THE LIVES OF ANIMALS AND ANIMALS IN OUR LIVES

Collected publications 1988-2017

A thesis submitted for the Degree of

Doctor of Science

in

The Faculty of Sciences

of

The University of Adelaide

by

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B.Sc, B.Sc (Hons), Ph.D.

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FACULTY OF SCIENCES

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CONTENTS

Abstract

Cardio-respiratory and metabolic adaptations of animals to their individual environmental conditions can be unique and so wonderfully variable. However, there are also underpinning physiological hurdles that must be overcome for evolutionary success. Such a physical determination is controlling surface tension in the lung. This action is undertaken by the pulmonary surfactant system that enables lung inflation. Whilst the environment, through a range of characteristics can shape the lipid and protein make-up of surfactant in individual species, the system itself is remarkably conserved. Evolutionary animal biology also impacts real world issues in wildlife conservation and in the relationship between people and nature. New methods in science and community education and engagement including citizen science have been applied to animal biology within human communities to further enhance the understanding of science as a way of knowing and that animals and wildlife are fundamental to our own health and well-being.

Declaration

This thesis contains no material which has been accepted for the award of any other Degree or Diploma in any university or other tertiary institution, and to the best of my knowledge and belief, contains no material previously published or written by anyone else, except where due reference has been made in the text.

I give consent to this copy of my thesis, when deposited in the University of Adelaide library, being available for loan or photocopying.

Christopher Brian DANIELS
July 2018

Statement Concerning Affiliation with the University of Adelaide

Christopher Brian Daniels completed a Bachelor of Science degree and then Honours at the University of Adelaide (1978-1981) before undertaking a PhD at the University of New England (1982-1987) (see Appendix 1).

Research included in this application was undertaken whilst he held research/academic positions at the University of California Irvine (1985), Flinders University (1986-1993), Adelaide University (1994-2006) and University of South Australia (2007-2018).

The majority of the publications included in this thesis **(in excess of 62%)** were completed and published whilst he worked as an academic (Lecturer --to--Professor) for the University of Adelaide and carry an organisational by-line from the Departments/Disciplines of Physiology and Environmental Biology at the University of Adelaide. In addition the urban ecology and citizen science research undertaken at the University of South Australia began at the University of Adelaide from 2002-2006.

Hence, C B Daniels has had a strong and continuous relationship with the University of Adelaide and this University is home to the majority of the research delivered here.

Acknowledgements

This work, and in fact my 35 years in academic research, could not have occurred without the extraordinary talent, support, hard work and intellect of my primary research partner, colleague, friend and wife, Professor Sandra Orgeig. Sharing a laboratory and a research direction with her for 32 years enabled us as a team to achieve so much more than we could ever have achieved alone. We shared the ups and downs (mostly ups) of working through really difficult experimental or technical issues. With Sandy I was able to work with animals almost unknown to science and develop or modify techniques ourselves to measure the almost unmeasurable. Whether it be lungfish, or cell culture, 1-gram pre-hatchling lizards or sophisticated protein analyses, Sandy with her amazing biophysical, chemical and technical knowledge, powerful analytical mind, extraordinarily high standards and steely determination to make things work, was always able to find a solution. To have been able to study, discuss, argue, plan, travel, write, present and research with her, has been the joy of my life.

No work in academia can be achieved without wonderful colleagues. In my lab and overseas, the wise counsel of my collaborators, friends and postdocs who provided support and hard work cannot be underestimated. I have had the great privilege of working with so many individuals who opened doors to the research world. It is impossible to name them all, but to all those who hosted my students, provided rare and obscure animals, taught us techniques in impossibly short time periods, and who supported our ventures into edited books and volumes, I thank you all so much. However, a few of special note with whom I laboured with for extended periods on particularly complex issues include: Terry Nicholas, Allan Smits, Jeffrey Whitsett, Peter Frappell, Olga Lopatko, Greg Johnston, Philip Wood, James Smith and Sam Schürch.

I would also like to acknowledge and am particularly grateful to all my 25 honours students, 1 masters student and 13 PhD students. In addition, a host of medical students, summer scholarship students and undergrads provided a vibrant and exciting research environment. They say you learn more from your students than they learn from you. And it's true. Whilst all changed my life, a few courageous souls took giant strides into the unknown and opened up huge areas of research, new to me, and in many cases new to the world. These students include: Lucy Sullivan, Catherine Tait, Jonathan Codd, Philip Wood, Philip Roetman, Sonya Johnston, Natalie Foot (née Miller), Carol Lang (née Ormond), Helen Blacker and Sheryn Pitman. To you all I owe so much. Thank you for continually challenging me, extending me, and for continually "raising the bar".

Finally, I owe so much to all my family, but particularly my son Samuel and daughter Alexandra. As youngsters they were "conference kids", dragged to all corners of the globe. As they aged they helped with talks and presentations and listened without grumbling (too much!) at the dinner table about talk on surfactant, lungs, urban ecology, citizen science and all sorts of wild and variable sciencey topics. And of course they got out the cheese and wine for the stream of visiting scientists arriving at our house in the evenings. For your patience and support I particularly thank you.

Historical Context to this work

Animal Biology has undergone several major, (if quiet) revolutions over the past 50 years. When I first read zoology at the University of Adelaide in the 1970's, animal biology was deeply entrenched in the philosophy relating how a species was adapted to its environment. Work in physiology by the grand masters, Scholander, Schmidt-Nielsen, Bartholomew, and others demonstrated "adaptations". Environmental adaptations were often determined and quantified relative to a related species that occupied different environments. Hence, comparative animal physiology was the norm. My initial Honours and PhD work followed this pattern and I have maintained an interest in the adaptations of individual species to particular environmental conditions throughout my career. Part 1, Section 1 highlights this physiological approach to understanding animals by exploring their cardio-respiratory or metabolic adaptations which underpin their behaviour and physiology in response to environmental challenges.

However, the first major revolution came in the mid 1980's when the new generation of animal biologists, armed with new and powerful statistical analyses, demonstrated the fallacy of two species comparisons and opened up the power of multiple species comparisons in a phylogenetic context. This new phylogenetic framework enabled the drivers for the evolution and then radiation of anatomical and biochemical and then ultimately physiological systems to be uncovered. I first encountered this new evolutionary physiology in the laboratory of Al Bennett at the University of California, Irvine, in 1985. When I moved to Flinders Uni, School of Medicine I was able to apply the concepts developed by Bennett, Garland, Arnold, the Packards, Huey and others to a virtually unknown physiological system studied by Prof Terry Nicholas, the pulmonary surfactant system. From the 1980s, through to the present, with the aid of many outstanding researchers (but primarily Sandra Orgeig, who joined my lab in 1990) I have taken an evolutionary approach to understanding the function and roles of pulmonary surfactant in airbreathing animals, leading ultimately to a better understanding of human respiratory health and disease. This material is presented in Part 1, Section 2.

By the early 2000's interest in and support for evolutionary or comparative animal physiology was waning. Research directions in Australia shifted to becoming more human focussed, particularly in understanding human health and wellbeing. Animal biology moved away from only understanding "How animals work" in either a comparative or evolutionary sense, into also understanding how we as a species interact with nature, for our benefit, and for that of the wildlife itself. Urban ecology, till 2000 a very poorly understood and often disparaged branch of ecology, started growing and developing because it linked the needs of people and communities to the nature around them. In part in response to the decreasing interest in "pure science" and to the simultaneous need to ensure that animal biology remained relevant and perceived as important in the eyes and psyche of the community, I began to develop twin interests in urban ecology and science communication and education. Science now must have an impact. It must engage the community, deliver change (for the better) and extend beyond the walls of academia to inform government policy, community design and construction, environmental recovery and

the very behaviours and attitudes we all have towards animals. To accomplish this level of impact, I had to move from publishing in just academic journals read only by my peers, to the literature read by a range of practitioners, members of many other disciplines and the wider community itself. Writing in symposia for community societies and specialist practitioners (such as TREENET), producing books of scientific merit but aimed at a much wider readership and developing methodologies to conduct relevant community research in/on nature became my new challenge. To aid in this broadening of the science, I developed an extensive citizen science program (2007 – present with ABC radio) which engaged a large proportion of the South Australian community, produced excellent published science and also 'gave back' the science to lead the community debate and ultimately impact policy. For example, the citizen science project termed 'The Great Koala Count' of 2012 led to 2 excellent peer-reviewed research papers and also a brand new South Australian government 'Koala Management Policy'. The new science of nature research for everyone could also be taken into schools to develop scientific and ecological literacy, which has been alarmingly declining in South Australia. Now very few CV's of environmental, animal or nature-based researchers contain simply journal articles. Part 2 of this thesis provides the academic research of my studies into urban ecology using citizen science, qualitative analyses and extension beyond academia into real world communities. However, it also provides the publications that led to significant community impact and new outcomes for wildlife. This connection between academic rigour and practical community outcomes represents the future of animal biology research.

