual interests, provided important support for Richard Schomburgk's interest in the plant sciences. Otto, described by Gerstaecker as architect, veterinarian and doctor,\textsuperscript{162} took a leadership role in community affairs. Both Richard and Otto were appointed to the magistracy and appear to have been regarded as men of substance and authority in a district which had many settlers of German origin, involved as they were in a wide variety of local community groups.\textsuperscript{163}

\textsuperscript{160} As a silversmith Julius produced exceptionally fine work, some of which is exhibited in the Art Gallery of South Australia. His work is described and illustrated in J. B. Hawkins, \textit{Nineteenth century Australian silver}, vols. I and II, Antique Collectors' Club Ltd., Suffolk, England.

\textsuperscript{161} \textit{Australian dictionary of biography}, vol. 5, p. 306. For forty years Muecké was closely connected with the German press as newspaper proprietor, journalist and editor, giving talks on such varied topics as the teaching of science, the need for an agricultural college and issues relating to crop diseases.

\textsuperscript{162} \textit{Botanische Zeitung}, March, 1853, p. 167.

\textsuperscript{163} Otto organized the petitions on behalf of the Buchsfelde settlers in 1851 for land for a church and he was Master of the Lodge of Fidelity in 1856. As members of the
Keeping up his interest in natural history he is known to have collected zoological specimens during his early years in South Australia. He had had a great deal of experience in collecting zoological specimens in British Guiana, had expertise in collecting procedures and would have had the incentive of knowing that such material would be very welcome in Berlin. He sent specimens of reptiles and amphibians to Berlin to Professor H. W. Pieters or Peters.\textsuperscript{164} The amphibians were the first known specimens to have been collected in South Australia and deposited in a museum collection. They were sent to Berlin where they were reported by Peters (1864, 1875) and deposited in what became the Zoologisches Museum, Museum für Naturkinde der Humboldt Universität zu Berlin. Schomburgk obtained at Buchsfelde representatives of all species now occurring within fifty kilometres of Adelaide, four of which were described as new: \textit{Limnodynastes dumerli} Peters, \textit{Camarolius varius} Peters, \textit{Neobatrachus pictus} Peters, and \textit{Hyla calliscelis} Peters.\textsuperscript{165} There are other specimens in this museum with labels indicating that they were from Schomburgk in Adelaide but it is not clear if they came from Buchsfelde. Schomburgk also sent back specimens of reptiles. These were probably collected in the earlier, warmer months of 1863. Loyau in his \textit{Gawler Handbook} of 1880 referred to 'rare snakes and lizards' collected on the Para River, sent

\textsuperscript{164} The name has been spelt both ways.

\textsuperscript{165} Michael Tyler, \textit{Mitteilungen der Zoologisches Museum in Berlin}, vol. 61, no. 2, 1985, pp. 335-37.
by Schomburgk to the Academy of the Sciences in Berlin and notes that they 'embraced three new genera and eleven new species'.166 Amongst those known to have been collected by Schomburgk and sent to Berlin are Suta suta (Peters 1863), the Myall snake, Toliqua occipatilis (Peters 1863), the Western Blue-tongued lizard, Tiliqua adelaidensis (Peters, 1863), the common Blue-tongued lizard and Lygosoma schomburgkii (Peters 1863), now Ctenotus schomburgkii (Peters 1863), a small skink.

However, there is no record of Richard Schomburgk collecting plant specimens in South Australia. There are a number of possible explanations for this. Specimens could well have been sent to colleagues but not been recorded because, while interesting to the recipients, they were not new varieties. It would be surprising if he had sent no specimens at all to his colleagues in Berlin in a period when there was so much interest in Australian flora. The simplest explanation is that he was busy with other activities that seemed more pressing and relevant at the time.

Schomburgk's scientific contacts appear to have been primarily with colleagues in Germany during these years at Gawler. The letter to von Humboldt already quoted was sent on Christmas Eve of 1849, three months after the brothers arrived in South Australia, to tell him how they were faring. The brothers activities were considered to be of sufficient interest in the botanical world to rank some notices in Botanische Zeitung.167 Zoological and other specimens were sent to Berlin, and Richard Schomburgk was subsequently made

167 e.g. March, 1843, September 1844, November, 1844, March 1853.
a member of some prestigious German scientific bodies. There are no letters on file at the Royal Botanic Gardens, Kew from Richard during these Gawler years yet there are both letters and records of botanical specimens sent by Robert Schomburgk (by then Sir Robert) from Bangkok. Robert also corresponded from Bangkok with George Francis at the Adelaide Botanic Garden regarding plant specimens.

In addition to caring for the farm and vineyard Richard Schomburgk appears to have dealt in plants commercially. Swinbourne recorded that he had advertised fruit-trees and vines for sale in the early 1860s. Adelaide Botanic Garden's archival papers include a letter to Francis from the prominent nurseryman and seedsman Friedrich Haage of Erfurt, in Germany, advising that a shipment of goods to the Botanic Garden included a box of roots and plants, and another containing apple and pear pips and flower-roots, both destined for 'Mr. Schomburgk of Buchsfelde'. Haage requested that the boxes be forwarded to Schomburgk. It seems that Schomburgk was thought to be sufficiently well-known for this to be a reasonable request. The vineyard at Buchsfelde was some five acres in extent, and Schomburgk was recorded as making a white wine from Madeira and Verdelho grapes and a red wine from Mataro grapes 'both of which are considered excellent wines'.

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169 Letter from Frederick Haage to George Francis, 11 June, 1859. Adelaide Botanic Garden Archival collection.

Both Richard and Otto were active members of the Gawler Institute and in about 1860 Richard Schomburgk became Curator of the Gawler Museum, established under the auspices of the Gawler Institute. The nucleus of that collection appears to have been presented by the Naturalist Club early in 1860.\textsuperscript{171} The contents of this museum were eventually combined with those of the South Australian Museum in Adelaide and regrettably the specimens have been incorporated without their origin being noted.\textsuperscript{172}

The Schomburgks were fortunate to have two keen naturalists amongst their neighbours at Buchsfelde. One was Johann Frederick bis Winckel, a political agitator before fleeing Germany, and a keen orchardist and vigneron at Buchsfelde.\textsuperscript{173} Bis Winckel became curator of the Gawler Museum after Schomburgk went to the Botanic Garden. The other was Mrs. Kreussler, a woman who, having lived a protected life in Europe, was widowed just before she left Germany with her young family. She seems to have been befriended by the Schomburgk family and may have come on the \textit{Princess Louise}. She had a small private museum with a wide variety of natural history specimens and had a special interest in entomology.\textsuperscript{174}

\begin{flushleft}
\textsuperscript{171} G. Loyau, \textit{The Gawler Handbook}, p. 21. Loyau recorded that 'a gentleman of great repute in the scientific world, Dr. Richard Schomburgk', had accepted the office of curator.
\textsuperscript{172} Information from curatorial staff, South Australian Museum.
\textsuperscript{173} Information provided by Mrs. Urlwin, a descendent of the bis Winckel family. Loyau, \textit{The Gawler Handbook}, p. 96-9
\textsuperscript{174} G. Loyau, \textit{The Gawler Handbook}, p. 99. Loyau said there were two rooms of specimens including birds and animals, butterflies, beetles, shells coral, reptiles, snakes, as well as mineral specimens. It was thought by her descendants that she was helped by Richard Schomburgk in acquiring some understanding of botany.
\end{flushleft}
Relatively little is known of one scientific activity of the brothers at Buchfelde; meteorological observation. Otto was said to have earned himself a reputation as a naturalist by his 'physical and meteorological studies' in the Buchsfelde settlement. In the letter to von Humboldt dated December 1849, shortly after the foundation of the settlement of Buchsfelde, Otto wrote that they had what they believed to be the first meteorological station in South Australia. In fact, records of rainfall were already being kept at West Terrace, Adelaide. It is not known exactly what readings were taken at Buchsfelde although, given the interest of von Humboldt and von Buch in meteorological matters, and the work done by Robert and Richard in keeping such records in British Guiana, it seems likely that the work was done thoroughly. Robert had been sufficiently concerned with meteorological and astronomical matters to have set up an observatory in Georgetown before he left British Guiana. Present day meteorological records indicate that there was a recording station at Buchsfelde at the time when bis Winckel took over the Schomburgks' farm. Otto's remarks could indicate that he was unaware of the West Terrace observations or that their own were more detailed. It is unlikely that the issue can be settled because the records do not appear to have survived. What is likely is that both brothers were involved in meteorological recording and that they were sending to Berlin records which became part of the world-wide observations compiled under the influence of von Humboldt, the founder of systematic meteorology. Von Humboldt's insistence on the

175 'At Home with Hans Schomburgk', Addendum to Jena Review 3/1957, published by V.E.B. Carl Zeiss, Jena, Literary Department. Hans Schomburgk, the twentieth century African explorer, was a descendent of Richard Schomburgk's relatives in Leipzig.

176 Information from Kevin Burrows of the S.A. Bureau of Meteorology.
necessity of accurate determination of numerical data and his own example of the proper methods of collection laid down the rules for future generations.\textsuperscript{177}

In 1860 Richard Schomburgk was one of the founding committee members of the Gawler Town Agricultural Society and won prizes at Agricultural Shows for his grapes and wines in the period 1860-3.\textsuperscript{178} Both Schomburgk brothers became involved in local government. The first meeting of the Muddla Wirra Council (which was proclaimed on 18 January 1854) was held at Otto Schomburgk's home on 24 January 1854.\textsuperscript{179} Richard served as Chairman in 1860-61. Learning how civic matters were handled in the British-Australian style was valuable experience for someone who was to become a Botanic Garden director, involving as it did such activities as selecting projects, negotiation at both a local and regional level, planning, lobbying, and reporting back to constituents. Moreover, membership of organizations in Gawler put him in contact with people of some influence in the community. Richard obtained a commission from his colleague Walter Duffield, who was on the council, to select trees for the Duffield property Para Para. This was said to feature Australian flora and plant material was sought from as far afield as Darwin for the purpose.\textsuperscript{180}

\textsuperscript{177} The initiative he took in the organization of international scientific collaboration has been of the greatest consequence for the advance of our meteorological laws which form the basis of weather forecasting. Kellner, \textit{Alexander von Humboldt}, p. 233.

\textsuperscript{178} \textit{Farm and Garden}, 11 April, 1861, p. 178.


\textsuperscript{180} Undated newspaper clipping, from the 1930s from a collection in the possession of the Schomburgk family.
Otto died of heart disease in August 1857. The management of the farm now depended on Richard who stayed on at Buchsfelde for a further eight years, during which time he gradually became more prominent in local affairs. He was not a Chairman of the Council until after Otto's death. His work in setting up the Gawler Museum came in these last eight years, as did his committee work for the Gawler Town Agricultural Society.

In September 1865 he applied for the Botanic Garden's directorship. In his letter to Mrs Manget, Schomburgk wrote that the principal reason for applying was that he could give his children a better education in Adelaide. The eldest surviving daughter of Richard and Pauline was Antonia, born in 1852. They had four other daughters, Marie, Clara, Anna and Rosye and one son, Otto Heinrich. Otto, born in 1857 and named after his uncle Otto, was eight years old in 1865 and in addition, there was Richard's nephew, Robert, to be educated. Adelaide offered opportunities for the Schomburgk daughters, too, with its private schools, opportunities for music and painting lessons, and a more varied social life. It may be also that Schomburgk felt that his wife, a shadowy figure about whom little is known, would be helped by a less physically demanding life than that on the farm at Buchsfelde. In the Manget letter Richard wrote that

Sixteen years were spent in 'Buchsfelde' under labour, toil and anxiety which new settlers always have to undergo. My good wife, although not used to such a rough life, braved it nobly.

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181 Letter to Mrs Manget.

182 Family records indicate that Richard helped to educate this lad after moving to Adelaide.

183 Letter to Mrs. Manget.
Richard no longer had the help of his brother Otto in running the farm and vineyard and, had they stayed, it would have been years before either his son, Otto or his nephew Robert were old enough to take real responsibility. With the new position went the Director's Residence, a fine two-storied house in a beautiful garden setting in the centre of the city. Financially, a salaried position gave substantially more security than life on the farm. Financial security for the family, combined with the advantages of educational and cultural facilities in Adelaide, would aid the children's professional and marriage prospects; a point of special relevance in Victorian times to a man with five daughters.

Adelaide also offered new challenges for Richard Schomburgk himself. He was fifty four and despite the rigours of the British Guiana expedition many years before there is no evidence that he lacked energy or physical fitness. His physical strength is indicated by the fact that he remained active until the last year of his life, surviving an attack of typhoid fever in his sixties and maintaining the position of Director until his death at the age of seventy nine. A portrait painted in 1884 shows him as a fine-looking man, with a broad brow and a genial expression.

Schomburgk was in a strong position for the Directorship. He had an international reputation because of his British Guiana expedition and had both a doctorate and connections with important scientific institutions in Germany. In this period the natural sciences were benefiting from the rise in size and prestige of the university system.

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184 S. A. Lands titles office records show that Richard still had a mortgage of £400 in 1865.
in Germany and from the great number of scholarly journals and handbooks. German achievements in the fields of natural science and horticulture were highly regarded among the British as exemplified by Loudon's comments and also by such appointments to Australasian colonial botanic gardens and natural history museums as those of von Mueller as Curator and Government Botanist in Melbourne, Ernst Bernhard Heyne as Chief Plantsman in Melbourne, and Gerhard Krefft to the curatorship of the Australian Museum in Sydney. Of note are the explorer Ludwig Leichhardt, who actually applied, although unsuccessfully, for the directorship of the Sydney Botanic Gardens, Konkordie Amalie Dietrich, who collected in Queensland and New South Wales, and Wilhelm von Blandowski, the first staff member of the National Museum in Victoria. There were a number of German born collectors of considerable repute in the natural history field in South Australia, and here Hillebrand, Bauer, Menge, Behr and Tepper are of note. As well there were a number of well-known South Australian nurserymen of German origin working in the horticultural field, Heyne, who returned to Adelaide and was joined by Ludwig Wertheimer and Freidrich Seessle, Carl Friedrich Neumann of the Model Nursery, Highercombe, Max Weidenbach of the Glen Osmond Nursery and C.A. Sobels at Tanunda.

In addition to having a reputation for solid achievement both internationally and locally Richard had a good working knowledge of farming procedure, horticulture and viticulture under South

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186 Moyal, *A bright and savage land*, pp. 95, 109-111.

Australian conditions; in a colonial situation it was better to have tried techniques oneself than to be a theorist or an overseas expert. He had a solid grounding in horticultural techniques from his original apprenticeship. Pike commented that the five ways to respectability in the founding years of Adelaide were early arrival, thrift, temperance, piety and the ownership of land.\(^{188}\) German immigrants as a group were regarded as models of morality, industry and frugality.\(^{189}\) The Schomburgks had been industrious and civic-minded local leaders at Buchsfelde, they had a successful farm and vineyard, and they had supported and helped to develop the local church. Richard's doctorate from the Germania academy, although an honorary one, was based on the considerable amount of field research and even apart from the material he sent from South Australia to Berlin there was the three volume, *Reisen in Britisch Guiana*, a substantial contribution to the fields of natural history and anthropology.

The Gawler *Bunyip* described the presentation of a silver goblet to Richard Schomburgk when he left Gawler. 'Presented to Dr. Schomburgk, Ph.D. J.P. by his friends in Gawler and vicinity, as a token of respect and esteem.'\(^{190}\) The young man who as a 'middle brother' had set out for British Guiana with Robert in 1840 and for South Australia with Otto in 1849 had now outlived both these men and was moving into a position of public prominence of his own. He was still only fifty four years old. In his own words, in his letter to Mrs. Manget: 'A new era began in our life!'


\(^{189}\) Ian Harmstorf, *Guests or fellow-countrymen*, p. 68.

\(^{190}\) G. Loyau, *The Gawler Handbook*, 
Chapter 4

DEVELOPING THE BOTANIC GARDEN SITE

Schomburgk took up his appointment as second director of Adelaide Botanic Garden in September 1865. Other people who had applied for the position included Daniel Bunce, former nurseryman and curator of the Geelong Botanic Garden from 1857-1872, H. Krichauff, another German settler and later parliamentarian, and F. G. Waterhouse, the Curator of the Museum. In his letter of application Schomburgk stated that he was well known to Dr Wyatt of the Botanic Gardens Board who could attest to his 'botanical knowledge and practical knowledge of gardening'. He mentioned his work in the Royal Gardens in Berlin, his appointment to the British Guiana expedition, his membership of the Horticultural and Geographical Societies in Berlin and the title of Doctor of Philosophy recently conferred upon him by the 'Germanic Academy' (Deutsche Akademie der Wissenschaften) 'in consideration of my requirements in Botany and Natural History'. In addition, he referred to having been 'seventeen years residing in the colony' (although strictly speaking he was beginning his seventeenth year in the colony, having arrived in early August 1849).

New director - new plans

Approaching the new project with enthusiasm, Schomburgk made a number of recommendations for improvements straight away. At the Board Meeting in October 1865 approval was given for a number of

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2 R. Schomburgk, letter of application to the Board, in Adelaide Botanic Garden archival collection.
improvements, based on the new Director's written report. These included heating the Orchid House, stove houses and Conservatory with hot water pipes; painting the greenhouses; ordering some 600 new labels; rearrangement of the Herbarium; getting samples of artificial fruits; forming an experimental garden; increasing the number of 'florists' flowers'; having a new aviary built and stronger cages for some of the animals; and using a previously uncultivated part of the Garden for a system garden to provide for 'scientific arrangement of the natural system of Plants'.

The extent of this list suggests that Richard Schomburgk was able to use his reputation in local and scientific circles to get support for these improvements. A variety of interests was catered for: family parties would enjoy seeing the animals and birds; horticultural enthusiasts would be pleased with the improved collection of 'florists' flowers' and the improved hot-house collection; while the educational and scientific role of the Botanic Gardens was catered for in the provision of better labels, the development of an experimental garden, the reorganization of the herbarium and plans for the system garden. Artificial fruits were provided so that visitors could learn about different varieties of fruit-trees for domestic or commercial purposes.

On a very practical level, the purchase of a new horse and cart was approved and Schomburgk in his first outward letter requested permission from the City Corporation to purchase manure from the

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3 Board of Adelaide Botanic Garden Minutes (hereafter referred to as Minutes), 6 Oct. 1865.
city streets. That this should be his very first letter suggests something about his personality and values. His original training was practical rather than theoretical in orientation, he had farmed for sixteen years at Buchsfelde and in addition he must have had a capacity not to take himself too seriously. This had already been illustrated in his younger days when he told stories against himself in the first chapter of his *Reisen in Britisch Guiana*. Certainly a more sensitive soul would not have allowed a letter about manure to be the first to appear in the Letter Book.

Schomburgk's personal contacts with people and institutions overseas and the fact that his name was known through the British Guiana expedition would have been of immediate value in enhancing and increasing exchanges of specimens of flora and fauna to increase the Botanic Garden's collections. The Zoological Society in London, the Royal Botanic Gardens at Kew and the Royal Botanic Gardens in Berlin were some of the organizations with whom exchanges could be made. Improvements to the glasshouses enabled the quality and variety of the orchid collection to be enhanced. Schomburgk already had a great interest in tropical plants through his British Guiana collections and orchids were of great interest in the horticultural world at this time. In the Director's first Annual Report, written in January 1867, he commented that plants that had been in a 'very sickly and unsatisfactory condition' in the conservatory, stove and

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5 Correspondence with the Chief Secretary relating to this in the Letter Book for the period November 1865-March 1866 indicates that the Agent-General in London acted as intermediary with the Zoological Society in London.
fern-house were now showing 'vigorous growth'. The collection of orchids, enhanced by new specimens from the Royal Botanic Gardens, Kew, and the botanic gardens of Berlin and Mauritius, contained eighty five 'costly and many of the handsomest specimens available' so that he believed the collection would soon be unrivalled in Australia. There was a period of extraordinary enthusiasm for orchids, lasting from about 1840 to the end of the century, when a prize specimen brought back by a collector such as Benedikt Roezl could fetch 300 guineas in Manchester. When Schomburgk wrote that 'the quaint and beautiful forms of this very interesting division of the tropical flora will become accessible for the first time to a large portion of the public...' this was an area of horticulture which would attract a great deal of interest.

The display of aquatic plants had been enhanced by the formation of a large 'aquarium', 82 ft (25 m) by 42 ft (12.8 m), using solar heating which enabled the 'gorgeous nymphiaecae' to be grown in the open. His 'nymphaea' and 'nelumbiums' were grown from seed from Germany. Shrubberies and flower beds were established on islands in the pools created by Francis - the waterways were then, as now, an important part of design elements in the garden. At the northern end of the gardens, the creek leading away from the lake was turned into a straight channel in what seems to have been Schomburgk's first

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6 In the nineteenth century the word 'stove' was used for a hot-house.

7 Report from the Director of Botanic Gardens, 1866, p. 1. Annual reports will be cited as Reports. The exact title varied over the years.


KEY TO PLAN OF ADELAIDE BOTANIC GARDEN 1874

1. Fountain
2. Class ground
3. Avenue of Ficus Macrophylla (Fig Tree Walk)
4. Animal Cages
5. Palm House (now Old Palm House)
6. Kitchen Garden
7. Lumber Yard
8. Statue of Diana on Diana's Island
9. Fern House
10. Museum (Wood Museum)
11. Nursery
12. Shop
13. Stove House
14. Conservatory
15. Hospital Grounds
16. Green House
17. Director's Residence
18. Classical statue (Flora)
19. Rockery
20. Lawn
21. Trellis with Bougainvillea
22. Orangery
23. Classical statue (Niobe)
24. Aquarium
25. Music Pavillion
26. Victoria Regia House
27. Rose garden (Rosery)
28. Statue (Kiss' 'Amazon')
29. Arboretum
30. Experimental Garden
The Aquarium

Dating back to the early part of the Schomburgk era, the Aquarium, adjoining the main lake, was used for water plants. Poplars, quick growing like willows and playing an important role in landscape design in the Francis and Schomburgk eras, are marked on the plan of the site.
effort to deal with the many practical problems associated with the waterways.

The straight channel was thought to provide a stronger current, although the Director wrote that it also added to the symmetry of that part of the garden. To this end, he planted an avenue of the 'handsome American ash-tree' (*Fraxinus americana*) along the western side of the main walk. Other avenues of trees were planted also. One was of *Pinus insignis*\(^{10}\) [*Pinus radiata*] along the eastern side of the main walk; this main walk provided the north-south axis in the design of George William Francis.\(^{11}\) These avenues of pine and American ash provided eastern and western boundaries for part of the zoological section of the garden.\(^{12}\) The use of avenues of trees dated back to the Persian and Roman empires, reappearing in Renaissance Italy and spreading to France and the Netherlands as well as to Germany - where Schomburgk would have been familiar with those of the Sanssouci gardens. In Britain they featured in the sixteenth and seventeenth centuries when avenues of lime, elm and horse-chestnut were planted.\(^{13}\)

In 1866 Schomburgk introduced another very important avenue of trees, which, unlike the avenues of pine and ash, have survived to provide a feature of the Botanic Garden today. This is the avenue of Moreton Bay fig-trees, *Ficus macrophylla*. Schomburgk had written to

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\(^{10}\) Botanical terms used in the Reports will be given, with the names used today in square brackets.

\(^{11}\) The legacy of Francis was honoured by an obelisk with a brass commemorative plaque, not far from the North Terrace entrance gates.

\(^{12}\) See 1874 plan of Adelaide Botanic Garden.

\(^{13}\) P. Goode and M. Lancaster (eds.), *Oxford companion to gardens*, p. 30.
Cages for animals and birds

Photograph shows young *Ficus macrophylla* trees planted in 1866 to form what is now known as Fig Tree Walk.
Charles Moore of the Botanic Garden Sydney in November 1865 for suggestions for a source that could supply 60-80 trees 2-3 feet high. This evergreen species is characterized by dark green glossy leaves measuring up to ten inches (25 cm) and a trunk conspicuously swollen at the base and buttressed. The fully grown trees, 50-100 feet (15-30m) in height and with a spread of 60-100 feet (18-30m), today form a magnificent avenue of trees with a cathedral-like quality. The Moreton Bay fig was one of the earliest native plants to be used extensively in Australian landscape architecture, especially in public parks and gardens where it provided shade so important in the summer months. Schomburgk left two significant avenues of trees, the *Ficus macrophylla* avenue and another one of *Araucaria* species, *Araucaria excelsa* [now *A. heterophylla*] and *Araucaria cookii*, [now *A. columnaris*] planted in 1868. They provide major design features which have no counterpart today in the Botanic Gardens of Melbourne and Sydney.

The steep banks of the creek at the northern end of the garden, running to the north-west corner, were planted with weeping willows and a variety of conifers 'pinus, cupressus, thuya, taxus and araucarias' and other plants. A rosery was planned, bound to be

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14 Schomburgk to Moore, 2 November 1865 in Letter Book 1865-81. Reference to this planting took only one line in the 1866 Report.


16 An avenue of *Ficus macrophylla* in Sydney Botanic Garden was removed when the Cahill Expressway was built in 1958. There are avenue trees remaining at the Brisbane City Botanic Gardens, with *Ficus benjamina* and *Araucaria* species, and a magnificent avenue of wellingtonias, *Sequoiadendron giganteum*, planted in 1874, in the Botanic Gardens in Ballarat.

popular with keen gardeners. A large section of what used to be known as the Police Paddock, now part of Botanic Park, had been acquired by the Botanic Garden. Schomburgk drew up plans for the planting of this although work did not actually begin until 1873-74.

While the newly planted trees were growing and the areas concerned had an unfinished appearance, the provision of attractive flower beds in the gardens was of special importance. Bricked pits, framed and glazed, had been erected in the nursery 'to facilitate the raising of florists' flowers, which always prove an attraction in a public garden, and of which there was before a great want', and flower parterres had been laid out in different parts of the gardens in 'the new ribbon or mosaic style'. Parterres and ribbon borders were of considerable importance in garden design in this period. The landscape gardener, W.A. Nesfield (1783-1881) played an important part in making the embroidered parterre popular. He designed ribbon borders for the Royal Horticultural Society's new garden at South Kensington in London where he used a Florentine scroll based on Italian church floors and the influence of this design was immediate and widespread after these gardens were opened in 1861. It was publicized in the Gardener's Chronicle, in Andrew Murray's Book of the Royal Horticultural Society, (1863), John Arthur Hughes' Landscape Gardening and Garden Architecture (1866) and Samuel Beeton's anthology The Book of Garden Management (1862).

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18 There are two different spellings, 'rosery' and 'rosary' but the former is adopted in this work because it is somewhat more common today. Schomburgk himself used 'rosary'.


Parterre near the entrance gate

This view, from an area west of the main entrance gates, shows the fountain on Main Walk and statues of Venus and Hebe.
'Parterres de broderie' or embroidered parterres, using box and coloured gravel alone, had been used in the late seventeenth century, especially in France. The revival in Britain dated back to at least 1812 as is seen in a design of J.C. Loudon. They were used in continental Europe at this time, having been evident in some of the famous French gardens, although popularity had decreased after the eighteenth century. In Germany they had been used at Augustburg until 1842; and in Britain parterres appear in Nesfield's design at such places as Worsley Hall, Cheshire by 1846, Broughton Hall in Yorkshire between 1855-1877, and Warwick Castle in 1869 (with designs that had elements of the work of Désalliers d'Argenville's *Theory and Practice of Gardening* of 1712). Parterres might be a mixture of box and gravel alone or be combined with hardy plants or a mixture of half-hardy and fine-leaved plants.21

In Australia ribbon borders developed an established fashion of 'bedding out': a practice in which seedling annual flowers were planted out in elaborate patterns, together with a variety of hardy perennials such as pelargoniums and succulents which could be used to create a geometric carpet; these two being particularly useful because of the variety of their leaf forms.22 Pelargoniums were mentioned in the following year's Report, when new parterres were 'adorned with the brilliant colours of the new geraniums newly arrived from England.'23 Whereas in an English winter they generally had to be kept in a hot-house, in South Australia geraniums grew


23 Report, 1867, p. 2.
readily from cuttings and thrived outdoors, withstanding dry conditions particularly well. A number of species of pelargonium came from South Africa\textsuperscript{24} where climatic conditions comparable to those of South Australia were found. In displaying pelargonium cultivars, the Botanic Garden was demonstrating a plant that was ideal for the South Australian home gardener. Today the hardier forms of this plant are to be found in gardens all over the State. Trevor Nottle refers to Victorian ribbon borders as incorporating 'ribbons of colour - as many as seven, sometimes more - in a straight line'. Serpentine ribbon borders were designed also, but it was not until later that the more elaborate interwoven patterns were developed, and even later semi-tropical 'dot plants' were added. He lists as 'dot plants' yuccas, cordylines, araucarias, or agaves as plants to give accent to a scheme.\textsuperscript{25}

These popular developments could be more easily seen by the public as a result of the levelling, gravelling and guttering of part of the public walks, previously impassable in the winter months in some places. Apart from those areas of the garden primarily designed for display purposes, there were areas with a more utilitarian purpose, for example the experimental and nursery gardens. The experimental ground, designed 'for the cultivation of medical, industrial and fodder plants' suited for the climate, continued the acclimatization work started by Francis but was relocated to the north-east corner of the gardens, out of the main display areas and later screened by the trees of the arboretum. The second was a nursery garden so that


\textsuperscript{25} T. Nottle, 'A gardener's miscellany of 19th century plants', p. 184.
ornamental trees and shrubs could be supplied, 'for the purpose of beautifying public grounds and ornamenting cemeteries etc.'

About this time there were some administrative developments. For example, the staff were to have special badges because 'it often occurs that visitors trespassing doubt the authority, in not very polite terms, of the men, if these reprimand the trespassers'. Improved supervision was also possible with the addition of a building, now known as the North Lodge, erected near the northern entrance for the head gardener who was responsible for the overnight care of the animals - attacks by dogs had previously killed and maimed some of them. The staff at this time consisted of twelve men of whom two had been employed since the Botanic Garden was first established. The legacy of Francis lay not only in the original design features and the plantings of the first ten years but also a group of men who had learnt to work together. Pay sheets indicate that the staff of twelve in June 1865 included five who had been employed in June 1860 (Robert Boyd, Thomas Dyer, Thomas Cooke, James Godden, Andrew Porter), Boyd and Cooke also appearing on the pay-sheets for January 1856. Wages in 1865 were £2.2.0 per week for an unskilled gardener, with John Rankine the foreman getting £2.8.0. Rankine had free rent once the foreman's cottage was built but he also had extra responsibilities at night and over weekends, such as having to attend to the greenhouses in the evenings. Labour costs were approximately £27 a week, depending on the amount of

26 Report 1866, p. 2.
27 Report 1866, p. 2.
28 When the request was made for about £500 for this building it was noted that locating the garden foreman there would enable easier yet supervised access for the public through the adjoining gate. Letter Book, January 1866.
overtime earned from weekend work. Staff numbers varied according to economic conditions; for example in July 1867 three general hands and a carpenter were dismissed in order to reduce running costs.\textsuperscript{29} Schomburgk's own salary was £300 per annum at this time and the total budget £3000 per annum.\textsuperscript{30}

Schomburgk's first Annual Report (the 1866 Report written in January 1867) contained descriptions of what had been done and outlined improvements planned for the coming year. While much shorter than his later reports, it set the pattern of those to come. The style is a personal one with remarks which indicate Schomburgk's personal reaction and frequently his enthusiasm for a project, such as 'the work has been done to my entire satisfaction' and 'I am confident that in a short time our collection ... will be unrivalled in Australia'. Instead of a bland statement that the condition of the plants in the hot-house had improved with the new heating system, we learn that whereas they had been in a 'sickly and unsatisfactory condition' they are now 'healthy and vigorous'. Similarly he described how the excellent water supply in a year of drought had maintained the freshness of the parterres which would otherwise have had a 'dreary and death-like appearance' and mentioned that in teaching people about suitable fruit trees, models of fruit in the museum were preferable to live trees in view of the 'temptation to the predatory acts of juvenile visitors'.\textsuperscript{31}

\textsuperscript{29} Minutes, July 1867.

\textsuperscript{30} Letter Book, 19 June 1868.

\textsuperscript{31} Report 1866, p. 3.
Schomburgk's reports are more detailed than those of Francis. Correspondence in the Letter Book indicates that they were written with the idea of their being distributed rather than just submitted to Parliament and that Schomburgk was conscious of the importance of public perception that money was well spent. In this first Report plants grown for their economic value are mentioned only briefly; the main reference in this respect was to an attempt to grow tea plants from seed handed over to the Director by the government. This information forms just one paragraph of the three page report - in later years the report of plant trials was to take a much larger percentage. By comparison, in this first report the account of the zoological section takes up about a quarter of the text; a much higher proportion than in later years when plant trials were relatively more important. The rebuilding and re-siting of the cages for the 'interesting captives' (the animals and birds) appear to have been an important project during Schomburgk's first year of office and at this stage he could almost be regarded as an expert in zoology as much as in botany. There is considerable acknowledgement of plant material and creatures for the menagerie received from donors. The donors were listed by name - a useful public relations exercise since donors tend to be pleased to see their names in print. There were 43 donors of plant material in 1866 (apart from institutions in Australasia and overseas) who sent both live material and exhibits for the museum and there were 34 donors of animals and birds. Donors of plants could receive plants in return on condition that plants were not purchasable and had already been in the gardens for a period of two years, which ensured that they were well-established.

32 Schomburgk, letter accompanying Annual Report, December 1868, Letter Book 1865-81 and Schomburgk to Chief Secretary, 29 January, 1870.
Such a policy gave some protection to the nurserymen also. Schomburgk estimated that he had about 5000 different species in the gardens, having added about 1200 new species since his appointment some fifteen months earlier. He embarked on a re-labelling programme, with the country of origin being added to the name on the label, and he planned to produce a new catalogue in the coming year - both very important for the educational role of the Garden.

The report balances the attention given to the various functions of the Botanic Garden, scientific and utilitarian, educational and recreational, and balances an account of work done and success achieved with plans for the future. There were thus both demonstrable improvements and promises of more to come. Already the Botanic Garden was an important leisure resource.

In the following year, 1867, the levelling, guttering and gravelling of the walks progressed. Determination that the style of developments would follow some overall plan is indicated by a letter from the Board to the Mayor and Corporation of Adelaide offering them an iron bridge, originally intended to be used on one of the lakes, which had been imported from England but which proved to be 'too heavy' and 'unsuited for the purpose'.33 While no use could be found for the bridge in the ensuing years, it was certainly not used in the Gardens.

However, there was public enthusiasm for what was being achieved and the style that was developing. Three local residents organized a

public subscription to raise funds to provide two new statues. The statue of Kiss's Amazon would provide a feature for the new rosery and that of Niobe would provide a focal point for a new avenue of conifers leading up to the higher ground on the eastern boundary. The shape of the hill was to be improved so that a vantage point would provide a fine view over both the gardens and the city itself. Given the relatively flat nature of the Botanic Garden site these developments would provide some important visual contrast. The third statue, that of Venus, was the Board's contribution. The statue of the Amazon has survived to the present day but the other two statues disintegrated when attempts were made to move them during the 1950s.

For Schomburgk these acquisitions not only enhanced the beauty of the gardens but cultivated 'public taste for the fine arts'. The use of statues in the garden was something with which he was very familiar from his European training. Statuary in gardens dated back to classical times and was a feature of great gardens in seventeenth-century France and of Versailles in the eighteenth century. In the eighteenth century, statuary was used in Britain in gardens such as that of Stowe and in 'le jardin anglais' at Ermenonville in France. In Bavaria there were some 300 statues in eighteenth-century Veitshöchheim. In the region known to Schomburgk in his early years statuary was used at Mosigkau, Halle; Oranienbaum, Halle; the Grosser Garten, Dresden with its collection of 1500 statues; the Rheinsburg Park, Potsdam, where there were statues of Pomona and

34 Minutes, 2 August 1867.
35 Report 1867, p. 2.
View across Botanic Garden towards the Royal Adelaide Hospital

Photograph (c. 1872) shows the domed glasshouse dating back to the Francis era and statues along Main Walk.
Flora (both subjects for statuary in the Adelaide Botanic Garden in Schomburgk's time) and at Sanssouci itself.36.

The use of statues helped create the atmosphere of a mature garden while trees and bushes were growing. One feature soon to produce a great display was the rosery planted with some 300 varieties. Schomburgk was delighted with the rapid growth of the bushes and was fortunate that Adelaide's climate was a favourable one for roses - which thrive in a sunny well-drained position so long as there is adequate irrigation. The flowering season for roses in South Australia is much longer than that in Europe and there were varieties of roses that had to be grown in glasshouses in Europe but which could be grown outdoors in Adelaide.37 Schomburgk was to find that the main problem came from excessively hot, dry conditions in mid-summer which could spoil his display, although he was helped by the irrigation system that had been installed by 1867.

Roses had been introduced to Europe from Persia where they are known to have been cultivated as long ago as the twelfth century B.C. The introduction of Chinese roses into England at the end of the eighteenth century led to the development of the modern garden rose. Nineteenth-century interest in roses was stimulated both by the magnificent collection at Malmaison of the French Empress Josephine and by the great expansion in the number of varieties available as a result of work on hybridization done by leading French rosarians of


37 It was because of this that a collection of rare and threatened species was sent to the rosery at Carrick Hill in suburban Adelaide as a bi-centenary gift from rose growers in Germany.
that time.\textsuperscript{38} The practice of budding for propagation of bush roses was well established in Germany in the period when Schomburgk was a young gardener there. There was a fine collection in the royal Prussian rose garden on the Island of Pfau (Pfauinsel or Pfaueninsel) near Potsdam\textsuperscript{39} and Schomburgk had worked at Potsdam. He reported in his 1867 \textit{Report} that all his new roses were now budded\textsuperscript{40} - it seems that he and his staff were doing the propagation themselves.

A rosery was a feature which interested a wide range of people and it provided an attractive display after a fairly short time compared, for example, with an avenue of trees which might take twenty years to do so. Writing in January 1868, Schomburgk was already referring to the rosery as a 'much admired feature of the garden'. It was in 'oriental style' with the roses planted in 'ampitheatrical rows' with the colours shading from carmine to white. It is not clear exactly what was meant by this statement about the oriental style. There was a good deal of horticultural interest in the 'oriental style' at the time so the statement would have had advantages from a public relations viewpoint.


\textsuperscript{39} G. Krüssman \textit{The complete book of Roses}, pp. 61 & 142. The collection included 2,100 standards and 9,000 bush roses of some 140 varieties planted in the spring of 1821 on the advice of Lenné. As hybridization developed Ernest Herger of Köstritz had about 2,000 varieties in cultivation by 1857, some indication of the importance of rose breeding at the time. The collection at Malmaison contained 250 varieties.

\textsuperscript{40} \textit{Report} 1867, p. 1 (written in January 1868).
Photograph shows how visual interest was provided by the design of flower beds, the central statue (now re-located near Kiosk) and the contrast in shape and colour of the group of conifers in the background. Cages for birds can be seen near the group of conifers.
Oriental influence on European design was important in the eighteenth century. Traders and explorers brought back *objets d'art* as well as plants and the Orient provided inspiration for new ideas in household and garden design. The introduction of flowers from China to the modern garden was of great importance to horticulture, bringing us not only the modern bush rose but pinks, peonies, chrysanthemums, camellias, magnolias, gardenias, forsythia and wisteria. China's garden tradition, a tradition which can be viewed as the oldest continuous garden tradition in the world, developed from the richest and most widely diversified flora of all the temperate regions.\(^{41}\) Sir William Chambers' *Dissertation on Oriental Gardening*, published in 1772, was widely read in England. It was used in a campaign against formalism and the geometrical style in garden design, being associated with the rage which swept Europe for *chinoiserie* and for the landscape and the Anglo-Chinese garden\(^{42}\). By 'oriental' Chambers seems to have been referring predominantly to the Chinese garden tradition. There was not a lot known in Europe about the Japanese garden tradition in the period under study.

Chambers' ideas were also influential in continental Europe, particularly in the German states, as seen in the Englischer Garten, Munich, and the gardens of Mosigkau, Oranienbaum, Schwetzingen, Nymphenburg, Pillnitz, Schönbusch and Veithöchsheim.\(^{43}\) In the German states there were such features as the Chinese House at Sanssouci and the Chinese garden and temple at Schwetzingen. In


\(^{43}\) *The Oxford companion to gardens*, pp. 176, 382, 406, 410, 433, 503, 504 & 582.
Britain there was the Chinese temple at Woodside, Old Windsor and the Pagoda at the Royal Botanic Gardens, Kew, and features at Sezincote, the Brighton Pavilion and Alton Towers. All were derived from enthusiasm for things oriental - although admittedly this involved support for a European concept of oriental ideas and a very imperfect knowledge of actual Chinese gardens.44

Loudon, writing about Chinese gardens, refers to visitors' accounts that the Chinese were 'good imitators of nature', using rock and artificially-made hills, artificial lakes, winding walks and bridges.45 Schomburgk's own interest in oriental garden design might have been stimulated by his contact with his older brother Robert, who was British Consul in Bangkok until 1855, although he himself had not ever visited an Asian country. It is possible that his view of oriental gardens was based on particular accounts which he had read but, regrettably, there are no diaries or personal papers that have survived that can throw light on this matter. Whatever may be the origin of this remark about using 'the oriental style' and whatever may have been the extent of his interest in things oriental, he did not incorporate into Adelaide Botanic Garden's site design any features of an artificial nature such as a pagoda or tea house.

The other possibility is that Schomburgk had in mind the Islamic tradition of an enclosed garden, where a calm and harmonious retreat could be found from the dusty world outside, with flowers providing fragrance. These gardens were traditionally symmetrical with a


45 Loudon, Encyclopaedia of gardening, pp. 384-385.
geometrical design being employed and defined areas for flowers and paths. The elements of privacy, order and geometry are certainly to be found in Schomburgk's rosery design although the Islamic focus on water is absent.\textsuperscript{46} A statue was used for a focal point in the centre rather than a fountain or pool.\textsuperscript{47}

The idea that colour should not be used at random, but rather provide harmony in design through the blending of shades of colour, does relate to Chinese concepts of garden design where harmony, and especially harmony with nature, was an important element.\textsuperscript{48} Schomburgk's statement about oriental design may have referred predominantly to the blending of shades of colour in the design of the rosery rather than the actual layout. The Botanic Garden Library in his time had a copy of \textit{The Tree Rose - Practical Instructions for its Formation and Culture} (1845)\textsuperscript{49} but it has little on the design of rose gardens. The \textit{Encyclopaedia of Gardening} provides another standard reference work of the day, and one of Loudon's two designs for roseries bears some similarity to that chosen by Schomburgk.\textsuperscript{50} William Paul in \textit{The Rose Garden} (1848) suggests a number of ways of displaying roses, including planting them simply in straight rows about four deep, using poles for climbing roses to produce an arched effect, separating beds with gravelled walks, making use of some

\textsuperscript{46} \textit{The Oxford companion to gardens}, pp. 277-279.

\textsuperscript{47} The present rose garden, relocated to the place where Schomburgk had his Class Ground, now has a fountain in the centre.

\textsuperscript{48} \textit{The Oxford companion to gardens}, p. 111; L. Gothein, \textit{A history of garden art}, p. 236; J. Berrall, \textit{The garden}, p. 340.


\textsuperscript{50} Loudon, \textit{Encyclopaedia of gardening}, p. 1075
circular or arch-shaped beds and planting trees such as pines as a background.

A picture of the rose garden, included in Schomburgk's first catalogue in 1878\textsuperscript{51}, shows all these features except rose arches which appear in pictures at a later date. His roses were planted in rows along the edges and in a predominantly oval shaped bed incorporating circular shapes in the centre. Such a design was also advocated by Edward Kemp writing on \textit{How to lay out a Garden} (1858) who recommended a regular shape, with beds 'tolerably bold and simple in their outline', suggesting a circular, square, octagonal, or better still, oblong shape 'diversified with a mixture of smaller circles'.\textsuperscript{52} Smith (1852) commented that the rosery was generally laid out in the 'geometrical parterre style'\textsuperscript{53} and Loudon illustrates both oblong and octagonal beds with concentric rings.\textsuperscript{54} Paul also wrote of the desirability in design terms of having the rose garden 'concealed from distant view' so that the visitor experienced some surprise in coming upon the 'mass of lovely flowers'.\textsuperscript{55}

Kemp suggested planting roses in a separate garden, which he termed a rosery, detached from the rest of a garden by a screen of shrubs,

\begin{footnotesize}
\begin{enumerate}
\item Edward Kemp, \textit{How to lay out a garden, intended as a general guide in choosing, forming or improving an estate, with reference to both design and execution}, 2nd edn, Bradbury and Evans, London, 1858, pp. 280-282.
\item Charles Smith, \textit{Parks and pleasure grounds or practical notes on country residences, villas, public parks and gardens}, 1852, Reeve and Co, London, p. 49.
\item Loudon \textit{An Encyclopaedia of gardening}, p. 1075.
\end{enumerate}
\end{footnotesize}
not only to provide shelter from wind but also because the rose garden looked 'very uninteresting' in winter. Contemporary pictures show that there were trees and shrubs on at least three sides of the rosery which would indeed have produced such an effect and the addition of a statue in the centre was in keeping with Paul's ideas also. It is apparent that the design for Schomburgk's rosery was in accordance with ideas about garden design expressed in books on gardening available at the time to local horticultural enthusiasts. Kemp, who observed that 'roses are favourites with everybody', noted that it was important to have wide paths as admirers of roses always wanted to examine them at close range. The 1859 Catalogue of Plants of George William Francis shows that he had built up a good collection of roses well before Schomburgk came; Francis lists 24 species and about 100 varieties or cultivated varieties, referred to today as cultivars. For comparison we know that F.W. Newman, Curator of the Botanic Gardens in Hobart, listed 70 different roses in his 1857 catalogue, his list being a composite list of species and cultivars. Schomburgk established the new rosery soon after his arrival and by the time he produced a catalogue in 1878 listed 24 species and 402 cultivars. It is worth noting at

56 Kemp, How to lay out a garden, p. 281.

57 ibid., pp. 281-2.

58 For example, Rosa bracteata (McCartney rose) and Rosa banksiae (Banksia rose) are different species of rose; there are a number of different cultivars of the latter with petals of differing shades and variations as to double or single etc. A cultivated plant has characteristics (developed by such process as hybridization, selection or mutation) which are retained when the plant is reproduced.


60 R. Schomburgk, Catalogue of plants under cultivation in the Government Botanic Garden, 1878.
View of eastern part of the garden

(c. 1871). This area, planted as an arboretum and including a number of indigenous eucalypts, is close to the present day Tropical Conservatory.
this point that confusion can arise when nineteenth-century writers refer to so many 'varieties' or 'kinds', for example referring to roses or acacias, where a botanist or trained horticulturist would rather refer to species or cultivars.61

The year 1867 saw the planning of the arboretum in the north-east corner of the Gardens in the area bordered by the creek, the experimental garden and the boundary adjoining the Lunatic Asylum.62 An arboretum is a collection of trees grown to illustrate the diversity of species and forms but arboreta are frequently designed to provide aesthetic enjoyment also.63 Schomburgk described how most of his arboretum would be planted with Australian trees and shrubs from the western, eastern and north-eastern parts of Australia. He raised a wide variety of plants from seeds in his nursery. He referred to 42 species of *Eucalyptus* and 70 species of *Acacia*, adding that 'without doubt, when accomplished, this part will make one of the most delightful and picturesque parts of the garden'.64 A photograph, dated approximately 1871, of the eastern area of the garden shows some tall trees that appear to be some of the original vegetation on the site before the establishment of the Gardens in 1855. The arboretum is still in existence as part of the Schomburgk legacy with a number of fine old trees which would date back to Schomburgk's plantings - it is an area that has been

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61 Such confusion has led to the term taxon (plural taxa) being used by botanists today for a taxonomic unit. *Rosa bracteata*, referred to in a previous footnote forms such a unit.

62 See map.

63 *Oxford companion to gardens*, p. 20.

64 *Report 1867*, p. 3.
rejuvenated and can still be described as 'one of the most delightful and picturesque parts of the garden'.

Adjoining this arboretum was the pinetum on the hill, bordering the Lunatic Asylum grounds. Conifers enjoyed great popularity during this period in Britain; the landscape gardener Charles Smith commenting that 'the Pinetum is unquestionably the most important of all the special collections of tree, whether as a member of a general arboretum or as planted by itself'. Conifer is the colloquial name given to members of the gymnosperm group of primitive plants and pines are members of this group. They played an important part in arboriculture in Germany when Schomburgk was a young man. Enthusiasm for conifers was stimulated by the introduction of exotic conifers to Europe, in particular the Douglas fir in the 1820s, the deodar from the Himalayas and the Atlantic cedar (Cedrus atlantica) in the 1830s, followed by the monkey-puzzle tree (Araucaria araucana), and then Californian conifers including the redwoods and wellingtonias of the 1840s. Most conifers are evergreen and their all-season colour together with their variety in shape and form made them popular amongst landscape gardeners. In the 1850s and 1860s there was a vogue for planting conifers in

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65 Elliott, Victorian gardens, p.116; Smith, Parks and pleasure grounds, p. 258.

66 Smith, Parks and pleasure grounds, p. 258.

67 The group is to be contrasted with the more advanced flowering plants called angiosperms. A conifer is a tree or shrub bearing a cone, although some gymnosperms such as yew (Taxus baccata) and maidenhair tree (Ginkgo biloba) do not have cones but are still regarded as conifers. Conifers are commonly considered to be evergreens but include deciduous trees such as the swamp cypress (Taxodium distichum). Oxford companion to gardens, p. 124.
avenues. Schomburgk's early planting of *Pinus insignis* [*Pinus radiata*] dates back to this period.

In Hobart, F. W. Newman listed no less than 134 species of conifer in his Catalogue of the Royal Society's Garden in 1857, out of a total of about 1300 species altogether; clearly conifers were regarded as a very important part of the collection. Ferdinand von Mueller, writing in his 1859-60 *Report* for the Botanic Gardens, Melbourne, describes a very substantial collection of conifers there - 185 different species around his Palm House and additional species scattered through the gardens, making at least 10,000 conifers in the areas for which he was responsible. He saw the conifers as providing shelter for other species in the Garden besides providing a 'pine park' easily accessible for the city's inhabitants. Von Mueller referred to the 'noble forms' of the conifers. Pescott, writing of von Mueller's pinetum and the importance which he placed on conifers, has commented that the emphasis on pines was almost certainly a reflection of the environment in which he had been reared and educated in Europe, and it is likely that Schomburgk was not only influenced in this way himself but had his views reinforced by his visit to von Mueller in Melbourne in 1867. This was one of the few recorded trips he made to another colony, and one that exposed him to von Mueller's ideas. Von Mueller sent a gift of 60 specimens of *Pinus*

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70 Von Mueller wrote that 306 pines had been planted on a slope facing a lagoon, 1,299 on the Garden lawns, 7342 in the Government House reserve and 1,000 in the Domain. *Annual Report, of the Government Botanist and Director of the Botanical and Zoological Garden, 1859-60*, Government Printer, Melbourne, p. 5.
*insignis* in May 1866 along with 60 specimens of American Ash (*Fraxinus americana*) which appear to have been used for the first avenues planted by Schomburgk.

There had been a limited number of conifers in Adelaide Botanic Garden previously. Francis listed 62 species in his 1859 catalogue. Schomburgk's new collection of 130 specimens of 80 species 'of the most handsome kinds' was planted after the ground had been dug two feet deep. The area was served by the new irrigation system which also serviced the rosery and experimental garden. Schomburgk could write in January 1868 that the pines 'thrive uncommonly well' and he promoted the stone pine (*Pinus pinea*), the Aleppo pine (*P. halepensis*) and the Californian pine (*P. radiata*) as being very suitable for public tree planting. By the end of 1868 he could report that he had 141 species, all (except for the species from Japan and the Himalayas) growing well and the total collection forming 'one of the finest collections of conifers in the Australian colonies'. The popularity of conifers in this period is indicated by lists in catalogues of the Australian botanic gardens; some 60 species listed in Bailey's 1885 Brisbane catalogue, about 150 listed in Moore's 1895 Sydney catalogue, and 105 in Guilfoyle's Melbourne catalogue of 1883.

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71 Minutes, 4 May 1866.

72 *Report* 1868, p. 3.

From the viewpoint of landscape design Schomburgk's use of conifers contributed to a 'romantic' effect which could be said to be related to his northern European background. However conifers are not just part of the northern European tradition. Their international range is illustrated by the way that pines and cypresses were part of the gardening tradition of both Italy and China; in Italy in both a formal style and in more informal ways and in China in quite a different way - gnarled pine trees and drooping willows taking their place near 'mountains', 'lakes' and streams of the arranged landscape. The English eighteenth century writer Gilpin refers to the 'picturesque beauty' of the stone pine. Schomburgk used conifers in a variety of ways for landscape design. They were planted both as specimen trees, as part of groups of trees, and were also used in formal ways, particularly in avenues such as his avenue of *Pinus radiata* planted on the eastern side of the Main Walk and his avenue of araucarias planted in 1868. From a landscape design viewpoint conifers are chosen for their form, the depth of their colour, and, since most are evergreens, for their contrast with deciduous trees. Schomburgk used conifers to form a backdrop for his rosery and the Araucaria Avenue which forms such a landmark in the Botanic Garden today was used to provide visual contrast, breaking up the site into smaller sections and helping to provide a line that ran diagonally across the site leading from the statue of Niobe on the eastern boundary down a


76 *Gilpin's Forest scenery*, edited, with notes and introduction by Francis George Heath, Sampson, Low, Marston, Searle and Rivington, London, 1883, pp. 107-8

77 See photograph of rosery.
small hill to the main lake. 78 A gravelled walk (no longer existing) was made between the araucarias leading to an area at the top of the hill where there was a flower parterre and a fountain near the statue. The striking effect of conifers, particularly araucarias, in landscape design, both from their height and the contrast provided by their form, is also noticeable in photographs of the Main Walk in this early period. 79

The 'gigantic Victoria Regia'
While species such as conifers grew in the open, some exotic plants required glasshouse conditions. 'All botanic gardens ought to possess a certain amount of plant-houses, properly glazed and supplied with heating apparatus' asserted Charles Smith in 1852. 80 He regarded a botanic garden as scarcely complete without special glasshouses for such species as palms and orchids. 81 Adelaide Botanic Garden already had the conservatory erected in the Francis years in its glasshouse range but by January 1868 Schomburgk and the Board were getting plans and estimates for a new glasshouse which would enable the cultivation of the giant waterlily *Victoria regia* [now known as *Victoria amazonica*]. 82 The astonishing growth habits of the Victoria lily had inspired a new type of building, the Victoria House, to allow for a plant which could produce leaves of 6-7 feet (1.8-2.1m) in diameter. The waterlily was already associated with the names of

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78 See photograph.
79 See photograph.
81 *Ibid.* Smith declared that a botanic garden should have a palm-house, an orchidaceous house, a heath-house and stoves, greenhouses and propagation pits.
82 Minutes, January 1868.
both Robert and Richard Schomburgk. Although other European travellers had reported it, the detailed description sent back to Britain by Robert Schomburgk led to its botanical classification and he had brought back seed in 1837.\textsuperscript{83} A number of unsuccessful attempts were made to cultivate the \textit{Victoria} in Britain before the first flower opened at Chatsworth in November 1849.\textsuperscript{84} Reports of the royal waterlily in scientific journals and newspapers produced great excitement, with such descriptions as 'the Queen of Aquatics' and 'the vegetable wonder'.\textsuperscript{85}

Richard's proposal to grow the \textit{Victoria} in Adelaide was accepted, although he himself admitted that it was quite risky. This was not only because some members of the government considered it an extravagance\textsuperscript{86} but also because the waterlily had not been grown successfully in Europe before he left for Australia and he had no practical experience of raising it. Nevertheless he wrote in the 1868 \textit{Report} that the existing stovehouses were not large enough to accommodate the rapid increase in tropical plants and since overcrowding 'was so dangerous to them' it had been decided to build a new structure which would also accommodate the \textit{Victoria} as well.


\textsuperscript{84} William Blunt, \textit{In for a penny. A prospect of Kew Gardens}, Hamish Hamilton, London, 1978, p. 108. Three plants had been propagated at Kew; one going to Joseph Paxton at Chatsworth, one to the Duke of Northumberland at Syon and one kept at Kew. Paxton won the race to produce the first flower.

\textsuperscript{85} An article in \textit{Journal of Horticulture and Cottage Gardener}, 3 September 1861, pp. 442-444, devoted three pages to descriptions of its cultivation and the manner in which the plant grew and flowered. Schomburgk's own paper, 'The Victoria Regina' read to the Philosophical Society in Adelaide on 29 September 1868 recounts the difficulties encountered in cultivating the \textit{Victoria} in Britain, not only in getting viable seed but in creating conditions suitable for cultivation.

\textsuperscript{86} Schomburgk to Hooker, 2 May, 1869. Royal Botanic Gardens, Kew, archival collection.
The cost was £560 and the project was achieved by means of using the Garden's own carpenters and 'making retrenchments in all the different parts of the gardens'. The tank for the *Victoria* was 36 ft by 26 ft and 6 ft deep (10.9 m by 7.9 by 1.8 m), making it larger than that of the Duke of Devonshire at Chatsworth and heating equipment was provided by Linde of Rundle Street, Adelaide. Three inch pipes were laid at the bottom of the tank under pebbles and soil, with a small waterwheel to provide movement in the water.87 Given the difficulties of growing the *Victoria* this equipment must have required careful planning. It was not cheap to provide for what Sir William Blunt has described as 'this demanding but status-giving monster'.88

There was some opposition to the plan:

many wellwishers of the Garden consider it an extravagance to build such an extensive structure for the royal water-lily, but they did not consider that it is also the abode of 1,169 other tropical plants and that after the removal of the plants into the new house, there is no observable deficiency in the old stovehouses. I hope that they will have now come to the conviction of how overcrowded the houses must have been and how necessary such an additional building.89

The venture was in fact a great success. The Victoria House was 'a model of gracefulness...'90 The flowering of the *Victoria* produced a degree of excitement in Adelaide which could be likened to that which accompanied Bradman's cricket scores at the Oval in later

87 Schomburgk, 'The Victoria Regina', p. 23.
88 Blunt, *In for a penny*, p. 110.
90 *Express and Telegraph*, 19 September, 1868.
Victoria House

The photograph (exact date not known) of the interior of the Victoria House illustrates not only the size of the leaves but the variety of plants grown in the glasshouse. The Victoria House, re-built and re-glazed, is now part of a glasshouse complex known as the Schomburgk range.
years. The *Register* of 12 October 1868 reported 5840 visitors on the previous Sunday. Some 30,000 visitors were recorded in the five week period up to November 1868. In all attendances at the Gardens grew to 300,000 visitors for the year - a remarkable number given that the 1866 census gave the South Australian population size as 163,000. The successful flowering of the *Victoria* was of special pride to South Australians because it was quite difficult to grow and it was thus a special coup for Schomburghk. Annual Reports referred to its beauty and rapid growth. Many contained notes on how many flowers and leaves had been produced in a particular year and how large they were. Newspaper reports described how the leaves of what had been a small plant with a six inch (15 cm) leaf, placed in the tank on 22 July, were nearly covering the tank by 19 September. There were hour by hour descriptions of the opening of the flower-buds. During the very first season the *Victoria*, planted in its special tank when its leaves were up to 6 inches in diameter, produced in its first six months 54 leaves one of which was 6 feet 4 inches (1.9 m) in diameter and forty one flowers, each nearly 13 inches (33 cm) in diameter. In 1869 leaves were up to 6 feet 6 inches (1.98 m) in size and there were as

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92 *Register*, 12 October 1868.


95 *Express and Telegraph*, 19 September, 1868.

96 *Express and Telegraph*, 1 October, 1868.

many as 190 flowers during the year. Schomburgk recorded that he was experimenting with different types of soils and other factors to try to approximate conditions that existed in British Guiana where he and his brother had found specimens of the Victoria with leaves as large as 7 feet 4 inches (2.2 m) across.\(^98\) He learnt to replace the plants with new ones every two years by growing new plants from seed and keeping at least one plant in reserve and was gratified to be told by people who travelled overseas that Adelaide's Victoria House was 'the handsomest they have seen.'\(^99\) The 'Royal water lily' has now been grown for 120 years in Adelaide. The Botanic Gardens in Melbourne grew the Victoria somewhat before Adelaide but they did not have the consistent success demonstrated by Schomburgk in subsequent seasons.\(^100\)

The Victoria House provided one of the substantial and noticeable improvements which helped to build up the prestige of the Botanic Garden and with it Schomburgk's own reputation. He himself described it as one of the great achievements in the Garden, being quick to point out that he was able to grow many other tropical plants as well - epiphytic and terrestrial orchids and other plants requiring warm, humid conditions.\(^101\)

In cultivating the Victoria Schomburgk was doing something that had international prestige. Three plants had been raised at Kew in 1849, 

\(^{98}\) Report 1874, p. 5.

\(^{99}\) Reports 1870, p. 5 and 1872, p. 7.

\(^{100}\) Ferdinand von Mueller grew the Victoria for four successive years from 1867 in Melbourne, being successful a little earlier than Schomburgk, R.T.M. Pescott, The Royal Botanic Gardens, Melbourne, 1982, p. 77.

\(^{101}\) Report 1868, p. 1.
one of which was sent to the Duke of Devonshire and when this produced its first flower in November 1849 Paxton wrote that the sight was 'worth a journey of a thousand miles'. The lily was grown at Kew the next year and in Amsterdam in 1859. The Birmingham Botanic Garden erected a Lily House in 1852 at the cost of £800. They were able to produce flowers in 1853, a source of great pride to the Board as the growing of the Victoria was a matter of prestige and rivalry among botanical institutions in Britain and the continent.102

In addition to the Victoria, the Gardens had acquired orchids from Kew, Java and St Peters burg giving a total of 160 species, to which a further 95 species were added in 1870 through purchase and exchange. There was a fine collection of variegated leaf plants; in the period 1870-1872 this included Dracaena, Croton, Caladium, Dieffenbachia, Anthurium and Maranta. Schomburgk considered the collection not to be surpassed in the Southern hemisphere103, a comment likely to bring a glow of parochial pride to his readers. Such a display would have been of considerable interest to home gardeners who might wish to grow such plants in their home conservatories, for by this time successful settlers were establishing fine houses to which a conservatory would be an appropriate adornment.104

102 P. Ballard, An oasis of delight: the history of the Birmingham Botanical Gardens, Duckworth London, 1983, p. 51. The Birmingham Lily House was 60ft x 36ft - a larger one was needed to house other tropical plants but of the £500 needed only £250 was raised.


104 Charles Smith had written in 1852 that 'among the various appendages which it is desirable that a mansion-house should possess, none is more important than a conservatory, which when happily placed, may be regarded as an extension of the drawing room', Smith, op. cit., p. 13. Hix illustrates the point with some lines from Benjamin Disraeli's Henrietta Temple; 'Miss Temple is quite right',
One visitor was not impressed by the 'queen of aquatics'. In a letter published in the *Advertiser* a writer with the nom de plume of 'Jolly Humbug' referred to a 'dirty-looking' flower which he admitted was 30 hours old and might have been on the wane:

> The whole froth that we have heard about the flower is just a little German bumptious brag, and nothing else. The water-wheel and the leaves are by far the best part of the show.\(^{105}\)

However the editor, suggesting that the writer himself might be in 'the wane of life', declared that it was 'too late in the day to make fun of the Victoria Regia' and, indeed, visitors were numerous and appreciative. The *Examiner and Daily Telegraph* described the Victoria House as 'a model of gracefulness', commenting that

> the immense improvements that have been made during the last few months are a credit to the skill and taste of Dr. Schomburgk and the liberality of the Government.\(^{106}\)

The *Observer* described 'the Doctor's Victoria House' enthusiastically as 'a Sydenham Palace in miniature' and 'the greatest undertaking he has yet undertaken'. Referring to 'the Fairyland that is to be' the writer explained that as plants grew 'there would be a tropical lake embosomed in a semi-tropical forest - an epitome of the most luxuriant scenery in the world...', 'All the art of European horticulture will be employed to display the wonders of American and Indian vegetation'.\(^{107}\) The project that had seemed risky at first had become an overwhelming success.

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\(^{105}\) *Advertiser*, 2 October 1868; also published in *Examiner and Daily Telegraph*, 30 September 1868.

\(^{106}\) *Examiner and Daily Telegraph*, 30 September 1868.

\(^{107}\) *Observer*, 17 October 1868.
Yet it seems that some visitors were not satisfied with merely looking at plants in which they had an interest. A detective was employed during 1868 after a spate of robberies of plants and the rule was adopted that flowers might not be brought into the Gardens after 'one occasion when about twenty people came in with flowers in their button-holes, and hundreds went out with some...'\textsuperscript{108} Schomburgk commented in many of his annual reports that despite the large number of visitors the behaviour of most was 'highly becoming' - apart from that of some of the boys. He complained of:

\begin{quote}
the disgraceful behaviour of a set of boys, or would-be young men, who frequent the garden with apparently no other purpose than that of stripping the few fruit-trees, teazing (sic) the animals, or destroying the birds' nests.\textsuperscript{109}
\end{quote}

Nevertheless, such problems as thefts of plants, problems with the safety of animals, and one incident in 1874 of 'wanton destruction' when the \textit{Victoria} was mutilated by boys who threw potplants at it, led to the attendance of two policemen on busy Sunday afternoons when there might be 3,000 visitors.\textsuperscript{110}

\textbf{New plants from far and wide}

Schomburgk was pleased with the interest shown by most members of the public in the Gardens and in particular for their support with donations of plant material. Some forty of these were mentioned in the 1868 \textit{Report} apart from colleagues in kindred institutions in Australia and overseas. A number of these names re-appear year after year. The list included well-known professional and business

\textsuperscript{108} \textit{Report} 1868, p. 3; Minutes, October 1868.
\textsuperscript{109} \textit{Report} 1866, p. 2.
\textsuperscript{110} Minutes, September 1874; \textit{Report} 1870, p. 7 and 1874, p. 5.
men and community leaders, for example in 1868: J. Angas, Samuel Davenport, Sir J. H. Fisher, J. Hodgkiss, M.L.C., T. H. O' Halloran, Dr W. Wyatt, and from the horticultural field, Messrs. Hackett and Giles and Pascoe (nurserymen and seedsmen), and J. Curnow (active in the Agricultural and Horticultural Society). Such donations and active cooperation between the Botanic Garden and local horticulturists were all the more valuable because of the difficulties involved in importing plants from overseas, a situation where two thirds of a case of plants or even more might have died on the journey to South Australia after a long wait to receive the goods.\textsuperscript{111} Letters to Europe took months to arrive so arranging for replacements was no easy matter. Later in the Schomburgk era improvements in the speed of ships led to an increase in the percentage of plants arriving safely, but even then boxes might be trans shipped to the wrong destination.\textsuperscript{112} Similar problems arose in the transport of animals and birds, as when twelve animals sent by the Zoological Garden in London died on the voyage, attributed to neglect on the voyage as much as to its length.\textsuperscript{113}

Schomburgk's skill in propagation meant that once he had plant material he had a good chance of increasing the number of plants for the Garden. Many people who donated plants received plants and

\textsuperscript{111} For example Minutes January 1868 record that two thirds of a case sent from London by Hendersons had died in transit and Minutes, January 1869 record that most of the contents of two cases sent by Dr Hooker had perished.

\textsuperscript{112} As happened in 1882 when long awaited plants were sent by mistake to Madras instead of Adelaide. Minutes, January, 1882.

\textsuperscript{113} Report 1869, p. 6.
seeds in exchange. Schomburgk wrote that he

would beg to impress on the Board the necessity to devote every year a small sum for the purpose of collecting plants and seeds within the Colony to enable me to make exchanges in Europe with kindred institutions.\textsuperscript{114}

That he should 'beg to impress upon the Board' the importance of this suggests that Board members may have considered the collection of indigenous material a less important activity than the acquisition of interesting exotics such as orchids, and it was important for the Director to remind the Board that a balance had to be maintained. Similarly, Schomburgk reminded the Board of the importance of 'strict adherence' to the rule that newly-introduced exotic plants should be at least two years in the garden before young stock or cuttings were given away, although plants of commercial and economic importance could be distributed to the public as soon as possible. Such a reference suggests that there might have been Board members who wished to have the rule bent on occasions. Schomburgk gave the issue some prominence in his 1870 Report, commenting that:

> In my endeavors [sic] to give satisfaction to everyone, by extending, as much as possible, the general usefulness of the garden, I regret that I am not altogether successful. The nurserymen, for instance, complain that the public is supplied too freely with plants, cuttings and seeds, from the Garden, and that their trade is suffering by it. The regulation by which plants that can be spared, are offered in exchange for any not in the garden, but also requiring that new ornamental plants shall not be distributed until two years after their introduction, greatly protects the nurserymen.

This two year rule was important to make sure that plants were well-established but also gave the nurserymen a chance to import their own material. Nurserymen gained a considerable number of orders from enthusiastic amateur gardeners who had seen new species in the Garden and did not want to wait two years for a plant. It was important to maintain good relations with nurserymen and to

\textsuperscript{114} Report 1868, p. 3.
reduce the risk that they would see the Botanic Gardens as a threat to their business. In a more general sense, it was important to be establishing good relations with members of the public if funds were to be forthcoming for the Gardens and it is noteworthy that Schomburgk postponed his original plans for a system garden or class ground for several consecutive years, realizing that there would be only limited public support for the project. While the construction of the class ground was postponed the area around the proposed site was developed with avenues of trees, so that when the class ground was eventually constructed there was already an avenue of Sterculia heterophylla [Brachychiton populneus] on two sides. Work started in 1870 on the class ground project, only gradually at first because of lack of funds.

There is an air of confidence in Schomburgk's account of 1870. There had been more plant material exchanged than in any previous year. He had received orchids, bromeliads, aroids, cacti and 1300 packets of seeds, all supplied by Dr Regel, a fellow countryman at St Petersburg, to whom Adelaide owed the largest part of its orchid collection, and another important collection from Dr Scheffer at Buitenzorg in Java (now part of Indonesia) with seeds of palms and orchids, plants for the Victoria House and hot-house and the 'famed upas tree' (Antiaria toxicaria) with its poisonous latex. There were plants from the Botanic Gardens of Sydney, Brisbane, Hobart, Auckland, Trinidad, and

115 Correspondence between the nurseryman C. Hackett and the Board reported in Minutes September-October 1871 is an example of problems in this area.

116 The scheme had been proposed in Report 1867, p. 3.

117 Extraordinary stories of the effects of this tree were spread in the eighteenth century; the surroundings were said to be desert and the poisonous influence of the tree thought to be fatal to people, J. C Willis, Dictionary of flowering plants and ferns, 8th edition 1973, p. 74.
plants and seeds from the Himalayas and Japan. New orchids and tropical plants made a fine display in the Victoria House. Photographs taken in the Schomburgk era show many variegated species and a number of climbers trained along the rafters. Schomburgk mentions Passiflora trifasciata, Thunbergia grandiflora, Allemanda hendersonii, nobilis and violacea, Antigonon leptopus, Petrea volubilis, Hexacentrys [Thunbergia] mysorensis, Clerodendrum thomsoniae and C. balfouri, Corynostylis aliflora, Dioscorea, Anaectochilus discolor and discolor variegata, Bougainvillea and Ipomaea.

In addition, he was undertaking a new development in the most northerly section of the Gardens, adjoining Botanic Park near North Lodge. A pond formed in the stream was enlarged and improved by work sloping the banks, and the area planted with a collection of 'weeping' trees. The following is Schomburgk's list of species planted, with his common names and country of origin. A note has been added as to whether the tree appears in the 1878 Catalogue - indicating whether it had survived or not.

Sophora japonica var. pendula, [Japanese Pagoda tree] [listed 1878]
Salix napoleonis, [Willow] [Levant] listed 1878
Ulmus pendula, [Cork elm - Europe] [listed 1878]
Sorbus aucuparia pendula, [Rowan tree] [listed 1878]
Prunus domestica pendula, [Europe] [listed 1878]
Prunus semperflorens pendula, [not listed in 1878]
Fraxinus excelsior pendula, [Europe] [listed 1878]
Populus pendula, [listed in 1871 but not listed 1878]

118 C'Balfouri' is now a syn. of C. thomsoniae.
Betula pendula, [Silver birch - Europe and N. America] [not listed in 1878]
Tamarix chinensis (China) [not listed in 1878]
and other forms of Populus (Poplar) and Salix. (Willow)

Leaving aside the willow varieties, the weeping forms of the other
species would be difficult to find in South Australia today. The hot,
dry Adelaide summers do not provide good conditions for growing
these trees and that area of the Garden would have been exposed to
drying northerly winds. In addition, the trees would probably have
arrived in a dormant condition after being packed in late autumn in
Europe and the warmer climate would have brought them out of
dormancy into the hot conditions of March in Adelaide. Schomburgk
did say that given the large size of the weeping trees, some having
trunks 10-12 feet (3.0-3.7 m) high, and the 'ugnenial' season for
planting them after their arrival, they had grown well, but many are
likely to have failed subsequently. He did very well to have had six of
these species still growing in 1878. Betula pendula (Silver Birch) is
grown today in home gardens on the Adelaide plains but is always at
risk in a year when hot, dry conditions persist for a long period.

One might expect that greater success would be achieved with the
planting nearby of a mixed group of palms and other tropical and sub-
tropical plants Zamia, Dracaena, Ravenala (Travellers palm), Musa
(banana), Strelitzia, Aralia, Canna, Yucca and Cactus. By 1872 the
Director reported that the palms in this area were growing well:
Latania borbonica [Latania lontaroides] (an ornamental Fan palm),
Sabal blackburnia [Sabal blackburniana], Chamaerops macrocarpa [C
humilis var elatior] C. fortunii [Trachycarpus fortunei], C. humilis,
Phoenix reclinata, Rhapis flabelliformis [Rhapis excelsa] (broad
leaf lady palm) and *Micrococos chilensis* [*Jubaea spectabilis*]; their success led him to try further planting of palms as lawn specimens.\(^{119}\) By 1873 the group included also *Encephalartos natalensis* and some *Strelitzia*. Schomburgk listed *Strelitzia augusta* [*S. alba*], *S. juncea* and *S. reginae* [*S. reginae var. juncea*] - South African plants suited to local conditions. A small hillock was raised and plans made to erect a fountain which would help to water the plants. Some of the species mentioned are still in existence in this area of the Gardens today.

A winding walk beside the pond led from this area along the stream to the western boundary by the Exhibition Ground. This section, one of the coolest and shadiest parts of the Gardens, was planted with a mixture of about 500 flowering and evergreen shrubs and trees, such as *Spiraea*, *Lonicera* (honeysuckle), and *Syringa* (lilac). Some 24 species of *Spiraea* were reported to be thriving a year later, in 1871, although they had failed as a group elsewhere in the Garden before - some indication of the nature of the trial and error process that occurred.\(^{120}\) Also reported to be successful in this cooler area one year later were *Isonandra gutta* [*Palaquium gutta*] (gutta-percha tree), *Liriodendron tulipifera* (Tulip Tree) and species of *Magnolia*. In the 1878 catalogue he listed: *Magnolia bicolor*, *M. conspicua* [*M. heptapeta*], *M. fascata* [sic][*Michelia figo*], *M. grandiflora*, *M. norbertiana*, *M. purpurea* [*M. quinquepeta*] and *M. superba*. There were also species of *Daphne* - in the 1878 catalogue he listed *Daphne collina*, *D. indica* [*D. odora*], *D. indica* [*D. odora*] var. *rubra*, *indica* [*D. odora*] var. *variegata*, *D. laureola*, *D. mezereum* and *D. odora*. Most of

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\(^{119}\) *Report* 1872, p. 7.  
\(^{120}\) *Report* 1871, p. 6.
the magnolias come from China and the daphnes originate from both China and Europe.

A large number of new species of conifers, many from Japan and China, were added to the pinetum. Shrubs and trees planted in 1870 were listed as coming from a wide variety of countries: Europe, the Levant, India, Nepal, Persia, Japan, China, Java, North America and the Cape. While there is popular criticism that Australians have planted European species rather than indigenous ones in home gardens, the Botanic Garden's records show that exotic plants and shrubs were imported from all over the world, many coming from the Middle East, the Cape, China and Japan, the Indian sub-continent and Indonesia.

Not all plants could be obtained by means of exchange with overseas colleagues or colleagues in Australia. An account from a firm in Hamburg dated December 1871 lists plants of some 200 different species (including Dr. Schomburgk's weeping trees, *Magnolia, Spiraea*, and *Lonicera*) which were purchased for approximately £22.00; a considerable amount since £22.00 was a typical figure for the weekly wage bill of the Botanic Gardens staff in 1871.\(^{121}\)

The border of shrubs running along by the Exhibition Ground was the next project in this area. The existing border was described as having nothing but 'acacias and other common stuff' together with fruit-trees which were continually being disfigured when branches were broken by boys stealing fruit. In 1874 the Director decided to replant the area with European and North American forest trees. By

\(^{121}\) Accounts and pay-sheets for 1871 in Adelaide Botanic Garden archival collection.
this time a large number of acacias had been established in the arboretum. Schomburgk noted with disappointment the short life of many of the Australian species in the gardens. He contrasted the fine growth of the Californian pines, which had reached 20-30 feet (6-9 m) within 6-8 years, with that of the Australian native tree and shrubs:

But I observe that a good many of our native trees and shrubs begin to die, especially Acacias, Cassias, Grevilleas, Hakeas, Templetonias, Hibiscus, &c., which have been planted in the early days of the garden, and have reached the age of about ten to twelve years. As the same is also apparent in their native state it must be concluded that their lives are of short duration and become shorter still in the garden by the good soil occasioning overgrowth, which is especially remarkable in the first year after their existence.122

Botanic Park

Schomburgk had further opportunities to promote tree-planting in a positive way. An extra 84 acres (34 ha) had been made available to the Botanic Garden with the acquisition of the area now known as Botanic Park. When funds became available to lay it out, Schomburgk planned a landscape garden and arboretum with a carriage drive lined with shady trees, and grassed areas with 'scattered clumps or single trees, conspicuous to the eye by their fine foliage or form...'.123

Although the summer of 1873-4 was particularly hot and dry with shade temperatures of 105°-110° F (40.5-43° C) and only one inch of rain (25 mm) between September and February, Schomburgk reported only 3% losses to the 4,000 young trees for this Park planting. He had demonstrated that early planting and assiduous attention to watering enabled young trees to survive under difficult conditions. He wrote, 'I understand that the loss of trees by other public bodies this season is very material; but I consider this is their own fault', adding that if

122 Report 1874, p. 7. The comment was repeated in Report 1884, p. 6.
123 Report 1873, p. 4.
trees were watered adequately when planted they would withstand great dryness subsequently. He then gave details as to how his own watering programme had been carried out, watering only twice after planting but going quite deep. Extracts of Annual Reports were published extensively in South Australian newspapers, enabling widespread dissemination of such information. Schomburgk planted as many varieties as possible of European and North American forest trees - ash, oak, birch, lime, and pine - as well as the best of the Australian native trees available. There were avenues of cork elm, Moreton Bay fig and Oriental Plane; the last of which he strongly recommended for public planting, as seen in Paris.

Further planting went on in subsequent years as resources became available. The remainder of some 9000 trees had been planted by the beginning of 1877, with European and North American forest trees growing 'luxuriantly' and reaching a height of 10-12 feet (3.0-3.7 m) that year, and 25-30 feet (7.5-9.0 m) by 1879. Towards Hackney Road where the soil was fairly stony, conifers such as the Pinus halepensis (Aleppo pine) and Pinus pinaster (the maritime or cluster pine) were planted. The Park was laid out so as to provide views to St Peter's Cathedral and the Congregational Church in Brougham Place, North Adelaide from an elevated vantage point where a half circle was planted with shady trees and provided with seats so the fine view could be enjoyed. Over the years the trees have grown so that this view is not possible today. The drive, intended for carriages, was planted with two rows of avenue trees on either side. Some 200 Oriental Plane trees formed the outside rows and the inside ones were alternately planted with native Lagunaria patersonii
(the Pyramid Tree or Norfolk Island Hibiscus) and Sterculia diversifolia [Brachychiton populneus].

Losses for the whole Botanic Park project were placed at only 2%. The skill of the Botanic Garden's staff is indicated by the fact that a few years later, when the erection of a new Palm House led to some landscaping changes, some 30 large trees were lifted and transplanted. Not having the proper equipment used in Europe, they used horses and drays, succeeding in the task although the ball of earth around the roots weighed several tons.\(^{124}\)

Apart from major projects such as this, normal care of trees required regular watering in the summer while they were young. This might occupy several men with a dray for weeks on end. In addition, there was mowing to remove Cape Dandelion (Cryptostemma calendulaceum=Arctotheca calendula).\(^{125}\) Mowing was a major task, occupying six men for eight weeks in 1877 for one mowing alone, and it had to be repeated that season. If the summer months were exceptionally dry, watering was also time-consuming in both the Park and the Gardens. The 1879 Report records an exceptionally hot summer with a four week period when shade temperatures fluctuated between 95°F and 106°F (35°-41°C), reaching 113°F (45°C) in the shade at one point (with 172°F or 77°C recorded in the sun). Schomburgk, who believed this to be the highest temperature ever recorded in Adelaide up to that time, noted that the poplars, willows,

\(^{124}\) Report 1876, p. 7.

\(^{125}\) The wording of Schomburgk's report suggests that the weed was a fire hazard, which is puzzling because it would be no more a fire hazard than other drying weeds. The mowing may have been intended both to remove the weed and to reduce the risk of fire.
ashes and elms along the banks of the lake became scorched and leafless. He had all his general hands occupied in watering during the six month period prior to his writing the 1879 Report in March 1880. Understanding such climatic extremes was not easy for settlers, even forty years after European settlement had begun in Adelaide, yet it was an important factor in the trial and error process of learning what could be grown successfully on the Adelaide plains.

One longstanding problem was the bank of the River Torrens, in places 34 feet (10.3 m) high and prone to being undermined. Eventually, when the main Botanic Park planting was completed, this had to be dealt with properly. The Legislature voted £600 as a first instalment for what Schomburgk called 'this tedious and dangerous work'. The aim was to produce a gentle slope some 82 feet (25 m) wide. This was planted with bamboo and willows to stop the earth being washed away during floods, and rushes were grown along the water's edge. Bamboos might be regarded as a poor choice today but they were fast-growing and did fulfill the task of stabilizing the earth at a time when water-flow in the Torrens could be heavy; for example in 1883 the river rose 8 feet (2.4 m) in a few hours. Of some 800-900 trees planted in this area some species, such as conifers and some of the willows, proved unsuitable for the brackish soil and were replaced with Tamarix gallica. There were special problems with an area of the river near the Company's Bridge (now Hackney Bridge) known as the 'death-hole'. This required more expensive treatment to prevent the banks collapsing during flooding. The total cost for sloping the banks of the Torrens came to about £1500, a

126 Report 1879, p. 3.
large expense comparable to the cost of such major projects as the purchase of the Palm House in 1874-5.\textsuperscript{127}

The pedestrian walk beside the river became part of a useful recreation area. The Legislature voted £300 for two entrance gates to be erected; one from Frome Road and one from Hackney Road. Each had a lodge for a man in attendance to control the transit of carriages through the Park, the Director noting drily that he suspected that if the gates were left open 'even flocks of sheep and herds of cattle' would be driven through.\textsuperscript{128} The Park regulations excluded heavy vehicles and the drive was only open during daylight hours, excluding Sunday mornings. The carriage drive, one and a half miles long (2.4 km), was officially opened on 20 June 1884.

There were some problems with unwanted visitors. The Park was frequented by 'disorderly persons of both sexes' who slept in the hollow gum trees or under the pine trees along Hackney Road and this led to the fear that if not frequently patrolled by the police at night the Park would become the 'nightly rendezvous of bad characters'.\textsuperscript{129} Vandalism was a problem in the nineteenth century just as it is today; some young trees were uprooted altogether, others as high as 6-8 feet (1.8-2.4 m) were snapped in two or twisted. For Schomburgk it was 'really disheartening'. He hoped that new clauses of the amended Criminal Act inflicting corporal punishment for wantonly destroying trees would be carried out 'to the letter'.\textsuperscript{130}

\textsuperscript{127} \textit{Reports} 1881, p. 15, 1882, p. 8 & 1883, p. 10.

\textsuperscript{128} \textit{Report} 1882, p. 9.

\textsuperscript{129} \textit{Report} 1876, p. 9.