AWARDS FOR THIS RESEARCH

2014	R.H. Stanhope Oration. Invited award presentation CONASTA 63 (Australian National Science Teachers Association) Adelaide July 6-9
2011	Earthwatch Rio-Tinto Citizen Science Prize (finalist prize, $5,000): to P. Roetman and C. Daniels, Barbara Hardy Institute Citizen Science program
2011	Chancellor's Community Engagement Award, Special Commendation ($3,000): Awarded to P. Roetman and C. Daniels, University of South Australia.
2010	South Australian National Stormwater Industry Award (SIA) for Policy, Education and Research for the book *Adelaide Water of a City*
2010	Planning Institute of Australia (PIA-SA) Research Award for the book *Adelaide Water of a City*
2010	Medal, Field Naturalists Society of South Australia
2010	Whitley award commendation, Royal Zoological Society of NSW, for the book *The Possum-tail Tree*
2010	South Australian Stormwater Industry Award (SIA) for Policy, Education and Research for the book *Adelaide Water of a City*
2009	High Commendation, Australian Institute of Landscape Architects (AILA) for the book *Adelaide Nature of a City*
2008	Commendation, Planning Institute of Australia (PIA-SA) for the book *Adelaide Nature of a City*
2007	Chancellors Award for Community Engagement for Operation Bluetongue, UniSA

2007	South Australian Premiers Science Excellence Award for Science Education and Communication Excellence, State government, SA
2006	Winner, Whitley medal, Royal Zoological Society of NSW for best Australasian zoological publication in 2005 for the book *Adelaide Nature of a City*
2005 & '06	Finalist, Premier's Science Awards in Science Communication, State government, SA
2003	Mentorship Appreciation Certificate (postgraduate), Arizona State University
1998	PGSA Postgraduate Supervisor of the year (Runner up), Uni of Adelaide

Selected Reports, Accounts and Reviews of C.B. Daniels' research

Anon (1995). Research links respiratory failure and body temperature In *Medical Imaging and Monitoring*, Sept 1995 page 12.

Anon (1995) Studies of evolution lead to respiratory health insights. Technology index 8: 2-3.

Kleiner K. (1997). Breathing Space: Do lungs work because of a mutation 350 million years ago? In *New Scientist* 11 October1997 page 21.

White A. (2011) Urban Zoology: the Possum-tail tree. Understanding possums through citizen science. Review of book of the same name by Roetman P.E.J. and C.B. Daniels (2009). *Aust. Zool.* 35: 998-999.

Semenza J.C. (2012) Creating Sustainable Communities: The Quadruple bottom line. Review of Roetman P.E.J. and C.B. Daniels (2011) Creating Sustainable communities in a changing world. *EcoHealth* DOI: 10.1007/s10393-012-0795-1

Sales of Books and DVD's: 22,800 books and DVD's sold since 2006

Bibliometric Analysis

Metrics relating to this BIBLIOGRAPHY
130 units (3 designated part A and B)
10 books, volumes and DVDs
17 Book Chapters
103 Articles

*= University of Adelaide credited as institution
4 Books
10 Book Chapters
67 Articles
= 62.3% of units included here

Authorship

- Single author = 6
- 2 authors = 31
- 3 authors = 42
- 4 authors = 24
- More than 4 authors = 27

Most of the manuscripts in the Curriculum Vitae and presented for the D.Sc. resulted from collaborative efforts.

As a general principle:
I had a critical role in all publications on which I am listed as an author.

I had a major contribution to the research presented in any manuscript on which I am listed as either first or last author.

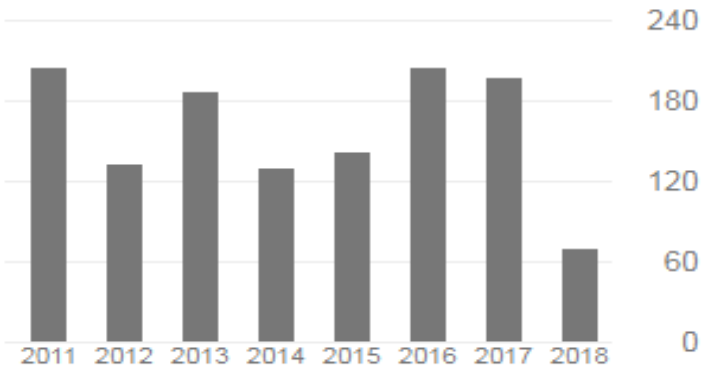
The contribution is progressively less from second author to second last

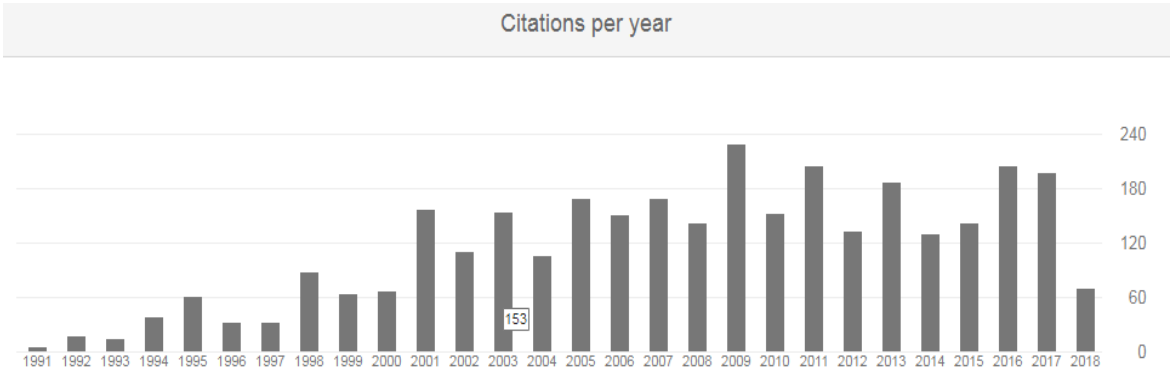
% contribution, Journal Impact Factor and Citation number of each article (as of January 2018) is provided with each article.

- First or sole author = 31
- Last author = 48
- Student as first author = 67

Google Scholar Citations to July 2nd[t] 2018

	All	Since 2013
Citations	3304	931
h-index	33	16
i10-index	89	25





Journals (43)	**Number of articles (103)**	**Impact Factor**	**Comment**
Anat Rec	1	1.431	
Animals	1	1.654	
Am J Physiol	12	2.982	
Am J Resp Cell Mol Biol	1	4.100	
Amer Zool/ integrative Zoology	1	2.070	
Austral Ecol	1	1.708	
Austral Ecology	1	1.708	
Aust J Zool	3	0.766	
Biochem Biophys Res Comm	3	2.466	
Biochim Biophys Acta	1	5.547	
Clin Exp Pharm Physiol	2	2.010	
Comp Biochem Physio A	8	1.812	
Comp Biochem Physiol D	1	2.857	

Comprehensive Physiology	1	6.949	
Cell Mol Life Sci	1	5.788	
Ecological Appl	1	4.314	
Ecology and Evolution	1	2.440	
Environmental Science and Policy	1	3.751	
Exp Lung Res	2	1.394	
Frontiers in Psychology	1	2.323	
FASEB	1	5.498	
Hellenic J Nucl Med	1	1.048	
Herpetologica	2	1.333	
Integr Comp Biol	1	2.382	
International innovations	1	N/A	
Int J Sust Devel and World Ecol	3	1.864	
J Appl Physiol	2	3.351	
J Comp Physiol B	1	1.947	
J Ed Enquiry	1	0.550	Research gate IF
J exp Biol	5	3.320	
J Mol Evol	2	2.434	
Journal of Sustainable devel	1	0.720	Research gate IF
Mem Qld Mus	1	N/A	
NIPS (now Physiology news)	1	5.037	
Physiol Biochem Zool	14	2.104	
PLoS One	1	2.806	
Reprod Fertility Develop	1	2.656	
Respir Physiol	12	1.660	
Teaching Science	2	N/A	ERA B journal
TREENET Symposium	3	N/A	
Urban Ecosystems	1	1.666	
Trans Royal Soc SA	2	0.763	

2017 Impact factors from https://jcr.incites.thomsonreuters.com/JCRJournalHomeAction.action?SID=A2-OIEvx2FdhxxvOaRhk4A1gOazxxcNrWvmYrmX-18x2dcRHewG0ehhBTPTpUU0DGKQx3Dx3DirCLyz1g7ThI8ToGF8g7Iwx3Dx3D-iyiHxxh55B2RtQWBj2LEuawx3Dx3D-1iOubBm4x2FSwJjjKtx2F7lAaQx3Dx3D&SrcApp=IC2LS&Init=Yes

Books (9), Book chapters (17) and DVD (1)

Books Published as Journal Volumes	**Year**	**Journal**	**Length**	**Impact Factor**
Evolution of Physiological Processes	1988	CEPP	40 pages	2.010
Surfactant, lungs and the evolution of airbreathing: A tribute to R.E. Pattle	2001	CBP A	301 pages	1.812
City Life: New Perspectives in Urban Ecology.	2006	Austral Ecology	179 pages	1.708

Stand alone Books	**year**	**Publisher**	**Length**	**Copies Sold**
Adelaide Nature of a City	2006	BioCity (U of A)	600 pages	> 5.500
Adelaide Water of A City	2010	Wakefield press	600 pages	> 3,500
The Possum-tail Tree	2009	Barbara Hardy Centre	144 pages	> 4,800
A Guide to Urban Wildlife: 250 Creatures you meet on your street	2010	Harper Collins/ABC Books	318 pages	> 2,000
The Fearsome Flute Players: Australian Magpies in our Lives.	2011	Crawford House	144 pages	> 3,500
Creating Sustainable Communities in a Changing World	2011	Crawford House	262 pages	2,000
Total number of books sold				**>21,300**

DVD			**Length**	**Copies sold**
Adelaide : the Nature of Our City : DVD			53 min	>1,500

Publishing Houses of Books containing Book Chapters

"yes" = listed on the Aust Govt register of acceptable Commercial Publishers

Book Chapters

Publisher	Number of Chapters	Listed
Academic Press	4	yes
Biocity	6	no
Crawford House	2	yes
Marcel Dekker	1	yes
Oxford university Press	1	yes
Routledge	1	yes
Springer-Verlag	1	yes
Wakefield Press	1	yes

World rank (QS) of the Institutions of my Collaborators

National (20)

Institution	World rank (QS)
CSIRO Land and Water	Not Ranked
Flinders Uni	551 - 600
Griffith Uni	325
Hanson Institute, Institute of Medical and Veterinary Science	Not Ranked
James Cook Uni	367
Macquarie Uni	240
Monash Uni	60
Queen Elizabeth Hospital	Not Ranked
Queensland Dept Environment and Heritage	Not Ranked
Royal Adelaide Hospital	Not Ranked
Royal Melbourne Hospital	Not Ranked
Royal Zoological Society of SA	Not Ranked
South Australian Museum	Not Ranked
Uni Adelaide	109
Uni Melbourne	41
Uni New England	801-1000
Uni Newcastle	224
Uni Queensland	47
University of South Australia	279
Uni Tasmania	313

International (33)

Institution	World rank (QS)
Behala College, Kolkata, West Bengal, India	Not Ranked
Children's Hospital medical Centre U Cincinnati OHIO USA	500-550
Eberhard-Karls-University, Tubingen, Germany	164

Humboldt University, Berlin, Germany	120
International Islamic Uni Kuala Lumpur Malaysia	701-750
Medizinische Hochschule, Hannover, Germany	Not Ranked
Memorial University of Newfoundland, Newfoundland Canada	701-750
Quinnipiac College Connecticut USA	Not Ranked
Rowett Research institute U of Aberdeen Scotland UK	158
Sick Kids Hospital U of Toronto Canada	31
St Louis Univ Missouri USA	Not Ranked
Southampton General Hospital, Southampton, UK	102
Universidad Complutense, Madrid, Spain	233
Universidad De Sao Paulo, Brazil	121
U Auckland, New Zealand	82
U Bern, Switzerland	167
U British Columbia, Vancouver, Canada	51
U Calgary, Alberta, Canada	217
U California, Irvine, USA	164
U California, San Diego, USA	38
U California, Santa Cruz, USA	301
U Johannesburg, South Africa	601-650
U Las Vegas, Nevada, USA	Not Ranked
U Nairobi, Kenya	801-1000
U New Mexico, Albequerque, USA	461-470
U North Texas, USA	Not Ranked
U Oregon, Portland, USA	551-600
U Southampton, UK	102
U Texas, Arlington, USA	Not Ranked
U Western Ontario, London, Canada	210
U Wisconsin, USA	55
Witwatersrand Uni, South Africa	364
Zoological Institute KU, Leuven, Belgium	71

Precis of Contribution

Part 1: The Lives of Animals

Section 1: Cardio-Respiratory Physiology and Energetics of Animals

Zoologists love animals and I am determined to understand how animals work. Trained in a Zoology Department, which at the time was very strong in animal physiology (adaptions to environment) and also ecology, I have always been strongly influenced by hypothesis testing to determine environmental adaptations. My area of expertise during my undergraduate and postgraduate studies was in cardiovascular and respiratory physiology and energetics, particularly of lizards. As I set up my own research laboratory I attracted a wide range of colleagues and students with similar interests but who were not necessarily interested in the evolution of the pulmonary system (see section 2). Some students were interested in the animal as a whole organism, others were interested in modelling processes in extinct animals, and some were interested in developing new techniques to explain unknown phenomena. In some studies I worked with other, often young researchers to add a comparative aspect to their medical, ecological, evolutionary or physiological research.

As examples of my work on "how animals work" I showed that inflammatory mediators produced by lizards were similar, but simpler than those found in mammals (publ 1). This supported the hypothesis that body temperature fluctuation acted as a major mechanism to control bacterial infections and that while most of the biochemical pathways exist to create some of the most powerful anti-inflammatory mediators (such as leukotrienes), these molecules were not produced in reptiles. Work with Peter Frappell and Bill Mautz and other students demonstrated the effect of temperature on metabolism, breathing mechanics and defensive behaviour in lizards by demonstrating the mechanism by which lizards most efficiently altered their complex breathing pattern to effectively control blood gases as their metabolism changed (publ 4-7). Research with Ted Garland and Al Bennett (publ 3) on the inheritance of locomotor capabilities and their energetic correlates, demonstrated that the exercise performance capability of snakes had the highest heritability of any system then known. Exercise capacity also influenced risk of parasitism, with water skinks that were better swimmers and divers, being more likely to consume aquatic prey (containing life stages of the acanthocephalan parasite *Sphaerechinorhynchus rotundocapitatis*) and simultaneously increasing the likelihood of the lizard being consumed by the final host of the parasite, the water foraging red-bellied black snake (publ 2).