\textsuperscript{130} \textit{Report} 1876, p. 9 & 1877, p. 9.
Such problems occurred not only in Botanic Park but also in the plantation along North Terrace and the Bowden Plantation for which Schomburgk had become responsible. North Terrace was one the four terraces surrounding the central city area in Colonel Light's original plan and one which the Botanic Garden adjoined. At Bowden, where each year Schomburgk had to replant hundreds of trees destroyed by local children, further damage was inflicted by wandering goats. Along North Terrace trees were uprooted even though protected by tree-guards. The Director wrote despondently and with characteristic candour, 'I never expected so much difficulty in keeping these plantations in order.'\textsuperscript{131}

Some other developments in the 1870s
As has been noted, Schomburgk had written at the very beginning of his term of office about the importance of providing a system garden or class ground; an area where plants would be laid out according to their botanical classification. Year after year there were insufficient funds for this but by 1871 a start was made with 160 families, each family represented by five or six genera. Schomburgk had 'long cherished' this project,

\textit{Notwithstanding that at present very little or no taste for the science of botany seems to exist among our rising generation, this taste may, perhaps, be more prominent in a future one.}\textsuperscript{132}

In view of this situation the design aspects were especially important. The symmetrical pattern chosen, 'in the shape of a hippodrome', was to be broken with 'two serpentine walks' and a fountain set in the centre for water plants such as Nymphaeaceae. In

\textsuperscript{131} \textit{Report} 1876, p. 10.

\textsuperscript{132} \textit{Report} 1867, p. 3.
addition to an avenue of *Sterculia heterophylla* [Brachyciton populneus] on two sides of the class ground there were to be avenues of *Tristania conferta*, now *Lophostemon confertus* (brush box) *Eucalyptus calophylla* (marri) and *Eucalyptus marginata* (jarrah) on the remaining sides, all selected on the basis of having a fine shape and 'dense and verdant foliage'.

The establishment of a class ground is one of the areas of work where we can make a useful comparison between the approach of Ferdinand von Mueller in Melbourne and that of Schomburgk in Adelaide. As previously mentioned, von Mueller received much criticism for arranging plants in the Melbourne Botanic Gardens in a way which, while demonstrating their botanical relationship, led to unattractive design. In contrast Schomburgk seems to have made a considerable effort to make the system garden as attractive as possible and the project was delayed while other development of the Botanic Garden, more attractive to the general public, evolved.

One of the projects which made a considerable difference to the appearance of the Gardens was successful experimentation with different types of lawn grass from various parts of the world. By 1870-72 couch grass (*Cynodon dactylon*) had proved to be a grass which could withstand what the Director described as 'the scorching heat of the summer months'. The three acres (1.2 ha) which had been planted in 1869 had by 1870 formed a 'beautiful green and close lawn' which, although not 'in such perfection as we used to see at home',

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133 *Tristania conferta* [Lophostemon confertus] which is fast-growing when young if given adequate water, is today popular for street tree planting in Sydney and Melbourne. It is regarded as useful for this purpose as it is moderately fast growing and of good shape. Ernest Lord, *Shrubs and trees for Australian gardens*, 4th edition, pp. 29, 32 and 38.
nevertheless fulfilled his dream of changing the previous 'dreary and death-like' appearance of the lawned areas. Lawns could now give the summer garden a 'cheering aspect'. A couch lawn needed fairly frequent mowing but, aided by the technological developments of the nineteenth century which gave us the first lawn mower, South Australians could now embark on a tradition maintained today. Despite waves of popularity for alternatives in landscape design the suburban lawn still reigns supreme. While Schomburgk admitted that couch tended to be dull in the winter months he considered that this problem could be offset by surrounding vegetation including flower parterres with brilliant colours. He also experimented with buffalo grass (Stenotaphrum secundatum) which he had seen being used to advantage as a lawn grass in the Sydney Botanic Gardens, and which he found rather more robust in its growth than couch\(^{134}\). Buffalo grass, like couch, became widely used for domestic and civic plantings, both having great importance in the field of recreation. Buffalo might feel a little more prickly to children who played on it but it was hardy and did not require a great deal of watering.

Lawned areas are shown on the 1874 plan of the Botanic Gardens on either side of the Main Walk, on either side of the Araucaria Avenue, between the fountain along Main Walk and the lake, and to the east of Top Lake. There also appear to be lawns around the animal enclosures that were on either side of the Moreton Bay Fig avenue, along the stream that ran through the Arboretum, and along the north-west corner of the Gardens. The larger proportion of these lawns was in the southerly half of the Gardens where the largest number of flower beds were located. This area would have been heavily used by

\(^{134}\) Report 1870, p. 6 and 1871, p. 6.
visitors. Growth of the lawns was aided by liberal dressings of manure. Schomburgk reported in 1873 that he had obtained from the City Corporation 200 loads of manure from the streets:

the effects of manure mixed with night-soil is apparent whenever it is used and no doubt will also be beneficial to the lawns.\textsuperscript{135}

This observation helps explain the remarkable growth of many of the newly planted trees in the Gardens. Not only did plants survive but new ones could be propagated from them. The value of this is seen in the 1873-74 summer, the year when there were twelve days of extreme heat with temperatures of 105-110°F (40.5-43°C) in the shade, resulting in losses of many plants from cooler climates such as those of New Zealand, Europe and North America. Duplicates planted in cooler places and in the bamboo sheds escaped destruction.

By 1873, plant material could be sent by steamer and plants were arriving in the monthly mail service. The cost might be twice that of transport in sailing vessels, but Schomburgk considered it well worthwhile since there was a substantial reduction in losses which we have seen might be as heavy as two thirds of what was sent.\textsuperscript{136}

The extent of the exchange of plant material is indicated by the fact that 20 Wardian cases containing 900 plants and about 3,000 packets of seeds were despatched from Adelaide in 1873 (the first year when steamer transport is mentioned) to kindred institutions for exchange, whereas in 1872 there had been only 15 Wardian cases sent.\textsuperscript{137} In addition, seeds were sent to such places as Kew, Berlin, St. Petersburg, Java, Natal, New Zealand, Belgium, United States,

\textsuperscript{135} Report 1873, p. 7.

\textsuperscript{136} Report 1873, p. 8 and 1874, p. 7.

\textsuperscript{137} Report 1872, p. 7.
Hamburg, Alexandria, as well as to Sydney, Melbourne and Brisbane. The number of Wardian cases sent rose to 22 in 1874.\textsuperscript{138}

**The Palm House**

There had been a total increase of 1,979 species in the years 1871-2 and an increased number of tropical plants was producing overcrowding in the existing glasshouses. In the 1873 *Report* Schomburgk outlined the problem and made an eloquent appeal for a solution. For several years he had been claiming that the collection of tropical plants was 'undoubtedly the most numerous and valuable collection in the Southern hemisphere' but now he was declaring that this collection was at risk because of overcrowding. A number of plants had reached the roof or would shortly do so and he argued:

> it would indeed be a sacrilege to top these fine specimens, and so spoil them for ever. We have at present barely sufficient room to afford accommodation and display the extensive and valuable collection of plants, and as overcrowding is so dangerous for them, it is indispensably necessary to their health and safety that means should be found to erect a new and commodious structure which is now so much required.

The argument was that we had a collection to be proud of, not only one that was better than those in the other Australian colonies but better than those anywhere else in the Southern hemisphere. We should therefore protect these treasures and save them from self-destruction as the plants grew and conditions became more crowded. Having made a recommendation for the building of a palm-house he went on to observe that he had heard

> very favourable accounts of a palm-house built of iron in Bremen, which is considered one of the finest structures of its kind in Germany, for its tasteful and elegant proportions and general suitableness.

\textsuperscript{138} *Report* 1874, p. 7.
Schomburgk waxed eloquent as he described the proposed structure. It would have a rotunda with an ornamental fountain 'surrounded by palm and fern trees'. Planting these directly in the ground rather than growing them in pots would favour luxuriant growth and the display of 'their graceful and noble foliage to greater advantage'. Since the Botanic Gardens site was subject to flooding, the palm-house should be placed on a raised terrace with a broad walk and grass margin - this terrace could be adorned with flower beds and statues.\(^{139}\) It was especially important to avoid flooding because the heating system would be set into the ground.

It was estimated that the palm-house would cost some £1400 necessitating a special government grant. However, the Director wrote persuasively that with such a structure:

> I think our garden would be complete, and would add still further to the fame which it already possesses in the neighbouring colonies and abroad.

By 1874 the Legislature had approved the Board's proposal and an order had been placed with the manufacturer, J. Höper of Bremen. The architect supervising the project was Gustav Runge who had designed Herr Rothermund's palm-house. Schomburgk's friend, the Adelaide businessman C. Meyer, acted as intermediary. From Bremen the prefabricated structure was shipped to London and thence to Adelaide, arriving in September 1875.\(^{140}\) Other than some problems with the transporting of the glass - twelve cases of which had to be replaced\(^{141}\) - the operation went quite smoothly. The palm-house was

\(^{139}\) Report, 1873, p. 3.

\(^{140}\) Minutes, 1 October 1875, report that it had arrived. Schomburgk referred to its arrival as being in December when he wrote his 1875 Report, probably writing from memory rather than checking the date.

\(^{141}\) Minutes, January 1876.
100 feet long and 35 feet wide (30.5 by 10.7 m), with a 37 foot (11.3 m) high rotunda in the centre and the wings on the side 23 feet (7 m) high. The price was £1087 delivered in Bremen. Meanwhile work could begin on the formation of the terrace for the palm-house. The terrace was to be 150 feet long by 75 feet wide (46 m by 23 m), the soil being obtained by forming a small lake in the Park Creek, across from the Exhibition Ground. A great deal of labour would be involved in forming the terrace, turfing the sides and clearing an area of about six acres (2.4 ha) around the Palm House but this part should become 'one of the most interesting, delightful and picturesque' parts of the Garden.

The Palm House was of iron and glass construction. Improved production techniques for iron and glass together with pioneering work in design had seen glasshouses erected in the botanical gardens of Dublin, Belfast and Kew between 1839 and 1848 and also the Crystal Palace in 1851. Great Britain gave a lead in design. In Germany, a number of large glasshouses were built after the 1860s in the botanic gardens of Berlin, Karlsruhe, Schönbrunn, Strasbourg and Würzburg. The outstanding plant among the exotic vegetation raised in these European hot-houses was the palm. Many varieties of plants might be grown together, with tall exotic plants such as palms usually grown in the higher central part of a glasshouse.

Attempts to raise plants in specially created structures independent of climate and seasons went back to ancient times. Specularia (stoves) complete with heating flues were found at Pompeii. In the

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first century A.D. Columella described cucumbers being grown in a vessel covered in transparent stone, *lapis specularis* or talc. The early botanic gardens at Padua and Leyden had greenhouses with a brazier to supply additional heat. The introduction of exotic plants into Europe in the sixteenth century and the desire to produce what Loudon later called 'an artificial climate' in which they could be grown, led to experiments in heating and ventilation and to correspondence between gardeners about successes and failures in such enterprises. Saloman de Causto, writing to the Elector Palatine in Heidelberg in the seventeenth century, described both wooden and stone orangeries - this was at a time when aristocratic patrons wanted citrus fruits for the table. By the eighteenth century the Dutch were producing forcing frames with sloped glass roofs and sliding wind shields for producing oranges, pineapples and grapes. Oil paper could be used under windows to produce double glazing.

The nineteenth century saw remarkable advances in glasshouse design. New heating techniques, using pipes under the floor, meant that the building could be glazed all the way around. There were improvements in ventilation. As early as 1805, John Claudius Loudon observed that hot-house plants needed not only adequate heat and light but proper ventilation if they were not to be weak and spindly. In 1817 he reviewed different theories about the angle that forcing frames should have in relation to the sun. An understanding of these factors was important in the successful development of his


145 Koppelkamm, *Glasshouses and wintergardens*, p. 15.
'artificial climate', which was in effect early air-conditioning. It was a development which enabled dramatic horticultural developments, and major experimentation by professional gardeners took place. Nineteenth century developments included James Kewley's 'automatic gardener', a thermostatic device which was described by Loudon in his *Encyclopaedia of Gardening* as early as 1822, and various self-acting ventilators devised by horticulturists in the period 1820-1840.146 Loudon, who was an architect as well as one of the most productive horticultural writers of the nineteenth century, was one of the most important innovators in the design of glasshouses. His work was followed by the technical virtuosity of Joseph Paxton's Crystal Palace which made a great impression internationally. During this period new techniques evolved for using hollow cast-iron columns as props which could also serve as a conduit for rain water from the roof, rain water being preferred for plants because of its pH characteristics.

British supremacy in the design of hot-houses, acknowledged by nineteenth-century writers, was related not only to the traditional British passion for gardening, but to her advantage as the leading economic and industrial country.147 As technology for iron and glass production improved, glasshouses were used extensively in commercial nurseries and kitchen gardens. Iron was now used in bridges, railway stations, warehouses, exhibition halls and arcades. With the old production techniques, flaws in glass and irregularities could lead to plants being burnt due to the sun's rays concentrating on


one spot. Glass could now be made by the pouring and rolling process so that large panes could be produced profitably.\textsuperscript{148} The spread of conservatories was aided by reductions in the price of glass after the repeal of the Glass Act in 1845, combined with lower prices for coal and iron.

A combination of improved technology and great interest in horticulture, both as a recreational activity and as a pathway to economic success, provided the background to the development of the glasshouse in nineteenth century gardens. In the domestic sphere it became fashionable in middle-class circles to have a conservatory attached to the house. Amongst some of the noteworthy developments in glasshouses in the British Isles were the Royal Horticultural Society’s conservatory at Chiswick (1840)\textsuperscript{149}; the Belfast Botanic Garden Palm House (built during 1839-40 and 1853); Turner’s Palm House and curvilinear range in Dublin’s Botanic Garden at Glasnevin (1843); Paxton’s Great Stove or Conservatory at Chatsworth (1836-1840); Turner’s great Palm House at Kew (1844-48); the less well-known Winter Garden erected in Regent’s Park in London and opened in 1846\textsuperscript{150}; and the Crystal Palace built for the Great Exhibition in London (1850).\textsuperscript{151} The glasshouses in the Dublin

\textsuperscript{148} Hix, \textit{The Glasshouse}, p. 34.

\textsuperscript{149} Only one wing was built of the four planned (185 feet long and 30 feet wide) because the glass was so expensive, Hix, \textit{The Glasshouse}, p. 116.

\textsuperscript{150} Turner played an important part in the design of this building and Decimus Burton was also involved, Hix, \textit{The Glasshouse}, p.122.

\textsuperscript{151} Oxford companion to gardening, pp. 229 & 426. The Belfast structure had a 46 foot high dome, with a short axis of 45 feet spanning the space between the two wings and a long axis of 66 feet which brought the front well beyond the line of the wings. Kohlmaier and von Sartory give the dimensions as 175 feet long, width of dome 67 feet, height 46 feet. In comparison the Great Palm House Kew was 362 feet long, transept 100 feet wide and 66 feet high, wings 50 feet high and 30 feet high, Turrill, \textit{The Royal Botanic Gardens, Kew}, p. 154.
and Belfast Botanic Gardens and the Palm House at Kew are still extant but many nineteenth century glasshouses were destroyed by fire or demolished during the first half of the twentieth century due to the expense of maintaining them in an era when tastes had changed. We are especially fortunate that Adelaide's Palm House has survived.

When comparisons of the dimensions of Adelaide's Palm House are made with glasshouses in other botanic gardens or other comparable institutions, it is apparent that the size of Adelaide's new Palm House was on a par with those in European cities. Adelaide's Palm House is 100 feet long and 35 feet wide (30.5 by 10.7 m), with a 37 foot (11.3 m) high rotunda in the centre and wings on the side 23 feet (7 m) high. The Pfauinsel Palm House in Berlin, (built 1829-1831), a wood and iron building designed by A. D. Schadow assisted by K. F. Schinkel, was one of the first large hot-houses in Germany and a prototype for future German hot-houses. Its dimensions were 109 feet long, 46 feet long and 46 feet high (33.2 m by 14 m by 14 m). Designed to accommodate a collection of palms purchased from the plant lover Foulchiron, it provided for some of the largest specimens grown in a palm-house in Europe. It was destroyed by fire in 1880. Alexander von Humboldt is said to have commented that whenever he was in the Pfauinsel Palm House he felt himself to be transported back to the forests of Orinoco\(^{152}\), and since Schombugk brought back a collection of palms to Berlin it is likely that he, too, was familiar with this Palm House. Other important German glasshouses of the period were the Orangery and Forcing House in Berlin-Glienicke, built

in 1839, destroyed in 1914 but now being rebuilt; the Winter Garden of the Palais Prinz Albert in Wilhlemstrasse, Berlin, built in 1832; and the Great Palm House of the Royal Botanic Gardens, Berlin-Schöneberg built in 1857-1859, 178 feet long, 57 feet wide and 57 feet high (54.3 m by 17.4 m by 17.4 m).153 There was also the great Flora in Berlin-Charlottenburg built in 1871-1873, combining a public recreation area and a palm-house, but its large dimensions (396 feet long by 270 wide or 120 m by 82 m) place it in a building category different from Botanic Gardens palm-houses such as those of Adelaide and Belfast.

Gustav Runge, the architect for Adelaide Botanic Garden's new Palm House, had previously won a commission to design the Philadelphia Opera House and had won recognition for his sensible arrangements for heating and ventilation, both of which were important features in the success of the Palm House in Adelaide. Runge was responsible for Castle Mülenthal at St. Magnus for Baron von Koop and the Customs House in Kaiserstrasse, Bremen. He was also responsible for the Baths at Breitenweg, regarded in its time as a model for good swimming facilities154 and a building which would have required skill in the design of ventilation and heating techniques.

A combination of wrought iron and cast iron was used for glasshouses during this period. Forged parts could not be produced as efficiently as the parts that were cast. Cast iron with its high

153 Costing 405,000 marks to build, this was demolished in 1907. The 57 foot high central structure had two wings 60 feet long, 57 feet wide and 33 feet high. G. Kohlmaier and von Sartory, *Houses of glass*, p. 166.

Palm House

Photograph (c. 1877) shows the raised terrace on which the Palm House was erected. The statues, part of a collection of four, were imported from Berlin.
carbon content was very brittle and wrought iron was used where parts of the structure had to withstand stress and curvature. The palm-house from Bremen is unusual in having a high proportion of wrought iron. The building is in many ways ahead of its time in its use of "curtain walls", the walls being suspended rather than supporting the roof. Glass is not used to provide rigidity to the walls, as was common in designs in Britain at the time. There are similarities to the use of glass as cladding in modern tower blocks. The design of the prefabricated Palm House is regarded today as one that demonstrates considerable skill and sophistication. There were two pillars supporting the central rotunda. Timber was still being used for glasshouses during this period and the Victoria House was of timber construction but the constant damp atmosphere had caused considerable rotting of roof timbers. They had to be replaced as early as 1875 - 'a work attended with much inconvenience and injury to the plants' - and subsequently the whole southern side had to be re-timbered. It was already clear by then that an iron structure would have been preferable. The Palm House ventilation, considered by Schomburgk to be 'perfect', was provided by two rows of ventilators on the sides and a row on the roof, 'easily' worked by pulleys and ropes. Heating was provided by a coke-burning tubular boiler, some five feet high and eighteen inches across (1.5 m by 0.45 m), from Holme and Partington in Manchester, a similar heating system having been used successfully by Rothermund in the much colder climate of Bremen. The boiler was placed in an excavated area at the western end of the Palm House and two rows of four inch (102

155 Information from Mr. Bruce Harry of LeMessurier Architects, Adelaide.

156 Report 1882, p. 5.

157 Report, 1875, p. 6.
cm) iron pipes traversed both sides of the building, ending in cisterns at the eastern end.\textsuperscript{158} Trial heating of the apparatus was successful following the erection of the Palm House under the supervision of the Colonial Architect's office.\textsuperscript{159}

Schomburgk himself planned and supervised the interior arrangement. This necessitated transfer of tropical plants from other glasshouses. One was a sixteen foot (4.9 m) high palm, a \textit{Latania borbonica} [\textit{L. lontaroides}], in the central part of the rotunda, and surrounding this were a number of plants with variegated leaves. The arrangement is seen in a photograph of the interior taken during this period. A six foot (1.8 m) wide walkway went around the central group up to each end of the building, and from this the visitor could see tree-ferns from New Zealand, Port Natal and Queensland, six to seven feet high (\textit{Cyathea dealbata}, \textit{C. dregei}, \textit{C. excelsa}, \textit{C. medullaris}, \textit{Alsophila cooperi} [\textit{Cyathea cooperi}], \textit{A. leichardtiana} [\textit{Cyathea leichardtiana}], \textit{A. australis} [\textit{Cyathea australis}], \textit{A. youngiana} and \textit{Dicksonia antarctica} [\textit{Dicksonia youngiana}]. A selection of climbing plants was trained up the eight pillars supporting the rotunda. Beside the red and blue tiled walkways was a collection of palms, some in pots, some in the ground. Schomburgk listed the following as the most noteworthy: \textit{Cocos weddeliana} [\textit{Microcoelum weddelianum}] \textit{Cocos coronata} [\textit{Syagrus coronata}] \textit{Cocos flexuosa} \textit{Martinezia erosa} [\textit{Aiphanes erosa}] \textit{Elaeis guineensis} (used on the Malay peninsula for palm oil)

\textsuperscript{158} Problems with the Victoria House heating system are noted in the 1876 \textit{Report}, p. 7 after some flooding occurred - boiler and fire hole were seven feet deep. By having the Palm House on a terrace, the risk of such problems could be reduced.

\textsuperscript{159} \textit{Report}, 1876, p. 6.
Ceroxylon niveum [Polyandrococos caudescens]
Ceroxylon andicola [C. alpinum]
Areca nenga
Areca nibung
Areca catechu (Betel-nut palm)
Areca monostachya
Oenocarpus bacaba
Oenocarpus penanga
Oenocarpus kuhlii
Zalacca edulis [Salacca zalacca]
Daemonorops fissus
Daemonorops palambaniscus [D. palambanicus]
Pritchardia macrocarpa
Pritchardia pacifica (Fiji Fan palm)
Thrinax brasiliensis
Thrinax parviflora (Florida Thatch palm)
Astrocaryum malybo
Maxmiliana murmura [Maximiliana murmura]
Maxmiliana regia [Maximiliana maripal]
Orbignya dubia
Kentia forsteriana [Howea forsteriana] (Kentia palm)
Kentia belmoriana [Howea belmoreana]
Thrinax elegans (one of the Thatch palms)
and species of Cecropia, Paratropia [Schefflera], Musa, Cycas,
Aralia, Ravenalia [Ravenala], Heliconia, &c.

together with such climbing plants as: Petrea, Stigmaphyllon,
Combretum, Antigonon, Allemanda, Stephanotis, Passiflora,
Tacsonia, Aristolochia, Jasminum, Clerodendrum &c.
Interior of Palm House

Photograph shows the grotto, which used rock from the Black Forest, the tiled walkway and the raised beds.
The Palm House was also used for tropical trees. Schomburgk introduced some South American species with which he had been familiar as a traveller: *Galactodendron utile* (the 'cow tree' producing a juice used as a milk substitute for tea on the British Guiana expedition); the Calabash tree (*Crescentia cujete*), the gourds of which were used by the Amerindians as bottles and cups; the Trumpet tree (*Cecropia peltata*)

160 used by the Amerindians both to make a wind instrument and to produce fire by friction; *Amyris balsamifera*, used for its balsam; and *Swietenia mahagoni* prized for mahogany wood.

The Palm House was opened on 22 January 1877. At the opening ceremony Lady Musgrave spoke of:

> this beautiful building - this fairy palace - this splendid palm house, has crowned our greatness with a beauty, I may say a magnificence, which all Adelaide will appreciate with pride.161

The Director described the Palm House as 'like a fairy tale of the thousand and one nights'. He noted that the plants gave an appearance of having been there for many years; over a thousand had come from the Victoria House and the old conservatory. In addition new plants from overseas were being added, their arrival sometimes producing much excitement as when poinsettias were reported in 1876.162

Outside the Palm House there was a fine display of annuals on the terrace: phlox, pansies, petunias, geraniums, verbenas, gomphrenas.

160 Schomburgk referred to it as *Cecropia palmate*. *Cecropia palmata* is the snakewood tree and *C. peltata* is the Trumpet tree.

161 *Register*, January 1877.

162 *Report* 1876, p. 9.
View from Palm House terrace

This view shows some of the willows which were planted beside the streams. Quick growing, they provided plantings which helped to break up the site and provide visual contrast. (From a nineteenth century bromide print, exact date not known).
and lobelias. A Port Adelaide firm of ship chandlers joined in the enthusiasm with the gift of a 96 feet (29 m) high flag pole, the most expensive gift yet received by the Gardens. Statues of Pomona, Ceres, Clio and Flora were placed in the Palm House, these together with ornamental vases were ordered from Castener & Co. of Berlin - it is good to know that Schomburgk and the Board included Clio, the muse of History, in the group!

The project was an expensive one. The cost of the ironwork and glass, including freight and commission, was £1300 and the cost of building the foundation of the terrace, the flight of steps and the statuary was approximately £2,500, making a total of £3,800. This did not include the cost of painting and glazing, which was done by the Garden's own workmen.

Schomburgk wrote that:

No doubt the whole undertaking is a great success; but as there is nothing perfect in the world, so it is with our Palm House, it should be at least twice as large. In a few years by the steady increase of the tropical plants the house will be overcrowded and the noble palms will soon have reached the roof. This down-to-earth remark was in some contrast to the previous talk of 'the fairy tale of a thousand and one nights'. The problem was that the palms grew almost too luxuriantly and some of them might have to be removed altogether because they would not stand being topped and might damage the roof. The ones causing most concern were

\[163\] Report 1882, p. 5 and 1883, p. 7.

\[164\] Report 1876. By contrast the Minutes, July 1876 gives the names of the statues as Flora, Pomona, Ceres and Urania. It may be that a change was made in the order. Since the Report was written on April 16, 1877 it is likely that the later list was the final choice.
*Phoenix, Pycnosperma, Kentia, Corypha, Pritchardia and Livistona.*

**Developments after 1877**

In addition to the more exciting work involved in the construction of new projects, there was also the more prosaic but continuing work to be carried out in maintaining existing buildings and facilities. Sheds, fences and trellises which dated back to the early days of the garden had to be replaced or repaired. Schomburgk pointed out in Reports that tradesmen on the Garden's staff did this kind of work when they had time free, enabling the work to be done for only the cost of materials - he appeared to make some effort to bring such cost saving to the attention of his audience.\(^{166}\)

A more serious problem was the continued pollution of the waterways. There are letters of complaint about this problem dating from November 1866.\(^{167}\) In 1877 it was reported that the ponds were worse than ever before - the water foul-smelling and declared by an analytical chemist to be dangerous to health. Visitors complained about the offensive smell and the sight of water which had become brown and black, but more serious still was the risk to families living in the Gardens. Schomburgk wrote that it was a wonder that steps had not been taken to remove 'this abominable nuisance' when an underground drain could be built between East Terrace and the Frome Bridge to deal with the problem. He had reason to be

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\(^{165}\) *Report* 1882, p. 5.

\(^{166}\) For example in *Report* 1876, p. 9 where he noted that it would cost £300-£400 if work had to be done by public tender.

\(^{167}\) Letter Book, 28 November 1866.
distressed - in 1872 his eldest daughter, Antonia, had died of typhoid fever. The Schomburgk's used a well in the Gardens for drinking water and it is thought this became contaminated at a time when typhoid fever was prevalent in Adelaide.\textsuperscript{168} It was not until 1880 that the problem was resolved by means of a scheme devised by South Australia's first Hydraulic Engineer, Oswald Brown, who had been appointed in June 1878.\textsuperscript{169} Brown's scheme was to pipe water from the Waterworks yard in nearby Hackney down to Top Lake in the Gardens. The resolution of the problem might sound a little mundane yet Schomburgk felt strongly enough to write, with more enthusiasm than literary finesse, that 'it is a fact that this is one, if not the greatest improvement yet carried out in the Garden...'\textsuperscript{170}

The next large-scale project not only provided an improvement of lasting value but also provided a building of note for future generations. This was the Museum of Economic Botany. Schomburgk was already campaigning for this project while the Palm House was being established. In 1876 he noted that it was regrettable that the existing Museum was so small and always crowded. Many interesting objects had to be 'stowed away from want of room'. Additions to the collection of artificial specimens of fruit and fungi could not be exhibited for want of space and it seemed 'useless' to accept additions to the museum. They had received useful gifts of herbarium

\textsuperscript{168} Information from Mrs A. M. Howard, Schomburgk descendant, May 1986.


\textsuperscript{170} \textit{Report} 1880, p. 10.
specimens from North America but these were stored away in a small room in the back yard and deserved a better location.

I revert to the subject in the hope that some larger building may be erected for this highly necessary and instructive project.¹⁷¹

The following year, as he continued his campaign for a better Museum building, he commented that the specimens were 'much injured' both by damp and a much more dangerous enemy the termite (known in South Australia as white ant).¹⁷²

Eventually Schomburgk had his way and the construction of the Museum of Economic Botany began in 1879. It was opened to the public on 27 May, 1881.¹⁷³ Designed and supervised by the Government Architect-in-Chief, E. J. Woods, the building was in the 'Greek style', 104 feet long and 40 feet wide (31.7 m by 12.2 m) with a central portico and flight of steps. There were sixteen windows to provide light on the eight foot high (2.4 m) display cases. These were set out between the windows and at right angles to them, enabling the cases to receive the maximum amount of light as was done in the museums at Kew and Kensington in London. The Museum of Economic Botany at Kew had been opened in 1847 and the British Museum (Natural History), South Kensington was opened in 1881. In the centre of the room were two rows of showcases in the form of tables with others like this under the windows and recesses. Schomburgk worked for months on end on the arrangement of items, making good use of a printed guide to the display at the Museum of Economic Botany at Kew. At the eastern end of the building a separate room

¹⁷¹ Report 1876, p. 10.
¹⁷² Report 1877, p. 10.
¹⁷³ Minutes May 1881. Curiously the Minutes record that it was to be opened 'without any demonstration'.

Museum of Economic Botany

Photograph of exterior of Museum display cases (still in use) and busts of famous men of science.

Photograph of exterior of Museum shows statues (removed in the 1950s).
was set aside to house his herbarium. The beautiful ceiling of the Museum was painted by the decorative artist W. J. Williams according to a classical design. Fortunately this has survived to the present day. The building is now on the State Heritage List.

The cost of the Museum, building, fixtures, glazing and decorative painting was £2,900, extra work such as rough painting and most of the work of the fixtures being done by the Garden's own painters and carpenters. A terrace was formed outside since the ground fell four feet (1.2 m) from east to west and around it the lawns and flowerbeds were laid out in 'Greek style' in accordance with the classical style of the building. The lawns were planted with palms, draecanas and agaves. Statues representing the four seasons were placed on the terrace, repeating the classical theme. The development of this area formed the last major project of the Schomburgk era.

The year 1880 also saw the construction of a new Fern House, 63 feet long by 26 feet wide (19 m by 8 m), providing for most of the tropical ferns. It relieved over-crowding and provided room for new acquisitions. A further 44 species were added in 1882 alone, some of them only recently introduced into Europe. Inclusive of the heating apparatus the work cost only £60 since most of the work could be done by staff. In Schomburgk's last Report the number of ferns had reached 488 species. Ferns enjoyed great popularity in the middle decades of the nineteenth century. In Britain the 'fern craze' had its

View of the large Fountain on Main Walk

This engraving shows the Director's Residence to the right. Wardian cases, said to be used at this time for cacti, can be seen along Main Walk.
peak in the 1860s; the plants were prized for conservatories and used extensively during the Victorian era as design motifs for china, glass, fabrics, decorative tiles, wall decorations and gardens benches.\textsuperscript{175}

Orchids still attracted a great deal of attention. Inevitably some of the collection did not survive but new ones were being sent by Schomburgk’s overseas contacts. For example in 1882 he reported the addition of 37 new species which brought the total number in his collection to 302 species, and by 1889 the number of species and varieties was given as 411.\textsuperscript{176} Reports in this period give considerable attention to the addition of such plants as ferns, palms, orchids, bromeliads and aroids, demonstrating not only Schomburgk’s interests but the public taste of the day. Bromeliads (a large and distinctive family found in central and south America which includes pineapples, a number of ornamentals and many epiphytes) were a family well-known to Schomburgk from his Guyana travels. His large collection of aroids (Araceae) - 226 species by 1884 - included plants that we now know as the arum lily, \textit{Philodendron} and \textit{Dieffenbachia}.

A special Cactus House and Cactus Shed were built so that a cactus collection previously kept in Wardian cases along the Main Walk (seen in the engraving of Main Walk) could be supervised more closely. This move helped to prevent theft and improved the appearance of the Main Walk. The other major project for 1880 was the addition of new

\textsuperscript{175} D. E. Allen, \textit{The British Fern Craze}, Hutchinson, Oxford, 1869, pp. 46 and 56.

\textsuperscript{176} In 1883 there was a request for funds for a new Orchid House 100 feet long and 50 feet wide (30 m by 25 m), adjoining the Victoria House, but no record of its being granted that year or later in Schomburgk’s term of office.
gates for the North Terrace entrance, providing a more imposing entrance and a more servicable railing than the original wooden one. The gates were chosen from the pattern book of Messrs. Turner and Allen, an art foundry in London. Costing £454 the gates were important in a number of ways. The attractive design helped to enhance the streetscape of North Terrace as the main 'boulevarde' of Adelaide. The nineteenth century legacy of fine institutional properties along North Terrace begins with the Adelaide Botanic Garden and continues with the Royal Adelaide Hospital, the University of South Australia (established as the School of Mines in 1889), the University of Adelaide, the Art Gallery, the Museum, the State Library, Government House, Parliament House, Old Parliament House and the Railway Station. The gates provided an atmosphere that invited the visitor into the Gardens, and a sense of anticipation of what was to come. Opening on to Main Walk, they provide a formal entrance to the Gardens. and are themselves set off by some fine trees including the old peppercorn tree (*Schinus molle* var. *areira*) planted during the Francis era. The lamps are still lit at night making the gates a feature that can be admired in the evenings as well as during the day-time.

The year 1880 can be seen as the peak of the great development phase of the period 1865-1891. A number of improvements were still to come but the main work was done. Schomburgk turned sixty nine in 1880 and even though he was still very active one could not expect a continuation of the drive to begin new projects.

Some new developments arose from handing over the collection of mammals to the Zoological Society. This made available the areas
where the cages had been as well as five acres (2 ha) of land that had been used for growing cereals for feed. A lengthy battle had been waged between the Botanic Garden Board and the committee of the Zoological Society over the issue of whether the Zoological Society should be granted portion of Botanic Park. This was one battle for resources in which the Botanic Garden Board was not successful. Although there are places in the world where a Zoo and a Botanic Garden are combined, as in the case of Frankfurt, in Australia separate institutions developed.

The period 1881-1891 saw useful but not dramatic improvements: improved fencing; additions of specimens for the Museum of Economic Botany and Herbarium; replanting of the rosery that had been laid out in 1867; substantial repairs in 1885-6 to the timber-framed Victoria House; replacement of iron heating pipes in the stove houses and replacement of the water-pipes in the rosery; rebuilding of one of the wooden bridges in the gardens; repairing trellises and fences; removing several hundred loads of sand from the lower pond; replacing labels; and repainting items such as statues. New plants were always being added, some 200-500 per year, as the following list indicates: 327 additions in 1882 giving a total of 11,181 species; 478 additions in 1884 giving a total of 11,985; and 240 additions in 1886 to give a total of 12,753 species. [Totals are exclusive of 'florists' flowers' or cultivars.177]

The period 1885-1886 saw two of the driest years on record, with particularly hot periods in the summer of 1885-86. The 1885 Report records that in some areas of South Australia crops had been total

177 For example, there were many varieties of pelargonium and rose.
failures with yields low elsewhere, and the following year poor rains once again led to low yields. In an economy heavily dependent on agriculture poor yields caused budgetary cuts. Not only were new capital developments out of the question for the Garden but staff had to be cut by five at this time. Despite improved agricultural yields following good falls of rain in 1887, a reduced grant for the Gardens further curtailed staff numbers. In 1888 Adelaide recorded only 14.5 inches (368 mm) of rain, some 6.4 inches (163 mm) less than the average of the previous 49 years. In some of the northern areas of South Australia crops were total failures.

The year 1887 brought Adelaide's Jubilee Exhibition and although every effort seems to have been made to make the Gardens as attractive as possible for visitors through such measures as repainting, the removal of overgrown, unsightly shrubs and fertilizing of the lawns, the Director wrote with a note of weariness that he could not keep the Gardens in the order in which they should be kept without the proper means:

> I am most anxious to avoid needless expenditure, and to reduce even needful outlay within practicable limits but I cannot do impossibilities, and if the garden is to grow in value and usefulness the means ought to be proportioned to the results which are expected from the Board under which I act. The gratifying notices which reach the Board of Governors show that their efforts are not unappreciated, ... whatever shortcomings there may be is in no way due to want of will or care on their part.178

Even if funds were not available for new projects there were always maintenance tasks to be undertaken. One of these involved a row of Pinus radiata that Schomburgk had planted in 1866. He had been very proud of their rapid growth in the early days but by 1888, twenty two years later, they were 70-80 feet (21-24 m) high, and many had

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become 'unsightly' from losing their lower branches; moreover their roots were causing the roses in the western section of the rose garden to become stunted. Although the Director wrote that it might be 'regarded as an act of vandalism', the decision was made in 1888 to remove the pines. Doing this without injuring the roses was 'tedious and troublesome' work, however it did enable the planting of 100 additional roses - standard roses 6 feet (183 cm) high, with 'festoons led from rose tree to rose tree' together with climbing plants to make a new avenue.\footnote{Report 1888, p. 7.} Similarly some eucalypts were removed in several parts of the gardens, either because other plants in the vicinity would not thrive\footnote{As in the experimental ground and on the island.} or, as in Botanic Park, because they were old and dying. There would soon be very few of the old eucalypts, 'these giants of the forest', left in the Park.

In the same way that the passage of time saw conifers and eucalypts causing problems to other plants nearby, problems arose from the continued growth of the palms in the Palm House. The Board considered raising the entire roof and dome by about 6 feet (183 cm) but realized that eventually the palms would reach the roof again. The solution, Schomburgk wrote in his 1888 Report, was to build a new Palm House. However his own period at the Botanic Gardens was coming to an end. The directors who followed him were not as persuasive with the Legislature; it took until 1988 to get funds for a new tropical house. In 1988, two hundred years after the first European settlement in Australia and a hundred years after Schomburgk's 1888 Report, special funds were made available jointly by the Commonwealth Government of Australia and Government of
South Australia for a Conservatory for the Botanic Garden as a Bicentenary project. It was dedicated to the public in November 1988.

The last Annual Report of the Schomburgk era was that of 1889. In that year the number of species listed had increased to 13,603, exclusive of 'florists' flowers'. Amongst these were species of economic interest such as newly-introduced fodder plants, vines and figs. The best rains ever recorded in Adelaide had fallen, 30.8 inches (7820 mm), and the Botanic Garden had been bright in the summer months with annuals such as amaranthus, zinnias, portulacas and marigolds and some 800 potted chrysanthemums. The *Victoria* lily which, despite being replaced with new plants every couple of years, had failed to flower in 1888, produced flowers in 1889, to the Director's great satisfaction. Interest in it was such that each year there would be a section in the Annual Report on the number of flowers and the size of the giant leaves.

In 1889 Schomburgk turned seventy eight. There was no compulsory retiring age and he was considered to be remarkably active for his years, but nevertheless age was beginning to tell. He was suffering from gout, a disorder of the joints causing painful swelling and at times this caused him to be confined indoors. It was this disorder that was said to have caused him to miss the opening of the Palm House as early as 1877. Although there had been no major projects to initiate or complete in the last few years there was always maintenance and renewal as in any mature garden. There were fine trees to admire that had been planted as small seedlings. There were tropical plants in the glasshouses to remind him of the dangers and delights of the British Guiana expedition so many years before. For a
plantsman such as Schomburgk there was the pride of recording some 13,600 species growing in the Gardens. Some 300,000 visitors came annually to the Gardens each year to enjoy them. Finally there was the Museum of Economic Botany, his own special project, where he spent so much time in his last years working on his herbarium. Placed there was a portrait of Schomburgk presented to him in 1884 by a group of subscribers. The inscription on the portrait referred to the presentation being made by a number of his friends:

> in appreciation of the zeal, energy and skill which he had devoted to rendering the Botanic Gardens an ornament to the City of Adelaide and the pride of the province of South Australia.

This enthusiasm is also reflected in the total number of visitors to the Gardens in the Schomburgk era. Figures given in Annual Reports range from 260,000 to 300,000. Population figures for South Australia were as follows:

<table>
<thead>
<tr>
<th>YEAR</th>
<th>POPULATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1866</td>
<td>163,452</td>
</tr>
<tr>
<td>1871</td>
<td>185,425</td>
</tr>
<tr>
<td>1876</td>
<td>212,538</td>
</tr>
<tr>
<td>1881</td>
<td>275,344</td>
</tr>
</tbody>
</table>

[Source: South Australia Year Book 1986]

Although raw figures cannot tell us the exact motivation of visitors, attendance figures of 260,00-300,000 per year do indicate what an important role Adelaide Botanic Garden provided in these years as a recreational institution. In subsequent chapters I will examine the role played by the Botanic Garden as a scientific institution and as an educational institution. However, simply using the raw attendance figures we can make a comparison with the city of Dublin. Sir
Frederick Moore, curator of the Royal Botanic Gardens, Glasnevin, recorded 326,914 visitors in 1884, the bulk of whom came on Sundays (256,914 compared with 70,650 on other days).\textsuperscript{181} Census figures for 1881 gave the population of Dublin as 249,602 whereas the population of urban Adelaide was 100,926. So making a rough comparison one could say that there were two visits per person recorded in Adelaide compared with one visit per person in Dublin - figures which reflected not only climatic differences but also the great importance of the Botanic Garden as a recreational resource in Adelaide. Many of these visitors came on Sundays. As early as 1868 Schomburgk reported that the number of Sunday visitors to Adelaide Botanic Garden ranged from 2,200 to 7,500 during the year, with some 2000 during the week.\textsuperscript{182} In contrast the Royal Botanic Gardens in Edinburgh were not open to the public at all on Sundays until 1889 when 27,000 visitors were admitted during Sundays in April, that is about 6750 per Sunday that month.

The figures for Adelaide are especially striking in view of the fact that visitors to Botanic Park, adjoining the Gardens, were not included in the Adelaide Botanic Garden figures. Following the opening of the Carriage Drive of Botanic Park in 1884, the number of carriages recorded as passing through was 7772 in addition to 900 horsemen in 1885, rising to 11,919 vehicles in 1886 and 1423 horsemen.\textsuperscript{183}

\textsuperscript{181} Moore, the nephew of Charles Moore of Sydney Botanic Gardens, was curator 1879-1922.

\textsuperscript{182} Report 1868, p. 3.

\textsuperscript{183} Report 1886, p. 10.
Pride in the Gardens expressed by local residents, is illustrated by that of a resident who wrote in 1875 in a letter to a British horticultural journal:

You should see our Botanic Gardens, under the care of Dr. Schomburgk, brother of Sir R. Schomburgk, discoverer of the Victoria Regia Lily, you would pronounce them worthy to be numbered amongst the most lovely public gardens in the whole world.\textsuperscript{184}

Another writer referred to the Gardens being 'a paradise of flowers and noble trees and plants'. William Harcus in \textit{South Australia, its history, resources and productions}, published in 1876 asserted:

\[\text{...the glory of Adelaide and the pride of its citizens, is our beautiful Botanic Garden, which under the magic wand of the accomplished Director, Dr. Richard Schomburgk has grown into a thing of beauty which will be a joy for ever. They who have seen all the Botanic Gardens in the other colonies, without a moment's doubt or hesitation given the palm to ours.}\textsuperscript{185}\]

Such views were reinforced by praise from visitors to South Australia. Typical of these were visitors from the British Isles such as Richard Twopeny who wrote:

But the pride of Adelaide is its Botanic Garden, which unpromisingly situated on a perfectly level spot, with no water at hand, has been transformed by artificial water and artificial hillocks, into the prettiest garden in the world. The area is only forty acres, but every inch has been turned to the utmost advantage, and this is really a garden, while the Sydney Gardens - mark the plural - are more park-like, and those of Melbourne can hardly be called gardens, in the strict sense of the word.\textsuperscript{186}


Memorable also are the much quoted comments of another British visitor, Anthony Trollope, who compared the gardens of Sydney, Melbourne and Adelaide:

As regards Australian cities, those of Adelaide are next to the gardens of Sydney. In Melbourne the gardens are more scientific, but the world at large cares little for science. In Sydney, the public gardens charm as poetry charms. At Adelaide, they please like a well-told tale. The gardens at Melbourne are as a long sermon from a great divine, - whose theology is unanswerable, but his language tedious.187

From Victoria came politician and journalist J. L. Dow who applauded the fact that the gardens were kept in 'remarkable order, not even the remotest corner being neglected'. He observed that 'a refined taste is shown everywhere, especially in the laying out and the planting of the terraces, parterres and ribbon beds' and, on a practical note, that great pains had been taken with the gravelled garden walks which dried immediately after the heaviest rains.

Whereas the Melbourne Botanic Gardens, 'with a magnificent site, has not been fortunate in having its natural advantages improved by art', and 'the gardens of Sydney please the visitor chiefly by the views obtained by a lovely bay' and the picturesque charm of very old vegetation:

Adelaide by sheer dint of artistic skill, and in spite of a position lacking natural advantages, has a gem of a garden.188


188 [J. L Dow], Special reporter of the Leader, 'The Botanic Gardens', in Agriculture in South Australia, reprinted from the Leader, p. 7.
Richard Schomburgk was thus one of those fortunate people who lived to receive recognition for their achievements. He died in office in March 1891 in his eightieth year and was buried at North Road cemetery, his staff forming a guard of honour for the cortege.
Chapter 5

SCIENTIFIC AND UTILITARIAN GARDENING

PART 1 - GRASSES AND FODDER PLANTS

In his 1886 'Sketch of the Botanic Garden and its progress' Schomburgk referred to 'picturesque, scientific gardening' and his reports demonstrate his belief that the Gardens should provide for both the scientific and the picturesque. He noted in January 1869 that many people with an interest in the Garden

contend that plants of a commercial and economic value should receive more attention while others insist that ornamental plants should receive more attention; but I have the conviction that as far as my means go I do not neglect either.2

We saw that Schomburgk promoted scientific and utilitarian work from the time of his first months in the Botanic Garden. In his first Report he outlined plans to establish a Class garden, an experimental garden for the cultivation of medical, industrial and fodder plants and a nursery garden for raising both a supply of ornamental trees and shrubs 'for the purpose of beautifying public grounds and ornamenting cemeteries, &c.' and for street tree planting by local corporations and district councils. In that same year tea seed supplied by the government was planted on a trial basis. A system of exchange was inaugurated with other organizations for the zoological collection; in 1866 there were botanical and zoological exchanges with other botanists and collectors in the Royal Botanic Gardens, Kew, the Royal Botanic Garden, Berlin, the Imperial Botanic Garden of St Petersburg, the Botanic Gardens of Hamburg, Java, Mauritius and Trinidad, the Central Museum Madras, the Paris Exhibition Committee,

1 Report, 1886, p. 15.

2 Report, 1868, p. 2.
the Zoological Society of London, the Acclimatization Societies of Melbourne, Sydney, Tasmania and Queensland, as well as the Botanic Gardens of Melbourne, Sydney and Brisbane.3

In the next twenty five years there was to be a large volume of scientific and utilitarian work. This chapter will outline research concerned with grasses and fodder plants for agriculture and the pastoral industry. Pulses, plants for oil and fibre, vegetables and tubers, plants for culinary use and beverages, plants for medical and pharmaceutical use and plants for the fabric industry and for tanning will be considered in Chapter 6. Arboriculture, the promotion of tree planting, will receive some attention in Chapter 6, but will be examined further in Chapter 8 together with botanical work concerned with the collection and identification of plant species.

Research in the fields of agriculture, viticulture and horticulture
A major role for a colonial botanic garden was what was known as acclimatization: the procuring of plant material for trials in the botanic gardens itself or for trials by primary producers and interested local residents. As was observed in the Introduction, in Australia, as in South Africa, Canada and New Zealand, economic growth was linked to the production of staple export products such as wool, meat, wheat, gold and fish4 and the production of wool, meat and wheat were all dependent on the availability of appropriate plant products.

3 Report, 1866.
Botanic gardens in the British Empire played an important role in the selection and development of plants suitable for commercial crops. The Botanic Garden in Adelaide was part of a network of government botanical stations which radiated out from the Royal Botanic Gardens, Kew, not only to Australasia but to South Africa, the Indian sub-continent, the West Indies and Singapore. There were further exchanges with Dutch and French counterparts. Schomburgk's links with German botanists in Europe and South America placed him in a particularly strong position for exchange of plant material and information aiding species selection and new methods of cultivation. Lucile Brockway refers to 'a small homogeneous scientific elite' which provided a mechanism for Western botanical expansion working with the support of their government and the commercial establishment.\(^5\) In this chapter, cooperation between scientists in the European metropolitan centres and those on the periphery will be seen in action.

Schomburgk would have needed no persuasion from his Board to become involved with crop research. He had grown up in a region of Germany which had good soil and where agriculture and horticulture were important economic pursuits. His background in farming at Buchsfelde meant that he was very familiar with the practical problems associated with the acclimatization of plants and the development of effective techniques for agriculture, horticulture and viticulture under South Australian conditions. His friend Dr Muecke had written articles for the *Süd Australische Zeitung* on agricultural matters such as soil fertility, and these topics are also thought to

have been a matter of interest to Schomburgk's brother Otto. Undoubtedly there would have been discussions between the three about these topics. Richard Schomburgk himself had been a foundation member of the Gawler Town Agricultural Society in a period when agricultural research and the promotion of scientific farming led to the formation of agricultural societies in a number of different geographical localities in South Australia. His interest in economic botany was apparent in the early days of his travels outside Germany. In addition, the interest of Alexander von Humboldt in plant geography and in scientific method provided an important source of influence. Schomburgk could bring to his twenty five years of crop research at the Botanic Gardens both enthusiasm and the wisdom that comes from practical experience.

In this chapter and the following ones the botanical names used will be in the first instance those used by Schomburgk himself. Where there appears to be a simple spelling or printing error this will be noted. A chart at the end of each section sets out the name used by Schomburgk and name used today, although in the absence of actual specimens it is not possible to identify the plants positively. There are no records of the details of trials so we have to depend on general descriptions given in the Annual Reports. The chart will also give some indication of the way that the plant has been used in South Australia since its introduction.6

**Early crop research and plant trials**

Schomburgk's first recorded work in crop research involved trials of tea seed. While the trials were unsuccessful7 he commented that

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6 Information from David Symon for Chapters 5 & 6 is gratefully acknowledged.
since 'it is so very desirable to support new industrial branches for the advancement of the Colony' such setbacks should not discourage people from further crop research.\(^8\) Nevertheless, as far as tea was concerned he was soon stating publicly that despite the high hopes held by some people, plants requiring tropical conditions would not thrive. Observing that questions were periodically raised as to whether there might be places where sugar, coffee, tea and cotton could be grown in South Australia he noted that attempts to grow these could only lead to total failure as these crops required a different climate from that of South Australia with its cold, wet winters and hot, dry summers.\(^9\) That he should have to argue in this way is an indication of just how much some settlers had to learn about the environment of the new colony. The Director could cite actual figures of chemical analysis in the case of sugar cane which is today regarded as a crop needing a hot moist climate not found in South Australia. Analysis of the sugar content of sugar-cane which had grown in the Gardens showed the sugar content to be only 6.25% whereas in places such as Cuba and Martinique the yield was 17%-18%. Schomburgk noted that the South Australian grower would need 2 shillings a pound for his sugar to make a profit and at that time he could not get such a price. Similarly, coffee was not a viable proposition because the cold southern winds produced unsuitable climatic conditions, cotton required moist conditions in summer, and

\[^7\] This was also the case in those made by von Mueller in Melbourne who had used the same tea seed. There seems to have been a problem with the seed itself.

\(^8\) Report 1866, p. 3.

\(^9\) Meanwhile his colleague Walter Hill was reporting successful trials of cotton, coffee and sugar in Brisbane, Report of the Brisbane Botanic Garden, 1866, pp. 1-2.
while tea might grow 'in the gullies' it was very doubtful as a paying proposition.10

Fruit trees were another matter. Many grew well in Adelaide and were of interest to householders. The Director noted that gardeners needed to know more about what varieties to grow. Since not all varieties could be grown in the Botanic Garden due to lack of space, not to mention the problems of lads stealing the fruit, models of various kinds of fruits were ordered from Germany.11 By 1867, the Experimental Garden was laid out and medical plants, 'allopathic and homeopathic', which had been imported, were found to grow well and to be potentially profitable. The Experimental Garden was used for a wide variety of crops of potential economic value: grasses and fodder plants, legumes, oil and fibre-producing plants, vegetables, fruit-trees, and plants for dyes and other miscellaneous uses.

Grasses and fodder plants
Agriculturally and economically, grass is the most important plant family for the human race. Cereals (annual grasses cultivated for their grains) have provided the principal crops of most civilizations, their grains constituting the main source of calories for the world's population. In a lecture given in 1873 Schomburgk declared

No doubt you will agree with me that in the household of nature there is not a more important tribe of plants than that of the grasses, as upon the seeds of the cereal division more than two thirds of the population of the globe subsists.12

10 'Capabilities of the various districts of the colony', paper read before the Chamber of Manufactures, in Papers read before the Chamber of Manufactures, Government Printer, Adelaide, 1873, pp. 103-4.

11 Report 1866, p. 3.

12 R. Schomburgk, The grasses and Fodder plants which may be beneficial to the Squatter and Agriculturist in South Australia, Paper given to the Chamber of Manufactures, December 1873, printed by The Advertiser, Adelaide 1874.
Grass provides both the major cereal crops and most grazing for both wild herbivores and domesticated animals, such as cattle and sheep. Asked to name the world’s important food resources few people think of pasture plants, yet after the grains, the grasses and pasture legumes provide the major source of stock food. In addition, the ecological role of the grass family is fundamental. Grasslands make up approximately 20 per cent of the world’s vegetative cover.\textsuperscript{13} As noted in Chapter 2, Australia’s grasslands have been the major medium for utilizing land resources\textsuperscript{14}, grassland areas having been extended as a result of European settlement. Thousands of hectares of forest in temperate Australia were cleared of trees and sown as pasture.\textsuperscript{15} Pasture grasses were of vital importance in colonial South Australia which was heavily dependent on its pastoral industry both for local consumption and for the development of exports.

Given the importance of grasses and fodder plants to human settlement, it is not surprising that trials of plants from this group formed such an important part of acclimatization work in the Schomburgk era. Plants from this group appear to have been given attention every year during his term of office. Since cereals complete their life cycle in less than a year the farmer has a return in a comparatively short time and seed can be stored for long periods enabling the supply of distant markets. Dry matter yields in cereals are relatively high compared with grain crops belonging to other


\textsuperscript{15} Lamp, Forbes & Cade, \textit{Grasses of temperate Australia}, p. 8.
plant families such as legumes. However, yields are heavily dependent on soil fertility and the availability of fixed nitrogen.\textsuperscript{16} In South Australia, this was to lead to considerable problems for those farmers whose soils were of poor fertility.

The collection of vegetation that is commonly referred to as pasture species consists mainly of grasses but there are other forage plants such as clovers, medics and herbs in the group. In Europe, where intensive farming predominates, there is a relatively small area under permanent grassland. In comparison, in Asia, Africa, North America, South America and Australia native and naturalized permanent pastures provide the bulk of the food for grazing animals.\textsuperscript{17} In the higher rainfall areas of Australia, most landholders ran their stock on native pastures in the early years of settlement and in normal years native pastures provided adequate supplies of dry matter feed.\textsuperscript{18} However, overstocking, droughts and clearing of land for agriculture could destroy these native grasses. In South Australia, native grasses were rapidly disappearing during the period when Schomburgk worked at the Botanic Gardens and some introduced grasses were found to be difficult to establish. As a result trials of pasture grasses were of considerable economic importance. In importing grasses for trials, Schomburgk was one of a whole group of European colonists of different nationalities who carried the native grasses of Europe to other continents, during the eighteenth and


\textsuperscript{18} Whittet, \textit{Pastures}, p. 1.
nineteenth centuries and who exchanged different species of grasses with each other.

Herbage grasses have a short history of deliberate cultivation in comparison with most crops. Although the Romans cultivated plants such as lucerne, red clover, vetches, lupins and fenugreek for feeding livestock, it is believed that the practice was not widespread after the decline of the Roman Empire. For example, *Medicago sativa* (lucerne or alfalfa) is not thought to have been grown in Europe, other than in Spain, between the fifth and fifteenth centuries, whereas it was grown widely by the Roman colonists. The earliest English writers on agriculture refer to the use of *Vicia sativa aestiva* and *Vicia sativa hyberna* (summer and winter vetches) but plants such as lucerne and sainfoin or saintfoin (*Onobrychis sativa*) were not introduced into England until the seventeenth century. Settlers from Europe introduced European species such as Italian and perennial rye-grass, meadow fescue, tall fescue, cocksfoot and timothy into North America. As a result of increased awareness of the agricultural value of the different species, seed was sent back to Britain, giving impetus to experimentation with native grasses in the early nineteenth century. Early Australian pioneers are known to have sown such pasture seeds as *Lolium perenne* (perennial rye), *Dactylis glomerata* (cocksfoot), *Trifolium repens* (white clover), and

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*Trifolium pratense* (red clover)\(^{23}\) and experimentation has continued since that time right through to the present day.

**Early trials of grasses 1867-1872**

Schomburgk recorded his first trials of pasture grasses at the Botanic Gardens in his 1867 *Report*. He had imported 162 different species of which about 100 had grown, and of these 'only six species seem to stand the climate'.\(^{24}\) Of the successful ones *Stenotaphrum complanatum* [*secundatum*] (buffalo grass)\(^{25}\) was promoted by Schomburgk as a pasture grass but has become better known as a turf or lawn grass for domestic use. The five others were *Elymus giganteus*, *Festuca altissima*, *Dactylis altaica*, *Piptatherum thomasii* and *Piptatherum multiflorum*. Two species of *Pennisetum*, *P. longistylum* and *P. fimbriatum*, grew well but were rejected by cattle. Among the annual grasses *Ceratochloa australis* or people's grass, a variety of prairie grass, was recommended by Schomburgk for pasture use and for hay as was the European grass *Bromus mollis* which was already naturalized in the District of Onkaparinga.\(^{26}\) He noted that 'perennial and Italian rye-grass both suffer from droughts'.

Buffalo grass was again promoted in the 1868 Report with the comment that it endured droughts and scorching temperatures, was suitable for both rich and sandy soils, was easily propagated and was palatable to cattle. There were reports of trials of perennial grasses

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\(^{24}\) *Report* 1867, p. 1.

\(^{25}\) Referred to as *Hemitaphrum glabrum* in the 1868 *Report*.

\(^{26}\) *Report* 1867, p. 1.
such as *Avena elatior* ('French rye-grass' - referred to as oat-grass in later reports) *Alopecurus pratensis* (meadow fox-tail grass), *Hordeum jubatum* (meadow barley), and *Eleusine oligostachya*.

By 1869 Schomburgk was reporting success in growing *Panicum giganteum* (Guinea grass) 'so famed in the West Indies and South America', obtained from the Acclimatization Society in Brisbane. He already knew it well from his South American experience and found that in the first trials at the Gardens it withstood drought and heat well. He believed that if it grew half as well as it had in South America:

> there would through the summer months be an end to all difficulties about green food for cattle.

However he noted that farmers must plant it on prepared ground adding that:

> generally the preparation of land for grasses is neglected, from the belief that grasses should grow without trouble anywhere\(^2\)\(^7\)

Other grasses reported to withstand the hot summer conditions and to be palatable to cattle were those that Schomburgk described as *Stenotaphrum complanatum* (buffalo grass)\(^2\)\(^8\), *Elymus giganteus* (lime-grass), *Festuca altissima* (fescue grass), *Piptatherum thomasii* and *P. multiflorum* (millet grass), *Alopecurus pratensis* (meadow fox tail) and *Hordeum jubatum* (meadow barley). The Director was

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\(^2\)\(^7\) *Report* 1869, p. 3. Whittet refers to guinea grass as *P. maximum* describing it as a strong growing grass, a native of Africa where it supplies a large bulk of feed in tropical and subtropical regions, noting that it was extensively grown on the north coast of N.S.W. in the early days of pasture improvement days until it was replaced by paspalum and kikuyu. Whittet, *Pastures*, p. 174. Guinea grass requires a shorter dry season than that which occurs in South Australia.

\(^2\)\(^8\) He had previously called referred to buffalo grass as *Stenotaphrum complanatum*, but then changed to *Hemitaphrum glabrum*. It is now known as *Stenotaphrum secundatum*. *Cynodon dactylon* was initially spelt as *Cynotn dactylon* but spelt *Cynodon dactylon* in the 1870 *Report* and the 1873 review.
enthusiastic about prairie grass and *Bromus mollis* as being valuable both as pasture grass and for hay if sown early. There were some New Zealand grasses provided by the Honourable Mr Murray but their names were not given in the 1869-79 reports.²⁹

*Elymus condensatus* (bunch grass) Seeds of *Elymus condensatus*, a native of British Columbia, were sent in 1870 by Henderson Henry of Hay Lodge, Edinburgh 'who takes such an interest in our institution'. Bunch grass was said to thrive in both poor and rich soils. It had been very highly recommended for fattening cattle 'which, it is said, devour it ravenously'.³⁰ The 1872 Report quoted a letter from Rev. R.C. Lundin Brown of Ellesmere, published in the English periodical *The Farmer*, extolling the nutritive qualities of bunch grass for fattening cattle and encouraging trials among farmers in the Edinburgh region.³¹ The letter had given very specific advice about cultivation methods which was then reprinted in Schomburgk's report. This material on bunch grass indicates the manner in which the world wide spread of information and plant material was occurring among those seeking greater productivity on their farms. Schomburgk's experience followed that of the Californians in that he noted that the grass grew relatively little in its first season. However it appeared that it was not only cattle that 'devoured it ravenously' - it was recorded that the grass 'would during the

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²⁹ It is not clear if this was the Hon. David Murray or the Hon. Alexander Murray.

³⁰ *Report* 1871, p. 4.

³¹ Rev. Lundin Brown had lived in the British Columbia area for a number of years. His letter was originally published in a Californian newspaper.
summer have grown still higher if the grasshoppers had not eaten them close to the ground'.

*Stenotaphrum secundatum* (buffalo grass) and *Cynodon dactylon* (couch grass) Reference has previously been made to trials of two grasses which proved to be very successful for lawns, buffalo grass (*Stenotaphrum secundatum*) and couch grass (*Cynodon dactylon*). Couch grass, 'remarkably vigorous' and 'forming a beautiful green sward in the summer' and buffalo grass 'a more robust and stronger growing plant' both became important turf grasses in South Australia.

**Review in 1873**

By 1873, Schomburgk could make some general comments about the growth of grasses and pasture grasses, both in the 1873 *Report* and in a lecture to the Chamber of Manufactures entitled 'The Grasses and Fodder Plants which may be beneficial to the Squatter and Agriculturist in South Australia':

...the cultivation of artificial grasses and fodder plants will and can never be so general here as at home on account of the large extent of land in possession of the squatter, and on account of the insuperable difficulty arising from the climate and from the droughts to which some parts of the Colony are often subjected, which is against the cultivation of most of the artificial grasses; and there are not many European and foreign grasses which would live throughout the year and will renew themselves annually.

Many of the native grasses had died out as a result of 'cultivation and depasturing' since the arrival of Europeans:

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32 *Report* 1871, p. 4.
33 *Report* 1871, p. 6.
whenever man settles in a new country he exerts a potent influence over the indigenous vegetation and animals, especially if the intruders are of an agricultural and pastoral pursuit.\textsuperscript{34}

He noted that it was not only 'the plough, the herd and the axe' which destroyed the native grasses but also the introduction of noxious weeds from other countries. As a result, both annual and perennial grasses were disappearing. An example of this was \textit{Anthistiria ciliata} [now \textit{Themeda australis}], (kangaroo grass), a summer growing perennial widespread in the early days of the colony which:

had been relished so much by the stock that it had been fairly eaten out of the ground, and I fear it will soon disappear entirely.

In a statement that was advanced for its day Schomburgk proposed, both in Annual Reports and in the paper given to the Chamber of Manufactures, that squatters should divide their runs into paddocks and that each year one paddock be kept free of stock to enable the grasses to regenerate:

Undoubtedly such a system of rotation would be very beneficial... It is true that this would involve both trouble and expense, but no doubt the cost would by-and-by be repaid by greater productivity on the runs.\textsuperscript{35}

In addition:

the farmer, as well as the squatter will find it advantageous to have a paddock of artificial grasses near his homestead... for the purpose of keeping stock which requires to be kept in good condition during the summer months...\textsuperscript{36}

He had not found it easy to find appropriate new species of grasses for the purpose. Many introduced species could not withstand the dry South Australian summer. He had been experimenting for seven years

\textsuperscript{34} R. Schomburgk, \textit{The grasses and fodder plants which may be beneficial to the squatter and agriculturist in South Australia.}

\textsuperscript{35} \textit{Report} 1873, p. 5 repeated in \textit{Report} 1877, p. 5.

\textsuperscript{36} R. Schomburgk, \textit{The grasses and fodder plants which may be beneficial to the squatter and agriculturist in South Australia.} Also in \textit{Report} 1873, p. 5 and \textit{Report} 1877, p. 5.
and had sown 60-80 different kinds of grasses every year, keeping them clean of weeds but not watering them at all during the summer, so he could assess whether they would withstand dry summers with temperatures ranging from 80-100°F [26.7-37.8°C]. At this stage he was still enthusiastic about the potential of bunch grass, citing both the British Columbian experience and his own trials during a particularly dry summer.

*Panicum maximum* (Guinea grass) (referred to as *Panicum giganteum* in 1869 and *Panicum maximum* in 1873): Encouraged by the interest of the Governor of South Australia, Sir James Fergusson, Schomburgk promoted the use of guinea grass which Sir James knew from a stay in the West Indies. A number of Australian colonial governors took a keen interest in science and, some like Fergusson, could provide valuable contacts for economically useful plants. Guinea grass had limited application as plants had to be sown individually in specially prepared ground.

*Bromus unioloides* (prairie grass) from South America, introduced as early as 1858, grew well on the plains as well as the hills around Adelaide. Schomburgk had very positive reports from his colleague T. Goode of Goolwa (97 km south of Adelaide) about this grass, used for hay-making. It has persisted as a useful, if minor, pasture species.

37 Sir James Fergusson was Governor from February 1869 to April 1873.

38 For example, Ann Moyal describes the contributions to science of Sir John Franklin and Sir William Denison in Tasmania, and Captain John Hunter and Sir Thomas Brisbane in New South Wales in, *A bright and savage land: scientists in colonial Australia*, pp. 37, 44 & 88-90.
Panicum spectabile (Phillips grass) There were also positive reports on Phillips grass or panic grass, not only from the trials in the Experimental Garden but also from those of H. W. Phillips of North Adelaide. Demonstrating the valuable role played by the individual enthusiast Phillips distributed more than 1000 packets of seeds. These included seeds given to Henry Mais, the Engineer in Chief, for planting around the new reservoir to prevent soil being washed away, and also seeds distributed through Postmaster General and Government Astronomer Charles Todd39 to all the telegraph stations between Port Augusta and Darwin and across to Western Australia. This provided the potential for reports from a wide variety of conditions. Schomburgk himself distributed seeds to many applicants from other Australian colonies, quoting in his 1876 Report a letter sent to the Queenslander newspaper from a man in Stanmore who had considerable success with Schomburgk's panic grass seed.40

Other grasses reviewed in 1873
In all about twenty grasses for pasture use were reviewed in 1873. One receiving positive reports was Avena elatior (oat grass) [Arrhenatherum elatius], a perennial, frost-resistant grass of European origin. Found to withstand drought and variations in quality of soil, it was described by Schomburgk as 'excellent' and a 'superior grass for hay'. Two falling awn grasses (Piptatherum thomassii and P. multiflorum), both from Europe, had been found to grow well throughout the year and were palatable to cattle. Milium multiflorum (millet grass), also of European origin, was 'worth cultivation for

39 Todd was like Schomburgk a member of the Philosophical Society and played an important part in the local scientific community.

40 J. Gibon, letter to the Queenslander, 10 February 1877, quoted in 1876 Report p. 4.
both summer and winter fodder', withstanding droughts, being used for hay and also being palatable to cattle. Three other kinds of panic grasses, *Panicum tomentosum*, *P. tenerifae*, and *P. cros galli* [P. crus galli] were recommended; nearly all the panicum grasses being nutritious for stock, as was *Pennisetum villosum* (pennisetum) from Abyssinia. *Festuca duriuscula* (fescue grass) was known to withstand drought, to thrive even on sandy soil and to be palatable to cattle. Two other fescues *Festuca elatior* and *F. ovina* were also recommended. The European cocksfoot (*Dactylis glomerata*) [sic] had been found to provide good yields of nutritious fodder and to withstand drought. Buffalo grass (by then referred to as *Stenotaphrum glabrum*) from the United States, while not thought to be as nutritious as some grasses, was palatable to sheep and cattle, could grow on sandy soil and was valuable for binding river banks and sandy soil. Apart from being suitable for permanent pastures it had been used in Adelaide by Schomburgk and by Moore in the Botanic Gardens, Sydney, as a lawn grass. The other lawn grass, couch (*Cynodon dactylon*), was also recommended to squatters as a hardy grass, popular with sheep and to a lesser extent with cattle.

There were some others about which less was known but which were considered by the Director to be worthy of trials: *Phalaris americana*, a kind of canary grass; *Eragrostis cylindrica* (love grass) from Chile; *Aira caespitoosara* [Aira caespitosa] (hair grass); blue Kentucky grass [botanical name not given]; and *Coix lacryma* and *C. exalta* (two kinds of Job's tears) which withstood the summer 'pretty well' and were nutritious. He observed that the rye grasses *Lolium perenne* and *L. italicum*, which had proved quite successful in Victoria, were nutritious but tended to die off after a year or two under local
conditions. *Plantago major* and *Plantago lanceolata* (rib grass or plantain), described as fodder plants from Europe, were suitable for both sheep and cattle and for a variety of soil types. Schomburgk wrote that he thought that this herb was not well known or it would be more extensively grown as it was propagated so easily.

The clovers (*Melilotus alba, M. officinalis* and *M. lupulina*), described in the 1873 lecture, 'Grasses and fodder plants', are discussed in a later section.

*Dactylis caespitosa* (tussock grass) There had been some trials of tussock grass, a sturdy grass from the Falkland Islands, Patagonia and Terra del Fuego which grew to 5-6 feet high [152-183 cm] and had been praised both in the German agricultural journals and by Dr Hooker for its nutritious qualities.41 The first seeds received as tussock seed proved not to be of that species at all but of honey grass (*Holcus lanatus*). Schomburgk's account of how the mistake came to be made gives us some idea of the widespread nature of plant material exchange. His friend Dr A. Phillipi, Professor of Zoology and Botany at the University of Santiago in Chile, had been directed by the Chilean government to apply to the government of the Falkland Islands for tussock grass seed 'for distribution and acclimatisation' throughout Chile. Seed was received from the Falklands and Professor Phillipi sent some of it to Germany for distribution without waiting to test it. However the seed proved to be honey-grass. This had recently been introduced into the Falklands and, on the grounds that it was superior to tussock grass, that government

41 According to Lawsons' *Agrostographia* Hooker first observed it when he was botanist on an Antarctic expedition in 1842 and was responsible for its introduction to Europe. Lawsons' *Agrostographia*, p. 7.
had despatched it to Professor Phillipi without notifying him of the change. Schomburgk wrote that he had finally received tussock grass seed from Hungary where there had been successful trials.\textsuperscript{42}

\textit{Rhynchelytrum repens}. In 1874-5, the first seeds of 'the red grass of Natal' were received. The grass was highly recommended by the Hon. John Williams, a South Australian pastoralist and parliamentarian whose brother had lived in Natal for some years. No botanical name was given but this is thought to be \textit{Rhynchelytrum repens}. Schomburgk obtained his seed from Mr Keith, Director of the Botanic Garden, Port Natal, noting that similarities in the climate between South Australia and Natal made the experiment a potentially fruitful one.\textsuperscript{43} In this case the network of contacts involved a combination of a local parliamentarian and his family as well as world wide botanic gardens links.

\textbf{Review of grasses in 1878}

By 1878 Schomburgk was able to extend his trials with grasses as a result of being able to use some land in Botanic Park. Previously a smaller plot in the Botanic Gardens provided space for only 6-8 plants of each variety tested. He planted the following grasses and fodder plants:

\begin{itemize}
  \item Agrostis verticillata,
  \item Aira caespitosa,
  \item Andropogon giganteum,
  \item Alopecurus pratensis,
  \item Avena flavescens,
  \item Bromus longiflorus,
  \item Bromus inermis [B. inermis]
  \item Ceratochloa exaltata,
  \item Cynosurus cristatus,
  \item Dactylis glomerata,
  \item Elymus condensatus,
  \item Festuca duriuscula,
  \item Festuca elatior,
  \item Festuca rubra,
  \item Holcus lanatus,
  \item Milium altissimum,
  \item Panicum
\end{itemize}

\textsuperscript{42} Report 1876, p. 3.
\textsuperscript{43} Report 1875, p. 4.
spectabile, *Panicum tomentosum*, *Paspalum ciliatum*, *Pennisetum fimbriatum*, *Piptatherum thomasi*, *Phleum pratense*, *Phleum fluitans*, *Poa pratensis*, *Poa sempervirens*, *Saccharum cylindricum*, and under fodder plants he listed: *Plantago lanceolata*, *Symphytum asperrinum* and *Trifolium medium*.

Schomburgk divided the grasses into four different groups according to their capacity to withstand drought:

**Group 1: Grasses which withstood the dry summer conditions best**

*Panicum spectabile* (Phillip's grass) which had done the best, followed by *Saccharum cylindricum* (a sugar grass), *Festuca duriuscula* (Hart's fescue grass), *Pennisetum fimbriatum*, *Aira caespitosa* (tufted hair grass), *Bromus longiflorus* (long flowering broom grass, now brome grass), and *Bromus inermis*. To this group he added in 1878: *Panicum tomentosum* (panic grass) *Dactylis glomerata* (cocksfoot), *Cynosurus cristatus* (crested dogtail grass) and *Paspalum dilatatum* (bastard millet grass).

**Group 2: Grasses which suffered to some extent but were not completely destroyed**

Group 3: Grasses which 'suffered materially and cannot be recommended'  
Holcus lanatus (sugar or soft grass), Agrostis vetticillata (switch grass), Alopecurus pratensis (foxtail grass), Ceratochloa exaltata.

Group 4: Grasses which 'entirely succumbed to the drought'
Avena flavesens (oat grass), Poa fluitans (water grass), Festuca elatior (tall fescue grass) and Phleum pratense (catstail grass).

He added that Prickly comfrey and Plantago lanceolata had suffered from lack of water, to a lesser extent so did different kind of clovers, however lucerne and the sheep bush Pentzia virgata had withstood the conditions well. Further details of Prickly comfrey and Pentzia virgata had been given in 1870 and 1872.

Reviewing twelve years of experiments with grasses from various parts of the world he wrote that his research had not proved as successful as he would have wished but the seven grasses of the first group were 'worthy of a trial, if only a little bit of attention and care are paid to their culture'.

Seeds sent from Florida 1880
A new batch of seeds, sent by J. Hagenauer of Monticello, Florida, of the best green fodder and hay-producing grasses in Florida, could be reviewed by 1880. They had been sent without botanical names but were known as bunch-grass, crab-grass and smut-grass. Crab-grass, which Schomburgk thought was probably a Panicum species, was considered one of the best grasses for permanent pasture in the southern states, being reported in the agricultural journals to have a
higher nitrogen content than that of clover and to be suitable for hay as well as green manure.44

Reviews of 1881-2
The summers of 1880-81 and 1881-82 were particularly hot ones and this meant that reviews written early in 1881 and 1882 after a period of 13-15 years were of special value because plants had been tested under a wide range of conditions. The year 1882 was noted as one of poor rainfall, only 15.74 inches or about 400 mm (the average rainfall being about about 21 inches or 533 mm).

Those that had best withstood the hot conditions are listed below together with the Director's comments:

Summary from 1881 and 1882 Reports

_Aira caespitosa_ tufted hairgrass - 'a vigorous durable grass, withstands the drought well.'

_Dactylis glomerata_ cockfoot grass - 'very durable and productive'.

_Festuca duriuscula_ hard fescue grass - 'also very durable'.

_Holcus lanatus_ honey or soft grass - 'withstood drought well although a soft grass'.

_Cynosurus cristatus_ crested dogstail - 'a hard and vigorous grass'.

_Poa pratensis_ smooth-stalked meadow or Blue Kentucky grass - one of the most useful and durable grasses introduced yet, forming a good turf, and withstanding the severest drought'.

_Bromus longiflorus_ long flowered bromus grass - 'a very productive and drought withstanding grass'.

_Bromus inermis_ - 'a very durable grass'.

_Agrostis stevenii_ Steven's bent grass - 'has withstood the drought uncommonly well'.

44 Report 1880, p. 5. _Digitaria sanguinalis_ is known as crab grass in parts of the United States. _Eleusine indica_, crowfoot or finger grass is also known as crab grass. Both are considered weeds today, Whittet, pp. 154 & 157.
Poa sempervirens  Green meadow grass 'a very durable grass'.

Pennisetum fimbriatum fimbriated pennisetum 'withstood the drought fairly'.

Eleusine oligostachis few spiked Eleusine 'a drought-withstanding grass'.

Andropogon schoenanthus - 'also durable grass' (1881) not mentioned 1882.45

Hairy panic grass [botanical name not given] 'withstood the drought well' 1881 [not mentioned in 1882].46

Crab grass, 'probably a species of Panicum' - newly received from Florida, had grown exceptionally well and had resisted the drought (March 1882) but was not mentioned in the 1882 Report.

Phillip's grass and Prairie grass as usual withstood the drought well.47

There are some discrepancies in the above list compared with reports from previous years, e.g. Holcus lanatus had been listed in the 1878 review in the group which had 'failed materially and cannot be recommended', but there is no explanatory note about its improved performance.

In retrospect, it can be seen that these are grasses of cool temperate regions which did not prove successful in the long term. Although Schomburgk told the Select Committee on Vegetable Products that he had found that plants from the Mediterranean region and American plants were on the whole the easiest to transfer to South Australia48,

45 This grass is described in the 1885 Report as having been 'introduced into the garden' the previous year, 1884, although it had already been referred to in the 1881 Report and had also been listed in the 1871 Catalogue.

46 Panicum effusum is now known as hairy panic grass, It is a perennial dry weather resistant native species found in coastal and tableland districts in N.S.W. Although valuable as fodder the young growth can cause photosensitization in sheep, see Whittet, p. 121.

47 Report 1881, p. 7 and 1882, p. 4.

the concept of testing grasses from the more climatically similar Mediterranean region was not fully established.

**Fodder plants other than grasses**

Trials of *Pentzia virgata*, a small bush composite native to the Cape of Good Hope, mentioned above, were recorded in 1878. The first trials were recorded in 1870 after the Director received a packet of seeds from Dr Hooker of the Royal Botanic Gardens, Kew, who described the plant as a valuable sheep fodder suitable for dry climates. After two years it was reported to have shown vigorous growth without having been tended or watered and it grew well from cuttings. By 1872 Schomburgk was offering cuttings to the squatters in the hope that they would test the plant to see if its qualities were as reported in the Cape.\(^4^9\) No comment appears in the Reports about its acceptance or otherwise amongst farmers, although Schomburgk did refer in 1887 to the plant being grown by a Mr Hughes in Hackney Road.\(^5^0\) *Pentzia* was also reported in 1886 to have been grown successfully in the Tasmanian Botanical Gardens, Hobart but had not at that stage been distributed amongst Tasmanian farmers.\(^5^1\)

Also recommended for fodder were *Poterium sanguisorba* (small burnet) described as a hardy perennial plant that was attractive to sheep, and some clovers, *Melilotus alba* and *M. lupulina*, said to survive longer than other forms of clover. Both were

\(^4^9\) *Report* 1870, p. 4 and 1871, p. 4.

\(^5^0\) His statement was made was evidence to the Select Committee on Vegetable Products in response to questions from the Chairman, Hon. R. A. Tarlton about *Pentzia. Report of the Select Committe on Vegetable Products*, p. 1.

\(^5^1\) Francis Abbott, Superintendent of the Tasmanian Botanical Gardens, reported that in the Cape of Good Hope higher prices were paid for sheep fed on *Pentzia* which was said to have excellent fattening properties and to grow back again after being grazed by sheep. Abbott who thought that the plant was best propagated by seed, said that he intended to introduce the plant to the drier areas of Tasmania. *Victorian Royal Commission into Vegetable products, Second progress report and continuation of minutes of evidence*, Government Printer, Melbourne, 1886, p. 42.
thought to grow best in damp soils or clay sub-soils. *Medicago sativa* (lucerne) appears in the 1878 catalogue of plants grown in the Garden but the Director did not comment on it specifically, possibly because it was already much used by farmers and did not need explanation.

*Marsilea macropus* (nardoo) Of the native plants the Nardoo was a species that attracted the attention of the Director towards the end of the 1870s. It was described by Schomburgk as 'common to the interior of South Australia', and found 'on the Lachlan River and Liverpool Plains, and is much relished by stock'. He had grown some plants in sandy soil in the Class Ground where they had survived six years without 'the slightest attention being paid to them' in the summer months. He believed that it was well worth trying to grow it in the coastal regions of South Australia, starting with plants near the homestead where the progress of young plants could be watched.

**The Sorghum/millet group**

Seeds of another important fodder plant from the sorghum genus were received from Sydney during this period. The first sorghum received appears to have been *Sorghum saccharatum*, 'the Farmers Friend', listed in the 1871 *Catalogue*. Its popularity with the New South Wales growers came from the high percentage of sugar it contained and from the way it grew in a variety of soils. Schomburgk recorded that samples of sugar had been sent to Sydney where they were worth £30 to £35 a ton. Schomburgk mentioned trials of *Sorghum*...
*nankinensis* in his 1875 *Report* and wrote in 1879 that sorghum cultivation was receiving increasing attention in America both for forage and for sugar production as seen in Iowa. The modern Sudan grasses in the U.S.A. have been developed from wild sorghum. Grain sorghum first went to America with the slave trade, when guinea corn and probably chicken corn were introduced. Brown and white *durra*[^55] were introduced to Australia from North America in approximately 1874, followed by milo (about 1880) and the kafir corns were introduced from South Africa in about 1876.[^56] Sorghum improvement was pioneered in the U.S.A. where sorghum, known in parts of the U.S.A. as milo or milo maize, was developed as a stock feed. Schomburgk's colleague in California, Professor Saunders, considered that the most profitable were Kenney's early amber sugar cane, Dhoura or brown Egyptian corn (*Sorghum cernuum*) and red *imphe*.[^57] Schomburgk's initial trials suggested that all three were hardy enough to withstand local climatic conditions. He did not think that sugar production from sorghum was practical in South Australia although he considered the Northern Territory a more promising region.[^58]

[^55]: There are variations in spelling, including durra, dhura and dhoura.


[^57]: *Report* 1879, p. 4.

[^58]: Australia is heavily involved in sorghum development today, for example there is Australian input at I.C.R.I.S.A.T, the International Crops Research Institute for the Semi-Arid Tropics in Hyderabad, India. There research is being done on sorghum for use in the developing world where the need for sorghum grain as human food is greatest.
There was a reference in the 1879 Report to two kinds of sweet corn, previously introduced to the West coast of America from China. These appear to be referred to as 'Indian corn'. Seeds were sent to both model farms (Millicent and Roseworthy) for trials.\(^5^9\)

Schomburgk made further enquiries in the United States about a 'Dhoura' sorghum thought to be *Sorghum vulgare*, a native of Africa, cultivated in both Africa and Asia for grain and in the southern states of the United States as one of the most valuable of the forage plants. After two years' trial in Adelaide he considered it to be drought resistant and suitable as a forage plant. He had positive reports of the three other sorghums he had received from the United States: Kenney's early amber sugarcane, red imphe and dwarf broomcorn. He found that some of the millets could be treated as perennials. The Director was 'quite confident' by 1882 that they were 'destined to prove of great value in South Australia'.\(^6^0\) In the period 1879-1880 he described trials of Egyptian pearl millet (*Pencillaria spicata*) for use as a forage plant for stock and poultry. This was an attractive species which could be grown as an ornamental plant for its bright green foliage, being one of the most leafy of the sorghum family and producing a mass of small shoots, a little like *Reana luxurians* (Téasinte).\(^6^1\) As Schomburgk's interest in the sorghum/millet group continued his network of contacts sent him new varieties for trials. Two more came from Professor Saunders in California in 1883, both forwarded to him by 'Mr Farren' of New South Wales. There had been a reference to 'Mr W. Farron of New South

\(^{59}\) Report 1879, p. 5.

\(^{60}\) Report 1882, p. 4.

\(^{61}\) Report 1879, p. 4 and Report 1880, p. 5.
Wales' in the 1879 *Report*, referred to as Farren in another paragraph. Schomburgk would probably have seen the name only in handwritten form and it seems likely that the person concerned was actually the wheat-breeder William James Farrer (1845-1906), who by 1882 was formulating specific plans for producing improved wheats. Farrer was a very reserved and reticent man and his sensitive disposition could well have made him disinclined to correct his older colleague in correspondence between them, were he to have recognized such an error in handwritten correspondence. In further references in the text the name of Farrer will be used although there is an element of doubt about it.

These two new varieties of sorghum from California were known as rural branching or branched dhura and Californian evergreen millet. The former Schomburgk described as superior to the common dhura. It was not easily blown down by the wind and since it produced an abundance of foliage, throwing out more shoots than the common dhura, could be recommended for ensilage. These observations of 1883 were confirmed in 1887 together with the comment that the plants of rural branched dhura lasted two years if there were not heavy frosts.

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62 *Report* 1879, p. 3.

63 'William James Farrer', in *Australian dictionary of biography*, vol. 8, p. 471.

64 *Report* 1883, p. 4, The Californian evergreen millet which was said to differ from the other millets in being more of a dwarf variety, and 'no doubt another valuable acquisition' turned out during trials to be Phillips grass (*Panicum spectabile*), *Report* 1884, p. 7.

65 The 1887 comment was that 'Rural branched dhura' still appeared to be superior to 'Dhura' in the wind resistance of plants and the number of shoots produced, although the seed did not ripen as well. *Report* 1887, p. 6.
Schomburgk listed the following millets as being cultivated in the Botanic Gardens by 1883:

rural branched dhura, Californian evergreen millet, Egyptian corn, American broom corn, dwarf broom corn, evergreen broom corn, pearl millet (Pencillaria spicata), Kenney's early amber sugarcane, white Egyptian corn (sorghum vulgare), brown Egyptian corn (sorghum cernuum), red imphe and Tíasinté (Reana luxurians).66

'German or golden millet' had been mentioned very favourably in 1879 but no botanical name was given and it does not appear to be on the above list.67

Contact with colleagues in the United States was aided greatly by liaison with the Department of Agriculture, Washington D.C., an important source of both plant material and information. In the 1872 Report there is the first mention of plant material being sent by Commissioner Frederick Watts of that Department; this contact was to continue for many years. In 1872 Schomburgk applied to Watts for 'the true American broom millet seed'. American broom corn supplied material for brooms which were largely imported into South Australia. Schomburgk knew that millet grew well in the Adelaide hills and southern districts. He was hopeful that if the broom corn could be grown and the necessary skills learned, brooms could be manufactured locally as was being done in the region around Newcastle, New South Wales and in Victoria.68 Trials of two more varieties from America, 'long brushed broom corn' and 'hybrid broom corn', were reported in 1887; the former a robust plant which seemed

66 Report 1883, p. 4.
67 Report 1879, p. 5; Report 1883, p. 4.
68 Report 1883, p. 5.
promising for broom manufacture, and the second comparable to other varieties they had grown.

Lack of summer rain and the shortage of water for irrigation have precluded grain sorghum from becoming a major crop in South Australia. Some forage sorghums, for example *Sorghum sudensis* (sudan grass) are grown occasionally on dry land farms but more often where some water is available.

*Phalaris canariensis* (canary grass)

Another crop proposed in 1873 was canary seed. *Phalaris canariensis* was said to be a native of Southern Europe and the Canaries but was also grown in England and Germany. Schomburgk commented that its cultivation was 'entirely overlooked' by farmers although the 'enormous prices' of two shillings to two shillings and sixpence per pound were paid by local residents. The 'ruling price' of three to four pence per pound in 1873-4, and four to sixpence per pound by 1884, would pay the grower quite well and the plant was said to grow under a variety of conditions.

*Symphytum asperrimum* (prickly comfrey)

In the years 1876-1877 *Symphytum asperrimum*, today known as a herb for medicinal use, was being promoted as a forage plant in


70 *Report 1884*, p. 21. Some indication of the contemporary value of these amounts is indicated by the fact that a labourer was paid six to eight shillings a day in 1882, a tradesman about ten shillings a day; *South Australia: a brief account of its progress and resources. With map showing its position in relation to the other Australian colonies, also a description of the Adelaide Exhibition 1881*, Government Printer, Adelaide, 1882, p. 20.
England and France with considerable enthusiasm. Schomburgk described it as a native of the Caucasus Mountains region and introduced to the Royal Botanic Gardens, Kew, as early as 1799. He referred, with a note of caution, to accounts of the yield (which would have been fresh matter yield) being as high as 80-120 tons/acre [200-250,000 kg/ha], a remarkably high yield. However, he believed that the assertion that the plant would flourish in 'any soil' was unsupported by evidence and considered that rather it would need good, deep, moist soil. He had obtained specimens for trials from Guilfoyle, who was by then Director at the Melbourne Botanic Gardens, and on this occasion advised members of the public to get plants from the local seedsmen and nurserymen, Messrs Heyne and Hackett for propagation. Christy's *Forage Plants and their economic conservation by the new system of 'Ensilage'* published in 1877 promoted the use of prickly comfrey for ensilage - a practice used by the Arabs for storing forage in fresh condition for future use and at the time regarded in Europe as innovative. However, attempts to use prickly comfrey as a forage crop plant showed that, despite the 'rave reviews', the crop was quite unsuitable for conditions on the Adelaide plains. In 1878 the Director wrote that he was convinced that this plant was 'of little use' on the Adelaide plains and that promises of an expected yield of 80-100 tons per acre had led to bitter disappointment elsewhere:

The same complaint we hear from New South Wales, Victoria, even from the tropical countries, such as Queensland, Ceylon, Singapore, &c., where the planters

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For example by Prof J. Barral, Secretary of the Société Centrale de l'Agriculture en France writing in the *Journal de l'Agriculture*, 7 October, 1876, quoted in Thomas Christy, *Forage Plants and their economic conservation by the new system of 'Ensilage'*, London 1877, pp. vi-vii. It was advertised in England as early as 1830 by a nurseryman at Lewisham according to Lawson's *Seed and Nursery Company, Agrostographia*, p. 7.
have been disappointed with it, and speak in strong terms of the expense they have been put to in introducing and planting it.\textsuperscript{72}

*Reana luxurians* (Téosinte)\textsuperscript{73}

Enthusiastic reports from overseas on a new crop were certainly no guarantee that it would prove suitable for South Australian conditions. This was the case with a new fodder grass *Reana luxurians*, sent to Schomburgk by the Société d'Acclimatation in Paris and recorded in a lengthy account in the 1878 *Report*. Indigenous to Central America, it had been brought to the attention of the Director of the Botanic Garden in Guatemala, where the plant was known as Téosinte. He had seen very positive accounts of it from the *New Caledonia Moniteur*, and after it was introduced to the Société d'Acclimatation of France there were trials in the south of France and in French colonies. The plant had attracted interest in Algiers, the island of Bourbon, Mauritius, New Caledonia, Cairo, Madras and Singapore. The reports which came to Schomburgk about its cultivation indicate how it was possible to make use of the network of contacts of the French colonial system in order to exchange information on crops of economic value. Amongst the many societies of which Schomburgk was a corresponding member were those of the Société Nationale de Cherbourg and the Société d'Horticulture des Bouches de Rhone, Marseille.

*Reana* appeared to Schomburgk to need the same cultivation as maize and sorghum. His report on its cultivation was added to others in

\textsuperscript{72} *Report* 1878, p. 5. The failure of the crop in South Australia is also reported in 1888 in *Report* 1888, p. 5.

\textsuperscript{73} Téosinte is a close relative of maize (*Zea mays*) and together with *Tripascum* spp. they are the three New World members of the tribe Maydeae. A rare perennial form of Téosinte is now extinct outside botanic gardens.
Christy's *New Commercial Plants* of 1878.\(^{74}\) Schomburgk was able to make a comparison of his own trials of *Reana* with those at the Government garden at Palmerston in the Northern Territory, now part of suburban Darwin, where *Reana* grew to 12-14 ft [366-427 cm] in five to six months. Although he considered it essentially a tropical plant in its habits it could be grown as a summer forage plant in South Australia, growing to 5-6 ft [152-183 cm], however it would be killed by any subsequent early frosts.\(^{75}\)

**Sheep parsley (??*Apium petroselinum*) and *Ornithopus perpusillus* (seradella)**

Sheep parsley, described as 'one of the varieties of the common parsley', was proposed as a 'valuable fodder plant' in 1884, in particular for sheep. In Europe it was thought to help prevent 'red water' and 'liver rot'.\(^{76}\) In the same year Seradella (*Ornithopus perpusillus*) was mentioned as an annual which could be recommended as a good fodder plant if it were sown early in the season, for example in May, when the plants could be frequently cut.\(^{77}\)

**Wheat farming and the need for diversification**

There were large areas of South Australia particularly suited to wheat growing and wheat was an extremely important crop in the South Australian economy during Schomburgk's directorship. Wheat like other cereals is quick growing and can offer the farmer a quick

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\(^{74}\) Christy refers to *Euchloena luxurians*.

\(^{75}\) *Report* 1879, p. 5.

\(^{76}\) Mortimer as early as 1721 recorded that it was grown in Buckinghamshire to improve the lands and prevent 'the rot of sheep', quoted in Lawson's *Agrostographia*, p. 3.

\(^{77}\) *Report* 1884, p. 8.
return in comparison with the planting of fruit trees or raising of stock; an important consideration for a new settler who had limited capital backing. Wheats were, and still are, the preferred staple food of traditional farming communities in Europe from the Atlantic to the northern parts of the Indian subcontinent. Like the other staple grains, maize, oats and barley, wheats contain significant amount of protein in addition to carbohydrate. Moreover, wheat is often preferred because of its palatability and its versatility in cooking. The gluten contained in wheat grain provides the 'rising' quality of wheat flour and thus its value in bread and cake making. It is the only cereal with this quality. Although Australia is not one of the largest wheat producers in the world, wheat forms a significant part of Australia's export earnings and an even larger role in South Australia's economy. South Australia came to be regarded as the 'granary of Australia' in the latter part of the nineteenth century, providing grain for the rapidly growing population in the eastern part of Australia. Much of South Australia's agricultural land is close to the coast enabling a significant export trade to develop to the United Kingdom and to the other colonies in the period before inland railways developed.

As we saw in Chapter 2 the first wheat to be sown in Australia was brought out with the First Fleet and planted at Farm Cove, now part

78 Zohary & Hopf, The domestication of plants in the New World, p. 16.


of the Royal Botanic Gardens, Sydney. The task was to introduce a completely new plant to a country with no tradition of agriculture as known to Europeans. Early wheat growing in Australia was made difficult not only by the lack of experience on the part of European settlers of farming under local conditions but also by the fact that the first types of wheat grown were quite unsuitable for local climatic conditions. In addition, the varieties used had little resistance to the effects of various parasitic organisms that thrived under local conditions. In the early years of farming, there was little attempt to keep the different types of wheat separate. It is thought that the wheats grown in the period through to 1850 were the White and Red Lammas types, popular in England and Scotland but ill-adapted to the Australian environment. The colonization of South Australia and Victoria opened up a new era in the developing wheat industry in Australia. Efforts to improve yields through selection and introduction of new varieties saw Australian farmers becoming leaders in the development of the science of plant breeding.

Although the South Australian climate with its dry summers made wheat somewhat less susceptible to rust and other fungal diseases than was the case with early wheat grown on the New South Wales coast, there was nevertheless a serious rust epidemic in 1867 leading to a major government enquiry. Schomburgk was an important witness at this enquiry. At this time he had been at the

81 For example see the account in John W. Adams, My early days in the colony, undated, privately printed account. Copy provided by R.R.J. Taylor of Tusmore, S.A.

82 Wrigley & Rathjen, 'Wheat breeding in Australia', p. 96-98.

83 ibid., pp. 98-100.

84 H. R. Wallace, 'Plant pathology', in C. R. Twidale et. al. (eds.), Ideas and endeavours, the natural sciences in Australia, Royal Society of South Australia, Adelaide, 1986,
Botanic Gardens for only two years but he had farmed for sixteen years at Buchsfelde.

There is no mention of experiments with different wheat varieties at the Botanic Garden until 1879 when Schomburgk received some seed from 'Farrer' in New South Wales. This had been sent to New South Wales by Professor Saunders, 'a known practical and enthusiastic experimentalist' living in Southern California. There had already been links with the Department of Agriculture in Washington, D. C. The next decade saw valuable exchanges with agricultural research workers in the United States, where large areas were being developed for crops and pasture as was occurring in South Australia. Schomburgk's experiments with different wheats during the next few years came at a time when there was a burst of activity to try to deal with problems in the farming industry. Continual cropping had left large areas deficient of phosphates and other essential elements in the soil, leading to lower yields. It was not until the 1880s that experiments at the newly established Roseworthy College showed the dramatic improvement in productivity that came with the application of phosphates, and subsequently superphosphate came into widespread use.

There were other problems, such as years of poor rainfall, after wheat farming had spread into areas of unreliable rainfall in the mid-north and northerly regions of South Australia. During the 1870s and 1880s those seeking farming land had moved north to the areas

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85 Evidence of Professor Custance, Royal Commission on vegetable products, second progress report and continuation of minutes of evidence, p. 83.
around Caltowie, Jamestown and Laura, and to the scrubland of Yorke Peninsula: 275,000 extra acres (111,000 ha) in wheat were added in the land boom of 1872-74 when good falls of rain were received. In 1875-80 wheatlands had expanded further north from Terowie to as far as Hawker.

As this expansion occurred farmers searched for appropriate wheat varieties, seeking such properties as resistance to rust, hardiness, vigour, yield and quality. Wheat such as Purple Straw, which had been grown near Adelaide, was less suitable for these drier areas. The more enterprising farmers sought plant material from friends and colleagues, read reports in newspapers and journals, and exchanged information at agricultural shows and meetings of organizations such as Farmers' Associations. Schomburgk was part of this information and exchange network through his contact with members of organizations such as the Royal Agricultural and Horticultural Society, Farmers Clubs and the Agricultural Bureau.

Accompanying the seeds sent by Farrer to Schomburgk in 1879 was a letter from him which acknowledged Schomburgk's reputation in the field of crop research:

Knowing the great interest and care you take in this matter, and the success you have already achieved in introducing forage plants, in fact of such which benefit the community, I trust the seeds to you rather than to any other one for cultivation.

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86 Meinig, *On the margins of the good earth*, p. 48. Enthusiasm for expansion led to the passing of the Waste Lands Amendment Act which allowed settlement beyond 'Goyder's Line'.


88 Report 1879, pp. 3-4.
Schomburgk, in quoting in a Report from this letter, showed that he was not averse to receiving some public recognition of his reputation in this way. Farrer proposed that he should receive back half of the yield obtained by the Director, who in turn kept one part himself and sent two parts for trials at the two Government experimental farms: at the new Experimental Farm and Agricultural College at Roseworthy and at Millicent in a higher rainfall area in the south-east of the colony. Schomburgk also sent some of the seed to the Agricultural Society for distribution amongst farmers, so as to have some comparison with that grown under the conditions of soil and weather conditions in his own Experimental Ground. Included in this group were seeds of two varieties of wheat new to the colony, white wheat and Sherman's.\textsuperscript{89}

Sections on both wheat and a variety of pasture plants took an important place in the Annual Reports during the next few years; for example in the 1879 Report material on grasses and forage plants took about two of a total sixteen pages. This particular report, which had the first material on wheat experimentation, is the first in which the work of Pringle in Vermont, U.S.A. is mentioned - in this case with reference to trials of two new varieties known to the Director as Defiance and Champlain. Schomburgk obtained seeds from Bliss and Sons in New York after hearing of the success of the two varieties in the American agricultural newspapers.\textsuperscript{90} In this case Schomburgk distributed 100 samples to South Australian farmers, getting reports back from 39 of them. In addition he experimented

\textsuperscript{89} Report 1880, p. 3.

\textsuperscript{90} Report 1879, p. 4. Schomburgk wrote that Defiance was produced by hybridizing common club wheat with a fine white wheat from the Pacific coast and Champlain by combining the hardiness of a Black Sea wheat with the fine quality of Golden Drop.
with 15 varieties himself; 11 kinds from East India, and four from the United States (Sherman's and white wheat from California in addition to Defiance and Champlain). Red rust attacked the Californian and East Indian wheats but Defiance and Champlain appeared little affected. Local farmers, particularly G. Pearce of Crystal Brook and P. J. Spain of Terowie, had found these two to be both prolific and rust-resisting although Champlain was considered to be 'too flinty' and less suitable for milling. Of the 39 reports, none indicated serious problems with rust with these new wheats, although some had their main crop destroyed by rust, the popular Purple Straw being particularly affected.91

During 1881, the South Australian Government ordered a quantity of the South African wheat Du Toits on the recommendation of G. E. Wilson of Terowie. It was described as being impervious to red rust and as producing a superior grade of flour. Another wheat, April or Twenty Weeks, recommended by W. Milton of McLaren Vale was ordered from England, and samples were sent to all the Farmers Associations in South Australia, along with samples of Defiance and Du Toits for distribution to different districts. By this time Farmers' Associations produced a network of local groups to whom samples could be sent, with local secretaries collecting replies. Correspondence in the Observer in January 1881 provided reports from farmers on the performance of new wheat varieties.92 Schomburgk could quote his own experience from the Experimental Ground. Ironically he could not give exact figures for the yield of Twenty Weeks because the sparrows had 'made great havoc' among

91 Report 1880, p. 3.
92 Correspondence, Observer, 1, 8, 15 & 22 January, 1881.
the crop. In 1868-9, at the height of a period of local enthusiasm for liberating European birds, he had liberated a pair of sparrows, previously kept in cages, in the belief that their value in consuming insect pests would outweigh any damage they might do. At the time he had written that 'the injury they do to a few fruits must be overlooked'; perhaps he tried to take his own advice in 1881.

By 1882, reports from farmers on the new wheats indicated that Du Toits seems to become a favourite among farmers, although the 'Defiance' is favourably spoken of in some districts. The year 1882 saw poor rainfall and high temperatures in September and October (shade temperatures reaching 96° F or 35.5° C in Adelaide); the average yield in the colony was only four to five bushels per acre (269-336 kg/ha). Such a poor yield would have barely returned the farmer his seed. In the northern areas the wheat crop was a failure. Even with the best available wheat varieties farmers would not have successfully grown wheat under these conditions, but further south there was more potential for success. Letters to the Register and Observer newspapers in 1883 from two farmers who had received samples of Defiance wheat from the Director are some indication of the importance of wheat varieties in this period and the difference they could make to yields. One noted that whereas his wheat

93 Report 1881, p. 5.
94 'The great utility of the sparrow is now a settled question, and the injury they do to a few fruits must be overlooked', Report 1869, p. 7.
95 Report 1882, p. 3.
96 An approximate conversion since a bushel is a measure of volume not weight.
97 Report 1882, p. 3.
98 Quoted in Report 1883, p. 3.
averaged only two and a half bushels in 1882, Defiance yielded at the rate of eight bushels per acre. Moreover, while no rust was detected on Defiance, his other wheat was much affected.99

The last reference to wheat trials occurs in the 1883 Report, written in March 1884. In all, there are records of trials being carried out over four to five years during the period 1879-1883. Although trials may have continued after this, none are recorded. It seems likely that after 1883 the main centre for wheat research was at Roseworthy Agricultural College (established in 1882), combined with that done on the model farms and research organized under the auspices of the Agricultural Bureau and local agricultural societies. Experiments in the period earlier than 1879 appear to have been concerned with the issue of rust in cereals. The 1868 Report refers to experiments carried out under the auspices of the Commission to Enquire and Report upon the Diseases in Cereals in South Australia, experiments which demonstrated that farmers could use for seed purposes grain from cereal affected by rust.100 Research into the production of wheat was thus concentrated in two periods, 1867-68 and 1879-83. In the long term one of the most important aspects of trials was the introduction of the Du Toits strain of wheat. Selections from this variety had immediate commercial impact and, in turn, selections such as Marshalls No. 3, Federation and Gluyas contributed to three families of varieties which dominated the Australian wheat industry after 1900.101

99 Letter of F. Bohnsack of Whitwarta, quoted in Report 1883, p. 3.
100 Report 1868, p. 5.
101 Wrigley & Rathjen, 'Wheat breeding in Australia', pp. 102-3.
In 1873 Schomburgk stated in an address to the Chamber of Manufactures that:

it must be evident to all that the period has arrived for a change in our system of husbandry. The efforts of our agriculturists have now to a considerable extent to be directed to other objects than that of wheat-growing, which has reached its utmost limits - a contingency that cannot surprise, and that no one has ever doubted must arrive sooner or later. To wheat, which has hitherto engrossed our almost exclusive attention, other products must be added from which our agriculturists may derive an income, the time having passed when wheat-growing alone was the safest and most profitable occupation.\textsuperscript{102}

Schomburgk was not alone in putting forward this view in South Australia as the wheat frontier reached its outermost limits in the North.\textsuperscript{103} There was considerable interest in the possibilities of crop diversification during the 1880s in both South Australia and Victoria; a situation which will be further examined in Chapter 8. A number of crops could provide some alternative to wheat; for example other cereals, crops which yielded hay, legumes, pasture plants for animal fodder, oil and fibre producing plants. The profitability of these would depend on local climatic and soil conditions as well as commercial considerations involved in the marketing of the raw product. The farmer had to be prepared to experiment with new crops. Nevertheless the first step was to obtain suitable plant material and to carry out trials to see if further investigation was warranted. In the 1880s Schomburgk recorded trials with a number of new species.

\textsuperscript{102} Schomburgk, 'Capabilities of the various districts of the colony', p. 102.

\textsuperscript{103} Meinig, \textit{On the margins of the good earth}, pp. 120-3.
**Eragrostis tef** (Teff or tef)

Seed for trials of *Eragrostis tef*\(^\text{104}\) was received from the Royal Botanic Gardens, Kew, in 1886. While Schomburgk did not think teff would be grown for its flour he thought it might be suitable for hay. After finding that the seed germinated satisfactorily he distributed 440 packets of seeds for trials. However, in the 1887 *Report* he recorded that he had 'not received one letter informing me of the result'.\(^\text{105}\)

**Chamaecytisus palmensis** (Tagosaste or tagasaste)

Another fodder plant which featured in the reports of the last decade of Schomburgk's directorship was tagosaste (*Cytisus proliferus*, now *Chamaecytisus palmensis*)\(^\text{106}\) now known as tagasaste. The first seeds of tagasaste received were from William Thiselton-Dyer, Assistant Director of the Royal Botanic Gardens, Kew, in 1879. Tagasaste is included in this chapter for convenience although it is a very different kind of plant from most of the other fodder plants being considered. An attractive, evergreen leguminous tree-shrub requiring a light dry soil and an absence of frosts, it is native to the Canary Islands, where farmers had used it to maintain livestock over long, dry summers. It can be planted as a hedge, thus also providing a windbreak, and is useful in providing forage for bees. An observant

\(^{104}\) Schomburgk referred to it first as *Eragrostis abyssinica* and in 1887 as *Agrostis abyssinica*

\(^{105}\) *Report* 1887, p. 5. Teff is known today as a crop which will grow in areas of high altitudes (1700-2,500 m) where the annual rainfall is about 2,500 mm. It is cultivated in some places in Australia, Kenya and South Africa for hay and is grown as a cereal grain in Ethiopia as the most important single crop in that country, see P.M. Smith, 'Minor crops', in Simmonds (ed.), *Evolution of crop plants*, p. 304. Whittet in *Pastures* indicated that it has been grown in N.S.W. coastal districts but while found to have rapid growth it was less successful than Japanese millet for carrying capacity and total yield, p. 159.

\(^{106}\) It is referred to in the 1887 *Report* as *Cytisus proliferus*. 
medical practitioner on the island of La Palma in the Canary Islands reported on the value of tagasaste in a Spanish journal in 1862.\textsuperscript{107} Seed was sent to Kew where interest in the potential of this plant for countries with prolonged dry periods led to seeds being despatched for trials in colonial botanic gardens. Although still not well known today in Australia, it has considerable potential in the prevention of soil erosion and rehabilitation of degraded soils, while at the same time providing green feed for browsing animals. L. C. Snook, commenting on the early trials, observed that it was remarkable that Schomburgk should so quickly have discerned one of the most valuable attributes of tagasaste, namely its ability to thrive on all sorts of soils.\textsuperscript{108} On the basis of this attribute, as well as tagasaste's drought resistance and its value as a fodder plant, tagasaste was enthusiastically promoted by the Director who included in his reports practical advice about methods of cultivation. However, he wrote with some disappointment about the poor response he had from local farmers:

> although I offered seed of the 'Tagosaste' for distribution, only a few applications have been made in South Australia, but a large number were received from the neighbouring colonies.\textsuperscript{109}

Nevertheless, some local farmers did grow the new shrub. The 1887 \textit{Report} recorded that A.B. Robin of Para Grove, Nuriootpa, had considerable success with tagasaste which he grew around his farm for both shelter and fodder. Robin, who found it a fast growing,
hardy, useful plant with an attractive appearance, was keen to promote it in his area. A farmer named Koch from Gippsland, Victoria, to whom seed had been sent four years earlier, had tagasaste shrubs growing to a height of about 13 feet (about 400 cm). Branches were clipped in the summer to provide fodder for cattle and sheep. The shrub flowered profusely from May to September and attracted bees at a time when there were few flowers available, making it a useful plant for apiarists. Koch enthused that the shrub was 'one of the most useful ever introduced into Australia'. 

It is still grown occasionally and has become naturalized in the Adelaide Hills.

**Andropogon calamus aromaticus and Andropogon schoenanthus**

By 1885, seed of a new fodder plant, *Andropogon calamus aromaticus*, sent by E. Palmer of the Saharanpur Botanical Department Garden, had been received. Palmer described it as a perennial grass which, as well as providing fodder, also yielded a strong aromatic essential oil. Distilled from the roots, 'Ginger grass oil Nemaur', was highly valued there as an embrocation in the treatment of rheumatism. Seeds of *Andropogon schoenanthus* were also received. Described as a native of Southern Asia which was also found in tropical Australia, it yielded Siri oil, of medicinal use. Both grasses survived their first summer, *A. schoenanthus* reaching 3-4 feet [91-122 cm]. Schomburgk expressed satisfaction that even if the roots were not used, the colonial collection of fodder plants had been increased by the

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110 Report 1887, p. 7. This appears to be the A. B. Robin who was a foundation student of Roseworthy College.

111 Report 1889, p. 6. L. Haegi, (pers. comm. September 1988) notes that Tagasaste has been used on Kangaroo Island off the coast of South Australia in recent years and it is now growing wild in the Adelaide Hills. The use of tagasaste in Western Australia is increasing due to the promotional efforts of L.C. Snook.
addition of two useful fodder plants which could survive in the local climate.\textsuperscript{112}

\textit{Lespedeza striata} (Japanese clover).

In 1885, Schomburgk was sent glowing reports from the \textit{Rural Californian} newspaper of trials of Japanese clover.\textsuperscript{113} It provides another example of the operation of the contact network that brought accounts of overseas trials to the Director's attention. It is also a good example of the slow and often painful nature of field trials with new pasture species. Information on \textit{Lespedeza striata} had been sent by T. E. Schlegel of Beachport, then a small coastal town a considerable distance (about 563 km) from Adelaide. It was described as a perennial clover which grew in a wide range of soils, including poor soils, withstood summer droughts, spread without further cultivation, was palatable to sheep and cattle, and improved the soil.\textsuperscript{114} Schomburgk wrote to the Secretary of the State Board of Forestry in San Francisco, 'begging him to procure me some of the seed' and subsequently obtained seed 'after much trouble, writing to several of my correspondents in California and London'. He obtained eight pounds of seed, tested it to ensure it would germinate, and distributed it among farmers.

Sometimes the initial response of farmers to an offer of seed was poor but in this case he had distributed 700 packets of seed and had a further 200 applications after seed ran out. The response from

\textsuperscript{112} Report 1885, p. 5.

\textsuperscript{113} Referred to as \textit{Lespedeza stricta} in 1885 but as \textit{L. striata} in the 1888 Report.

\textsuperscript{114} The \textit{American Home Farmers Manual} also gave a positive account of the clover which was being grown below 36 degrees latitude right down to the Mississippi. Report 1885, p. 5.
farmers was very disappointing. Seven hundred packets of seed had been distributed on the understanding that the Director would be informed of the results but he reported receiving only one communication which was that the seed had not germinated. He noted that seed had been planted at different periods, from July through September and thought that farmers might have planted the seed too deep. This suggests that he had some information about the trials, possibly from word of mouth in the agricultural world. He observed that the clover was slow growing and his own trials indicated that later rather than earlier sowing was more effective. Nevertheless, in 1888 he acknowledged that despite the glowing reports from California, the clover was a failure in South Australia. Trials in different places and with different soils revealed that the clover did not make good growth in the summer months and died out altogether in winter. At that stage he did not have results back from farmers in Victoria and New South Wales to whom seed had been sent.115

The lespedezas are useful in soil conservation, for renewing worn out soils, and provide excellent hay and pasturage. While the disappointing results in 1887-88 may have been related to the fact that many legumes have impermeable seeds, making germination poor and sporadic unless the seed is scarified, this group has not been successful South Australia.

**Review in 1888**

By 1888, a further review could be made of the grasses in the experimental plots at the Botanic Gardens. The Director made the

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115 Report 1886, pp. 4-5; 1887 p. 5; 1888, p. 4-5; Whittet, Pastures, p. 345.
following observations on species that had been added to the collection:

*Melica ciiliata*: 'a native of Europe and a valuable perennial fodder grass'; is much liked by sheep.
*Rottboellia exaltata*: 'a native of N. Australia, a perennial, and regarded as a good fodder grass'.
*Panicum sanguinale*: a native of S. Europe. 'Although an annual it grows on barren ground and spreads very quickly'; is much liked by sheep.
*Panicum colonum*: 'A native of Africa, also a quick spreading annual'.
*Perois latifolia*: 'A perennial grass from the Cape of Good Hope, strongly recommended as a durable good fodder grass'.
*Andropogon Martinii*: 'although a tropical grass from India it seems to thrive well with us'.
*Andropogon schoenanthus* and *Andropogon calamus aromaticus*: which had been recently introduced and which had survived two dry summers furnishes 'aromatic roots yielding an odoriferous essential oil' for perfumery besides being useful as animal fodder
*Eleusine coracana*: from Asia had been introduced as an annual which spread easily, was described as very palatable to sheep and cattle and having good fattening properties for stock.
*Panicum crus galli*: described as a valuable and nutritious annual 'found in almost all warm countries' had been found growing on gardens and roads in South Australia spreading spontaneously and withstanding droughts Schomburgk thought it should be introduced into homesteads by farmers.116

After a drought year in 1888 with only 14.5 inches [368 mm] the Director listed the following group of pasture and fodder grasses which had survived the extreme conditions:

*Paspalum dilatatum*, (bastard millet grass): 'a native of South America'; 'seems to spread well', 'good accounts of this grass are given in some of the American agricultural papers'. The 'valuable grass has maintained its luxurious growth without irrigation during the disastrous drought'.
*Elymus unioloides* (prairie grass ): 'although...one of the best and most nutritious of grasses, and is little affected by our driest season, it has not received the attention from our colonial agriculturalists that it deserves', self-sown seeds grow freely', 'one of the best grasses for hay'.
*Elymus condensatus* (bunch grass) from California: 'a valuable grass' 'stands our climate well'.
*Panicum crus galli*: 'valuable summer grass', 'very nourishing', 'grows most vigorously in the months of December, January and February', 'spreads spontaneously', 'often found growing in gardens and on roadsides'.
*Festuca duriuscula* (hard fescue grass ): 'hardy and durable'.
*Piptatherum multilorum* (falling awn grasses) and *P. thomasi*: 'both withstand the most severe drought'.
*Milium multilorum* (millet grass), *Pennisetum villosum* (meadow grass) and *Poa pratense* (penisetum grass): 'all withstood the recent drought with great hardiness'.
*Agrostis abyssinica* (Teff): 'kept well during the drought' - 'a good grazing grass'.

Onobrychis sativa (Saintfoin or espersette - the German common name): 'one of those plants which I cannot too strongly recommend' '...valuable fodder plant withstood the drought admirably. Without watering it grew vigorously all through the summer.' '...valuable in the shape of green fodder, and also as hay'.

Millets and broom corn survived the 1887-88 summer and were described by as 'valuable summer fodder plants, especially for cows', especially 'red imphe' and 'rural branching dhoura'. Among the trefoils and clovers, the white melilot (Melilotus alba), the hybrid trefoil (Trifolium hybridum) and the 'pale flowered Medick' (Medicago media) were all reported to have withstood the drought well, but none of the fodder plants were regarded by Schomburgk as surpassing lucerne, 'which has not been affected in the slightest degree by the drought', as a fodder plant.

The last report of trials of new pasture plants in the Schomburgk era was a brief report of a large collection of grasses and fodder plants introduced by the Agricultural Bureau and distributed among farmers for trials. Most had already been grown in the Botanic Gardens but there were some new ones, for example some new millet grasses, Panicum album, P. italicum and P. germanicum.

Schomburgk also reported on some other grasses which appear to have been from his own collection. One was the bastard millet grass, Paspalum dilatatum 'a native of Buenos Ayres [sic] and Monte Video' which spread well and stands both wet and dry seasons well - 'I cannot sufficiently urge upon farmers and others the desirability of

117 Report 1888, pp. 4-5.
118 Report 1888, p. 5.
119 Report 1889, p. 7. Festuca rubra was mentioned although it had already appeared in the 1871 list.
giving it a trial', and he had a similar message about cocksfoot or orchard grass *Dactylis glomerata*:

...one of the most valuable of the grasses for permanent pasture that have been introduced into the colony...

...of vigorous growth, does well in almost any soil, and is much relished by cattle and sheep. It stands both feeding down and cutting down and grows again with great rapidity. It is one of the most prolific grasses and possesses considerable nutritious properties, and is valuable for fattening purposes.

Trials were also being made at this time of Louisiana grass *Paspalum platycaule*, 'a native of Jamaica, Peru and of Mexico', an annual said to produce good hay. Seeds of this grass had been introduced by the Adelaide seedsmen Messrs. Hackett and Co.\textsuperscript{120} The report of this collection of grasses shows the cooperation that was occurring between the commercial sector, the Agricultural Bureau and the Botanic Gardens at the time.

**The importance of the trials**

The value of Schomburgk's trials of grasses and fodder plants will be discussed more fully in Chapter 8 but it is worth noting that we have only a very general account of the trials that were carried out. There are no type specimens and we cannot be certain that what is called by a certain name by Schomburgk is the same plant that we know by that name today. Botanical names were not always given and there have been changes in nomenclature. There are no diary notes extant today nor accounts of trials other than what appears in the Annual Reports. We know there were some plants which were first tested in the Experimental Ground and others which were tested on a much larger scale when a larger plot became available in what we now call Botanic Park, near the old Lunatic Asylum. It is recorded that in the

\textsuperscript{120} *Report* 1889, p. 7.
Experimental Ground proper in 1885 there were some 24 species of fodder plants and 76 grasses, in addition to 43 medical species, 7 poisonous, 7 fibrous, 28 culinary, 5 dye-plants and 7 'miscellaneous and useful'. The summary table of grasses and fodder plants that follows shows that about 120 were mentioned during 1865-1891. Some were not successful and were never mentioned in the text of Annual Reports. Some probably failed before producing seed and this would help explain why some species are referred to as new acquisitions when the species had already been listed, for example in the 1871 Catalogue.

The collection was a large one and the long period during which trials were maintained meant that there was time for people with an interest in pasture grass and fodder plant research to visit Schomburgk and to correspond with him. At the time the Director possibly had quite detailed notes available on the trials. His interest in continuing the trials after the establishment of Roseworthy Agricultural College is indicated by his remark in 1886 that

> Although at the Experimental Farm at Roseworthy, similar experiments are carried out on a more extended scale, I shall not cease to devote attention to the introduction of any new economical plants which may promise to become useful or beneficial to the colony. A Botanic Garden is not devoted to the promotion of Botany alone but also to the object of bringing to a country useful foreign plants in order to test their suitability and to ascertain whether they can be cultivated profitably.\(^1\)

There may have been some professional rivalry between the younger Professor Custance, an agricultural chemist by training, and the older Schomburgk, but their work was complementary since Schomburgk was carrying out trials at the Botanic Gardens where the average rainfall was approximately 21 inches [525 mm] a year whereas

\(^{121}\) Report 1886, p. 6.
Professor Custance was working at Roseworthy where he had 'poor sandy soil' and had recorded an average rainfall of about 16 inches [406 mm].

Custance when giving evidence to the Victorian Royal Commission into vegetable products in 1886 recommended the following plants to farmers for pasture purposes after four years of trials:

[Both botanical and common names are those given by Custance]


All trials were on 'poor sandy soil' and without watering. Compared with the successful species today, the list of Custance is marginally more successful than that of Schomburgk. Other fodder plants considered by Custance to be of value were sorghum (valuable because it was available when it was hardest to find green feed for cows), millet both for seed and fodder, maize, especially Cobbett's corn and sugar corn (as a green fodder chaffed with hay or straw, bengal gram and dhoura).¹²² Some of the above group will be considered in the next chapter in sections on legumes, vegetables and tubers and plants for oil and fibre.

Reviewing Schomburgk's research, it is clear that the concept of homoclime, that is, areas of similar climate, had not evolved. Schomburgk tested large numbers of species from both cool temperate and and tropical areas, both inherently dissimilar to South

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¹²² *Royal Commission on vegetable products, second progress report and continuation of the minutes of evidence*, pp. 71-2 & 78.
Australia and therefore likely to yield few successes. The concept of actively seeking plants of Mediterranean type climate did not develop until just before World War II.
**SUMMARY OF GRASSES AND FODDER PLANTS REFERRED TO BY SCHOMBURGK**

Date indicates year of first reference (for example in an Annual Report or the 1871 or 1878 Catalogue.)

<table>
<thead>
<tr>
<th>NAME</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Agrostis argentea</em></td>
<td></td>
</tr>
<tr>
<td>1875</td>
<td></td>
</tr>
<tr>
<td><em>Agrostis capillaris</em></td>
<td>Brown Top bent. Used for lawns in cool districts.</td>
</tr>
<tr>
<td>1878 Catalogue</td>
<td>Now naturalized in S.A. but of little concern.</td>
</tr>
<tr>
<td><em>Agrostis laxiflora</em></td>
<td></td>
</tr>
<tr>
<td>1871 Catalogue</td>
<td></td>
</tr>
<tr>
<td><em>Agrostis solandrii</em></td>
<td>Probably = <em>A. avenacea</em>, a native grass of minor value.</td>
</tr>
<tr>
<td>1879</td>
<td></td>
</tr>
<tr>
<td><em>Agrostis stevenii</em></td>
<td></td>
</tr>
<tr>
<td>(Steven’s Bent grass)</td>
<td></td>
</tr>
<tr>
<td>1876</td>
<td></td>
</tr>
<tr>
<td><em>Agrostis stolonifera</em></td>
<td>Variable European grass. Not established in S.A.</td>
</tr>
<tr>
<td>(creeping bent grass)</td>
<td></td>
</tr>
<tr>
<td>1885</td>
<td></td>
</tr>
<tr>
<td><em>Agrostis verticillata</em></td>
<td>May = <em>Polypogon viridis</em>. Now established in S.A as a minor weed of swampy sites.</td>
</tr>
<tr>
<td>(switch grass)</td>
<td></td>
</tr>
<tr>
<td>1876</td>
<td></td>
</tr>
<tr>
<td><em>Aira caespitosa</em></td>
<td>May = <em>Deschampsia caespitosa</em>. Considered native to S.A. but doubtful. Rare and of little significance.</td>
</tr>
<tr>
<td>(hair grass/ tufted hair grass)</td>
<td></td>
</tr>
<tr>
<td>1873</td>
<td></td>
</tr>
<tr>
<td><em>Aira coerulea, fol var.</em></td>
<td>Probably an ornamental grass</td>
</tr>
<tr>
<td>1881</td>
<td></td>
</tr>
</tbody>
</table>
Alopecurus pratensis
(meadow fox tail)
1868

Established in S.A. but rare and of little significance.

American broom corn
1883

May = Sorghum bicolor.

Andropogon allionii
1875

May = Heteropogon contortus, a weedy dry tropic
bunch grass. Occurs in northern Australia.

Andropogon bombycinus
1871 Catalogue

May = Cymbopogon contortus, a native grass of drier
areas and of some use for pastoral areas.

Andropogon calamus
aromaticus
1885

Andropogon campanus
/campanos
1876

Andropogon giganteum
(tall Andropogon)
1876

Andropogon ischaemum
1875

May = Dichanthium ischaemum, native to sthn Europe.
Not established in S.A.

Andropogon martinii
1886

May = Cymbopogon martinii (a 'taxonomic
nightmare'). A valuable scented grass.

Andropogon muricatus
1878 Catalogue

May = Vetivera zizanoides, a tropical Asian scented grass.

Andropogon schimperii
[A. schimperi in 1878
Catalogue]
1875
**Andropogon schoenanthus**  
1871 Catalogue  
May = *Cymbopogon schoenanthus*, a north African grass. Camel Grass Oil is distilled from the roots.

**Antheora elegans**  
1878 Catalogue

**Anthistiria ciliata** (kangaroo grass)  
(report only - no record of trials)  
1876

May = *Themeda triandra*, Kanagaroo grass. (Also in Africa etc.) Important native grass over much of Australia, palatable, easily overgrazed, often surviving only in protected sites.

**Anthoxanthum gracile**  
1878 Catalogue

**Anthoxanthum odoratum** (sweet scented vernal grass)  
1878 catalogue

Well-established in better rainfall areas. Not sown. Probably more useful than weedy.

**Arundo benghalensis**  
1871 catalogue

**Arundo conspicua**  
1871 catalogue

**Arundo donax** (Spanish reed)  
1871 catalogue

Locally known as 'bamboo'. Well established in gardens. Used widely for stakes for tomatoes etc. Locally naturalized in Waterfall Gully and other sites. Used for erosion control. Probably more useful than weedy. Other uses could be developed e.g. musical reeds, 'brush' fences.

**Arundo festucoides**  
(reed grass)  
1868
Avena elatior
(French rye-grass)
(oat grass - 1873)
1868
May = Arrhenatherum elatius, Sparingly established
in moister areas. Of little significance.

Avena flavescens
(Blue Kentucky grass)
1877
May = Trisetum flavescens (in much of Europe).
Not established in S.A. The name 'Kentucky blue-grass
is usually applied to Poa species - see below.

'Bermuda grass'
sent from Florida
-no botanical name
1879
May = Cynodon dactylon, see below.

Briza maxima
1871 Catalogue
'Quaking grass'. Widely established as as minor weedy
grass. Palatable but of minor use, not sown.

Briza media
1871 Catalogue
Not established in S.A.

Briza minor
1871 Catalogue
'Shivery grass'. Widely established as as minor weedy
grass. Palatable but of minor use, not sown.

Bromus brizaformus
1871 Catalogue
Native to S.W. Asia. Not established in S.A.

Bromus giganteus
1871 Catalogue
May = Festuca gigantea, a grass of temperate Asia.

Bromus gussoni
1874
May = B. diandrus. Now well established in S.A.
Widely spread, useful early grass in young phases.
objectionable in head. 'Jabbers'

Bromus inermis
1875
Cultivated in Europe. Variable perennial. Not established in
S.A.
Bromus longifolius
[B. longiflorus 1877]
(long flowered broom grass)
1875

Bromus mollis
1867
May = B. hordeaceus, 'soft brome', 'goose grass'.
Widely established in S.A. Useful early grass. Less
useful head but of some value. Acceptable alien
grass but not sown.

Bromus schraderii
1871 Catalogue
According to Vasey, in
U.S.A. distributed as
'Australian oats' and
actually B. unioloides.
May = B. wilkenowii = B. catharticus. Taxonomy much
confused. Useful palatable winter-growing, weak
perennial. Sown on irrigated pastures. Widely established
in waste places. Does not take heavy grazing arising
from its palatability.

Bromus unioloides
(prairie grass)
date of first ABG trials
unclear - introduced in
colony by 1858, appears to
have been trials by 1873.

'Broom millet'
no botanical name
1872
May = Sorghum bicolor.

Buffalo grass
See Stenotaphrum secundatum.

'bunchgrass'
1880
No botanical name
Sent from Florida. Vasey refers to following as
bunch grasses, Stipa comata, S. satigera, S. spartea,
S. viridula, Orysopsis cuspidata, Deschampsoa caespitosa.

Calamagrostis haleriana
1878 Catalogue
May = C. villosa. - a winter grass of Europe.
Not established in S.A.

Calamagrostis phragmitoides
1878 Catalogue
'Californian evergreen millet'
1883

*Ceratochloa australis* 1867
(people's grass-'a variety of prairie grass')

*Ceratochlea exaltata* 1876
May be *Bromus catharticus*, see above.

*Chloris disitichiophylla* 1871 Catalogue
May = *Eustachys disitichiophylla* single recent record for S.A.

*Chloris diplachne* 1878 Catalogue

*Chloris fascicularis*
1878 Catalogue

*Cytisus proliferus* 1879
(Tagosaste / Tagasaste)
Deliberately planted to some extent.

*Coix exaltata* [referred to as Job's tears 1868]
In 1873 Job's tear grass was referred to as *Coix lacryma*]

*Coix gigantea* 1875

*Coix lacryma* - *jobi* = Job's Tears. Not established in S.A.

Chamaecytisus palmensis. Useful decorative and fodder tree. Now increasingly naturalized in moist areas.
Coix lacryma
love grass
1873
[may be have been introduced as Coix exaltata]

'crabgrass'
1880
[sent from Florida 'probably a species of Panicum' -1881]

'Crowfoot'
[ sent from Florida]
1880

Cynotum dactylon
(couch grass)
1870

Cynosurus cristatus
(crested dogstail)
1871

Dactylis altaica
1867

Dactylis caespitosa
(tussock grass)
(supposedly introduced in 1874 but early specimens were apparently Holcus lanatus) Probably introduced 1875-6

Coix lacryma-jobi

Crab grass is applied to Digitaria sanguinalis fairly widely. It is a summer growing weedy grass in S.A. Nuisance in gardens, lawns etc, otherwise little agricultural significance.

In S. A. 'crowfoot' is applied to Erodium spp. -a common weedy herb of pastures of European origin.

Cynodon dactylon. Locally called couch grass. (Confusion can arise because in Europe this common name is given to different species.) Widespread in S.A. and considered native; useful lawn, garden and orchard weed. Summer growing so of little agricultural use.

Locally established as minor weedy grass of little agricultural significance.

?D. glomerata.
**Dactylis glomerata**
(European cocksfoot)

1873

Important pasture grass in cooler regions of world. Palatable, widely sown. In S.A. importance increased in recent years by introduction of Mediterranean ecotypes. The northern European forms restricted to high rainfall areas.

**Dactylis longissima aurea**

1885

**Danthonia caespitosa**

1878 Catalogue

Common wallaby grass. Widespread native grass. Important in native pastures but not sown.

**Dichelachne crinita**
(mouse grass)

1885

Native genus. Not planted.

Dhoura or brown Egyptian corn (by 1881 brown Egyptian corn)

see *Sorghum cernuum*

'Dhoura' [1880]

see *Sorghum vulgare*

Dwarf broomcorn

[possibly referred to in 1879 Report under another name]

1880

Egyptian corn

[may be listed under under another name earlier
In 1883 listed separately to Brown Egyptian corn]

1883

May = *Sorghum bicolor.*
Eleusine coracana  1886

Eleusine oligostachya
(few spiked eleusine)  1868
May = Eleusine tristachya. Sparsely established in S.A. Of little significance.

Elymus arenarius
1871 Catalogue
May = Leymus arenarius. Not established in S.A.

Elymus condensatus
(bunch grass)  1871

Elymus giganteus
(lime-grass)  1867
May = Leymus racemosus. Not established in S.A.

Elymus glaucifolius  1880

Eragrostis abyssinica
(Teff)  1886
Eragrostis tef. Not grown or established in S.A.

Eragrostis brownii
1871 Catalogue
May = E. benthamii a widespread native grass of minor significance.

Eragrostis cylindrica
(love grass)  1873
see note re: Coix lacryma.

Eragrostis elegans
1871 Catalogue

Eragrostis megastachya
1871 Catalogue
May be a Satavia or Saccharum.
Erianthus ravennae 1871 Catalogue
May = Saccharum ravennae. Not established in S.A.

Eulalia ?japonica 1871 Catalogue
May = Miscanthus sinensis - now grown as an ornamental grass.

Festuca altissima (fescue grass) 1867
Widespread in Europe. Not established in S.A.

Festuca duriuscula (Hart fescue grass) 1871
May = F. rubra - occasionally used as a lawn grass, scarcely established.

Festuca elatior (tall fescue grass) 1871
May = F. pratensis (meadow fescue) used as an agricultural grass in cool areas to a limited extent. Not of great significance.

Festuca ovina 1871 Catalogue
Widespread in Europe, not established in S.A. May be used in lawns.

Festuca pratensis (meadow fescue grass) 1871
See above for F. elatior.

Festuca rigida 1878 Catalogue
May = Desmazeria rigida, widely established in S.A. as minor weedy grass.

Festuca rubra (fescue grass) 1877
May be sparingly established in S.A. Used as a lawn grass. No agricultural significance.

Festuca scabra 1871 Catalogue
May be Elymus scabra, a widespread native grass of limited agricultural significance.

'German or golden millet' 1879
May = Setaria italica
Glyceria stricta  
1875  
May = *Puccinellia stricta* a native to N.Z. Tolerant of brackish conditions.

Gymnothrix japonica  
May = *Pennisetum*  
1875

Hemarthrium glabrum  
*Hemitrachrum glabrum*  
[both spellings used]  
(buffalo grass)  
1868

Hierochlnea redolens  
1875  
A scented 'Holy' grass. Used in churches.

Holcus lanatus  
(woolly soft grass/ sugar / honey grass)  
1871  
[ also received in 1874 under name of  
*Dactylis caespitosa*]

Hedysarum onobrychis  
('common saintfoil')  
1885  
The cultivated *Hedysarum* is *H. coronarius*. Grows especially in southern Europe. Has often been tried here but not successful so far.

Hordeum jubatum  
(meadow barley)  
1868  
North American. Established as a weed in Europe. Not yet recorded for S.A.

Imperata arundinacea  
(reed like Imperata)  
1885  
May = *I. cylindrica*. Widespread tropical grass = Kunai grass of Papua New Guinea. Sparsely occurs in S.A. Not planted.

Kenney's/  
Kenny's early sugar cane  
(sorghum)  
1879

May = *S. bicolor*: one of the sweet stemmed forms.
Lagurus ovatus
1871 Catalogue
Widespread along S.A. coastlines. Of minor value.
Reputedly tolerant of copper deficiency.

Lespedeza stricta
[L. striata by 1888]
(Japanese clover)
1885
Forage legume in tropical areas.

Lolium bucheanum
1871 Catalogue

Lolium perenne
(rye grass)
1871 Catalogue
Important pasture grass of cool temperate areas worldwide. Widely used in moister S.A. as well as naturalized.
As with Dactylis q.v. the use of Mediterranean ecotypes has increased use.

Lolium italicum
(rye grass)
Mentioned in 'Grasses and fodder plants' paper.
1873
Important sown pasture grass of moist areas.
Scarcely naturalized. Useful in irrigated pastures.

Lotus australis
1871 Catalogue
Native shrublet. Of minor agricultural importance.

Lotus caniculatus
(bird foot)
1885
May = Lotus corniculatus - see below.

Lotus corniculatus
1871 Catalogue
= Trefoils, Lotus may = L. uliginosus. Sparingly naturalized in wet areas of S.A.

Lotus cytisoides
1871 Catalogue
A Mediterranean legume.

Lotus hirsutus
1871 Catalogue
May = Dorycnium hirsutum, a Mediterranean legume.
Not in S.A.
Lotus jacobaeus
1871 Catalogue

Marsilea macropus
(Nardoo)
1879
Native 'Nardoo.' like many ferns toxic in quantity
Several species native to seasonally wet areas of South
Australia.

Medicago arborea
1871 catalogue
Mediterranean shrub. Not used in agriculture.
Has been grown and tried.

Medicago falcata
1871 catalogue
A northern European biotype. Not used as such but
possibly of use in breeding lucerne. Not established
in S.A.

Medicago media
(pale flowered medic)
1885
Hybrid form, probably *M. falcata* x *M. sativa.*
(i.e. perennial lucerne form.)

Medicago sativa
(lucerne)
1871 catalogue
Lucerne = Alfalfa.
A most important legume, widely used in S.A.

Melica altissima
(tallest Melic grass)
1878 catalogue
Central European grass. Not established in S.A.

Melica ciliata
1886
Variable European grass. Not established in S.A.

Melica coerulea
1871 catalogue

Melilotus alba
(white melilot)
1873
Widely established in moister S.A. Of minor
importance as weed. Some significance in contaminat-
ing wheat.

Melilotus coerulea
1871 catalogue
May = *Trigonella caerulea,* legume cultivated in
Europe and widely naturalized
Melilotus lupulina
1873

Melilotus officinalis
Widespread in Europe, may be cultivated for forage.
1871 catalogue

Melilotus vulgaris
1873

Milium altissimum
1877

Milium effusum
Grows in moist areas of Europe. Not established in S.A.
1871 catalogue

Milium germamicum
1871 catalogue

Milium multiflorum
May = Piptatherum miliaceum. See below.
(many flowered millet grass)
1873.

'Minnesota Mammoth Rye'
Proved to be a true wheat

Onobrychis sativa
May = O. viciifolia. Widely cultivated for fodder in
(saintfroin or espersette)
Europe.
1888

Ornithopus perpusillus
Widespread in Europe. Trials here but not great
(seradella)
success so far.
1884

Ornithopus sativus
Widely cultivated in Europe for fodder.
(birdsfoot vetch)
1871 Catalogue
<table>
<thead>
<tr>
<th>Species</th>
<th>Notes</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Panicum album</em> (millet grass)</td>
<td>May = <em>Oplismenus burmannii</em>, widespread in tropical areas.</td>
<td>1889</td>
</tr>
<tr>
<td><em>Panicum capillaceum</em></td>
<td>This could be <em>P. capillare</em>, a minor weedy grass in S.A.</td>
<td>1876</td>
</tr>
<tr>
<td><em>Panicum ciliare</em></td>
<td>May be <em>Digitaria ciliaris</em>, a Crab grass, widespread in tropics, of minor use as a native grass.</td>
<td>1875</td>
</tr>
<tr>
<td><em>Panicum colonum</em></td>
<td>May = <em>Echinochloa colonum</em>, probably from Old World tropics. Of minor significance in S.A.</td>
<td>1886</td>
</tr>
<tr>
<td><em>Panicum crosc galli</em> (P. crus galli 1871)</td>
<td>May = <em>Echinochloa crus-galli</em> = Barnyard grass. Widespread summer grass in S.A. Of minor use as pasture, minor pest of orchards in River Murray area.</td>
<td>1873</td>
</tr>
<tr>
<td><em>Panicum germanicum</em></td>
<td>May = <em>Setaria italica</em> (Italian millet) an important millet.</td>
<td>1889</td>
</tr>
<tr>
<td><em>Panicum giganteum</em> (Guinea grass)</td>
<td>May = <em>P. maximum</em> = Guinea grass. Important tropical pasture grass. Used in Queensland.</td>
<td>1869</td>
</tr>
<tr>
<td><em>Panicum italicum</em></td>
<td>May = <em>Setaria italica</em>. Italian millet. Grown for summer forage under irrigation. Occurs as sporadic escapes. Once important Old World millet.</td>
<td>1889</td>
</tr>
<tr>
<td><em>Panicum jumentorum</em></td>
<td>1871 Catalogue</td>
<td></td>
</tr>
<tr>
<td><em>Panicum melananthum</em></td>
<td>May = <em>Panicum bisulcatum</em> from swampy Old World tropics.</td>
<td>1879</td>
</tr>
<tr>
<td><em>Panicum milioceum</em></td>
<td>See <em>Piptatherum</em> below.</td>
<td>1871 Catalogue</td>
</tr>
</tbody>
</table>
Panicum orygynum
1876

Panicum plicatum
fol. niv. vittatis
1871 Catalogue

Panicum sanguinale
May = *Setaria palmiflora*, grown as ornamental
grass, sometimes variegated.
1886

Panicum spectabile
(Phillips grass/
coapine of Angola)
1873

Panicum teneriffae
May = *Tricholaena teneriffae* of Southern Europe and
(panic grass) North Africa. Not established in S.A.
1873

Panicum tomentosum
May = *Setaria tomentosum* growing in damp, shady
1873

Paspalum ciliatum
May = *P. conjugatum* of northern South America.
1877

Paspalum dilatatum
= 'Paspalum', important grass in eastern states of Aust.
Paspalum dilatus- 1886
(Bastard millet grass) Minor use in S.A under irrigation. Nuisance weed of
1876

Paspalum elegans
1871 Catalogue

Paspalum platycaule
May = *Axonopus compressus*, a weedy tropic grass,
1889
not suited to S.A.

Pencillaria spicata
May = *Pennisetum glaucum* = *P. typhoideum*
(Egyptian /pearl millet)
= Pearl millet. Important cereal of dry tropic areas.
1879
Pennisetum. fimbriatum
(fimbriated pennisetum)
1867

P. longistylum = P. villosum. Widely established weedy grass of
1867 no agricultural value.

Pennisetum italicum May = Setaria italicæ, a millet
1876

Pennisetum villosum See under P. longistylum above.
1873

Pentzia virgata
1870

Perotus latifolia May = Perotis indica, widespread in Asian tropics.
1886

Phalaris americana May = Phalaris arundinacea, see below.
canary grass
1873

Phalaris arundinacea Reed Canary Grass. Grass of wet habitats not
1871 Catalogue established in S.A.

Phalaris canariensis Very occasionally grown - doubtfully naturalized.
('canary seed')
1873

Phleum fluitans
1877

Phleum pratense Timothy grass, of importance in temperate regions.
1871 Catalogue Rarely grown, rarely established.
\textit{Piptatherum. multiflorum} = \textit{P. mileaceum} Widely established weedy grass of roadsides, suburbs etc., not used in agriculture.

(falling awn in 1873)
(many flowered piptatherum in 1885)
1867

\textit{Piptatherum thomasii} Closely related and doubtfully distinct from above spp.
(millet grass)
(falling awn 1873)
1867

\textit{Plantago gnaphaloides}

\textit{Plantago lanceolata} Widespread weed of parks, gardens, paths, etc. While eaten and palatable it is not now planted.
(rib grass/plantain)
1873

\textit{Plantago major} Minor weed of wet sites.
rib grass/plantain.
1871 Catalogue

\textit{Plantago maritima} Minor weed of coastal and saline sites.
1871 Catalogue

\textit{Plantago media} Widespread in Europe but not used agriculturally.
1871 Catalogue
Not recognized in S.A.

\textit{Poa anceps}
1878

\textit{Poa fluitans} May = \textit{Glyceria fluitans}, palatable but semi-aquatic grass.
(watergrass)
1877

\textit{Poa nemoralis} Widespread in Europe. Not recognized in S.A. though may be used occasionally in shady lawns.
meadow grass
1871 catalogue
**Poa plumosa**
1871 catalogue

May = *Eragrostis amabilis* of East Indies.

**Poa praetensis**
(common meadow grass)
(Kentucky grass 1885)
1871 catalogue

Kentucky Blue grass. Used for lawns. Naturalized in cooler, wetter areas.

**Poa sempervirens**
1876

**Poa trivialis**
1871 catalogue

Not established in S.A.

**Poterium sanguisorba**
(small burnet)
1873

May = *Sanguisorba minor*. Palatable, variable, widespread in Europe. Naturalized in S.A.

Prairie grass - see
*Bromus unioloides*
by 1873

See above under *Bromus*.

**Reana luxurians**
(Téasinté)
1878

May = *Euchlaena mexicana* a grassy relative of maize.

**Red grass of Natal**
1875

**Red Imphe (millet)**
1879

see *Rottboellia exaltata*

**Rottboellia exaltata**
1886

From Tropical Asia. Widely used as green fodder.

Not grown in S.A.

**Rural branching dhura**
1883
Saccharum cylindricum  sugar grass  1877

Sheep parsley  'one of the varieties of common parsley  1884

Setaria glauca  May be = S. pumilia. Occasionally established in S.A.
1871 catalogue

1871 catalogue

Setaria viridis  Widespread weedy summer growing grass.
1871 catalogue

Setara macrochaeta
1871 catalogue

'smut grass'
from Florida - no botanical name
1880

Sorghum cernuum  May = S. bicolor.
(Brown Egyptian Corn or Dhoura in 1879 Report)
1871 catalogue

Sorghum nankinensis
1875

Sorghum saccharatum  May = S. bicolor.
(Farmer's friend
1871 catalogue
Sorghum vulgare
(white Egyptian corn
/Dhoura/
Indian millet)
1871 catalogue
May = S. bicolor.

Sporobolus indicus
1878 catalogue
= Rats-tail grass. Established weed of lawns, paths,
footpaths, etc.

Stenotaphrum complanatum
(buffalo grass)
1867
= Stenotaphrum secundatum. Used for lawns, sparingly
naturalized.

Stipa capillata/capitata
1871 catalogue
Native to southern Europe. Not established in S.A.

Stipa gigantea
1871 catalogue
Native to southern Europe. Not established in S.A.

Stipa tenacissima
esparto grass
1878 catalogue
Native to southern Europe. Not established in S.A.

Symphytum aspernum
(prickly comfrey)
1877
Comfrey. Has often been boosted but always failed.

Trichloena tenerifff
1871 catalogue
Not established in S.A.

Trichloena rosea
1875
May = Rhynchelytrum repens (Red Natal Grass).
See above.

Tritolium hybridum
(hybrid trefoil)
1871 catalogue
Rarely planted, not established. Useful in northern
Europe.

Tritolium incarnatum
1871 catalogue
Rarely planted, not established.
Trifolium medium
[1877]
Occasionally planted, not established.

Trifolium pratense
1871 catalogue
(clover)
Rarely planted, though important cool temperature legume; equally rarely established.

Trifolium repens
1871 catalogue
Important clover in moister areas, widely naturalized, weed in lawns etc.

Tripascum dactyloides
1878
Not established in S.A.

Triticum aestivum
wheat
Cereal wheat. Major crop.

varieties included:
Arctic 1877
Californian white 1879
Sherman 1879
Defiance 1879
Champlain 1879
Du Toit/Du Toits 1881
April or Twenty weeks 1881

Triticum ciliatum

Triticum scabrum
1879

Triticum polonicum
1877
Polish wheat. Not grown except in cereal collections.

Triticum repens
1871
May be Elymus repens. Twitch grass. Locally established can be a bad weed. The 'couch grass' of Europe.
'Watergrass'
tall grass to 7 ft.,
sent from
Manning River, N.S.W.
1879

*Zea mais* (maize)
Maize. Major world crop. Used for sweetcorn and forage in S.A.
1878 catalogue
Experimental Garden

This area, now used for the Classground, was used in Schomburgk's time for experimental plots of pasture grasses, forage plants and other useful plants. The Foreman's cottage, in the background, is now used for the North Lodge Shop. To the right of the cottage are the gates leading to Botanic Park. Photograph is c. 1873.
Chapter 6

SCIENTIFIC AND UTILITARIAN GARDENING

PART TWO: PULSES, PLANTS FOR OIL AND FIBRE, PERFUMERY, MEDICINAL AND CULINARY USE, AND FORESTRY.

PULSES

Pulses or grain legumes have played an important part in providing the protein requirements of a large part of the world's population. Their high protein content is related to their capacity to fix atmospheric nitrogen. The group includes such crops as *Lens culinaris* (lentil), *Pisum sativum* (pea), *Glycine max* (soy bean), *Cicer arietinum* (chickpea), *Vicia faba* (broad bean), *Vicia ervilia* (bitter vetch), *Vicia sativa* (common vetch), *Lathyrus sativus* (grass pea), *Trigonella foenum-graecum* (fenugreek), and *Lupinus spp.* (lupins).

*Cicer arietinum* (chickpea, Bengal gram)

Of the grain legumes chickpea has been one of the most important in terms of area occupied and quantity produced. Today it ranks third in the world's production of seed legumes. Important because of its nutritive value, chickpea, like lentil and pea, has provided an important meat substitute. Its seed contains 20-22% of crude protein and the amino acid profile of its protein complements that of cereals. Adapted to a warm Mediterranean-type climate it does not succeed in cool temperate regions.

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1 A world wide shortage of protein foods combined with an energy crisis leading to fertilizer shortage has led to increased interest in pulses in recent years.

2 The main producers are currently India, which produces about 80% of the world production, the countries around the Mediterranean, Ethiopia and South America. D. Zohary and Maria Hopf, *The domestication of plants in the New World*, p. 98; S. Ramanujam, 'Chickpea', in N. W. Simmonds (ed.), *Evolution of crop plants*, pp. 157-8.
Chickpea was one of the first pulses to be the subject of trials in the Schomburgk era. It is recorded in 1868 that chickpea or 'pois chiche' had been spoken of highly by the commissioners of the Paris Exhibition as a fodder plant for a dry climate and Schomburgk's colleague Frederick Waterhouse of the Museum had obtained seed from Texas, enabling some trials to be carried out. Schomburgk had some doubts as to its value as a fodder plant in South Australia, on the ground that it came 'from a more tropical country'. He later reported trials of 'gram' which did 'uncommonly well' in the Garden with a fair yield. It seems that he was referring to Cicer arietinum which was known as Bengal gram during this period. Schomburgk's 'gram' seed was provided by the Governor; once again vice-regal channels proving a useful source of plant material. Sir James Fergusson, Governor from 1869-73, had previously been Under-Secretary for India from 1866-7 and subsequently became Governor of New Zealand. Gram was described as valuable for horse-feed and

3 Report 1868, p. 2. Chickpea was in fact long-established as a crop in the Mediterranean region.

4 It is possible that the reference may have been to Dolichos uniflorus which is referred to as horse-grain plant in H. Drury, The useful plants of India; with notices of their chief value in commerce, medicine and the arts, 2nd edn.1873, reprinted Periodical Experts Book Agency, Delhi, 1978, p. 186; or to Phaseolus mungo (green gram) or black gram (apparently a form of P. mungo and also grown in India). In evidence given to the Royal Commission into Vegetable Products, third progress report, Melbourne, 1886, p. 27, a businessman, formerly living in India, referred to Dolichos biflorus as horse gram, saying it had recently been imported from India into Australia. In his paper 'Capabilities of the various districts of the colony' (1873), p. 115, Schomburgk refers to chickpea as the 'valuable East India pea'. In Plants under cultivation in the Government Botanic Garden, 1871 chickpea does appears as Cicer arietinum. Charles Moore, Director of the Sydney Botanic Garden referred in 1886 to gram being easily grown and valuable for horse-feed and for poultry, not grown to a great extent in N.S.W. but imported from India and the south of Europe.

5 Report 1870, p. 4.

a crop which had been favourably reviewed in the *Inglewood Advertiser*. Schomburgk advised that samples of the seed could be obtained from the Garden. He considered that crops such as gram, yellow lupin and maize could be grown with profit, yet 'with the exception of oats and barley, very little attempt has been made by our farmers to grow other grain for cattle.'

Although trials continue, *Cicer arietinum* has not become an important crop in South Australia. There is a small local market for imported seed. It is grown to a limited extent in northern N.S.W. and southern Queensland.

*Arachis hypogaea* ("ground or earth nut")

In 1872 Schomburgk was given seeds of the 'ground or earth nut' or peanut as we know it today, sent from New Zealand after Mr R. Ross of Highercombe exhibited some in the Agricultural and Horticultural Show. Ross served for a time on the Botanic Gardens Board; a knowledgeable member who made a considerable contribution to South Australian agriculture and horticulture and who would have provided a valuable link between politicians and horticulturists. He typifies the useful supporters that Schomburgk had in the local community. Ross had practical experience from his own property at Highercombe. He was active in the Royal Agricultural and Horticultural Society, becoming President for a period and serving on the wine committee and on the committee involved in the production of *The Garden and the Field*. He was a parliamentarian, serving as Speaker of the House of Assembly and as Treasurer in Colton's

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7 Schomburgk, 'Capabilities of the various districts of the colony', p. 111 and *Report* 1870, p. 4.
ministry during 1877, and supported the establishment of Roseworthy Agricultural College. He had the reputation of being someone who was willing to share his knowledge and ideas with other enthusiasts.\(^8\)

In attempting to grow groundnut, Ross and Schomburgk were promoting a plant that was rich in oil (43%) and protein (25-28%) and which is today grown all around the world in temperate and tropical regions, chiefly in the range 36°N and 36°S; Adelaide's latitude is 34°57'S.\(^9\) Schomburgk wrote that the plant grew well in sandy soil and was very productive and Professor Custance reported in 1886 that he had grown it successfully at Roseworthy College.\(^10\) There is an extensive local market today. Nevertheless, this species is only grown on a small scale or hobby basis in South Australia. It is a valuable crop in Queensland and the Northern Territory.

\textit{Lens culinaris} (lentil)

Lentil was proposed as a crop by the Director in his 1873 paper to the Chamber of Manufactures. He described it as little known at that time in England but grown from Biblical times, and in the nineteenth century known on the Continent as a profitable crop which would thrive even in poor, stony soils. On this occasion Schomburgk quoted R. Wynne's account in the \textit{Journal of the Agricultural Society of New


\(^10\) \textit{Royal Commission into vegetable products}, second progress report, p. 73.
South Wales which recommended the plant for extensive planting around Sydney. Lentil was promoted as invalid food and Schomburgk remarked that large quantities were imported by the German merchants in South Australia so there should be a good market for the product. In his last Annual Report, that of 1889, Schomburgk commented again on the value of lentil, particularly because of the nutritious value of the 'straw' it produced, and observed that it 'is deserving of more attention than has been paid to it hitherto by farmers, and it will grow on very poor soil.'

Lentil has been used as a companion plant in wheat and barley cultivation in Mediterranean agriculture. It has provided a major source of protein in the belt from north-western India to Spain and North Africa. Although yields are not high (about 50-150 kg/ha), lentil is one of the most tasty and nutritious pulses and can provide an important meat substitute. Despite long continued trials and a small but steady local market, lentil is not widely grown in South Australia. Renewed interest in recent years has seen some crops grown.

Vicia species

Vetch, along with gram, yellow lupin and maize, was one of the crops proposed for cattle fodder in the paper given to the Chamber of Manufactures in 1873. Vetch has been used since Roman times as an

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11 Schomburgk, 'Capabilities of the various districts of the colony', p. 112.


13 In view of its tastiness and high quality protein there is interest today in increasing yields and providing strains suitable for mechanical harvesting. D. Zohary, 'Lentil' in Evolution of crop plants, pp. 163-4.
animal crop but its bitter taste makes it unsuitable for human consumption. Vetches are for the most part annuals and are useful for cover, green manure, and soil improvement, as well as for hay, pasture and ensilage. Schomburgk made no more specific reference than his general recommendation about vetches in the 1873 paper and no particular types are recorded amongst his trials.

While Vicia species (other than Vicia faba) have been grown successfully in South Australia, limited market for their seeds has resulted in virtually no further development, except for a few crops for forage. In the last twenty years Vicia faba has been successfully developed, especially since the introduction of appropriate cultivars from the Mediterranean, and there are now many hectares of Vicia species grown in the cereal areas.

Lupinus (lupin)
Prominent among the lupins are white lupin (L. albus), yellow lupin (L. luteus) and the narrow leafed lupin (L. angustifolius). Vigorous in their growth, lupins can tolerate poor soil and produce large, easily harvested seed. They have been used as grain foods, as animal forage, for soil improvement and for ornament. However, the use of lupin is complicated by the fact that it generally contains bitter alkaloids which are difficult to remove. In the past there have been efforts to remove these by boiling or steeping in water, while in Peru lupins are reported to have been grown as a bitter hedge plant to discourage

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grazing.\textsuperscript{15} Yellow lupin \textit{(L. luteus)}, with its aromatic yellow flowers, was popular as an ornamental plant in England in the seventeenth and eighteenth centuries and was grown on the Baltic Coast for grain and forage.\textsuperscript{16} It was one of the crops proposed by Schomburgk in his paper to the Chamber of Manufactures in 1873. As in the case of vetches there is no specific information about types of lupins being given trials by Schomburgk.

Except on special acid sandy soils in the south-east, lupins have not been successful in South Australia in the way they have in, say, Western Australia. Much of the area climatically suitable for lupins has heavy, alkaline soil which does not suit lupins. However, interest persists and the selection of alkaloid free forms ('sweet lupin') has also been important.

\textit{Prosopis pubescens} (screw bean or mesquite bean) and \textit{Prosopis juliflora}

In 1877, Sir Joseph Hooker of the Royal Botanic Gardens, Kew, sent Schomburgk about 8 pounds (just under 4 kg) of \textit{Prosopis pubescens}, which was described as a 'new and useful vegetable product suitable to warm and dry climates'. Schomburgk also received seeds of \textit{Prosopis juliflora} from a Jamaican contact. The bean was used for animal fodder in addition to being a source of a gum said to be suitable for both 'medical and technical' purposes, providing a material for paste and jubes. Schomburgk received mixed reports

\textsuperscript{15} Increased use of lupins would involve selection for non-bitter seed as they have further potential as a protein source. Zohary and Hopf, \textit{The domestication of plants in the New World}, p. 111.

\textsuperscript{16} P. M. Smith, Minor crops, in \textit{Evolution of crop plants}, pp. 312-3.
about it. In areas such as Colorado, U.S.A., it was said to provide a valued source of fodder for horses and cattle. However, a report sent from Jamaica to Kew advised using the bean with caution as both *Prosopis pubescens* and *Prosopis juliflora* could produce death in horses.\(^{17}\) Tree legumes, such as mesquite, honey locust or carob, are valuable in reducing the risk of soil erosion and once established the tree or bush provides a long term source of fodder.\(^{18}\) *Prosopis juliflora* was described by a Texan correspondent of Schomburgk as very hardy in times of drought and useful as a shade tree in stockpens.\(^{19}\) By 1878, Schomburgk observed that while the South Australian climate did not appear to suit *Prosopis pubescens* he was having success with the Jamaican *Prosopis juliflora*. Specimens planted the previous year had grown to about six feet (about 183 cm).\(^{20}\) The following year seeds were made available for distribution.\(^{21}\)

*Prosopis* has become locally established in areas of South Australia, Western Australia and Queensland. In arid areas it forms impenetrable thickets - every effort is being made to exterminate it in this State.

**Glycine max** (soybean) syn. *G. soya, G. hispida, Soya max*

In 1884, Schomburgk referred to trials of soybean, commenting that the bean could be eaten in its green state or made into a sauce. His

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\(^{17}\) *Report* 1877, p. 4.


\(^{19}\) *Report* 1879, p. 5.

\(^{20}\) *Report* 1878, p. 5.

\(^{21}\) *Report* 1879, p. 5.
first trials were not successful; the seeds either not germinating or failing to thrive. He intended to try again but there were no further references to it.  

Soybean is now established as a crop in northern New South Wales and in Queensland. It remains a most important legume with many uses but seems unlikely to be grown commercially in South Australia.

*Lathyrus tingitanus* (Tangir or Tangier pea), *Cajanus cajan* (pigeon pea), *Lathyrus sativus* (grass pea)

During the Schomburgk era there were no recorded trials of the common pea (*Pisum sativum*) - a species which would already have been known to many settlers. However, there were trials of three peas used as forage crops. Plants in this group for which trials are recorded in the period 1865-90 are Tangir pea (*Lathyrus tingitanus*), pigeon pea (*Cajanus cajan*), the East India pea (for which no botanical name was given in Reports) and the wood lathyrus or flat pea (*Lathyrus sylvestris*). The grass pea or chickling vetch (*Lathyrus sativus*) is a minor pulse crop of traditional agriculture in the Mediterranean basin, south-west Asia, Ethiopia and north-western parts of the Indian subcontinent; India being the main producer today. Mostly used as an animal feed, *Lathyrus sativus* is a useful crop in view of its ability to grow in dry places and in poor soils.  

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22 *Report* 1884, p. 8. Soy bean is now known to be very site specific and especially latitude specific; for successful cultivation a variety would be needed to suit local conditions. R. Wesley Smith, Dept. of Primary Industry and Fisheries, Northern Territory of Australia, personal communication.

In 1883, Sir Joseph Hooker sent Schomburgk seeds of a fodder plant known as the Tangir pea (*Lathyrus tingitanus*), an annual crop from Northern Africa, said to be nutritious for cattle. Pigeon Pea, *Cajanus cajan*, mentioned by Schomburgk in the 1885 *Report*, was described as a leguminous shrub, producing pods and peas, native to India and largely cultivated in tropical countries. The Director had 'no hesitation' in recommending it for the Adelaide plains. It is a hardy plant which is now thought to be best adapted to tropical grassland and arid regions. Today, grown almost entirely on poor land by small farmers, it is found primarily in India, but also in the Caribbean, south-east Asia, Pakistan, Malawi and Uganda. It is also used as a forage crop in the south-eastern U.S.A., Italy, Hawaii and north-western Australia.

In 1889, in Schomburgk's last Annual Report, there was an enthusiastic account of a new fodder plant, the wood lathyrus or flat pea, *Lathyrus sylvestris*. He had received seeds of the plant, together with a report about it, from the Director of a German agricultural college at Poppelsdorf near Bonn, after the *Register* newspaper reprinted a glowing report about this crop, originally published in the *North British Agriculturist*. The *Register* observed that farmers might feel cautious on reading reports of a wonderful new forage plant which was said to produce excellent crops on even the poorest soils, but, given the nutritious nature of the crop and the recent

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24 *Report* 1883, p. 4.


26 It was said to yield a crop of at least 4 tons of hay per acre and that 'the nutritious value of the crop, as determined by chemical analysis, is about twice that of clover hay', *Report* 1889, p. 5.
subsidies paid to growers by the Prussian Government, local farmers should certainly experiment with it.

*Cajanus* is regarded today as climatically unsuitable for South Australian dry-land agriculture and seems unlikely to be successful here. Both species of *Lathyrus* can be grown but, like *Vicia*, there is limited use for the seed. However, a place might be found in stock feeds.

*Dolichos species*
There is a brief mention of another leguminous fodder plant, *Dolichos*, in the period under study. Schomburgk had seeds of *Dolichos unguiculatus* in 1889, apparently in a collection of seeds that came from the Agricultural Bureau.27

*Dolichos* is regarded today as climatically unsuitable for South Australian dry-land agriculture and seems unlikely to be successful here.

It should be noted that in trials of pulses, as with other species, plants were not individually watered since this would not be practical for farmers. Schomburgk commented that plants had to have the capacity to survive the summer months with a minimum of care.

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27 One of the better known species of dolichos today is the Lablab, hyacinth bean or bonavist bean (*Dolichos lablab*), an important legume in tropical countries which is being used in the Northern Territory. Both pods and seeds are edible and the plant is also used for hay and forage, chiefly for horses and cattle. Hill, *Economic Botany*, p. 343, *Anote*; Dept of Primary Industries and Fisheries, Northern Territory, 181, Oct. 1985.
SUMMARY OF PULSES REPORTED BY SCHOMBURGK 1865-1891

[excludes any fodder plants in list in Chapter 5]

[Date indicates first time a species is mentioned in Annual Reports or other publications of Schomburgk.]

**NAME**  
*Arachis hypogaea*  
(ground nut)  
1872

**COMMENT ON PRESENT USE**  
Major world legume crop. Rarely grown in S.A. but important in southern Queensland, northern N.S.W. and the Northern Territory.

*Cajanus cajan*  
(pigeon pea)  
1885

Grown in tropical Australia. Not suited climatically to S.A.

*Cicer arietinum*  
(chickpea, gram)  
1868

Also known as garbanzo. Important world legume crop. Trials continue in southern Australia.

*Dolichos anguicalatus*  
[Dolichos unguiculatus]  
(dolichos)  
1889


*Lathyrus sylvestris*  
(wood lathyrus or flat pea)  
1889

Climbing ornamental perennial, not grown agriculturally.

*Lathyrus tingitanus*  
(Tangier pea)  
1883

Colourful weed in Mt Lofty hills area.

*Lens culinaris*  
(lentil)  
1873

Major world crop. Little grown in S.A. but trials continue.

*Lupinus*  
(lupin)  
1873

Important crop in W.A. Has not done so well in S.A. (possibly due to local soils). Trials and tests continue and some crops grown in S.E. of S.A.
**Prosopis juliflora** 1877

Pernicious weed. Every effort is being made to eradicate it.

**Prosopis pubescens**
(screw or mesquite bean)
1877

As above.

**Soja hispida [Glycine max]**
(Soja bean/soybean)
1884

Grown in N.S.W. and Qld. Major world legume, unlikely to suit S.A.

**Vicia species**
(vetch)
1873

Some species grow well and are naturalized, e.g. *V. sativa*. Yields good but limited market.

[In this chapter, as in Chapter 5, information on the present status of crops has been provided by David Symon, former staff member of the Waite Agricultural Research Institute, University of Adelaide.]

**PLANTS FOR OIL AND FIBRE**

This group includes such plants as cotton, flax, false flax, poppy, hemp, and sesame. In the nineteenth century plant oils were used in lamps, in soap-making, and also as lubricants for machinery - a role which has now largely been taken over by mineral oils. As foodstuffs, plant oils provide concentrated food which is easy to store from one harvest to the next and together with animal fats they form an important group in human nutrition. Oil-yielding plants are amongst the earliest considered for their utilitarian value in the Annual Reports.
The olive (*Olea europaea*), important in both history and modern commerce\(^{28}\), will be considered in a separate section on plants for orchard and vineyard.

*Helianthus annuus* (sunflower)

The first oil-yielding plant to be mentioned is the common sunflower, referred to in a paper given to the Philosophical Society in December 1868. On this occasion, Schomburgk referred to articles in horticultural and agricultural journals newly arrived from Germany describing how the common sunflower (*Helianthus annuus*) had become an important commercial crop in Russia and Germany. Schomburgk noted that the sunflower had been introduced into Europe some two hundred years earlier but had only recently become a product of commercial importance\(^{29}\). As well as being used in homes it was also used as a lubricator for the delicate machinery which produced textile fabrics. There were useful by-products from the sunflower. Oil-cakes could be produced for cattle, there was excellent feed for poultry and pigs from the seeds and the leaves were valuable for manure\(^{30}\). Sunflower production had been recommended by W. T. Teapitt in the *Journal of the Agricultural Society of N.S.W.* , who noted that while much attention was being given to cane and beet for sugar production, sunflower production might be a more suitable crop for small farmers. Teapitt had promoted the cultivation of the sunflower among farmers in the vicinity of Orange, New South Wales, on the basis that the sunflower

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\(^{29}\) By 1866 it was said that 100,000 cwt. (5100 tonnes) of sunflower oil was being produced in Russia; Schomburgk indicated that this was per annum.

\(^{30}\) He also mentioned 'potash' as a bi-product but it is not clear what he meant.
was hardy, could tolerate a variety of soils and was convenient to harvest. In addition it could be processed by machinery which Teapitt believed was simple and effective. A factory in Melbourne could process oil seeds.

Recommending trials of sunflower in his 1868 Report, the Director acknowledged criticism in one of the German newspapers in the colony that sunflower would not be profitable in South Australia. He believed that since it tolerated a variety of soils and was suited to the South Australian climate there should be trials on a limited basis, beginning, like the Russians, in 'nooks and corners', and the results then discussed in Farmers Clubs. Sunflower did have a tendency to exhaust the soil but this could be remedied by manuring. Sunflower cultivation was mentioned again in 1884 in the paper 'Plants which are recommended to be grown in conjunction with wheat cultivation' - included as an Appendix to the 1884 Report. His promotion of sunflower as a profitable crop was supported in 1886 by Professor Custance of Roseworthy College who thought that 40-50 bushels per acre could be produced. This could yield up to £15 an acre.

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31 Teapitt’s letter was quoted by Schomburgk in ‘On the cultivation of the sunflower’, Paper read before the Philosophical Society on 1 December 1868. It appears that the letter appeared in Journal of the Agricultural Society of N.S.W. 1868, vol. 1, no. 1 [original not seen].


33 Professor Custance told the Victorian Royal Commission into Vegetable Products that a gallon of oil could be produced per bushel, and the commissioners suggested that even at 6/- a gallon this would be very profitable, Royal Commission on vegetable products, second progress report, pp. 82-3.
Sunflower has become an important world crop and is grown extensively in Australia. It is a minor crop in South Australia, grown mainly in the south-east of the State. It is also a minor weed in the Murray region.

*Ricinus* (castor oil plant)

Schomburgk strongly recommended the planting of 'ricinus' (probably referring to *Ricinus communis*). Considerable amounts of castor oil were imported yet he believed it could be manufactured in South Australia. One local manufacturer used £300-£400 worth of ricinus oil as a lubricant for machines and engines annually and it was also used extensively for medical purposes. *Ricinus* grew well in quite poor soil, needing little care once planted. Although the plant was often regarded as just a nuisance he believed that the seed, 'worth 10-12 shillings a hundredweight' (about 51 kg), could be picked by children to earn extra money. Schomburgk mentioned *Ricinus* again in 1884 as a 'much neglected tree' which, while widespread in the colony, was not receiving very much attention. His views on *Ricinus* were echoed by Professor Custance of Roseworthy College who had obtained two kinds of seeds from India. Custance found it easy to grow and was positive about ricinus as a commercial prospect.