My temperature research also extended to energetics and metabolic studies in mammals and included studies into thermogenesis in *Sminthopsis,* a small marsupial capable of diurnal torpor when it dropped its body temperature at least 15 C. We were the first to show these animals had activated brown fat typical of hibernating mammals but could utilize both shivering and non-shivering thermogenesis to arouse from torpor (publs 17 and 18).

I described many respiratory-related physiological systems during progressive change or environmental challenge, such as the presence, and development of antioxidant and other hormonal systems during development in egg-laying vertebrates including crocodiles (publ 8.9), and how lizard lungs operate under compression with exceptionally large babies (paper 10). I extended my interest in animal respiration to extinct animals with very long necks to understand the physics of air movement in extremely challenging structures. The sauropod *Mamenchisaurus* with its 11m trachea must have had a sac-like respiratory system similar to birds as other modelled systems (e.g. broncho-alveolar lungs) demonstrated a work of breathing too great to be sustainable. The long-necked elasmosaur *Aphrosaurus* must have held its neck in a rigid manner directly in front of its body (and not in the S or swan shape depicted in the movies) to manoeuvre through the water, hunt and breathe (publ 16). All of this work provided new insights into how the respiratory systems of non-mammals operated in changing and dynamic environments (publ 11, 20).

I have always been fascinated with the process of regeneration, and tails of lizards are outstanding models for understanding this most extra-ordinary of developmental processes. So much needs to happen at the correct time to prevent the regenerating tissue from collapsing and dying. For example as the tissue grows it must collect fluid and other material that should be removed by the lymphatic system. In mammals growth factors involved in the control of lymphangiogenesis (growth of new lymph vessels) are vascular endothelial growth factors-C and .D (VEGF-C/D). We characterized a model of lymphangiogenesis in which the tail of lizards is regenerated without becoming oedematous (publs 12-14). We demonstrated a functional lymphatic network, as determined by lymphoscintigraphy, that is associated with an up-regulation of a reptilian homologue of the VEGF-C/D protein family (rVEGF-C/D) as determined by Western blot analysis using a human reactive VEGF-C polyclonal antibody. Furthermore, lymphangiogenesis is controlled by homologous, highly conserved factors, including VEGF-C, VEGF-D and the receptor VEGF-R3, which are differentially expressed throughout regeneration and in different areas of the tissue, as determined by real time quantitative PCR and immunohistochemistry (publ 12-14).

In all this research I was able to work with many investigators with very specific skills in a wide range of physiological fields. Hence, this collection of articles includes techniques such as plethysmography, radiolabelled molecule transport, anti-oxidant, metabolic, cell, molecular and enzyme measurements, histology and electron microscopy, phylogenetic analysis, oxygen consumption, and mathematical modelling. To understand physiological processes in animals, particularly from an evolutionary perspective I organised a symposium that was published in a volume of *Clinical and Experimental Pharmacology and Physiology*. All these pieces of research employed both descriptive analysis and hypothesis testing to understand how a process operated and how environmental variables, such as temperature will affect that action.

To demonstrate the breadth of these studies into how animals work I have divided Section 1 into the following parts:

- Cardio-respiratory physiology and energetics (papers 1-11)
- Gecko tail lymphatics (papers 12 -14)

- Dinosaurs and giant extinct marine reptiles (papers 15,16)
- Marsupials (papers 17,18)
- General volumes in comparative and evolutionary physiology (papers 19, 20).

Section 2: Pulmonary Surfactant and the Evolution of Air breathing

Surfactant lipids and proteins form a surface active film at the air-liquid interface of internal gas exchange organs, including swim bladders and lungs. The system is uniquely positioned to meet both the physical challenges associated with a dynamically changing internal air-liquid interface, and the environmental challenges associated with the foreign pathogens and particles to which the internal surface is exposed. We describe the evolution of surfactant structure and function in invertebrates and vertebrates using a range of techniques including lipid and protein biochemical analyses, dynamic and static lung compliance, isolated cell culture, isolated perfused lung preparations, surface activity measurements, egg incubation, pharmacological preparations, histology, lung imaging and electron microscopy.

Lungs of vertebrates range from simple, transparent, bag-like units in fish to complex, multi-lobed, compartmentalized structures in some reptiles, birds and mammals. Much of the research focuses on changes in lipid and protein composition, particularly in response to changes in body temperature. Here, my research describes the evolutionary origin of the surfactant system from invertebrates and fish to mammals and humans. The presence of a surfactant system likely predates lungs. Surfactant in its simplest form is dominated by cholesterol. Disaturated phospholipids (the most surface active component of the mixture) increases as a fraction of the surfactant mixture as body temperature and lung complexity increase. The phase transition temperature (temperature at which a lipid moves from a semi-solid gel form to its spreadable liquid crystalline state is 41°C. Cholesterol and other unsaturated phospholipids can lower this phase-transition point. Hence, animals with lower body temperatures have less disaturated phospholipid (which is also less surface active) whilst the addition or removal of cholesterol rapidly and dynamically controls the phase-transition temperature of the mixture during body temperature changes in ectotherms. Measurements of surface activity for surfactant removed from different animals demonstrate that the rapid addition of cholesterol keeps the lipids functional and hence lung function is optimised even in small mammals such as bats that undergo rapid changes in body temperature and breathe at high frequencies.

Despite the anatomical and thermal variability, the surfactant system is remarkably conserved. Surfactant protein A is present in the simplest of the vertebrate lungs and swim bladders whilst the other 3 proteins arrive at different points in the evolutionary process. In mammals, purifying selection is the paramount evolutionary process that has acted upon the structure of the surfactant proteins.

Surfactant function in simple bag-like lungs of non-mammals is primarily to act as an anti-adhesive to prevent the folded faveolar (analogous to alveoli) surfaces from sticking together upon exhalation. Surfactant in non-mammals also acts to prevent the lung from filling with fluid and has an important innate immune role. In mammals, surfactant functions to maintain alveolar stability and structural integrity in lungs.

Much of our work has also been on describing the mechanisms behind the control of the surfactant system (release and composition). My work examined the biochemical, hormonal, autonomic, and mechanical factors that regulate normal surfactant secretion in mature animals under a range of different stresses including enduring very high temperatures and diving. Small changes in the cholesterol content also appear to alter the phase transition temperature of the surfactant mixture in very heliophilic lizards that can tolerate body temperatures up to 48°C. The research also demonstrated that the surfactant proteins have a role in maintaining a mixture capable of moving between a solid and fluid, liquid-crystalline state during a breathing cycle regardless of the body temperature of the animal. We demonstrated the importance of hormonal control of regulation in non-mammals particularly adrenaline and acetylcholine, although mechanical distortion of the cell is more important in humans.

I also present an analysis of the ontogeny of surfactant development among the vertebrates and the contribution of different regulatory mechanisms that control this development. The research also describes hormonal, hypoxic, thermal and biochemical impacts on surfactant development in a range of species with either egg laying or live birth strategies. In all cases the development of the system occurs very late in egg hatching animals but much earlier in viviparous animals and is driven by hypoxia influencing adrenaline and corticosteroid release that in turn stimulate both the maturation and release of surfactant as the animal pips its egg and draws its first breath. Interestingly viviparous lizards demonstrated a complete surfactant system at 66% of the duration of pregnancy (similar to humans) whilst egg-pipping lizards, chickens and crocodiles mature their surfactant system moments before they draw their first breath. Presumably the uncertainty around precise birthing, and the role of the mother in the process necessitates early surfactant development in viviparous neonates. Egg hatchers use their own falling pO_2 to stimulate the final process.

Also presented is research where this evolutionary perspective is placed in a human context to provide insights into the control of the development of the human surfactant system and its function in health and disease. In achieving this last aim, in conjunction with Profs Sandra Orgeig and Alan Smits, I held a symposium in Cambridge UK which we edited and published as a 300 page, 25 article volume synthesising the field of surfactant biology. In this manner we could, for the first time, place the evolutionary and comparative work on surfactant in the framework of mainstream medical research. We have also just completed a large publication in *Comprehensive Physiology*, of over 60 pages (30,000 words and with more than 600 references) which achieves the same end. This research has been covered by a number of technical and science publications aimed at disseminating the discoveries to a wider audience (eg *New Scientist*).