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34 *Report* 1869, p. 4; R. Schomburgk, 'Capabilities of the various districts of the colony', p. 110; *Report* 1884, p. 21.


36 Custance noted that in Kansas 361,386 bushels had been obtained from 24,145 acres, *Royal Commission into vegetable products, second progress report*, p. 73.
Although castor oil is an important crop on a world-wide basis\textsuperscript{37} it has never become commercially viable in South Australia. It was grown for ornamental purposes and is a minor weed in many areas.

*B\textit{rassica} spp. (including rape and mustard)*

The potential of rape (*B\textit{rassica napus}*), was discussed by Schomburgk in his 1873 paper to the Chamber of Manufactures. Oil from rape seed could be used for fuel, cooking and as a lubricant. He would have been familiar with rape crops in his native Saxony. He observed that rape seed oil brought high prices in Europe because Continental crops were sometimes affected by frost and snow, a low risk factor in most of South Australia. However, he feared that rape might be damaged by *aphis*\textsuperscript{38} His remarks were repeated in 1880\textsuperscript{39} In 1884 there was a report of seed brought back from India by Henry Scott, who had been Commissioner for South Australia at the Calcutta Exhibition\textsuperscript{40} Scott, a local businessman with pastoral interests, was active in civic affairs in South Australia and a valuable ally for Schomburgk; the link between the two men will be further examined in Chapter 8.

By 1885 trials had been successful, with *aphis* posing no special problem. The crop survived three particularly hot summers so that by

\begin{flushright}
\textsuperscript{37} In the twentieth century the importance of castor oil as a lubricant is partly due to the fact that its viscosity varies little with temperature and it is one of the best lubricants for high-speed engines. It is today grown commercially in India, Brazil, U.S.A., U.S.S.R. and China. Dharampal Singh, 'Castor' in *Evolution of crop plants*, p. 84.

\textsuperscript{38} 'Capabilities of the various districts of the colony', p. 110.

\textsuperscript{39} Appendix to *Report* 1880, p. 16.

\textsuperscript{40} *Report* 1884, p. 8.
\end{flushright}
1887 the Director could describe rape as a crop which could be grown profitably in the colony.\textsuperscript{41}

A large quantity of mustard was imported into South Australia and Schomburgk considered that mustard might prove a worthwhile crop.\textsuperscript{42} As with rape, he expressed concern as to whether plants could withstand aphis, 'the pest of the Colony', but added that Australia was 'the land of anomalies' and his fears might be premature.\textsuperscript{43} Twelve years later, he could report that the plants were doing well, had survived several particularly dry years and aphis were not a great problem. By 1887 a 'mustard manufactory' had been established and the crop appeared to have some potential.\textsuperscript{44} Schomburgk showed a tin of mustard and a bottle of mustard oil made at the Waverley Vinegar Company to the Select Committee on Vegetable Products.\textsuperscript{45}

Mustard has continued to be an important spice, today the most important spice in the world in quantity terms and only exceeded by pepper in value terms. It also has medicinal use and the oil can be used in soap-making and as a lubricant so that it would have been a versatile and valuable crop to produce in colonial South Australia. Although the main areas of production are today in North America,

\textsuperscript{41} Report 1885, p. 7 and Report 1887, p. 7.

\textsuperscript{42} There are four species relevant here, Sinapis alba (white mustard), Brassica juncea (brown mustard), Brassica nigra (black mustard) and Brassica carinata (Ethiopian mustard).

\textsuperscript{43} 'Capabilities of the various districts of the colony', p. 109.

\textsuperscript{44} Report 1885, p. 7 and Report 1885, p. 7.

\textsuperscript{45} Report of the Select Committee on Vegetable Products, p. 7.
mustard is grown in Australia for domestic consumption.\textsuperscript{46} Despite long continued trials, \textit{Brassica} as a field crop (that is not in horticulture) has only recently become a minor crop in South Australia, mainly in the south-east.

\textit{Papaver somniferum} (opium poppy)

The opium poppy, an annual herb, is grown as a crop for two purposes: first, as a source of opium and secondly, for its seeds which are rich in oil. The oil is used for both culinary and for industrial purposes; cold pressing yielding an edible oil and second (hot) pressing yielding an oil suitable for lamps, soap and paints.\textsuperscript{47} The use of opium as a medicine and as a narcotic is of great antiquity, in particular it was valued for its pain-relieving characteristics.\textsuperscript{48} The first reference to this crop by Schomburgk was in 1872 when he was distributing seed and promoting the crop as appropriate for the South Australian climate and soil. A good sample of opium had been exhibited in one of the local Agricultural shows.\textsuperscript{49} Schomburgk noted that in Victoria alone opium to the value of £94,451 had been imported. He commented that cultivation and manufacture could be carried out by young people and since the return on poppy culture, whether for oil or opium, was within a few months, it was an attractive economic proposition.\textsuperscript{50}

\textsuperscript{46} J. S. Hemingway, 'Mustards' in \textit{Evolution of crop plants}, p. 56; Hill, \textit{Economic Botany}, p. 459. Plants in this group are grown as an oil crop, particularly in the Indian sub-continent.

\textsuperscript{47} Hill, \textit{Economic Botany}, p. 197.


\textsuperscript{49} \textit{Report} 1872, p. 6. This exhibit was by Schomburgk's colleague, Mr G. Francis. (This man seems not to be related to the first Director).

\textsuperscript{50} \textit{ibid.} He based his figures on the Customs returns for Victoria.
There is a further reference to successful trials of this crop some fourteen years later in 1884-5 when it was reported that seeds of opium poppy had been brought to South Australia by Henry Scott from the Calcutta Exhibition along with other seeds.\textsuperscript{51} The crop was promoted again in 1887 as a profitable one for the colony.\textsuperscript{52}

*Papaver somniferum* has not become established as a crop in South Australia although it is grown as a drug crop, under close supervision, in Tasmania. A closely related species is a minor weed in South Australia.

*Linum usitatissimum* (flax)

An annual plant grown for both its oil and fibre and cultivated since prehistoric times, flax was grown at the Botanic Gardens during the period under study. Flax was the principal oil and fibre source in the Old World. Primarily a crop of temperate regions, flax adapts to a variety of climatic conditions but requires a soil rich in moisture and organic matter. Until recently it was extensively cultivated in a region from the Atlantic coast of Europe to Russia and India and down to Ethiopia in east Africa. The seed contains about 40 per cent oil, providing linseed oil, an edible drying oil. The residue after oil extraction provides high protein feed for cattle. In peasant communities linseed oil has been used as a source of edible oil and high grade lighting oil and, given the versatility of the crop, it is not surprising that it was used extensively in frontier life for individual

\textsuperscript{51} It is possible that when seeds of the plant had been distributed earlier, about 1872, there had not been trials at the Botanic Garden.

\textsuperscript{52} *Report* 1884, p. 8; *Report* 1885, p. 7; *Report* 1887, p. 7.
families and self-supporting communities in the United States. Nevertheless flax is not an easy crop to grow; ideally requiring good soil preparation, crop rotation and experience as to when and how to harvest. Authorities in a number of places in Australia made special efforts to encourage flax-growing in the nineteenth century. Early issues of *The Garden and the Field* in 1875 indicate some of the promotion which was occurring; for example an intercolonial flax-harvesting machinery competition in which sponsorship came from the South Australian Chamber of Manufactures, the Royal Agricultural Society of South Australia and the Department of Agriculture in Victoria. Flax production for fibre purposes will be discussed further in the section below on oil-producing plants.

*Sesamum indicum* (sesame)

Sesame seed was one of the seeds brought back to Adelaide from the Calcutta Exhibition by Henry Scott. *Sesamum indicum* is a traditional warm season crop of south-west Asia and the Mediterranean basin, its oil valued for its quality of keeping fresh for a long time without turning rancid. Schomburgk noted in 1884 that the oil was popular in India where it was grown extensively. Although he had tried seed from various sources over a period of some years, seed had never germinated. He successfully germinated one batch of seed obtained

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54 For example, *The Garden and the Field*, vol. I, 24 August and 7 September 1875.

55 The domestication of plants in the New World, p. 126.

56 Report 1884, p. 8. Today sesame is regarded as more suitable for hot, dry tropics with an annual rainfall of 500-1100 mm. It is grown in Africa, Asia and parts of Latin America and currently is being promoted as suitable for parts of the Northern Territory, crops being grown successfully in the Katherine and Douglas Daly districts. D. Parker et. al. in 'Growing sesame in the Northern Territory' *Agnote*,
from the Secretary of the Agricultural Society in Madras, growing the seed in 1885, but concluded in 1888 that 'the Indian oily grain' was not suitable for South Australian conditions. Sesame has never been established as a crop in this State.

*Lallemantia iberica*

Seeds of this oil-producing plant, 'a native of the Orient and Syria', newly introduced into Germany from Russia, were received during 1882, but the plant is not mentioned in later Reports. It is a labiate annual or biennial with aromatic leaves. It has never been established as a crop in this State.

**SUMMARY OF OIL CROP PLANTS MENTIONED BY SCHOMBURGK**

[Date indicates first time a species is mentioned in Annual Reports or other publications of Schomburgk.]

<table>
<thead>
<tr>
<th>NAME</th>
<th>COMMENT ON PRESENT USE</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Brassica spp.</em> (rape and mustard) 1873</td>
<td>Despite continued trials <em>Brassica</em> has only recently been established as a minor field crop in S.A. - mainly in the south-east of S.A.</td>
</tr>
<tr>
<td><em>Helianthus annuus</em> (sunflower) 1868</td>
<td>Has become an important world crop now grown extensively in Australia. A minor crop in S.A. - mainly in the south-east. It is also a minor weed in the Murray region.</td>
</tr>
<tr>
<td><em>Linum usitatissimum</em> (flax) 1868</td>
<td>Flax and linseed have never been important crops in S.A. There was an upsurge in flax fibre production during World War II and flax (linseed) is occasionally grown.</td>
</tr>
</tbody>
</table>

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Dept. of Industries and Development, No. 233, Feb. 1987. Information also supplied by George Brown, Director, Darwin Botanic Gardens, N.T.

57 *Report* 1888, p. 6; D. Parker et. al. in 'Growing sesame in the Northern Territory'.

58 *Report* 1882, p. 5.
Lallemantia iberica 1882
A labiate annual or biennial with aromatic leaves.
Never established as a crop in S.A.

Olea europaea (olive) 1871
See under section on plants for orchard and vineyard.

Papaver somniferum (opium poppy) 1872
Has never become established as a crop in S.A. Grown in Tasmania. A close relative is a minor weed in S.A.

Ricinus spp. (castor oil plant) 1869
Has never become a crop in S.A. Minor weed in many areas.

Sesamum indicum sesame 1880
Never established as a crop in S.A.

PLANTS WHICH COULD BE USED FOR FIBRE

Within the group of plants used for oil and fibre there are some which yield both products, such as flax, and some which would be used for fibre production alone. Although all but the simplest plants contain fibres, few plants contain fibres of economic importance. Plant fibres which are used in this way include seed hairs and the hairs of the inner walls of fruit (as found in kapok and cotton), leaf fibres (as in sisal, Manila hemp, Phormium tenax or New Zealand flax), fibres from the inner bast tissue or bark of the stem (as in flax, jute, ramie and hemp), woody fibres used in paper-making, and a miscellaneous group which would include fibre from the husk of fruit as used in coir. Vegetable fibres are used for textiles, cordage fibres, stuffing and upholstery materials, paper-making, brushes and mats, and there
are miscellaneous uses such as in hats, baskets and raffia.\textsuperscript{59} Synthetic fibres were not produced before the 1890s so that in the period under study fibres had to be produced from natural sources.\textsuperscript{60}

In the 1870s and 1880s there was considerable interest in the commercial possibilities of fibre-yielding plants in colonial Australia. Botanic gardens were actively involved in trials.\textsuperscript{61} Schomburgk quickly rejected cotton as a viable crop, although excited by its potential as a crop in the area around Darwin, and began investigating other kinds of fibres.

\textit{Boehmeria nivea} (Chinese grass-cloth, rhea fibre plant or ramie)

Some of the first experiments were with Chinese grass-cloth or Rhea fibre plant (\textit{Boehmeria nivea}), a native of China, Japan and the Malayan peninsula, introduced into Europe in the eighteenth century.\textsuperscript{62} Schomburgk was soon of the opinion that this plant was not of real commercial potential in South Australia. It did not grow vigorously and produced only one crop a year.\textsuperscript{63} Today \textit{Boehmeria nivea} is regarded as being more suitable for temperate or sub-tropical regions where there is a cold season rather than for the tropics. Nevertheless, it is not an easy crop to grow and requires fairly rich


\textsuperscript{60} Edlin, \textit{Man and plants}, p. 200.

\textsuperscript{61} Guilfoyle in Melbourne was particularly active in experiments with fibres and fibre processing.

\textsuperscript{62} Kirby, \textit{Vegetable Fibres}, pp. 148-149.

\textsuperscript{63} \textit{Report 1877}, p. 7.
soil and rainfall throughout the year\textsuperscript{64} which would have made for poor yields in most of South Australia. Schomburgk recommended that there be trials of the plant in Darwin where he believed an experimental garden would soon be established. By 1870 he had received discouraging reports from Walter Hill, Director of the Brisbane Botanic Garden who stated that although \textit{Boehmeria} grew well, no one had been able to prepare it successfully for manufacturing purposes.\textsuperscript{65} In 1888 Schomburgk reported that the offer of a reward by the Indian Government had led to an improved processing method being developed. He hoped that this might lead to successful \textit{Boehmeria} fibre production in the Northern Territory and the new irrigation areas of Mildura and Renmark on the River Murray, with the plant growing 'as luxuriantly as it does in other sub-tropical countries'.\textsuperscript{66}

Despite his enthusiasm, in the long term \textit{Boehmeria} did not prove to be a successful crop in Australia.

\textit{Linum usitatissimum} (flax)

Flax has already been discussed in relation to its oil-producing qualities. Fibre produced from flax is stronger than that of cotton or wool, and linen cloths have special qualities of strength and durability as well as special qualities relating to water absorption and drying. Flax fibre is used in linen thread and fabric, canvas, carpets, fishing lines and paper products. However the processing of

\textsuperscript{64} Kirby, \textit{Vegetable Fibres}, pp. 148-152.

\textsuperscript{65} Hill's comments can be found in \textit{Report of the Brisbane Botanic Garden} 1868, p. 2, and 1868-9, p. 2.

\textsuperscript{66} \textit{Report} 1888, p. 7.
flax is more difficult than that of cotton. From the time of the Industrial Revolution flax came to be gradually replaced by cotton and, more recently, has been almost completely replaced by cotton and synthetic fibres.

We have seen that flax-growing was supported by such organizations as the South Australian Chamber of Manufactures, the Royal Agricultural Society of South Australia and the Department of Agriculture in Victoria. Support had also been given by Rev. T. J. Smith of Kapunda and Messrs Wills and Co. had offered a premium for the first ton. In 1870 Schomburgk received 'white line' seeds from a white-flowering flax from East India, sent by Lieut. Col. A. Crawford from Tasmania. Once this grew successfully he distributed the resulting seed to growers. The 1870 Report recorded that there was a good reaction to South Australian flax on the English markets and that 'farmers in the district of Gumeracka (sic) are following the good example set by farmers in the south'. Nevertheless, the Director observed correctly that 'the task of introducing a new branch of industry is not an easy one and wants time'.

In 1886 Professor Custance of Roseworthy College continued the promotion of flax-growing. He asserted that it grew easily, quoting a yield of one and a half tons per acre, but thought that it was not much grown because farmers could not find a market for the straw.

67 Flax production in Britain reached a peak in the 1860s. A. Durant, 'Flax and linseed', in Evolution of crop plants, pp. 190-2.


69 Report 1868, p. 2.
whereas in England straw could be sold to paper manufacturers.\textsuperscript{70} Custance reported that while there should be a market in Britain for the seed, just as there was for wheat, very little flax was being grown in South Australia. Premiums offered by the government had never been claimed.\textsuperscript{71}

Flax was grown during the second World War in South Australia as part of the war effort but while there are some crops today there is no large-scale production.

*Phormium tenax* (New Zealand flax)

There were also attempts to grow *Phormium tenax*, which the Director recommended 'if only for domestic purposes'. *Phormium tenax* requires a rich, moist, well-drained soil.\textsuperscript{72} More profitable crops could be grown on soil rich enough to grow this species. *Phormium tenax* is used today by market gardeners to tie up bunches of vegetables and in addition is used as an ornamental plant with increasing numbers of cultivars becoming available.

*Cannabis sativa* (hemp) and *Crotalaria juncea* (sunn-hemp or sann hemp)

Amongst the species grown in the Experimental Garden were some fibre-producing plants used in the production of rope. Schomburgk referred to sunn hemp or sann hemp (*Crotalaria juncea*) in 1870 as a

\textsuperscript{70} An Ely manufacturer in Britain was prepared to take 1000 tons of flax straw @ £4 10s per ton, *Royal Commission into vegetable products, second progress report*, p. 73.

\textsuperscript{71} Custance thought that as a rough estimate 32 bushels of flax might be produced per acre.

\textsuperscript{72} Kirby, *Vegetable Fibres*, p. 291.
substitute for common hemp (*Cannabis sativa*). Cannabin *Cannabis sativa* is today grown for fibre, obtained from the plant stems; for its seed, containing about 30 percent oil; and also for the narcotic drug cannabis made from its resinous exudate. Schomburgk promoted common hemp both on the basis that the hemp plant 'will grow in almost any soil, and could probably be grown throughout the Colony with profit' and also that both fibre and seed bought a good price overseas. Seed brought £2 4s 0d to £2 8s 0d per cwt. and was much in demand in Europe. He noted that in the nine months prior to his report 1,050 tons of cordage and rope had been imported. Today with hemp so much associated with the narcotic drug trade it is often forgotten that hemp has been been grown from very early times as a source of fibre for ropes. It produces a particularly strong, durable product. Crops can be used, as they are in India, for fodder and green manure. It is currently illegal to grow cannabis as crop.

*Crotalaria juncea*, which does best under conditions of moderate rainfall, is today grown in India. It is not considered a suitable crop for South Australia.

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73 Report 1870, p.4. The tall annual which we know as hemp (*Cannabis sativa*) is an ancient crop plant providing a fibre, a psychotomimetic drug, a minor food and a fixed oil from its seeds. The narcotic qualities were recognized in India by 1000 B.C. The drug appears to have been introduced to Western medicine about 1840. 'Hemp' in *Evolution of crop plants*, p. 203.

74 Schomburgk, 'Capabilities of the various districts of the colony', p. 106.

75 Smith, 'Minor crops', in *Evolution of crop plants*, p. 311.

76 Kirby, *Vegetable Fibres - Botany, Cultivation and Utilization*, p. 183.
Stipa tenacissima (Esparto grass)

One of the fibre-producing plants being promoted in the 1870s was Esparto grass *Stipa tenacissima*, introduced to the Garden by 1872 and described by Schomburgk as a native of Spain, Portugal, Greece and North Africa. He knew it as a plant commercially valuable for the manufacture of both rope and fine writing papers, observing that 140,000 tons [142800 t] of Esparto grass was imported into England in 1871. Prices were rising because of the demand. According to the *Gardener's Chronicle* the quantity exported from Algeria and Spain was falling because those harvesting it were pulling it up instead of mowing it.\(^77\) Dry Esparto grass was worth £5 0s 0d to £5 10s 0d a ton and under favourable circumstances up to six to eight tons an acre could be harvested. It was supposed to grow in extraordinarily poor soil conditions:

> it grows on the poorest of soil, especially limestone or sand; in fact where the soil will produce no other vegetation the Esparto grass will grow. It grows even in the sands of the Sahara, on stony hills, and on the very brink of the coast...I have not the slightest doubt that the grass will thrive with us, and that many thousands of acres of arid land, of a limestone or stony nature, we possess in the different parts of the Colony which is scarcely fit for pasture, by sowing it with Esparto grass may become useful. Considering the similarity of our climate with that of Spain, and, in fact, the north of Africa, I am sure we have nothing to fear that our droughts would affect its growth - and how its introduction would benefit South Australia if our deserts could be changed into productive districts!\(^78\)

The comment about 'the similarity of our climate with that of Spain, and ...the north of Africa' is of note because it is one of the few cases where climatic comparisons are made.

The great expectations held for Esparto grass made it all the more frustrating that seed could not be obtained for experiments, one

\(^77\) *Gardener's Chronicle*, 5 June 1872, quoted by Schomburgk in *Report 1872*, p. 5.

\(^78\) *Report 1872*, p. 5
seedsman writing that 'the Spaniards won't part with it'. However in 1872 one ounce of seed was obtained, at £2 0 0 an ounce, from William Bull's 'Establishment for New and Rare Plants' in London. Despite the Director's fears that the Spaniards might have destroyed the 'germination powers' of the seed, 1000 plants were obtained. By 1878 Schomburgk had been able to supply Esparto grass seed to the Agri-Horticultural Society of Madras, to the proprietor of a paper mill in Geelong and to three people in New South Wales, where another paper mill was planned. He added that he was proud of the fact that it was the Adelaide Botanic Gardens which had introduced such a useful product to Australia.

Esparto grass has not become an established crop in South Australia.

*Lygium spartium* [*Lygeum spartum*]

This was a grass, suitable for paper-making, which grew in Spain and Africa. It was introduced in 1877. Like Esparto grass it has not become an established crop in South Australia.

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79 ibid.

80 On the account is the notation 'seed of the above very scarce and dear'. The original account is held in Adelaide Botanic Garden Archival collection. Bull was a Fellow of the Linnean Society, the Royal Horticultural Society, the Royal Geographical Society and other horticultural organizations.

81 Report 1878, p. 5.

82 Report 1877, p. 7. Like Esparto grass, which has great flexibility and felting power, *Lygeum spartum* is used in the production of fine printing papers, either alone or mixed with other fibres, see Hill, *Economic Botany*, p. 230.
**Agave sisalana.**

Sisal hemp was a product derived from *Agave sisalana*\(^{83}\) from eastern Mexico. The 1889 *Report* stated that specimens from Yucatan were sent to Florida in 1836 from whence sisal bulbils were sent to Brazil (now the largest producer) and via Hamburg to what we know as Tanzania, founding the East African sisal industry. It was noted that sisal rope withstood damage from sea water and was thus ideal for ships' cables. Suckers were provided by Thiselton-Dyer, who had become Director of the Kew Gardens as successor to his father-in-law, Sir Joseph Hooker.\(^{84}\) Sisal is grown as a garden plant in South Australia but has never been established as a crop.

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### SUMMARY OF PLANTS YIELDING FIBRE FOR COMMERCIAL USE MENTIONED BY SCHOMBURGK

[date indicates first time a species is mentioned in Annual Reports or other papers of Schomburgk].

<table>
<thead>
<tr>
<th>NAME</th>
<th>COMMENT ON PRESENT USE</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Agave sisilana</em> (producing sisal hemp) 1889</td>
<td>Grows in S.A, occasionally naturalized but never established as a crop</td>
</tr>
<tr>
<td><em>Boehmeria nivea</em> (Chinese grass-cloth ramie) 1868</td>
<td>Used in the Philippines and East Asia; not suited to S.A.</td>
</tr>
</tbody>
</table>

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\(^{83}\) Referred to in *Report* 1889 as *A. sisilana*.

\(^{84}\) *Report* 1889, p. 6. Sisal was said to be easy to cultivate, growing from suckers, with the plants coming to maturity in three to four years.
Cadium spp. [Cladium] Native species. Not used. 1877

Carex spp. Native species. Not used. 1877

Crotalaria juncea Grown in India - needs lots of water. Not suited to S.A. (sunn hemp/sann hemp) 1870

Cyperus juncus Not established as a crop. 1877

Dianella spp. Native flax lily. Minor use as ornamental species. 1877

Lepidosperma spp. Native sedge. Not established as a crop. 1877

Lepidosperma concavum Native sedge. Not established as a crop. 1878

Lepidosperma gladiatum Native sedge. Not established as a crop. 1878

Lepidosperma longitudinal Native sedge. Not established as a crop. 1878

Linum usitatissimum (flax) Grown during Second World War. Crop can be grown but not economical. Oil bearing forms better economically but not much is grown. 1868

(also 'white line' (white flowering) from East India 1870)
Lygium spartium
[Lygeum spartum] 1877
Has been grown in grass collections. Not established.

Paritium elatum = Hibiscus elatus. Not established as a crop.
(Cuba bast) 1871

Phormium tenax Widely grown as ornamental (variegated species also)
/New Zealand flax/ Used to tie up vegetables in the Adelaide Hills.
1868

Stipa tenacissima Has not become an established crop in S.A.
[Marochloa tenacissima] 1872
(esparto grass)

VEGETABLES AND TUBERS

Plants in this group which received attention were beet, the chufa or rush nut, the Egyptian luffa, the Kumara from New Zealand, the tree tomato or tamarillo, the vine Boussingaultia basselloides, and the Chinese artichoke [Anredera cordifolia]. These were all mentioned in Annual Reports but no doubt advice was also given informally by the Director and his staff on other vegetables commonly grown in domestic gardens in Adelaide.

Beta vulgaris (beet)
In the 1873 paper to the Chamber of Manufactures Schomburgk wrote that the 'enterprising men of the South' were attempting to grow beet as a crop. He believed that the soil and climate in the Mt Gambier region in the South East of South Australia would be very suitable for such an enterprise. Schomburgk would have been quite familiar with
beet cultivation in Germany, where it had been in production since the eighteenth century. At that time 4,500,000 cwt. (approximately 229,500 t) of sugar was produced annually from beet in Europe. On average 4,000 lb. (1816 kg) sugar was obtained from 500 cwt. (25.5 t) of beet; said to be the yield of about two and a half acres (3.5 ha). The product remaining after the sugar was extracted formed an excellent feed for cattle and could also be used for paper production. The molasses yield could be used for fodder. The Director pointed out that if beet sugar could be produced for the same price as cane sugar, which was then imported, beet production could be a flourishing industry, especially useful because it would enable the fattening of cattle. He believed it would be valuable in providing a rotation crop, 'as the want of such is severely felt in South Australia'. Sugar beet which thrives on fertile soils in lowlands with warm, sunny summers is said to favour salty soils. The argument that rotation crops were needed was a sound one but beet would take nutrients out of the soil. While growing beet might help with diversification of crops it would not add to soil productivity.

Sugar beet has not been established as a crop in South Australia due to competition from Queensland sugar cane. Red beet and silver beet are grown as domestic vegetables.

85 Evolution of crop plants, p. 25.
86 Schomburgk, 'Capabilities of the various districts of the colony', pp. 106-107.
87 Edlin, Man and plants, p. 100.
Cyperus esculentus (chufa or rush nut)

Schomburgk's 'Chuffa or earth almond', a member of the sedge family, was known from the times of the ancient Egyptians. In the nineteenth century it was grown in the south of the United States for the sake of its fleshy tubers for sheep, hogs and poultry feed. After receiving some specimens for trials Schomburgk gave some advice in his 1879 Report on how and when the chuffa should be planted. By 1880 he observed that it did not seem to grow as well in South Australia as in America; an observation repeated the following years when the plants failed after exceptionally hot summers in 1880-1881 and 1881-1882.\(^88\) By 1884 he wrote with resignation:

I have not succeeded in doing much with this plant, and this season the tubers did not mature. I consider that the failure is due to the unsuitability of the climate of South Australia.\(^89\)

In this case a five year period of trials gave an unequivocal result.

Luffa aegyptiaca (Egyptian luffa)

Local friends and colleagues frequently sent seeds and plant material for trial planting and this is how Schomburgk acquired some seed of the Egyptian Luffa, \((Luffa\ aegyptiaca)\) from his compatriot Weidenbach in 1883. This was a cucumber-like fruit which, when dried, was exported from Egypt and sold as a bath sponge in Britain\(^90\) as what we would call a loofah. Today it is occasionally grown as a garden plant but it is not grown commercially.

\(^{88}\) Report s 1880, p. 5, 1881, p. 5 & 1882, p. 4.
\(^{89}\) Report 1884, p. 8.
\(^{90}\) Report 1883, p. 4.
*Ipomoea chrysorrhiza* [*I. chrysorrhiza*] (kumara) [now *I. batatas*]

An article in the local *Register* newspaper published information from the British *Gardener's Chronicle* on the New Zealand plant Kumara, which was said to be closely related to the sweet potato. Schomburgk reported that Sir Joseph Hooker, who had been trying for ten years to introduce the plant into England, had succeeded in growing kumara after receiving some new specimens from New Zealand. There were said to be some thirty varieties cultivated by the Maoris.91 Sir Joseph considered that the plant might be a useful one for European countries. Schomburgk, who thought it might grow in the cooler areas of South Australia, such as 'the gullies', applied to Professor Thomas Kirk of Wellington for tubers. Schomburgk had some difficulty in growing the plant the first year but was sent further instructions and a new batch of tubers in 1884.92 By 1887 he had begun to doubt that kumara was suitable for the Adelaide plains since fairly small tubers were being produced but was still hopeful that the plants might be more successful in the nearby area of the Adelaide hills.93 He noted that the plant had recently been introduced to the East Indies by the Director of the Botanic Gardens at Saharanpur where the crop was considered a useful addition to the vegetables available there.94 Today it is grown in the eastern states of Australia on a small scale.

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91 *Report* 1884, p. 5. Information and tubers had been sent from the knowledgeable W. Colenso to Sir Joseph Hooker at Kew.

92 *Report* 1885, p. 4.

93 *Report* 1887, p. 4. He had tried leaving the tubers in the ground over the winter. This had been successful the first year with a relatively dry winter. However the next year, when the winter was quite wet, the tubers had rotted in the ground.

94 *Report* 1885, p. 4.
The account of kumara illustrate the links that existed between the Botanic Gardens of the Indian subcontinent and those of Australasia. Such links were supported by contact with the Royal Botanic Gardens, Kew and were sometimes aided by the vice-regal network. Information also came from commercial and government publications such as the *Gardener's Chronicle*, Christy's *Forage plants and Shrubs* and *New Commercial Plants* (1878), and the U.S.A. Department of Agriculture's book *Agricultural Grasses and Forage Plants* (1889).

*Cyphomandra betacea* (tree tomato or tamarillo)

In 1884 seeds of the tree tomato (*Cyphomandra betacea*) were received from the Director of the Botanic Garden, Jamaica, (Sir) Daniel Morris (1844-1933), a Director of considerable standing in the British colonial botanic garden network. Native to South America, the tree tomato was grown in places such as Peru and Chile during the winter months when ordinary tomatoes did not thrive. Schomburgk expressed doubt as to whether they would survive in Adelaide without glasshouse protection but was prepared to experiment with the four plants he had. In 1885 he had concluded that this species was only suitable for glasshouse cultivation. It was subsequently grown successfully in New Zealand where, as tamarillo, it is still produced on a commercial basis. In South Australia it is occasionally grown by horticultural enthusiasts.

95 For example, see comments in the *Gardener's Chronicle*, vol. 23, 1885, pp. 146 & 574.

96 *Report* 1884, p. 6.

97 *Report* 1885, p. 4.
Miscellaneous vegetables

*Boussingaultia basseloides* [Anredera cordifolia] was a perennial vine, native to Mexico and Chile, which seems to have been grown in the Botanic Garden from the very early years - probably from about 1861. It attracted some attention in 1885 as a source of edible tubers for cattle and sheep. In 1886 the Director wrote that if accounts of its use and culture were accurate, the vine would be very useful. Several people were trying to cultivate the vine and it could thus be ascertained '...whether the tubors [sic] are so useful as has been stated...' 98 a note of caution which no doubt was based on the many disappointments which the then elderly Schomburgk had experienced over the years. Today the vine is occasionally grown as a garden plant.

In his last Annual Report before he died, that of 1890, Schomburgk reported the receipt of tubers of the Chinese artichoke (*Stachys tuberifera*) [S. affinis] for trial at the Botanic Garden from Albert Molineux, secretary of the local Agricultural Bureau. He expected it to be 'a welcome addition to our list of domestic vegetables'. 99 He reported that it had been introduced into France and England during the preceding two years which, if accurate, is an indication of how quickly plant material new to Britain and France was received in South Australia for trials.

98 Report 1886, p. 5.
99 Report 1889, p. 4.
SUMMARY OF VEGETABLES AND TUBERS MENTIONED BY SCHOMBURGK

[Date indicates first time a species is mentioned in Annual Reports or other publications of Schomburgk.]

<table>
<thead>
<tr>
<th>NAME</th>
<th>COMMENT ON PRESENT USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beta vulgaris (beet) 1873</td>
<td>Vegetable beet and silver beet grown but sugar beet cannot compete with Queensland sugar cane.</td>
</tr>
<tr>
<td>Cyperus esculentus (chuffa or earth almond) 1879</td>
<td>Schomburgk's trials showed it to be unsuitable for S.A. conditions. This species may have sometimes been confused with Cyperus rotundus, nut grass, a pernicious weed.</td>
</tr>
<tr>
<td>Boussingaultia basseloides [Anredera cordifolia] 1871</td>
<td>Occasionally grown in gardens as a fence climber.</td>
</tr>
<tr>
<td>Cyphomandra betacea (tree tomato or tamarillo) 1884</td>
<td>Occasionally grown in domestic gardens, no commercial plantings.</td>
</tr>
<tr>
<td>Ipomoea chrysorrhisa [I. batata] (kumara) 1884</td>
<td>Grown in eastern Australia on a small scale.</td>
</tr>
<tr>
<td>Luffa aegyptiaca (Egyptian luffa) 1883</td>
<td>Occasionally grown as a garden novelty.</td>
</tr>
<tr>
<td>Stachys tubifera (Chinese artichoke) 1890</td>
<td>Thought to be rare in S.A. today.</td>
</tr>
</tbody>
</table>
PLANTS FOR MEDICINES AND DRUGS

Tobacco (*Nicotiana tabacum*)

*Nicotiana tabacum* is the best known of the *Nicotiana* species, although there are others which have been used. In Australia, *Nicotiana benthamiana* and other species were used by Aboriginal people before the arrival of Europeans. *Nicotiana tabacum* is a native of tropical America but has become adapted to cultivation in both subtropical and temperate regions. Introduced into Europe in 1556 it was taken to Africa, Asia and Australia.\(^{100}\) In his paper delivered to the Chamber of Manufactures in 1873 on the 'Capabilities of the various districts of the Colony' Schomburgk strongly supported investigating the potential of tobacco as a crop in South Australia. He gave a separate paper 'The Culture of Tobacco' in which he acknowledged information in G.R. Porter's *The tropical agriculturist: a practical treatise on the cultivation and management of various productions suited to tropical climates*.\(^{101}\) The proposal was calculated to be of interest to both businessmen and politicians. Seeds of six different kinds of tobacco had been received from Europe and America and 'freely distributed to a large number of persons residing in different districts in the Colony', every recipient receiving with it a copy of Schomburgk's speech to the Chamber of Manufactures.

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There had been attempts to grow tobacco in the early days of the Colony although these had faded away as wheat-growing was seen to be more profitable. In 1851 Schomburgk had recorded a tobacco field in Lyndoch in the Barossa Valley where leaves were as large as 21 inches long (533 mm) and 12 inches wide (305 mm), showing that a good crop was possible. He believed that tobacco could be grown in 'the South', in the Adelaide region, for example at Reedbeds (now suburban Fulham), Hope Valley (now outer suburban Adelaide), Mount Barker, Gumeracha and Blumberg (now Birdwood) in the Adelaide Hills and in the Barossa Valley. Apart from producing tobacco for smoking, the plant was useful in producing a sheep wash. Schomburgk had some experience of tobacco cultivation from visiting plantations in British Guiana\textsuperscript{102} and he went on to describe at some length how tobacco should be cultivated.

In \textit{The Culture of Tobacco} he stated that a Melbourne firm was offering £112 per ton (£114 per tonne) for good leaf, with demand steadily increasing. Fifteen cwt. per acre (1875 kg/ha) being an average yield, the crop paid well at approximately £84 per acre.

The paper quotes the following sets of figures relating to tobacco use and production:

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\textsuperscript{102} His brother Robert managed a tobacco plantation in the United States prior to his British Guiana travels which may have furthered Richard's interest.
IMPORTS OF TOBACCO TO THE AUSTRALIAN COLONIES PER ANNUM

<table>
<thead>
<tr>
<th>Colony</th>
<th>Population</th>
<th>Per Head</th>
</tr>
</thead>
<tbody>
<tr>
<td>New South Wales</td>
<td>£103,297</td>
<td>501,586</td>
</tr>
<tr>
<td>Victoria</td>
<td>£246,888</td>
<td>728,734</td>
</tr>
<tr>
<td>South Australia</td>
<td>£24,788</td>
<td>185,626</td>
</tr>
<tr>
<td>Queensland</td>
<td>£22,651</td>
<td>115,000</td>
</tr>
<tr>
<td>Tasmania</td>
<td>£15,742</td>
<td>100,000</td>
</tr>
</tbody>
</table>

[Source: R. Schomburgk, 'The culture of tobacco' (1873)]

The Director noted that a country with a population of a little more than 1.5 million people was spending nearly half a million pounds per annum for this 'small luxury'.

PRODUCTION OF TOBACCO PER COLONY IN 1870

<table>
<thead>
<tr>
<th>Colony</th>
<th>Acres</th>
<th>Producing</th>
<th>Lbs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>New South Wales</td>
<td>366</td>
<td>producing</td>
<td>357,491</td>
</tr>
<tr>
<td>Victoria</td>
<td>114</td>
<td></td>
<td>144,480</td>
</tr>
<tr>
<td>Tasmania</td>
<td>222</td>
<td></td>
<td>447,555</td>
</tr>
<tr>
<td>Queensland</td>
<td>22</td>
<td></td>
<td>not stated.</td>
</tr>
<tr>
<td>South Australia</td>
<td>nil</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[Source: R. Schomburgk, 'The culture of tobacco' (1873)]

At this time, based on a price of 6 pence per pound (considered to be a conservative figure since one shilling per pound was offered for good colonial leaf tobacco in Melbourne) production per acre was as follows:
VALUE OF PRODUCTION OF TOBACCO PER ACRE IN AUSTRALIAN COLONIES

<table>
<thead>
<tr>
<th>Colony</th>
<th>Production (lb. per acre)</th>
<th>Value (£ 8 s. 0 d.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>New South Wales</td>
<td>976</td>
<td>£24 8s 0d</td>
</tr>
<tr>
<td>Victoria</td>
<td>1,003</td>
<td>£25 1s 0d</td>
</tr>
<tr>
<td>Tasmania</td>
<td>2,010</td>
<td>£50 8s 0d</td>
</tr>
</tbody>
</table>

[Source: R. Schomburgk, 'The culture of tobacco' (1873)]

Schomburgk believed that whereas South Australia might not produce a tobacco of as high a quality as that produced in America or the West Indies, a tobacco suitable for cake or twist tobacco could be produced. Money currently being sent out of South Australia would be retained. Moreover employment would be provided for young people since work such as weeding, breaking off shoots and so on could be done by boys:

...it is alarming when we see the great number of neglected boys in the streets of the city, who might on such plantations be employed to great advantage to themselves, and with profit to the proprietors and Colony'.

Arguing that Parliament should encourage the production of tobacco by such strategies as offering a bonus for its production, he admitted that while he was a free-trader he considered it would be worthwhile placing a higher duty on imported tobacco for a time to help establish the industry.

While tobacco was grown in the early days of settlement it did not become an important crop in South Australia. It is still grown in other parts of Australia, for example at Mareeba in Queensland and Mansfield in Victoria.

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103 This process is spelt out in Porter, *The tropical agriculturist*, p. 156.
104 'The Culture of Tobacco', p. 49.
*Glycyrrhiza glabra* (Liquorice plant)

This was proposed as a commercial crop in 1874. Schomburgk had read in the *Journal of Applied Science* about increased use of liquorice in a period when it was used not only in medicine but also as a flavouring material in the tobacco and confectionery industries and in the brewing of beer.\(^{106}\) In the twentieth century the largest producer of the cultivated liquorice root is Spain\(^{107}\) which suggests that the South Australian climate could have been suitable for its production. Although weedy colonies persist it is not grown on a large scale today.

**Plants for medical use**

Medical plants, 'allopathic and homeopathic' which had been imported were found to grow well and to be potentially profitable. By 1868 a number of perennial medical plants were considered to be established in the Experimental Garden; 25 were listed:

**PERENNIAL MEDICAL PLANTS LISTED BY SCHOMBURGK IN 1868**


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\(^{106}\) *Report* 1874, p. 5.


\(^{108}\) Today 'common dandelion' refers to *Taraxacum officinale* and *Leontodon taraxacoides* is the botanical name for hawkbit.
Erythraea centaurium, Erysimum strictum (hedge-mustard), Erysimum cordatum, Hyssopus officinalis, Althaea officinalis (marshmallow), Malva sylvestris, Arctium lappa (burdock), Anchusa officinalis (officinal burgloss), Artemisia abrotanum (southernwood), Phytolacca decandra.

The Director recorded that he had already been able to supply 'many invalids' with herbs and repeated in ensuing years how gratifying it was to him to be able to do so.  

In 1872 Schomburgk reported that among the new medical plants to be introduced that year was Mikania guaco (M. amara) which had been highly spoken of as a snake bite antidote by Alexander von Humboldt and also by many people known to Schomburgk in British Guiana:

notwithstanding that Professor Halford's method (injecting ammonia into the wound) is highly spoken of, and has, indeed, already saved many lives, we should try also the Mikania. The frequent accidents and loss of life occurring from snake bites in Australia, especially during the last few years, induced me to introduce this valuable plant.

Once he had successfully propagated the Mikania he planned to send some specimens to G. B. Halford (1824-1910) (first professor of anatomy, physiology and pathology at the University of Melbourne) for testing. Schomburgk thought that although the plant could not easily be acclimatized in South Australia it should be possible to grow it outdoors in New South Wales and Queensland. The plant has a long standing reputation throughout its range as a febrifuge and

snake-bite remedy and is used as an inoculant as well as being rubbed into the wound.\textsuperscript{111}

In the 1878 \textit{Report} it was recorded that there had been a great demand for a plant named \textit{Phytolacca decandra} (Virginian pokeweed) which was used in homeopathic medicine for the treatment of diphtheria in children.\textsuperscript{112} Mullein or Shepherd's Club (\textit{Verbascum thapsus}) was much sought after during 1880-83, a decoction from the leaves being used as a treatment for consumption and one of the spurge species, \textit{Euphorbia pilulifera}, found in tropical areas such as northern Queensland, being used in a decoction for asthmatic complaints. 'It would be a beneficial discovery if these domestic remedies were really effective', the Director wrote with a note of caution.\textsuperscript{113}

Many requests were reported for English broom (\textit{Cytisus scoparius}), the 'common dandelion' (\textit{Leontodon taraxacum})\textsuperscript{114} and Virginian pokeweed (\textit{Phytolacca decandra}). Schomburgk pointed out that some other herbs which were in great demand by druggists, such as camomile, peppermint, lavender, dandelion and \textit{Althaea} were at that time imported but could be grown profitably in South Australia 'in the

\textsuperscript{111} In places such as Colombia, Guatemala, and El Salvador it is also used in a variety of other ways: in cases of tetanus and scorpion sting, as an antispasmodic, vermifuge, emmenagogue, diuretic, and sudorific agent and in the treatment of gout, rheumatism, asthma, catarrh, stomach spasms, liver trouble and genital tract disorders. An emmenagogue is an agent to promote menstrual discharge, a vermifuge promotes the expulsion of worms or other parasites from the intestinal tract, a sudorific promotes perspiration and a febrifuge is an anti-febrile medicine. Julia Morton, \textit{Atlas of the Medicinal Plants of Middle America: Bahamas to Yucatan}, Charles C. Thomas, Springfield Illinois, 1981, pp. 947-8.

\textsuperscript{112} \textit{Report} 1878, p. 5.

\textsuperscript{113} \textit{Report} 1880, p. 6 and 1882, p. 5.

\textsuperscript{114} See note 108.
gullies'. This would not only provide a remunerative crop but would also provide a much fresher product for druggists. An acre of peppermint yielded eight to ten pounds (3.6-4.5 kg) of oil when it was distilled, worth £2 0s 0d per pound.\textsuperscript{115}

By 1883 there were some 37 plants for allopathic and homeopathic medicine being grown, all of which had been shown to grow well under local conditions.\textsuperscript{116} The list was as follows:

- Pennyroyal mint - *Mentha pulegium*
- Peppermint - *Mentha piperita* [M. x piperata]
- Spearmint - *Mentha viridis* [M. spicata]
- Tansi [Tansy] - *Tanacetum vulgare*
- Common melilot - *Melilotus officinalis*
- Common yarrow - *Achillea millefolium* [Achillea millefolium ]
- Dandelion - *Leontodon taraxacum* [L.taraxacoides - hawkbit]
- Succory - *Cichorium intybus* [chicory]
- Savoury - *Satureja montana*
- Sarsaparilla - *Smilax sarsparilla* [Smilax sarsaparilla]
- Horehound - *Marrubium vulgare*
- Wormwood - *Artemisia absinthium*
- Common Tustan - *Androsaemum officinale*
- Broadleaved mullein - *Verbascum thapsus*
- Hyssop - *Hyssopus officinalis*
- Marshmallow - *Althaea officinalis*
- Burdock - *Arctium lappa*
- Southernwood - *Artemisia abrotanum*

\textsuperscript{115} Reports 1877, p. 7 and 1883, p. 5.

\textsuperscript{116} Report 1883, p. 5.
Chamomile - *Matricaria chamomilla*
Phytolacca - *Phytolacca decandra*
Common English broom - *Cytisus scoparius*
Rosemary - *Rosmarinus officinalis*
Burnet - *Pimpinella anisum* [anise]
Cat-thyme - *Teucrium marum*
Common toad flax - *Linaria vulgaris*
Woolly milfoil - *Achillea lanata*
Stinking horehound - *Ballota acetabulosa*
Lemon palm [lemon balm] - *Melissa officinalis*
Sage - *Salvia officinalis*
Rue - *Ruta graveolens*
Lavender - *Lavandula spica* [L. angustifolia - English lavender]
Thyme - *Thymus vulgaris*
Fennel - *Foeniculum vulgare*
Rest harrow - *Ononis spinosa* [Ononis spinosa]
Soapworth - *Saponaria officinalis* [Bouncing Bet]
Basil-leaved soapworth - *Saponaria ocymoides*
Cat-mint - *Nepeta cataria*

Another group of plants of medical use came from the Northern Territory; these were dried specimens rather than live ones. When the Museum of Economic Botany was established it was possible to expand the display of dried plant material. Amongst the products acquired in 1881 was a collection of exhibits from Paul Foelsche, Inspector of Police at Port Darwin, demonstrating aboriginal use of plant products to provide 'household necessities, food adjuncts and medicines'. The collection is discussed further in Chapter 8.
Pyrethrum species received attention in the 1880s. In 1885 Schomburgk reported with satisfaction that he had at last obtained plants of this species. He referred to Pyrethrum roseum and Pyrethrum carneum [P. coccineum](which he described as being natives of the Caucasus) in the 1885 Report and to P. roseum and P. cinerariaefolium [Chrysanthemum. cinerariifolium] in the 1888 Report. Pyrethrum species provided a powder which had been used for a long time in Persia and Russia as an insecticide against fleas and other insect pests. The Victorian Government was distributing Pyrethrum seed in the hope of encouraging production of the powder and Schomburgk, who had raised about 12 plants from the seeds he had imported, was hopeful that they would grow well in South Australia.

There have been many trials of Pyrethrum in Australia since the Schomburgk era. Synthetic forms of pyrethrum are now used extensively reducing the demand for the natural product.

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117 It was noted that the powder became commercially available in Russia in 1828 and that by 1885 substantial amounts were produced.

118 Report 1885, p. 5. Pyrethrum is a valuable source for insecticides; having low mammalian toxicity and low persistence and possessing both knock-down and killing effects. Since World War II the principal production centres have all been in tropical highland regions where the plant flowers for most of the year and labour costs are low, see R.B. Contant, 'Pyrethrum', in Evolution of crop plants, p. 33.
### SUMMARY OF PLANTS USED FOR MEDICAL AND PHARMACEUTICAL PURPOSES

[Date indicates first time a species is mentioned in Annual Reports or other publication of Schomburghk]

[Where spelling was corrected in a subsequent year this is noted in square brackets.]

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Achillea millefolium</em></td>
<td><em>Artemisia abrotanum</em></td>
<td>1868</td>
</tr>
<tr>
<td>(common yarrow)</td>
<td>(southernwood)</td>
<td></td>
</tr>
<tr>
<td><em>Achillea lanata</em></td>
<td><em>Ballota acetabulosa</em></td>
<td>1883</td>
</tr>
<tr>
<td>(woolly milfoil)</td>
<td>(stinking horehound)</td>
<td></td>
</tr>
<tr>
<td><em>Althea officinalis</em></td>
<td><em>Cichoria insibus</em></td>
<td>1868</td>
</tr>
<tr>
<td>[Althaea ]</td>
<td>[Cichorium intybus]</td>
<td></td>
</tr>
<tr>
<td>(marshmallow)</td>
<td>(succory)[chicory]</td>
<td></td>
</tr>
<tr>
<td><em>Anchusa officinalis</em></td>
<td><em>Cytisus scoparius</em></td>
<td>1868</td>
</tr>
<tr>
<td>(bugloss)</td>
<td>(English broom)</td>
<td></td>
</tr>
<tr>
<td><em>Androsoemum officinalis</em></td>
<td><em>Erysimum cordatum</em></td>
<td>1868</td>
</tr>
<tr>
<td>(common tustan)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Arctium lappa</em></td>
<td><em>Erysimum stricta</em></td>
<td>1868</td>
</tr>
<tr>
<td>(burdock)</td>
<td>(hedge-mustard)</td>
<td></td>
</tr>
<tr>
<td><em>Artemesia absinthium</em></td>
<td><em>Erythraea centaurium</em></td>
<td>1868</td>
</tr>
<tr>
<td>[Artemisia 1883]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(wormwood)</td>
<td><em>Euphorbia pilulifera</em></td>
<td>1878</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Foeniculum vulgare
(fennel)
1883

Glycyrrhiza glabra
(liquorice)
1874

Hysopus officinalis
[Hyssopus 1883]
(hyssop)
1868

Lavendula spica
(lavender)
L. angustifolia
ssp angustifolia
1883

Leontodon taxacum
[taraxucum 1883]
(dandelion)
1868
[L. taraxacoides]
[hawkbit]

Linaria vulgaris
(common toad-flax)
1883

Malva sylvestris
1868

Marrubium vulgare
[Marubium 1883]
(horehound)
1868

Matricaria chamomilla
(chamomile)
1883

Mentha x piperita
(Pennyroyal mint)
by 1868

Mentha pulegium
([mentha spicata]
(spearmint)
by 1868

Mentha viridis
1883

Mikania guaco [M. amara]
1872

Nepeta cataria
(cat-mint)
1883

Nicotiana tabacum
(tobacco)
1871

Ononis spinosa
(rest harrow)
1883
Pimpinella anisum
(anise 1868)
[burnet]
1883

Saponaria officinalis
(soapworth)
[Bouncing Bet]
1883

Phytolacca decandra
1868

Saponaria ocymoides
(basil leaved soapworth)
1883

Pyrethrum carneum
[Chrysanthemum coccineum]
1885

Satureja montana
(savoury)
1868

Pyrethrum carneum
[Chrysanthemum coccineum]
1885

Smilax sarsaparilla
(sarsaparilla)
1868

Pyrethrum roseum
[Chrysanthemum coccineum]
1885

Tanacetum vulgare
(tansy)
1868

Rosmarinus officinalis
(rosemary)
1883

Teucrium marum
(cat-thyme)
1883

Ruta graveolens
(rue)
1883

Thymus vulgaris
(thyme)
1883

Salvia officinalis
(sage)
1883

Verbascum thapsus
(broad leaved Mullein, Shepherd's Club)
1868
PLANTS FOR CULINARY USE AND PERFUMERY

Fruit trees

Many fruit trees grew well in Adelaide and were of importance to householders. Schomburgk wrote in his preface to the 1878 Catalogue of Plants that most fruits, except for a few 'intertropical fruits' thrive most luxuriantly in South Australia, and come to such perfection in size, and frequently in flavour, as is hardly known in other countries... On the plains grow apples, pears, apricots, peaches, nectarines, oranges, citrons, lemons, plums, cherries, figs, almonds, mulberries, olives and grapes; while in the hills and gullies besides are grown strawberries, raspberries, gooseberries, currants, walnuts, chestnuts, filberts, &c.

He was of the opinion that peaches, apricots, and plums reached a size and flavour unknown in Europe but cherries he considered 'not to attain the perfection of home'. Today cherries would rarely be grown on the plains but are grown commercially in the cooler Adelaide hills area, where pears and apples are also grown commercially. Pears and apples are much less common on the plains. Schomburgk noted that stone-fruit trees were much more short-lived than those in Europe. This, he believed, might result from rapid growth and 'early and excessive bearing'.

Soon after his appointment Schomburgk noted that, while gardeners needed to know more about what fruit trees could be grown, not all kinds of fruit-trees could be grown in the Botanic Gardens. This was partly due to lack of space but there was also the problem of lads stealing the fruit. One solution was to order models of various kinds


120 ibid., p. ix.
of fruits from Germany.\textsuperscript{121} As early as 1869 it was considered desirable to have a standard collection of 'vines, fruit-trees and useful plants for domestic purposes' so members of the public could gain an appreciation of what could be grown in their own gardens.\textsuperscript{122}

By 1873 plans could be made for an area of six acres (2.43 ha) near Hackney which had been used by the Lunatic Asylum and which would be available to the Botanic Gardens with the opening of the new Asylum. This enabled a standard collection of fruit-trees, vines and domestic plants to be established, something much needed by the public because of confusion over nomenclature.

\textbf{Rutaceae (citrus)}

There are not many references to citrus trees in Schomburgk's reports and papers. Schomburgk noted in 1876 that the trees of his orangery in the Botanic Gardens were showing signs of disease, disease which had been observed in other gardens and which he thought to be due to 'a layer of unsuitable soil'. Citrus trees have not been used for decorative purposes in South Australia the way that they have been used in other regions with a dry summer such as Spain. The failure of the orange trees at the Botanic Gardens may have led to the loss of opportunities to promote citrus trees for decorative purposes. However citrus has become a major crop. Citrus trees have been grown successfully on the Adelaide plains, both commercially\textsuperscript{123}

\textsuperscript{121} Report 1866, p. 3.

\textsuperscript{122} Report 1869, p. 3.

\textsuperscript{123} Thomas Hardy stated that the orange was one of the most profitable of local crops by 1886. Victorian Royal Commission into vegetable products, first progress report, 1886, p. 16.
and for domestic purposes, and very successfully in the Riverland irrigation areas since the 1880s.

Prunus amygdalus (almond)
The almond was of special interest to Schomburgk. Grown in Mediterranean countries for many centuries it was well suited to the South Australian climate. Almonds had been grown early in South Australia's settlement and were recorded in a settler's garden in 1837 and in Bailey's very early Botanic Garden in 1841.¹²⁴ In a paper to the Chamber of Manufactures Schomburgk wrote that:

Of these till now very little has been thought, and in consequence these trees have been utterly neglected, because, as the phrase goes 'they won't pay', but I am of a different opinion, since I have seen that the almonds will form a profitable export.¹²⁵

He believed that as many as two thirds of the thousands of the colony's almond trees were grown from seedlings and did not produce a marketable product. He recommended grafting with the Jordan and Brandis varieties, which were much sought after in the trade: Jordan almonds (a hard shell variety with a fine flavour) being quoted as 85s.-240s./cwt shelled. For almonds in their shell the price of 60s.-70s/cwt was equivalent to 7.5 pence/ pound or 3.4 pence/kg at a time when a labourer was paid 5s a day. The Director believed the almond tree would grow in a variety of districts and in a wide variety of soils:

I hope that horticulturists as well as agriculturists will take this into their consideration; and it must be plain to them that almonds will pay for export for the little trouble bestowed upon them. There may be many nooks and corners on their properties where almost nothing will grow. I can assure


¹²⁵ 'Capabilities of the various districts of the colony', p. 109.
them the almond tree will be satisfied with such spots; only they must not neglect to trench the ground first.\textsuperscript{126}

Schomburgk questioned whether the Jordan almond cultivated in South Australia was true to its name and by 1879 he had obtained two trees of the true Jordan almond from Veitch's nursery in London, reporting that he would soon be 'in a position to distribute grafts and buds'.\textsuperscript{127} South Australian horticulturist and vigneron Thomas Hardy stated in 1885 that there was only a limited amount of land in South Australia with suitable soil and climatic conditions for almonds but where conditions were suitable, about 100 trees could be planted per acre. After ten years this might yield 20-30 pounds at 5-6 pence per pound.\textsuperscript{128} By the turn of the century almond trees were common in home gardens in the Adelaide region, valued both as an ornamental tree and for the nut which is high in protein and one of the most popular of all the nuts. Almonds have provided a valuable commercial industry, particularly in districts south of Adelaide. They are also sparingly naturalized.

\textit{Juglans} spp. (walnut), \textit{Castanea} spp. (chestnut) and \textit{Corylus} spp. (filbert, hazelnut)

Schomburgk commented that although these might not thrive on the Adelaide plains, they should prove suitable for cultivation in the Adelaide Hills and provide a profitable crop.\textsuperscript{129} There is a limited number of \textit{Corylus} spp. (hazelnut) trees in South Australia, mainly in

\textsuperscript{126} ibid., p. 109. There are similar comments in the \textit{Report} 1884, p. 19.

\textsuperscript{127} \textit{Report} 1879, p. 6.

\textsuperscript{128} \textit{Royal Commission into vegetable products, first progress report together with minutes of evidence}, p. 10.

\textsuperscript{129} \textit{Report} 1880, p. 15 and 1884, p. 19.
the Adelaide Hills and a few orchards of *Juglans* spp. (walnuts). In addition to old *Castanea* spp. (chestnut) in gardens in the Adelaide Hills, some orchards have been established in recent years.

*Ficus carica* (fig)

Like the almond, the fig had been grown in Mediterranean countries for centuries and was well suited to the South Australian climate but, as with the almond, there were problems in producing good quality fruit. Schomburgk raised the issue of whether the Smyrna fig grown in South Australia was true to its name. The name 'Smyrna fig' appeared to be a general one given to figs growing in the region of Smyrna, of which the most valuable was the Eleme or Elemi.\(^{130}\) The Chamber of Manufactures requested the South Australian Agent-General in London to procure some cuttings of suitable plants and Schomburgk succeeded in growing eighteen plants from a parcel which arrived in the wrong season and in a rather dry condition. He wrote optimistically that the Chamber of Manufactures would distribute them in due course and that in time it should be possible to produce as good a product as that of the Mediterranean.\(^ {131}\) In fact the introduction of the Smyrna fig was fraught with difficulties. In 1885 and 1887 it was recorded that fruit dropped off when it reached the size of a walnut\(^ {132}\) and Schomburgk discovered that colleagues in California were reporting the same experience.\(^ {133}\) Smyrna figs today provide a very important commercial crop in Greece, Asia Minor,

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\(^{130}\) *Report* 1878, p. 6.

\(^{131}\) *Report* 1880, pp. 6-7.

\(^{132}\) *Report* 1885, p. 7.

\(^{133}\) *Report* 1888, p. 5.
Algeria, Portugal and California. They produce no staminate flowers and it is now known that they are totally dependent on cross-pollination from caprifigs, the wild figs that grow naturally in the Mediterranean, in a process involving fig wasps. Attempts at cultivation in places such as California were not successful until caprifigs and fig wasps were introduced. 134

Fortunately other varieties were sought too. In 1884 Schomburgk reported that enquiries had been made in Italy by Sir William Milne regarding the kind of figs thought best for drying purposes. Professor Comes, Director of the Botanic Gardens at Portici135 recommended the Trojan fig, supplying Sir William with both plants and instructions for cultivation. By 1889 Trojan figs were reported to have borne good quality fruit.

The fig, like the almond, became common in domestic gardens in South Australia. Old fig trees are frequently found in old gardens today, hardy trees that have provided shade in summer and quantities of fig jam for the table. Orchards of jam figs were established but are now in decline.

**Sericulture**

Schomburgk was convinced that the South Australian climate was 'eminently adapted' to the production of fine quality raw silk and that sericulture could become a useful industry. 'For many years', he wrote, 'with all my energy, I have advocated sericulture as a paying


135 Today known as Istituto ed Orto Botanica della Facolta di Agraria Portici, Napoli, see *International directory of botanic gardens* 1V, p. 86.
industry and advised the extensive planting of the mulberry.'\textsuperscript{136} A disease among silkworms in Europe, unknown in South Australia, made the possibility of a South Australian industry appear especially attractive. After making enquiries of sericulturists in Italy, Southern France and Germany as to the type of mulberry favoured there, he raised 2000 seedlings of \textit{Morus cedrona} during 1867 for distribution to interested parties.\textsuperscript{137} The trees had been found to grow well in a variety of locations. Other people interested in sericulture kept him informed of their efforts, amongst them George Francis\textsuperscript{138} of Gawler, F. Wurm, Samuel and Margaret Davenport, and the Zoological Society of New South Wales (which provided silkworm eggs). Sericulture was still being promoted strongly when the journal the \textit{Garden and the Field} was first published in 1875. In the period 1875-78 sericulture is mentioned in most issues, albeit often as a short item, whereas many other crops were mentioned only occasionally. The Government supported the establishment of the colony's first mulberry plantation in the grounds of the Magill Orphanage, using mulberry trees grown in the Botanic Gardens.\textsuperscript{139} There was also much enthusiasm in other parts of Australia. However by 1887 Schomburgk reported that during the previous five to six years there had been little demand for mulberry trees as the growers were not finding sericulture profitable.\textsuperscript{140}

\textsuperscript{136} Schomburgk, 'Capabilities of the various districts of the colony', p. 105; also \textit{Report} 1869, p. 4.

\textsuperscript{137} He wrote subsequently that after many trials the white mulberry appeared the best but another variety, \textit{Morus multicaulis}, was used for the young silkworms.

\textsuperscript{138} The first Director called himself George William Francis to avoid confusion with this man, see B. Best, \textit{George William Francis}, p. 88.

\textsuperscript{139} \textit{Report} 1869, p. 4.

\textsuperscript{140} \textit{Report of the Select Committee on Vegetable Products}, p. 3.
Despite the early optimism, sericulture never became a major industry in Australia, other crops being found to be more profitable. Today mulberry trees are to be found in many old gardens in South Australia, providing local children with the opportunity to raise silkworms although not providing the employment opportunities desired by Mrs Bladen Neill of Cowra, the Davenports and other supporters of sericulture.

**Vitaceae (Grapes)**

An industry that did prove successful, and one which came to be of great economic importance to South Australia, was viticulture. Schomburgk's first reference to vines was in 1867. Sultana cuttings, which he had ordered from the Botanic Garden at Capetown for £5, were received in December 1867\(^1\) and the Director recorded that by grafting them he had been able to grow eight cuttings. From these he was able to distribute 52 grafts among vinegrowers during 1868. He heard that about two thirds of these grew. Some 1700 could be distributed the following year. There were also vine cuttings from 'the celebrated Jardin de Luxembourg' and grafts of these were distributed from 1869 onwards.\(^2\)

By January 1870, Schomburgk could report that more than two thirds of the grafts that had been distributed had grown and he regarded the sultana as established in the colony. In his *Report* he encouraged

\(^1\) Minutes, June and December 1867.

\(^2\) *Report* 1868, p. 2; *Report* 1869 p. 3.
growers to use long rod pruning,\textsuperscript{143} as with the Zante currant, rather than short spur pruning. He had applications from 'the neighbouring colonies' for grafts - distribution of the sultana by Adelaide Botanic Garden had thus benefited growers in other parts of Australia as well as those in South Australia. Viticulture was said to be paying better than most other crops in South Australia by the 1880s.\textsuperscript{144}

In his paper to the Chamber of Manufactures in 1873 and again in his chapter 'The Flora of South Australia' in W. Harcus (ed.) \textit{South Australia: its History, Resources, and Productions} \textsuperscript{145}, Schomburgk observed that the first sample of Zante currants sent to Melbourne was considered to be of better quality than imported ones, yet little attention had been given to the production of dried fruit such as currants and raisins.\textsuperscript{146} At that time more than £120,000 worth of dried fruit was imported annually into the Australian colonies and since

\begin{quote}
we know that our climate is in every way favorable (sic) to these productions, is it not surprising that no more attention has been paid to these sources of profit?
\end{quote}

\textsuperscript{143} With eight to ten eyes left on each rod, to yield fruit.

\textsuperscript{144} Thomas Hardy reported that growers got £5 per ton in 1886, the price having been steady for some years, and that 'the farmers ... consider it pays them better than anything else on their farms at present.' \textit{Royal Commission into vegetable products, first progress report}, p. 17. Giving evidence S. H. Cureton, with experience in the irrigation area in Southern California, said that they reckoned that ten acres would be a profitable vineyard producing an income of about £225 per annum, p. 38. He also stated that for raisins (muscat and sultana grapes) they expected after 6 years to get 50 boxes (20 lb a box) per acre, i.e. 100 lb. per acre and after ten years, 350 lb per acre, p. 59. Growers could not supply the great demand in California for dried peaches, apricot and dried apples.

\textsuperscript{145} W. Harcus (ed.), \textit{South Australia: its history, resources and productions}, Government Printer, Adelaide 1876, p. 145.

\textsuperscript{146} 'Raisins' appears to be used by Schomburgk as a general term for what we now know as raisins, sultanas and currants.
Potential existed not only for raisins, he believed, but also for dried apples, apricots, plums and figs, all of which were left to rot on the ground when they could be dried profitably. South Australia's hot, dry summer made drying a particularly suitable form of processing fruit if it could not be economically marketed when fresh and it was also a valuable technique for domestic purposes.

In 1886 vigneron Thomas Hardy reported to the Victorian Commission on Vegetable Products that currants and raisins were worth about 5-6 pence a pound wholesale, local purchasers preferring the local product. He found sultanas to be relatively easy to dry compared with other grapes such as muscat grapes.

Plant material might be needed not only for new kinds of fruit but to produce disease resistant stock. By 1880 there was considerable concern about the risk of the disease phylloxera spreading to Australia. The aphid *Phylloxera vastatrix* or vine-louse had been introduced into France in 1861. It was identified in 1868, by which time whole vineyards had been affected by root disease. The first recorded introduction in Australia was in 1875. Devastation caused by *Phylloxera vastatrix* and the need to find disease-resistant root stock led to research at such centres as the French Department of Agriculture and Commerce in Montpellier, in the Californian State University and in England. Australia and New Zealand participated in

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147 *Royal Commission into vegetable products, first progress report*, p. 11. Growers were aided by a protective duty in favour of the local product of about 2d. per pound.


149 *The Australian Encyclopaedia*, vol. 4, p. 480.
this research and a Mr Crighton of San Francisco sent a parcel containing the wild vine *Vitis californica*, considered to be phylloxera proof, to W. B. D. Mantell, Acting Director of the Geological Survey Office in Wellington, for propagation in New Zealand and Australia. He in turn sent seed to the South Australian government. Such a programme of propagation might enable the development of disease free stock in geographically separated Australia and New Zealand, which could form a valuable pool of plant stock should the disease spread further. Schomburgk’s colourful warning was that ‘We should be prepared, as the enemy is approaching our shores’.

By 1882, Schomburgk had received favourable reports on *Vitis californica* from recipients of the vine-stock, observing that as well as producing grafting stock *Vitis californica* produced ‘a palatable claret wine’ and ‘is destined in the future to make the claret of California famous’. He suggested that native Australian vines might also be used for grafting purposes, in particular six kinds of *Vitis* native to New South Wales.\(^{150}\)

In 1886 ‘through the energy of Sir Samuel Davenport’\(^{151}\) cuttings of the Daira grape from Almeira in Spain were obtained through the Spanish merchants Jimenez and Sons in London. After a bad start, when the first set of cuttings were washed overboard into the Bay of Biscay, a second batch yielded some grafts for distribution. Daira was considered one of the best varieties of grapes for export since it

\(^{150}\) *Reports* 1880, p. 6 and 1881, p. 7, 1882, p. 4. Later in the century phylloxera devasted the wine growing areas near Sydney and along the Victorian border. South Australia, which experienced less damage, became the principal viticultural state of the Commonwealth, *The Australian Encyclopaedia*, vol. 4, p. 331.

\(^{151}\) Davenport was knighted in 1884.
travelled well. By 1887 the Director could distribute 'one hundred well rooted plants among the vinegrowers'.

'Daira' is now equated with 'Ohanez' grape, still grown for horticulture.

The last of the new vines known to have been sent to the Gardens for trials during the Schomburgk era was the Mexican vine *Vitis mexicana*, discovered in Mexico by a traveller and collector for Damann and Co, a large commercial nursery near Naples. The Mexicans were said to produce from the fruit a palatable wine, tasting a little like the muscatel grape, as well as preserves and excellent vinegar. The advantage of the vine was thought to be its ability to withstand drought. The seeds of the Mexican vine had been sent on to Schomburgk by Albert Molineux, then Secretary of the Agricultural Bureau. Records of Schomburgk's contact with people in Italy are only sketchy but the fact that he was awarded the Order of the Crown of Italy indicates that his work was well-known to some people who were influential in scientific and horticultural circles there.

Schomburgk was very positive about the quality of grapes grown in

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152 Report 1887, p. 5.
153 Report 1889, p. 4.
the area around Adelaide and the potential of local wine for foreign markets.

The finest grapes are grown on the plains: here they ripen to great perfection, and the South Australian wine must soon obtain a high character in the foreign markets.154

He was supporting an industry that was to prove an extremely valuable one. South Australia was to become the largest producer of grapes of all the Australia states, with an industry worth $1,050,000 per annum by 1988-89.155

*Olea europaea* (olive)

Promoting olive culture in the 1877 and 1878 Reports Schomburgk referred to the work of Samuel Davenport and Mr J. Crompton in South Australia. He also recorded the success of W. R. Boothby, Sheriff of Adelaide, in growing olive trees to provide a good quality 'Lucca' oil. Boothby had brought back from Italy 'souchets' from suitable trees and from these souchets young trees were grown in the Experimental Ground ready for distribution among olive growers. South Australian olive oil was reported to have been highly commended at the Vienna and Philadelphia Exhibitions and at the Sydney Exhibition, as well as having 'earned laurels' at the Paris Exhibition for its quality. The Director encouraged olive culture on the basis that trees would grow in 'any soil or locality'. Although of slow growth in the first five to seven years, trees would yield well after eight to ten years. Similar

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154 R. Schomburgk, 'Flora of South Australia' in W. Harcus (ed.), p. 141. Recognition of quality South Australian wines in Britain has taken longer than Schomburgk hoped but some hundred years later they are receiving recognition from connoisseurs and export of quality wines is finally increasing after years of export of poor to medium quality wines.

remarks were made in the 1884 Report.\textsuperscript{156} Schomburgk gave somewhat less space in his reports to olive culture, compared to topics such as pasture grasses, sericulture or wattle farming, although there was some advice on the importance of pruning of olive trees. He may have considered that the work of enthusiasts such as his colleagues Davenport and Boothby made additional trials at the Botanic Garden unnecessary.\textsuperscript{157}

The perfume industry

In his lecture 'Capabilities of the various districts of the colony' Schomburgk recommended the cultivation of flowers for the manufacture of perfumes, a topic previously raised in a pamphlet by Samuel Davenport.\textsuperscript{158} First mentioned in Annual Reports in 1872, it was known to be an industry with valuable potential.\textsuperscript{159} British India and Europe at that time consumed annually about 150,000 gallons (682,500 L) of 'handkerchief perfume' alone. Schomburgk observed that flowers used for perfume grew especially well in South Australia: jasmine, mignonette, verbena, rose, lavender, \textit{Acacia farnesiana}, heliotrope, rosemary, peppermint, violets, wall-flowers, laurel and orange. Wattle and 'myall wood' and other native plants

\textsuperscript{156} Report 1884, p. 19.

\textsuperscript{157} Thomas Hardy giving evidence at the Victorian Royal Commission into Vegetable Products in 1885 stated that olive trees did not yield a crop every year. He did not think that olive production was as profitable as other some other crops. He was getting £8-9 per ton from oilmakers. Hardy also produced wine and dried raisins and currants. \textit{Royal Commission into vegetable products, first progress report}, p. 10.

\textsuperscript{158} Samuel Davenport, \textit{Some new industries for South Australia; silkworms, mulberry, olives, tobacco etc}. Rigby, Adelaide, 1864.

\textsuperscript{159} Report 1872, p. 6.
could also be used. He noted that there were two other requirements for a successful industry besides the availability of suitable flowers. They were firstly, a modification in the law of licensing so that vessels of less than 25 gallons (114 L) could be used, and, secondly, the need for growers to be confident that a bona fide manufacturer would purchase specified flowers, leaves, roots or plants at a marketable price. Schomburgk wrote confidently that he had 'no doubt' that South Australia would be a perfume producing country and that flowers suitable for the manufacture of perfume 'thrive probably in greater perfection here than in any part of the world'.

He quoted the following figures from the publications of Piesse and Brande and the Cornhill Magazine as to the possible yield per acre:

<table>
<thead>
<tr>
<th>Plant Type</th>
<th>Yield</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jasmine plants</td>
<td>80,000 producing 5000 lbs. flowers @ 1/- lb</td>
<td>£250</td>
</tr>
<tr>
<td>Rose bushes:</td>
<td>10,000 producing 2,000 lbs. flowers @ 9d</td>
<td>£75</td>
</tr>
<tr>
<td>Orange trees:</td>
<td>100 at 10 years old - 2,000 lbs. flowers @ 6d.</td>
<td>£50</td>
</tr>
<tr>
<td>Violets:</td>
<td>1,600 lbs. of flowers, @ 2/-</td>
<td>£160</td>
</tr>
<tr>
<td>Acacia farnesiana:</td>
<td>302 at 3 yrs, 900 lbs. flowers @ 2/-</td>
<td>£90</td>
</tr>
<tr>
<td>Geranium plants:</td>
<td>16,000 yielding 40,000 lbs. leaves. - producing 2 oz. distilled otto/ cwt. at 5/- per oz.</td>
<td>£200</td>
</tr>
<tr>
<td>Lavender:</td>
<td>3547 plants giving flowers for distillation</td>
<td>£30</td>
</tr>
</tbody>
</table>

---

160 *Acacia farnesiana* was referred to as 'cassia'. It is not clear which woods are referred to in the statement about wattle and myall wood. *Acacia acuminata* was said by Maiden to have the scent of raspberries and that of *Acacia pendula* to have the scent of violets. Other possibilities are *Acacia conferta*, *A doratoxylon* and *A. harpophylla*. J. H. Maiden, *The useful native plants of Australia (including Tasmania)*, The Technological Museum of N.S.W., Turner and Henderson, Sydney, 1889, Facsimile edition edition, Compendium Pty Ltd, Melbourne, 1975, pp. 289, 311, 349, 363 and 364.

161 Schomburgk, 'Capabilities of the various districts of the colony', p. 116.

162 *ibid.*
There were some other plants for which he could give figures for yield of otto oil (or oil of attar) per cwt. but not yield per acre: these were rosemary, aniseed, caraway, fennel seed and patchouli or patchouli.\footnote{Patchouli oil comes from distillation of the leaves of \textit{Pogostemon patchouli} (or \textit{P. cablin}), and while less well known that the others mentioned is today extensively used in cosmetic preparations and the such major food products as alcoholic and non-alcoholic beverages, frozen dairy desserts, puddings etc. as well as being used in Chinese folk medicine. Albert Leung, \textit{Encyclopedia of common natural ingredients used in food, drugs and cosmetics}, John Wiley and Sons, New York, 1980, p. 260.}

In 1878, it was reported that Theodor Piesse of Piesse and Lubin, the largest manufacturers of perfume in England, had visited Australia in the hope of encouraging horticulturists to grow scent-bearing plants so as to provide an alternative source of raw material to that of southern France, supplies having been interrupted by the Franco-Prussian war. The visit of Theodor Piesse to Melbourne had demonstrated that growers had a definite market for their product. It appeared to be worth considering whether some method of extraction of the essential oils could take place in Australia to provide a product suitable for export. Giving evidence to the Select Committe on Vegetable Products in 1887 Schomburgk noted that a Mr Tocchi had tried to distil perfume but 'could not get the pure perfume as we get it from home'.\footnote{Report of the Select Committee on Vegetable Products, p. 5.}

The possibility of a perfume industry was raised by Schomburgk's colleague Professor Custance of Roseworthy College who considered that both lavender and rosemary were suitable plants for
distillation.165 Despite their hopes the perfume industry did not become a major one in South Australia.

*Humulus lupulus* (hop)

Although hops are best known for their use in brewing, providing the characteristic bitterness of beer and the essential oils contributing to beer flavour, they have also been used in medicine for their sedative and soporific qualities. The hop is a climbing perennial, propagated commercially by cuttings. Indigenous to the northern hemisphere and known to the Romans, it is today grown commercially in Australia, New Zealand, South Africa and South America.166 Hops were recorded in the Francis catalogue of 1859 and again in Schomburgk's first catalogue of 1871.167 Schomburgk contacted a former colleague on the Gawler bench, Richard Turner, in order to obtain male hop plants from Kent in England. These did not survive but after further efforts he could by 1884 record successful introduction of the male hop plant which was understood to be valuable in the production of seed and the improvement of flavour.168

In Schomburgk's time plants were being grown successfully at Lobethal (by Mr F. Kleinschmidt), at Encounter Bay (Mr Bell) and also at Mt Barker and Mt Gambier. Schomburgk thought that there were not many districts in the colony where hops could be grown successfully

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165 *Royal Commission into vegetable products, second progress report and continuation of minutes of evidence*, pp. 73-4.


167 It should be noted that where plants appear in both catalogues one cannot assume that they were grown continuously as the plants could die and be replaced at a later date.

168 Schomburgk, 'Capabilities of the various districts of the colony', p. 107. At this time Richard Turner was special magistrate at 'Gambierton' (Mt Gambier).
but there might be some suitable places such as in 'the gullies'.\textsuperscript{169} Kleinschmidt was said to have used his successful hop plantation to pay off debts from a failed tweed factory in Lobethal.\textsuperscript{170} Hop production continued in Lobethal until at least 1938\textsuperscript{171} but it is not of importance commercially in South Australia today. It is grown commercially in Tasmania and Victoria under cooler climatic conditions.

\textit{Cichorium intybus} (chicory)
Chicory is recorded in the Catalogue of George William Francis in 1859. It is a perennial salad plant native to Europe and grown since Greek and Roman times. The root is roasted and used as an adulterant of coffee, especially in Europe.\textsuperscript{172} By 1874 it was described by Schomburgk as 'in some places [of the colony] so prolific as to be considered a nuisance'. Yet, while fairly simple to grow and manufacture, it was being imported, the amount for the previous nine months being some 55,000 lbs. (approx. 25,000 kg) at a cost of about £629. Schomburgk believed that there was the commercial potential to produce not only enough for local needs but to supply neighbouring colonies too.\textsuperscript{173}

\begin{itemize}
\item \textsuperscript{169} Schomburgk, 'Capabilities of the various districts of the colony', p. 107; \textit{Report 1880}, Appendix A (Plants which are recommended to be grown in conjunction with wheat cultivation) and \textit{Report 1884}, Appendix A (similar to 1880 Appendix with minor modifications), p. 20.
\item \textsuperscript{170} George Loyau, \textit{The representative men of South Australia}, p. 53.
\item \textsuperscript{171} Jim Faull and Gordon Young, \textit{People, places and buildings: rural settlements in the Adelaide Hills, South Australia}, South Australian Centre for Settlement Studies, Adelaide, 1986, pp. 57-62.
\item \textsuperscript{172} Hill, \textit{Economic Botany}, pp. 377 & 472.
\item \textsuperscript{173} Schomburgk, 'Capabilities of the various districts of the colony', p. 112. Similar remarks in Appendices to 1880 and 1884 \textit{Reports}.
\end{itemize}
Chicory was grown as a war-time crop in World War II but is not an important crop today.

*Capparis spinosa* (caper).

In a similar situation capers had been grown at the Botanic Garden since the time of Francis, yet they were imported and Schomburgk believed it should be possible to produce this 'so-much-sought-after luxury' locally. He observed that in the Mediterranean region capers were picked by children and then pickled. In places such as the neighbourhood of Toulon it was grown between fig and olive trees and he thought it would grow well in South Australia 'especially in the gullies'.

Although capers can be grown in South Australia no industry has developed.

*Opuntia tuna* and *Opuntia cochinillifera* (for cochineal)

Cochineal was being proposed for local production in 1873. Schomburgk reported that in the West Indies, Mexico, Brazil and East India the cochineal insect was used to produce a dye called carmine. Despite efforts by the Mexicans to keep the breeding of the insect secret, specimens were obtained and introduced to Corsica and Spain during 1827 by Bertholet. Schomburgk had by 1874 successfully grown both kinds of the 'cochineal plant', *Opuntia tuna* and *Opuntia cochinillifera*175, these grew 'luxuriantly' in the Gardens with little attention176 and he was interested in the possibility of importing the

174 Schomburgk, 'Capabilities of the various districts of the colony', p. 112

175 Both appear in his 1871 Catalogue.

176 *Report* 1874, p. 5.
cochineal insect. He knew there had been some attempts to introduce the insect to Australasia by Sir George Grey.\footnote{177} The trade was lucrative - Schomburgk quoted the exports of Oxaca province of Mexico as being worth £750,000 annually. As the insect was bred successfully in Spain and Corsica, where the climate was not unlike that of South Australia, the Director considered it an enterprise worth considering.\footnote{178} However it was not an enterprise which came to be of economic importance. Very few, if any, natural product dyes are used today on a commercial basis.

*Withania coagulens* (the 'cheese-maker')

A plant introduced in the 1880s, the 'cheese-maker', a shrub common in Afghanistan and Northern India, gives a good illustration of international contacts and international cooperation in that period. Schomburgk was aware of interest at the Royal Botanic Gardens at Kew in 1881 in finding a vegetable substitute for animal rennet in order to facilitate the introduction of a cheese-making industry in India. Seeds of *Withania* were obtained by Henry Scott, Executive Commissioner of the Calcutta Exhibition. The plant was shown by Professor A. Sheridan Lea of Trinity College, Cambridge to have the essential qualities of animal rennet in experiments which were subsequently reported by Schomburgk in his 1884 *Report*.\footnote{179} It is not known whether use was made of this plant in South Australia.

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\footnote{177} Sir George Grey (1812-1898), explorer, governor and politician, was Governor of South Australia from 1841-1845. Grey, a keen naturalist, had introduced the cochineal insect to New Zealand when Governor there. Grey had also sent cochineal insects to the Melbourne Botanic Gardens, but these were lost.

\footnote{178} At this stage he was aware that the discovery of new 'aniline' [sic.] colours had done the carmine trade some harm but 'it is still a most flourishing trade', see Schomburgk, 'Capabilities of the various districts of the colony', p. 115.

\footnote{179} *Report* 1884, p. 4.
Galactodendron utile (the cow-tree)

After several attempts Schomburgk had succeeded by 1876 in growing this tree. He knew it from his British Guiana travels; on that expedition finding the cow-tree enabled them to use its milky juice in their tea.\textsuperscript{180} It is not clear whether he considered the tree might grow in tropical parts of Australia or whether he simply was introducing an interesting specimen.

SUMMARY OF PLANTS FOR CULINARY USE AND PERFUMERY

[Date indicates first time a species is mentioned in Annual Reports or other publication of Schomburgk.]