To place the large amount of literature (papers 21 to 88) into an interpretable flow, I have subdivided the work into the following sections:

- Composition and function of surfactants in animals (papers 21–35)
- Control of surfactant release, composition and function (papers 36-39)
- Temperature in mammals: Dunnarts (*Sminthopsis crassicaudata*) and bats (papers 40-47)
- Control by hormones and pressure (papers 48-53)

- Surface activity (papers 54-56))
- Evolution of the development of the surfactant system - non-mammalian vertebrates (papers 57 -70)
- Evolution of the development of the surfactant system - mammals (papers 71-74)
- Evolutionary patterns and processes (papers 75-81)
- Evolutionary patterns and processes: cholesterol and lipids (papers 82,83)
- Evolutionary patterns and processes: proteins (papers 84-86)
- Summaries and volumes (papers 87,88)

Part 2 Animals in Our Lives

Section 3: Urban Ecology

Having worked to understand how animals work, the next obvious steps were to understand the role of humans in the evolution of animals and their environments. There are now no environments on earth not impacted to some degree by humans. However, it is in cities and communities that animal behaviour and physiology has been affected the most. In addition, whilst we have a strong impact on animals in our backyards, they in turn have a strong impact on us. My research therefore shifted to understanding this two–way relationship between urban animals and ourselves using my home city (Adelaide, South Australia) as a model. Adelaide and its surrounding peri-urban ranges and coast is a biodiversity hotspot, hosting 60% of the state's birds, 30% of the state's vascular plants, and 20-22% each of the state's mammals, reptiles, amphibians and fish species. It is also the home to a very large number of introduced plants and animals arriving deliberately or accidentally from elsewhere in Australia or from overseas. I examined the process of introduction and extinction of species and their effects on local ecosystems. This process was affected by naturally occurring challenges such as droughts, but also the direct action of people planting in their own backyards, or creating and supporting green infrastructure on larger scales (buildings, parks and suburbs). Urban ecology is therefore a cultural construct rather than a natural one and is therefore inherently unstable and capable of rapid change and collapse.

Evolution occurs incredibly rapidly in cities, both on an individual species level and at the guild, trophic and community levels. With honours student Cath Tait we used historical records to document the appearance and disappearance of plants and animal species since the founding of the city of Adelaide South Australia in 1836 (publ 89). These data enabled us to identify forces promoting the disappearance and survival of species as the city grew and the paper has become one of the seminal studies for understanding evolutionary processes in urban ecology. Similarly, we used over 40 years of bird observations in the Adelaide parklands to identify how forces such as drought, planting styles and park-use affected bird guilds (publ 94). These general long term and multi-species studies provided the framework to ask more specific types of questions about how species use and adapt to the urban environment. For example geckos still use particular types of trees, primarily *Eucalyptus* trees and others with exfoliating bark, and are never found on European

trees with solid bark (e.g. Elms) which lack the cracks and bark peeling that lizards require for shelter. Parrots will use every type of street tree, but some for simple activities such as perching, and will struggle to find all the resources they require unless native trees are present (publ 90). This work enabled me to develop some important general insights into the patterns behind the disappearance of native species and the successful establishment of invasive species (pest or not) (publ 91-94). Forces such as connectivity with outside native regions, climate and particularly the provision of water, the presence of diverse food sources, including both flowering plants and insects, and the type and nature of predators (mammals such as cats, dogs and foxes and larger carnivorous birds) primarily determine the animal assemblage. Water, fire regimes and urban planning styles also determine the green component to urban ecology (publs 93,95,96,98).

As a result of this research I worked to understand how our community responded to the threats to native wildlife and the arrival and presence of pest species by redesigning their neighbourhoods to improve resilience and support survival for wildlife (publs 91-93, 95, 96). To achieve this latter aim I needed to engage the wider community and those organisations actively engaged in implementing change strategies. These organisations included, the botanical gardens, SA Water, the Australian Association of Aborists (TREENET), the Natural Resource Management Boards, the South Australian Museum, a range of state government departments (e.g. Environment, Transport, Health, Education and Planning), local government (Councils), history societies, and the wider community, as well as academic institutions. These organisations also funded much of the research. As a result, my published material, whilst still reviewed was delivered to this wider audience through books and even a DVD (produced with the South Australian Museum) (publs 99-109, 111, 112). As with my research in sections 1 and 2, I also wanted to connect my research with that of the leaders in urban ecology. I therefore organised two symposia in 2004, in the annual meetings of the Australasian Society of Ecologists and the Australasian Society for Animal Behaviour, and edited and published the presented papers in a volume of *Austral Ecology* in 2006. In this way my research was presented to both the academic world and also practitioners undertaking on-ground local management. It also provided me with access to information and research cites not normally available to biologists. Two books (*Adelaide Nature of a City* and *Adelaide Water of a City)* eventually sold almost 9,000 copies between them and won a range of national and local awards from a diverse array of organisations.

However, the books *Adelaide Nature of a City* and *Adelaide Water of a City* did more than just connect with a wider group of end users than the traditional academic community. These books engaged practitioners from a wide range of disciplines, some not even scientific, such as history, engineering, indigenous knowledge, architecture and town planning, and from a broad range of age groups (16 to 90 years old) and with very variable levels of tertiary education, who were all experts in their fields and contributed material to the books. As a result both studies elevated Urban Ecology into a truly transdisciplinary study requiring novel methods of information transmission and new methods to interpret the material. For example, we can no longer consider the management of a pest species as simply a biological control issue. Quite often it is also impacted by engineering and town planning considerations and also almost always has a community engagement component.

This is perhaps why the books won so many awards from organisations far removed from my home discipline of Zoology.

To differentiate the different types of research output, I have organised the material into the following sections:

- Adaptations to urban environments: refereed articles (papers 89 – 97)
- Publications for educated community impact (papers 98-108)
- Books and DVD (items 109-114)

Section 4. Human Connections to Nature

Over the past 2 decades, western communities have begun to shy away from science in general and environmental science in particular as valuable methods for gathering the evidence for understanding and therefore managing our world. As we move deeper into the Anthropocene it seems that ecological literacy is declining, along with participation and appreciation of nature and the willingness to act to conserve wildlife. As an extension of my work in urban ecology and through the understandings I developed by producing transdisciplinary publications, I chose to explore the relationship between humans and their backyard wildlife by developing a citizen science program. Citizen science is a developing methodology that engages the wider public in the scientific process by having community members work with trained scientists to collect data to answer important questions. The analysed data are returned to the community to fuel management discussions and develop policy for future actions. In this way both the community and the scientists benefit. The community develops a better understanding of how science works and also can engage from a position of knowledge and investment in the application of the results. Scientists benefit because they can generate data bases at either time or geographical scales that would otherwise be impossible.

In conjunction with ABC Radio Adelaide and the School of Education at UniSA I was able to develop 6 Citizen science projects that operated across the State of South Australia. Known as Operation Bluetongue, Operation Possum, Operation Magpie, Operation Spider, The Great Koala Count and Operation Outdoors, these activities explored our relationship with animals or nature. The goals of our program have been to study wildlife, to understand how people interact with wildlife, to trial novel methods of community engagement, to educate people about wildlife, and to build our understanding of the citizen science methodology. Our first projects were focused on common wildlife taxa in South Australia: bluetongue lizards (in 2007), possums (in 2008), Australian magpies (in 2009), and spiders (in 2010). Each project has included an online survey instrument for data collection, open to the public for participation for up to 13 weeks during spring. We engaged a wide audience through traditional media (radio, print and television), new media (Facebook and YouTube), project events and competitions. Evidence of our community engagement is clear, with 7049 online questionnaires completed over the first four projects. A formal education program, with materials disseminated for each project, has increased our community engagement, with participation by thousands of school students. The reach of various media outlets has increased the number of people able to learn passively from our projects. For example, talkback radio segments held numerous times during each project have an audience of over 30,000 people. Qualitative

information was also sought to corroborate the quantitative data regarding learning and behaviour change. Survey respondents were asked to give examples if they reported that they had learnt something or had changed their behaviour as a result of their participation. Outcomes we determined in addition to species identification, descriptions of location and animal behaviour were behaviour changes in the citizens themselves which included: 1. Awareness, knowledge or understanding (of a particular scientific topic); 2. Engagement or interest (in a scientific topic); 3. Attitude (towards a scientific topic); 4. Behaviour (related to a scientific topic); and 5. Skills (related to a scientific endeavour). Later 'operations' such as Operation Outdoors moved to continue to explore the relationship between people and nature (see below).