<table>
<thead>
<tr>
<th>NAME</th>
<th>COMMENTS ON CURRENT USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acacia farnesiana</td>
<td>Native to northern S.A. Occasionally grown in gardens.</td>
</tr>
<tr>
<td>(cassia)</td>
<td>1870</td>
</tr>
<tr>
<td>Capparis spinosa</td>
<td>Can be grown in S.A. (e.g. seen in Adelaide Botanic Garden) but no industry developed.</td>
</tr>
<tr>
<td>(capers)</td>
<td>1871</td>
</tr>
<tr>
<td>Carum carvi</td>
<td>Sometimes grown by herb enthusiasts.</td>
</tr>
<tr>
<td>(caraway)</td>
<td>1873</td>
</tr>
<tr>
<td>Castanea vesca [C sativa]</td>
<td>A few orchards now established in the Adelaide Hills, and there are some old plants in Hills gardens.</td>
</tr>
<tr>
<td>(chestnut)</td>
<td>1871</td>
</tr>
<tr>
<td>Cheiranthus cheiri</td>
<td>Used today as a garden flower.</td>
</tr>
<tr>
<td>(wall flower)</td>
<td>1871</td>
</tr>
</tbody>
</table>

\textsuperscript{180} Report 1876, p. 7.
*Cichorium intybus*  
(chicory)  
1874  

*Citrus* spp.  
Major crops.  
1870  

*Coffea liberica*  
(coffee)  
Uns suited to S.A. Sent to Darwin  
1874  

*Coffea arabica*  
(coffee)  
as above.  
1871  

*Corylus avellana*  
(filbert)  
A few plants in Adelaide Hills.  
1871  

*Ficus carica*  
(fig)  
Orchards of jam figs in decline. Some persist in home gardens.  
1879  

Trojan fig  
1879  

Smyrna fig  
1879  

Col de Signora Blanca  
(from Italy)  
1879  

Col de Signora Blanca d'Or  
(from Italy)  
1879
<table>
<thead>
<tr>
<th>Species</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Foeniculum vulgare</em></td>
<td>Now regarded as a weed. Widely found in roadsides and waste places.</td>
</tr>
<tr>
<td>(fennel seed)</td>
<td>1871</td>
</tr>
<tr>
<td><em>Galactodendron utile</em></td>
<td>Might have been considered useful for tropical areas</td>
</tr>
<tr>
<td>(cow tree)</td>
<td>1876</td>
</tr>
<tr>
<td><em>Glycyrrhiza glabra</em></td>
<td>Relic weedy patches persist.</td>
</tr>
<tr>
<td>(licorice)</td>
<td>1874</td>
</tr>
<tr>
<td><em>Heliotropium arborescens</em></td>
<td>Occasionally grown in gardens.</td>
</tr>
<tr>
<td>(heliotrope)</td>
<td>1870</td>
</tr>
<tr>
<td><em>Humulus lupulus</em></td>
<td>Has been tried. Now grown in Victoria and Tasmania.</td>
</tr>
<tr>
<td>(hop)</td>
<td>1868</td>
</tr>
<tr>
<td><em>Jasminum spp</em></td>
<td>Garden shrubs and climbers.</td>
</tr>
<tr>
<td>(jasmine)</td>
<td>1870</td>
</tr>
<tr>
<td><em>Juglans regia</em></td>
<td>Garden trees and a few orchards.</td>
</tr>
<tr>
<td>(walnut)</td>
<td>1871</td>
</tr>
<tr>
<td><em>Lavandula officinalis</em></td>
<td><em>L. augustifolia</em> ssp. <em>augustifolia</em> is English lavender. Garden plants. There are some commercial lavender farms in S.A.</td>
</tr>
<tr>
<td>[probably <em>L. augustifolia</em>]</td>
<td>1870</td>
</tr>
<tr>
<td><em>myall wood</em></td>
<td>May be either <em>Acacia pendula</em> (native to N.SW) or <em>A. papyrocarpa</em> (native to W.A. and S.A.). Small industry for 'tourist art' but no large scale use for perfumery.</td>
</tr>
<tr>
<td></td>
<td>1870</td>
</tr>
</tbody>
</table>
Mentha piperita  
[Mentha x piperita]  
(peppermint)  
1870  
Garden plant.

Morus cedrona  
(mulberry)  
1867  
Occasional garden trees, probably all leaf producing forms. *M. nigra*, the edible mulberry occasionally grown.

Morus alba  
(mulberry)  
1867  
Occasional garden trees.

Morus multicaulis  
(mulberry)  
1870  
Occasional garden trees.

Olea europaea  
(olive)  
1871  
A few orchards, more important as an invasive tree of hills areas.

Opuntia tuna  
(for cochineal)  
by 1874  
A few naturalized. Minor weed.

Opuntia coccinellifera  
(for cochineal)  
by 1874  
Was not established for commercial use in S.A.

Pelargonium spp  
(geranium)  
1870  
Popular garden plant, some naturalized but of minor importance.

Pimpinella anisum  
(aniseed)  
1871  
Not established as a crop for perfumery.  
Occasional use in gardens.
May be occasional garden use. Not established commercially.

Orchard crop and many trees in home gardens.

Jordan almond
1879

Brandis almond
1884

Garden shrub in Adelaide hills areas.

Minor garden plant.

Major nursery industry for home gardens and cut flowers. No significant use for scent.

Garden plant.

Lemon verbena. Garden plant.
*Foeniculum vulgare* (fennel seed) 1871

Now regarded as a weed. Widely found in roadsides and waste places.

*Galactodendron utile* (cow tree) 1876

Might have been considered useful for tropical areas.

*Glycyrrhiza glabra* (licorice) 1874

Relic weedy patches persist.

*Heliotropium arborescens* (heliotrope) 1870

Occasionally grown in gardens.

*Humulus lupulus* (hop). 1868

Has been tried. Now grown in Victoria and Tasmania.

*Jasminum spp* (jasmine) 1870

Garden shrubs and climbers.

*Juglans regia* (walnut) 1871

Garden trees and a few orchards.

*Lavandula officinalis* [probably *L. augustifolia*] (lavender) 1870

*L. augustifolia* ssp. *augustifolia* is English lavender. Garden plants. There are some commercial lavender farms in S.A.

*myall wood* 1870

May be either *Acacia pendula* (native to N.S.W) or *A. papyrocarpa* (native to W.A. and S.A.). Small industry for 'tourist art' but no large scale use for perfumery.
<table>
<thead>
<tr>
<th>Plant Name</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mentha piperita (peppermint)</td>
<td>1870 Garden plant.</td>
</tr>
<tr>
<td>Morus cedrona (mulberry)</td>
<td>1867 Occasional garden trees, probably all leaf producing forms. M. nigra, the edible mulberry occasionally grown.</td>
</tr>
<tr>
<td>Morus alba (mulberry)</td>
<td>1867 Occasional garden trees.</td>
</tr>
<tr>
<td>Morus multicaulis (mulberry)</td>
<td>1870 Occasional garden trees.</td>
</tr>
<tr>
<td>Olea europaea (olive)</td>
<td>1871 A few orchards, more important as an invasive tree of hills areas.</td>
</tr>
<tr>
<td>Opunta tuna (for cochineal)</td>
<td>by 1874 A few naturalized. Minor weed.</td>
</tr>
<tr>
<td>Opunta coccinellifera (for cochineal)</td>
<td>by 1874 Was not established for commercial use in S.A.</td>
</tr>
<tr>
<td>Pelargonium spp (geranium)</td>
<td>1870 Popular garden plant, some naturalized but of minor importance.</td>
</tr>
<tr>
<td>Pimpinella anisum (aniseed)</td>
<td>1871 Not established as a crop for perfumery. Occasional use in gardens.</td>
</tr>
</tbody>
</table>
Pogostemon patchouli
[\textit{P. cablin}]
patchouli or patchouli
1873

\textit{Prunus amygdalus}
(almond)

Jordan almond
1879

Brandis almond
1884

\textit{Prunus}
\textit{laurocerasus}
(laurel)
1873

\textit{Reseda odorata}
(mignonette)
1870

\textit{Rosa} spp
1870
[first reference to rose for commercial use for perfumery]

\textit{Rosmarinus officinalis}
(rosemary)
1871

\textit{Verbena triphylla}
[Aloysia triphylla]
(verbena)
1872

May be occasional garden use. Not established commercially.

Orchard crop and many trees in home gardens.

Garden shrub in Adelaide hills areas.

Minor garden plant.

Major nursery industry for home gardens and cut flowers. No significant use for scent.

Garden plant.

Lemon verbena. Garden plant.
**Viola odorata**  
(violet)  
1871

**Vitaceae**  
(Grapes)  
Major crop in S.A important for fresh fruit, dried fruit, wine and ornamental 'crimson glory'.

**Daira grape**  
1886

'sultana raisin grape'  
1867

= Ohanez - still grown today.

**vine cuttings from**  
Jardin de Luxembourg  
[20 wine grapes -no details]  
1867

**Vitis antactica**  
Australian species (from New South Wales).

**[Cissus antarctica]**  
1880

**Vitis californica**  
These two (V. californica, and V.mexicana) represent a group of American species root stock: an important development.

**Vitis mexicana**  
1889

**zante currant**  
Use of this cultivar declining.

1873

**Withania coagulens**  
('the cheese-maker')  
Locally naturalized on Eyre Peninsula but very rare.

**Not used at all.**  
1884
PLANTS FOR FABRIC PRODUCTION AND FOR TANNING

_Rubia tinctoria_ (madder) and _Isatis tinctoria_ (woad)

In 1870 there was a report of successful trials of the dye-plant madder which was grown very profitably in France. It was being grown in Adelaide as early as 1859. Schomburgk wrote that roots were available to farmers but since the plants grew very vigorously it was important that they did not spread unchecked to become a nuisance. Another dye-plant, woad, had been introduced by 1874. Woad is not known to have been grown in South Australia commercially. Almost all commercial natural dyes have now been replaced by synthetic dyes.

_Dipsacus fullonum_ (weaver teasel)

Weaver teasel had been already established in the Gardens by the time that wool and tweed was manufactured at Lobethal. The fruit heads of weaver teasel were used to raise the nap of the fabric, since machinery was not then available for the process. Schomburgk was able to supply the mill with plants and seeds so that they did not have the expense of importing the teasels, something which seems to have pleased him immensely. He also raised the possibility of growing the plants as a paying industry\(^1\). He reported that woad and madder were 'useful and indispensable' at the mill.\(^2\) Today, machinery is used to raise the nap in the process of manufacturing wool.

\(^1\) _Report_ 1873, p. 6.

\(^2\) _Report_ 1874, p. 5.


Tanstuffs

The 1878 Report was the first in which wattle farming was promoted as a potential industry for South Australia. Schomburgk had also raised the possibility of wattle farming in a lecture to the Chamber of Manufactures entitled 'Forest tree planting and its influence on climate'.

Although a remunerative undertaking no attention has been paid to its cultivation, and consequently a direct source of wealth has been neglected throughout the colony.

There had been little control over the stripping of trees for bark or consideration of long term strategies. However, a short time prior to Schomburgk's report, regulations had been made about the stripping of trees on government land. In Victoria, where whole districts had been denuded of wattle, the need to encourage the re-growth of trees was apparent. A report on wattle farming arising from the Victorian government's enquiry into the cultivation of wattle for commercial purposes revealed that a very large quantity of wattlebark was being consumed locally each year, some 12,000 to 15,000 tons per annum earning, at £5.0s.0d to £5.12s.6d per ton - from £63,000 to £78,000 per annum. This figure did not include the amount exported to England. Bark imported by England for the tanning industry, from Spain and other continental countries, was said to be in short supply at the time, leading to higher prices.

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183 'Forest tree planting and its influence on climate', was a paper given to the Chamber of Manufactures on June 6, 1878. Printed at the Advertiser and Chronicle offices, Adelaide 1878, p. 5. The paper was re-published in 1884.

184 Report 1878, p. 7; further information was in R. Schomburgk, Wattle farming, 1884.

185 Report 1878, p. 7.
In South Australia, other than in the South East, only the broad leafed wattle *Acacia pycnantha* was used, whereas in Victoria use was made of both black wattle *Acacia decurrens* and silver wattle *Acacia dealbata*. Of the three, black wattle was the most productive. A quick growing tree which grew well in South Australia, it could be barked at eight years, producing 40-60 pounds of bark, and at maturity yielded 100-150 pounds per tree. In the Botanic Gardens, specimens of black wattle reached 30-40 feet after about eleven years. Schomburgk did not have production figures for the whole of South Australia at the time he wrote, although he could quote the success of some individual farmers. However, he believed that wattle-growing was suitable for many acres of land north, south and south-east of Adelaide; land which had been exhausted from cereal-growing. This was before the large scale use of chemical fertilizers enabled continuous cropping of cereals. He considered that one reason why wattle-farming should be a profitable operation was that after the first year, when the trees were about 3-4 feet high (about 90-120 cm), the land could be used for grazing sheep 'without injury to the young trees'.\(^{186}\) The trees grew 'readily in almost any soil' although the yield of tannin bark from trees growing on limestone formation was inferior to that from trees grown in other soils.

Schomburgk set out some estimates of the cost of establishing a wattle plantation and the yield which might be expected. Whether or not his figures were accurate and realistic, the estimates had some potential value in presenting elementary concepts of cost benefit analysis.

\(^{186}\) R. Schomburgk, *Wattle farming*, 1884, p. 5.
ESTIMATE OF EXPENDITURE ON A WATTLE PLANTATION OF 100 ACRES DURING AN 8 YEAR PERIOD.

Rent of 100 acres for 8 years at rate of 6s. per acre per annum 240.0.0
Ploughing 100 acres in drills 10 ft. apart 25.0.0
Sowing wattles and actual cultivation including cost of seed 37.10.0
Supervision for 8 yrs. (nominal) say £10 per annum 80.0.0
Pruning the trees, taking off useless wood (only necessary for two years), 10s. per acre 50.0.0
Incidental and unforeseen expense 27.10.0
Interest on the whole amount expended during 8 years 240.0.0

Actual cost of stripping and carting as shown below 1,515.0.0

£2,215.0.0

Receipts derivable from a Wattle Plantation of say 100 acres planted in the manner proposed.

Each acre planted with wattles 10 ft. apart would carry 400 trees, and at end of fifth year would yield say 56 lb. matured bark, Stripping only every third tree, 332 tons would be stripped off 100 acres. This at £4 per ton would give for first stripping 1328.0.0
In the sixth or following year, a similar number of trees would be stripped. The bark having increased in weight (say 14 lb.), the increased yield of second stripping would therefore be 400 tons at £4 per ton 1600.0.0
In the seventh year the remaining trees would be stripped, from which a still greater increase would be obtained, say 480 tons at £4 per ton 1920.0.0

Total yield of bark would therefore represent a money value of £4,848.0.0
The cost of stripping would not exceed 15s. per ton, on account of the facilities provided by the regularity of the trees, while carting would represent another 10s. per ton. These combined charges would be 25s. per ton and on 1,215 tons would be £1,515, leaving a clear profit on the 100 acres (after allowing for the primary expenditure) of £2,637.0.0

[This yield is equivalent to £3.4.0 per acre per year].

In Victoria the government took a role in encouraging the wattle industry, for example by directing that wattle trees should be planted on all railway reserves with suitable soil. Schomburgk promoted wattle farming in the Annual Reports of the period 1878-86 stating in 1886 that

it is entirely due to the efforts made through the management of the garden that public attention has been so thoroughly awakened to the advantages and profits which may be derived from the systematic cultivation of wattle.

The wattle bark industry did prove to be an important one, both in terms of its contribution to the South Australian economy and in terms of the value to the individuals for whom it provided a livelihood. It died out at the end of the 1930s.

There were other species besides acacias which were suitable for use in the tanning industry. In response to the publication of material from his 1883 Report in the Register and Advertiser newspapers the Director received a letter from a former resident of the Orange River Free State in South Africa about a plant known in South Africa as Eland's Boontjes or Eland's Boontges (Elephantorrhiza burchellii) a legume that could be used in the tanning of leather. The plant was said to be used widely by farmers in the Orange River area,

188 Report 1886, p. 22.
the roots for tanning and the rest of the plant by grazing animals. Farmers used the leather for both shoes and breeches. Schomburgk applied to J. M. Wood, Director of the Botanic Garden, Natal, for seed for trials in South Australia.\textsuperscript{189}

This account demonstrates how publicity for the Botanic Garden's work led to further information, which in turn produced new plant material through the international exchange network. This particular plant was reported in 1886 to have survived three particularly dry seasons but Schomburgk, who had in the past experienced disappointment with trials after early high hopes, wrote cautiously that 'it would be premature to hazard a positive opinion yet'.\textsuperscript{190} In 1887 he noted that although the plant grew well and was very ornamental the amount of tannic acid in the roots was less than had been hoped when it was first tested.\textsuperscript{191} It does not seem to have been established or used on a large scale.

Suggestions for plant trials might come from local business houses. An example of this, provided by the case of \textit{Sumach} (another plant used for dyeing and tanning purposes)\textsuperscript{192} is worth describing in some detail. A letter had come to the Adelaide firm Harrold Bros. from their London headquarters giving details of the cultivation of the

\textsuperscript{189} Report 1884, pp. 3-4.

\textsuperscript{190} Report 1886, p. 5.

\textsuperscript{191} Report 1887, p. 4. It was considered to be worthwhile testing at other seasons of the year as the amount of tannin varied in different seasons as in the case of wattles. In addition the roots contained 'colouring matter that is considered objectionable'.

\textsuperscript{192} Some 10,000-18,000 tons were imported into England annually according to Schomburgk quoting John Smith's \textit{Dictionary of plants which provide the natural wants of man}, in Report 1884, p. 6.
plant, which grew in Italy and could tolerate poor or sandy soils. It appears that Harrold Bros. had initiated the enquiry. Learning that the plant was known in the area of Palermo, Italy, they had written to the British Consul in that area. Harrold Bros. supplied Schomburgk with information they had received in a letter from the British Consul on such matters as propagation techniques, prices obtained for Sumach, the name of a book written on cultivation of the plant, and the name of the English firm in Palermo which ground and exported the product. The letter gives some indication of the cooperative attitudes then existing between the commercial sector and the Director of the Botanic Gardens.

Thinking that it might be to the interest of some of your clients to introduce it, and thus turn to good account sterile ground, and feeling that it might be a desirable addition to the products of the colony, we have had pleasure in getting the foregoing information together, but should you desire more we will write to the firm mentioned by the British Consul.\textsuperscript{193}

In fact Schomburgk already had specimens of shrubs known as sumach, \textit{Rhus coriara} and \textit{Rhus cotinus}. He noted that the leaves and young shoots of the plant, which were poisonous and astringent, were ground to produce both tannin and a yellow colouring matter.

In cases such as these where seeds were obtained from a commercial concern, botanic garden or friendly colleague, Schomburgk appears to have raised seeds in pots then planted them out in the Experimental Garden, after which, if they were successful, they could be offered for trials in other parts of the colony. His original training and subsequent lengthy experience meant that many of his contacts knew that if it were possible to propagate plants he would succeed in doing

\textsuperscript{193} Report 1884, p. 7.
so. This is reflected in the remarks of people who sent him plant material.

**SUMMARY OF PLANTS FOR FABRIC INDUSTRY AND TANNING, MENTIONED BY SCHOMBURGK.**

(Date indicates first time a species is mentioned for this purpose in Annual Reports or other publication.)

<table>
<thead>
<tr>
<th>Plant Name</th>
<th>Date</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Acacia pycnantha</em></td>
<td>1878</td>
<td>Native to southern S.A. Now used for horticulture. National flower of Australia.</td>
</tr>
<tr>
<td><em>Acacia decurrens</em> (black wattle)</td>
<td>1878</td>
<td>E. Australian sp. sparingly naturalized in S.A. Occasionally grown for horticulture.</td>
</tr>
<tr>
<td><em>Acacia dealbata</em> (silver wattle)</td>
<td>1878</td>
<td>E. Australian sp. sparingly naturalized in S.A. Occasionally grown for horticulture.</td>
</tr>
<tr>
<td><em>Dipsacus fullonum</em> (weaver teasel)</td>
<td>1873</td>
<td>Occasionally naturalised in South East of S.A. Not used now.</td>
</tr>
<tr>
<td><em>Elephantorrhiza burchellii</em> (Eland's Boontjees/Boontges) (Eland's beans)</td>
<td>1884.</td>
<td>Not thought to have ever been established or used in S.A.</td>
</tr>
<tr>
<td><em>Isatis tinctoria</em> (woad)</td>
<td>1871</td>
<td>Not thought to have been established or used in S.A.</td>
</tr>
</tbody>
</table>
**Rhus coriaria**
(sumach)
1884

**Rhus cotinus**
[Cotinus coggygria]
(sumach)
1884

**Rocella tinctoria**
1881

**Rubia tinctoria**
[Rubia tinctorum]
(madder)
1870

**TREE PLANTING FOR UTILITARIAN PURPOSES**

Forest products are used for a wide variety of purposes. In addition to timber products for building and engineering use, shingles, fencing, furniture and cabinet making, there are a variety of other products and uses: packing containers, cooperage, sports and recreational ware, musical instruments, wooden ornaments and toys, scientific and technical instruments, surgical appliances, industrial equipment, vehicle manufacture, fuel wood and the production of charcoal. Early settlement in South Australia saw trees being cut quite indiscriminately to produce such products and it was not until the 1870s that serious attention was paid to the issue of conservation of forest reserves.
Schomburgk's early reports considered the issue of civic tree-planting and we have seen that he promoted planting of avenues of trees in the city. The establishment of the arboretum and pinetum at the Botanic Gardens provided opportunities for trials of a wide variety of different species. There were large numbers of trees: 144 species of conifers with 492 specimens, 34 species of eucalypt and 41 species of wattle with 152 specimens and 124 respectively by 1868.\textsuperscript{194} This helped promote public education as to the species that were suitable for South Australian conditions. By 1868 it was recorded that trees and shrubs could be supplied to Corporations, District Councils and other public bodies for the purpose of beautifying public places, church and grave-yards.\textsuperscript{195} In the 1869 \textit{Report} mulberry trees were discussed in the practical context of the promotion of the sericulture industry.\textsuperscript{196}

In 1870 we find the first general discussion in reports of the importance of forest tree planting in South Australia. Schomburgk had given a paper to the Philosophical Society in August 1870 entitled 'On the influence of forests on climate, and the preventing of the wasteful destruction of our forests which has hitherto prevailed'.\textsuperscript{197} In this address he stressed both the importance of constituting reserves of existing forests and the value of planting the sides of railways, main roads and secondary roads and small

\textsuperscript{194} \textit{Report} 1868, p. 3.

\textsuperscript{195} \textit{Report} 1868, p. 3.

\textsuperscript{196} \textit{Report} 1869, p. 4.

\textsuperscript{197} 'On the influence of forests on climate, and the preventing of the wasteful destruction of our forests which has hitherto prevailed', 9 August 1870, in \textit{Papers read before the Philosophical Society and the Chamber of Manufactures}, 1873.
plantations. He wrote on the value of encouraging tree-planting on private property. Clearly, he saw tree-planting as not only being valuable in providing timber for the local economy but also important for broad environmental reasons.

At this time he recommended some of the Western Australian trees *Eucalyptus marginata* (jarrah), *E. calophylla* (Western Australian red gum), *E. gomphocephala* (tuart), *Acacia acuminata* (raspberry scented acacia) and *Santalum cygnosum [S. spicatum]* (sandalwood) as timber trees suitable for the Adelaide plains. (*Santalum spicatum*, described as a W.A species, does occur in S.A.). *Eucalyptus marginata* was growing well in the Botanic Gardens and was a particularly valuable hardwood. *E. calophylla* was 'strongly recommended for extensive planting' on the basis of its value for fencing, its quick growth and attractive appearance. *E. gomphocephala* (tuart) was valued for its durability. *Acacia acuminata* and *Santalum cygnosum* were both valuable exports for the East Indies trade. Enthusiastic as the Director was about the early growth of these Western Australian species, it is significant that by 1872 he had found that in adjoining avenues planted alternatively with *Tristania conferta, Eucalyptus marginata* and *E. calophylla*, the last two were growing so much more slowly after a year that they were replaced with *Tristania* specimens.

Of the European trees suitable for the plains Schomburgk recommended *Fraxinus excelsior* (common ash), *Ulmus campestris* (common elm), *Ulmus suberosa* (cork-barked elm), *Robinia pseudoacacia* (locust tree), *Melia azedarach* (white cedar), poplars of various kinds and conifers such as *Pinus halepensis* (Aleppo pine),
Pinus maritima (maritime or swamp pine), P. insignis and other Californian pines. For areas such as the Adelaide Hills his experience led him to recommend Aesculus hippocastanum (horsechestnut), Quercus robur and Q. rubra (oak), Q. suber (cork oak), various maples and elms, Platanus orientalis (plane tree) and European and North American conifers. In his paper to the Philosophical Society he also recommended the planting of the New South Wales red cedar in South Australia. He believed that a supply of 18,000 to 20,000 trees could be raised annually for distribution so long as an additional grant was made available for the purpose.

In 1872 there was further promotion in the Annual Report of the use of conifers in 'the city and its approaches', as was done in Melbourne and Sydney, especially the use of Pinus halepensis, P. insignis, P. maritima, P. laricio, P. pinea, P. pinaster, P. sabiana, P. longifolia and P. canadensis. Most species grew well except '...the genera Picea, Abies, and some of the Himalayan species...'. An avenue of conifers dating back to this period is that of P. halepensis and P. pinaster in Botanic Park adjoining Hackney Road. Conifers were recommended in place of eucalypts for public plantings in 'our squares, terraces and the approaches to the city'. Eucalypts had to be replaced along North Terrace, 'the principal avenue' of the city, where two thirds of those

198 Report 1870, p. 4.
199 'Influence of forests on climate', August 9, 1870, in Papers read before the Philosophical Society and the Chamber of Manufactures, 1873, p. 7.
200 Report 1870, p. 4.
planted had already died by 1871. Some 4000 plants were given away to civic bodies in 1869; this had risen to more than 7000 plants in 1873. Such tree-planting not only made the city and its environs more attractive but had a utilitarian value in providing shade and shelter and retaining the soil, especially on river banks, along railway lines and around the new reservoir. By 1874, Schomburgk reported very favourably on English and cork elms and plane trees for street tree planting, the period when important avenues were planted along Frome Road and in Botanic Park - today some of the finest avenues in the city.

By the time of the 1875 Report, when more serious efforts were being made to establish forest reserves, the Director spelt out some general principles of tree planting. These would be applicable to private individuals attempting forest tree planting on their own land as well as to those plantations being established by the new Forest Board. *Pinus halepensis, Pinus maritima*, Californian pines, elm, ash and plane were mentioned as being suitable trees for the plains. The deciduous trees of Europe and North America were thought to be suitable for the hills and southern districts, especially the Mt Gambier area. In the 1875 Report Western Australian eucalypts were also recommended as was Tasmanian blue gum [*Eucalyptus globulus*]. The latter was said to have the advantage of being quick growing and being suitable for telegraph and scaffolding poles for the building

202 Report 1871 p. 3. It was reported that the eucalypts were replaced with *Ficus macrophylla, Grevillea robusta, Sterculia heterophylla, Lagunaria patersonii, Tristania conferta* and *Melia azedarach.*

203 Report 1869, p. 5; Report 1873, p. 8.
industry.\textsuperscript{204} The planting of an Arboretum of European and North American forest trees 'elms, oaks, birch, ash, maple, &c' along the boundary of the Botanic Garden adjoining the old Exhibition Ground provided further opportunities for public display of these trees; by 1876 'their luxuriant growth has surpassed my expectation'.\textsuperscript{205} As noted in Chapter 4, European and North American forest trees were also to be seen in the newly planted Botanic Park, where trees planted in 1874 were reaching up to 10-12 feet (3.0-3.6 m) in height. Losses were only 2\% out of a total of 9,000 trees planted, with most losses due to vandalism.\textsuperscript{206} The Director used these figures in his address to the Chamber of Manufactures of June, 1878, 'Forest tree planting and its influence on climate'.\textsuperscript{207} By the time he gave this paper in 1878 Schomburgk could make specific suggestions about forest tree planting and the commercial potential of particular kinds of timber. He cited the example of a belt of trees some 20 feet (6.1 m) wide around the farm of Mr J Hodgkiss (a Member of Parliament and 'enthusiastic agriculturist'), the trees providing shelter from frost, wind and fires.

\textit{Fraxinus spp.} (ash) Schomburgk gave special attention at this time to species of ash, both \textit{Fraxinus americana} (American ash), which could be grown on the Adelaide plains and which provided a tough but light timber suitable for the handles of implements and for oars, and the

\begin{footnotesize}
\begin{itemize}
\item \textsuperscript{204} Report 1875, p. 5.
\item \textsuperscript{205} Report 1876, p. 8.
\item \textsuperscript{206} Report 1876, p. 9.
\item \textsuperscript{207} 'Forest tree planting and its influence in climate', paper read to the Chamber of Manufactures, June 6, 1878 published by Advertiser and Chronicle Office, Adelaide, 1878. This paper included some of the same material as his paper 'Influence of forests on climate', August 9, 1870.
\end{itemize}
\end{footnotesize}
European ash which was used by wheelwrights, coachmakers, joiners and turners. 208

*Ulmus* spp (elm) Elm was also recommended, especially the common elm. Elms had grown well in the Botanic Gardens and the wood was said to be fine-grained and durable in water. It was suitable for use by wheelwrights, machine makers, shipbuilders, and joiners. Elms were strongly recommended in 1875 for public squares and streets and in 1877 for planting for its valuable timber.209

*Populus* spp. (poplar) The wood of poplars was suitable for use by cabinet makers, turners and toy-makers. Schomburgk recommended *Populus alba* (white poplar), *P. monilifera*, *P. angulata* and *P. dilatata* in his 1878 paper.

*Salix* spp. (willows) Willows were first promoted in 1877, based in part on the successful growth of a number of different species in Botanic Park. Schomburgk pointed out that although commonly associated with damp places, some willows grew in poor soil in exposed positions. He recommended willows for the banks of local rivers such as the Murray, Onkaparinga and Hindmarsh and for the south-east of South Australia. He especially recommended *Salix russelliana* for timber, and the osier willow, *Salix viminalis* for stabilizing river banks and to provide work for basket makers.210 Basketware, imported from Europe and America, was used for prams,

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208 'Forest tree planting and its influence in climate', 1878, p. 3.


210 *Report* 1877, p. 6; 1884, p. 21.
invalid chairs and commercial containers where light-weight metals and plastics are now used. The 1886 Report records Sir Samuel Davenport importing plants of three kinds of basket willows 'much esteemed for basket-work at home'; however it is not known to what extent willow was used for basket-making in the period under discussion. Willow timber is light and hard-wearing; denting rather than splitting under pressure and was thus valuable for items such as making the paddles of steamboats, broom handles, cricket bats and artificial limbs. The willow has adapted to a wide variety of climatic conditions and is today found in most parts of the world. Willows came to be used for planting along water-courses in the southern parts of South Australia and were said to have been used to mark the River Murray banks so that paddle steamers knew which channel to take during times of heavy flooding.

*Robinia pseudoacacia* (locust-tree) The wood of this North American tree was prized for its strength and toughness and was valuable for use in the cogs of wheels and for trenails in ship-building.

*Quercus* spp. (oak), *Acer* spp. (maple), *Tilia* spp. (lime), *Fagus* spp. (beech) and *Betula* spp. (birch) Trees such as these, which were some of the most valuable in Europe and North America, did not grow well in the locality of Adelaide: 'They suffer materially from droughts and

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211 *Report* 1886, p. 6. These were Huntingdon, Bitter and Yellow Ozier varieties.

212 S.C. Warren-Wren, *Willows*, David and Charles, Newton Abbot, 1972, pp.13-14 and p. 78. There are places where willows are not grown, for example the Malay peninsula, Polynesia or a number of tropical islands.

213 'Forest tree planting and its influence in climate', p. 4 A trenail or treenail is a cylindrical pin of hardwood used to fasten timbers together, especially used where materials are exposed to water.
hot winds, their growth is very slow and stunted, but in the [Adelaide] hills and no doubt in the Mt Gambier district, they will grow more rapidly.\textsuperscript{214}

\textit{Juglans} spp. (walnut) and \textit{Carya} spp. (hickory)
Walnut grew in the hills but was recommended to be grown for its nuts rather than its timber. Several kinds of hickory had grown in the Botanic Gardens but had not thrived and could not be recommended.\textsuperscript{215}

\textit{Tamarix gallica} (Tamarisk) was found to be useful for planting along seashores, such as at nearby Glenelg, to prevent sand accumulating on nearby roads.

\textit{Quillaja saponaria} (the soap bark tree) A number of plants contain saponins (water soluble glucosides). These are natural products that can be used as soap substitutes. The soap bark tree was one of these, a native of Chile and Peru. The saponin content of the bark was used in Chile as a substitute for soap for washing fabrics. A specimen was sent to the Botanic Gardens by Sir Joseph Hooker in 1883. Schomburgk doubted that it would grow outdoors successfully but sent seed to Palmerston in the Northern Territory for trials. However he reported in 1884 that none of the seed had germinated.\textsuperscript{216}

\textsuperscript{214} ibid.
\textsuperscript{215} ibid.
\textsuperscript{216} Report 1886 p. 6 In the twentieth century it is known as a substance for washing delicate fabrics and was used in the Second World War as an emergency material for cleaning lenses and precision instruments. It has been used in the pharmaceutical field also, Hill, \textit{Economic Botany}, p. 209.
European and North American conifers. More successful than the soap bark tree were some of the European and North American conifers. Schomburgk recommended *Pinus maritima*, *P. halepensis*, *P. pinaster* and *P. pinea*, which provided good timber and would grow quite close to the coast. He also recommended *P. canariensis* and the Californian pines, *P. sabiana* and *P. insignis*. All three of these last named were described as 'resinous, durable and free from the ravages of insects' and *P. insignis* was especially praised for its quick growth.\(^{217}\)

Surprisingly, Schomburgk also recommended *Sequoia sempervirens*, the Californian redwood. Two valuable timber trees *Pinus sylvestris*, the Scots fir, and the larch (which he referred to as *Pinus larix*) he had found unsuccessful on the plains but worth trying in the cooler areas of the Adelaide Hills and Mt Gambier.

Australian species

The 1878 paper gives a summary of useful South Australian trees 'which, from the wasteful destruction of our forests and elsewhere, have already become scarce, and deserve replanting'.\(^{218}\) The foremost of these was the red gum, which he believed compared in utility with any timber in the world. It was a durable timber for underground work, bridges, jetties, railway sleepers and shipbuilding and it had the important quality of being resistant to termite damage. The white gum, South Australian blue gum, stringybark, ironbark, box gum and swamp gum all provided valuable timber.\(^{219}\) By the time this

\(^{217}\) 'Forest tree-planting and its influence on climate', p. 4.

\(^{218}\) *ibid*, p. 4.

\(^{219}\) These were all referred to by their common name. The summary table at the end of the chapter gives the botanical names associated with the common names used in this period but it is not possible to identify them positively because of the great variation in common names used.
paper was written he had found that the Western Australian jarrah, of which he had previously been so hopeful, would only grow in sandy soils and on the sides of hills - those planted in Adelaide and in heavy soils had proved failures. However, he had found the Tasmanian blue gum, *E. globulus*, to be one of the quickest growing trees, growing 40-50 feet (12-15 m) in ten to twelve years. On a commercial basis, an acre of land could take 680 trees planted 8 feet (2.4 m) apart. With reasonably good soil, alternate trees could be cut down after twelve years, bringing in £51 (from 340 poles at 3s a pole), which would pay for the original planting. However, Schomburgk added with tongue in cheek, since no branch of agriculture, horticulture, or aboriculture, is at once so pleasant and so productive of possible gain as farming on paper, which often leads to great errors, let us reduce the yield of the first thinning of the blue gum to £30 or £40, they will even then pay for the preparing of the ground.220

Other trees native to South Australia which had commercial potential included the sheoak, which was used for wheel spokes and tool handles, and *Acacia melanoxylon* (blackwood), a species valuable for cabinet makers but almost destroyed near the coast, and one which Schomburgk wanted to see replanted. *Eucalyptus odorata* (peppermint tree) provided wood considered very suitable as fuel for steam engines. It was said to be second only to wood from the eucalyptus species that are known collectively as mallee. Mallee was known locally as an excellent firewood for domestic purposes.

Schomburgk published some supplementary remarks to his paper of 6 June 1878, adding some information about useful timber trees from the other Australian colonies. He explained that there was

220 'Forest tree-planting and its influence on climate', p. 4.
considerable variation in the colonies as to common names used, names such as 'redgum', 'peppermint gum' and 'stringybark' being used for very different trees in different colonies. To add to the problem of nomenclature, there were variations within the one colony. In South Australia the common name 'white gum' was used in different localities for both *E. leucoxylon* and *E. viminalis*, and *E. leucoxylon* was known variously in different localities as 'bluegum', 'pink gum', 'redgum' and 'white gum'.

Schomburgk wrote of the principal timber trees of the other colonies that 'most of them are cultivated in the Botanic Garden, and are thriving uncommonly well'. However he did not indicate which were failing to thrive. In addition, his knowledge of the distribution of different species had limitations. Despite such limitations his remarks are useful in that they give some indication of the timber thought to be especially valuable at the time. This group is marked with an asterisk in the summary table below. Where they were listed in a Botanic Gardens Catalogue this is indicated.

Schomburgk considered the timber trees *Eucalyptus viminalis* (swamp gum), *E. gigantea* (Tasmanian stringybark), *E. globulus* (blue gum), *E. amygdalinus* (Tasmanian peppermint) and *Fagus cunninghami* (native myrtle) to be the most valuable; all providing a close-grained timber that could be used for ship-building, house construction and other purposes for which oak was used in England. He noted that many of the Victorian timber trees grew in South Australia, exceptions being the gigantic *E. amygdalina* and *Fagus cunninghami*. He considered the

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221 J. E. Brown, *The Forest Flora of South Australia*, Parts 1-9, Government Printer, Adelaide, 1882-90. [Not all the parts of *The Forest Flora* are paginated.]
most striking of the N.S.W. trees to be *Cedrela australis* (red cedar). It grew well in the Botanic Gardens and could be recommended for S.A. Other valuable trees were *E. siderophloia* (ironbark) and *Angophora intermedia* (appletree), both providing very durable timber. Ironbark was prized by wheelwrights while the apple tree was useful for wheel naves and other purposes where it was important that wood did not split easily.\(^\text{222}\)

A number of the Queensland timber trees grew in N.S.W. but also were successful in S.A. Schomburgk gave special mention to the durable timber to be obtained from the following from Queensland: *E. pilularis* (blackbutt), 'a timber of great strength and durability', *E. botryoides* (Qld blue gum), 'useful for wheelwrights' work, naves, felloes, etc', *E. tereticornis* (Qld redgum)\(^\text{223}\), *E. stuartiana* (turpentine tree) (used in underground work), *E. fibrosa* (Qld stringybark), used for flooring-boards and *E. citriodora* (lemon-scented gum), used for building and also providing oil by distillation of the leaves. He commented that 'all these trees will prosper with us' but it was not clear whether he was referring to just the Queensland trees or to a larger group that included the Tasmanian, New South Wales and Victorian timbers.\(^\text{224}\) Western Australian timbers referred to in this paper were those that the Director had written about earlier in 1870.\(^\text{225}\)

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\(^\text{222}\) The nave is the centre part or hub of the wheel, to which spokes and axle are attached.

\(^\text{223}\) In the paper it is referred to as *E. tereticornia*.

\(^\text{224}\) 'Forest-tree planting and its influence in climate', supplementary remarks, p. 8.

\(^\text{225}\) In 'Influence of forests on climate', pp. 6-7.
Trees for tan bark
These have already been considered in a previous section. However they are noteworthy in forming an important part of the timber product industry. The most important were *Acacia pycnantha*, *A. decurrens* and *A. dealbata*.

SUMMARY OF USEFUL TREES MENTIONED BY SCHOMBURGK
[Date indicates first time a species is mentioned in Annual Reports or other publication.]
* Indicates species mentioned in a letter of 28 June 1878, in a list of timber trees from N.S.W., Victoria, Qld and Tasmania; it is not clear whether these were being recommended for planting in S.A.
A.B.G = Adelaide Botanic Garden.226

<table>
<thead>
<tr>
<th>NAME</th>
<th>COMMENT ON PRESENT USE</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Acacia acuminata</em></td>
<td>Minor horticultural use.</td>
</tr>
<tr>
<td>(raspberry scented acacia)</td>
<td></td>
</tr>
<tr>
<td>1870</td>
<td></td>
</tr>
<tr>
<td><em>Acacia dealbata</em></td>
<td>Minor horticultural use.</td>
</tr>
<tr>
<td>(silver wattle)</td>
<td></td>
</tr>
<tr>
<td>1871</td>
<td></td>
</tr>
<tr>
<td><em>Acacia decurrens</em></td>
<td>Minor horticultural use.</td>
</tr>
<tr>
<td>(black wattle)</td>
<td></td>
</tr>
<tr>
<td>1871</td>
<td></td>
</tr>
<tr>
<td><em>Acacia melanoxylon</em></td>
<td>Minor horticultural use.</td>
</tr>
<tr>
<td>(blackwood)</td>
<td></td>
</tr>
<tr>
<td>1870</td>
<td></td>
</tr>
</tbody>
</table>

226 Information has been provided for this section by David Symon, Robin Barker, Tony Whitehill, Theckla Reichstein and the staff of the Technical Section of Adelaide Botanic Garden.
Acacia pycnantha  
(broad leaved wattle)  
1871

More widely planted and protected. Used on Mt Barker Freeway.

Acer spp.  
1870  
(maple)

Was recommended for Adelaide Hills region. Failure on plains.

Acer saccharinum  
(sugar maple)  
1869

Was recommended for avenue planting. Failure on plains.

Aesculus hippocastanum  
(horse-chestnut)  
1870

Was recommended for Adelaide Hills region. Failure on plains.

* Angophora intermedia  
(N.S.W. applewood)  
1878 Catalogue

Sincarpia maculata.

Betula pendula  
(birch)  
1871

Popular horticulturally but not really suitable for Adelaide plains.

Carya spp.  
(hickory)  
1871 Catalogue

Rarely grown.

Casuarina spp.  
(Shea Oak)  
1871 Catalogue

Some species popular with native tree growers.

Castanea vesca  
(Spanish chestnut)  
1871 Catalogue

Occasionally grown. A few recent small orchards (e.g. at Echunga).
*Catalpa syringaefolia*  
Catalpa tree  
(Indian bean tree)  
1871 Catalogue

*Occasional horticultural use on plains.*

*Cedrela australis*  
(New South Wales red cedar)  
1871 Catalogue

*Occasional horticultural use. Two in Adelaide Botanic Garden dating back to Schomburgk era.*

*Cupressus* spp.  
1866

*Many used in horticulture. Some as windbreaks in the South-East.*

*Eucalyptus* spp.

*E. amygdalinus*  
(Tas. stringybark)  
1871 Catalogue

*syn. E. salicifolia. Rare in S.A.*

*E. botryoides*  
(Qld. bluegum)  
1878

*Commonly planted but only in last 20-30 years.*

*E. calophylla*  
(Western Australian red gum)  
1870

*Occasional horticultural use.*

*E. citriodora*  
(lemon scented gum)  
(spotter gum)  
1871 Catalogue

*Widely planted horticulturally e.g. avenue at Waite Institute.*

*E. diversicolor*  
(kauri) [karri]  
1878

*Rare. No local specimens known to A.B.G staff.*

*E. fibrosa*  
Qld stringybark  
1878

*Rare.*
* E. gigantea  
(Tasmanian stringybark)  
1878

Rare. No local specimens known to A.B.G staff.

Eucalyptus globulus  
(Tasmanian blue gum)  
1870

Widely planted in S.A. but largely unsuitable due to low rainfall.

E. gomphocephala  
(tooart or tuart)  
1870

Useful in sandy coastal areas for shade and ornamental planting.

E. leucoxylon  
1871 Catalogue

Native species widely planted in horticulture.

Eucalyptus marginata  
(jarrah)  
1870

Rare. No specimens known in S.A.

* E. megacarpa  
W. Australian blue gum  
1878

Rare. No specimens known in S.A.

Eucalyptus obliqua  
(S.A. stringybark)  
1871 Catalogue

Native but not widely planted.

Eucalyptus odorata  
(peppermint)  
1878 or earlier

Native but not widely planted.

* E. pilularis  
(N.S.W. blackbutt )  
1878

Rare. No specimens known in S.A.

* E. siderophloia  
(N.S.W. ironbark )  
1871 Catalogue

Rare.
*E. stuartiana*  
(Qld turpentine tree)  
1871 Catalogue  
Rare. No specimens known in S.A.

*E. tereticornis*  
(Qld redgum)  
1878  
Rare.

*E. viminalis*  
(Tas. swamp gum)  
1871 Catalogue  
Occasionally planted in Adelaide Hills.

S.A. white gum  
[? *E. coriacea* or *E. rostrata*]  
1878  

'box gum'  
[? referring to *E. hemiphloia*]  
1878

'swamp gum'  
[? referring to *E. gunnii* or *E. viminalis*]  
1878  
*E. viminalis* occasionally planted.

*Fagus cunninghamii*  
native myrtle (Tas. & Vic.)  
1878  
Total failure in S.A.

Fagus spp.  
(beech)  
1878  
Almost total failure in S.A.

*Ficus macrophylla*  
Moreton Bay Fig  
1867  
Was recommended for avenues etc. Large size makes it inappropriate for smaller areas but can be used where space available. Fine trees in Botanic Park, Levi Park etc.
Fraxinus americana, (American ash) 1866

Fraxinus excelsior (common ash) 1870

European ash

Grevillea robusta (silky-oak) 1867

Gleditchia triacanthos 1867

Lagunaria pattersoni 1871 Catalogue

Melia azedarach (white cedar) 1867

P. canadensis [name does not appear in Catalogues] 1872

Pinus canariensis Canary Island pine 1871 Catalogue

Pinus cembra (stone pine) 1867

Rare.

Rare. Occasionally used in horticulture e.g. Golden Ash.

[? F. excelsior]

Was recommended for avenue planting. It is fairly widely planted for horticulture but very mixed results.

Was recommended for avenue planting. Occasionally planted.

Mentioned as an avenue tree. Good for coastal areas.

Widely used as a street tree but now out of favour.

There is both a Pinus canadensis and a Populus canadensis [Golden poplar]. Perhaps a misprint for Pinus canariensis?

Successful and used for horticulture.

Very rare. There was a specimen at Newman's nursery until the late 1960s and possibly one at St Vigeans, Stirling.
P. halepensis (Aleppo pine) 1867
Widely planted and now naturalized, probably the most successful Pinus outside the South-East.

P. insignis (Californian pine) 1866
= Pinus radiata: our major timber tree in South East.

Pinus larix (larch) 1871 Catalogue
Rare if not total failure.

P. laricio corsican pine 1871 Catalogue
Rare if not a total failure.

P. longifolia (long leaved pine) 1871 Catalogue
? syn. of P. roxburghii - a specimen exists near front gate of A.B.G. and some in Botanic Park, also at Waite Institute, but considered rare.

P. maritima (maritime pine) 1870
Rare.

P. pinea (Italian stone pine) 1871 Catalogue
Successful along coast. Possibly now coming back into popularity.

P. pinaster (star or cluster pine) 1871 Catalogue
Used in South-East - almost naturalized.

P. sabiana 1871 Catalogue
Seems surprising that this species was not used more. Successful in Waite Institute Arboretum.

Pinus sylvestris (Scots fir) 1871 Catalogue
Schomburgk noted it was unsuccessful on Adelaide plains but worth trying in cooler areas of Adelaide Hills/Mt Gambier. However has been a failure.
Pinus radiata
in catalogue listed separately from P. insignis
1871 Catalogue

Most important timber tree.

Platanus orientalis
(plane-tree)
1867

Was recommended for avenue planting. Has been very successful. Both P. orientalis and P. acerifolia now being replaced by Mediterranean ecotypes.

Platanus acerifolia
1871 Catalogue

Populus
[?Populus nigra 'Italica']
(black poplar)
1867

Popular but due to suckering is losing favour.

Populus alba
1878

Occasional use. Also suckers.

Populus angulata
1871 Catalogue


Populus dilatata
1871 Catalogue

Appears to be an old name for Populus nigra 'Italica'.

Populus monilifera
1871 Catalogue

?= P. deltoides (American cottonwood). Little used in ornamental horticulture.

Rhopala spp.
1871 Catalogue

?= Rupala, a tropical American species of Proteaceae. Likely to be a complete failure.

Quercus rubra
(oak)
1870

Was recommended for Adelaide Hills region. Some horticultural use.

Quercus robur
(oak)
1870

Popular English oak.

Not the best adapted of Quercus spp. for S.A.
*Quercus suber*  
(cork oak)  
1870

Does well but is not widely planted.

*Quillaia saponaria*  
(soap bark tree)  
1886

Rare.

*Robinia pseudacacia*  
(locust-tree or false acacia)  
1870

Occasionally planted. Not now in much favour.  
Suckers.

*Salix spp.*  
(willow)  
(Huntingdon, Bitter and Yellow Osier)  
1871 Catalogue

Several species weedy.

*Santalum acuminatum*  
(sandalwood)  
1878

Native species. Occasional horticultural use.

*Santalum cygnosum*  
(sandalwood)  
1870

Native species. Occasional horticultural use.

*Santalum lanceolata/ lanceolatum*  
(sandalwood)  
1871 catalogue

Native species. Occasional horticultural use.

*Sequoia sempervirens*  
(the Californian redwood)  
1878

Occasional horticultural use.

*Sterculia spp.*  
1866

Occasional horticultural use.
<table>
<thead>
<tr>
<th>Species</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Sterculia diversifolia</em></td>
<td>Used as an avenue tree in Schomburgk era.</td>
</tr>
<tr>
<td>1876</td>
<td></td>
</tr>
<tr>
<td>Tamarix spp.</td>
<td>Some use along coast.</td>
</tr>
<tr>
<td>(Tamarisk)</td>
<td></td>
</tr>
<tr>
<td>1878</td>
<td></td>
</tr>
<tr>
<td>Tilia spp.</td>
<td>Almost total failure.</td>
</tr>
<tr>
<td>(lime)</td>
<td></td>
</tr>
<tr>
<td>1878</td>
<td></td>
</tr>
<tr>
<td><em>Tristania conferta</em></td>
<td>Used as street tree in last 30-40 years but not ideal.</td>
</tr>
<tr>
<td>1871/1872</td>
<td></td>
</tr>
<tr>
<td><em>Ulmus americana</em></td>
<td>Thought to be rare.</td>
</tr>
<tr>
<td>1877</td>
<td></td>
</tr>
<tr>
<td><em>Ulmus campestris</em></td>
<td>= <em>Ulmus procera</em>. Widely planted but not ideal.</td>
</tr>
<tr>
<td>(common or English elm)</td>
<td>Suckers badly, now being replaced.</td>
</tr>
<tr>
<td>1867</td>
<td></td>
</tr>
<tr>
<td><em>Ulmus suberosa</em></td>
<td>as above.</td>
</tr>
<tr>
<td>(cork-barked elm)</td>
<td></td>
</tr>
<tr>
<td>1870</td>
<td></td>
</tr>
</tbody>
</table>
Chapter 7

SCHOMBURGK AND THE PLANT SCIENCES

If we are going to ask questions regarding Schomburgk's role as a 'man of science' and assess his contribution to the plant sciences we should first consider the role of a scientist in the nineteenth century in a general sense. Then, more particularly, we can consider the role of the scientist in the Australian colonies in the latter part of the nineteenth century. Such an examination makes it easier to put Schomburgk's contribution into perspective.

Science involves the process of examining natural phenomena in order to better understand our world and our place in it. In studying the role of the scientist we need to take into account the fact that science is not only an intellectual activity but also, as David Knight has stressed, a practical and a social activity. Economic and social development in nineteenth century Australia was associated with a scientific culture that was concerned with the development of economic resources in order to provide products for local consumption and the export market - a different approach to that of the scientific community in metropolitan centres in Europe. Before considering this point in more detail we need to look at the nature of the scientific community in which nineteenth century scientists were working, an issue previously raised in Chapter 2.

Scientific societies, so important by the middle years of the nineteenth century, had their origins in the scientific societies and

1 David Knight, The Nature of science - the history of science in western culture since 1600, Andre Deutsch, London 1976, p. 11.
academies which developed in the mid-seventeenth century in Europe. The Royal Society of London and the Academy of Sciences in Paris followed those founded by the Italians and Spaniards in the sixteenth centuries. In Britain, the Royal Society was incorporated in 1662 and the Royal Institution of Great Britain to 1799. In Germany, the Academia Naturae Curiosorum, to which Schomburgk and von Mueller belonged, was founded in the seventeenth century as the first natural history organization in Germany and one that established the first German scientific periodical.

In the eighteenth century science was discussed by physicians, lawyers, clergymen, men of property and educated women, and pursued as a hobby or a more serious occupation, but it was rarely a formal profession or source of income. Scientific societies at the beginning of the nineteenth century were still very general in their approach and members would hear papers on all aspects of science. During the nineteenth century the enormous growth in the body of scientific knowledge was accompanied by a steady development of the organized scientific community. This was not only seen in scientific societies and scientific journals but also in institutions of higher education and research. In Britain, for example, the British

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2 Knight, *The nature of science*, pp. 11-12 & 83-84; *Encyclopaedia Britannica Micropaedia*, vol. 1, p. 43.

3 The organization dates back to a meeting held at the home of Sir Joseph Banks, then President of the Royal Society, see Gwendy Caroe, *The Royal Institution, an informal history*, [with a final chapter by Alban Caroe], John Murray, London, 1985, p. 106.

4 *Encyclopaedia Britannia Micropaedia*, vol. I, p. 43.

5 Knight, *The Age of Science*, p. 2.

Association for the Advancement of Science (BAAS), which held its first meeting in 1831, became the focus for meetings of both professional and amateur scientists with an annual meeting forming a backbone to the association's activities. In every sizeable provincial town societies were formed to pursue scientific knowledge. By comparison the Royal Society became the preserve of professional scientists.7

The early scientific societies were concerned with almost any aspect of science. However, the nineteenth century saw specialized fields of knowledge develop, first geology and biology and then sub-species of biology such as zoology and botany, followed by the rise of specialist journals and societies such as geological or chemical societies.8 We can see this happening in England as the Society for Promoting Natural History of 1782 was followed by successors such as the Linnean Society with a more specialized approach. There was also a place for organizations with a more general approach to science. In continental Europe a Swiss Society for the Advancement of Science, which held its first annual meeting in 1815, became a model for similar societies throughout the world. The American Association for the Advancement of Science was established by 1848. A gathering in Germany for those in the fields of natural science and


8 Marks, Science and the making of the modern world, p. 219.
medicine in 1822 led to the formation of the Deutscher Naturforscher Versammlung. An important meeting chaired by Alexander von Humboldt in Berlin in 1828 helped to stimulate British men of science in their efforts to establish BAAS. The Australasian Association for the Advancement of Science, ANZAAS, formed in 1888, can be regarded as the fifth of those permanent organizations on the Anglo Saxon model formed in the world.9

These changes in the organization of the scientific community accompanied dramatic changes in knowledge about the natural world and ways of studying it. David Knight refers to the period from approximately 1789 to 1914 as an 'Age of Science' when science reached maturity - a golden age:

the nineteenth century became the Age of Science partly because in those years it became not merely an intellectual activity, but also a practical and a social one: an agent, as prophesied, in changing society.10

Science as a method of interpreting the world permeated all areas of human endeavour and became the standard by which all else was measured.11 Ann Moyal describes the dramatic changes which formed a background to the development of scientific enterprise in Australia thus:

From massive accumulations of data, fundamental changes took place in the biological and geological sciences; the theory of evolution and geographical distribution transformed men's understanding of the nature of species; chemical science matured to invigorate other disciplines; the physical and geophysical sciences broke down the Newtonian concept of a strictly mechanical world; and the sciences of astronomy and geography (including related disciplines of


10 Knight, The Age of Science, p. 9.

In order to put developments in the plant sciences into perspective, it is worth considering some of the outstanding contributions made to science in the nineteenth century. In the physical sciences the nineteenth century witnessed the birth and rapid development of mathematical physics; great advances in instrumental optics; the birth of spectrum analysis; the development of James Clerk Maxwell's electromagnetic theory; the invention of the battery in 1800 which revolutionized the science of electromagnetism; theoretical developments following the development of the heat engine which revolutionized thermodynamics; the birth of modern atomic theory; and spectacular developments in physical and organic chemistry, biochemistry and industrial chemistry. Modern astronomy may be said to begin with the work of the German born William Herschel. In the earth sciences, amassing of descriptive information gave way to more sophisticated efforts to classify and explain collected material leading to great advances in minerology and petrology. In the biological sciences the nineteenth century saw the birth of cytology and histology; important work in morphology, ecology and microbiology; the rise of the two closely connected disciplines comparative anatomy and vertebrate palaeontology; and

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the medical sciences made tremendous headway, becoming closely linked with general biology.\textsuperscript{13}

Such outstanding research led to important developments in the field of applied science of which examples are the work of Sir Humphrey Davy in mining and agriculture, Michael Faraday's electric motor, Johann Schweigger's multiplier, Heinrich Hertz's radio apparatus and the work on the astatic galvanometer of Leopold Nobili and Charles Wheatestone together with important research and development with aniline dyes in the German chemical industry.

A further contribution of note to nineteenth-century science was the amassing of plant and animal material in museums as a basis for research. One such collection was the Hunterian Collection of the College of Surgeons in London. This was the collection of Richard Owen who befriended Richard Schomburgk when the latter was in London preparing for the British Guiana expedition.\textsuperscript{14}

It was a period when fundamental changes were occurring in our understanding of the world. At the same time, linked with these changes, there were dramatic new technological developments - synthetic dyes, railways, gas lighting, electric telegraphs and iron bridges. Many scientists seemed optimistic that the future was theirs and many educated people believed scientific developments would bring prosperity and reduce misery. On the one hand, science


\textsuperscript{14} Schomburgk wrote of him as the 'celebrated' and 'lovable' Director, commenting that his 'gentleness, amiability and integrity of character charmed every heart at the outset'. \textit{Travels in British Guiana}, vol. I, p. 6.
would provide answers to all questions that could reasonably be asked - arguments would clear the air and truth would be revealed; on the other, science could act as an agent of social change, and science and technology together could transform the world.\textsuperscript{15} It is significant that the object of the Royal Institution, when it was established in 1799, was to harness science to the task of improving the lot of the poor.\textsuperscript{16}

In this atmosphere of enthusiasm there was much popular interest in science and many of those engaged in science made considerable efforts to make other people aware of their work and its implications. They wrote essays in quite general publications and described scientific developments in a lively way. Scientists earnestly tried to educate the public through lectures, textbooks and magazine articles and many eminent scientists such as Louis Agassiz in the United States viewed popularization as part of their scientific work.\textsuperscript{17} Large and enthusiastic audiences attended lectures given in London by Sir Humphrey Davy, Michael Faraday, John Tyndall and

\textsuperscript{15} Knight, \textit{The Age of science}, pp. 3 & 5-7.

\textsuperscript{16} Caroe, \textit{The Royal Institution}, p. 1. By about 1802 the Institution changed its approach to one of helping the poor indirectly by means of agricultural reform. After the Institution was reconstituted in 1810 its laboratory was opened to public use and it carried out useful experiments for which it could be paid. In the period 1849-51 a policy was developed that it should support the advancement of science for its own sake and that scientific research was not assumed to be a means to useful ends. pp. 27, 33-4, 48 and 66.

\textsuperscript{17} Knight, \textit{Age of science}, p. 6; Sharon Dunwoody, 'News Flash! Scientist speaks with reporters', in \textit{1990 Yearbook of science and the future}, Encyclopaedia Britannica, University of Chicago, 1989, pp. 224-5. Knight cites articles in the \textit{Edinburgh Review} and \textit{Quarterly review} during this period as examples. The trend was also apparent in the \textit{Gardener's Chronicle}. In South Australia daily newspapers and publications such as \textit{The Garden and the Field} carried science news such as items about soil chemistry, the use of microscopes and theories about causal factors in infectious disease.
Thomas Huxley\textsuperscript{18}, and those of von Humboldt in Berlin on physical geography. Some of these lectures had a practical orientation like Davy's lectures on tanning and dyeing.\textsuperscript{19} There is a parallel here with the situation in South Australia where there was popular science writing in newspapers and periodicals of 1850-1880, lectures on very practical matters were given at the Chamber of Manufactures or Philosophical Society meetings in Adelaide and a conversazione might be held involving a demonstration of the use of the microscope or the telephone.\textsuperscript{20} Down to the 1860s it was possible for the layperson to read and understand a much higher proportion of original publications in science than is the case today. Men of science wrote for the general readership, even in scientific journals.\textsuperscript{21} Up until the middle of the nineteenth century distinctions between pure and applied science do not seem to have been marked and again using Sir Humphrey Davy as an example, he could on the one hand work with Michael Faraday on isolating iodine and on the other develop the miners' safety lamp or a method for preserving copper sheeting on ships through electrolytic experiments. Science was to be useful.\textsuperscript{22}

The demise of generalists by the early twentieth century and efforts to professionalize was accompanied by a loss of ability to popularize and a reduction of interest in doing so.\textsuperscript{23} Up to the middle of the

\textsuperscript{18} Huxley was also much in demand for his popular science writing.


\textsuperscript{20} As is apparent in Adelaide Philosophical Society Reports index for 1853-1877.

\textsuperscript{21} Knight, The nature of science, p. 76.

\textsuperscript{22} ibid., p. 24.

\textsuperscript{23} Sharon Dunwoody, 1990 Yearbook of science and the future, pp. 224-5.
nineteenth century scientists were called natural philosophers - the word 'scientist' appears to have been first used in the 1830s and only gradually came into more general use.\textsuperscript{24} The natural philosopher had been concerned with very general issues.\textsuperscript{25} However, by the end of the nineteenth century scientists would expect to read books and journals in their own specialization and to have quite limited knowledge of other specialties. This developing specialization along with increasing professionalization provided major changes in nineteenth century science. The future would lie with the expert rather than the wealthy amateur and such an expert would probably work full time - a feature which was becoming apparent in the period under study.\textsuperscript{26} Both specialization and professionalization saw the nature and scope of the scientific societies change. Societies with very general interests in Great Britain and Prussia, such as Britain's Royal Society (where members could meet active researchers and hear papers on all aspects of science) gave way to organizations open only to the qualified rather than to keen amateurs.\textsuperscript{27} In Britain, specialization saw the rise of such bodies as the Zoological Society of London (1826), the Royal Astronomical Society (1831), the Royal Botanic Society of London (1839), the Chemical Society of London (1841) and the Royal Palaeontological Society (1847), as well as the

\textsuperscript{24} Knight, \textit{The Age of science}, p. 58. Morrell and Thackray describe how, at the Cambridge British Association meeting in 1833, Coleridge forbade members to call themselves philosophers and in response William Whewell coined the word 'scientist', Morrell and Thackray, \textit{Gentlemen of science}, p. 20.

\textsuperscript{25} Knight, \textit{The nature of science}, pp. 28-9.

\textsuperscript{26} Knight, \textit{Age of science}, p. 4; L. Pearce Williams, \textit{The nineteenth century}, pp. 1-2; Brockway, \textit{Science and colonial expansion}, p. 70.

\textsuperscript{27} Knight, \textit{Age of science}, p. 4.
Royal Horticultural Society (1804) and the Royal Agricultural Society (1838). 28

Sir William Hooker spoke of having no time for anyone who wanted to be a generalist in science; 'that had been where Schomburgk had gone off the rails'. 29 In the early part of the nineteenth century it was still possible for men like the Schomburgk brothers to have only limited formal training for research in the field of natural history and to learn much of what they needed from colleagues or personal research and reading. However, increasingly courses became available in universities. Richard Schomburgk's working life spanned this period. By the end of his life there were university courses available in subjects such as botany, chemistry and geology and each was treated as a separate discipline. In South Australia the appointment of Professor Ralph Tate (1840-1901) to a Chair of Natural History at the University of Adelaide in 1875 meant that botany, zoology and geology could be taught at tertiary level. Tate himself commented that the Chair was so wide it might well be referred to as a sofa. A graduate of the Royal School of Mines in London, Tate was one of the new breed of tertiary trained scientists. He brought to South Australia a highly critical and analytical mind together with a lively, energetic personality. Although not liked by some because of his abrupt, somewhat abrasive manner he earned respect as a fearless debater and critic. He came to dominate the local scientific community, helping to transform the Philosophical

28 Brockway, Science and colonial expansion, p. 71.

29 Colin Roderick, Leichhardt, the dauntless explorer, Angus and Robertson, North Ryde, N.S.W., 1988, p. 152. It is likely that Hooker was referring to Robert Schomburgk, with whose work he was familiar, rather than to the then little known Richard.
Society into an active Royal Society, leading field naturalist expeditions and publishing a large number of scholarly papers in the fields of botany, zoology and geology. He makes a good contrast with Schomburgk because a difference in age of only some thirty years was associated with very different training and qualifications for a scientific position - even allowing for the fact that the nature of the Botanic Garden directorship did require a more practical orientation.

In the Victorian era reformers looked to France and Germany for ideas about the teaching of science and technology. While France was the first Western country to attempt a massive national reform of education, with the sciences becoming an essential element of instruction, Germany came to lead the world in scientific education by the mid-nineteenth century. German universities were able to assimilate the sciences and make them part of their regular course of instruction. This was helped both by the important role in administration played by the faculties and by the support of government in funding. With scientific departments growing rapidly universities could respond quickly to the needs of specialization. The teaching of science and medicine was given attention at the University of Göttingen, a new science syllabus was developed at the


31 Knight, The nature of science, p. 118.

University of Berlin in 1810\textsuperscript{33} and also at other universities such as those of Breslau, Königsberg, Halle, Bonn, Jena, Erlangen, Munich, Würzburg, Heidelberg and Tübingen. The efforts of Alexander von Humboldt and the success of the Gesellschaft Deutscher Naturforscher und Arzte also contributed to scientific development.\textsuperscript{34} When, in 1828, von Humboldt presided over a meeting of 600 scientists from Germany, Sweden, Denmark and England, science in Germany was already making significant advances.\textsuperscript{35}

One important feature of German scientific development was that laboratories and research institutes were particularly well equipped\textsuperscript{36} and in addition there was appropriate technical education for training rank and file scientific workers. The Prussian government, concerned to build up national strength through industrial development, set up a number of technical institutions, such as the Berlin Technical Institute founded in 1821. The rank and file of technically trained people was created by popular education; Prussia had free and universal elementary education before any other Western country and students who had proceeded to Technical High Schools became engineers and other skilled technicians for German industry.\textsuperscript{37} Training in horticulture and forestry in Germany was also much admired in Britain. Training in pure science, applied

\textsuperscript{33} The University of Berlin was established in 1808. Wilhem von Humboldt, brother of Alexander, played a vital role in the establishment of the University and the University now bears his name.

\textsuperscript{34} Taton (ed.), \textit{Science in the nineteenth century}, p. 553.

\textsuperscript{35} Babbage who, as a participant, was greatly impressed by developments in Germany, was involved in subsequent efforts to promote scientific education in Britain.

\textsuperscript{36} Taton (ed.), \textit{Science in the nineteenth century}, p. 553.

\textsuperscript{37} \textit{ibid.}, p. 51.
science and technology in Germany were all considered to be of a high standard in the period under study.

In the early part of the nineteenth century, German was a language little known in Britain, although there were fairly close links, due to their geographical proximity, between businessmen in places such as Hamburg and their counterparts in Britain and as well there were dynastic connections through the Hanoverians. Links between Germany and Scotland appear to have been stronger than those with England - one example is provided by the prize winning essay of DeKlenze, the Director of the Royal Bavarian Experimental Dairy Station\textsuperscript{38}, on German Agricultural Experimental Stations. This was published by the Highland and Agricultural Society of Scotland in 1878. The research of some German scientists came to be known through translated works. For example, Liebig whose work was translated by William Gregory, Professor of Chemistry at Edinburgh\textsuperscript{39}, acquired a considerable reputation in Britain and he built up good relations with the British Association for the Advancement of Science. Liebig, like Schomburgk a protégé of Alexander von Humboldt, turned increasingly in the 1830s to studies in applied science, especially the applications of chemistry to agriculture, physiology and manufacturing.\textsuperscript{40} Works of his which were translated in the 1840s had much appeal in a period when many people hoped

\textsuperscript{38} This was reprinted in the \textit{Annual Report} of the Saidapet Experimental Farm, Madras, 1879. A copy of this, held in the Adelaide Botanic Garden library, is believed to have been sent to Schomburgk from Saidapet. The essay is discussed in more detail later in this chapter.

\textsuperscript{39} Gregory also translated Reichenbach's work.

\textsuperscript{40} Kargon, \textit{Science in Victorian Manchester}, pp. 102-3.
that a more scientific approach to agriculture would lead to greater productivity.  

Close cooperation developed between Germany and Britain on meteorological matters, with von Humboldt playing an important role in working for international cooperation in science and influencing other scientific travellers through his written work. One of the most famous of these was Charles Darwin who, as noted in Chapter 3, had read Humboldt's *Personal narrative* in English translation before going on his voyage to South America. The Ray Society published some natural history of German origin and chemical work (in addition to that of Liebig) was translated.

There were also links with German science provided by educated people who came to Britain after the political upheaval of 1848. By the 1850s, Anglo-German contacts in the field of science were substantial and Germany was seen as a place where science was

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41 For example *Chemistry in its application to agriculture and physiology* (1840), *Animal chemistry* (1842) and *Familiar letters on chemistry* (1843). Liebig's *Agriculture* was translated by Lyon Playfair, one of the first British scientists to go to a German university to do a PhD. After succeeding Gregory at Edinburgh, Playfair came to play an important role in policies on applied science, Knight, *Age of science*, p. 66.

42 For example when James Clark Ross led an expedition to the Antarctic in 1839-43 his ships were in effect floating magnetic observatories, enabling observations recommended by Humboldt. Knight, *Nature of science*, p. 147.


44 The Ray Society, named in honour of the naturalist John Ray (or Wray) 1627-1705, was founded in 1844 specifically to publish works of natural history.
respected and rewarded.\textsuperscript{45} In science, philosophy, classical studies and theology Germany had a fine intellectual reputation. After the Prussian victories in 1870, Prussian success was a spur to scientific and technical education in other places.\textsuperscript{46} England, where the great universities of Oxford and Cambridge dominated, was unable to provide the kind of advanced and specialized training provided in Germany. However, by the end of the century there were universities in the commercial centres of Manchester, Birmingham Leeds, Liverpool, Newcastle and Bristol which were committed to research on the German model and there were changes in teaching and research methods in the older universities. The Royal School of Mines was established, along with the Royal College of Chemistry as a place where Liebig's methods could be brought to Britain.\textsuperscript{47} Laboratories and museums were important as a focus of science in the nineteenth century as was the observatory.\textsuperscript{48}

Museums were among the first of the scientific institutions to receive direct government support for scientific research. Important collections were built up, using the material brought back by people such as Banks, Darwin and the many other collectors who accompanied expeditions overseas. Botany and zoology (which depended on wide geographical observations in a way that observations in the physical sciences did not) had received great impetus from the expanding colonial activity of Great Britain and in

\textsuperscript{45} Knight, \textit{Age of science}, pp. 63-8; Morrell and Thackray, \textit{Gentlemen of science}, p. 43.

\textsuperscript{46} Knight, \textit{Age of science}, p. 140.

\textsuperscript{47} Both were eventually to become part of The Imperial College, London.

\textsuperscript{48} Knight, \textit{Age of science}, p. 183.
particular from voyages of exploration such as that of Captain Cook. Botanical, zoological and geological research in Britain benefited from the classification of such collections, as it did in continental Europe and the United States.\textsuperscript{49} Important collections of Australian material were sent to museums of natural history in Britain and continental Europe although sometimes at the expense of reference material being retained in Australia.\textsuperscript{50}

Although the British government had given financial support to the Board of Agriculture as early as the end of the eighteenth century\textsuperscript{51}, agricultural research appears to have been mostly supported by private landowners\textsuperscript{52} and it was not until the twentieth century that substantial funds were made available to research stations (such as the privately established Rothamsted) and for agricultural colleges in Britain.\textsuperscript{53} In comparison, the DeKlenze essay states that German agricultural research stations numbered 59 by 1878, the first having been established as early as 1852.\textsuperscript{54} There were trenchant criticisms of government policy on funding and on the standards of science education in England, by writers such as Babbage in his \textit{Reflections on the Decline of Science in England} of 1830, echoed by

\begin{itemize}
\item \textsuperscript{49} Knight, \textit{Nature of science}, pp. 147 & 150.
\item \textsuperscript{50} An example of this being the loss of invaluable local material from the South Australian Institute Museum. Twidale, Tyler and Davies, \textit{Ideas and endeavours - the natural sciences in South Australia}, p. 169.
\item \textsuperscript{51} Caroe, \textit{The Royal Institution}, p. 27. It was formed by a group of private landowners (one of the 'improving landlords' being Sir Joseph Banks) and Pitt was persuaded to give an annual grant of £3000 for the study of the state of agriculture in the country and its improvement.
\item \textsuperscript{52} Such as the Duke of Bedford at Woburn.
\item \textsuperscript{53} Knight, \textit{Age of science}, pp. 151-4.
\item \textsuperscript{54} \textit{Annual Report} of the Saidapet Experimental Farm, Madras, 1879.
\end{itemize}
John Tyndall in 1858.\footnote{55} As Knight observes, governments have supported science because they have seen it as a practical activity bringing wealth and power - the support of science could thus be seen as a worthwhile investment. The British government had a reputation for concentrating on utilitarian science.\footnote{56} Britain had supported science through its support of expeditions, navigation and cartography, and through public exhibitions and research grants, albeit limited ones, through the Royal Society. Prior to grants for science going to universities from the 1880s onwards, the British government had provided some support to the plant sciences of agriculture and horticulture through institutions such as the Royal Botanical Gardens at Kew and the establishment of the Board of Agriculture.\footnote{57}

In the United States a strong tradition of support for technology developed in the history of science together with support for applied science as demonstrated in the grants of land to colleges or universities which would undertake serious training in the

\footnote{55}{The debate is discussed by Caroe in \textit{The Royal Institution}, p. 60 and in much more detail in Morrell and Thackray, \textit{Gentlemen of science}, pp. 47-52. Babbage supported increased specialization, government financial support for scientists and civil honours for scientists. Discontent with the old idea that science needed the patronage of the aristocracy was one reason why the British Association for the Advancement of Science was formed. Correspondence in 1830 between Babbage and David Brewster (editor of scientific journals and of the \textit{Edinburgh Encyclopaedia} and later President of BAAS) outlines some of the problems being faced at this time. Morrell and Thackray, \textit{Gentleman of science}, p. 47. See also Taton (ed.), \textit{Science in the nineteenth century}, p. 552.}

\footnote{56}{An example of this view is in Botting, \textit{Humboldt}, p. 267. 'the down to earth mercantile British public, with its interest in the practical results of applied science rather than the laws and hypotheses of pure science...' Liebig believed that the British were too much inclined to expect practical results from science in the short term, see Knight, \textit{The age of science}, p. 166.}

\footnote{57}{Knight, \textit{The nature of science}, p. 151.}
agricultural and mechanical arts.\textsuperscript{58} In the United States, as in Germany, there was early recognition that scientific and technical expertise were foundations of material power.\textsuperscript{59} The pattern of development of scientific organizations in the United States shows many similarities to that which occurred in Britain and continental Europe. However, government support for American agricultural colleges and research stations shows more similarities to the pattern that developed in Germany than that of Britain, and a similar pattern of support for applied science is apparent in the plant sciences in Australia.

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We have seen that early scientific work was carried out in Australia under the auspices of government sponsored voyages of exploration and that British and French governments in this way built up

\textsuperscript{58} Early scientific institutions and assocations in that country included the Columbian Institute founded in 1815; the National Institution for the Promotion of Science (as direct heir of the Columbian Institute); the American Philosophical Society (Philadelphia) (dating back to as early as 1743 although it was not incorporated until 1780) and a rival organisation the American Academy of the Arts and the Sciences in Boston(1780). Others of note were the Academy of the Natural Sciences of Philadelphia established in 1817; the Naval Observatory in 1841; the Smithsonian Institution (1846); the American Association for the Advancement of Science (the name adopted in 1848 but the organization deriving from the American Association of Geologists of 1840); and the National Academy (to be comparable to the Royal Society and the French Academy) in 1863. Also of importance were the St Louis Academy of the Sciences (1856) and the New York Lyceum, founded in 1817, renamed the New York Academy of the Sciences in 1876. In 1847 scientific schools were established at Yale and at Harvard, followed in 1867 by Johns Hopkins University which came to provide an important centre for scientific research. The Morrill Land Grant Act in 1862 provided grants of land to colleges or universities providing training in the agricultural and mechanical arts. See Taton (ed.) \textit{Science in the nineteenth century}, pp. 563-9.

\textsuperscript{59} There were other approaches such as that in England and France to provide training through Mechanics' Institutes and the Conservatoire des Arts et Métiers so that skilled workers would be taught the scientific principles underlying their work. Nevertheless, providing part-time study for employees with demanding full-time work could provide only limited technical training.
important collections of natural history specimens. Such government support of science is relevant to our study in two related ways. Firstly, in places such as Australia there was support for scientific endeavour through expeditions of exploration, geological surveys, the establishment of scientific institutions such as botanic gardens, natural history museums and observatories and lastly by encouragement of local collecting and observation. Secondly, by attaching men with an interest in natural history to expeditions of exploration that were mounted in the eighteenth and nineteenth centuries, valuable training was given to promising young scientists. For young men with an interest in natural history, a strong constitution and a sense of adventure such trips also provided opportunities for personal advancement. Richard Moritz Schomburgk was one of the young men whose career was established as a result of participation in an expedition of exploration. Most of the best naturalists in Britain had sailed on some kind of expedition, returning to publish and edit books on astronomy, natural history and the earth sciences. Many became distinguished members of learned societies.60

To embark on an expedition of exploration might offer great opportunities for adventure and a chance to make a contribution as a natural history collector but was also an undertaking with considerable risks. Loss of life or permanent injury from disease, exposure or attack by indigenous people were occurrences which are well documented: amongst them Buchanan and Parkinson who perished on Captain Cook's first Endeavour voyage, and Richard Cunningham, John Gilbert and Ludwig Leichhardt on expeditions

60 Knight, Age of science, p. 147.
within Australia. However, if a young man were to embark on such an expedition and survive, his account of his travels could be a very marketable product and work on material from the expedition might then establish his professional reputation. In Schomburgk's case, production of an account of scientific travels combined with success as a farmer, horticulturist and vigneron made possible a salaried scientific position.

Britain as a leading maritime and colonial power took a lead in voyages of exploration. If systematic observations were to be made on such expeditions government support and a team of men of science were required. As Knight observes, "this was "big science" of the nineteenth century as far as funding was concerned, when most physics was still an affair of individuals working by themselves or with an assistant or two, and using relatively cheap equipment." Without government support Darwin would not have sailed around the world and the Schomburgks would not have gone to British Guiana in 1840-44.

From this overview of the development of science in the nineteenth century we can now turn to examine the scientific and utilitarian work that was carried out at the Botanic Garden in Adelaide in the period 1865-1891 and in particular the work that was done experimenting with plant species that might be useful in South Australia.

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Science in Australia

The new province of South Australia provided favourable conditions for scientific development. Its physical resources enabled the production of minerals, livestock, fruit and grain. The climate was adaptable to a European lifestyle. European emigrants included people with education and some means who hoped to establish a society that allowed freedom of opinion and opportunity. British scientific traditions at the time were ones which supported utilitarian science and it was not surprising that in this land of opportunity a scientific approach that supported resource development was nurtured by Anglo-Australian society. As Kargon argues in his study of Victorian Manchester, scientific practitioners, rather than just emerging as a gift to the populace, can be produced to fulfil a regional need - science can result from enterprise.63

However, the scientific approach of European settlers has another aspect relevant to colonization. Science can be seen to provide a means of ordering experience, a rationale for belief in progress and a mental orientation towards rapid change.64 Such an approach, seen in the attitudes of the settlers at Buchsfelde in the period 1849-1859, was an advantage to those developing a new society in a new country, a situation where appropriate institutions and forms of organization - political, economic and social - had to be developed.

We have seen in Chapter 2 that a principle of settlement in South Australia was that population be concentrated in Adelaide. A


64 Brockway refers to the 'cognitive' aspects - the use of science as a means of ordering experience. Brockway, Science and colonial expansion, p. 70.
significant group of Adelaide residents wanted a city with the kind of institutional resources that fostered intellectual development, ones which would be comparable to those found in a substantial British provincial city: libraries, a natural history museum, a botanic garden and zoological garden and a university. To these could be added societies that fostered study of the natural sciences. In Britain societies such as the Manchester Philosophical and Literary Society provided opportunities for study and communication for self-made men who were 'devotees' of science. The scientific society provided opportunities for both identity and status in scientific pursuit, providing recognition in the scientific community and perhaps status in the larger society.\(^65\) In Adelaide membership of an organization such as the Philosophical Society may have helped to provide social legitimization but there was a further aspect - respectability was sought for the city as well as the individuals. A learned society provided opportunities for the relatively small number of people interested in natural history and related areas to share knowledge and ideas. Those concerned with scientific matters wished to keep up-to-date with developments in science. In addition, there was concern to study the natural environment of South Australia. Papers were given on botany, entomology and geology. Interest in statistical research is illustrated by papers on infant mortality statistics or the effect of deep drainage in Adelaide on death from typhoid fever and diarrhoeal diseases.\(^66\) Membership

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included local medical practitioners, University staff, civil engineers and enthusiastic amateurs. It stood at about 100 in 1878, of whom 36 had given papers, and some 126 by 1888, of whom 51 had given papers. An active Microscopical Section and later a Field Naturalists' Section provided opportunities for practical studies.67

In a broader context, science can be seen as an expression of culture at a time and a place and nineteenth century science reflected the world view of societies within the European empirical tradition.68 The values of scientists in colonial Australia reflected prevailing beliefs in the importance of exploring and studying the natural phenomena of new lands and the value of exploiting natural resources of the country to serve the needs of the politically dominant group - settlers of European origin who wanted to make a living producing goods useful to other European people.

As had been noted in Chapter 2, the colonists sought to impose their outlook and attitudes on an environment unsuitable for many of their practices. At Philosophical Society meetings in Adelaide there were papers on Aboriginal culture and papers on indigenous plants and Schomburgk raised both the issue of the loss of forest trees and its effect on the environment in 1870 and the effect on soil of over-cropping. Nevertheless, papers at the Society did not seriously question the environmental changes which were occurring. The colonists wanted the kind of plant material that provided the food, shelter or transportation to which they were accustomed. To this

67 See Transactions and proceedings and report of the Royal Society of South Australia, 1878; Edmonds, 'Zoology' in Ideas and endeavours, the natural sciences in South Australia, p. 178.

68 Knight, The nature of science, p. 184.
end they sought plants appropriate for conditions in the different regions of Australia. The introduction of new plant material was crucial to this enterprise. Accounts of the Buchsfelde settlement in its early days provide some illustrations of how this occurred. Plants such as the German Gravenstein apple were brought from Germany, plant material was acquired in Brazil on the voyage to Australia, and orders sought from London. Contemporaries of the Schomburgks admired the way that a practical approach was combined with the scientific as they established their farm. This is seen in accounts of Buchsfelde in the *Botanische Zeitung* and in a letter to the South Australian *Register* in 1860. This latter described how the brothers had proceeded 'with the usual energy and ability of scientific men to form a beautiful vineyard and orchard that have given so great a stimulus to horticulture and vine-growing in this quarter'.

The application of a scientific approach to practical agriculture and horticulture is also seen in the work of their compatriots Carl Muecke, M. P. F. Basedow and F. E W. Krichauff. It is an approach which seems to personify the motto of the local journal the *Garden and the Field* in the 1870s: 'science and experience to guide, intelligence to comprehend, and industry to execute'.

One reason why it was important to put science to practical use was that many of those who came to Australia with scientific training or ambitions in the period before 1850 could not earn a living in the field of science and turned instead to the world of commerce for paid

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69 Letter from 'E.L.G.' to *South Australian Register*, January 23, 1860.
work. The Schomburgks seem to have determined on their arrival to establish a farm and to be part of a settlement of settlers of German origin. As events transpired their experiences at Buchsfelde and Gawler enabled them to gradually become part of the broader predominantly Anglo-Australian community. From this base they could write, send specimens overseas, put their scientific knowledge to practical use - in farm, garden and vineyard, in veterinary science, midwifery and journalism. They maintained correspondence with colleagues in Europe. They helped to swell the ranks of the small community of educated people who supported infant learned societies and publications, sharing with each other information and ideas from literature and correspondence received from overseas. Both Richard and Otto Schomburgk, like Basedow, Muecke and Krichauff had a special role in early South Australian science because of their links with Germany where training and research in the fields of science and technology were relatively advanced.

Plant transfer and crop research
We have seen in Chapters 5 and 6 how the establishment of the Experimental Ground soon after Schomburgk's appointment enabled expansion of the work commenced by Francis in testing plants that could be useful to settlers. Chapters 4, 5 and 6 have shown that the number of plants of utilitarian and ornamental value introduced was substantial. The importance of such plant introductions has to be

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viewed in the context of Australia being, according to Burt and Williams in *Australian science in the making*

probably the only country in the world in which, with a single exception (*Macadamia* the Queensland nut), every edible cultivar and every crop plant is, or has been derived from, an introduction, as indeed is true of most of the ornamental grasses and sown pasture species. The First Fleet and its colonist successors were to provide Australia not only with a new human population but also with an almost completely new economic flora.\(^{71}\)

There are indigenous forest products which have been of great commercial value and ornamental plants which have been used for essential oil and as cut flowers. There have been some efforts to establish the quandong (*Santalum acuminatum*) and other indigenous plants on a sound commercial basis. Nevertheless, it remains true that virtually all edible crops grown in Australia are derived from imported plant material.

Australian colonial botanic gardens, which played a vital role in introducing this material, have sometimes been referred to as 'acclimatisation gardens' and this raises the question of what was meant at the time by 'acclimatisation' when used in this way.

Acclimatisation societies established in the Australian colonies in the period 1860-1870 were responsible for bringing into Australia both plants and animals which might be useful or of interest to the European settlers. Wealth was derived from natural products and it was believed that animal and plant distribution would increase that

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wealth; that land would become more productive and jobs created. An Acclimatisation Society had been formed in Paris as early as 1854 with the stated aim that agriculturalists, naturalists, landowners, scientific men and government officials not only in France but in 'every civilized country' could be involved in providing increased and more varied sources of food and creating new economic products. Colonial support committees developed in places such as Algiers and Guadeloupe as well as regional committees in France so that there were some 2000 members by 1860.

An Acclimatisation Society was established in England in 1860 which cooperated with such organizations as the Zoological Society of London, the Zoological Society of Victoria, the Acclimatisation Society of Victoria (established 1861) and with various individual enthusiasts. A number of these people - doctors, lawyers, newspaper men and scientists - had been active in acclimatization work on an individual basis before the formal establishment of the Acclimatisation Society of Victoria. Organizations such as the Philosophical Institute (later the Royal Society of Victoria) and the Philosophical Society in Adelaide, together with local newspapers, provided a forum for discussion about the value of plant and animal introductions. Acclimatisation societies often gave more attention to animals than plants but plant introductions were discussed and

72 Linden Gillbank, 'The origins of the Acclimatisation Society of Victoria: practical science in the wake of the gold rush', in Historical records of Australian science, vol. 6, no. 3, pp. 359, 361 & 372.

73 ibid, pp. 359 & 361.

74 The fact that members included the two Kings of Siam at a time when Richard Schomburgk's brother Sir Robert Schomburgk was the British consul provides some insight into the nature of the network of scientists and diplomats in the mid-nineteenth century.
plant material exchanged. Schomburgk received plant material from the Brisbane Acclimatisation Society each year between 1869 and 1874 and 1879-80.

It may be that at the time some people hoped that plants grown under Australian conditions for a year or two would become 'acclimatized' to the new environment and thus become useful in the same way that a gardener would gradually expose a plant to outside temperatures before moving it from glasshouse conditions to the open garden. Schomburgk's writings give us only limited guidance to his own views on this. In the Annual Report of 1889 he wrote of attempts to grow fig cuttings from Smyrna, observing that

probably the experience of a few more years in this country may be necessary before it can be determined whether the peculiarity heretofore shown by this tree is permanent, or whether gradual adaption to the South Australian climate may not overcome it.75

It is not at all clear what he meant by 'gradual adaption'. A doctrine proposed by the French biologist Lamarck in 1809 influenced evolutionary thought throughout most of the nineteenth century. Lamarckism was based on the principle that changes acquired by organisms during their lifetime - such as greater development of an organ or a part through increased use - could be transmitted to their offspring. Some believed that living things could actually adapt to a new environment in a way that produced genetic changes.76 However there is nothing in Schomburgk's writings to indicate whether he supported such views.

75 Report 1889, p. 6.
We have only limited knowledge about the conditions under which plants were grown when Schomburgk experimented with crops at the Botanic Garden and it is impossible to assess how well controlled the experiments were. For example, we are told that because samples of 'red grass of Natal' were received late in the season they were put into four inch pots rather than in the open ground and that throughout the summer they were exposed to the hot sun, but the amount of water received or other comments on cultivation are not recorded. It seems that grasses were grown in strips in the Experimental Ground and then later, after land became available in the old Asylum grounds next door, grasses could be grown there also. Detailed information about the trials may have been kept but the records have not survived. Schomburgk's evidence to the Select Committee on Diseases in Wheat demonstrates that he was ready to adopt an experimental approach in which he grew specimens under varying conditions and assessed the different results obtained. In that instance he varied conditions of warmth, humidity and proximity to rusty straw to assess the effect of these conditions upon the incidence of rust in pots of wheat. A second investigator, an analytical chemist, was used to provide an independent account of what was observed.77

Experiments with plant material and reports from South Australia and overseas produced information on the kind of crops which might be profitable for various localities. Annual Reports indicate that both information and plant material were made available not only to

77 There was a marked contrast between the evidence given by Schomburgk to the committee and that of von Mueller. Schomburgk's evidence reflected his practical approach - that of von Mueller was in a somewhat more scholarly vein. Nevertheless, Schomburgk's observations about the fungal nature of the disease were accurate and a useful contribution. *Report of the Commission on diseases of cereals in South Australia.* (1868).
the residents of South Australia but to people far beyond local boundaries. In the previous two chapters we saw how Schomburgk's reports covered a wide range of topics: the use made of certain crops in different parts of the world, countries of origin of different crop plants, processing methods, marketing problems, different varieties available, problems of disease and propagation, and issues relating to crop rotation and crop diversification. Advice might be detailed to the point of suggesting how far apart to plant the rows of seeds, how deep these should be, which month to sow, when to cut for feed and so on. There was discussion about what might be grown as alternatives to wheat; ranging from crops for forage and pasture to the establishment of wattle farming and timber plantations.\footnote{78} There were sections on the practice of viticulture, especially in relation to disease resistant stock.\footnote{79}

Wide circulation of reports and catalogues helped to foster exchange of both plant material and information about crops between individuals and organizations. Reports mentioned the names of those who had been working with certain plant varieties and this enabled interested people to make contact with each other. Schomburgk excelled at establishing contacts with others who were active in the fields of botany, horticulture and agriculture and he facilitated in various ways the exchange of information and plant material. His style of work will be further examined in Chapter 9 - it is sufficient to stress at this stage that his range of contacts was considerable.

\footnote{78}{e.g. Report 1875.}\footnote{79}{Report 1869, p. 3.}
Establishing such contacts led to a broader, more international approach to the sharing of information and problem solving. How such problem solving occurred is illustrated by attempts to obtain suitable figs for drying. It seemed that the local climate should be suitable for growing figs for drying and yet dried figs were being imported. Schomburgk reasoned that either local settlers did not have suitable species or their techniques of production were inadequate. Attempts to obtain figs from Smyrna were fraught with difficulty so contacts were made with people in places such as North America to see whether pooling information could produce a solution. Eventually, although not in Schomburgk's time, the source of the problem was identified. A similar approach appears to have been made with regard to techniques for growing and processing *Boehmeria nivea* (Chinese grass cloth or Rhea fibre plant), a plant which the Director hoped could be grown in the Northern Territory.

Production of catalogues and circulation of Annual Reports helped to promote exchanges; listing the species in the collection enabled other parties to apply for material or offer material by means of exchange. The work necessary to produce a catalogue is enormous: the identity of plants must be checked and it is also necessary to check that plants are still in existence and have not died. It is significant that the first catalogue was produced at the time of Francis, the first Director, the second and third in the time of Schomburgk; there was then a long gap with no new catalogue being produced during the entire period 1890-1950. The next catalogue appeared in 1955 during the Directorship of Noel Lothian. After a fifth edition (a typescript list) was produced in 1972 the most recent is the sixth edition in 1988. Such gaps in production are related to the immensity of the task of producing a catalogue.
Considerable resources and commitment are required and both Francis and Schomburgk were directors who had such commitment.

Plants listed in the catalogue were those actually growing in the Botanic Garden. However, as has been discussed in previous chapters, plant material was not only grown in the Botanic Garden itself but was also distributed to people in South Australia and in other colonies in order to see how economic plants would fare under different conditions of soil and climate. Linked to this was the belief that farmers should try new plants, that they should not be dependent on one main crop and, in particular, that they should not concentrate solely on wheat. In a theme which is evident in a number of his publications from 1869 onwards Schomburgk preached about the advantages to be derived from crop diversification. He wrote in 1869:

For the well being of the colony, everything possible should be done to introduce new branches of industry, as it must be evident to all that the period has drawn very near for a change in our system of husbandry. The time has passed when wheat-growing alone was the safest and most profitable occupation.\textsuperscript{80}

The efforts of our agriculturists must be directed to other objects than wheat-growing, which has reached its utmost limits, and has hitherto engrossed almost exclusive attention.

Yet

The praiseworthy endeavors of the Chamber of Manufactures to introduce new industries into the Colony has [sic] been with very little results.\textsuperscript{81}

In the 1876 Report he wrote that crop diversification was in the interest of both the colony as a whole and that of the individual farmers. Certainly it was clear by that time that the fertility of

\textsuperscript{80} \textit{Report} 1869, p. 4.

\textsuperscript{81} \textit{Report} 1876, p. 5.
large tracts of land had been exhausted. A considerable amount of land in South Australia in the zone with climatological conditions suitable for agriculture was of poor soil quality. Farmers might get profitable crops in their first few years on newly cleared land if the seasons were good ones but as the soil nutrients were used so-average yields fell. Risks increased with drought years and such risks increased as the farmers went further north to the areas where average annual rainfall was lower.

Schomburgk was one of a number of people who promoted the cause of crop diversification in the 1870s and 1880s. It was a recurrent theme in journals such as the Garden and the Field. Since the early days of settlement newspaper and journal articles had promoted crops which might suit local conditions and this had also occurred through meetings of agricultural and horticultural organizations. Organizations such as the Chamber of Manufactures arranged for the presentation of papers with proposals for new crops and offered prizes for essays on new industries. While diversified farming was common in the first years of settlement of South Australia a tendency to concentrate on wheat alone developed in the latter part of the 1860s and during the 1870s.

Schomburgk, supporting crop diversification in an appendix to his 1880 Report entitled 'Plants which are recommended to be grown in conjunction with wheat-growing' argued that 'our peculiar climate with its periodic droughts' limited the range of crops that could be grown. Furthermore the fertility of large tracts of land had been

82 Report 1876, p. 5.
exhausted through 'lack of attention to the warnings of science'.\textsuperscript{83} He believed that diseases such as red rust and climatic factors such as frosts, hot winds, droughts - all factors which affected the careful as well as the 'most slovenly' farmer - made it vital for farmers to have other paying crops from which they could derive an income should their wheat crop fail. In his 1881 \textit{Report} he declared again that wheat growing had reached its 'utmost limit' and there were similar comments in 1883. He argued that farmers had made very little effort to try other crops, despite the uncertainty of wheat, and observed sadly that they probably would not do so until calamities of various kinds affected their own districts. He was especially concerned with the position of small farmers who had only two or three 80 acre (32.4 ha.) sections,\textsuperscript{84} familiar as he was with farms of this size in the vicinity of Buchsfelde. His own commitment to introducing plants and experimenting with new species is indicated by the remark he made early in his directorship that even if one or two of the hundreds of pasture grasses that he introduced proved useful he would be satisfied.\textsuperscript{85} He was aware of the limitations of what he called 'armchair farming'. We saw in Chapter 6 that he warned that no branch of horticulture or agriculture is at once so pleasant and productive of possible gain as gardening and farming 'on paper', reminding his readers that estimates of profit could be quite misleading.\textsuperscript{86} Nevertheless, as described in Chapters 6, he thought that farmers should give serious consideration to the potential of new crops such as herbs and medicinal plants, flowers

\textsuperscript{83} \textit{Report} 1880, appendix A.

\textsuperscript{84} \textit{Report} 1881, pp. 5 & 8.

\textsuperscript{85} \textit{Report} 1867, p. 2.

\textsuperscript{86} \textit{Report} 1883, p. 6.
for the perfume industry, broom millet, canary seed, fruit for a dried fruit industry or wattle for the tanning industry.

As the Director considered the potential of new crops and promoted diversification he raised issues relating to cost analysis. The first evidence of this approach in Schomburgk's writing is seen in *Reisen in Britisch Guiana* when a similar analysis was made of plantation crops in British Guiana. The influence of his older brother Robert, who had considerable commercial experience, is likely to have been important. To raise such issues in the Annual Reports was part of a policy of encouraging farmers to be 'thinking farmers'; encouraging them to consider long term issues, not just focus on the problems of a particular season. Such an approach involved considering what the expenses of a project would be over several years, what the long term return would be, whether anything could be done to improve soil fertility and how to limit exposure to variations in demand and market price for crops. To this end, there was also an examination of factors relating to marketing and processing. Thus, in examining the possibility of flower farming for the perfume industry, the Director raised issues such as transport of raw material, local versus overseas processing and the licensing of stills. Discussion about flax production involved the issue of the establishment of mills for processing while in discussion of the wattle industry he wrote about the consumption of wattle bark per annum in Victoria (South Australian figures not being available) and the potential demand from Great Britain. These issues were relevant for businessmen and politicians as well as for farmers.

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A better understanding of the causes of disease in crops could lead to selection of more suitable species and possible remedies such as improved farm practices. The *Reports* of 1880 and 1881 give very detailed directions on dealing with rust in cereals with details that reflect Schomburgk's understanding of farming practice, such as the advice that great caution be taken when carrying new stable manure and that stubble and roadside weeds be burnt to prevent the further spread of wheat spores.\(^8^8\) As mentioned above Schomburgk, along with C. W. L Muecke and George Francis, gave evidence to the commission set up by the Government of South Australia in 1867 into diseases in cereal crops in the colony.\(^8^9\) That two members of the commission, William Everard and Wentworth Cavenagh, were longstanding members of the Board of the Botanic Garden (Everard from 1865-89 and Cavenagh from 1875-92\(^9^0\)) is illustrative of the connections between horticultural and agricultural research in South Australia. Work published by Anton de Bary in France (1853) had clearly established an association between a fungus and plant disease of this kind and the life cycle of the causal fungus *Puccinia graminis* had been described in detail by de Bary in 1865-6.\(^9^1\) There was no one employed as a plant pathologist in South Australia at the time that the commission took evidence so links that Schomburgk and his colleagues had with scientists in continental Europe were especially valuable in making the latest European research available locally. The five members of this Committee interviewed farmers

\(^8^8\) *Reports* 1880 and 1881, p. 4

\(^8^9\) *Report of the Commission on diseases of cereals in South Australia* (1868).

\(^9^0\) *The Botanic Garden, Adelaide, South Australia, Centenary volume 1855-1955: history, guides and catalogue of plants*, p. 9.

about the incidence of diseases such as blight and 'take-all' and about factors which might be associated with it such as soil type, conditions of sowing and weather conditions at the time of sowing together with accounts of remedies used. Schomburgk's evidence included the information that his experiments showed that seed from rusty wheat produced healthy plants.\textsuperscript{92} Von Mueller referred in his evidence to the life cycle of \textit{Puccinia graminis} and to the work of de Bary. Such evidence appeared to confirm the predisposing factor of climatic conditions. Although much of the evidence given to the commission was anecdotal rather than based on experiments, the work done appears to have defined problems and increased understanding about the problems of disease in cereals and the link with environmental conditions. The Committee recommended the establishment of model farms and a government department to further scientific enquiry and experiment.\textsuperscript{93}

The application of a scientific approach to problem solving seen both with regard to the selection of plants for commercial production and also in Schomburgk's material on disease in plants is seen again in the way he introduced his readers to concepts about chemical analysis of plant products. Thus in 1880 he reports on analysis of \textit{Sorghum vulgare} and makes a comparison between the amount of the 'nearly non-nutritious' cellulose with the content of 'starch for dextrine and sugar'. His analysis was couched in the scientific language of his times but, while the terminology may differ, the concepts involved in such an approach are very similar to those used today.

\textsuperscript{92} \textit{Report} 1868, p. 5.

\textsuperscript{93} Wallace, 'Plant pathology', pp. 151-4.
We have seen that Schomburgk, along with a number of local businessmen, landowners and professional people, promoted crop diversification as a path to economic well-being and better land management. The view promoted by the Adelaide Silk Industrial Association was that finding alternative crops to wheat would increase the value of property and stabilize an economy heavily dependent on a single product.\textsuperscript{94} There is another aspect to the issue. J. B. Hirst argues that many were emotionally unable to accept the way in which the country was developing, their ideal being the closely worked fields of England and continental Europe. In Europe land was dear and labour cheap; in South Australia the reverse was true, so farmers aimed to acquire as much land as possible and use as little labour as possible.\textsuperscript{95} Hirst describes much of the advice given to farmers as 'impractical' but he admits that the suggestion that farmers grow fruit and vegetables for their own consumption was sensible. Issues relating to crop diversification are still of concern today.

**Promotion of research and training in the wider sphere**

Schomburgk was also involved in promotion of research outside the confines of Adelaide Botanic Garden. One aspect of this was promotion of research into plant products in the Darwin area using a government experimental station. The aim was to encourage trials of crop plants under tropical conditions in a region considered to have considerable economic potential. After a period of land acquisition


\textsuperscript{95} *ibid*.
and land speculation in the seventies, more serious efforts were made during 1880-85 to develop pastoral and agricultural industries in the Northern Territory as the basis for the future economic development of the region. Seeds of vegetables had been taken by Frederick Schultze when he accompanied Surveyor-General Goyder on his expedition to Port Darwin in 1869.

A Government Garden was established at Palmerston with William Hayes, appointed in May 1869, as the first official Gardener. Schomburgk wrote in his 1869 report that he would send up a wardian case of live plants 'by the first opportunity [sic]'. When Hayes died, Schomburgk recommended Angus McDonald from Adelaide for the position in Darwin. After some negotiations about salary Maurice Holtze (1840-1923) was appointed to the position of Government Gardener in 1878 and later as Curator. Holtze, who like Schomburgk had begun his career as an apprentice gardener in Germany, demonstrated what could be grown on an experimental basis. While such activities did not prove that such crops could be grown on a large scale, they did raise optimism among politicians,


98 Referred to variously over the years as the Government Garden, the Experimental Garden, the Government Nursery and the Botanic Garden.

99 McDonald eventually became Head gardener at Adelaide Botanic Garden in 1879.

100 Holtze was apprenticed to a firm of nurserymen and landscape gardeners in Hanover and worked for four years at the Royal Gardens in Hanover under Professor Johannes Leunis before going to St Petersburg where he worked for two years at the Imperial Gardens in St. Petersburg. *Australian dictionary of biography*, vol. 9, p. 353-4.

administrators and journalists about the potential of the region. Nevertheless, environmental difficulties made for lack of success in establishing industries and capitalists were unwilling to risk investing in the region after some early failures in plantation agriculture such as that of the Delissa Pioneer Sugar Company and the Adelaide and Port Darwin Sugar Company. The Northern Territory example is an interesting one because it shows so clearly how successful experiments of growing tropical plants in small plots with careful supervision does not mean that crops can be grown economically on a commercial basis. Similarly experiments at Adelaide Botanic Garden, while important, were only one element in establishing the viability of new industries.

The second aspect of promotion of research on an institutional basis outside the confines of Adelaide Botanic Garden was seen in support for training and research in agriculture. In order to have efficiently run farms and gardens it was thought that attention should be paid to the education of young people who were moving into the primary industry workforce. As director of the Botanic Garden Schomburgk was in a position to see that merely making available plant stock with commercial potential would not attract interest if farmers were not open to new ideas and if they paid little attention to assessing current practice. It was thought that one way of improving farm and orchard practice was to provide an agricultural college and experimental farm which would train young people, carry out research, and provide a source of new ideas to permeate the industry.

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102 P.F. Donovan, A land full of possibilities, pp. 136-8. The pastoral industry managed to survive but was nearly bankrupt by the end of the decade of the 1880s.
Roseworthy Agricultural College was established in 1884.\textsuperscript{103} Schomburgk supported its establishment, as is shown in his evidence to a government committee where he gave evidence alongside M. P. F. Basedow and W. Cavenagh.\textsuperscript{104} Cavenagh, a long-serving member of the Botanic Garden Board has already been mentioned in connection with the Commission on diseases in cereals. Schomburgk's keen interest in the education of young people is apparent in evidence which he gave in 1868 to the Select Committee appointed to enquire into the working of the Education Act (1868-9).\textsuperscript{105} His writing indicates his strong belief in the principles of 'scientific agriculture', an interest which he shared with Basedow and Muecke.\textsuperscript{106} Basedow introduced into Parliament the bill to establish Roseworthy College and the Government Experimental Farm, a move which would involve the appointment of a Professor of Agriculture and thus bring to South Australia someone knowledgeable about soil chemistry.

Roseworthy, established as the first agricultural college in Australia in 1884, was followed by Dookie in Victoria in 1885, Hawkesbury in New South Wales in 1888 and Longerong, Victoria in 1889. Queensland's Gatton was not established until 1895 and Western

\textsuperscript{103} Roseworthy was formally opened in 1885.


\textsuperscript{105} Report of the Select Committee appointed to enquire into the working of the Education Act, \textit{S.A. Parliamentary Papers}, 1868-9, no. 56. In his evidence Schomburgk noted that in Prussia primary schools had garden plots and children were taught basic horticultural techniques such as planting, grafting and pruning by their teachers.

\textsuperscript{106} Basedow, Muecke and the Schomburgk brothers had all been involved in the production of the \textit{Süd Australische Zeitung} at the time when the Schomburgks first lived at Buchsfelde and as mentioned in Chapter 3 there was intermarriage between the three families.
Australia’s Muresk much later in 1925. The establishment of the first five colleges between 1884-95 indicates that the intellectual milieu of the period favoured the development of an institution for training and research in agriculture and horticulture in a country heavily dependent on primary industry, the later date for Muresk reflecting the much smaller population in Western Australia. However, given suitable economic conditions and an appropriate social milieu the existence of a group of people trained in the plant sciences in Germany had an important effect as a catalyst in South Australia. The role of Schomburgk, Muecke, Basedow and Krichauff has to be seen in this context.

All four would have been aware, through contact with colleagues and accounts in journals, of the extent of agricultural training and research in Germany and Austria. The essay by DeKlenze, the Director of the Royal Bavarian Experimental Dairy Station published by the Highland and Agricultural Society of Scotland in 1878, lists the extent of the German Agricultural Experimental Stations. It is remarkable that there were 59 such stations by 1878, the first having been established at Möckern in Saxony in 1852. DeKlenze estimated that 600,000 marks or £30,000 per annum was spent on these stations. Their analysis service enabled the assessment of feeds and artificial manures and checking for adulteration of seeds and they were said to be involved in a very wide range of research in the field of agricultural chemistry.

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107 Australian Encyclopaedia, vol. 1, p. 129.

108 Nevertheless £30,000 per annum would only provide an average of £500 per station. They may have been partly self-supporting and have had other sources of funds.
Soil chemistry was a topic of great concern to settlers who wished to advance agricultural development in South Australia. This is seen in articles in the local newspapers and in journals such as the *Farm and Garden* and *The Garden and the Field*, both committed to support for scientific agriculture. The interest of the local community during the early period of settlement in efficient farming is reflected in the way that the Agricultural Society of South Australia was established as early as 1839, only three years after the first permanent European settlement.\(^{109}\) It appears that many South Australian farmers were advanced by world standards in terms of their knowledge and the techniques used\(^{110}\) and they contributed to a cultural milieu which not only produced an Agricultural College in the 1880s but also the establishment the Forest Board in 1875 and Department of Woods and Forests in 1882.\(^{111}\)

**Attention to climate**

A scientific approach to horticulture and agriculture required an understanding of climatological conditions. It is significant that Botanic Garden *Reports* in the period under study usually began with a summary of weather conditions during the previous year, with accounts of the effect of weather conditions on plants growing in the

\(^{109}\) There had also been a South Australian Bush Club, established in November 1838, disbanded in 1843. Two organizations by the name of the Agricultural Society of South Australia were established in 1839, one continuing on to be part of the Agricultural and Horticultural Society. C. Guerin, *One hundred years on the land*, Adelaide, 1988, pp. 5-6.

\(^{110}\) A. J. Rathjen, Waite Agricultural Institute, University of Adelaide interview September 1989. This view is also reflected in letters to the *Queenslander* in 1875-6. Bolton refers to South Australia having the best reputation for innovation among the Australian colonies, although he is referring particularly to technical innovation, see *Spoils and spoilers*, p. 77.

Botanic Garden. Publishing such records helped to educate settlers by focussing attention on both the potential and limitations provided by physical factors in the environment. There was also scientific and educational value in publishing such material in a report which was circulated to institutions outside South Australia.

A description of the weather for the year might take up as much as half a page of a report where the main text (excluding pictures and lists of new acquisitions) was perhaps ten pages long. These descriptions were important in bringing attention to the extremes of temperature and rainfall with which the settler had to contend. For example, 1876 had seen not only the driest, but also the hottest and coldest weather recorded; rainfall was 13.34 inches (339 mm) as against an average of 21 inches (533 mm), the shade temperature had reached 114 °F (45.5 °C) in December and during the winter the temperature had dropped to 28 °F (-2.2 °C) in July, an unusually low temperature for the Adelaide plains. The 1876 Report began with the words 'Truly our climate is one of extremes and one with which all our wits are required to cope,'\textsuperscript{112} a sentiment which must have been echoed by gardeners throughout South Australia that year. Such variations caused considerable damage to plants and trees which had previously been grown successfully in the Gardens. Understanding the way that factors such as temperature varied over a number of years helped people to use plant material more successfully. Schomburgk came to understand that there were plants which might appear to thrive initially but which would not survive a ten year period because sooner or later there would be extremely hot or cold

\textsuperscript{112} Report, 1876, p. 3.
conditions. In winter there might be frosts which had disastrous effects on tropical and sub-tropical plants and in summer there could be periods with no rain for eight to ten weeks and temperatures reaching over 100°F (38°C) for days on end.

Knowledge of these factors and practical experience of attempts to grow various species led to recommendations about what could be grown and what would probably not thrive. For example, it was very difficult to grow oak, lime, birch, horse-chestnut, maple, and beech on the Adelaide plains although they could be grown in the Adelaide Hills. Schomburgk noted that both alpine and tropical plants suffered from the dry atmosphere. Difficulties had been experienced in growing plants such as Camellia, Rhododendron, Azalea, Gaultheria, Andromeda and Clethra out of doors on the plains although they, too, could be grown successfully in the Adelaide Hills in elevations of 1000-2000 feet (305-610 m). The genera Picea and Abies and the Japanese and Chinese conifers were of 'lingering growth' while none of the Taxus grew successfully. The provision of a suitable microclimate through shelter or shadehouse conditions could provide some protection for small and medium sized plants; thus many home gardeners on the Adelaide plains have learnt to plant their hydrangeas and fuchsias under the shade of trees and bushes and to give some protection for camellias. An important part of the educational role of the Botanic Garden with regard to ornamental horticulture was the demonstration of a range of plants suitable for local conditions. This was shown in the use of hardy lawn species such as couch and buffalo grass for domestic and civic plantings or the fine displays of varieties of pelargoniums which in most parts of Britain could not be kept out of doors all year round. Excellent results were achieved with South American species such as
*Jacaranda mimosifolia*, *Myroxyton peruiferum*, Brugmansia and Tecoma. Tropical flowering shrubs listed by the Director in the 1882 *Report* as successful on the Adelaide plains included Oleander, Bauhinia, Hibiscus, Bignonia, Erythrina, Raphiolepsis, Lagerstroemia, Guilliania, Lantana and Astrapae. He wrote of the Oleander that 'no northern gardener can have any conception' of the flowers in summer; observing that the quantity of flowers, their size, colour and fragrance, surpassed that in its native country.

As Schomburgk said, it was a matter of using one's wits. He had found that the South Australian climate suited succulent plants and listed Yucca, Opuntia, Aloe, Rhipsalis, Pereskea, Cereus, Echinocactus and Fourcroya [Furcræa] in particular. Some of the palms could be grown out of doors: *Phoenix dactylifera* (date palm), *Phoenix reclinata* and *Chamaerops humilis*, all native to Africa; *Jubaea spectabilis* and *Sabal blackburnia* from South America; and *Chamaerops tortunii* [Trachycarpus fortunei] from Asia. He could grow *Corypha australis* from tropical Northern Australia out of doors. Also successful in Adelaide plains conditions were *Encephalartos* species from South Africa and tropical Australian *Macrozamia*.

Bulbous and tuberous plants from South Africa, Gladiolus, Brunsvigia (such as *Brunsvigia rosea*, the belladonna lily\textsuperscript{113}), Haemanthus, Watsonia, Ixia, Babianus and Ornithogalum grew well, so did plants such as Hippeastrum, Amaryllis, Narcissus, Crinum, Pancratium and Alstromeria and some of the Lilium (such as *Lilium candidum*, the Madonna lily and *L. tigrimum*).

\textsuperscript{113} Also known as *Amaryllis belladonna* and often found in old Adelaide gardens.
Finally, it is interesting to see a list of 'tropical trees and shrubs' listed by Schomburgk as suitable for South Australian conditions, together with the country of origin. A list published in 1882 was presented with only minor modifications in 1889; the species came from Japan, China, India, South America and the Middle East, highlighting a pragmatic approach as to what could be grown in South Australia:

*Paulownia imperialis* (Japan)

*Laurus camphora* (Japan), [now *Cinnamomum camphora*]

*Broussonetia papyrifera* (Japan) (Paper mulberry) [*Broussonetia papyrifera*]

*Stylinga sebifera* (China) [now *Sapium sebiferum*]

*Aralia papyrifera* (China) [now *Tetrapanax papyrifera*]

*Ficus roxburghii* (East India)

*Ficus religiosa* (East India)

*Ficus sycomorus* (Egypt)

*Jacaranda mimosaeifolia* (South America) [*J. mimosiafolia*]

*Koelreuteria paniculata* (China)

*Sophora japonica* (Japan)

*Eriobotrya japonica* (Japan) (Japanese loquat)

*Ficus benghalensis* (India) (banyan tree)

*Ficus elastica* (East India) (India rubber tree)

*Ficus lucida* (East India)

*Schinus molle* (Peru) (Pepper tree)

*Psidium littorale* (South America) [replaced in 1889 list by the guavas *P. pomiferum* and *P. pyriferum*]

*Viburnum chinease* (China) [*Viburnum chineanse*]

*Schotia latifolia* (South Africa) (Elephant hedge bean tree) [deleted in the 1889 list]

*Ceratonia siliqua* (Levant) (Carob or locust tree) [deleted in the 1889 list]

*Alianthus glandulosus* (China) [now *Alianthus altissima*] [added in 1889]

*Cinnamomum zeylanicum* (Ceylon) [added in 1889]
The Director observed that most of the fruit trees brought from the cooler parts of the world - apple, pear, peach, nectarine, plum, medlar, orange, lemon, fig, quince, almond, olive and grape - grew well on the Adelaide Plains, enthusing that they 'attain a size and often a flavour almost unknown in other countries' while berry fruit such as raspberry and strawberry grew particularly well in the Adelaide Hills.

The comments above were all about introduced plants. Schomburgk's comments on native trees suitable for local conditions have been considered previously; suffice to say here that plantings in both the arboretum and Botanic Park gave the home gardener good examples of trees suitable for local conditions and this was augmented by remarks in reports on native trees.

In years of unusually good or bad weather conditions for farmers the Reports would contain comments on the effect of weather on crops. Over the years there were summaries of seasonal and annual variations on the viability of different species grown in the gardens, referring to both ornamental and utilitarian species. Part of the Schomburgk legacy is a 25 year summary of weather conditions in relation to horticulture and agriculture in South Australia. The Schomburgk data describes an overall effect of the pattern of weather; this combination of factors and how it affected plant growth provides a measure qualitatively different from simple statistics that were kept by the colony's meteorological service.
Such meteorological records are not a feature of the Annual Reports of Bailey in Brisbane or Moore in Sydney during this period.\textsuperscript{114}

Richard and Otto Schomburgk were known to have kept meteorological records at Buchsfelde\textsuperscript{115} and weather records continued to be kept at Buchsfelde after Richard Schomburgk went to the Botanic Gardens. No details appear to have survived about the nature of the records kept. Otto Schomburgk wrote to von Humboldt that he thought their recording station was the first of its kind in South Australia. At this time records were kept of rainfall at West Terrace\textsuperscript{116} but the brothers were probably keeping observations of other kinds such as humidity and barometric pressure in addition to temperature and rainfall. They had visited Göttingen as they left Germany en route for British Guiana to see Gauss and to visit the Observatory in order to learn the procedures necessary for meteorological observations. Von Humboldt's interest in the way weather conditions and weather variations affected plant growth (ideas further developed by Darwin, Wallace, Huxley and Hooker) laid the foundation for the science of plant geography.\textsuperscript{117} Such interest suggests a source of influence on

\textsuperscript{114} While there are annual reports for the Brisbane Botanic Gardens for most years between 1865-91, meteorological records are recorded for only two years: a quite limited report in 1880 and a detailed report in 1891 by Bailey, following the establishment of a meteorological station in July 1890. When von Mueller was Director of the Botanic Garden in Melbourne he did not preface his reports with meteorological information nor did Charles Moore in his infrequent reports on the Sydney Botanic Gardens.

\textsuperscript{115} Letter from Otto Schomburgk to Alexander von Humboldt, December 1849, see Chapter 3, note 153.

\textsuperscript{116} Rainfall readings survive from 1839. Regular observations of other phenomena began when Sir Charles Todd became Superintendent of Telegraphs and Government Astronomer in 1856. \textit{South Australian Year Book 1989}, p. 5.

\textsuperscript{117} Malcolm Nicolson, 'Alexander von Humboldt, Humboldtian science and the origins of the study of vegetation', \textit{History of science}, vol. 68, June 1987, pp. 169 & 171-8. Humboldt's system of classification of vegetation was developed by his disciple A. H. R. Grisebach to produce the first comprehensive classification of the world's
his protégés. The Schomburgks are known to have kept careful records during the British Guiana expedition over a period of three to four years which is likely to have established a well ingrained habit of record-keeping. While one can only infer the influence of von Humboldt on Richard Schomburgk's interest in the effect of weather conditions on plant life, there does seem a strong probability that such an influence existed.

**Environmental issues**

Schomburgk's interest in environmental factors is manifested in his concern with general issues, such as soil degradation and the importance of trees in the environment, and with issues relating more specifically to the Botanic Garden itself, such as his concern with pollution of the streams flowing through the Garden.

We saw in Chapter 4 that Schomburgk had complained for many years about this pollution and the health problems resulting from it, and that his daughter Antonia had died in 1872 from typhoid fever attributed to pollution of a well near the Director's residence. Schomburgk himself is said to have suffered from typhoid fever at this time. He wrote in the Annual Report of 1875 that:

> we cannot wonder at the constant complaints of visitors of the disagreeable and offensive smell arising from these ponds, which are therefore avoided as much as possible, nor that the same cause should be so detrimental to the health of the families living in the Garden. It is indeed high time that steps should be speedily taken to remove this abominable nuisance from the only recreational ground the citizens of Adelaide possess.\(^{118}\)

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\(^{118}\) *Report* 1876, p. 3.
Again in 1877:

Although the ponds in the Garden have all been cleaned out, the water cannot improve as long as the sewage of nearly two-thirds of the town is allowed to accumulate in the Garden...during my residence in the Garden I have never seen the ponds so often polluted as during the last year - the water often showing colours from brown to black. Mr. G. Francis, the analytical chemist, had the kindness to analyze the water, and declared it dangerous to health and to be very foul, the very worst sewage water.119

The sewage included effluent from a number of factories in nearby East Terrace.120 Schomburgk gave evidence to the Sanitation Commission on the problems of pollution as it affected the Botanic Garden121, campaigning loud and long before the Hydraulic Engineer, the capable Oswald Brown, was able to devise a solution in 1880. Schomburgk's vociferous complaints about water pollution had been prominent in his Annual Reports and thus were widely circulated and much publicized.

He was also attentive to broader environmental issues relating to farming: for example the long term effects of the loss of forest trees, the long term effects of extinction of native grasses, the possibility of providing belts of timber around farms and the value of afforestation projects. Schomburgk's Report of 1875 and his paper to the Philosophical Society that year stressed the importance of forest trees in relation to climate. He reported on French and German research in the previous twelve years which he claimed left 'not the

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120 Report 1878, p. 10.
slightest doubt on the subject':

In France, a series of observations, extending over eight years, were made in the neighbourhood of forests, and also in plains denuded of trees; the results showing that one quarter more rain fell annually in the former than in the latter localities. It has further been observed that forests affect the equality of temperature, as the sea does along the coast, and that a great contrast in this regard was found in the temperature of the plains. The same observations have been made in Germany, especially in Bavaria, with similar results.¹²²

He was very critical of previous government policy relating to afforestation:

A gross mistake has unquestionably been made by the Government in the earlier days of this colony in not declaring and laying out reserves for the purpose of forest preservation and cultivation.¹²³

In taking this view he cited examples from other countries to demonstrate how dangerous the destruction of forests was to climate and, in contrast, how beneficial was the replanting of forests. In his 'Influence of forest on climate' he wrote:

In Japan, a law exists that whoever cuts down a tree is obliged to plant another instead. In Biscay, every proprietor plants two for one he cuts down, and the law compelling them is severely executed. Now, if I had the power, I would go even further, and would compel them to plant three trees instead of one or two.¹²⁴

He championed the value of tree-planting to promote rainfall and the value of tree-planting in public places, such as along public roads and railway lines as carried out in France and Germany. Such plantings

¹²² Report 1875, p. 4. There were similar comments in Schomburgk's 'Influence of forests on climate', paper read before the Philosophical Society, 9 August, 1870, p. 5 and in his paper, 'Forest tree planting and its influence on climate', given to the Chamber of Manufactures on 6 June, 1878.

¹²³ Report 1875, p. 4.

¹²⁴ Schomburgk, 'Influence of forests on climate', p. 5.
would yield useful timber of the kind then imported to South Australia.

Naturally the present generation would not derive a benefit from such a scheme; we would only have the pleasure to [sic] watch their growth, and the pleasing sight of the green belts traversing our plains, denuded at present of all trees; but I am sure the next generation would bless us for such an important undertaking.\textsuperscript{125}

He believed in the influence of trees upon rainfall:

He believed in the influence of trees upon rainfall:

In the same manner as the lightning conductor attracts the electric fluid, the forests attract and draw down the rain clouds, which benefit themselves, and likewise the neighbouring agricultural land. We find, therefore, as a consequence, always good agricultural land near forests.\textsuperscript{126}

The view that cultivation of land improved the climate were promoted by such books as \textit{Vegetable Substances Used for the Food of Man} [1846],\textsuperscript{127} the author arguing that cultivation of the earth exerted 'the most beneficial effect upon climate'. Schomburgk seems to have been influenced by the work of the German botanist Hermann Schacht (1814-1864), Professor of Botany and Director of the Botanical Garden at Bonn from 1860-64. Theories about the effect of vegetation and cultivation of the land on rainfall were of worldwide interest at the time. D. W. Meinig, who has reviewed a number of 'rainfall' theories, observes that 'the influence of trees upon rainfall' was - unlike the 'rain follows the plough' theory - more of a scientific idea than a folk idea. Meinig describes Schomburgk as the most eminent of the local advocates of the theory about 'the influence of trees' and a major force in getting some of the forest reserves established. Schomburgk's address to the South Australian

\textsuperscript{125} Schomburgk, 'Influence of forests on climate', p. 7.

\textsuperscript{126} Schomburgk, 'Influence of forests on climate', pp. 1-2.

Philosophical Society in August 1870, 'The Influence of Forests on Climate' was given at a time when there was considerable disquiet about the rapid destruction of South Australian timber resources from clearing land for farms. In September 1870, a month after Schomburgk's talk, his colleague, F. E. H. W. Krichauff, proposed that the South Australian parliament carry out a return or survey into the extent of remaining stands of timber and how native timber reserves could be preserved and replaced. Geoffrey Bolton refers to Krichauff as having 'a ready ally' in Schomburgk, although he refers to the curator, 'Robert Schomburgk'.\footnote{Bolton, \textit{Spoils and spoilers}, p. 47.} Schomburgk was authorized to collate results obtained from sending a questionnaire to local authorities and private citizens regarding the extent of timber stands remaining in the various localities. Recommendations were also sought about the potential for planting forest trees. These activities were followed in 1873 by an Act to Encourage the Planting of Forest Trees. In 1875 Parliament took the further step of establishing a Board to protect and regenerate native vegetation and to establish commercial forests. When the first Forest Board was set up in November 1875 Schomburgk was one of its members. Forest tree nurseries were established, plantations were established and trees were raised to distribute to landowners.\footnote{Woods and Forests Department of South Australia, \textit{Annual Report, 1990/91}, p. 7; N.B. Lewis, \textit{A Hundred years of State Forestry 1875-1975}, p. 14; J. E. Brown, \textit{A practical treatise on tree culture}, (Adelaide, 1881), p.viii. There was state sponsored forestry activity in India at the time, with a different administrative structure, India providing a centre for scientific forestry in the British Empire.} South Australia's State Forest Service can be said to have been established in 1875, claimed by the present Woods and Forests Department to be the first of its kind in the British Empire. The Board was given responsibility for 195,000 acres (78,900 ha.) of land and was charged with the
responsibility of protecting and regenerating native vegetation, and of demonstrating the practicability of forestry. Victoria passed a Forestry Act in 1876 and in 1884 appointed a Conservator of Forests but forest reserves continued to be exploited for agricultural use. It was not until 1907 that forestry began to be put on an effective footing. In New South Wales a position of Inspector-General of Forests was created but very limited finance and resources were provided before 1909. Tasmania appointed a conservator of forests in 1885, while Queensland and Western Australia, the colonies with the largest area of land under timber, did not set up effective forest administration until the end of the century. New Zealand's second Forests Act of 1885 saw Schomburgk's colleague Thomas Kirk appointed as Conservator of Forests and, as a result of his energetic approach, the formation of the Forest and Agriculture Branch of the Lands Department and schemes developed for the protection of native forests.

Meinig observed that while Parliamentary action in South Australia was probably more influenced by the practical needs of fuel, building material and fencing, Schomburgk himself stressed the detrimental climatic effects of denudation of the land and F. E. H. W. Krichauff acted as the parliamentary spokesman for these views.

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newspapers in South Australia's northern towns such as Clare, Port Pirie and Port Augusta took up the theme and subsequently the Conservator of Forests, John Ednie Brown, emphasised the influence of trees to the point of attributing the aridity of Australia's interior to the lack of trees.\textsuperscript{133}

The suggestion that one could increase rainfall in a predominantly dry region such as South Australia was bound to produce interest and, in addition, Schomburgk argued that trees provided shelter and helped the growth of young plants, stopped good soil being washed away as well as providing valuable humus for the soil from leaves. His beliefs in the importance of afforestation led him to assert that:

A Government, or public body, assuming the direction of a newly established Colony, ought always to make the preservation of forests a first consideration, and to establish protective laws, whereby the forests could be preserved, and be made to yield a handsome revenue to the State at the same time.\textsuperscript{134}

So there was not only the argument that the government ought to act about afforestation for the good of the whole population but also that it would be profitable to do so. He gave examples of the actions of governments in other parts of the world which had taken or were considering taking action to promote afforestation. The examples cited were Mauritius in the Indian Ocean; French Algeria where Australian acacia, sheaok and eucalypt were being planted extensively; and the Egyptian Delta, where, he asserted, the rainfall had increased to the extent that there were forty rainy days a year rather than six. He reported that in Denmark, Sweden, Russia, Germany and North America there was concern at the reduction of

\textsuperscript{133} Meinig, \textit{On the margins of the good earth}, p. 71.

\textsuperscript{134} Schomburgk, 'Influence of forests on climate', p. 3.
forests and the increased price of fuel; people were becoming aware of the need to replant trees.\textsuperscript{135} In citing this material from France and Germany, Schomburgk was bringing research results from continental Europe to the attention of Adelaide's politicians and civic leaders. Writing about techniques for sowing forest trees (for forestry purposes as opposed to ornamental use) he could again cite the practice adopted in Germany and France, noting that in those two countries 'forest culture' was achieved 'only by scientific systematic management' which he asserted was 'unparalleled in any country...'\textsuperscript{136}

Articles in journals such as \textit{Nature} and the \textit{Gardener's Chronicle} at the time make it clear that French and German forestry training were held in high esteem by British writers in this period.

The loss of forest trees was one of a number of contributing factors to increasing soil degradation in South Australia. In saying that:

\begin{quote}
the fertility of large tracts of our soil has been exhausted for want of attention to the warnings of science - warnings constantly repeated but less heeded than they ought to have been,\textsuperscript{137}
\end{quote}

the Director was commenting on a situation already apparent in the period 1870-80 and still of great concern today. The words could come straight out of a 1990s newspaper or journal article. While it is beyond the scope of this study to examine environmental issues in detail it is important to note that soil degradation was apparent and of such concern to Schomburgk over a hundred years ago.

\textsuperscript{135} Schomburgk, 'Influence of forests on climate', pp. 3-4.

\textsuperscript{136} \textit{Report} 1875, p. 5.

\textsuperscript{137} \textit{Report} 1880, Appendix A, p. 13.
The issue of whether planting trees could affect rainfall and climate is a complex one involving both factors that Schomburgk referred to and others which he did not discuss. Trees bind the soil thus helping to prevent top-soil loss and also, as Schomburgk asserted, they help with retention of water in the soil. Trees provide shelter for both plants and animals against wind, temperature and evaporation. Further factors not discussed by Schomburgk are firstly, that removal of trees can be associated with a rise in the water table producing increased evaporation and salinity, and secondly that trees absorb light and heat - without them the bare soil reflects light and heat, affecting temperature, humidity and rainfall.\footnote{138 Interview with Tony Sadler, former Education Officer at Adelaide Botanic Garden, April 1991.}

The term used by Schomburgk and Molineux for the farmer who cared for the soil and gave thought to what he or she was doing was the 'practical' farmer. Their expectation was that ordinary farmers should be able to apply themselves to the problems of caring for the land around them, not that this should be the responsibility of city-based experts. They had, after all, come from a continent where the same land had been farmed continuously for centuries. They were aware that it was important for expert advice to be made available so farmers could act appropriately to care for their land. For such reasons support was given to organizations such as Farmers Clubs and the Central Agricultural Bureau. In addition, giving away trees raised at the Gardens, together with advice on their care, were practical ways of encouraging tree-planting. For instance, in giving advice about the importance of deep-watering of newly planted trees Schomburgk could make use of the example of his Botanic Park
planting with its 2-3% losses compared with the heavy losses sustained by both public bodies and many private persons.\textsuperscript{139} Attempts were also made by exhortation in written reports to make farmers more aware of the importance of retaining natural vegetation.

Relations with botanical colleagues and exchanges of plant material
Adelaide Botanic Garden played an important role as part of a worldwide network of botanic gardens facilitating the transfer of plant material from one country to another. An examination of how Schomburgk built up his collection of plant material indicates how complex a process this was. Lucile Brockway's \textit{Science and colonial expansion} paints a picture of the Royal Botanic Gardens at Kew as the hub of the wheel of exchange. Yet our case-study of Adelaide Botanic Garden reveals that a colonial botanic garden could be the hub of another wheel of exchange in which Kew was very important but only one of a number of sources, some of them non-British and some of them commercial enterprises rather than a public institution.

The first observation one can make about the nature of the exchanges is that Schomburgk's contribution owed much to the time and energy he put into developing links with colleagues all over the world and preparing material for exchanges. That it required considerable commitment is indicated by Guilfoyle's comment soon after he became Curator in Melbourne that 'much time is lost in selecting, packing, directing, and forwarding plants from this Garden to various

\textsuperscript{139} Another example is \textit{Report} 1867, p. 1.
institutions'. The scale of Schomburgk's operation is indicated by examples such as the year 1876 when 19 Wardian cases containing live plants went to other institutions along with 1500 packets of seeds. The Wardian cases taking live plants went not only to Kew but also to such places as Vienna, Mauritius, Java, Singapore, Natal, Cape of Good Hope, Port Elizabeth, New Caledonia, New Zealand, Brisbane, Melbourne, Geelong, Sydney and Tasmania.

A comparison can be made with the donations made to European Botanic Garden in this period - a study of the National Botanic Gardens, Glasnevin, Dublin providing a good example. Nelson and McCracken provide figures for the year 1883. In that year donations as opposed to purchases were received from 120 donors and 2666 plants were distributed. Packets of seeds received numbered 1925 and 1467 were distributed. Donors of seeds and plants were from Ireland 39, England 29, Scotland 6, Germany 11, Italy 3, Holland, 3 India 2, America 2, Australia 2, Switzerland 1, Denmark 1, Spain, 1, Ceylon 1, Russia 1. There were seeds and plants from the botanical gardens of Kew, Edinburgh, Cambridge, St Peters burg and Leiden. In 1883 Schomburgk acknowledged material received from the Botanic Gardens of Kew, Singapore, Saharanpur, Hongkong, Mauritius, Jamaica, Buitenzorg, St Petersburg, Natal, and from the Department of Agriculture, Washington, D.C., U.S.A. and the nurseryman Linden of Ghent. The Glasnevin figures show a comparable number of packets of seeds dispatched to those from Adelaide but with donations

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140 At this stage Guilfoyle considered there was so much work to be done in making the Melbourne garden 'what it ought to be' through weeding, provision of drainage and replanting that his staff should not be trying to handle exchanges as well. R.T. M. Pescott, W.R. Guilfoyle, p. 81.

141 Report of the Curator of the Royal Botanic Gardens Glasnevin, for the year 1884, as reported in the Gardener's Chronicle, 25 July, 1885, p. 118.
coming predominantly from Europe, whereas Schomburgk's list shows that his exchanges involved a predominance of non-European sources.

A further comparison can be made with Hobart Botanic Garden figures for this period. Hobart had exchanges with botanic gardens and botanical stations at Melbourne, Adelaide, Kew, Calcutta, Saharanpur, the 'Chamber of Agriculture', Washington and private and commercial sources including commercial nurserymen in London, Ghent, Melbourne, Sydney and Tasmania itself. A smaller botanic garden and one with very limited funding, the Hobart Garden had its exchanges mostly with London (both through Kew and commercial nurserymen) and with Melbourne, with additional material coming from Belgium, India, Adelaide and Sydney. There was also some material from New Zealand via a private collector in Tasmania.

We saw in Chapter 4 that after 1873 the Wardian cases were sent by steamer thus reducing losses that had been as heavy as two thirds of live plants originally sent.\textsuperscript{142} Schomburgk recorded that 1500 packets of native seeds were sent in 1876 to the principal botanic gardens in England, France, Germany, Russia and East India. The exchanges were not necessarily with Botanic Gardens; in the case of Wellington, New Zealand the exchange appears to have been with private individuals. Nurserymen are often mentioned and in the case of Belgium the exchanges appear to have been predominantly with a private firm rather than a botanic garden. So while exchanges among the network of botanic gardens were important they were augmented by interaction with nurserymen from the commercial sector and private individuals, a point which becomes apparent when one studies

\textsuperscript{142} Reports 1873, p. 8 and 1874, p. 7.
the operation of an individual botanic garden, as in this case-study, but which is not revealed by a more general study of the network of colonial botanic gardens, using secondary sources, such as Brockway's study.

It is true that the Royal Botanic Gardens, Kew, is recorded as having been the source of donations of plant material more years than any other institution: in 22 out of 24 years. Sir Joseph Hooker also contributed extensively to the Museum of Economic Botany. However, the most surprising feature of the list of donations over the years of the Schomburgk era is the importance of St. Petersburg which is mentioned in 21 out of 24 years. One year 600 packets of seeds are recorded; a remarkable number - today the Botanic Gardens staff would view 50 packets from one institution in a year as a very large amount. Sydney Botanic Gardens is the next most important donor institution, recorded in 20 years out of 24. Some of this material would have come to the Sydney gardens from overseas institutions such as Kew but there are not sufficient records to establish the details of the transfer of items. Schomburgk had a close relationship with the Director, Charles Moore. Melbourne Botanic Gardens is listed in 18 years, with a noticeable gap during the years 1869-1872 when relations between Schomburgk and von Mueller appear to have been strained. The problem in their relationship is indicated by a letter from Schomburgk to Bentham in

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143 There was no Annual Report in 1891: Schomburgk died in March and towards the end of his Directorship the Report was usually dated March or April. The first of his Annual Reports was 1866.

144 The other Botanic Gardens in the British Isles appear to be of only minor importance as far as exchanges were concerned.
1869. Schomburgk was then offered the position of Director of
the Melbourne Gardens after von Mueller lost this position, a
situation not likely to endear him to von Mueller who is known to
have felt bitterly about his ousting. Material was sent from
Brisbane Botanic Gardens in 17 years, in addition to at least eight
years when there were donations from the Brisbane Acclimatisation
Society - there was some overlap between the personnel concerned.
Walter Hill, who was in charge of the Brisbane Botanic Garden, lacked
the resources that Schomburgk had in Adelaide but was nevertheless
an able and energetic Director.

Of comparable frequency were the donations from a non-British
source, the well-staffed Botanic Garden at Buitenzorg (Bogor), Java,
in the Dutch colonial network, acknowledged in 17 out of 24 Annual
Reports. Dr R. H. C. Scheffer, Director of Buitenzorg and before him
Dr J. E. Teijsmann, both Dutch botanists, were an important source of
plant material, especially tropical plants for the glasshouses.
Buitenzorg was a scientific establishment of some note, well staffed
with as many as thirteen Europeans by 1892. It had a good laboratory
and facilities for visiting research workers. Johannes Elias

145 Schomburgk to Bentham, August 1869. Correspondence in archival collection of the
Royal Botanic Gardens, Kew.

146 Wright, R. 'A troubled start: The Domain, Melbourne, 1872-3', in Victorian


148 James Veitch, A travellers notes, Notes of a tour through India, Malaysia, Japan,
Correa, the Australian colonies and New Zealand during the years 1891-3.
Privately published by James Veitch and Sons, 1896. Veitch, visiting in 1892
admired the 'system and thoroughness' of the institution, noting that five of the staff
were doctors of science. p. 83. The Visitors' or Foreigners' Laboratory at
Buitenzorg, established in 1884, is described in Pieter Honig, Pieter and Frans
Verdoorn, Frans (eds.), Science and scientists in the Netherlands Indies, Board for
the Netherlands Indies, Surinam and Curacao, New York City, 1945, pp. 59-60.
Teijsmann (1809-1882) was curator there from 1831-69\textsuperscript{149} and Dr Rudolph Herman Christiaan Carel Scheffer (1844-88) was director from 1868-80, founding the Economic Garden and the Agricultural School.\textsuperscript{150} Scheffer would have been quite a young man when the correspondence with Schomburgk began. The geographical isolation of both Scheffer and Teijsmann from other European settlements would have made contact with Schomburgk of special value and the three men shared an interest not only in tropical flora but in agricultural research and training.

There was another group of institutions which while not as numerically frequent in lists of donations was still of considerable importance; the Botanic Gardens at Mauritius, mentioned 12 years and those of Hobart and Singapore, both mentioned 11 years. Mauritius had special importance because of its connections with the French colonial network. Although administered by the British, Mauritius had links of language and culture with France. There were no donations of live plants recorded coming directly from the Jardin de Plantes in Paris although some may have come from Paris indirectly. However there was important contact in relation to herbarium specimens and research into phylloxera. Schomburgk appears to have had some knowledge of the French language which would have aided such contacts.

There are three other groups which are each represented in approximately half the Annual Reports: the South African colonies;

\textsuperscript{149} Stafleu and Cowan, \textit{Taxonomic literature}, vol. VI, p. 201.

\textsuperscript{150} Dr Scheffer, said to have been an enthusiastic and hard-working director, died aged only 35 of a tropical illness contracted at Buitenzorg. Frans A Stafleu and Richard S. Cowan, \textit{Taxonomic Literature}, vol. V, p. 123.
Jamaica and Trinidad in the West Indies; and the colonies of the Indian sub-continent. Natal and Cape Town were important sources of plant material donations. Natal (17 years) and Cape Town (11 years) were part of the British Empire network and had regions where climatic conditions were similar to those of regions in South Australia. South African settlements had agricultural, pastoral and horticultural developments which showed some similarities to those found in southern Australia. Schomburgk purchased his sultana vine cuttings from the Botanic Gardens at Cape Town and there were exchanges of information between horticulturists and botanists about diseases in orange groves and vineyards. Although the West Indies climate differed considerably to that of South Australia, Jamaica and Trinidad were represented 12 and 4 years respectively, providing economic plants of interest to Schomburgk. For most of the period in question the director at Jamaica was the well-regarded Daniel Morris. (Sir) Daniel Morris (1844-1933), British botanist, administrator and tropical agriculturist, was a graduate from Dublin who served at the Botanic Gardens, Peradeniya, Ceylon from 1877-1879 and served as director of public gardens, Jamaica from 1879-1886. He became assistant director at Kew 1886-1898.

Interest in economic botany was probably the main motive for exchanges with Government gardens of the Indian sub-continent, the

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151 Schomburgk's Annual Reports record considerable concern with phylloxera, as seen in his Annual Reports of 1880, 1881, 1882 and 1883. Schomburgk's colleague and friend Charles Moore gave evidence about orange cultivation and diseases affecting orange trees to the Victorian Royal Commission on vegetable products as reported in the *First progress report of Royal Commission on vegetable products*, Government Printer, Melbourne 1886, p. 32.

152 Stafleu and Cowan, *Taxonomic literature*, vol. III, p. 594. Such movements around the botanic gardens of the British Empire in the course of a botanist's professional advancements were a factor in widening the network of contacts of botanists and horticulturists in the system.
last of these three groups. The donations recorded were mostly in the period 1878-1889. The institution with which most contact is recorded is the government garden at Saharanpur in 11 years out of 24, and every year from 1879-1889. Saharanpur had a considerable area planted with vegetables and other plants of a utilitarian nature. The Superintendent, Gallon, came direct from the Edinburgh Botanic Gardens, an appointment typical for this period.\footnote{153} Plant material was received in eight years during the period 1875-9 from Madras, both from the Botanic Garden and from the Agricultural and Horticultural Society. Calcutta Botanic Garden was the source of plant material in 10 years during the period under consideration, mostly between 1878-89 but with donations also in 1871-2. The Calcutta Gardens were by then under the care of Dr (later Sir) George King, a distinguished horticulturist and excellent botanist.\footnote{154} During this period there was considerable interest in economic botany in the Indian sub-continent with substantial publications being produced. Plants for fibre, dyes, forage and pharmaceutical purposes feature in these publications. We saw in Chapter 6 that Schomburgk expressed interest in a number of plants grown in the Indian sub-continents including sesame seed (especially for its oil), the opium poppy, forage plants and plants for fibre such as flax and jute. Plant material sent from places such as Madras, Calcutta and Saharanpur was augmented by material from the vice-regal, diplomatic and military network, including donations from the colonial governors who had already served a term in India, as well as donations from Adelaide businessmen who attended International Exhibitions.

\footnote{153} The absence of shrubberies and flower beds at Saharanpur was explained by the London horticulturist Veitch on the grounds of the small percentage of Europeans in the district. Veitch, \textit{A travellers notes}, p. 33.

\footnote{154} Hyams & MacQuitty, \textit{Great botanical gardens of the world}, pp. 223-4.
Attention to afforestation in South Australia was almost certainly influenced by the example of the active programme in India.

The other very important institution providing plant material and information was the Department of Agriculture, Washington, D.C., Schomburgk's contact here being Commissioner F. Watts. Donations were received in 14 years of the 24 recorded, concentrated in the period 1872-86. Schomburgk was in regular contact with Frederick Watts after 1872. Watts, a man with practical experience of farming and a great interest in education, was a leading figure in the promotion of scientific agriculture. The Letter Book indicates that Schomburgk initiated contact with him at the suggestion of an Adelaide resident, immediately after Watts was appointed Commissioner. This was an extremely important channel for economic plants. Correspondence in *The Garden and the Field* in relation to collaboration between Schomburgk's colleague Frazer Crawford and his American colleagues on entymological research in the horticultural field, indicates that there was close contact and cooperation between researchers in the United States Department of Agriculture and those in Australia. There is every reason to believe that cooperation existed between other researchers in the fields of agriculture and horticulture. Reports and receipts indicate that Schomburgk was in contact with the staff of the New York Agricultural Station, the firm of seed merchants, Bliss and Sons, in New York, and agricultural researchers such as J. Hagenauer of Florida and C. G. Pringle of Vermont. Cyrus Guernsey Pringle (1838-__)


1911), one of America's pioneer plant breeders, developed several improved varieties of wheat, oats and potatoes on his farm through selection and crossing. 157 One year plant material from the United States came from three separate sources: a man named Kally in San Francisco, the Department of Agriculture in Washington, and in addition Californian bulbs were sent by a nurseryman colleague, William Bull in London. 158 From 1872 Schomburgk was in regular contact with Frederick Watts, Commissioner of the U.S. Department of Agriculture. Watts, a man with practical experience of farming and a great interest in education, was a leading figure in the promotion of scientific agriculture. 159 The Letter Book indicates that Schomburgk initiated contact with him, at the suggestion of an Adelaide resident, immediately after Watts was appointed Commissioner. The operation of the network of contacts is illustrated by the way that South Australian enthusiasts might relay information from overseas journals, as in the example mentioned in Chapter 5 when an article on a pasture species, Lespedeza striata from the Rural Californian newspaper was sent by Schlegel from a little town 200 km from Adelaide. The ways that existing contacts were used is illustrated by Schomburgk contacting the Secretary of the State Board of Forests in San Francisco to obtain seed of this species. 160 We gain an impression of enthusiasm for experimentation and exchange of ideas - a social milieu for


158 Report 1876.


160 Report 1885, p. 5.
scientific research to which Schomburgk contributed and from which he also benefited greatly.

Transfers of plant material between Adelaide and European centres provide further illustration of such networks of contact. Plant material from Europe came in two general categories: firstly, the donated material, which was mostly donated as part of an exchange system, and secondly, plant material purchased from commercial nurseries. Donations from Europe appear primarily to come from Kew and from St. Petersburg. Material from Kew was available as a result of the extensive exchange system of which Kew itself was the centre. Thus Schomburgk might be sent plants or seeds of South African origin from Kew rather than directly from Natal or Cape Town. The link with St. Petersburg revealed by my study is little known. St. Petersburg, which became the centre of Russian botanical science under E.L. Regel, had sources of material which included not only central Asia and the Far East but also Brazil and Chile, including Rio de Janeiro where St. Petersburg had a satellite garden. By contrast Schomburgk was receiving plant material from Australasia, Javà, and places in the British Empire network such as Kew, Natal, Singapore and the Indian botanic gardens and government gardens. So exchange between Schomburgk and Regel provided input from a variety of different sources that were complementary.

Regel, a man of efficiency and drive was, if slightly on the periphery of European science, an influential man in the botanical and horticultural world, editing Gartenflora, setting up the Russian Horticultural Society and working on the theoretical principles of

plant introduction and acclimatization. Regel's garden at St Petersburg had as many as 25 glasshouses including special glasshouses for palms, for orchids, for the heath group and for Australian material. Through his international contacts he built up collections from Europe, Asia and North America. Schomburgk was a passionate collector of tropical material, especially palms and orchids, and had access to material of the heath family (his links with Natal providing access to the Ericaceae and already having access to the Australian Epacridaceae which bears a close resemblance to Ericaceae). Apart from other common interests the two men both had a great interest in acclimatization. It is interesting that German botanic gardens were not a major source of exchanges. Rather Schomburgk's contact was with a German born professional colleague, Regel at St. Petersburg, and Germany was instead a source of commercially available plant material and written material such as journals.

The exchange system, as Schomburgk liked to remind his Government masters, enabled a great wealth of plant material to be acquired at no great cost although it did involve a great deal of work. There was still the need to purchase some material from the commercial nurseries and private collectors who played such an important role in plant exchange.

In England Schomburgk was dealing with the establishments of James Veitch and Son at Chelsea, William Bull of Chelsea, Williams of the Victoria and Paradise Nurseries, London, James Carter and Son, High Holborn, London, and Henderson of the Pine Apple Nursery, Maida Vale. Henderson wrote to Schomburgk 'you are certainly one of our very
best colonial customers'. In continental Europe the most important contacts were with Chevalier Linden at Ghent, Huber and Co at Hyères in the south of France and Smith and Haage at Erfurt, Prussia. A large quantity of invoices have survived providing detailed lists of the plants purchased. Such detail greatly exceeds that available about the nature of the plant material which came from exchanges where only occasionally is there detail about species.

In the Pacific region private individuals rather than a Botanic Garden might be a major source of material. This was the case with New Caledonia. Reports list men such as Messrs. Joubert, Strockarch and Lauri, all of New Caledonia, who were acknowledged for fine collections of ferns sent to Adelaide. In the case of some countries, for example Belgium, the main or sole link was with a nurseryman. In others the link appears to have been only with the Botanic Gardens, with a strong tie developing between Schomburgk and the Director of a Botanic Garden, as in the case of exchanges with Singapore, with Regel of the Imperial Botanic Garden, St Petersburg, and with Teijsmann and Scheffer of the Botanic Garden Buitenzorg in Java. In the case of these countries, differences in climate make it likely that the exchanges involved primarily exotic plants such as orchids rather than plant material for crops.

There are few records of exchange with Italian sources although recognition of Schomburgk with a silver medal awarded by the Academy of the Physical and Natural Sciences in Florence indicates

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163 The invoices are held in the Adelaide Botanic Garden archival collection.
that there was contact. In 1873 plant material from G. Pasquale of
the Botanic Garden at Naples is acknowledged and there are
references to plants of economic value being received from
commercial firms. In addition some material was obtained through
the diplomatic network, for example through the British Consul at
Naples and there were links through Adelaide businessmen and
politicians who obtained plant material when travelling in Italy. It
may be that despite climatological similarities between regions in
Italy and those of South Australia, political unrest in Italy during the
Schomburgk era made cooperation in plant exchange more difficult to
achieve than it would otherwise have been and a language barrier may
have been a further factor here.

In places such as Italy, Alexandria and the Indian sub-continent the
British consular and vice-regal system provided avenues for plant
exchanges as an adjunct to links between botanical institutions and
commercial enterprises. Instances of this were seen in chapter 6;
for example seeds sent by the H. Calvert, English vice-consul at
Alexandria in 1873 and 1874 and also plant material sent by Sir W. C.
F. Robinson in Western Australia where there was no botanic garden
to provide a link and where there was a dearth of established nursery
businesses.

Exchanges with New Zealand demonstrate particularly well the
mixture of sources in plant exchanges, ranging as they do from an
Acclimatization Society and professional people to nurserymen and
private collectors. The New Zealand Botanic Gardens did not play a
predominant role as is seen in the following list covering the 15
years when donations of plant material from New Zealand was
acknowledged. The sequence regarding donors in the Schomburgk era,
as recorded in *Reports*, is as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Donor</th>
<th>Notes</th>
</tr>
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<tbody>
<tr>
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<td>nil</td>
<td></td>
</tr>
<tr>
<td>1867</td>
<td>nil</td>
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<tr>
<td>1868</td>
<td>nil</td>
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<tr>
<td>1869</td>
<td>nil</td>
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</tr>
<tr>
<td>1870</td>
<td>Acclimatization Society Auckland</td>
<td></td>
</tr>
<tr>
<td>1871</td>
<td>Acclimatization Society</td>
<td></td>
</tr>
<tr>
<td>1872</td>
<td>nil</td>
<td></td>
</tr>
<tr>
<td>1873</td>
<td>C.F. Hanneke</td>
<td></td>
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In Australia nurserymen were a source of donations as well as purchases, collections of material coming from firms such as Lang and Co. at Ballarat, Victoria, Baptist in Sydney or Shepherd and Son in Sydney.

The Adelaide Botanic Garden case-study demonstrates how the system of exchange between Directors was augmented by use of commercial nurserymen and interested private individuals who acquired material from collectors around the world. It is apparent that building up a large and varied collection in a botanic garden involved acknowledging the material received from these people and ensuring that the donor received something useful or interesting in return. The existence of this network of enthusiasts is another side to the picture drawn by Lucile Brockway in *Science and colonial*
expansion of exchanges which led to economic development and imperial expansion.

Rather than Brockway's picture of an imperial botanic garden network with Kew at the centre, in the manner of a wheel of exchange, we see a web of exchange with important interaction between the botanic gardens, the nurserymen and seed merchants together with enthusiastic amateurs concerned with decorative as well as utilitarian plants. In addition there were important exchanges involving the Dutch, French and Russian imperial networks and the United States.

There is another aspect to the exchange network. Contacts with other botanists and horticulturists were helped by links which existed between those who belonged to various horticultural and scientific organizations. For example Schomburgk became a member of the Gesellschaft für Erdkunde in Berlin (the Berlin Geographical Society) in 1844 and the Verein zur Beförderung des Gartenbaues in der Königlich Preussischshen Staaten (the Royal Prussian Horticultural Society) in 1845 and he developed and expanded such links both while he was living in Buchsfelde and after he came to Adelaide. He was not ever made a member of the prestigious British society, the Linnean Society, but his membership of the Leopoldina would have been equally prestigious in Europe. The Leopoldina was of course not specifically oriented to botany. Those organizations to which Schomburgk belonged covered a wide range of interests. They ranged from the more practically oriented, such as the horticultural societies of London, Berlin, Frankfurt, Marseilles and San Francisco, to botanical societies in London, Edinburgh and Magdeburg, the Geographical Societies of Berlin, Halle, Leipzig, Dresden and Vienna,
the anthropological society of Berlin and learned societies in Cherbourg, Erlangen, Silesia, Moscow and Philadelphia. The long list may have been as much an indication of his assiduous correspondence as his prestige in his field but membership was a source of prestige as is evidenced by Schomburgk listing these organizations after his name on the front page of his Annual Reports, the list of 24 international ones and three in Australia making a seventeen line paragraph by the end of his life. The extent of Schomburgk's correspondence was indicated by an average expenditure of £25 a year on stamps. Since Schomburgk might be the only person in South Australia to be a member of such organizations he became the person to be contacted if information and advice were sought.

Recognition came not only in the form of membership of learned societies but also in the form of awards from European dignitaries. Schomburgk was made Knight of the Order of the Crown in Germany, Knight of the Order of the Crown of Italy and Knight of the Order of Merit of Philip the Magnanimous. These awards were from the King of Prussia, the King of Italy, Ludwig III and the Grand Duke of Hesse Darmstadt. The Order of the Crown, established by King William I of Prussia, had been awarded to only ten people by 1887 including the British Prince of Wales and at that time the Order of Merit of Philip the Magnanimous had been awarded to only five people, including the Prince of Wales and Sir Julius von Haast, explorer, geologist and museum builder, in New Zealand. The Order of the Crown of Italy had been awarded to some 59 people including three others besides Schomburgk from Australasia: Sir Julius von Haast, H. H. Hayter, the

163 Special Reporter of the Leader [J.L. Dow], Agriculture in South Australia, reprinted from the Leader, E & D Syme, Melbourne and Adelaide, 1874, p. 9. It is clear that Dow considered £25 a considerable amount for postage.
Melbourne statistician and Frederick McCoy, Professor of Natural History at Melbourne University and Director of the Victorian National Museum\textsuperscript{164} Richard and Robert are both believed to have been awarded honorary doctorates from the University of Jena.\textsuperscript{165}

The elderly scientist of 1881-1891

Schomburgk worked up until his death in 1891 and Board minutes indicate that he suffered from a degree of ill-health in his last few years. It does seem that during his last decade increasing age was associated with some inaccuracies in nomenclature in his written work. Albert Molineux, writing in \textit{The Garden and the Field} in November 1887 chided the elderly Director for a mistake in his evidence to the Select Committee on Vegetable Products. Schomburgk had described Phillips Grass (\textit{Panicum spectabile}) as one of the best grasses available for summer feed, referring to it as \textit{Sorghum halepense}. Molineux commented that:

\begin{quote}

it seems that the worthy Doctor must have momentarily mistaken it for one of the Sorghums or Millets which he has for so many years recommended - long before Mr. Cotton made such a stir.\textsuperscript{166}
\end{quote}

Molineux balanced his criticism by acknowledging Schomburgk's support for sorghums but he very properly brought attention to the error, reminding his readers that Phillips Grass had been introduced many times in Australia and the United States under various names but with a considerable lack of success.

\textsuperscript{164} Peter Lund Simmonds, \textit{The British roll of honour, a descriptive account of the recognized orders of chivalry in various countries, and their insignia, also detailed lists of the British subjects (now living) who have been enrolled in these orders...} Dean and Son, London, 1887, pp. 21, 23, 26-7 and 472.

\textsuperscript{165} Letter by 'E.L.G.' to the \textit{South Australian Register}, 23 January, 1860.

\textsuperscript{166} \textit{The Garden and Field}, November 1887, p. 74.
Peter Kloot in his paper 'Dr Richard Schomburgk's 'Naturalized Weeds' (1879)' has brought to light a series of errors with nomenclature and a failure to make appropriate corrections. Kloot's article refers to the two papers that Schomburgk wrote on naturalized weeds. He noted that the first, published in 1879 when Schomburgk was 68, received approval from the lay press but 'gentlemanly but nevertheless severe criticism from qualified reviewers'. Kloot observed that the text was amalgamated from earlier writings of Schomburgk and was heavily based on the *Flora Australiensis* (1863-78)\(^\text{167}\) rather than field observations. Not only did it contain 'serious errors and omissions' which were noted by Professor Tate of the University of Adelaide and Albert Molineux, but when a revised paper was published when Schomburgk was about 78 his revisions were inadequate. Kloot refers to errors which were made because the author failed to check back to his original material. He notes that the same opening paragraph was used in sections on weeds in reports and papers in 1873, 1874, 1875, 1879 and 1889. In fact repetition of paragraphs is not uncommon in Reports and other papers.

A further criticism is that the paper on 'Naturalised weeds', like Schomburgk's 1875 paper on the agricultural potential of South Australia, lacked material based on field observation. Kloot refers to Schomburgk's comment made in his paper to the Chamber of Manufactures in 1873 that although he was ashamed to admit it he had not been to places like Encounter Bay, the South or Mount Gambier

\(^{167}\) South Australian data in *Flora Australiensis* almost entirely derives from the period 1847-52 when Behr, Blandowsky and Mueller were collecting. Thus there was a need for more up-to-date observations. See Kloot, *op. cit.*, p. 209.
Despite "being an old colonist of twenty one years' standing".\textsuperscript{168} This statement is curious in itself because in 1873 Schomburgk had been in South Australia since August 1849 (a period of at least 23 years) and there are other instances in Reports where statements about the number of years since an event had occurred are clearly inaccurate. Kloot points to Schomburgk's opening remarks to his 1889 paper on \textit{Naturalised weeds} which refer to his 1879 paper but which misquote the title and he goes on to say that 'Schomburgk was probably writing from memory and it could be for this same reason that many of his botanical names and authority citations in all his writings are incorrect.' In addition, he believed that Schomburgk displayed 'stubbornness' in including in this later paper only one of a number of species which Molineux and Tate stated were omitted.\textsuperscript{169} Kloot's criticism highlights real limitations in Schomburgk's work as a botanist. Perhaps it was because of exasperation with these traits in a man who was ostensibly the most senior botanist in South Australia at the time that led to the names of Professor Tate and Otto Tepper not appearing on the list of subscribers to the portrait of Schomburgk that was presented at the Botanic Garden in 1884.\textsuperscript{170}

During this same period Schomburgk sent to the Paris Exhibition a South Australian herbarium collection with plant specimens from Southern, Northern and Western Australia.\textsuperscript{171} Referring to the collection in his Report Schomburgk acknowledged the help he had

\textsuperscript{168} Schomburgk, 'Capabilities of the various districts in the Colony', p. 103.


\textsuperscript{170} This list of subscribers is discussed in more detail in Chapter 9.

\textsuperscript{171} The collection was subsequently sent to Oxford and is now in the possession of the State Herbarium.
received from Mr T. Humphreys, his senior gardener. Dr John Jessop, Chief Botanist of the State Herbarium, describes the labels of the collection as so vague as to be virtually useless. For example they might refer to a specimen being found in 'Western Australia' without the exact location being established. It is possible that Schomburgk saw the specimens as of general interest and did not see the necessity of attaching a label with the exact location of where each was found. It is possible that there were other labels that have since been lost but on the other hand most specimens of both flora or fauna known to have been collected by him do not note the exact location where the specimens were found. Specimens of amphibians and snakes which he collected mostly have labels that they were found 'near Adelaide' although one is labelled 'near the Gawler River'. There were many other naturalists of this period who did not leave clear details of where their specimens were found, so Schomburgk was not alone in this behaviour, but the lack of detail in labelling is nevertheless very disappointing to botanists today. In striking contrast was the work of Schomburgk's contemporary, the naturalist Otto Tepper. Tepper's meticulous scientific observations were recorded in the proceedings of the Microscopical Section, the Field Naturalist's Section of the Royal Society and the South Australian Gardeners' Society.¹⁷² There is another explanation of the labelling of the specimens sent to the Paris Exhibition: this is that the specimens came from the collection in the Botanic Garden. This last seems to me the most likely in view of Schomburgk's comments:

The collecting, naming and preparing of the plants for the Herbarium has cost me a good deal of labour and exertion. With the assistance of Mr. Humphreys, the head gardener, about three months was spent on this work. I also have to thank Mr. J. S. Browne, Special Magistrate, Port Lincoln, who kindly collected the coast plants of that locality for the purpose. The collection of Australian plants in the Garden

¹⁷² See reports of these groups in The Garden and the Field, June-July 1887.
is considerable, and I could not forbear adding specimens from other parts of Australia to the Herbarium of plants in blossom at the time.\textsuperscript{173}

If more material had been collected in the field we would expect to have seen acknowledgement in the 1877 Report for the help given alongside the acknowledgement given to Browne.

Schomburgk's scientific interests did lead him to give support to younger collectors in the field just as he himself had been given support by von Humboldt. Thus he is known to have campaigned to have the natural history collector Frederick Schultze accompany the expedition led by G.W. Goyder (the Northern Territory Expedition expedition or Survey Party expedition) to the Northern Territory in 1869. He had previously made representations to the government to send a naturalist with expeditions but to no avail. This time he was provided with specimens to send to Joseph Hooker and George Bentham in England, to Regel in St. Petersburg and Alexander Carl Heinrich Braun (1805-1877) in Berlin. Braun was, like Regel, a fellow Leopoldina member. The correspondence which Schomburgk had with Bentham about these specimens reveals several things of interest:

Surely there will be several new spec. amongst this series, and I would beg you not to forget to call one or two of the new spec. after the energetic Commander of the Expedition, Mr. Goyder...This Gentleman by his liberal arrangements and animated by a zeal for Botany we have to thank a good deal for these satisfactory results. Also Mr. Schultz [sic] the indefatigable collector deserves this honour, that some plants are called after him. There is a third claimant for the same honour, that is my own little self (I may be wrong) but I may say, all that has been done, was undertaken at my request. I assure you that I had not a little trouble to convince my Government of the importance to science if a collector was attached to the Expedition.\textsuperscript{174}

\textsuperscript{173} Report 1877, p. 11.

\textsuperscript{174} Schomburgk to Bentham, August 1869.
Schomburgk begged Bentham not to let von Mueller know about the 'uniques' he was sending and referred to von Mueller's 'eccentric' behaviour towards Schomburgk. The wording indicates that there were strained relations between the two which are associated with the absence of plant exchange in the period 1869-1872 previously noted. Schomburgk also revealed his desire to have some species named after himself. He added 'My good friend Dr. Mueller [?] has thought not worthy as yet to call an Australian plant after me.'

In a further letter in September 1872 Schomburgk told George Bentham that the government planned to send an expedition to explore the country between Mt Stuart and Western Australia under Major Warburton. It was not possible for Schultze to go on that expedition so 'Mr. Berry of the Land Office', the second in command, was to act as surveyor and collector of botanical and other natural history specimens.

Really I am so glad I have succeeded in persuading the Government to attach a botanical collector to this Expedition. I am only sorry that old Schulz cannot accompany it because he is unable to ride so it fell to Mr. Barry\textsuperscript{175}, the second in command. This gentleman has no knowledge with regard to botany, but I have instructed him how to collect and dry the plants. The Government will provide three camels for the purpose of carrying the botanical treasures.\textsuperscript{176}

The letters give some insight into the interaction that occurred between the established botanists in Britain and those, like Schomburgk, who acted as intermediaries between these botanists and those who collected Australian material in the field. Schomburgk provides some basic training for Barry. He makes a request about nomenclature to Bentham, who he had met some thirty years earlier,

\textsuperscript{175} Schomburgk spelt the name as 'Berry' the first time.

\textsuperscript{176} Schomburgk to Bentham, September 1872.
confides in him about von Mueller's 'eccentric' behaviour and asks for Bentham's assistance in keeping secret the nature of some of the material being sent. He is quite prepared to ask for Bentham's help with identification of the material.

Knowing how valuable your time must be to yourself it is rather discourteous from me to molest you with a favor. When all the materials from Port Darwin have come to hand, it is my intention to publish at least a [?minimal] report upon them and in an appendix a Synopsis of the plants? [next word illegible] If not trespassing on your valuable time to [sic] much would you kindly [word omitted?] with the names of the plants, according to their number, for the above purpose. A few words with reference to the geographical distribution from your able pen would increase the importance of such a document.

Despite Schomburgk's hopes about having a plant species named after him this did not eventuate. The situation is complicated because Richard and Robert were both 'R. Schomburgk' and there have been numerous cases where the two have been confused.\textsuperscript{177} Richard Schomburgk is recognized in the specific epithets for a number of species but appears not to be recognized in any genus. In the binomial system of botanical nomenclature it would have been more prestigious to have a genus or a species named after him. In Australia there is a climber called \textit{Boerhavia schomburgkiana}. H. N. Moldenkel lists \textit{Petrea schomburgkiana} as named after Richard, and lists \textit{Vitex schomburgkiana} and \textit{Lippea Schomburgkiana} as named after Robert in the Verbenaceae family.\textsuperscript{178} In the 1875 \textit{Report} there is a reference to the stove plant \textit{Laportea schomburgkii}.\textsuperscript{179} In Schomburgk's 1878 \textit{Catalogue} there is a reference to \textit{Aralia schomburgkiana} in addition to what was referred to as \textit{Victoria}


\textsuperscript{178} 'A brief historical survey of the Verbenaceae and related families', \textit{Plant Life}, vol. 2, no. 82, 1948.

\textsuperscript{179} This is referred to in the 1878 \textit{Catalogue} as coming from the South Sea Islands with Bull as author. It was probably named after Richard rather than Robert.
schomburgkia / Regia schomburgkia [Victoriaamazonica]. The orchid
Cattleya schomburgkia may have been named after Robert rather than
Richard.

When we consider Richard Schomburgk's work in connection with
collections and taxonomy of Australian plant material a comparison
with Ferdinand von Mueller is inevitable. While von Mueller developed
an international reputation as a taxonomist this area of study was
one in which Schomburgk had real limitations. There is no clear
evidence that he himself collected botanical specimens while he was
at Buchsfelde. That is not to say that he did no collecting. In a
speech made in his honour when he left Gawler it was stated that the
Gawler Museum was 'indebted to him as a contributor, as well as
Curator...'. He could have sent botanical specimens to colleagues in
Germany without records of this having survived. As we have seen in
Chapter 3, he was active in collecting Australian reptiles and
amphibians and it is possible that he also collected plant specimens
to be sent to Europe. A biography of Schomburgk's contemporary and
fellow Leopoldina member Sir Julius Haast says of Haast's
decorations that it was likely they were in recognition of donations
of plant specimens. Schomburgk's decorations from the King of
Prussia, the King of Italy, from Ludwig III, the Grand Duke of Hesse
Darmstadt, and from the Academy of the Physical and Natural
Sciences in Florence could well have been in recognition of plant
specimens sent from Australia in addition to being acknowledgement
of his work on the natural history of British Guiana and of South
Australia. Although, as noted earlier, there is little evidence of
plant material being sent to Schomburgk from botanic gardens in
Italy, Schomburgk could still have been involved in sending plant
material from Adelaide to Italian botanists. The award from the King
of Italy suggests he had significant contact with colleagues in Italy. He was recommended for the award by the Secretary of State for Foreign Affairs\textsuperscript{180} and around the same period he was awarded a silver medal, dated September 1873, by the Academy of Physics and Natural History of Florence.

Given that he had made substantial collections of plant material on the British Guiana expedition one would have expected Schomburgk to do some collecting in South Australia. However on his arrival in Australia he was newly married and had the responsibility of establishing a farm, orchard and vineyard. It is known that he sold plants in the area and propagation and care of plants together with responsibilities on the farm would not have made it easy to travel any distance to 'botanise'. The wide variety of Otto Schomburgk's interests (recorded as scientific journalism, veterinary practice, medical practice, church leadership and participation in civic and community affairs) must have curtailed the time that Otto had as a farming partner before Otto's premature death in 1855. Moreover, the area where the Schomburgks lived had been covered by other earlier botanists making it an area of more limited interest. Nevertheless, there were opportunities to collect reptiles and amphibians of interest to collectors overseas. In comparison, Robert Schomburgk's correspondence in the archives of the Royal Botanical Gardens at Kew reveal the older brother to have been an enthusiastic botanical collector who wrote that he had been botanising while convalescing on the coast of Siam from serious illness.