In conjunction with each community event that we considered as work undertaken "at home", we also developed and operated school programs undertaken in the class room to explore the connection and the educational outcomes between programs (publs 120-122 provided). As it was particularly important to release the survey results to the community, we published two books that have sold nearly 8,000 copies amongst other publications from the ABC radio activities (e.g. *A Guide to Urban Wildlife*).

However, *The Possum-tail Tree* and *The Fearsome Fluteplayers* were important not only because they sold well and transmitted data to the general audience, but because they used some transformative styles to make data interpretable to the general public. We worked with a famous cartoonist, Ross Bateup, to liven the material with that wit that only cartoonists have. We also mixed both qualitative and quantitative material together with explanatory dialogue. Much of this style evolved from the information presentation style in *Adelaide Nature of a City* and *Adelaide Water of a City* which was data rich, but was delivered in a relatively non-threatening manner. This softening of the scientific style without decreasing the accuracy and voracity of the information is vital if the information is to be internalised by industry and community organisations and practitioners.

Only The Great Koala Count in 2012 differed because it took place on a single day. Here the citizen science aspect was to work with a large army of koala counters to determine an estimate of the number of koalas likely to reside in the Mt Lofty Ranges. The complex mathematics behind the collected observations of more than 500 people enabled us to estimate an average of 140,000 koalas. In addition, the considered opinions simultaneously obtained from the data collectors about how to manage the high population number were also incorporated into the South Australian Koala Management Policy (appendix 2). Publications 118 and 119 describe this process from problem to policy as solved with citizen science. To my knowledge this is the first time such a research outcome has been achieved.

Through the conduct of the citizen science program it became obvious that the 500 - 2000 or more participants in any 'Operation' apparently demonstrated a high degree of ecological literacy. In other words they were well-versed in knowledge concerning the natural environment. However, we had no way of actually measuring eco-literacy, and therefore determining the causes and contributions to that high level of connection. With PhD student Pitman I surveyed a large cross-section of the South Australian population using an online voluntary "test" of 30 questions with correct,

nearly correct, wrong and very wrong answers. The results were compared with those obtained across groups with exceedingly high ecological literacy (biology professors) relative to medium or low levels of literacy. It seems that while formal education counts as an important creator for ecological literacy, getting out into nature, watching documentaries, spending time outdoors (especially as a child) and with like-minded friends all contribute to developing a knowledge about our world. Most importantly ecological literacy is declining in our population as it is significantly higher in older Australians. It appears the growing disconnect between adolescence and nature is leading to decreasing ecological literacy, with worrying potential effects for future environmental decisions and decision-making (publs 123-127).

To enable the research flow I have subdivided this section into the following parts:

- Participatory research methods: citizen science (papers 115-119),
- Teaching science in schools (papers 120-122)
- Humans and nature (papers 123-127).

Summary

My publishing career spans 35 years and has enabled me to work on 3 different styles of animal biology using a diverse collection of model species, and an amazing array of methods and techniques. My work in comparative animal physiology has provided evidence explaining metabolic and energetic processes, how body parts regenerate, the physiology of dinosaurs and how reptiles breathe. My primary environmental variable has been temperature. In evolutionary physiology I was able to explain the role of pulmonary surfactant in the evolution of air-breathing, from both a compositional and functional viewpoint. The experimental variables here included temperature and pressure. I also produced contributions to the understanding of the development of the surfactant system in oviparous and viviparous species and in marsupial wallabies which seem to be somewhere in between! I have used the urban environment as a variable to understand the evolution of city species and the changes that occur in animal assemblages over time in urban environments. The human as an environmental variable and the environmental effects on the human have also been examined using citizen science and other engagement methodologies. It is this latter work that gives me most hope for the future conservation of wildlife because people do care for wildlife, and the more we understand about how animals work, the more we can engage with conservation and restoration.

Part 1: The Lives of Animals

Section 1. Cardio-respiratory physiology and energetics of animals

1.1 Cardio-respiratory physiology and energetics

1 McColl, S.R. and **C.B. Daniels**, 1988. A comparison between the inflammatory mediators produced by the blue-tongue lizard (*Tiliqua scincoides*) and human white blood cells. *Aust. J. Zool*. 36:209-215. (I.F. 0.766) (%contr.=40%) **Number of citations = 3**

2 **Daniels, C.B.,** 1990. The relative importance of host behaviour, method of transmission and longevity on the establishment of acanthocephalan populations in reptilian hosts*. Proc. 3rd Aust. Herp. Symposium, Mem. Qld. Mus.* 29:367-374. (I.F. N/A) (%contr.=100%) **Number of citations =4**

3 Garland, T., A.F. Bennett, and **C.B. Daniels**, 1990. Heritability of locomotor performance and its determination in a natural population. *Cellular and Molecular Life Science* 46:530-533. (I.F. 5.788) (%contr.=30%) **Number of citations = 106**

4 Frappell, P.B. and **C.B. Daniels**, 1991a. Ventilation and oxygen consumption in agamid lizards. *Physiol. Zool.* 64:985-1001. (I.F. 2.104) (%contr.=40%) **Number of citations = 27**

5 Frappell, P.B. and **C.B. Daniels**, 1991b. Temperature effects on ventilation and metabolism in the lizard *Ctenophorus nuchalis*. *Respir. Physiol.* 86:257-270. (I.F. 1.660) (%contr.=40%) **Number of citations = 36**

6 Mautz, W., **C.B. Daniels** and A.F. Bennett, 1992. Thermal dependence of locomotor performance and aggression in a Xantusiid lizard*. Herpetologica* 48:271-279. (I.F. 1.333) (%contr.=35%) **Number of citations = 37**

7 *Crafter, S., M. Soldini, **C. B. Daniels** and A.W. Smits, 1995. The effect of temperature and hypoxia/hypercapnia on the respiratory pattern of the unrestrained lizard, *Pogona vitticeps*. *Aust J. Zool.* 43:165-172. (I.F.0.766) (%contr.=30%) **Number of citations = 8**

8 *Starrs, A.P., S. Orgeig, **C.B. Daniels**, M. Davies and O.V. Lopatko. 2001. Antioxidant enzymes in the developing lungs of egg-laying and metamorphosing vertebrates. *J. Exp. Biol.* 204:3973-3981. (I.F. 3.320) (%contr.=20%) **Number of citations = 30**

9 *Shepherdley, C., **C.B. Daniels**, S. Orgeig, S. Richardson, B. Evans and V. Darras. 2002. Glucocorticoids, thyroid hormones and iodothyronine deiodinases in embryonic saltwater crocodiles. *Am. J. Physiol.* 283: R1155-R1163. (I.F. 2.982) (%contr.=25%) **Number of citations = 34**

10 *Munns S. L. and **C. B. Daniels**. 2007. Breathing with big babies: Ventilation and oxygen consumption during pregnancy in the lizard *Tiliqua rugosa*. *Physiological And Biochemical Zoology. 80: 35-46.* (I.F. 2.104) (%contr.=45%) **Number of citations = 9**

11 Maina, J.N., J.B. West, S. Orgeig, **C.B. Daniels**, P. Gehr, S.G. Kiama, N.J. Foot, C. Mühlfeld, F. Blank, L. Müller, A. Lehmann, C. Brandenberger and B. Rothen-Rutishauser. 2010. Recent advances into understanding some aspects of the structure and function of mammalian and avian lungs. **Invited** for the Proceedings of the 4th International Conference in Africa for Comparative Physiology and Biochemistry. *Physiol. Biochem. Zool.* 83(5):792-807. (I.F. 2.104) (contr.=5%). **Number of citations = 25**

1.2 Gecko tail lymphatics

12 *Tsopelas, C., S. L Munns, **C. B Daniels**, C. Lai, R. D. Cooter, and B. E. Chatterton 2002. Biodistribution and lymphatic speed of ^{99m}Tc-antimony trisulphide colloid in the lizard *Pogona vitticeps*. *Hellenic Journal of Nuclear Medicine* 1: 42-5. (I.F 1.048) (%contr.=20%) **Number of citations = 2**

13 ***Daniels, C.B.,** B. Lewis, C. Tsopelas, S. Munns, S. Orgeig, M.E. Baldwin, M.G. Achen, S.A. Stacker, B.E. Chatterton and R.D. Cooter. 2003. Regenerating lizard tails: A new model for investigating lymphangiogenesis. *FASEB J.* 17: 479-81 (express article). (Full text published online January 2, 2003. 10.1096/fj.02-0579fje.) (I.F. 5.498) (%contr.=30%) **Number of citations = 38**

14 *Blacker, H.A., C. Tsopelas, S. Orgeig, **C.B. Daniels** and B.E. Chatterton. 2007. How regenerating lymphatics function: Lessons from lizard tails. *Anat. Rec.* 290: 108-114. (I.F. 1.431) (%contr.=30%) **Number of citations = 12**

1.3 Dinosaurs and giant extinct marine reptiles

15 **Daniels, C.B.** and J. Pratt, 1992. Breathing in long necked dinosaurs; Did the Sauropods have bird lungs? *Comp. Biochem. Physiol. A:* 101:43-46. (I.F. 1.812) (%contr.=55%) **Number of citations = 21**

16 *Zammit, M, **C B. Daniels** and B P. Kear. 2007. Elasmosaur (Reptilia: Sauropterygia) neck flexibility: Implications for feeding strategies *Comparative Biochemistry and Physiology - Part A: Molecular & Integrative Physiology,* 150: 124-130. (I.F. 1.812) (%contr.=40%) **Number of citations = 15**

1.4 Marsupials

17 *Hope, P. D. Pyle, **C.B. Daniels**, I. Chapman, J. Kumuratilake, P. Trayhurn and G. Wittert. 1997. Identification of brown fat and a novel mechanism for energy conservation in the marsupial *Sminthopsis crassicaudata*. *Am. J. Physiol. (Reg., Int.*

and Comp. Physiol.) 273:R161-R167. (I.F. 2.982) (%contr.=15%) **Number of citations = 39**

18 *Clements, F., P. Hope, **C. Daniels**, I. Chapman and G. Wittert. 1998. Thermogenesis in the marsupial *Sminthopsis crassicaudata*: Effect of catecholamines and diet. *Aust J. Zool*. 46:381-390. (I.F. 0.766) (%contr.=10%) **Number of citations = 12**

1.5 Volumes in comparative and evolutionary physiology

19A **Daniels, C.B.** and S. Orgeig. 1998. Preface to the proceedings of the satellite symposium for the Australian Physiological and Pharmacological Society - The Evolution of Physiological Processes. *Clin. Exp. Pharm. Physiol.* 25:715. (I.F. 2.010) (%contr.=80%)
19B ***Daniels C.B**. and S. Orgeig. 1998. Editors of "*Evolution of Physiological Processes*". Proceedings of the Satellite Symposium for the Australian Society of Physiologists and Pharmacologists meeting, Adelaide Australia, 9 papers. *Clin. Exp. Physiol. Pharmacol*. 25:716-756. (I.F. 2.010) (%contr.=55%)

20 ***Daniels, C.B.** and S. Orgeig. 2006. Pulmonary surfactant, cell culture and tissue regeneration as models for understanding the evolution of developmental physiology. Chapter 1, pp 3-20. *In:* Warburton, S., W.W. Burggren, B. Pelster, C. Reiber and J. Spicer (Eds). Comparative Developmental Physiology. Contributions, Tools and Trends. Oxford University Press, 240 pages. (%contr.=70%) *Our work features on the cover* **Number of citations = 9**

Section 2. Pulmonary surfactant and the evolution of air breathing

2.1 Composition and function of surfactants in animals

21 **Daniels, C.B.,** H.A. Barr and T.E. Nicholas, 1989. A comparison of the surfactant associated lipids derived from reptilian and mammalian lungs. *Respir. Physiol.* 75:335-348. (I.F. 1.660) (%contr.=60%) **Number of citations = 30**

22 **Daniels, C.B.,** B. Eskandari-Marandi, and T.E. Nicholas, 1993. The role of surfactant in the static lung mechanics of the lizard *Ctenophorus nuchalis*. *Respir. Physiol.* 94:11-23. (I.F. 1.660) (%contr.=60%) **Number of citations = 17**

23 McGregor, L.K., **C.B. Daniels**, and T.E. Nicholas, 1993. Lung ultrastructure and the surfactant-like system of the central netted dragon, *Ctenophorus nuchalis*. *Copeia* 1993:326-333. (I.F. 0.748) (%contr.=40%) **Number of citations = 30**

24 **Daniels, C.B.,** L.K. McGregor and T.E. Nicholas, 1994. The dragon's breath: A model of the dynamics of breathing and faveolar ventilation in agamid lizards. *Herpetologica* 50:251-261. (I.F. 1.333) (%contr.=60%) **Number of citations = 23**

25 **Daniels, C.B.,** S. Orgeig, J. Wilsen, and T.E Nicholas. 1994. Pulmonary-type surfactants in the lungs of terrestrial and aquatic amphibians. *Respir. Physiol.* 95:249-258. (I.F. 1.660) (%contr.=45%) **Number of citations = 40**

26 **Daniels, C.B**. and C.H. Skinner, 1994. The composition and function of surface-active lipids in the goldfish swimbladder. *Physiol. Zool*. 67:1230-1256. (I.F. 2.104) (%contr.=55%) **Number of citations = 30**

27 Smits, A.W., S. Orgeig, and **C.B. Daniels**. 1994. Surfactant composition and function in lungs of air-breathing fishes. *Am. J. Physiol.* 266:R1309-R1313. (I.F. 2.982) (%contr.=30%) **Number of citations = 25**

28 ***Daniels, C.B.,** S. Orgeig, and A.W. Smits. 1995b. **Frontiers Review**: The composition and function of reptilian pulmonary surfactant. *Respir. Physiol.* 102:121-135. (I.F. 1.660) (%contr.=50%) **Number of citations = 38**

29 **Daniels, C.B.,** A.W. Smits, and S. Orgeig. 1995. Pulmonary surfactant lipids in the faveolar and saccular lung regions of snakes. *Physiol. Zool.* 68:812-830. (I.F. 2.104) (%contr.=50%) **Number of citations = 19**

30 *Orgeig, S., and **C.B. Daniels**. 1995. The evolutionary significance of pulmonary surfactant in lungfish (Dipnoi). *Am. J. Resp. Cell Mol. Biol.* 13:161-166. (I.F. 4.100) (%contr.=50%) **Number of citations = 37**

31 *Wood, P.G. and **C.B. Daniels**, 1996. Factors affecting opening and filling pressures in the lungs of the lizard *Pogona vitticeps*. *Respir. Physiol.* 103:203-210. (I.F. 1.660) (%contr.=50%) **Number of citations = 8**

32 *Orgeig, S., A.W. Smits, **C.B. Daniels** and J.K. Herman. 1997. Surfactant regulates pulmonary fluid balance in reptiles. *Am. J. Physiol.* 273:R2013-R2021. (I.F. 2.982) (%contr.=20%) **Number of citations = 11**