\textsuperscript{180} Undated newspaper clipping in clipping book for Schomburgk era in Adelaide Botanic Garden archival collection.
A further factor may be that Richard's special interests in later years appear to have been firstly, exotic plants from tropical regions and secondly, economic plants and forest trees. The excitement which he experienced in British Guiana on seeing the colour and diversity of flowering tropical plants seems to have left an indelible mark and he may not have ever developed a consuming interest in indigenous Australian flora. He seems to have had no special interest in taxonomy. His obituary in the *Journal of Botany* notes that 'his publications were mostly devoted to the economical side of South Australian botany', observing that while his *Botanical Reminiscences of British Guiana* contained descriptions of new species, his most important contribution to botany was considered to be the Synopsis of the Flora of British Guiana, published in his *Reisen in Britisch Guiana*, 1848.\(^\text{181}\) The obituary in *Nature* describes the work on both Flora and Fauna of British Guiana in the third volume of *Reisen in Britisch Guiana* (in which Schomburgk was assisted by other naturalists) as work that 'has not yet been superseded although its usefulness is unfortunately much limited by the publication of a large number of new names without descriptions'.\(^\text{182}\) He made useful collections of both animals and plants in British Guiana but one could be a competent collector without being skilled at classification.

Schomburgk was given much assistance by botanical colleagues in the assessment of the material which he brought back to Berlin but his own remarks in the preface to his *Reisen in British Guiana* are illuminating. He said that he was trained as a gardener and, while he had done his best and obtained help from others, he hoped he would be

\(^{181}\) *Journal of botany*, vol. 29, p. 224.

\(^{182}\) *Nature*, 21 May, 1891, p. 65.
judged for what he was, rather than for what he was not. Clearly he was not an outstanding taxonomist and there is every reason to believe that South Australian collectors sent specimens to von Mueller in Melbourne to be identified. A further point, previously made in regard to crop research is that either he made a large number of spelling errors with regard to botanical names in his written reports or else he was not successful with regard to proof-reading procedures; perhaps not tough enough in insisting that work be corrected and not sufficiently dogged about repeatedly sending back work to the Government Printer until it was correct.

Another obvious limitation of Schomburgk was in the area of what we would now call ecology - a field of knowledge which was in its infancy in his time. Von Humboldt's writing shows a real interest in ecological issues but ecology as a field of study is more of a twentieth century phenomenon. One has to view Schomburgk's liberating of sparrows in the Botanic Gardens in 1868 in this context. The sparrows had been kept in captivity for five years without breeding. Schomburgk wrote with satisfaction in January 1870 that he had reared four broods since June 1869, observing during the period 1869-70 that 'the great utility of sparrows' had been proved both in Europe and in North America, where they had been recently introduced. He believed that the damage done by sparrows to fruit was outweighed by their value in eating insects. He considered

183 Haeckel used the word 'oecology' in 1866 to refer to the study of animals in relation to their environment, in particular to relations with other animals or plants. Subsequent progress in in ecology was treated in C. B. Davenport's Experimental morphology (1897-99) and K. Semper's Animal life (1879-1881). See Taton (ed.), Science in the nineteenth century, p. 368.

184 Report, 1868, p. 4.
that native insectivorous birds were mostly 'passers' and did not keep insects under control.

Settlers did not realize the importance of planting Australian native plants to attract birds and it seems from Schomburgk's remarks about 'several gentlemen' having brought in larks and linnets to be liberated in the Botanic Gardens that the practice of releasing European species of birds was not uncommon. Some, such as the larks and linnets, disappeared after a time\(^{185}\) and those who liberated them could not predict which ones would not survive at all and which would multiply to the extent that they came to be regarded as a pest. Acclimatization Societies were in their heyday in the period 1860-70.\(^{186}\) Articles in the *Garden and Field* in the 1870s and 1880s referring to the problems that United States farmers and gardeners had with sparrows indicate that Schomburgk was not alone in his belief in the usefulness of this species. Such problems are akin to those arising from von Mueller planting blackberry bushes in the countryside around Melbourne, although in von Mueller's case he continued to plant blackberry bushes for a long time after people had become concerned at the consequences.

* * *

Schomburgk's writing style, as revealed in his published papers on economic botany, is very much that of a generalist. He did not produce any papers in the 1880s other than one on weeds and, as Kloot has pointed out, this had substantial limitations. He seems to have busied himself increasingly with the establishment of the

\(^{185}\) *Report*, 1871, p. 8.

Museum of Economic Botany in this period. He wrote of himself and it was written of him by Dow that he had no skilled help\textsuperscript{187} and was personally responsible for the arrangement of the items in the new Museum.

He had travelled comparatively little in Australia. He had gone to Melbourne in 1867 and in 1879 to Sydney but, as mentioned above, appears to have travelled very little in South Australia; he is not recorded as ever having been to Mt Gambier where there was a substantial German population nor to Victor Harbor or Encounter Bay until very late in life. It seems a little surprising. One possible explanation is that his special interests in botany and horticulture were concerned with exotic plants especially tropical plants such as orchids and that he did not find the Australian bush of great interest botanically. It is possible that it was not easy to leave the farm and his horticultural interests in his Gawler days. He may have had personal reasons for being unwilling to travel very far, such as some kind of health problem in the family. It is possible than Schomburgk did send examples of Australian flora to Europe but that the specimens were not especially important in advancing botanical knowledge and thus were not carefully recorded.

We have seen that Schomburgk was not passionately concerned with collecting indigenous Australian plant material and he was certainly not an outstanding taxonomist. Nevertheless he built up a considerable herbarium. The herbarium with its folders of dried plants played an important part of the work of scientific taxonomy

\textsuperscript{187} Although his senior gardeners would have been well trained from a horticultural point of view.
(which in turn was concerned with establishing the spatial and temporal relationship between the world's plants). The international nomenclature of taxonomy could be understood by botanists whose native tongues were Russian, French or Italian.\textsuperscript{188} Records of acquisitions in Annual Reports indicate that important collections were received from Professor Edouard Bureau of the Museum d'Histoire Naturelle, Paris, in 1881 with material from Chile, Spain, Algeria, Martinique and Mexico; from Dr Hooker at Kew in 1882 (South American and West Indian material); from Professor Kirk in Wellington, New Zealand in 1883 and F.W. Adams, New Zealand in 1884; from J. M. Wood, Director of the Botanic Gardens, Natal in 1883, 1884 and 1885; from MacOwan, Director of the Botanic Garden, Cape Town, in 1886; from Professor Schübeler of the Botanic Garden, Christiana, Norway in 1884; from Professor Regel of St Petersburg in 1885 (a collection of many Asian specimens); from Professor Cook of the College of Science, Poonah, in 1886; and specimens from the Botanic Gardens of Melbourne, Sydney and Brisbane and Palmerston (Darwin) as well as collections of South Australian material from Professor Tate of the University of Adelaide and the German born collector Otto Tepper. The herbarium was of special interest to Schomburgk in the last few years of his life and it was written of him that he was always to be found there and that his correspondence in its interest was enormous.\textsuperscript{189} Despite the importance of a herbarium for the scientific work of a botanic garden Schomburgk's successor, Holtze, did not wish to continue with the work of maintaining it. Veitch, visiting in 1893, wrote that Mr Holtze 'hopes,

\textsuperscript{188} Brockway, \textit{Science and colonial expansion}, p. 6.

however, shortly to transfer these elsewhere.\textsuperscript{190} Maintenance required continual vigilance against damp and insect pests. In a period of depressed economic conditions Holtze who had to contend with a reduced budget in the 1890s may have thought it wisest to reduce the scope of his work. The herbarium collection was eventually moved to the University of Adelaide Botany Department returning to the Botanic Garden when the State Herbarium was established in 1955 under the Directorship of Noel Lothian. Today, properly staffed and funded it plays a vital role in the Botanic Garden's scientific work.

The great flow of new plant material appears to have fallen away after Schomburgk's death.\textsuperscript{191} In the early part of the twentieth century horticulture at the Botanic Gardens was emphasized at the expense of a scientific role. There was much attention to horticultural activities such as growing dahlias but collection and classification of Herbarium specimens do not seem to have been regarded as an important function of the Botanic Gardens - rather this was something that would be carried out elsewhere.

So how does one summarize the contribution that Schomburgk made to the plant sciences during his directorship? First and foremost was the horticultural and botanical work associated with acquiring and maintaining a collection of plant material for study and education. In the context of the size and nature of collections of his day, it was a large and important collection. In the 1880s

\textsuperscript{190} James Veitch, \textit{A traveller's notes}, James Veitch and Sons, Chelsea, 1896, p. 176.

\textsuperscript{191} Kloot, \textit{Studies in the alien flora of the cereal rotation areas of South Australia}, p. 15.
Schomburgk was adding 300-400 new species a year to his collection. While he wrote in his last report that he had 13,000 species in his collection, excluding 'florists flowers' such as annuals and rose cultivars, his successor Holtze considered that this was considerably overestimated because annual losses 'which in a trying climate like ours are necessarily very large' had not been recorded.\textsuperscript{192} Holtze wrote in 1893 that in his opinion there were more likely to be only 6000-6500 species but he himself was not able to produce a new catalogue.\textsuperscript{193}

In Melbourne the emphasis of von Mueller's successor, Guilfoyle (Director of Melbourne's Botanic Gardens from 1873-1909) was more on landscape design than on an extensive collection of plants. Guilfoyle produced a catalogue in 1883 listing some 7,000 species, some inherited from von Mueller and some acquired by himself.\textsuperscript{194} F. M. Bailey's 1885 catalogue for Brisbane Botanic Garden and the Bowen Park garden of the Queensland Acclimatisation Society listed about 3,000 species.\textsuperscript{195} Moore's 1895 Catalogue for the Sydney Botanic

\textsuperscript{192} It is possible that disabilities such as gout meant that Schomburgk's supervision at the very end of his Directorship was not as tight as it had been earlier and that losses were not reported to him by his staff.

\textsuperscript{193} Report 1893. Holtze recommended that since the 1878 Catalogue was by then quite unreliable a new one should be prepared but this did not actually occur until 1955.

\textsuperscript{194} W.R. Guilfoyle, \textit{Catalogue of plants under cultivation in the Melbourne Botanic Gardens}, Government Printer, Melbourne, 1883, p.vii. Guilfoyle bemoaned the lack of a catalogue to use as a working basis when he became Director, von Mueller had listed new acquisitions each year without reference to location. Von Mueller had put much of his energy into the collection and classification of specimens of Australian flora, his herbarium becoming the most important in Australia.

\textsuperscript{195} F. W. Bailey, \textit{Catalogue of plants in the two metropolitan gardens, Brisbane Botanic Garden and Bowen Park (the garden of the Queensland Acclimatisation Society)}, James C. Beal, Government Printer, Brisbane, 1885.
Gardens lists about 5,000 species.\textsuperscript{196} There is no indication that Moore, Guilfoyle or Bailey had a range of international contacts comparable with that built up by Schomburgk and their acquisitions appear to have been smaller in number.

To give some comparisons from Britain and continental Europe the Dresden Botanic Garden, developed by the botanist Reichenbach from 1820, appears to have contained some 7,800 species in 1825, Halle some 7,000 and Karlsruhe about 8,000\textsuperscript{197}. As late as 1894 the famous Schoenbrunn Garden in Vienna had about 6,800 species.\textsuperscript{198} Birmingham Botanic Garden is said to have had about 9,000 species in 1834 making it one of the the best stocked botanic gardens in Britain, comparable to the collection at Glasgow Botanic Gardens which also had some 9000 species by 1831 and the London Horticultural Society's Gardens at Chiswick with some 10,000 species in 1840.\textsuperscript{199}

Schomburgk's collection was a large one by world standards. Kloot, commenting that he was 'probably the greatest plant introducer to have operated in Australia' noted that at the time of the 1878 Catalogue, when 8,500 species were listed, Adelaide Botanic Garden had one of the largest living plant collections in the world from


\textsuperscript{197} Heinz Glodschel, 'Ein historischer Gartenbummel', \textit{Die Union}, 4 February, 1989.

\textsuperscript{198} The new Adelaide Botanic Gardens Catalogue of plants, 1988, lists 5,200 species. There are now annexe botanic gardens in the cooler moister climate of the nearby Adelaide Hills so that the Adelaide Botanic Garden collection can be focussed on plants from warm temperate and sub-tropical regions.

\textsuperscript{199} Ballard, \textit{An oasis of delight}, pp. 24-5.
which private and commercial interests were supplied. From this collection new plant material suitable for Australian conditions could be tested and promoted. This included not only material suitable for South Australian conditions but also some plants suitable for a tropical climate such as that in the Northern Territory. In addition plant material was regularly sent to the other Australian colonies, for example pasture grasses to Queensland and New South Wales. Plant material which provided a valuable contribution to the South Australian economy included sultanas, phylloxera resistant vine stock, almonds, pasture grasses, sorghum, safflower, rape and the wheat variety Du Toits.

It is hard to say exactly what the contribution was worth in monetary terms. However when one considers that in Australia overall approximately 343,000 tonnes of sultanas are produced a year (figures for the 1988 season) of which some 256,000 tonnes are used for dried fruit. It is clear that the introduction of material for a new crop could be of considerable economic importance. Some crops, proposed by Schomburgk, did not become popular at the time but have gained acceptance in more recent times, for example production of lupin as a fodder crop has expanded significantly in

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200 Kloot, Studies in the alien flora of the cereal rotation areas of South Australia, p. 15.

201 Figures are based on the 1988 season, see Year Book Australia 1990, no. 73, Australian Bureau of Statistics, Canberra, p. 417. In 1988 some 58,000 tonnes of sultanas were produced, providing a valuable export income.

202 It is not suggested that Schomburgk was the only person bringing in sultana cuttings. His predecessor Francis had imported some cuttings but it is not recorded if they had survived or if there had been significant distribution. However it is known that Schomburgk had produced grafts and that these had been distributed.
recent years, especially in Western Australia.\textsuperscript{203} Similarly the oilseed industry (sunflower, soybean, rapeseed, safflower and linseed) is relatively young by Australian agricultural standards with production increasing rapidly in recent years. Soybean production in Australia was worth $29 million in 1987-8, rapeseed $18 million and sunflower $66 million. Compared with better known grain crops such as barley ($460 million), oats $195 million\textsuperscript{204} and maize $32 million these are nevertheless important crops.\textsuperscript{205} Grain sorghum, used primarily for stock feed, has been grown extensively in Australia only in the last two decades with rapid increases in production for the export market. Gross value in 1987-8 was estimated at $208 million.\textsuperscript{206}

Experiments with crop material and its importation, exchange, display and distribution thus fostered the development of several very profitable plant based 'industries' and the role of the director in this process was a crucial one. Schomburgk appears to have approached these tasks in what might be called a 'professional' manner. Professional used in this context refers to qualities associated with having a solid knowledge base in one's area of expertise in addition to having appropriate skills. However given the importance of both professionalization and specialization in nineteenth century science it is necessary to look more closely at the

\textsuperscript{203} Year Book Australia 1990, no. 73, Australian Bureau of Statistics, Canberra, p. 419.

\textsuperscript{204} In addition to $61 million value of oats for green feed and silage.

\textsuperscript{205} Year Book Australia 1990, no. 73, Australian Bureau of Statistics, Canberra, pp. 394, 400, 406-8.

\textsuperscript{206} Year Book Australia 1990, no. 73, Australian Bureau of Statistics, Canberra, p. 407.
concept of 'professional' which has meant very different things to different people. Some studies of professionalization, as Susan Faye Cannon has observed, have defined professionals as those who are trained in an institution for training specialists, who earns their living largely by selling their professional skills and thirdly, who belong to a group which stands for exclusiveness and ethics. Such a definition may be suitable today for doctors, lawyers, social workers and teachers but it is not suitable for categorizing nineteenth century scientists - for example it would not be suitable for important nineteenth century scientists such as Charles Darwin or Charles Lyell. Cannon argues that an appropriate definition must be able to include such people as Darwin and Lyell but also Richard Owen, John Herschel, and Robert Brown who were 'known to their contemporaries as masters of their craft, whose opinion on an experiment or a bone fragment or adjusting a telescope are worth four times as much as the average scientist's'. 207 Cannon suggests that in the nineteenth century a person who spent most of their energy of science might:

initiate, maintain or improve his middle-class status, might devote his life to this activity without needing the justification of being a doctor, lawyer or clergyman in addition; and might feel that his success was determined by the reputation he gained among his peers, not by monetary returns.208

Increasing professionalization saw 'qualifying' associations developing in the nineteenth century, which examined and certified individuals wanting to practice as well as occupational associations which looked after the interests of those so qualified. These functioned alongside two other kinds of professional group: 'prestige'

207 Susan Faye Cannon, Science in culture, p. 143.

208 ibid., p. 146.
groups such as the Royal Society and 'study' groups such as the Astronomical and Zoological Societies.\textsuperscript{209} For many people professional training came to mean a hierarchy of specialized course work and a degree along the lines of a German style university with laboratory courses.

Cannon suggests that one approach is to characterize the scientific professional as someone involved in a scientific endeavour with recognized social status, with its own standard of merit, with support and approval coming from a 'self-reviewing circle'. Furthermore the professional could be seen to be distinguished from the amateur, the patron, the dilettante, the teacher, the interested cleric, and the retired naval officer by long term attention to science as that person's major activity, by their technical expertise, and by the number and quality of their accomplishments. The scientific observer had the technical expertise to evaluate the significance of an observation in the light of a more general theory. A further refinement would be to see a 'fully formed professional' as one who is fully equipped both with expertise and attitudes to devote himself or herself to solving problems within a professional field with no need for monetary or ideological motivation from outside the field, for example a desire for cure various ills in the community.\textsuperscript{210} This approach is one which defines the professional as someone who has knowledge and skills but who has some other qualities too, which are concerned with values and motivation. A good example of the nature

\textsuperscript{209} ibid., p. 147, referring to Geoffrey Millerson, The qualifying associations: a study in professionalization, pp. 5 and 33-41.

\textsuperscript{210} Cannon, p. 156. A twentieth century example is provided by two taxonomists, who have retired from the University of Adelaide and now work voluntarily at the State Herbarium - both frequently arrive earlier in the morning than some of the paid staff.
of such qualities is provided in a letter written about the young Irish botanist William McCalla by David Moore, Director of the Botanic Gardens at Glasnevin. Moore wrote of McCalla that while he was

an indefatigable collector possessing of very considerable degree of natural talent...he wants almost every other acquirement necessary for crowning his labour with honour and success. He wants industry, taste and a due sense of honourable and faithful motives.211

The issue of values, such as 'honourable and faithful motives' is one about which much less is written than the issue of knowledge and skills and yet it is vital in understanding the role of the professional.

Schomburgk's work in the plant sciences can be seen in the above context as professional. He was recognized by contemporaries as an expert in the field of plant introductions and was used as source of expert advice for government committees. Using the Kew Guidelines as a benchmark it is clear that the work done in Adelaide Botanic Garden during his directorship was very acceptable by the standards of the day. There was a clearly marked collection of plants, laid out in an organized way. A herbarium was acquired and maintained. Although only limited in his skills as a taxonomist Schomburgk would certainly have been able to identify many plants for local enthusiasts - beyond that local specimens could be sent to Otto Tepper or to von Mueller in Melbourne who was by far the most important taxonomist in Australia by the 1870s. There was an excellent collection of economic botany specimens, including forestry products, and this was housed in a building which was built to last for generations. In addition to the plant material there was a

library with standard botanical and horticultural works and current journals.

We have seen that in addition to Annual Reports, publications were produced by Schomburgk which brought attention to matters of concern in horticulture, agriculture and forestry. Such publications were primarily of application within South Australia although some were of relevance to people in other Australian colonies or overseas. Articles written by Schomburgk do not appear to have been primarily written with a view to gaining international prestige but rather with the pragmatic approach of applying scientific knowledge to resource development. In doing so Schomburgk functioned as a professional who identified with his adopted country and who worked to further its development. Although he maintained extensive links with botanists and horticulturists in Europe his orientation was to Australian and particularly South Australian affairs. To have moved to Melbourne to take up the directorship of its Botanic Gardens might have aided his scientific and professional advancement but he could not be tempted to make the move. Kynaston has written of Ferdinand von Mueller that it was extraordinary that Mueller did not travel to Europe when he had numerous invitations to do so and such a trip would have had such value in professional advancement.\(^{212}\) However there is no evidence that either Schomburgk or von Mueller showed a strong desire to return to Europe even for a trip - it was as though they had chosen to make their lives in Australia and their total loyalty was to their adopted country. In Schomburgk's case he referred to himself in his writing as though he were a loyal local

citizen who was concerned that 'we' should not import plant products if they could be produced locally. He had been naturalized soon after arrival and adopted an Anglican church as his place of worship after moving to Adelaide. In adulthood his children appear to have maintained no German customs.²¹³ It is true that this situation was not totally incompatible with a desire to travel to Europe but certainly there is no evidence that such a trip was ever seriously contemplated.

The obituary on Schomburgk in Nature magazine asserted that as an author he was 'an enthusiastic horticulturist rather than a botanist' and that 'his most important literary work relates to the botany, to the agricultural and horticultural capabilities of his adopted country, and especially to the Botanic Gardens, of which he was to a great extent its creator',²¹⁴ a statement which emphasizes both his strengths and his weaknesses. In the next chapter we will examine how both promotion of the agricultural and horticultural potential of South Australia and the study of botany was achieved through the use of the Botanic Garden as an educational institution. In doing this we will see how much the scientific, educational and recreational roles of the Gardens overlapped.

²¹³ This is according to information obtained from descendants of Schomburgk's son and three of the daughters.

Chapter 8

THE BOTANIC GARDEN AS AN EDUCATIONAL INSTITUTION

In Chapter 2 we looked at those features of South Australian colonial settlement which formed a background to scientific and institutional development. It was noted that South Australia had the advantages of the combination of concentrated settlement, substantial economic development by the 1850s and the existence of a group of educated people who wanted the kind of scientific and cultural institutions appropriate for a provincial city such as Birmingham or Manchester in Britain or Dresden in Germany.

At the beginning of Schomburgk's administration the Botanic Gardens provided educational and scientific services alongside those provided by another 'North Terrace' institution, the Institute with its library and museum facilities. This chapter will show how the educational thrust of the work permeated the scientific and recreational aspects of the work done at the Gardens.

The definition used in Chapter 1 referred to a botanic garden as a 'garden containing scientifically ordered and maintained collections of plants, usually documented and labelled, and opened to the public for the purpose of recreation, education and research'. In the 1886 Report, when the colony was celebrating its Jubilee, Schomburgk summarized the work of the Botanic Garden since its inception; his statement emphasizes the importance of the educational role. He spelt out the importance of helping people find out what could be grown successfully;
The garden has not only formed a centre of cultivation, but has been the source from which reliable and valuable information has been disseminated over the whole colony.¹

He went on to comment in his 1888 Report that

a Botanic Garden is not a mere colonial show got up for the purpose of attracting the colonists or stranger who may honor South Australia with a visit. It is really an educational institution, by means of whose operation instruction may be spread over the colony, as to the constitution, habits, and mode of culture of introduced plants, not solely for the profit of individuals who may be engaged in the culture of the soil, but for the ultimate benefit of the whole community which furnishes funds for that purpose.²

The Botanic Garden was seen as primarily an educational institution. Study and education went hand in hand and while recreation was important it was stressed that the Garden was not to be a mere pleasure ground or public park. The focus was on 'introduced' plants and thus on aspects of acclimatization. Furthermore Schomburgk believed he was accountable to the whole community. This attitude permeated his work and is manifested in the balanced way that the services provided were appropriate for a wide range of people with very different interests.

Development of a collection of plant material and its presentation

Bringing together a collection of live plants in a Botanic Garden provided a focal point so people could study plants that were suitable for South Australian conditions while learning about plants more generally. As the collection was built up descriptions were published of new forest trees, shrubs and plants, vegetables of various kinds, grasses, cereals and flowering plants useful for making perfumes.

¹ Sketch of the Botanic Garden and its progress, Report 1886, p. 21.
Museum items such as models of fruit and exhibits of wood specimens enhanced the collection. Grouping particular plants together brought attention to their special features, for example there was a special area for herbs with medicinal value and this was then highlighted by periodic reviews in the Annual Reports. Pharmacists and others interested in both 'allopathic and homeopathic medicine' were allowed to make use of the herbs while exhibits were mounted in the Museum of Economic Botany to promote production for commercial and domestic use.

The Botanic Garden collection was large by the standards of today and as we have seen in Chapter 7 was large by the standards of the nineteenth century. The grouping of plants together to demonstrate the relationship between members of groups of plants to each other is seen in the provision of a system garden or class ground. This was an adjunct to the grouping of plants in the main collection according to family (for example cycads or bromeliads) or area of geographic origin (such as tropical plants). The final establishment of the class ground, after some years of planning, coincided with the establishment of the University. This enabled students of natural history to have access to a system garden. The Director was involved in teaching students in the early days of the University prior to the appointment of Professor Ralph Tate in 1875 to the Elder Chair of Natural Science. The provision of the class ground was regarded as a proper function of a botanic garden with a serious educational and scientific role; 'By all means a botanic garden should not be without such a scientific arrangement'. As has been noted Schomburgk waited until other things of more popular appeal were accomplished

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3 Report 1867, p. 3.
first, accepting that there was limited interest to be found in the community in the study of botany. There was a system garden in Sydney under the directorship of Charles Moore and this was further developed by Maiden. Moore gave lectures on botany as early as 1851 and had been gratified by the response. A visitor to Adelaide from Hobart returned home declaring that Dr. Schomburgk's system garden was a model of what should be established at the Hobart Botanical Gardens. Discussion recorded in the Proceedings of the Royal Society of Tasmania gives valuable insight into contemporary attitudes. However valuable the arrangement of plants might be from an educational viewpoint, some three acres were needed and it was difficult to make the garden aesthetically pleasing. Abbott, the Curator in Hobart, reported Schomburgk's comments that popular appreciation was very limited indeed. Another member observed that 'neither the educated or the popular bent of these [Australian] colonies can be said to be in the direction of science.'

For von Mueller the system garden was a very important part of the Botanic Garden in Melbourne but, as has been observed, his use of the

4 'notwithstanding that at present little or no taste for the science of botany seems to exist amongst our rising generation, this taste may, perhaps, be more prominent in the future one' Report 1867, p. 3.

5 As indicated by Lionel Gilbert in The Royal Botanic Gardens, Sydney, a history, 1816-1985, pp. 81, 86 & 97.

6 Gilbert, Royal Botanic Gardens, Sydney, pp. 84 & 97.


8 Abbott had visited the system garden in the University of Melbourne and had found the juxtaposition of plants 'incongruous' and many of the plants dead or 'languishing'. Abbott noted that Schomburgk had two acres rather than three for his system garden. Proceedings, 1881, p. xviii.

9 ibid., p. xviii.
traditional continental plan of square beds was not to the liking of a number of Melbourne's influential citizens. At Wellington's Botanic Garden James Hector is known to have established a teaching garden in 1886 with plants set out in traditional rectangular beds edged with *Buxus sempervirens* (box). Hector, who regarded this area as the true Botanic Garden, had the whole section enclosed to guard against vandalism, with admission restricted to those with a 'genuine' interest in the collection.\(^{10}\)

After the University of Adelaide was established\(^{11}\) the Board agreed that practical demonstrations of botany could be given at the Gardens 'on the understanding that the students did not walk on the lawns or borders or pick the flowers'\(^{12}\) and when Schomburgk prepared a 'Herbarium of the Flora of South Australia' for the Paris Exhibition, the University requested a duplicate set\(^{13}\) indicating some cooperation between the two institutions with regard to the teaching of botany. The teaching potential of the Botanic Garden collection was further enhanced by both the labelling of specimens and the production of catalogues. Labelling was time consuming and difficult but regarded as an important part of the educational role of a botanic garden and one which made such a garden different from a pleasure ground. In the set of guide-lines from Kew sent to James Hector, Sir Joseph Hooker wrote that collections should be 'conspicuously

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\(^{11}\) Teaching commenced in 1876.

\(^{12}\) Board Minutes of November 1877 record the correspondence with the Registrar of the University.

\(^{13}\) The Board agreed to this on condition that the University provided the necessary paper. Minutes November 1877.
ticketed. While labelling was regarded as an essential part of the work of a Botanic Garden, contemporary reports by botanic gardens directors and horticultural writers attest to the difficulty of providing permanent and legible labels. Schomburgk devoted half a column to the issue in his 1875 Report. Articles in the Gardener's Chronicle during the period under examination echo this concern with comments that the renewing of labels was for most establishments a 'source of constant trouble and expense'. New solutions to the problem, described with great enthusiasm one year, might be followed two years later with comments which indicate that the new method was found wanting.

The Museum of Economic Botany
Labelling was also an important part of Schomburgk's work in setting up the Museum of Economic Botany. In the case of the Museum labels, which could be larger than those outside, he gave country of origin and 'properties and the uses of each object'. He was occupied for some months in 1880 with labelling and arranging the specimens. The whole Museum of Economic Botany project was very dear to the Director's heart. As early as 1870 he had referred to his 'favourite scheme of making the museum a kind of technical one, at least for objects belonging to the vegetable kingdom...' The new building was to provide for both 'the economical collection of the garden', which had

16 For example, see the comments on labels in the Reports 1866, 1867 and 1868. Similar problems were recorded in Hobart, see Proceedings of the Royal Society of Tasmania 1881, p. i.
17 Report 1880, p. 10.
already been established in what came to be known as the Wood Museum\(^{18}\), and the existing herbarium collection. In proposing the new building the Director pointed to the educational value of exhibits:

Our museum is one of the institutions in the garden most appreciated by visitors: The miscellaneous objects of the vegetable kingdom it contains are not only of great importance to persons of various callings, each of whom will find subjects of interest amongst the numerous specimens, but they also show how natural products can be best turned to good account, and teach us to appreciate the general relations of the vegetable world to man. We learn from them the sources of innumerable products furnished by the vegetable kingdom for our use and convenience, whether as articles of food or construction, or application in medicine or art. In brief, the botanic museum shows us how little, as well as how much, we know of the extent to which herbs, shrubs and trees, contribute to our necessities, comforts and numberless requirements; and this can only be attained by exhibiting the economical and commercial plants in their raw state, side by side with the articles into which the products have been converted by means of man's labor and skill.\(^{19}\)

Such displays could demonstrate how different plants could be used and the process of manufacture, for example the museum collection came to include such items as models of fruit, samples of acids, tar, oil, samples of paper, silk and jute both in their raw state and in varying stages of manufacture.\(^{20}\) As noted in Chapter 2, in this period that preceded the petrochemical era plant products were used for a wide variety of purposes for which we would use metal alloys, synthetic fabrics, plastics and other twentieth century materials. Plant products were used for shelter, for food and beverages, medicines, paper products, printing ink, adhesives and dyes and for recreational uses, furniture, for surgical appliances, for machinery, in various forms of manufacturing processes and for containers and for binding purposes. An artificial leg in the mid nineteenth century

\(^{18}\) As a result of subsequent site development, the old Wood Museum is now part of the Francis Arbour.

\(^{19}\) Report 1877, p. 10.

would be made of willow. Wood was used not only for fuel in industry but also for charcoal for manufacturing purposes. Settlers in a colony such as South Australia had to learn which of the native trees were best for various purposes, for example which timber was best for garden tools and which for the axle of a cart - such information was gradually developed by trial and error. The museum displays held interest for people working in the fields of industry and commerce and could thus be seen to demonstrate to leading citizens and politicians how science and technology were relevant to economic progress in the colony.

There had already been a large number of exhibits in the old Wood Museum: samples of paper and fabric made from fibre that could be grown locally, timber samples, specimens of different kinds of wheat; in all some 2,000 specimens as well as the early herbarium specimens. A number of important international exhibitions were held in the 1880s and these were a fruitful source of new exhibits for the Museum of Economic Botany. For example, one collection came from the Japanese Court of the Sydney International Exhibition of 1879 with material from the Imperial chemical laboratories of the college of agriculture in Komaba-Tokis in Japan. The Fiji and Ceylon courts of that exhibition provided some further material. From the Melbourne exhibition came a collection of about 70 items of grasses, fodder and commercial plants. In the 1887 Report it was recorded that there were 8,166 items, a further 1,795 items having been added following the South Australian Jubilee Exhibition. The Bengal Government had donated 1,516 items in return for exhibits presented to that government by South Australia which had formed part of the South Australian collection at the Calcutta International Exhibition. This collection from Bengal was said to include as complete a
collection as could be assembled to represent the economic plants of India; 492 items showing medicinal products, 216 food substances, 108 oil-producing seeds, 44 dye plants, 44 plants useful in the tanning industry and 36 gums and resins.21

From the Sultan of Johore came 492 specimens of timber and another 90 miscellaneous items including specimens of gutta percha, copal, spices, fibres and bast. The directors of the New York Agricultural Experimental Station sent specimens of sugar, and the seed merchants, Messrs Dammen and Co. of San Giovanni a Teduccio, near Naples, sent a 'very valuable carpological [fruit] collection'. There was a collection of oil cakes 'now much used in Europe for the purpose of fattening cattle' and an elaborate case of specimens of English grasses from Messrs Sutton and Sons, the London seed merchants.22 From Kew came some specimens that had been exhibited at the Indian and Colonial Exhibition held in London, and a 'splendid' set of wax models of South Australian fruits came from the Commissioners of the South Australian Court in Melbourne. Timber specimens were exhibited separately in the Wood Museum. The timber collection also benefited from the various International Exhibitions held in Australia in the period 1879-88 as seen from the presentation by the British North Borneo Company of specimens of timber from Borneo previously exhibited at the Melbourne Exhibition. The gift also included a group of miscellaneous specimens which included 'eatable swallow nests' which might have entertained small

21 Report 1887, pp. 12-13

22 Report 1887, pp. 12-13. The exhibit is probably similar to that which has been exhibited in recent times in the Powerhouse Museum in Sydney.
visitors who were being shown items intended to edify them in various ways.

The 1888 Report gave a break-down of specimens displayed:
Medical drugs: 540; food substances: 125; spices: 37; oil seeds: 91; tanning materials: 64; dye plants and stuffs: 170; gums and resins: 122; fibres and bast: 178; carpological collection: 856; models of fungi: 210; models of fruit: 397.

Dye plants were exhibited together with dyed fabrics such as linen and wool. The Director's enthusiasm for these exhibits exceeded his capacity for elegant English when he began his section describing these exhibits in the 1881 Report 'What an interesting study are the dye plants...'. There were exhibits of cotton and silk in various stages of manufacture and Bombax seed pods used for stuffing cushions.\textsuperscript{23} Gums and resins were displayed in relation to their use in pharmaceutical practice and in the manufacture of paint and varnish. 'India rubber and gutta percha', names which sound quaint today were substances so important in technology in their day that Schomburgk's colleague Albert Molineux wrote that 'were it to go suddenly out of existence, civilization would almost be at a standstill until a substitute could be found.' Following the patenting of hot vulcanization in 1833-4, manufacture of rubber goods enabled technological developments such as submarine telegraphs, new manufacturing processes and new items in the domestic sphere, with

\textsuperscript{23} Descriptions of the contents of the cases are based on Report 1887, pp. 12-13 and material in The Museum of Economic Botany [ by a contributor]. [No publication details, not paginated - it is probably copied from newspaper articles in 1881. A handwritten title page adds 'compiled by A. Molineux'].
goods ranging from waterproof clothing and contraceptive devices to industrial seals, hoses and tyres.\textsuperscript{24}

Some displays were of particular plants or groups of plants which could be used for a variety of purposes. For example, notes on Museum of Economic Botany exhibits refer to marking nuts from India (*Semecarpus anacardium*) which produced a foodstuff, an indelible ink for marking fabrics, a black varnish, a caulking compound and was also used for a variety of medicinal purposes (including some 'only mentioned in whispers'). Products of *Acacia* species such as gums, tannin, perfumes and astringent medicines were displayed together. There were products from the Myrtaceaee (Myrtle) family - bark, cloves, timber for furniture and pyrethrum products. From the Euphorbiaceae (Spurge) family plants there were exhibits of *Stillingia sebifera* from China (used for dye, printing blocks and tallow), candlenuts from the 'candleberry tree' of the South Pacific Islands, used, threaded on a skewer, as candles and to produce candlenut oil and exhibits of the castor oil plant, *Ricinus communis*. From the Laurel (Lauraceae) family there were cinnamon, bay-leaves and camphor and from the wood, bark and roots of *Sassafras officinale* a volatile oil used in drinks, a yellow dye and oil for perfumes and medicinal purposes. From the Myriaceae family came products such as candle wax and shaving soap; oil from *Myrica nagi* and *Myrica cerifera* used for such purposes as removing lice and bed bugs and in the treatment of toothache and worms; as well as birch (Betula) bark used for dyeing, tanning, wood preservation and in medicines.

\textsuperscript{24} ibid; *Encyclopaedia Britannica Macropaedia*, vol. 15, p. 1174.
There was a section of products from the larger trees such as balsams, acids, copals, gums, lacs, mastichs, myrrhs, oils, rubbers, spirits, tragacanthns, varnishes and vinegars. These products were used for such varied purposes as medicines, dental treatment, commercial varnishes, tanning and dyeing, products for factories and workshops, the production of musical instruments, glues, perfumes and incense. The locally grown 'native grass-tree' (*Xanthorrhoea quadrangulata*) was another source of varnish and could also be used for paper production. One case had a display of products such as acetic acids, wood spirits, tars and oils extracted from various *Eucalyptus* species found in South Australia.25 Acorns and timber samples from oak trees were reminders of the use of these products in shipbuilding, ink-making, tanning and dyeing.

The processes of manufacture of food and beverages were demonstrated with such items as wheat products (for example bread, vermicelli, bran, pollard and so on), spices, dried fruit, and sugar products, flour made from cassava, Fijian tapioca, yams, hops, various forms of ginger, Paraguay tea or Maté and the more commonly known kinds of tea and coffee. There was a large display of the olive and its products and products of the vine including items such as grape-oil, cream of tartar, grape charcoal (used in lithography) and jams. Tobacco products included leaf produced in South Australia. Various types of rice were displayed - at this time it was thought that rice might be grown in the Coorong or Mt Gambier areas south-east of Adelaide. Rice was being grown in nineteenth century Europe

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25 The acetic acids, wood spirits and tars came from *Eucalyptus leucoxylon* (ironbark), *E. obliqua* (stringybark), *E. rostrata* [*E. camaldulensis*], *Melaleuca ericifolia* (tea-tree), *Banksia marginata* (honey-suckle), *Acacia melanoxylon* (blackwood), *Acacia decurrens* (blackwattle) and *Casuarina stricta* (sheoak). The oils came from *Eucalyptus stuartiana* and *E. viminalis* (box-gum).
in such places as Lombardy, Savoy and Westphalia and 'a good crop had been obtained at Windsor on the banks of the Thames'\footnote{The Museum of Economic Botany. Eighth notice.} so it was thought that rice could be grown in various parts of Australia.

There was a section with fibre products from bamboo, yucca, rushes; flax, hemp, palm and agave producing such items as mats, rope, nets, bags and paper. Paper was displayed made from a large number of eighteen different species found in Australasia - trees (such as \textit{Melaleuca ericifolia} and \textit{Eucalyptus stuartiana}), rushes, grasses, sedges and the local flag. There were specimens of lace and fine fabric made from the Rhea fibre from \textit{Boehmeria nivea} in various stages of manufacture. Near these were specimens of other members of the Urticaceae family used for cordage and sail-cloth and netted fibres from the \textit{Ficus} species. Palm products were grouped together: raffia, matting, hats, bags, palm oil, sago, fans, baskets, brooms, walking sticks, rattan and chair coverings. Items such as baskets and cordage were also displayed from the \textit{Juncaceae} (rush) and \textit{Cyperaceae} (sedge) families. A case with samples of silk products and silk manufacture was of interest at a time when there were still people hopeful of establishing a lucrative sericulture industry in Australia. Given Schomburgk's interest in pasture grasses it is not surprising that there was a display of these and some samples of flax and its uses. Near these was a display showing the different varieties of wheat and barley then being grown in South Australia, mostly small sheaves with a bottle underneath containing a sample of the grain. Molineux's description indicates that there were at
least 35 varieties of wheat displayed\textsuperscript{27} - a large collection for its day.

It was hoped that the displays would stimulate the interest of local manufacturers and agents in new products which could be made using plant material. Although Schomburgk encouraged the use of plants that could be grown in South Australia, the local economy could also be stimulated by manufacturing processes using imported plant material. It is worth noting that von Mueller's \textit{Select Extra-tropical Plants} with plants for 'industrial culture or naturalisation' was already available to interested readers in the 1880s as a source of further information.\textsuperscript{28} It is not possible to assess how successful the displays in the Museum of Economic Botany were in encouraging local manufacturers but since the Botanic Garden was such a popular place to visit and the Museum much frequented one can assume that most local manufacturers and men of commerce would have seen the display at some time.

The other important rationale of these displays was to demonstrate to the farmer or horticulturalist the possibility of either domestic or commercial production of new kinds of crops or new species of existing crops. Country visitors were numerous and observed by the Director to form the larger proportion of those visiting from Monday to Saturday. Working people in Gawler petitioned Parliament in 1883 for a return railway service on Sundays so that they could see 'the many improvements in and around Adelaide, including Torrens Lake,

\textsuperscript{27} \textit{The Museum of Economic Botany}, Eighth notice.

\textsuperscript{28} \textit{Select extra-tropical plants readily available for industrial culture or naturalisation, with indications of their native countries and some of their uses}, 7th edn, Government Printer, Melbourne 1888.
Botanic Gardens etc.', which they knew about from reading newspaper accounts. The petitioners made it clear that the Botanic Garden was one of the most important venues for the country visitor. Of special interest to farming folk among the country visitors were displays concerned with crops which might be grown and displays relating to diseases of plants and stock. Exhibits concerned with phylloxera came from Professor Blankenhorn in Karlsruhe, Germany; with specimens preserved in spirits as well as drawings. There was an exhibit demonstrating indigenous poisonous plants 'from which thousands of sheep annually lose their lives': *Lotus australis*, *Euphorbia drummondii*, *Lobelia pratiodes*, *Swainsonia greyana* and *Gastrolobium bilobum*. A large display of various kinds of fungi made of papier maché was designed to illustrate those which were poisonous. The 'toxicological collection' also included items such as opium poppies together with by-products morphine and laudanum and plants producing prussic acid and strychnine.

The exhibit of urari or curare, 'the deadly arrow poison of the Marcusis' is of special interest today since it would have been one of the first anaesthetic compounds imported into South Australia, and possibly the first. We saw in Chapter 3 that Richard Schomburgk had been able to study its production by the Amerindians in British Guiana and subsequently his brother Otto had carried out veterinary experiments in Berlin on the compound which remains active over a long period. It is probable that the material displayed in the

29 *S. A. Parliamentary Papers*, 1883-4/222, quoted in Hirst, *Adelaide and the country*, p. 34.

30 *Report* 1883, p. 11.

31 R Schomburk, 'On the urari: the deadly arrow poison of the Indian tribes in British Guiana', read before the Philosophical Society on April 10, 1866, in *Papers*
Museum had come out with the brothers from Germany as it is unlikely that Schomburgk would have had access to another source of the compound in the intervening years.32

There was a special section on plant material used by Aboriginal people. This had been obtained from the Northern Territory with the help of the Inspector of Police in that area, Paul Heinrich Foelsche. Schomburgk was able to use a skilled German compatriot to obtain the material from Darwin just as he was able to make use of the collector Frederick Schultze on the Surveyor-General G.W. Goyder's Northern Territory Expedition expedition or Survey Party expedition of 1868-9. The German born Foelsche had made a systematic study of aboriginal language and customs and was also known as a botanical collector.33

The collection included nine items showing foodstuffs, two prepared from Crotalaria dissitiflora, which were used for cordage and twine and six items used for medicinal purposes. In the last group Schomburgk mentions the vine Sacrostemma australis [Sarcostemma australis] used for skin diseases; a Eucalyptus product used as a plaster for wounds; and Duboisia pituri [D. hopwoodii], the leaves of which had properties similar to those of tobacco and were smoked or chewed by aboriginal people. Specimens of this species had been sent to Europe where it was said to be used 'as a potent remedy in


32 The Amerindian tribal experts were usually reluctant to reveal their secrets and specimens of the compound could not easily be obtained. Apparently the compound remains active for a long period.

33 Australian dictionary of biography, vol. 4, 1851-1890, p. 192.
ophthalmia practice'.

Following his British Guiana experience Schomburgk had a considerable interest in the use of plant material for medicinal purposes by indigenous people. His interest in teaching the public about the use of plant material by Australian aboriginal people was a natural development from this and it was combined with his promotion of live plants for medicinal uses. What is notable about Schomburgk's concern with plant material used by Aboriginal people is that this was an era when many people regarded aboriginal knowledge of plant uses with indifference - an attitude which continued to be prevalent with rare exceptions until quite recent times. Albert Molineux, writing about the Museum of Economic Botany display in 1881, commented that although it would not be strictly in accordance with the objects of the Museum he thought it would be desirable for specimens of ornaments, weapons, clothings and utensils used by South Australian Aboriginals to be exhibited in the Museum of Economic Botany and if this were not possible then perhaps such exhibits might be displayed by Waterhouse in the South Australian Institute Museum:

> The natives would, I am sure, come out in a far better light than many of our colonists are wont to regard them in, and their ingenuity would rather astonish those who are in the habit of regarding the Australian aboriginals as the most degraded people on the face of the earth.

An account of the South Australian Museum published in 1888 described the principal displays as being those for mammals, birds, fish and reptiles as well as minerals, fossils and shells. There was

34 Report 1881, p. 12.

35 The Museum of Economic Botany, Eighth notice.

36 The title of the Museum had been changed from South Australian Institute Museum to South Australian Museum during 1882-3.
no mention of ethnological displays although ethnological material had been collected.\textsuperscript{37} The Museum had operated in three small rooms until 1882 and even when it moved into the west wing of the new Institute building for the Museum, Art Gallery and Library display space was inadequate.\textsuperscript{38} Molineux's remarks indicate that ethnological displays at the South Australian Museum were very limited and the Museum of Economic Botany's collection of plants used by Aboriginals provided a valuable display which acknowledged the culture of the first inhabitants of South Australia. Schomburgk had left a display of artifacts at Gawler from the time when he was Curator of the Museum at Gawler Institute, including an immense net used for catching emus, part of a collection later handed on to the South Australian Museum.\textsuperscript{39}

Schomburgk approached with enthusiasm the task of teaching the public about the ways that vegetable products were used, not only by aboriginal people but in a more general sense.

\textit{When we consider that vegetable substances constitute nine-tenths of the whole commerce in raw products and that they furnish us with the bulk of our food and clothes, our medicine, and our building material, with many other necessaries and luxuries, and that no doubt hundreds of people eat and drink, use and admire various manufactured articles, but have no idea of the plants from which they are derived, it is more essential to direct attention to the vast importance of a museum of botanic economy.}\textsuperscript{40}

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\textsuperscript{37} \textit{South Australia in 1887-8, A handbook for the Centennial International Exhibition, Melbourne, 1888, [compiled by H. J. Scott], H.F. Leader, Government Printer, Adelaide, 1888, p. 91.}

\textsuperscript{38} \textit{Herbert M. Hale, The first hundred years of the South Australian Museum. 1856-1956, Records of the South Australian Museum, vol. XII, June, 1956, p. 39.}

\textsuperscript{39} Although the contents of the Gawler Museum were transferred to the South Australian Museum, deficiencies in record-keeping make it impossible to identify all the specimens transferred.

\textsuperscript{40} \textit{Report 1881, p. 12.}
He was gratified to find that the new Museum was one of the most popular features of the Botanic Gardens for visitors, even more popular than he had anticipated. Visitors who came from other colonies at the time of the Jubilee Exhibition 'appeared to be much struck by what they saw, and were loud in their praises of the garden', visitors being impressed with the objects themselves, as well as with their simple and practical arrangement. The descriptions attached to them, in short and simple form, respecting the uses to which they may be applied, are found to be sufficiently clear to render the printing of a catalogue unnecessary.

Descriptions included both botanical and popular names as well as a 'condensed description of the properties and uses' of the material. He considered this 'important and instructive' for older visitors as well as young ones. Aiming to make the displays both interesting and educational he used colour coding with some of his labelling so that there were different coloured labels for different groups of fungi; poisonous plants having a red label, edible ones blue and the 'harmless' white.

The broader world of science was not forgotten. A collection of busts of 'renowned scientific men' - Linnaeus, Alexander von Humboldt, Justus von Liebig, Michael Faraday, Rudolf Virchow, Leopold von Buch, Sir Joseph Banks, C. L. Willdenow, Jöns Jacob Berzelius, Sir Isaac Newton, Johannes Müller and A. de Jussieu - was imported from E. Warles of Leipzig, and is still in existence today,

41 Report 1881, p. 11.
42 Report 1887, p. 4.
43 Report 1887, p. 4.
44 Report 1880, p. 10.
although not always exhibited. There was also a series of lithographs of well known scientists. The collection, sent by Sir Joseph Hooker, was similar to one in the Museum of Economic Botany at Kew.\textsuperscript{45} Such a promotion of the role of eminent European scientists acknowledged some of the great developments in scientific knowledge and provided a link between the best in Europe and an ambitious colonial development.

As has been observed in Chapter 3, the idea of a Museum of Economic Botany appears to be based on the Museum of that name at Kew, opened in 1847 and the first of its kind. The arrangement of displays was based on that of the Museum of Economic Botany at Kew. The display cases themselves were modelled both on those at the Kew Museum and those at London's new Natural History Museum at Kensington, opened in 1881.\textsuperscript{46} Schomburgk could be criticized for demonstrating dependence on the imperial centre rather than showing colonial initiative and self-reliance but such criticism seems a little churlish. Schomburgk and the Board were modelling their museum on what was then the best in the world. The Museum of Economic Botany demonstrated a belief in both pure and applied science and an international approach to the study of the nature and use of plants. To invest $3000 on such a project some twenty five years after the official founding of European settlement in South Australia was remarkable at a time when bridges, railways and hospitals were needed and it is noteworthy that no other Australian Botanic Gardens

\textsuperscript{45} This little known collection is today displayed in the State Herbarium.

had a substantial structure of this kind, although other Botanic Gardens did have botanical museum collections.47 The Museum of Economic Botany collection of busts and lithographs of important scientists of the day is little known in the world of the history of science.

The development of the new Museum has to be viewed in the context of popular attitudes to natural history in the Victorian era in both Britain and Australia. There was a popular passion for natural history in nineteenth-century British society which is exemplified in accounts of domestic displays of shells, fossils, butterflies, pressed flowers and ferns, aquaria and wardian cases; this last being the Victorian version of the terrarium. It was common for newspapers to have columns on natural history and in Britain popular books on the topic could become best-sellers.48 Lynn Barber in The Heyday of Natural History argues that natural history offered 'rational amusement' - it was not to be regarded as 'mere amusement' like reading a novel or going to the theatre but rather had some element of useful instruction and moral uplift.49 As was seen in the writings of J.C. Loudon it was regarded as an occupation suitable for the clergy.50

47 For example, the Sydney Botanic Gardens had a building containing an office, lecture room, storeroom and museum erected in 1878. Moore listed 763 items in his catalogue of items in the museum in 1883. Gilbert, The Royal Botanic Gardens, Sydney, pp. 105 & 107.

48 Barber, The heyday of natural history, pp.13-15; Kynaston, A man on edge, p. 82.

49 See Barber, The heyday of natural history, p. 14. Columns in South Australian newspapers such as the Register and the Observer illustrate Barber's point, although there appears to have been comparatively less on natural history in South Australia and more on the applied sciences.

50 Lynn Barber, The heyday of natural history, p. 17. This point is also made by Susan Sheets-Pyenson in Cathedrals of science: the development of colonial natural history
In colonial Australian society it is noticeable that a significant body of research was done by such clergymen as William Woolls, W. B. Clarke and Julian Tennison Woods. The first binocular microscope imported into South Australia was said to be that of Rev. J. B. Austin. Contemporary attitudes were that on, the one hand, natural history was both 'scientific and therefore useful' and, on the other, that it provided a healthy occupation. It was suggested that those who studied natural history would become more cheerful, more patient and alert by studying nature. One man writing about the Botanic Gardens in The Garden and the Field refers to having received as a school prize in about 1867 a copy of Wonders of the Vegetable World, which he declared 'no doubt, had something to do with forming my love of natural history'. Barber argues that in a period when school subjects were taught in a dry and unimaginative manner part of the charm of natural history was that, unlike Latin, Geography and Mathematics, it was not taught in depth at school. Many people learned about natural history through their own endeavours, both as adults and children. It was a study open to the working man and his family. Tate in his Anniversary Address to the Philosophical Society in 1878 expressed the prevailing view thus:

A Museum is, moreover, a means of spreading culture among the intelligent lower classes, and such visitors leave it all the better for having been there.

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52 Barber cites such examples as William Swainson, A preliminary discourse on the study of natural history, (London, 1831) and James Drummond, Letters to a young naturalist (London 1831).

as it is impossible that they should not carry away some sort of idea which otherwise would not have occurred to them.\textsuperscript{54}

It was also open to women as well as men at a time when activities considered suitable for women, particularly middle class women, were somewhat limited and boredom a problem for many of the well to do.\textsuperscript{55} As homes were established and fortunes made in colonial South Australia, leisure time increased. Material in popular magazines and books on both gardening and the broader field of natural history became more accessible to the colonists through the development of the cheaper printing processes of the nineteenth century and through the establishment of libraries and reading rooms.

The educational value of Botanic Garden displays has to be considered in terms of the values and interests of local people. Styles of presentation have changed since the first displays were mounted in the Museum of Economic Botany in the 1880s but it seems that these early displays were very popular. At this time when the number of visitors to the Botanic Gardens as a whole was in the range of 260,000 - 300,000 a year, displays in the Museum of Economic Botany like the zoological displays and glasshouse collections were particularly popular. In comparison the opening times of the South Australian Museum were limited to 'weekdays' which excluded Sundays and the number of visitors to the Museum during the year ended 30 June 1887 was only 71,298.\textsuperscript{56} Schomburgk referred to the

\textsuperscript{54} Professor Ralph Tate, Anniversary Address, October 1878, in \textit{Transactions and Proceedings and Report of the Philosophical Society of Adelaide, South Australia for 1877-8}, p. 44.


\textsuperscript{56} \textit{South Australia in 1887-8, A handbook for the Centennial International Exhibition, Melbourne, 1888} [compiled by H. J. Scott], H.F. Leader, Government Printer, Adelaide, 1888, p. 91.
Gardens in 1877 as the 'only recreation ground the citizens of Adelaide possess.'

In the nineteenth century, just as today, there is considerable overlap between the role of the botanic garden in providing facilities for recreation with those it provides for education and research. This is clearly the case in the provision of a collection of live specimens. The set of specimens which is of great interest to the serious botanist may provide a pleasant spot for a group of visitors to sit and admire the flowers. The same group may next go to look at some shrubs to see if they are suitable for home planting. People who came primarily for a pleasant outing may learn something about plants and their origins as they walk around. Visitors may look at a plant, notice that it comes from China and then take special notice of others which come from China. They may see a label stating that a pineapple comes from the Bromeliaceae family and then notice similarities with other plants marked as being bromeliads such as *Billbergia*. Visitors could be interested in a plant because of a label referring to its economic importance, such as labels on *Coffea arabica* indicating that it produces coffee. They might notice that the tea plant *Camellia sinensis* was grouped with ornamental camellias. The way that the Museum of Economic Botany collection complemented the live collection is illustrated by displays of different kinds of tea used by different ethnic and national groups.

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such as Paraguay tea or maté, displays which lead the visitor back to different botanical species.

People can feel, smell and touch plant material in a Botanic Garden. This increases their feeling of involvement and enjoyment and enhances their capacity to learn from their experiences. The building up of collections of live plants and collections of plant products in the Museum of Economic Botany provided considerable potential for informal education allowing study and enjoyment to be combined. Schomburgk was of the opinion that the Botanic Gardens not only taught people about plants and plant products but gave them an 'appreciation of the arts'. He mentioned specifically the value of statuary in this respect but the same argument could be applied to the design features of the Museum of Economic Botany and the landscape design generally; here again study and enjoyment go hand in hand. Special efforts were made to make the Museum display attractive and it must in any case have provided a welcome escape from summer heat and from showers in wet weather. The 1888 Report mentions that the upright cases had been embellished with 'Makart Bouquets' of a style used in Germany:

... five feet high, arranged tastefully and composed of palm leaves, pampas, and other grasses, and everlasting flowers, which enliven the appearance of the Museum very materially.

The attraction of Botanic Gardens displays has to be seen in a context of an era in which there was an absence of today's radio, films, television, computer games or cars for a day trip. Entertainment which had an educational component was valued not only by the aspiring middle classes but by working people who saw education as a means to material success. The status of education in South Australia in the 1870s and 1880s was exemplified by the substantial
nature of buildings erected for educational purposes: the Museum of Economic Botany came from an era that produced the Collegiate School of St Peter, Prince Alfred College, the fine old schools in Tynte Street, North Adelaide and Gilles Street, Adelaide, the Institute Buildings in the city and country and the University of Adelaide.

While only a limited number of people were interested in formal botany, the collection of plants in the system ground or the herbarium, many people seem to have been interested in the informal study of natural history and this is demonstrated by membership of local groups and societies in South Australia. Natural history topics were discussed at the Philosophical Society which developed an active Field Naturalists Section and Microscopy Section. The South Australian Horticultural and Floricultural Society (of which Schomburgk became President), the Royal Agricultural and Horticultural Society, and the Acclimatization Society which became the South Australian Zoological and Acclimatization Society. All of these groups provided opportunities for informal education, talks, exchange of specimens and exchange of books and ideas. Economic botany was a topic of interest to many members.

Interest in economic botany has also to be viewed in the context of the attitudes of the day in relation to commerce and industry. Awareness of the importance of natural products as raw materials for manufacture was accompanied by a prevailing belief in the possibilities for economic progress - and some degree of excitement.

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59 See The Garden and the Field, vol. 1, no. 7, 1875, for a report on its activities.
that prosperity was around the corner and that opportunities must be grasped. Reference has already been made to the views of people like Rev William Woolls that plants and animals were provided by Divine Providence for the ultimate benefit of human beings.

In this intellectual milieu, Ferdinand von Mueller writing about plants that might be suitable for conditions in neighbouring Victoria wrote in 1876 in his introduction to his *Select Plants Readily Eligible for Industrial Culture or Naturalisation in Victoria*, 60 that he hoped that a copy would be placed 'in the library of each of our State-schools' adding that special scientific establishments should be established to promote introduction of 'vegetable treasures' from unexplored regions or to 'submit neglected plants of promising value to unbiassed original tests'. Interest in this field of study is indicated by the establishment of the Victorian Royal Commission on Vegetable Products appointed in 1885 followed by the South Australian Select Committee on Vegetable Products of 1887; by the activities of such organizations as the Chamber of Manufactures in South Australia which gave great emphasis to economic botany; and by the journal *The Garden and the Field, a Journal of General Industries* which was published under the patronage of both the Royal Agricultural and Horticultural Society of South Australia and the Chamber of Manufactures.

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60 F. von Mueller, *Select plants readily eligible for industrial culture or naturalisation in Victoria*, with indications of their native countries and some of their uses, printed for the Government of Victoria by McCarron, Bird & Co, Melbourne, 1876.
Use of reports and papers

Information about plant material, provided by both the display of live plants and displays of plant products in the Schomburgk era, was enhanced by the use of reports and papers. Hooker's memorandum of 1883 advised that a Superintendent

should annually prepare a report on the progress and condition of the garden, of its receipts and expenditure, donations, donors' names, and those of the more important plants distributed from it; this report should be printed by the Government.61

Not all Australian Botanic Gardens produced annual reports. Moore's 1871 Report on the Botanic Gardens in Sydney followed a gap of thirteen years and his 1879 Report was the last before his retirement in 1896.62 In contrast Schomburgk's reports were produced annually and their publication was an important part of the educational role of the Botanic Garden. Within South Australia they went to government officials and members of parliament and parts were reprinted in local and regional newspapers. In addition they were sent to people in other colonies and to Great Britain and items might be reprinted in these places.

We have already seen in Chapters 5 and 6 how information on utilitarian plants could form a substantial section of Annual Reports and might be the focus of an entire paper to the Chamber of Manufactures, as in papers on tobacco plants or wattle farming. However ornamental plants received a good deal of attention in Annual Reports as well. A particular plant or group of plants might be featured; for example an item on an aroid, *Pothos aurea*, newly

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received from Moore in Sydney. The arrival of an especially interesting new plant such as poinsettia (*Poinsettia pulcherimma plenissima*) or a valuable new palm such as *Trithrinax brasiliensis* was followed by an enthusiastic review by the Director which brought readers' attention to the specimen and its origin. Periodically there would be accounts of particular groups of plants and how they had fared - for example one on conifers and another on how native plants in the Botanic Gardens had a disappointingly short life span. There are reports of hot-house plants with snippets of information about especially attractive or unusual new plants, providing the kind of interesting material to be found in a gardening magazine and making the report more interesting to the general reader.\(^6^3\) They created the impression that the writer wanted to communicate with his readers rather than just report on what had happened. There were personal touches in remarks that 'I must congratulate myself on the success of...', and 'what has been done may be regarded as an act of vandalism by some, because it involved the removal of the avenue of pines...'.\(^6^4\) The equivalent of today's 'human interest story' in the popular press is found in accounts of animals in the zoological collection, especially their illnesses. The account of the death of a favourite gibbon after it contracted a pneumonia-like illness and the subsequent pining of her mate, is one memorable example of this.

One report gave an account of a specimen of *Encephalartus natalensis* [*Encephalartos natalensis*] which had been inadvertently left in a bond warehouse in Melbourne for six months and which, kept in the stove

\[^6^3\] *Report* 1869, p. 5 and 1875, pp. 5 & 8.

\[^6^4\] *Report* 1888, p. 7.
house finally grew some three and a half years after its arrival in Australia - the Director stating that the story was told 'so that parties receiving similar consignments may not lose patience when the plants show no immediate signs of growth'. One wonders how many of the Report's readers actually received specimens of *Encephalartos natalensis* that were delayed in transit and could profit by the tale but such stories did help to provide variety in reports.

The colourful style and varied content enhanced the educational potential of reports which were from the beginning much more substantial than those of Francis. They gradually increased from a length of about three pages to documents of 20-30 pages. The main report might be about 11 pages long, presenting a detailed account of the 'Progress and condition of the Botanic Garden' and after 1870 there was an appendix which listed new plants added to the collection during the year. Nearly every year after 1877 there was also an appendix reprinting a paper which the Director had given to local organizations such as the Philosophical Society or Chamber of Manufactures. One was 'Plants which are recommended to be grown in conjunction with wheat-growing' (1880 and 1884) describing crops in which the Director had an interest. Others included 'The influence of forests on climate' (1881) and 'Working men's holdings' (1885). The emphasis of the Annual Reports varied from year to year which helped maintain interest as did the lively, quite personal style of writing.

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65 *Report* 1875, p. 7.
Schomburgk's style involved the expression of firm opinions about what might succeed and what might not succeed, as in 'no doubt South Australia should be a perfume-producing country', 'wattle-farming will be an industry branch of great importance, and if the tree is systematically cultivated it will be beyond doubt a profitable speculation' or 'there is hardly any country where the olive thrives better than in Australia'. He might report information received from Europe and North America, introduce his readers to some of the experts of those countries, comment on broader environmental issues or warn in colourful language about the risk of disease such as the vine disease phylloxera as in 'we should be prepared as the enemy is approaching our shores'.

By 1878 he wanted to increase the educational content. He aimed:

- to make my annual reports something more than mere records of the condition and operations of the Botanic Garden; and with this view of rendering them more useful subjects of agricultural, horticultural, and arboricultural interest will in future be included in them.

In 1878 he included an Appendix on phylloxera, describing the way that the disease was transmitted, the spread of phylloxera infestations overseas and ways of combating the problem. He had acquired a pamphlet from the Board of Inquiry in Brisbane, written by Dr G. David who had been sent by the Prussian Government to countries with phylloxera infestations such as Spain, Portugal and France. The pamphlet was said to be considered in Germany the best on the subject. Schomburgk along with colleagues such as the

68 Report 1878, p. 3.
analytical chemist George Francis and journalist Albert Molineux actively sought and exchanged information on research being done overseas. For example Schomburgk obtained a copy of the Report of the Phylloxera Commission of the Cape of Good Hope,69 and George Francis gave a copy of *Les Ravageurs des Vergers et des Vignes avec un Etude sur le Phylloxera*, published in Paris in 1876 to Albert Molineux.70

Twice during Schomburgk's directorship new plant catalogues were produced. The main purpose of producing catalogues was said to be

> to provide the means of ascertaining the species of plants in the garden, both for the purposes of study and also of facilitating mutual exchanges with other kindred institutions in various countries, to which both the possessions and the wants of the garden will thus be made known, and they and ourselves may be better enabled to make additions to our several collections.71

Schomburgk's second Catalogue of 1878 was arranged 'according to the natural arrangement' which brought together plants related to each other 'enabling the student of botany to become acquainted with them'72, (for example a section for different types of cactus and another for bromeliads) and there was also a list of English names to help the non-botanist. Production of this catalogue appears to have been hastened by the request by the Commissioners of the Paris Universal Exhibition of 1878 for a thousand copies. Schomburgk

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69 Sent by Trimen, a British entomologist who became curator of the South African Museum from 1873-1895 was brother of Henry Trimen, the much respected director of the Botanical Gardens at Peradeniya, Ceylon, from 1879-1896.

70 The copy of H. de la Blanchère's *Les Ravageurs des Vergers et des Vignes avec un étude sur le phylloxera*, J. Rothchild, Paris 1876 was inscribed as the gift of George Francis. The book is now held in the Adelaide Botanic Garden library.

71 *Report* 1870, p. 3.

72 The classification was partly arranged according to Bentham's and Hookers' 'Genera Plantarum' and partly to E. le Maout and J. Decaisne's System of Botany.
could report with some pride that the catalogue was 'highly commented on by the French papers' and that the size of the collection, then some 8,500 species, and the quality of the catalogue led to the statement in the *Illustrated Paris Universal Exhibition* that such a botanic garden was a fact to be proud of and

...lets the world understand that colonies are not rude communities, but cultivate the arts with a good deal of assiduity, while education has received marked attention among them.73

There is little doubt that his pride was shared by many of his readers.

**The herbarium and the library**
The educational and scientific role of the Gardens, praised in this fashion by Schomburgk's European colleagues, was enhanced by the building up of a herbarium and library. We have already considered the role of the herbarium in the last chapter. Schomburgk was aware that, like a class ground, the herbarium would be of interest to botanists but not to the general public;74 yet stated that 'the herbarium is as necessary to a botanic garden as the zoological and mineralogical collections are to other institutions'.75

Hooker's 1883 guidelines recommend that a library of botanical books of reference should be attached to each garden in the same way that the provision of a herbarium was a proper function of a botanic garden. Schomburgk continued to develop the library commenced by Francis, adding 30 volumes of 'costly botanical and horticultural

73 Report 1878, p. 11.
74 Reports 1878, p. 10 and 1880, p. 9.
75 Report 1878, p. 11.
works' in 1867 to make a collection of 230 volumes and adding to the collection throughout his directorship. Walter Hill reported a collection of about 300 scientific works in the library of the Brisbane Botanic Gardens in 1866; money approved by the Legislature had been sent to Sir William Hooker at Kew towards the purchase of appropriate books.\textsuperscript{76} Schomburgk's collection included reference books on horticulture, systematic botany and economic botany, botanical and horticultural journals from Britain and continental Europe together with journals and reports from North America, South Africa, the Indian sub-continent and the Pacific region. Journals known to have been included in the collection in Schomburgk's time included the \textit{Garden and the Field}, \textit{Gartenflora}, the \textit{Gardener's Chronicle}, the \textit{Floral Magazine}, the \textit{Florist and Pomologist}, the \textit{Cottage Gardener}, the \textit{Journal of Horticulture}, \textit{Deutsche Garten Zeitung}, \textit{Die Naturforscher}, \textit{L'Illustration Horticole} and \textit{Lindenia}. There were probably others, too, but the collection was officially dispersed during the early part of the twentieth century and only some have been recovered. A significant botanical library was re-established in the 1950s under the Directorship of Noel Lothian, in the same period that the herbarium was re-established.

\textbf{Providing a horticultural and agricultural advisory service}

Education of home gardeners was an important part of the work of the Botanic Garden. Annual Reports, catalogues and the displays themselves indicated what could be grown locally, visitors could learn by observation about garden layout and design and there was the opportunity for people to approach the staff for advice and information. Comments in the Annual Reports point to these

\textsuperscript{76} Walter Hill, \textit{Report on the Brisbane Botanic Gardens}, 1866.
opportunities, for example: 'the number of persons who frequent the garden for instruction or study is increasing every year'; people 'come to see what they have and to compare and get the botanical name of what they have, and so derive a certain amount of knowledge, with the pleasure of seeing ... a permanent flower show in our stove and green houses'\(^{77}\), and 'the numerous applications I receive from visitors for information on floriculture \&c., assures me that the great advantage which this institution affords is now being well appreciated by the public'.\(^{78}\) Certain plant groups which were of considerable popular interest such as orchids and ferns were described in great detail in Annual Reports.\(^{79}\) There was practical advice on the use of manure. One Report recorded the great benefits of the special manure used in the Gardens. Street sweepings containing horse manure, were obtained from the Corporation, and were then combined with night-soil. This had produced 'luxuriant growth' in plants grown in relatively poor soil and Schomburgk wrote that he 'could not recommend this manure highly enough to all proprietors of gardens'.\(^{80}\)

Home gardeners could see native trees growing in both the arboretum and Botanic Park where there were the good examples of trees suitable for local conditions. This was augmented by remarks in reports such as those on *Eucalyptus macrocarpa* with its 'wonderful

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\(^{77}\) *Report* 1879, p. 3.

\(^{78}\) *Report* 1868, p. 1.

\(^{79}\) For example in *Report* 1880 p. 7, there is a list of about 41 orchids that were flowering that year and a long list of some 19 new ferns at the Gardens. The list took up about a half a column of the 20 page report.

\(^{80}\) *Report*, 1867, p. 2. The value of the manure had also been reported in *Report* 1866, p. 2.
flowers rivaling any of the handsomest flowers produced anywhere', a tree which he considered 'should be in every garden'. Information about the use of native trees included warnings for home gardeners, mentioned in Chapter 4 about the short life of native species such as Hakeas, Acacias, Grevilleas and Callistomens and how those that had been planted in the Gardens had begun to die after sixteen to eighteen years growth.

Thus the home gardener benefited both from the wide variety of species in the botanic gardens collection and the supplementary information provided in reports and catalogues. Of importance, too, was the enthusiasm for horticulture which was engendered - the vision of what might be achieved. Help given to professional gardeners and nurserymen through information and exchange of material could permeate through the community. Exchange of cuttings between enthusiasts, observation of techniques used by others, oral advice and horticultural columns in newspapers and journals all played their part. Visitors learnt about what could be grown on the Adelaide plains by seeing lawns planted with buffalo and couch grass surviving the hot, dry summers and equally by observing the drastic effects of the hot weather on Japanese maple and lime trees while pepper trees (Schinus molle) and jacaranda (Jacaranda mimosaeifolia) flourished.

While an elite group of trained gardeners employed by well to do citizens put the knowledge acquired to good effect in the large gardens in Burnside and Glen Osmond, Schomburgk rejoiced in the quality of Adelaide cottagers' gardens. He appears to have taken a

81 Report 1878, p. 9.
very different view to that of Albert Molineux who wrote in *The Garden and the Field* in October 1875 that 'the cottage gardens in the suburbs of Adelaide are almost as a rule overrun by weeds'.\textsuperscript{82} Schomburgk was of the opinion, by 1879, that 'an increasing taste for floriculture was visible among the working classes'.\textsuperscript{83} Perhaps he was a man with a more optimistic outlook than Molineux. Schomburgk praised the quality of specimen plants in floricultural shows in which cottage owners exhibited, commenting that they displayed 'care and judgement' in their cultivation of a standard such that trained gardeners could learn from them.\textsuperscript{84} One way of encouraging an interest in horticulture in the community was to encourage an interest in botany and floriculture in young people and to this end plants and cuttings were regularly provided for the annual shows of local schools.\textsuperscript{85} The North Adelaide Juvenile Floriculture Society was one group to which support was given. Such a group is not well known in accounts of recreational outlets in the nineteenth century but the *Garden and the Field* reported that the Society held its fifth annual show in the North Adelaide Congregational Hall on 1 November 1875. The Botanic Garden regularly provided displays for horticultural and floricultural shows, in order to increase public knowledge and understanding of ornamental plants, although there are frequent comments in *Reports* that such displays always involved some sacrifice, since damage occurred from the use of gas lighting and from transporting the plants.\textsuperscript{86}

\textsuperscript{82} *The Garden and the Field*, vol. 1, no. 5, 5 October 1875.

\textsuperscript{83} *Report* 1879, p. 3.

\textsuperscript{84} *ibid*.

\textsuperscript{85} For example, in *Report* 1880, p. 8.

\textsuperscript{86} For example, in *Report* 1878, p. 10.
Advice and information on horticultural matters in metropolitan Adelaide was one thing - advice and information for the farmers in country areas was much more difficult. Providing an agricultural advisory service was fraught with difficulties. One area of concern was the extent of destruction of native pasture grasses in country areas, 'wanton' destruction in Schomburgk's view, and the grave problems associated with replacing them once they were destroyed.

The squatter will, perhaps, shake his head and laugh at my warnings, but I can assure him that if the present system is carried on, viz., grazing the runs throughout the year and so repressing and injuring the native herbage, while every encouragement is given to the growth of bitter and noxious herbs, which the sheep will not touch... the obnoxious herbs will gradually increase, and the better grasses must give way every year.... and this period will be hastened should we have the misfortune to contend with succeeding dry seasons.87

It was to deal with this problem that Schomburgk recommended breaking up the grazing areas into smaller paddocks and developing a system of rotation which would allow the native pasture to regenerate. Since the native grasses usually grew as tussocks rather than in the form of close turf it was relatively easy for it to be eaten out of the ground and destroyed. Native pasture was of great importance because it was impossible to stock grazing runs with artificial grasses, due to the size of the grazing areas and the harsh climatic conditions. This advice was given in 1876, 1877, 1878 and 1880.88 Schomburgk also suggested collecting the seed of the better native grasses and sowing it in a fenced off area near the homestead, ploughing and properly sowing and harrowing. He added that if the grass were selected well, a small amount of seed would produce good cover over a large area. He also encouraged corn-growing to provide

87 Report 1876, p. 4.
88 Reports 1876, p. 4, 1877, p. 5, 1878, p. 4, 1880, p. 5.
good feed for stock in the summer months. In 1876 he noted that the destruction of native grasses as a result of overstocking was a problem that was occurring in South Africa as well as in Australia. Repeating the advice in 1877 he wrote that he feared that his advice would never be heeded but added that the wanton destruction of grasses would soon be shown by their disappearance. He added that 'instead of moralizing on the theme I will close the chapter on grasses with these words 'I have brought the facts before you'.

Whether the advice had any effect is impossible to tell. There was a fundamental problem about using large areas of Australia for farming and grazing in a way that would not cause disastrous environmental damage. These problems are now very apparent in the 1990s, a decade that has been proclaimed the 'decade of soil'. When one reads Schomburgk's comments on the destruction of native pasture grasses one is reminded of those on the Titanic observing that there seemed to be a large number of icebergs ahead.

In some cases of experimentation with new plants there was a disappointing response from local growers but a better response from those in other colonies. In 1876 the Director wrote that although he had very few applications for grass seed from within South Australia the opposite had been the case with the other colonies to whom hundreds of packets of seeds had been sent. On this occasion he quoted a letter sent by a farmer from Stanmore,

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89 Report 1877, p. 5.
90 Report 1876, p. 4.
91 Report 1877, p. 5.
Queensland to the *Queenslander* 10 February 1877 about the success of the panic grass (*Panicum spectabile*) grown from seed sent by Dr Schomburgk. The original trials of grass 'acclimatized by Dr Schomburgk' had been recorded in the *Queenslander*, which in itself is an indication of the widespread interest in such topics.

In the last years of his life Schomburgk wrote of his great disappointment about the response of South Australian farmers to the opportunities for trials of new plant material. Apart from problems which revolve around the motivation on the part of settlers to consider the care of the land, modern understanding of extension work helps us to understand why there should have been a poor response to Schomburgk's advice and information. A large amount of research has now been done on the special skills and conditions needed for good agricultural extension work. Such instances of a very poor response do not seem surprising when we consider the difficulties that trained agricultural extension workers still have in gaining acceptance for new techniques and new plant varieties even when they are in a position to work closely with farmers. The most effective advice and help comes when agricultural and horticultural advisers can get out to people's farms and are known by the local farmers. Schomburgk travelled surprisingly little in South Australia but in any case the sort of agricultural advice that was needed was far beyond the scope of a Botanic Garden Director given his responsibilities. Information sent to Farmers Clubs may have been more fruitful. While conservatism and lack of education on the part of farmers must have played a part, others were probably too overwhelmed with the problems of survival to be able to consider broader and long term issues.
Nevertheless there were farmers who could make use of the services provided by the Botanic Gardens. In 1880 the Director received letters from thirty nine farmers who had obtained specimens of Champlain and Defiance wheats and were reporting their results. It may have been easier to get a response in a case like this where the farmers were already growing the crop and where it was just a matter of trying a different sort of seed. It was more difficult to get a response when he was suggesting trials of a different sort of crop altogether. There were other occasions when the response rate was very low indeed, as in the case referred to in Chapter 5 where 700 packets of seed of Lespedeza striata were prepared and sent to farmers on the understanding that they would report on how it had grown, but only one communication was received. In 1888 he reported that he had not been informed of the outcome of distribution the previous year of rooted cuttings of the Spanish Daira grape. He went on to express:

my regret and disappointment at the way the institution has been dealt with by far the larger number of persons who have received seeds and plants from the garden

The procuring of the seeds and the rearing of various plants for distribution are both attended with trouble and expense. The garden under my charge is not endowed with much variety of soil and as it is situated in the plains the climate is naturally uniform. One object of giving away seeds and plants is to test the suitability of different places in the colony for the growth of introduced grasses, fruit-trees, and other useful and ornamental plants and shrubs. This can only be done by the collection of all the information that is possible from persons to whom they have been given for experiment. Failing the communication of such information, the time and trouble expended in rearing them, and all the cost incurred in bringing useful plants into the colony, are substantially wasted and thrown away.

It is disheartening in the extreme to experience the neglect which year after year I have had to encounter at the hands of persons for whose immediate advantage the products of the garden have been given away. It is moreover, a distinct breach of faith on the part of those persons who are the recipients of the various specimens which are distributed, to neglect or refuse to afford me information as to their

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92 Report 1887, p. 5.
progress, for it is a condition that they shall advise me of the results of the experiments in cultivation....

These problems are related to those which have already been referred to in an earlier section on Schomburgk’s concern with diversification. His overall impression was that farmers were reluctant to try new species of plants - 'the apathy shown is not only by our farmers but also by the squatting community, in making experiments with new plants, though they require but little trouble'. Such views might be expressed today by extension officers of the state Department of Agriculture or their counterpart in other parts of Australia - in primary industry, just as in tertiary education, providing opportunities for people to learn in no way ensures that they take advantage of the opportunity.

Despite some of the difficulties that have been outlined it is apparent that there was tremendous scope in a colonial botanic garden for assisting settlers to solve problems in horticulture and agriculture through advice and provision of plant material. To do so required a commitment on the part of the government to fund the Botanic Garden adequately; gaining such resources involved competition with community groups who sought funds for other purposes. In the next chapter I will examine how the Director handled problem solving of a different kind - that of being the administrator of a large institution.


94 Report 1881, p. 5.
Chapter 9

SCHOMBURGK AS DIRECTOR

During the period 1865-1891 considerable resources both in money and in kind were obtained for the Botanic Garden. This raises questions about Schomburgk's contribution in terms of the techniques he used to obtain these resources and about his style of work in general. To answer these questions we need to look at how he worked with his Board, his staff and a variety of interest groups in South Australia and beyond.

Personality and style of work

Special qualities and skills were required for working effectively with Board members and the government. Skills in compromise rather than confrontation were important. Similar skills and attitudes were needed to work with key people in the horticultural world, such as leading nurserymen.

Writers of obituaries and biographical accounts in the period 1860-1910 refer to Schomburgk as being patient with inquiries, kindly, a man concerned with the world's wrongs. It was said of him that he was someone who, despite having many honours and decorations, was 'one of the most unassuming of men, always willing to impart any information he possessed.'

On the occasion of the presentation of a silver goblet to Schomburgk, when he left Gawler to go to the Botanic Garden, he was described as 'one of those kind hearted men of science who delighted in benefiting the human family and who worked for others rather [than] to enrich or benefit himself', the speaker adding

1 Cyclopedia of South Australia, vol. II, p. 283.
that 'the same vigor and goodwill, and the same amiable character which had endeared him to his old neighbours would no doubt speedily show the Government that they had made a very judicious choice'. On his death an obituary writer could say 'No one ever applied to him in vain for information, even in his busiest hours'. An obituary in *The Garden and the Field*, written in a personal rather than a formal style includes the statement:

> If we were to write for a week we could not recount one-half about what should be written about his good works, and the respect in which he has always been held was universal....thousands mourn his demise.

It is true that obituaries and speeches such as that made in Gawler in 1865 typically focus on the good in people rather than their faults but much can be learnt from contrasting what is said with what is not said. Words such as 'goodwill' and 'amiable character' appear again and again. Schomburgk's obituaries consistently refer to his enthusiasm, kindliness, the respect in which he was held, his practical approach and the value placed on his management of the Gardens - they do not refer to intellectual brilliance, an analytical mind or to taxonomic skills.

We gain the impression from Schomburgk's reports that he was someone with vision and great enthusiasm who could take pleasure from his successes. He had qualities of warmth and candour. In a letter to an old friend in British Guiana, written about the time of his

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2 *Advertiser*, 23 December 1865.


5 Such as those in the *Register, Advertiser, Journal of Botany, The Garden and the Field* and *Journal and proceedings of the Royal Society of New South Wales*.
seventieth birthday, Schomburgk reveals himself as an affectionate husband. His account of the British Guiana expedition reveals a man who had a capacity to admit to, and laugh at, his own mistakes. A compassionate approach is apparent in his description of the death of the young woman who died of snakebite on that expedition. This compassionate approach is also evident in his report of the death of one of the gibbons in the zoological collection. He had worried that Adelaide's cold, wet winter 'would not agree with her' and although she was accommodated in one of the stove houses she developed inflammation of the lungs. He wrote

Her sufferings, and the behaviour in the last days of her life, reminded me so much of that of a human being - the same crisis - that it is no wonder if I became an adherent to Darwin's theory.

Someone else might have simply recorded that the gibbon died. Perhaps it is typical of Schomburgk that the remark about becoming an adherent to Darwin's theory is the only statement that appears in his reports and papers relating to the controversy and it is in fact ambiguous.

Physically Schomburgk appears have been someone with a strong constitution. Dow, after visiting him in 1874, wrote that considering that he was then over 63 and that five years of his life had been spent in what was then regarded as one of the unhealthiest parts of the world, it was remarkable that the Director looked 'so wonderfully

6 Schomburgk to Mrs Manget.
8 Report 1875, p. 9.
hale and full of energy' and much younger than his actual years. The portrait by Tannert presented to the Gardens in 1884 shows his hair to be still dark brown when he was in his early seventies. He had survived yellow fever in British Guiana, very much against the odds, and survived typhoid fever in Adelaide. He was still 'active in the superintendence' of the Gardens a few days before his death and at his last meeting of the Central Bureau of Agriculture a week before his death he was reported to have mounted the three flights of steps with 'unusual activity'.

Dealing with the Board
As an administrator Schomburgk had to establish good relationships with his board in order to work effectively. He needed their support in order to obtain resources for purchases, equipment and staff. Without such cooperation and support no director can put his abilities to effective use.

As a first step to examining relationships between Director and Board of Governors it is useful to look at the interests and capacities of Board members. Schomburgk's letter of application to the Board in 1865 indicates that he was already known to the influential Dr William Wyatt who served as Foundation member of the Board of Governors from 1855-86 and was thus a member through all the Francis era and most of the Schomburgk era. Wyatt shared an interest in the development of crops suitable for South Australia with Samuel (later Sir Samuel) Davenport who served on the Board

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9 Special Reporter of the Leader [J.L. Dow], 'Agriculture in South Australia', reprinted from the Leader, E & D Syme, Melbourne and Adelaide, 1874, p. 9.

10 The Garden and the Field, April 1891, p. 161.
for fourteen years from 1864-78. Davenport was an ardent promoter of agriculture and new industries in South Australia. Between 1864-1872 he published pamphlets dealing with the cultivation of olives and the manufacture of olive oil, silk and tobacco. He served as a City Commissioner from 1849-52 in addition to being a member of parliament in the Legislative Council 1846-8 and 1855-66. He was elected President of the Royal Agricultural and Horticultural Society and was later President of the South Australian branch of the Royal Geographical Society of Australasia besides serving as President of the Chamber of Manufactures for twenty years. He represented the colony as executive commissioner at the Great Exhibition in London in 1851, the Philadelphia Exhibition of 1876, the Sydney and Melbourne Exhibitions of 1879 and 1881, the Colonial and Indian Exhibition of 1886 and the International Exhibition in Melbourne in 1886.11

William Wyatt (1804-1886), surgeon, landowner and public servant, came to South Australia in 1837. He had been in private medical practice in Plymouth where he studied zoology and related sciences and was curator of the museum of the Literary and Scientific Institution. After arriving in Adelaide he acquired considerable property. He served as Protector of Aborigines, City Coroner and was first Inspector of Schools. He was a member of the Medical Board and the Immigrants Welfare Committee, one of the first proprietors of the Collegiate School of St Peter and took a leading part in the South Australian Institute, the Acclimatization Society, the Royal Society [Philosophical Society] and the Society of Arts.12 Wyatt appears

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11 *Australian dictionary of biography*, vol. 4, pp. 25-6.

12 *Australian dictionary of biography*, vol. 2, pp. 626-7.
frequently amongst the list of donors of plants to the Botanic Gardens and the fact that Schomburgk dedicated his *Botanical Reminiscences in British Guiana* to Wyatt is some indication how much he valued his colleague's support.

Two other important Board members were William Everard (1819 - 1889) and Sir Henry Ayers. Everard served from 1865 until 1889, a twenty four year term covering nearly all the Schomburgk era. Everard, a pastoralist and financier, served as Director of the National Bank of Australasia, the Executor Trustee and Agency Co., the Payneham and Paradise Tramway Co. and the Goodwood Tramway Co., was Chairman of the City of Adelaide Land and Investment Co., a member of the Council of the University of Adelaide, the Road Board and the Board of Governors of the Public Library, Museum and Art Gallery. He was a member of the House of Assembly in the period 1865-72 and a member of the Legislative Council during the period 1873-78, his parliamentary career including a term as Commissioner of Crown Lands and Immigration.\(^{13}\)

Sir Henry Ayers (1821-1897) served on the Board from 1862 until 1896, a thirty four year term which included the entire Schomburgk era. Ayers, a shrewd and successful businessman, reputed to be cautious and deliberate in his dealings with others, was prominent in the small group of people who dominated local financial and commercial affairs. As a parliamentarian he was seven times Premier of South Australia. He supported the University of Adelaide as Treasurer from 1874-86, was Trustee of the Savings Bank of South Australia, a director of the Bank of Australasia, a founder of

\(^{13}\) *Biographical register of the South Australian Parliament*, p. 72.
the Bank of Adelaide, Chairman of Directors of the South Australian Gas Company and chairman of the Australian Mutual Provident Society. His civic activities also included support for charitable bodies. Known for his great faith in the future of South Australia, he encouraged expeditions of exploration to the interior of Australia. His house, now the National Trust property Ayers House, was in North Terrace, making him a near neighbour of the Botanic Gardens. His business acumen, his contacts with other commercial and financial leaders in Adelaide and his underlying faith in the future of the province were all factors which gave him potential for influencing Botanic Gardens development. Not only was he an active Board member along with such stalwarts as Davies, Everard and Wyatt but his influence over others in political and business circles was important.

Attendance records compiled for Board meetings show that in the 1870s there were three men who were members throughout the whole decade and who were very regular in their attendance. These were Dr Wyatt, the Hon. W. Everard and Dr Davies. When there were proposals to increase the Director's salary these men were involved as proposer and seconder of the motion. Sir Henry Ayers was regularly attending Board meetings during 1874-6, especially 1875 and thus was active at the time of the Palm House project, and then very regularly in the 1880s. Davenport was active in the first six years of the Schomburgk era whereas Wyatt was more heavily involved from 1870-1875. The contribution of a board to an institution is often


15 Adelaide Botanic Garden Board Minutes 1865-91.
overlooked but the background and interests of these men indicate the potential that Schomburgk's Board had to provide the Gardens with the backing of civic and business leadership in Adelaide. While we may not be able to assess the contribution that each made, their collective expertise was considerable.

Despite the absence of personal diaries written by Schomburgk or other personal material to add to the formal minutes of meetings one can make inferences about relations between Board and Director both from examining events which did occur and from noting the absence of events involving confrontation and crisis. We know that in July 1870 the Board voted to increase the Directors salary, initially £300 to £400 a year on the grounds that 'it is the unanimous opinion of the Governors that the Salary of the Director is insufficient and disproportionate to the value of his service'. The Board further resolved at a special meeting on 25 November 1872 that Schomburgk's salary be increased by £100 per annum; this was proposed by Dr Wyatt and seconded by Dr Davies.\(^{16}\) By 1876 his salary reached its final figure of £600. This was 'with house and light'. Schomburgk's salary was comparable with that of the Speaker of the House of Assembly, the President of the Central Board of Health and the Secretary to the Minister of Education but these men were not provided with houses.\(^{17}\)

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\(^{16}\) Minutes July 1870 and November 1872. In 1873 Schomburgk was offered the position of Director of Melbourne's Botanic Garden, an offer he declined, despite the higher salary there. The Board may have wished to provide some incentive for Schomburgk to stay in South Australia by raising his salary in subsequent years.

\(^{17}\) *S. A. Parliamentary Papers* 1876, vol I, *Blue Book for South Australia* 1875. For comparison with contemporary prices, in 1886 a loaf of bread was about 2d-3d a loaf, beef was 4d-9d a pound and tea 2/- to 2/6 per pound, see *South Australia, its history, progress, resources and present position*, Adelaide, 1880, p. 96.
Supportive although they might be in some directions the Board members could also demonstrate a desire to set limits on the Director's activities. In 1869 Schomburgk was giving advice to the City Corporation on the planting of the city Squares. This work involved providing a design for the planting of Wellington Square in North Adelaide and amongst the large number of trees and shrubs given away during this period were some, presented to the Corporation, especially intended for the Square.\textsuperscript{18} In June 1869, some four years into Schomburgk's term, the Board referred to correspondence between the Director and the Chief Secretary's office and passed a resolution that while they had no objection to Schomburgk giving his professional advice to other public institutions they noted that the Act made it clear that control of the Garden is vested in the Board of Governors. They wanted it to be known that their consent was to be sought first and they would leave it to the discretion of the Doctor to comply with such a request providing it did not interfere with his duties at the Garden - a reminder to the Director to keep his enthusiasm under control.

One way of assessing a director's performance is to see how actual or potential conflict was handled. One of the striking features about Schomburgk's directorship is the very limited amount of overt conflict with staff, Board members or government. There is no record of periods of overt conflict such as those which occurred during the time of Charles Moore in Sydney, during von Mueller's directorship in Melbourne or those involving Sir Joseph Hooker at

\textsuperscript{18} Letter from the Town Clerk, Thomas Worsnop to Schomburgk, quoted in Minutes, July 1869.
Kew. It is illuminating to examine these cases and also to look at the situation of overt conflict between Gerard Krefft and the Board of the Australian Museum. All four cases provide an interesting contrast with the situation of Schomburgk and the Adelaide Botanic Garden Board.

Charles Moore was Director of the Sydney Botanic Garden 1848-96, a period which includes the whole of the Schomburgk era in Adelaide. Brother of the Director of the Glasnevin Botanic Gardens, he had begun his appointment under difficult circumstances. His appointment had been made in Britain by Earl Grey who was unaware that John Carne Bidwill had been appointed to the same position by Governor FitzRoy in Sydney. Aged only 28 when he arrived to take up the post, Moore faced an awkward situation; 19 he did not have the full support of his Committee of Management, some of whom would have preferred Bidwill as Director, and he had opponents in Sydney's horticultural and scientific circles. In 1851 FitzRoy dismissed the Committee of Management and Moore became responsible directly to the Governor through the Colonial Secretary. New South Wales did not have responsible government at this time. Had the Committee of Management functioned in a different manner it might have provided a buffer between Moore and some of his opponents.

In 1854 conflict surfaced between local nurserymen and Moore. This conflict appears to have been a contributing factor to the formation in 1855 of a Select Committee "to inquire into and report upon the Management and Conduct of the Botanic Gardens of New South

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19 The colonial legislature promptly reduced Moore's salary from the £300 planned for Bidwill to £200. However, it was raised to £300 in 1852. L. Gilbert, The Royal Botanic Gardens, Sydney, pp. 81 & 85.
Wales'. Amongst the matters investigated were allegations that Moore had shown favouritism in the distribution of plants and cuttings, had treated nurserymen in a 'miserly fashion' after receiving plants from them and that plants and seeds had been distributed too liberally to other people. It was also alleged that he had frequently and arbitrarily dismissed employees, that he had been discourteous to the Committee of Management, that accounts were kept in an unsatisfactory manner, that labelling of plants and the production of Annual Reports were deficient and that there was no catalogue of plants. Moore had been active in collecting native plants and exchanging these with nurserymen overseas and there was criticism of how this had been conducted. The main accusers were two prominent nurserymen, Thomas Shepherd and Michael Guilfoyle, father of William Guilfoyle who was later to replace Ferdinand von Mueller.

In 1856, when the report was completed, no action was taken against Moore although the Governor made some pertinent requests of the Director, emphasizing the importance of accountability. It appears that conflict had focussed on day to day administration, on such matters as the keeping of accounts, the writing of reports, the distribution of plant material, labelling of plants and maintaining records. There were policy issues involved - concerning both accountability and relations with nurserymen - but there was not fundamental disagreement about the role of the Botanic Gardens.

In contrast, the problems experienced by Ferdinand von Mueller which eventually led to his dismissal from his position at the Botanic

Gardens, involved not only relations with both government and
general community but also deep-seated disagreements about the
role and function of the Botanic Gardens. Von Mueller who served as
Government Botanist from 1853 to 1896 was also Director of the
Botanic Gardens, Melbourne from 1857 to 1873. In 1869 von Mueller
was asked to provide a supplementary report on his work at the
Gardens, a request which appears to have resulted from a growing
number of complaints about the style of his administration. It
appears that the public were expecting attractive floral displays,
sweping lawns and vistas in the English landscape style. While von
Mueller's reputation as a scientist and explorer were not questioned,
his absences on collecting expeditions caused ripples of discontent.
A particular cause of dissatisfaction on the part of civic dignitaries
and general populace alike was that von Mueller, in concentrating on
providing an educational and scientific institution which would help
meet the economic requirements of a developing colony, did not give
enough attention to aesthetic concerns. To many people the gardens
appeared dull and unplanned.21

In a statement on the objects of a Botanic Garden, cited in Chapter 1,
von Mueller had written that the primary aim of a botanic gardens
should be to bring together the greatest possible number of plants
from places around the world, to arrange them so that they could be
studied for 'systematic geographical, medical, technical or economic
information', and that appropriate records be kept.22 He appears to

21 R. T. M. Pescott, The Royal Botanic Gardens Melbourne: a history from 1845-

22 F. von Mueller, The objects of a Botanic Garden in relation to industries, lecture
given at Melbourne, November, 1871.
have thought in terms of the tradition of European Botanic Gardens. The problem was that public opinion favoured a more attractive form of presentation. Von Mueller had established a large system garden; he allocated 3 acres (1.2 ha) in the period 1857-8 out of a reported 43 acres (17.2 ha) under cultivation in 1857.²³ We have already seen that Schomburgk was careful not to establish a system garden until he had developed features of greater public appeal. The expectations of the Melbourne community and those of von Mueller were very different and unlike the conflict involving Moore there were real disagreements about the role of the Botanic Garden - not just about matters of administration. The Report of a Board of Enquiry established in December 1870 found that the Gardens had not been managed 'so as to give general satisfaction' and

the Director, although possessing very high scientific abilities, has not the requisite practical skill to enable him to design, lay out or maintain the Gardens in a proper state of culture; that there has been an absence of all taste; and an apparent inability to recognise and meet the requirements of the institution in this respect.

The Report further stated that despite large amounts of money having been spent, not enough had been done to extend the 'usefulness' of the institution which

should be a place where the whole colony could study horticulture, arboriculture, floriculture, and landscape gardening in their most perfect forms - it should especially be a model of careful and thorough cultivation, of well planned scientific effort, and of art skilfully applied to the embellishment of nature.²⁴

Two specific criticisms that were made were firstly, of von Mueller's management of the Gardens' labour force and secondly, lack

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of preparation of the soil of the reserve area - that is lack of attention to sub-soil draining, trenching and manuring. The second of these indicated that a director was sought who had better understanding of the practical aspects of gardening. The first criticism related to practical management skills such as might be acquired by someone who had experience in supervising the running of a large garden. Von Mueller had not been trained in practical gardening skills and neither had he been taught, in the way that a gardening apprentice might have been taught, about the niceties of working for an employer or a client. Both were skills which a motivated person could acquire. The criticism of the 'lack of all taste' was another matter - von Mueller could have taken the advice of others but perhaps a 'lack of all taste' implies that the person concerned would not see the need to take such advice. Von Mueller, busy with collection and classification of plants and the production of scientific papers, had other things on his mind.

It could be argued that people with a vested interest in von Mueller's removal, such as nurserymen who suffered from liberal gifts of plants to the public, were influential in the unfavourable reports on von Mueller which led to his dismissal. However the comments of British visitor Anthony Trollope give some insight into contemporary views about von Mueller's Gardens:

> The gardens though spacious are not charming, and the lessons that they teach are out of reach of ninety-nine in every hundred. The baron has sacrificed beauty to science, and the charm of flowers to the production of scarce shrubs, till the higher authorities have intervened.... 25

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Trollope further commented that:

The gardens at Melbourne are as a long sermon from a great divine, - whose theology is unanswerable, but his language tedious...26

an observation which graphically illustrates some of von Mueller's problems in communicating with the general public.

The situation of the zoologist Gerard Krefft (1830-1881) and the Australian Museum in Sydney might seem very different because it involved a natural history museum rather than a botanic garden.27 In fact there were similar problems to those involving von Mueller in that a man with considerable professional skills was dismissed because of poor relations with those in power. Krefft, German born like von Mueller and Schomburgk, had problems with staff members as well as with his Board and the Board used the evidence of staff to help oust him. Board and Parliament had powerful members who had differences with Krefft and were prepared to use the Krefft situation in their own power struggles.28 In the case of museums there were special problems associated with a finite number of exhibits and accessions. This led to problems when staff members or board members wanted to collect items themselves and had divided loyalties when material became available to them. In the case of a garden it is possible to propagate and give away something precious as a gift or as acknowledgement of a special favour so the situation


27 Johann Ludwig (Louis) Gerard Krefft, born in Brunswick, came to Australia in 1852 and became curator of the Australian Museum in 1864. His dismissal in 1874 was confirmed by the Governor in Council in 1876. Krefft, who first tried to resist his dismissal and barricaded himself in his quarters, finally became demoralized and did not ever regain a professional position. Australian dictionary of biography, vol. 5, 1851-1890, pp. 42-4.

28 This applied especially to Sir Henry Parkes. See Australian dictionary of biography, vol. 5, 1851-1890, pp. 42-4
is potentially a happier one. The Krefft story is the sorry tale of a very able man whose inability to deal with interpersonal conflicts ruined his professional career.

The conflicts that occurred during Joseph Dalton Hooker's reign of twenty years at Kew have been referred to in colourful terms by Sir Wilfred Blunt as the 'Ayrton War', the 'Earlier-Opening War' and 'the running battle of the Wall'. The first involved 'protracted differences' between J. D. Hooker and Acton Smee Ayrton (1816-86) who was First Commissioner of the Board of Works under Gladstone. It seems that Ayrton inaugurated a campaign of harrassment of Hooker, probably hoping to make him resign which would reduce the scientific role of the institution and thereby reduce running costs. Resignation was certainly contemplated by Hooker in 1872 but a number of eminent scientists mounted a spirited defence and Hooker was finally triumphant. The issue of the wall involved a request to have the eastern wall of the Gardens lowered. In 1844 Richmond vestrymen petitioned to have the wall lowered and topped with a railing. Sir William Hooker had said this request 'could not be entertained'. Renewed requests were made in 1877 at the time when the issue of opening hours was at its height during the directorship of his son J. D. Hooker. Sir Joseph, knighted in 1877, was not a man to take kindly to criticism from the public. He retaliated by increasing the height of a wall by nearly a metre. Such an action


31 Blunt, In for a penny, p. 164.
was bound to lead to claims of elitism which was demonstrated in the third battle - this one concerned with the opening times of the Royal Botanic Gardens. At that time Kew Gardens were closed to the public until 1 p.m. The campaign to allow the public access in the mornings began in 1866 soon after J. D. Hooker became Director. Hooker, a hard-working scientist of great repute, was inclined to be imperious. During this period he complained that so much money had been spent on aspects of the Garden which attracted the general public that three quarters of the expenditure was on items other than its 'primary object'. He grumbled that a tendency to regard the Gardens as a resort for pleasure seekers had developed and that to meet popular demands large sums were spent on making flower beds, the purchase of vases and ornamental work and on building Lodge Gates and conveniences.\(^{32}\) Anxious to limit further demands by the public on Garden resources, Hooker and his supporters insisted that only staff and bona fide students should be allowed at Kew in the mornings. In addition to this restriction, the entrance fee of one penny would have prevented some people from visiting at all.

By 1877 a Kew Gardens Public Defence Association was formed, the issue was raised regularly in the horticultural journal the *Garden*, cartoons appeared in *Funny Folks* and the controversy was eventually aired in Parliament. By 1882 the gates were opened at midday instead of 1 p.m., then from 1898 at 10 a.m. in summer months but it was not until 1921 that 10 a.m. openings were permitted in winter months.\(^{33}\) In this case there was conflict between the desire for

\(^{32}\) Blunt, *In for a penny*, p. 166.

\(^{33}\) Blunt, *In for a penny*, pp. 166-170.
community access and the professional man's perception of what was best for a scientific institution. Hooker could take the stance he did because both his own reputation and that of the Kew Gardens was very considerable but in the long term increasing public concern about the needs of the ordinary citizen did lead to gradual change.

By contrast in South Australia the Botanic Garden was to be from the very beginning a 'people's garden'. A more egalitarian atmosphere and the perceived need in a colonial setting for a multifunction institution was combined with a greater feeling of community participation. No entrance fee was charged at Adelaide, nor indeed at any of the other colonial Australian Botanic Gardens. In Adelaide popular support was demonstrated by donations of items such as plants and garden ornaments and by generous funding. In addition, in the period being studied, Schomburgk appears to have approached problem solving on a basis of cooperation rather than confrontation. His comment in his 1870 Report with regard to his relations with nurserymen is illuminating. Discussing the problem which all colonial Botanic Gardens directors faced, the need to give away plant material while not antagonizing local nurserymen, he prefaced his remarks with the phrase 'in my endeavours to give satisfaction to everyone, by extending, as much as possible, the general usefulness of the garden...' The phrase 'to give satisfaction to everyone' is a most revealing one. One does not find Ferdinand von Mueller making such a statement in his annual reports. Biographers of von Mueller reveal a very different person. He was a reserved man, determined, academically able, immensely hardworking and although capable of
acts of great kindness to other people he was not someone who excelled at building up community support.34

Schomburgk's remarks indicate that he believed both in being conciliatory and in allowing for the special interests of different groups in the community. His attitude involved respecting the views of others but also having a political sense of what was possible. Schomburgk was responsible to the Board and the Board was responsible to the government. There was a direct link with the Legislature by means of political nominees on the Board. If the Board were to be provided with the resources it sought then the Botanic Garden had to provide a service which was regarded as both useful and popular. That the Board was provided with the funds it sought for the Victoria House, the Palm House and the Museum of Economic Botany indicates a considerable degree of support. Regarding relations with nurserymen, it is noteworthy that Schomburgk had been in the business of selling plants and shrubs as a private person while at Buchsfelde and although it may have been done on a small scale it would have helped him to identify with the problems of the nurserymen. In addition, he had a great interest in trade and the economic aspects of primary production so that he was genuinely concerned with the views of merchants and local businessmen.

One of the most striking differences between the training of Schomburgk and von Mueller was that while von Mueller had a good scientific training in academic terms Schomburgk had practical training as a gardener. A German gardening apprenticeship trained a

young man to work for an employer or a client. As well as subjects such as elementary botany, arithmetic, geometry, surveying, plant propagation and landscape design there was training in the provision of plans and estimates for employers. Loudon, writing in 1827 wrote that

the knowledge of languages, history, geography, arts, science and literature, which a gardener daily occupied with his profession may acquire, provided that he begins at the commencement of his apprenticeship, and continues to employ his leisure hours reading till he is twenty or twenty five years of age, is by no means inconsiderable.\textsuperscript{35}

Loudon went on with remarks which made it clear that there were limits to what he considered the prospects of advancement to be in Britain -

not that he can, or need become learned; but if desirous, he may become generally intelligent; render himself fit, as far as conversation is concerned, for good society ...\textsuperscript{36}

No doubt a young man who wished to advance himself by obtaining a good position in one of the many royal gardens in Germany had to learn to please his client through being efficient, knowledgeable and courteous. Loudon had described the German gardener as generally 'a thinking, steady person' whose views were improved by travel. Yet creativity was also important - a successful gardener might provide a vision of something grand that would bring prestige to the client or master even though such creativity had to be combined with a capacity to estimate costs and to work within a budget. In a number of Schomburgk's reports there is a reference to economies which had been achieved in new projects because it had been possible to use the Garden's own staff for some of the tasks, and there is a note of pride

\textsuperscript{35} J. C Loudon, \textit{An encyclopaedia of gardening}, 5th edn, 1827, p. 1135.

\textsuperscript{36} ibid.
in such accounts as there was when the Botanic Park project was completed well within the projected budget. Such an approach of combining creativity with a capacity to work within prescribed limits was the hallmark of a professional gardener.

Schomburgk's ability to maintain good relations with his board and government masters may also have been helped by his family background. His forebears had for a hundred years or more worked in administrative, legal and quasi legal positions in a German principality. His father as a clergyman of no great rank in a relatively small town would have been obliged to maintain good relations with influential people in his region. Richard himself, sent away as an apprentice at the age of fourteen, must have learnt early in life not only gardening skills but the lessons of discipline and hard work that helped to make German gardeners so much sought after in Europe. This was followed by national service in the Royal Prussian Guard, training designed to foster discipline and leadership skills. Some time during his years at the royal gardens of Sanssouci Schomburgk came to the attention of von Humboldt and his colleagues leading to his selection as naturalist and historian for the British Guiana expedition. Even if the initial reason for selection had been that he was the younger brother of Robert and Otto, he must have also attracted some interest in his own right, through his own abilities. The possibility of acquiring natural history specimens from British Guiana would have been very attractive to those in the royal institutions and gardens in Berlin and given the difficulties and expense of such expeditions they needed to send someone who was completely reliable.
In selecting Schomburgk for the position of director of the Adelaide Botanic Garden the Board were putting their faith in a person who had been selected for such qualities as resourcefulness and reliability some twenty five years previously. However, he had in the meantime acquired new skills and knowledge, not only from the rigours of the British Guiana expedition but from farming and viticulture in colonial South Australia and from his experience of working with local groups in the Gawler area. This last was of great importance. It was not enough to have ideas about how to develop a garden or to practice horticultural research. It was also essential, as von Mueller’s experiences were to show, to be able to work at a pace and in a manner which was appropriate for the needs of local people. Being involved in the establishment of a local church at Buchsfelde, a local natural history museum in Gawler, the Muddla Wirra Council and various groups in Gawler and having the responsibility of being a local Justice of the Peace had provided Richard Schomburgk with experiences which showed how change was achieved in a small community. More gregarious than von Mueller, he had taken an active part in community groups such as church, Masonic Lodge and horticultural groups alongside local businessmen and civic leaders.

Schomburgk appears to have had a cooperative relationship with his Board. He may have begun with such advantages as maturity and a reputation (albeit as a 'younger brother') in European scientific circles. In the long term his skill in dealing with his Board must have involved a capacity to present plans, to compromise - to negotiate and to assess what was possible and what was not. Essential to this was the ability to assess what would seem attractive and relevant to other people.
We have looked at the issue of relationships with the Board from Schomburgk's viewpoint. Nevertheless, the Board itself had a positive contribution to make. Such a contribution can be overlooked if one views the Board as merely part of a system of control in the administrative process.\(^\text{37}\) The existence of a Board of Governors helped to provide checks and balances in the administrative system. Board members belonged to a variety of commercial and manufacturing enterprises and local interest groups such as the Agricultural and Horticultural Society. They would have provided a good sounding board for new ideas about the Garden's development. Board members might not have the technical expertise of the director but they can help make appropriate choices when presented with a series of options. The astute director introduces new ideas gradually to the Board and thence to the government. One can see evidence for this in Schomburgk's Reports in the period leading to the proposals for both the Palm House and the Museum of Economic Botany projects. In each case in acknowledging valuable gifts from institutions overseas he expressed regret that the items could not be properly displayed due to lack of space in existing facilities. In each case the proposal was to build a facility that would last for many years, serving not only the present generation but future ones. In each case, too, he proposed a structure that would be as fine as any to be found in the Southern Hemisphere. He provided a vision for the Board members and it was a vision which subsequently inspired government members to agree to provide funds.

\(^{37}\) Discussion during 1990-91 with Dr Brian Morley, the Director of the Botanic Gardens of Adelaide, was valuable in formulating ideas for the following section, as was informal discussion with some of the Board members.
Where the relationship between director and board is a cooperative one the director benefits by having other people with whom he can discuss problems and establish priorities, other people who can provide a shield from community pressures. A director can use his board as a shield on occasions along the lines of: 'It is unfortunate - no matter how I myself might view this proposal I know the Board is quite opposed to the plan'. In Schomburgk's time the Board members had some practical functions such as those connected with financial accounting which in modern times would be performed by a staff member. Schomburgk had only limited clerical assistance so he was responsible not only for a worldwide correspondence but also apparently for the handling of financial accounts. Payments had to be approved by the Board which meant that there was a regular checking procedure. Schomburgk had the benefit of working with a group of able people who had wide interests and close connections with important local institutions. While the Board minutes indicate that some members were erratic in their attendance, their collective knowledge was considerable and Adelaide was fortunate that they chose to give their time in this way. The strength of the nineteenth-century North Terrace institutions as a whole - the University, the Royal Adelaide Hospital and the Institute with its library, museum and art gallery wings - lay in such voluntary support from leading citizens.
Dealing with the government

Some of the comments made above regarding Schomburgk's relations with his Board also apply to his relations with the government. During his first five years as Director he was responsible for some developments which were very popular with the public. Such early successes stood him in good stead with the South Australian government. Schomburgk said of his Victoria House scheme, in a letter to Kew, that 'my government considers it something of an extravagance' and, as mentioned in Chapter 4, 'Many of the wellwishers of the Garden considered it an extravagance to build such an extensive structure for the waterlily.' However, the Victoria House was a resounding success. Until the Torrens Lake was developed as a recreation area there was no other large recreation ground.38 Thus for a long time the Gardens were, as Schomburgk stressed, the most important recreational area in the colony. Schomburgk's achievements during the period 1865-70 and the popularity of the Gardens put him in a strong position to obtain further resources during the 1870s; a decade of comparatively prosperous economic conditions in South Australia. Public expenditure in South Australia rose from £839,152 to £1,620,310 in the five year period between 1873-1878.39 Schomburgk's directorship occurred in a period when gross domestic output per head in Australia was rising steadily along with population numbers and standards of living.40

38 Schomburgk reported in 1881 that attendances on a Sunday were reduced, possibly because people were going to the Torrens Lake for 'rowing exercise etc.', Report 1881, p. 11.

39 S. A. Parliamentary Papers, Auditor-General's Reports 1874 and 1879.

40 McGhee estimated that after 1860 gross domestic output at market prices in Australia rose rapidly, from £66.8 million in 1861, £82.0 million in 1871,
The popularity of the Gardens was the basis on which requests for
funding could be based and the Reports brought attention to evidence
of such popularity, for example when there had been about 30,000
people over a four week period in 1868.\textsuperscript{41} Remarks such as that made
in 1874:

\begin{quote}
It is a fact which I cannot forbear repeating every year in my report, that this
establishment promotes the advancement and taste for horticulture and
floriculture in South Australia and the great advantage which this State
horticultural establishment affords in cultivating such taste.\textsuperscript{42}
\end{quote}

appeared in a number of \textit{Reports} with minor variations combined
with the much repeated statement that:

the number of persons who now frequent the gardens for recreation, instruction
or study is greatly increasing

It might seem that Schomburgk was overly repetitious with these
periodic remarks reminding both legislators and members of the
public that people used and appreciated the Gardens. However, the
remarks emphasized that this was money well spent. The success of
particular projects would be emphasized, for example the popularity
of the zoological collection, the Palm House and the Victoria House.
Reports such as those on the Victoria House - 'which, by competent
judges who have been travelling in England and on the continent, has
been declared the handsomest they have seen' - served the purpose of
reminding government and general public that money had not been
wasted. Every year from 1868 onwards there was a report on the

\textsuperscript{41} \textit{1868 Report}, p. 2.

\textsuperscript{42} \textit{Report}, 1874, p. 3. Schomburgk's literary style periodically produced a rather odd
kind of construction in sentences.
Victoria House and the progress of the lily. Remarks such as 'I am confident that in a short time, our collection of orchids will be unrivalled in Australia'⁴³ and that the collection of 144 species in the pinetum 'constitute without doubt one of the finest collections of conifers in the Colonies of Australia'⁴⁴ could bring a glow of parochial pride to the local citizens. Schomburgk did not hide his light under a bushel when it came to success as is indicated by such statements as 'I have cause to congratulate myself on having brought together such a fine collection of these noble plants'.⁴⁵

The idea that one should aim to develop the best that was available in the world is a recurrent and striking theme underlying work in the period under study. To achieve this required vision but it also required determination and persistence. Running through the Reports is the thread of Schomburgk's persistence in campaigning for new projects, just as there was persistence in crop trials, exemplified in his remarks that if he could add only one or two species to the collections, 'it will be worth all the trouble'.

The Reports give some indication of techniques used to promote new schemes. A typical campaign was that leading up to the new Palm House, opened in 1877. Schomburgk referred to the increase in his collection of tropical plants, commenting that the collection was the best in the Southern Hemisphere but that it had to be cared for properly. He bemoaned the fact that the collection could not be seen

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⁴⁴ Report 1868, p. 3.
⁴⁵ For example, Report 1880, p. 7.
to best advantage because of the lack of space, adding that some plants would suffer because of the lack of proper display space. He made comparisons with the situation in other places. He suggested that the provision of a new tropical house was so important that if the Board did not get a special grant he would be forced to make large scale retrenchments and curtailment of other improvements in order to try to pay for a new structure out of the ordinary annual grant.

Such a campaign for a new project would be carried out over a long period. Thus in 1875 he was on the campaign trail for his 'favourite scheme' - the Museum of Economic Botany, opened in 1881. He initially proposed this as a kind of technical museum, commenting on its value in showing the public the practical application of botanical science, and 'teaching them to appreciate the general relations of the vegetable world to man.' He complained that the valuable herbarium collection was 'stowed away in a small room in the back yard, and is much injured by the action of damp, and the encroachment of a still more dangerous enemy the white ants' - so that 'constant vigilance' was necessary to prevent its destruction.  

Campaigning in 1875 for extra money for improvements in Botanic Park, such as forming a new drive with avenues of trees, building a bridge and laying out croquet and archery lawns, he could use another argument. This was that although the project might seem expensive it was really substantially less than previously estimated; while

46 Report 1875, p. 9.
estimates for laying out and planting the park had been for a cost of about £6000 the cost was more likely to be £4000. He was also at pains to bring attention to situations where economies had been made by using the Garden's own staff for a task rather than employing outside contractors. Similarly he could emphasize costs savings when he built up a valuable collection for display in the Museum of Economic Botany through donations.

I have established a collection of great value without invoking the pecuniary aid of the Government except the paying [of] the freight of the consignments.47

Typically the reports were written with variety of content, a lively style, with a mixture of information, comment, exhortation and, where appropriate, complaints. Attention was focussed on positive aspects of the year's events, such as completion of a new project, finishing a project within budget, an increase in the number of visitors or a successful trial of a new economic crop. There was usually a positive attitude to visitors - that most took a 'lively and intelligent interest' in the gardens and its progress.48 It was only in the last few years that this very positive attitude began to fade. We have seen already that the Report for 1888, written when Schomburghk was seventy seven, contained a section on the distribution of economic plants in which he expressed his 'regret and disappointment' at the way the Botanic Garden had been treated by the majority of people who had been sent seeds and plants. The lack of response meant that time and trouble taken to select and send the specimens was to a large extent wasted, and the effort to select and

47 Report 1880, p. 10.
48 Report 1869, p. 5.
send material would have been all the greater in his last few years when he was afflicted with a painful condition such as gout.

However, complaints were less common than positive comments. People who had provided special services for the garden were thanked; for example the Commissioner for Police for extra surveillance on Sundays and holidays or the Hydraulic Engineer, Oswald Brown who finally developed a method of keeping polluted water out of the garden. There was careful acknowledgement of people who provided donations of plants and zoological specimens or other gifts and of others who had cooperated in trials of economic plants; the Director showed appreciation of the fact that people like to be thanked for their efforts and that most people are not averse to being thanked publically. Some were acknowledged for special help with a particular problem, as seen in Chapters 5 and 6 in the special thanks given to such people as Sir William Milne, Sir Arthur Blyth, Samuel Davenport and Mrs Davenport, the Honourable G.W. Cotton, T. Kleinschmidt and A.B. Robin.

Care was taken to keep members of parliament informed of Botanic Garden developments - copies of reports were sent to all members of the Legislative Council and the House of Assembly. Reports were also made available to local newspapers in both city and regional centres, which helped to disseminate information. Such an approach involved good public relations techniques. While one cannot prove that it produced better funding for the Botanic Gardens it is clear that providing good communication with both government and ordinary citizens and helping to create a positive image of the

49 Minutes, 5 March, 1869.
Botanic Gardens must have created a favourable situation for the allocation of resources to the Botanic Garden. The sequence of events involved government and community leaders providing favourable conditions for the establishment of the Botanic Garden; these solid foundations in the first ten years were then followed by an extra investment of ideas and energy when Schomburgk was first appointed. This brought results that were a source of pride to the local community which in turn brought about a favourable attitude to proposals for new projects. Schomburgk managed to persuade leading business and political figures that he was practical, resourceful and likely to succeed. It was fortunate for him that Parliament was run by businessmen and property owners who were Adelaide based\(^\text{50}\) and who were not antagonistic to his aims.

One interesting technique used in the Reports was bringing out into the open criticism which might be laid - some examples of this have previously been raised in Chapter 4. An example was conceding the point that the system ground project might not be popular with the general public but arguing that it was nevertheless valuable to the study of botany. In a similar vein Schomburgk acknowledged that the Victoria House project was not popular with everyone when it was first mooted and admitted that removing an avenue of large pine trees because their roots extended into the rose garden might be regarded by some as 'an act of vandalism'. Acknowledgement of criticism on the part of nurserymen about distribution of plants was a further instance of this technique. To bring the problem out into the open and to put the other side of the argument was good strategy.

Board minutes reveal some correspondence with the nurseryman Charles Giles who wrote complaining about the 'liberal distribution of plants from the Botanic Garden to private citizens.' The Director was ordered to answer the letter, 'that such distributions were according to the regulations of the Garden'. Giles cannot have been satisfied with the outcome because in a further letter regarding the privilege of obtaining plants from the Garden he wrote 'that he considered himself not well treated in this matter' and there was a further letter from Giles who was enraged that he was being denied 'a mere pansy plant' by a member of the Botanic Gardens staff after having donated a valuable collection of trees. A complaint by the nurseryman Copas, who had written to local newspapers, was raised in Parliament on 23 August and 8 September 1871. There was strong support for Schomburgk in the debate, with members citing the large number of trees and shrubs given to civic bodies - plants which those bodies could not otherwise have afforded - and arguing that there should not be interference with 'the best managed establishment in South Australia'. Another speaker argued that 'through the assiduity and kindness' of the Director 'the garden gained more in the way of presents than it gave away'. It is significant that of seven speakers supporting Schomburgk two mentioned having themselves received sultana cuttings. Coglan, who raised the complaint, was at pains to stress that he supported the distribution of trees and had himself requested jarrah plants on behalf of constituents.

51 Minutes, 1 Sept., 1871.
52 Minutes, 6 Oct. 1871.
53 Information from descendant Marguerite Cottell of Grove Hill, Norton Summit, S. A.
54 S. A. Parliamentary Debates 1871, cols. 262-3 and 415.
Relations with nurserymen and professional gardeners
Despite the occasional airing of complaints of this kind, Schomburgk appears to have retained the support of a group of prominent nurserymen and professional gardeners. He would have been in contact with them through activities such as membership of Royal Agricultural and Horticultural Society committees. Support of several of these is evidenced by the list of names of donors to the portrait of Schomburgk presented to the Botanic Gardens in 1884, names such as Smith, Giles and Hackett.

Schomburgk can be described as a plantsman - a word today used for an expert gardener, a connoisseur of plants, 'someone who loves plants for their own sake'. His passion for acquiring and growing plants and his enthusiasm for exchanging plant material combined with a practical approach and kindly nature would have made for a natural bond with other like souls. The practical man whose first recorded outward letter was to the City Corporation asking to be able to purchase manure was someone who lacked pretensions and had a down to earth attitude to horticulture. In Chapter 7 we saw how there were close links with nurserymen in Britain and continental Europe such as Haage of Erfurt, Chevalier Linden of Ghent and Bull of London as well as with those in Australia with regard to both purchase and donation of plant material. Qualities of cooperation and enthusiasm helped to promote exchange with overseas contacts just as it did with contacts within Australia, and such exchanges enabled the acquisition of plant material at minimal cost.

Maintaining good relations with those active in the horticultural world and with the public as a whole was aided by the Botanic Garden's policy of lending flowering plants for the shows organized by agricultural and horticultural societies. This has been referred to in Chapter 8 where it was noted that while supporting the Botanic Garden's role in education and aiding public relations the policy did nevertheless entail a great deal of work in preparation and transfer of plants. It also caused damage to plants, both from moving plants and from the use of gas in exhibition halls. The comment that 'it is always at a sacrifice, the plants suffering from ... the burning gas and the knocking about they in most cases receive'\footnote{Report 1880, p. 8.} appears again and again in the Reports. It was also noted in Chapter 8 that plants were provided for the 'juvenile horticultural shows' and in addition cut flowers and branches for decorations were regularly provided for 'public festivities, ecclesiastical and educational purposes'. Despite the work involved this was no doubt a valuable exercise from a public relations point of view and one which was made possible by the relatively low labour costs of the day.

\textbf{Funding for Adelaide Botanic Garden}

Our examination of relations between Director and Board and Director and government reveals firstly, that a great deal of attention was given by Schomburgk to negotiation and compromise and secondly, that a genuine attempt was made to balance the different needs of different groups. We have seen that this was aided by Schomburgk's own personality and early training in which he learned skills in working for a client. However the Board members' role was important, too, because they were able people who could act as a
filter for ideas and could encourage goal-setting that was appropriate for community needs.

Successful relations between Director and Board with the government helped maintain funding at a high level by Australasian standards. Schomburgk's colleague, Walter Hill, Curator of the Brisbane Botanic Garden, noted how well Adelaide Botanic Garden was funded. Hill wrote in 1875 that expenditure proposed that year for the Sydney Botanic Gardens (exclusive of the expenditure on the Domain and Hyde Park) was £4384 plus £4000 on improvements. Expenditure allowed for a competent overseer, a clerk and librarian and a bailiff to assist the director with administration and management. He noted that for the year 1874 the Victorian Government had expended £10,362 on the Melbourne Botanic Garden and that the annual vote varied from £10,000 to £12,000 including the salaries of 'superintending and clerical staff.' Hill observed with a note of envy that the estimated expenditure of the South Australian government on Adelaide Botanic Garden for 1875 was £6050 and that 'in this sum is included a liberal expenditure for everything that can advance the prosperity and usefulness of the institution.' The amount included £1000 for the erection of the Palm House with a further £800 required to finish the building. Hill argued that the South Australian allocation should form some sort of yard-stick for an allocation for Queensland since the territory, population and 'botanical wants' of Queensland more nearly approached that of South Australia than any other colony; in fact Queensland with its more varied climate should be allocated an even larger expenditure.57 Nevertheless his requests appear to have fallen on deaf ears.

57 Report of the Brisbane Botanic Garden 1876, p. 3.
A comparison between the funding for the various Australian botanic gardens does in fact reveal considerable differences. Melbourne's funding was by far the most generous, allowing for a large staff. By 1885 the sum allocated for the Botanical and Domain Gardens was £7836. This allowed for two clerks, four foremen, sixteen gardeners, two junior gardeners and eighteen unskilled workers, a painter, carpenter and casual workers. In addition there was the funding of £2509 for the Colonial Botanist, von Mueller, together with 2 clerks, 3 Herbarium assistants and their expenses.\(^58\)

Local economic conditions had a great influence on funds for example the grant for Adelaide was reduced in 1870 by £500 after poor seasons the previous year. However, even with such reductions the allocation for Adelaide's Botanic Garden was still a liberal one by Australian standards and there was a steady rise during the Schomburgk era. Whereas estimates for expenditure in Adelaide in 1871 had been for only £3000 for the Garden plus £100 for keeping Parliament House garden and Government House reserves\(^59\), annual budgets rose substantially over the next few years. By 1877-8 the allocation for Adelaide Botanic Garden was £6485 with the following breakdown:- £600 for the Director's salary, £3785 for wages, tools, materials, freight, office expenses, books, stationery, £200 for planting and maintaining trees in the grounds of Parliament House,

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\(^{58}\) *Victorian Parliamentary Papers*, Finance Papers 1885-6, A-no. 8.

\(^{59}\) Minutes, 6 Oct. 1871.
Government House, North Terrace and government reserves such as the Bowden reserve, plus £2000 for extensions.60

Winsome Shepherd and Walter Cook's *The Botanic Garden, Wellington* makes it clear that Wellington, like South Australia a settlement influenced by the theories of Wakefield, did not provide the kind of public support for a botanic garden that was to be found in Adelaide. Winsome Shepherd's analysis demonstrates that funding for New Zealand's botanic gardens was on the whole poor compared to that in Australia. She shows that for the period 1870-91 central government grants for the Wellington Gardens ranged from £300 per annum between 1870/71 and 1879/80 to nil in 1885-7. There was some income from town belt rents of £73 to £298 per annum and miscellaneous amounts from sale of plants, and various small grants, producing an average of about £423 per annum. Shepherd points to 1876/7 government allocations of £6700 in Adelaide, £4469 in Sydney, £2485 in Brisbane and £444 in Hobart for Botanic Gardens.61 McCracken's figures for Belfast indicate that income for the Botanic Garden between 1876 and 1891 ranged from £1353 in 1876 to £1294 in 1891. In 1891 the Curator's salary was only £117 and wages £362.62 Such figures demonstrate that funding for Adelaide Botanic Garden was indeed generous.


61 Shepherd & Cook, *The Botanic Garden, Wellington, a New Zealand history 1840-1987*, p. 56. James Hector was Manager of the Garden in addition to being Director of the Geological Survey Department and the Colonial Museum and Manager of the New Zealand Institute. The Institute Board and the Botanic Gardens Board appear to have overlapped in their membership with meetings often being held on the same day. While there were economies of administration from the close relationship of these organizations it is clear that the Wellington Gardens were poorly funded.

Another demonstration of the level of funding is provided by making a comparison of expenditure per annum on the Botanic Gardens (B.G.) in relation to the population of a colony and total government expenditure (Govt. expenditure p.a.) in New South Wales, Victoria, Queensland and South Australia in 1885:

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>New South Wales</td>
<td>957,914</td>
<td>£8,573,288 (179s/head)</td>
<td>£5,172 (1.3d/head)</td>
</tr>
<tr>
<td>Victoria</td>
<td>991,869</td>
<td>£6,140,356 (124s/head)</td>
<td>£10,315 (2.5d/head)</td>
</tr>
<tr>
<td>Queensland</td>
<td>315,489</td>
<td>£2,875,609 (182s/head)</td>
<td>£2,066 (1.8d/head)</td>
</tr>
<tr>
<td>South Australia</td>
<td>313,423</td>
<td>£2,454,808 (157s/head)</td>
<td>£6,240 (4.8d/head)</td>
</tr>
</tbody>
</table>

[Note 1. Victorian figures for expenditure on Botanic Gardens include expenditure on Government Botanist and his establishment.

Note 2. The Queensland government also made an allocation of £600 for the Botanic Garden at Rockhampton and £57 for labelling of plants at the Brisbane Botanic Garden.

Note 3. Figures per head have been expressed in shillings (s) and pence (d) for ease of presentation.]

These figures make it clear that government funding of Adelaide Botanic Garden compared very favourably with those of Sydney, Melbourne and Brisbane.

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Relations with staff
Just as it was important to have good relations with Board and horticultural colleagues, so it was important to maintain good relations with the staff. It is an area where there is only limited information available and where one must draw inferences based on the general development of the Botanic Gardens during the period 1865-91.

Schomburgk's comments in his Reports indicate pride in the work of his staff. His own thorough and very practical training under the German apprenticeship system, combined with enthusiasm and energy, would have aided his capacity to develop the potential of his staff. Experiences including his military service in the Royal Prussian Guard, his years on the British Guiana expedition and his practical experience of farming and gardening under South Australian conditions at Buchsfelde would have contributed to his management skills. Developments which occurred during his term of office are evidence of a team that worked well together; a combination of good leadership on his part and practical skills on the part of staff in carrying out the work, yet, as is so often the case, there is little information about individual staff members, some of whom were unable to sign their own names on their pay sheet. Pay sheets have survived and from these we know that a number of the staff served continuously for many years, thereby providing a stable workforce. General hands were put off when there were severe budget cuts but they were often re-employed when funds were greater.
Some further inferences about staff-management relations can be drawn from the absence of overt conflict. There is no indication of serious problems with staff, certainly not of the extreme kind that occurred with Krefl at the Australian Museum. In Schomburgk's obituary in *The Adelaide Observer* it was noted that he did not confine himself to generally directing affairs while leaving subordinates to put his ideas into practice but personally attended to the details of new schemes.\(^{64}\) It was also noted that he 'personally supervised the selection of new trees and shrubs'. There must have been minor disputes from time to time but there is no indication of disputes seriously harming the reputation of the Director.

The staff sent a memorial in 1873\(^{65}\) requesting that they be allowed an eight hours day but the Board indicated that it 'did not feel inclined to accede to the request'. In fact, although legislation for the eight hours day was passed in 1873, it appears that staff at the Botanic Gardens were not granted an eight hours day until the time of the third Director, Schomburgk's successor Maurice William Holtze (1840-1923). By this time there had been a change in Board composition, following the death of William Wyatt, Dr Davies and William Everard during the period 1886-9. It may have been that Schomburgk did not press as hard as Holtze did for the change; factors such as his age and his close relations with other 'old guard' Board members may have played a part in this.

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\(^{64}\) *Adelaide Observer*, Saturday, 28 March 1891, p. 33.

\(^{65}\) Minutes, September and October 1873.
Schomburgk does not appear to have had a real deputy. By the 1870s there were three gardeners on the staff. After one of these, a man named Sewell, left to go into the nursery business Schomburgk and the Board made approaches to Sydney and Melbourne to get a suitably qualified gardener. Johnson, the man chosen, was to have his fare refunded after six months work for the Garden, an offer which indicates that a well qualified gardener was someone not easy to find and retain. In the 1870s gardeners such as William Humphreys (who became Head Gardener in 1874) and Johnson and Sanders, the second and third gardeners, did not earn as high a wage as the 9/- a day earned by the Botanic Gardens carpenter, although benefits such as accommodation within the Gardens may have made the salary effectively much greater. These men would have supervised the general hands. Although there must have been training of staff on the job there was no apprenticeship system. No formal training scheme appears to have been introduced until the time of Holtze.

In the absence of a well qualified deputy, Schomburgk could write at the time of the establishment of the Museum of Economic Botany that he had 'no skilled help' available, although the remark may have related to skills in setting up museum exhibits. Those who were employed as gardeners would have had training either in Australia or overseas, probably as a gardening apprenticeship. The papers of Ferdinand Drzymalik, who was on the Botanic Garden staff and who had been apprenticed in Austria show that the subjects studied in

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66 Humphreys died in 1879 after serving on the Garden's staff from 1867 and being made Head Gardener in 1875. On his death Mr A. McDonald became Head Gardener. Report 1879, p. 11.

67 The apprenticeship papers including examination results are extant and held by Dryzmalik's descendents.
Austria were similar to those described by Loudon and discussed in Chapter 3, such as basic botany and chemistry, some mathematics, garden design and propagation techniques.

**Relations with the general public**

If there were elements of nineteenth century paternalism in Schomburgk's attitudes to staff such paternalism was also apparent in his reaction to damage done in the Gardens by members of the public. In Chapter 4 we saw that there were problems of thefts of small plants, wilful damage to plants (such as breaking off new trees), and minor damage caused by cutting names in seats, 'disfiguring' statues, teasing the animals and so on. Robberies also were noted, having increased so much that a reward was offered and a detective employed. Flowers in the buttonhole were not allowed after people went out wearing more than were brought in. This was a rule which Holtze on his appointment tried unsuccessfully to have rescinded, together with the one that prevented people from smoking in the Gardens. Police were appointed to help maintain law and order on busy weekend days, assistance which was regularly acknowledged in *Reports*. Regular offenders, as was noted earlier, were 'roughs' and 'unruly boys' who 'frequent the gardens apparently with no purpose other than that of pillage or teasing the animals'. Bringing attention to these matters in the Reports might have been aimed at gaining the cooperation of other visitors in combating these problems.

In relation to damage by visitors and the problems created by 'roughs and unruly boys' the Director's attitude was unashamedly paternalistic. He wanted culprits to be punished with the full force

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68 *Report* 1868, p. 3.
of the law as indicated by such remarks as 'I am truly sorry that the law cannot inflict more severe punishment on such'. He believed that malicious damage was not the province of only one social class, stating that culprits might come from any class of society. However his support for punishment of malefactors saw him express views that were those of a ruling group in society. He had already served as a Justice of the Peace in the small town of Gawler, where he served on the local bench, and his whole family background was one where the assumption of civic responsibility was commonplace. In colonial Adelaide his views on law and order were ones which would have fitted in well with those of his Board members and local members of parliament. He was in effect part of the fabric of social control in colonial society.

Participation in local organizations during his first sixteen years in Australia had provided training in how civic matters were handled in British Australian society and had helped Schomburkg make contacts with people of influence in the South Australian community: he had served on the foundation committee of the Gawler Town Agricultural Society, was a founder member of the Muddla Wirra Council, was involved with the Gawler Institute in his capacity as honorary curator of the Gawler Museum, was on the committee which planned a memorial to the explorer McKinley and was active in the local Masonic Lodge and his own Buchsfelde church group.

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69 Report 1869, p. 5.
70 Advertiser, 23 December 1865.
To work effectively in the South Australian community required support not only from those in positions of power and authority but also cooperation with ordinary citizens. While it was vital to get financial support and resources from parliament it was also important to have the kind of support that came from visitors to the Gardens and ordinary people who helped with donations. The development of the Gardens was helped by the large numbers of visitors who came to visit and who abided by the rules and regulations relating to the protection of plants and property. In addition there was a network of supporters who made available plant material and zoological specimens; there might be thirty or forty donors of animals and birds listed in a Report, providing opossums, kangaroo rats, cockatoos or turtles. Apart from those collected in South Australia some were donated from overseas sources. The zoological specimens were not only useful additions to add to the Gardens' collection but were also used as part of the exchange system. They could be used for purposes of exchange to acquire new zoological specimens from other colonies or overseas. On some occasions they could also be used in exchange for botanical specimens. The donation of botanical species has been discussed in Chapter 7 but it is worth noting here that apart from the overseas network there was a network of local contacts, 40-50 a year, who were actively involved with the Botanic Gardens. Such a network combined with those who provided animals and birds meant that there were on average two people a week sending material to the Gardens or delivering it, actively supporting the Gardens and feeling involved in the enterprise.
Schomburgk's cooperation with community organizations through providing pot plants, cut flowers and other material for decorations at public events as well as material for the horticultural and agricultural shows meant further links with local groups. Added to this, corporations, district councils and other public bodies were offered trees, shrubs and seeds 'to beautify public places, churches and graveyards.' Fine old trees in South Australian towns such as Strathalbyn and Gawler still survive from this period. The number of trees and shrubs given away rose and fell over the years as the following list demonstrates:

1868 - 3387
1870 - 4500
1872 - 10,532
1874 - 14,203
1876 - 4886
1878 - 4697
1880 - 7834
1882 - 1800
1884 - 1120.

The figure for 1876 was reduced because the legislature had not voted to continue the scheme of planting trees along the railway lines. Altogether 23,365 had been given away for this purpose in the previous four years, 1872-75 inclusive. It was noted in 1876 that since the government was making money available again some 6000 trees in the nursery could be offered once again.71

71 Report 1876, p. 8.
The figure for 1878 included 700 to private persons in exchange. There were in addition 2,500 packets of forest tree seeds and 50 lbs of forest tree seed sent to the Forest Board. The year 1880 saw 659 trees going to private persons in exchange; 600 for planting at Marble Hill; 965 for the Quarantine Station; 550 'for the Kapunda Reservoir, Hamley Bridge etc'; 1700 to Corporations and District Councils; 2800 to Adelaide Corporation; 200 to the Forest Board; and 360 for churchyards and schools - 7834 in all, in addition to some 2500 packets of seeds given away to the Forest Board, private persons and kindred institutions. By 1882 the number of trees and shrubs given to public bodies and private individuals had dropped to 1800. The Forest Board was by then distributing large numbers of trees so there were fewer applications. By 1884 the Gardens had ceased rearing trees for distribution. The service had been a valuable one and one that helped to maintain links with people in different part of South Australia. However it was appropriate for it to be replaced in time by a specialist organization.

Writing to Mrs Manget at the time of his seventieth birthday Schomburgk had explained that he had applied for the position of Director of the Botanic Garden to enable his children to get a good education in Adelaide. The Schomburgks' son Otto was to make a successful transition into Anglo-Australian society. Otto attended the leading Church of England school, the Collegiate School of St Peter, before embarking upon a successful Public Service career in 1874. He married the daughter of local lawyer and politician Henry

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72 He became Sheriff and Comptroller of Labour Prisons, a Marshal of the Vice-Admiralty Court, Commonwealth Electoral Officer for South Australia and Deputy-Marshall of the High Court of Australia. In addition he was active in the Militia Field Artillery, attaining the rank of Major by 1891.
Downer in 1902 - like his sisters marrying into a family of British extraction in the professional field rather than someone from the German community. The status of the family by the 1890s and its acceptance in Anglo British Society is indicated by the existence of an entry for Otto Schomburgk in *Burke's Colonial Gentry.*

Richard and Pauline Schomburgk's youngest child, Rosye, was said to have spoken only German in her earliest years at Buchsfelde. However, the children appear to have grown up using the German language very little and within a generation there appear to have been no traditional German customs or cuisine maintained in the family. There was a change of church allegiance, too. When he moved to Adelaide Schomburgk left behind him the small Lutheran church community of 'liberal persuasion' founded by his brother at Buchsfelde and in time joined the Church of England congregation of St Paul's, nearby in Pulteney Street, Adelaide.

The Schomburgks exemplify the trend for middle class and professional people of German extraction to move into Anglo-Australian society, sending their children to the leading schools and adopting Anglo-Australian customs. Both Richard and Otto Schomburgk were naturalized within a matter of weeks of arrival.

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74 Information from interviews during 1985-7 with Mrs A.M. Howard, Mr R. H. Schomburgk and Mrs A. Somerville, descendants of Richard Schomburgk.

75 St Paul's was established in 1869. The eldest Schomburgk daughter, Marie, married the incumbent after her father's death.

Although this may have been precipitated by the need to buy property, the pattern of a number of educated people with a professional or business background who came out on the *Princess Louise* was one of putting down roots in Australia and not returning to Europe. A descendent of Schomburgk's friend, the Buchsfelde naturalist Mrs Kreussler, noted that she seemed to have 'cut off her old life completely', a similar remark to that made by von Rieben from the *Princess Louise* who is said to have refused to talk to family members about life in Germany, saying 'we have left all that behind'.

Money that was saved appears to have been used for acquiring property or business interests rather than travel or a return to Germany. This pattern has been noted in a survey of descendents of *Princess Louise* passengers, families such as the Linges, Mueckes, Lindrums, von Riebens, Gladigows and Bürings. Of some fifteen families studied only one, the schoolmaster Listermann, had returned to Germany to live and this occurred comparatively soon after the group's arrival.

The drift of the economically successful, upwardly mobile Germans into Anglo Saxon society has been noticed in the United States generally and in Wisconsin specifically. Many of the more

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77 Letter from Mrs Laura Rowe to Director, Botanic Gardens, 1958 and information from Mrs J. M. Schomburgk, North Adelaide, South Australia, May 1990.

78 Research of Dr. Ian Harmstorf in this area has been supported by an unpublished study made by Ian Schomburgk and Pauline Payne in connection with a function held in 1989 to commemorate the anniversary of the arrival of the *Princess Louise* in 1849.

79 Listermann and his wife tried to establish a farm but found the task too difficult. Information from Pastor P. Scherer of the Lutheran archives, April 1988.

prosperous people of German origin appear to have decided that for social and economic success it was best to adopt English customs. In 1911 when the German consul Killiani visited Adelaide he was critical of the way that leading German born businessmen had become British in their loyalties and attitudes. In the 1870s it was common for business and professional men who were leading members of the German Club to send their children to Adelaide's leading schools, just as Richard Schomburgk did, and this had the effect of weakening the ties of the younger generation with German language and culture. In addition, while some of the successful merchant group worshipped at the doctrinally liberal St Stephen's church, many forsook Lutheranism for the more socially accepted English churches.

Respectability and acceptability depended on social class and until World War I it was possible to combine a German heritage with a place in Anglo Australian society - to be both British and German at different times. Respectability in early South Australia, Pike observed, was based on length of residence in the colony, thrift, temperance, piety and the ownership of land rather than on wealth, status or manners and on matters of 'industry and quiet sobriety' together with qualities such as self-help and self reliance those of

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81 Harmstorf, Guests or fellow countrymen, p. 217.
82 Harmstorf, Guests or fellow countrymen, p. 212.
83 Harmstorf, Guests or fellow countrymen, p. 197.
84 Harmstorf, Guests or fellow-countrymen, p. 212.
German extraction were thought to set an example. Support for the Germans as 'cousins who could keep an eye on France' was nurtured by the experience of having Prince Albert as Consort in Britain and a long period when there was cooperation rather than conflict between Britain and Prussia. The Prussian education system, discussed in Chapter 7, was much admired. By the 1870s Germans may have been viewed somewhat in the manner of the Swedes today as people who could offer technical expertise and who came from a country that did not pose a great military threat to the major powers of the day.

In such a situation Schomburgk's German background was not a serious stumbling block to his acceptance in Adelaide society. Schomburgk was a man with a pleasant manner and appearance and while he retained a German accent and wrote in a style that betrayed that English was not his native tongue he did not provide a figure of fun with unusual clothes or eccentric behaviour. He supported local institutions in South Australia and in his publications wrote of imports and the British Empire as 'ours'. His paper on the Victoria lily in 1868 finished with eulogistic remarks about Queen and Empire which would have done credit to any British born patriot.

Membership of his Masonic Lodge must have helped his position in the community, if for no other reason than the opportunity it provided for

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88 Raoul Middleman, unpublished draft paper produced for his entry on Schomburgk for *Australian dictionary of biography*.

regular contact with leading local citizens. His friend Muecke also was active in the Masonic world as was Edwin (later Sir Edwin) Smith, Lord Mayor of Adelaide 1879-82 and 1886-88, whose picture appears in the family photograph album. Smith was an outstanding civic leader in Australia in the 1880s - close cooperation between Schomburgk and Smith helped to improve city amenities. Other organizations, such as the Philosophical Society, the Chamber of Manufactures and the Royal Agricultural and Horticultural Society similarly provided opportunities for contact with people of influence while membership of the German Club provided contacts with German born members of the business community. There would also have been many contacts made through social or church gatherings involving other families with young people - with five daughters to be launched into respectable society Schomburgk could not afford to confine his interests to the plant sciences.

Some indication of both the nature of Schomburgk's network of contacts and the kind of support which he enjoyed is indicated by the list of names of subscribers to the portrait by Louis Tannert which was presented to the Board of the Botanic Garden in 1884. It was accompanied by an illuminated address with the names of 106

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90 Photographs in the possession of Mrs J. M. Schomburgk of North Adelaide, S.A. Smith, knighted in 1888, was also member of the House of Assembly from 1871-93 and associated with a large number of civic and philanthropic activities, see Susan Marsden et. al., *Heritage of the City of Adelaide*, Corporation of the City of Adelaide, Adelaide, 1990, p. 72.


92 The German born Tannert was appointed Master of the School of Painting in Adelaide in 1881 and first Curator of the Art Gallery of South Australia from 1882-9. Information from Adelaide Botanic Garden - the portrait is now in its Administration building.
subscribers headed by the Governor. Allowing for the fact that several of the signatures are difficult to decipher some 38 of the names appear to be people of German ethnicity. People who were in some kind of position of responsibility in the government, or who had been previously, accounted for some 26 names. Some names are prominent in the economic and political history of South Australia: Henry Ayers, Sir John Morphett, Sir Samuel Davenport, Peter Waite, J. H. Angas, Dr Simpson Newland, Sir Edwin Smith, J. C. Bray, Henry Scott and parliamentarians R. D. Ross, R. A. Tarlton, W. West-Erskine, R. W. E. Henning, Luke Furner and F. E. W. Krichauff. John Morphett, together with Schomburgk’s close colleague, Dr William Wyatt, had both been members of the first Natural History Society in South Australia, formed in 1838. Frederick Waterhouse and J. W. Haacke from the Museum were on the list. There are a number of prominent businessmen such as Caleb Peacock, William Everard, A. M. Simpson, James Martin, James Robin, C. H. Goode, Ross, R. A. Tarlton and J. Acraman. From the German community there were names from the business and professional community B. A. Noltenius, S. Schlank, A. Tileman, F. Basedow, J. M. Wendt, E. C. and H. C. E. Muecke, W. Menz, H. L. Vosz, Max and Edwin Weidenbach, O. Goerger, Theodor Scherk, Adolf von Treuer, Adolf Kauffman, Gustav Joachim and A. L. Balk. Parliamentarians Krichauff and Henning were also German born. There are prominent names from the ranks of the local nurserymen, Edwin Smith, Thomas Giles, W. Hackett. Missing from the list are two names from the botanical world: Professor Tate and Otto Tepper. Tate does not appear to have been away from Adelaide at the time.

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93 The illuminated address is held in Adelaide Botanic Garden library.

94 This is indicated by reports of the Field Naturalists’ Section of the Royal Society of South Australia for the period prior to the presentation of the portrait.
Tate's name does not appear either on the list of those who attended Schomburgk's funeral or those who sent apologies. One could postulate that Schomburgk's lack of interest in field botany and matters of taxonomy may have led Tate and Tepper to feel a lack of kinship with Schomburgk. Other absent names are those of Albert Molineux (surprising in view of the affectionate nature of the obituary in *The Garden and the Field* 95) as well as those of Goyder and Todd.96 Present on the list of subscribers are a number of members of the Philosophical Society: the entomologist and microscopist, Frazer Crawford, Samuel Davenport, William Wyatt and J. A. Johnson in addition to Elder, Rees, Tomkinson and Waterhouse.97 In all, the list shows substantial support from the business community, including prominent nurserymen, and from civic leaders, especially those with pastoral and agricultural interests.

**Schomburgk in later years**

Schomburgk lived to see his son well established in a public service career, two of his four daughters married to professional men while the third and fourth daughters were at home to care for him after the death of Schomburgk's wife Pauline. He had the companionship of his brother Julius who lived with him at the Botanic Gardens in his later years. Despite illness such as painful recurring attacks of gout Richard Schomburgk remained active till the end of his life, living in the charming Director's house at the Botanic Gardens, apparently

95 Although Molineux was editor of *The Garden and the Field* it is possible that someone else, such as Sir Samuel Davenport, wrote the obituary. The obituary appears to have been written by a member of the Central Board of Agriculture of which Molineux and Davenport were both members.

96 There are two or three signatures which are very difficult to decipher so it is possible that Goyder, Todd or Molineux were included on the list.

97 Two prominent medical men of the society, Drs Verco and Magarey are both absent.
unwilling to retire. He could stay on as the 'grand old man' of the Gardens, working quietly with his botanical specimens in the Museum of Economic Botany, attending meetings of organizations such as the Agricultural Bureau of South Australia along with his old friends F. E. H. W. Krichauff and Sir Samuel Davenport and a younger colleague, Saxon born lawyer and politician Robert Homburg (1848-1912) together with J. E. Brown, Conservator of Forests, Albert Molineux, editor of *The Garden and the Field*, mining magnate, pastoralist and politician W.A. Horn, M.P. (1841-1922), and agriculturist Henry Kelly (1826-1912). The activities with which the Bureau was involved, such as the collection of data on plants suitable for production in South Australia, methods of cultivation, prevention of disease, the preparation of products for market and the collection of statistics on production, were ones which Schomburgk had promoted throughout his time as Director, the practical tasks of supporting a scientific approach to primary industry.

In the Gardens he was maintaining what had been achieved rather than making any dramatic changes. His successor Holtze described how, when he took charge of the Gardens in June 1891, he found it

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98 Kelly was described as 'an enthusiast in all matters relating to agriculture', *Farm, Stock and Station Journal*, vol. 7, no. 11, May 1912.
necessary to remove about 200 'old and unsightly trees and overgrown shrubs':

the late Director was very well aware that this work would have to be done, but after all the natural love of an old man for his creation conquered his mind, as he told his friends that he would leave it for his successor to remove what he had planted.99

Appointed at the age of fifty four Schomburgk had stayed on to die in office in his eightieth year. Years before he had turned down the offer to take charge of the Botanic Gardens in Melbourne. At the time there was an exchange in verse which began with 'come live with me and trim my groves' from 'Melbourne to Schomburgk' which brought a reply in verse from Schomburgk. The poem says much about Schomburgk, a man whose first outward letter was about purchasing manure from the streets and who could laugh at his own mistakes in his account of his travels in British Guiana.

Melbourne to Schomburgk

Come live with me and trim my groves
For well thy Adelaide village proves
That square and terrace, park and field
To Schomburgk's taste and skill must yield.

For I will give thee house and stable,
And garden produce for thy table,
With store of fuel, gas and water,
And fifty thrice-told pounds per quarter.

Dr. Schomburgk's Reply.

It may be, Ma'am, if I were young,
I'd list to thine inviting tongue;
Thy offer now no impulse moves
To live with thee and and trim thy groves.

Thy liberal terms I briefly scan 'em;
Thy extra salary per annum!
Yet still my resolution hardens

99 M. Holtze, Report to the Governors of the Botanic Garden, 1 May 1893.
To stick to Adelaide's dear old gardens.

But could friends part and hearts not bleed;
Had life no past, had age more need;
Then p'raps I'd come by slow removes
To live with thee and trim thy groves.100

100 The poem under the title of 'From an Adelaide Scrap-book, about 1873' was reproduced in Friends of the Adelaide Botanic Garden Gazette, August-September 1983, vol. 6, no. 4, p. 15. The poem appears in an undated newspaper clipping in a book with newspaper clipping of the Schomburgk era in the Adelaide Botanic Gardens archival collection.
CONCLUSION

Schomburgk's death marked the end of a golden era for the Adelaide Botanic Garden. Holtze, appointed at the beginning of a decade notable for economic recession, began with a lower salary and a smaller overall budget. The introduction of motor transport enabled excursions to the beach and nearby countryside - the Botanic Garden became only one of many possible places for people to go for recreation. Domestic and commercial gardeners had developed a store of knowledge about what species were likely to thrive under local conditions. Other institutions, such as the Zoological Gardens, Roseworthy College, the University of Adelaide, the Woods and Forests Department and Department of Agriculture were by then playing their part in the development of the natural sciences and applied science in South Australia - services to be augmented by the establishment of the Waite Institute of the University of Adelaide in 1925 and the Council for Scientific and Industrial Research (CSIR) in 1926.

In assessing the contribution of the Botanic Garden and of Schomburgk himself to South Australian development in the period 1865-1891 we have looked at the work done in horticulture and viticulture, the contribution to agriculture, forestry and environmental affairs, the provision of civic amenities and the promotion of a scientific viewpoint in Australia generally and South Australia specifically.

Three broad themes have emerged from this case study. One is the cultural milieu in Adelaide and how it affected the work of a colonial
scientist. The second relates to the transfer of plant material: its importance to Australia and its place in British imperial development. The third theme revolves around the qualities of Schomburgk himself and the contribution he made.

Adelaide and the cultural milieu of Schomburgk's work at the Botanic Garden

Lionel Gilbert, discussing the Royal Botanic Gardens, Sydney argued that the scientific role of a botanic garden is the 'most important, if perhaps the least appreciated'. Nevertheless, the study of Schomburgk and Adelaide Botanic Garden has demonstrated the importance of maintaining a balance between the educational, scientific and recreational work. It is primarily as a scientific and educational institution that we must assess Adelaide's Botanic Garden in the period under study. Yet its recreational role is the one which is best known to the general public today. The inscription on the portrait of Dr Schomburgk presented to the Botanic Garden in 1884 referred to the 'zeal, energy and skill which he had devoted to rendering the Botanic Gardens an ornament to the City of Adelaide and the pride of the province of South Australia'. It was precisely because Melbourne's leading citizens did not regard von Mueller's Botanic Gardens as an ornament to the City of Melbourne and that the recreational role of the Melbourne Gardens appeared to them poorly served that Australia's leading scientist of the day ceased to be curator of those Gardens in 1873. It was the balance achieved between the different roles which determined whether an Australian botanic garden was acceptable to its colonial political masters - and thus was in a position to receive adequate funding. However, if the

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recreational role were emphasized and only a minimal scientific service were provided, as was the case in Canterbury, New Zealand, then the opportunity was lost to provide an institution as a 'beachhead' for colonial scientific development.

The Adelaide example is an important one because it demonstrates what could be achieved with favourable social and economic conditions. In Chapters 2 and 4 we saw that while the Adelaide site had some limitations, it was adequate for the purpose. Moreover, climatic conditions on the Adelaide plains allowed a wide range of species to be grown in the open. As we saw in Chapter 9, in the period under study South Australia's rapid economic expansion enabled adequate resources to be made available for funding public institutions. Concentration of population in the area around Adelaide provided a pool of educated and prosperous settlers who not only supported the initial development of a botanic garden but provided on-going support. We have seen that the cultural milieu in Adelaide was one which provided significant and substantial support for both Schomburgk and his colleagues on the Board, funding which we have seen greatly exceeded that in other Australian colonies. Such support enabled capital works, an adequate labour force and purchases of material. Given the favourable economic conditions, the cultural milieu is the key to understanding the success of this scientific and educational institution.

I have shown that such support was important not only in relation to the provision of funding and plant material. Adelaide's leading citizens, enthusiastic about developing local resources and proud of their achievements, exhibited a certain generosity of spirit, an openness to new ideas and a capacity to work together cooperatively
- all factors which supported creativity. Despite the demands and constraints inevitable in a new province which needed facilities for transport, water supply, education and health care, there was support for creative endeavour - a desire for things beautiful. It was this attitude that saw Stevenson bring a glasshouse and a prized collection of camellias to a brand new settlement where there were neither roads nor houses. We have seen that South Australian colonists had a vision of a 'better world' and it was one in which the landscape was to be changed by means of the introduction of new species of plants. With comparatively easy access to land suitable for agriculture, farmers and gardeners worked on such introductions in collaboration with both commercial enterprises and botanic garden resources.

It is clear that the Botanic Garden in the period under study was a source of great pride in South Australia. Activities such as trials of economic plants were very acceptable to civic and political leaders, as was the provision of green lawns, well constructed paths and fashionable ribbon borders. In comparison, the fate of von Mueller indicates that work on collecting and classifying native flora was not the kind of activity to bring acclaim from local community leaders. In Chapter 9 we saw how support from visitors reflected four different themes: firstly, that the Gardens were well-ordered and in 'refined taste'; secondly, that there was a magical, out of the ordinary, quality; thirdly, there was the idea that the Gardens provided 'rational amusement' for the populace and might lead to self improvement; and finally there was pride that the Gardens, the 'pride of the province', were comparable to or better to those in the other Australian colonies. On the one hand, the Gardens evoked pride,
enthusiasm and even excitement. On the other hand, there was the theme that this institution reflected a respectable society where civilization had come to 'the wilderness'.

Support for the provision of a large public garden was part of a nineteenth-century movement in Europe and North America to provide parks which could be used by the working man. We have seen that Adelaide Botanic Garden was an important recreational resource in South Australia, accessible because of its central location and its generous opening hours. Like the other Australian botanic gardens it was free to the public, contrasting with the situation in nineteenth-century Great Britain where visitors usually had to pay. This accessibility was reflected in the remarkable attendance figures referred to in Chapters 4 and 8. Valuable as an institution which catered for the gardener, farmer and Sunday visitor, the Gardens were also valuable in providing examples of styles of landscape design for those who were planning and planting parks and gardens. Civic improvement could be promoted in a practical way through the assistance given to local councils and provision of advice, but there was help as well in the form of encouragement and inspiration.

This study has demonstrated that social and cultural factors provided the underpinning to scientific work. This underpinning is demonstrated in practical matters such as Board membership and budget allocation choices. It is also seen in more subtle, less easily defined forces, exemplified by the vision that many had for future development; less easily defined but a driving force nevertheless. In particular the study demonstrates the importance of an urban middle
class culture that MacLeod notes has been so often underemphasized in Australian social history.

The introduction of new plants into South Australia
We have seen that since Australia depends almost totally on introduced species for edible cultivars and crop plants, the role played by botanists and botanic gardens was one of considerable influence on both the economy and the environment. Arable agriculture, now such an important part of the economy, depends entirely on introduced plants as does the softwood industry. Moreover, most Australians live in cities and suburban gardens abound with introduced species - rose, geranium, agapanthus, jonquil, iris and lawn grasses alongside more recently planted Australian callistemon, eucalypt or grevillea.

Some might argue today that the Botanic Garden's display might have given more emphasis to ornamental plants suitable for Adelaide's long, dry summers. In Adelaide, the development of designs featuring the fountains and courtyards of Moorish Spain could have led to less demand on scarce water resources than lawns and beds of roses. However, I have shown that if the design elements of Adelaide Botanic Garden were from Europe, the plant collection was made up of species gathered from all around the world. It is true that predominantly British settlers from 'the nation of gardeners' did not visualize Paradise as planted with eucalypts, mellaleucas and acacias. They sought both ornamental species and economic plants from Europe, South America, South Africa, the United States and countries in Asia and the Pacific region. Many of these species were appropriate for local conditions and could readily be used by settlers
as they created domestic and civic gardens - plants such as jacaranda, oleander, orange, fig together with hardy grasses such as couch, kikuyu and buffalo. Other species, such as tea amongst the economic plants or rhododendron amongst the ornamentals, proved to be inappropriate, at least on the Adelaide plains.

The plant collection at Adelaide Botanic Garden, a large collection by international standards of the day, allowed people to see what could be grown in South Australia as domestic and civic plantings for recreation, shelter and civic amenity. A cosmopolitan flora evolved. We have seen that it took considerable time and energy to establish which plants would thrive, which soil or weather conditions favoured growth, or to establish how large a particular tree was likely to grow. It also took an openness to new ideas and optimism. The complexity of assessment made the Botanic Garden's role such an important one. Testing new plant material and promoting suitable material for local conditions played a major part in the development of profitable plant based industries, such as viticulture, almond growing, and wheat and timber industries. Horticulture, agriculture and forestry all benefited, not only in South Australia but in other parts of Australia. Schomburgk encouraged people to experiment with new species, to diversify, to provide for local markets and to supply manufacturers, supporting diversification in the range of species produced so that fewer products would need to be imported from other colonies or from overseas.

In the broader perspective we know that significant changes to the Australian environment occurred as a result of the transfer of plant species, changes which may well be more long lasting than the
transfer of political ideas and institutions from other parts of the world. Moreover, in introducing a new economic flora and in developing natural resources in the way they did, the settlers destroyed the lifestyle of most of the Aboriginal inhabitants and at the same time set in train environmental changes of great magnitude. Yet, despite the dramatic changes wrought by the transfer of new plant species to Australia, traditional accounts of Australian history have given little or no attention to this phenomenon and the general public is very little aware of it. Walter Hill, Schomburgk’s contemporary and Curator of the Brisbane Botanic Garden and an important plant introducer does not have an entry in Australian Dictionary of Biography. The name of Schomburgk, who played such a large role in introducing plant species into Australia in the second half of the nineteenth century, is still being misspelt by competent historians in recent publications.² Popular historical accounts of South Australia rarely discuss important developments in the plant sciences such as the establishment of Australia’s first government forestry department or Australia’s first agricultural college, Roseworthy College - even though South Australia still depends on its agriculture more than any other Australian state.

Schomburgk and his contribution

In the period under study, Kew was of great importance as a source of material. The style of operation of Adelaide Botanic Garden followed that of Kew with a collection of economic plants, a herbarium, museum, library, annual reports and other features mentioned in the Kew Guidelines. Nevertheless, while Kew may have provided the

² Two examples in the period 1988–90 are The Heritage of the City of Adelaide (1990) and R.W. Home (ed.), Australian science in the making, while Bolton in Spoils and spoilers refers to Richard as Robert.
guidelines and Kew was available as a source of information, providing a model to follow (as with the Museum of Economic Botany) and moral support (as with the building of the Victoria House), the Adelaide Botanic Garden emerges as an institution which functioned autonomously, developing its own style and its own network of contacts. As we have seen Schomburgk was appointed by the Board of Trustees in response to perceived local needs. He was not recommended by an eminent botanist in Britain as was the case with his colleague Moore in Sydney and instead had experience of farming under local conditions and a reputation as a 'man of science'.

Schomburgk’s contacts were made with organizations and individuals in places relevant to South Australian conditions. Although other colonial botanic gardens of the British Empire, such as those in South Africa and the Pacific, played a vital role in the exchange process, there were important sources of plant material outside the British network: the Buitenzorg Botanic Gardens in Java (part of the Dutch colonial system), the Botanic Garden in St Petersburg and contacts in the United States. Such exchanges have not been noted in previous publications. Contact in North America, for example, was not with the British provinces in Canada but with the United States where agricultural and horticultural research carried out by individual researchers such as C. G. Pringle or staff in agricultural stations was relevant to work being done in Australia. The United States Department of Agriculture was an important source of plant material such as pasture grasses and fodder plants and here enthusiastic supporters of scientific agriculture such as Commissioner Frederick Watts provided a vital role in exchanges. Although St Petersburg appears to have been primarily a source of exotic material rather
than economic plants both Schomburgk and Regel were interested in economic botany and could exchange information in this area. It is true that Kew's support was influential in getting many of the British Empire Botanic Gardens established and Kew had important indirect influence if these gardens supplied plant material to Adelaide's Botanic Garden. Nevertheless Schomburgk's links with other researchers and collectors at St Petersburg, Buitenzorg and the United States developed because exchange between the institutions was of mutual benefit and because the participants were able and enthusiastic. Schomburgk's reputation in continental Europe, his practical approach and his enthusiasm and determination in working for the acquisition and distribution of plant material made him peculiarly suitable for this work. He was also helped by having the necessary economic resources. The smaller number of exchanges recorded in Hobart or Wellington reflects in part their smaller budgets.

Much has been written about the 'leavening' effect in colonial South Australia of the Dissenters and their belief in the possibility of creating a better society. There was also a 'leavening effect' on the intellectual life of provincial Adelaide provided by those settlers who came from Germany during the first thirty years of European settlement. The energy and enterprise of German born contemporaries of Schomburgk provided important support for work in the plant sciences. I have shown that work in the sciences and particularly in the plant sciences was of a very high standard in nineteenth-century Germany. The important contribution of German emigrants to Australia in the world of science is seen by the work of von Neumeyer, Krefft and the many botanists of whom Ferdinand von
Mueller was the most eminent. Schomburgk's links with Germany played a vital part in developing science in South Australia. For it was not only plant material that was imported but also ideas about development of the plant sciences; in particular there was a direct link with the ideas of Alexander von Humboldt, one of the most influential men of science in the nineteenth century.

Schomburgk's breadth of approach owed much to the Humboldtian influence. This influence can be seen in his on-going concern with meteorological measurement, his interest in economic aspects of production, his concern with state support for work in applied sciences such as afforestation and agricultural education, his interest in the relationship between plants and environment and his support for practical experiment. Schomburgk's strengths lay in the breadth of his approach and the balance he achieved in his work. Weaknesses in the area of taxonomy appear to reflect both his lack of training in this field and his own personality. It would be easy to say that he lacked attention to detail. However our assessment of his abilities must be balanced by recognition of his outstanding success as a horticulturist, success which indicates a considerable capacity to attend to detail.

Schomburgk was not an intellectual giant but his reputation in scientific circles combined with experience of local conditions provided a very acceptable combination in a colonial setting. His affable manner and down to earth approach combined with 'zeal, energy and skill' made him someone who attracted contacts from a wide variety of walks of life. An obituary stated approvingly that he was 'an eminently practical man' whose years of managing his own
estate produced the experience necessary to organize and manage the Gardens. Such a pragmatic and eclectic approach was the stuff of survival for European settlers in colonial Australia. Along with this practical approach were the 'zeal' and enthusiasm referred to in the dedication on Schomburgk's portrait. It exemplifies the work of so many of the best colonial botanists whose curiosity and excitement about the natural world provided inspiration for others in turn. For the best scientific work involves enthusiasm, dedication, often a kind of obsession. These qualities are evident in Schomburgk's work.

I have argued that those who took the giant step of emigrating to a country on the other side of the world had personal qualities which favoured innovation and enterprise in their life in the new country and that this provided an important contributory factor to the liveliness and spirit of innovation and optimism of South Australia in the period 1850-1890. Risk-taking was a significant feature of Richard Schomburgk's history and was particularly evident in his participation in the expedition of exploration which established his professional career - as it did in the case of so many other young scientists in the nineteenth century. Participation in a land based expedition may in fact have been more likely to develop the quality of practical resourcefulness than participation in a maritime expedition. Schomburgk's espousal of the liberal cause in Germany, his emigration to South Australia, establishment of a farm and vineyard in a new country and his initiation of new projects at the Botanic Gardens all demonstrated a capacity to take risks. His very survival indicated, in addition, a capacity to learn and adapt.
I have shown that the combination of breadth of experience and capacity to adapt stood Schomburgk in good stead when appointed as Director at the age of fifty four. His skills as an administrator help explain his success. As an administrator he needed skills in analysing, communicating and negotiating, a capacity to initiate new ideas, to motivate and supervise others, establish priorities and evaluate plans. He also needed a capacity to tolerate pressures from other people, to deal with misunderstandings or lack of support. To work as a scientist without budget constraints was a luxury available to few in colonial Australia, just as it is a rare luxury today. In the period under study professional, salaried scientists, men such as Schomburgk, von Mueller, Moore, von Neumeyer, Krefft, McColl, were administrators of an institution rather than salaried officers with scientific responsibilities alone. The problems of von Mueller, Moore and Krefft, discussed in Chapter 9, demonstrate how vitally important such management skills were.

Problem solving in the plant sciences in colonial Australia required both people and physical resources. Scientists who were enthusiastic and determined like Schomburgk had much to offer and Botanic Gardens had a special role to play. The natural sciences can be viewed as the 'big science' of most of the nineteenth century in Australia and as Inkster and Todd observed, in the absence of large scale manufacturing in Australia natural history took the role played by mechanical engineering or industrial chemistry in large, industrial economies in the nineteenth century. By modern standards, botanic gardens, natural history museums and expeditions of exploration were funded to a remarkable extent.
The focus of work at Adelaide Botanic was on acclimatization—although, as we have seen, Schomburk was concerned with other issues as well. Acclimatization research involved the establishment of a wide network of contacts in Britain, Europe, America and Asia and within Australia itself. It thereby developed a network of intellectual and practical support for individuals who were concerned with other matters: forestry, agricultural education, entomological research, or the breeding of new cultivars for specific conditions. This network was typified by cooperation between government, commercial interests, organized groups such as Acclimatization Societies or Philosophical Societies and private individuals.

Inkster and Todd comment that it was not until the last two decades of the nineteenth century that Australian science in general 'began clearly to respond to local imperatives rather than to imperial demands'\(^3\). This case-study demonstrates that Adelaide Botanic Garden was one institution in the vanguard of such a movement and can be seen to have been responding to local imperatives as early as the 1860s. It was adequately funded by government, well supported by the local community and it provided a wide range of services appropriate to local needs in a steady rather than intermittent fashion. Its director, who came from the old tradition of eclectic training, successfully handled the demands made on the paid professional worker in government service. A striking feature of his work was the support he gave to scientific agriculture and to forestry and the concern he expressed about environmental issues; all matters in which he was in the vanguard of scientific practice.

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\(^3\) See Introduction, p. xiv.
Schomburgk, described as a simple, kind hearted man of science, could write about 'picturesque, scientific gardening', of the Gardens being 'really an educational institution' and that he was 'anxious to render this establishment one not less of utility than of healthful recreation'. Brockway would see the work as facilitating colonial expansion. However, we might leave the last words to Sir Joseph Hooker:

'...there is nothing like a Museum and Gardens to screw money out of the public for science'.
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