33 ***Daniels C.B.,** P.G. Wood, O.V. Lopatko, J.R. Codd, S.D. Johnston, and S. Orgeig. 1999. Pulmonary surfactant in the gas mantle of the snail *Helix aspersa*. *Physiol. Biochem. Zool.* 72: 691-698. (I.F. 2.104) (%contr.=20%) **Number of citations = 13**

34 *Lang, C.J., A.D. Postle, S. Orgeig, F. Possmayer, W. Bernhard, A.K. Panda, K.D. Jürgens, W.K. Milsom, K. Nag and **C.B. Daniels**. 2005. Dipalmitoylphosphatidylcholine is not the major surfactant phospholipid species in all mammals. *Am. J. Physiol.* **289**: R1426–R1439(I.F. 2.982) (%contr.=10%) **Number of citations = 97**

35 *Miller, N.J., A.D. Postle, **C.B. Daniels**, and S. Orgeig. 2006. The composition of pulmonary surfactant from diving mammals. *Respir. Physiol. Neurobiol.* 152:152-168 (I.F. 1.660). (%contr.=15%) **Number of citations = 29**

2.2 Control of surfactant release, composition and function

2.2.1 Temperature in non-mammals

36 Daniels, C.B., H.A. Barr, J.H.T. Power and T.E. Nicholas, 1990. Body temperature alters the lipid composition of pulmonary surfactant in *Ctenophorus nuchalis*. *Exp. Lung. Res.* 16:435-449. (I.F. 1.394) (%contr.=50%) **Number of citations = 76**

37 *Wood, P.G., **C.B. Daniels**, and S. Orgeig. 1995. Functional significance and control of release of pulmonary surfactant in the lizard lung. *Am. J. Physiol.* 269:838-847. (I.F. 2.982) (%contr.=30%) **Number of citations = 71**

38 *Daniels, C.B., S. Orgeig, A.W. Smits and J.D. Miller. 1996. Influence of temperature, phylogeny and lung structure on the lipid composition of reptilian pulmonary surfactant. *Exp. Lung Res.* 22:267-281. (I.F. 1.394) (%contr.=40%) **Number of citations = 27**

39 *Wood, P.G., O. V. Lopatko, S. Orgeig, J. Codd and **C.B. Daniels**.1999. Control of pulmonary surfactant secretion from type II pneumocytes isolated from the lizard, *Pogona vitticeps*. *Am. J. Physiol. (Reg., Int. and Comp. Physiol.)*. 277 (46): R1705-R1711. (I.F. 2.982) (%contr.=10%) **Number of citations = 27**

2.2.2 Temperature in mammals: dunnarts (*Sminthopsis crassicaudata*) and bats

40 *Langman, C., S. Orgeig and **C.B. Daniels**. 1996. Alterations in the composition and function of pulmonary surfactant associated with torpor in a heterothermic mammal (*Sminthopsis crassicaudata*). *Am. J. Physiol.* 271:R437-R445. (I.F. 2.982) (%contr.=20%) **Number of citations = 46**

41 *Orgeig, S., **C.B. Daniels**, O.V. Lopatko and C. Langman. 1998. Effect of torpor on the composition and function of pulmonary surfactant in the heterothermic mammal (*Sminthopsis crassicaudata*). *In:* Adaptations to the Cold: Tenth International Hibernation Symposium, pp. 223-232. Edited by Geiser, F., A.J. Hulbert and S.C. Nicol. University of New England Press, Armidale. (%contr.=30%).

42 *Codd, J.R., **Daniels, C.B.** and Orgeig, S. 2000. Thermal cycling of the pulmonary surfactant system in small heterothermic mammals. *In:* Heldmeier, G. and Klingenspor, M. (Eds) Life in the Cold. Eleventh International Hibernation Symposium, pp. 187-197. Berlin: Springer-Verlag. (%contr.=30%). **Number of citations = 9**

43 *Codd, J. R., N.C. Slocombe, **C.B. Daniels**, P.G. Wood, and S. Orgeig. 2000. Periodic fluctuations in the pulmonary surfactant system in Gould's wattled bat *Chalinolobus gouldii*. *Physiol. Biochem. Zool.* 73:605-612. (I.F. 2.104) (%contr.=15%) **Number of citations = 29**

44 *Slocombe, N.C., J.R. Codd, P.G. Wood, S. Orgeig and **C. B. Daniels**. 2000. The effect of alterations in activity and body temperature on the pulmonary surfactant system in the lesser long eared bat *Nyctophilus geoffroyi*. *J. Exp Biol.* 203:2429-2435. (I.F. 3.320) (%contr.=10%) **Number of citations = 17**

45 *Codd, J.R., S. Schürch, **C.B. Daniels** and S. Orgeig. 2002. Torpor-associated fluctuations in surfactant activity in Gould's Wattled Bat. *Biochim. Biophys. Acta* 1580:57-66 (I.F. 5.547) (%contr.=20%) **Number of citations = 26**

46 *Codd, J.R., S. Orgeig, **C.B. Daniels** and S. Schürch. 2003. Alterations in surface activity of pulmonary surfactant in Gould's wattled bat during rapid arousal from torpor. *Biochem. Biophys. Res. Comm.* 308: 463-468. (I.F. 2.466) (%contr.=20%) **Number of citations = 12**

47 *Lang, C.J., S. Orgeig and **C.B. Daniels**. 2005. New insights into the thermal dynamics of the surfactant system from warm and cold animals. Chapter 1, *In:* Nag, K. (Ed.). Recent Research Developments in Lung Surfactant and its Dysfunction. Lung Biology in Health and Disease Series, Marcel Dekker. New York (%contr.=40%) **Number of citations = 10**

2.2.3 Control by hormones and pressure

48 *Wood, P.G., L.K. Andrew, **C.B. Daniels**, S. Orgeig and C.T. Roberts. 1997. Autonomic control of the pulmonary surfactant system and lung compliance in the lizard. *Physiol. Zool.* 70:444-455. (I.F. 2.104) (%contr.=20%) **Number of citations = 24**

49 *Wood, P.G., O.V. Lopatko, J. Joss, S. Orgeig, J.R. Codd, A.W. Smits and **C.B. Daniels**. 2000. Control of pulmonary surfactant secretion: An evolutionary perspective. *Am. J. Physiol. (Reg., Int. and Comp. Physiol.).* 278: R611-R619. (I.F. 2.982) (%contr.=30%) **Number of citations = 26**

50 *Ormond, C., **C.B. Daniels**, and S. Orgeig. 2001. Neurochemical and thermal control of surfactant secretion by alveolar type II cells isolated from the marsupial, *Sminthopsis crassicaudata*. *J. Comp. Physiol* B 171:223-230. (I.F. = 1.884) (%contr.=20%) **Number of citations = 11**)

51 *Ormond, C.J., S. Orgeig and **C.B. Daniels**. 2003. The effect of temperature on adrenergic receptors of alveolar type II cells of a heterothermic marsupial. *Biochem. Biophys. Res. Comm.* 310: 703-709. (I.F. 2.466) (%contr.=15%) **Number of citations = 2**

52 *Ormond, C.J., S. Orgeig, **C.B. Daniels** and W.K. Milsom. 2003. Thermal acclimation of surfactant secretion and its regulation by adrenergic and cholinergic agonists in type II cells isolated from warm-active and torpid golden-mantled ground squirrels, *Spermophilus lateralis*. *J. Exp. Biol.* 206: 3031-3041. (I.F. 3.320) (%contr.=20%) **Number of citations = 16**

53 *Miller, N.J., **C.B. Daniels**, D.P. Costa and S. Orgeig. 2004. Control of pulmonary surfactant secretion in adult California sea lions. *Biochem. Biophys. Res. Comm.* 313: 737-742. (I.F. 2.466) (%contr.=20%) **Number of citations = 14**

2.3 Surface activity

54 *Lopatko, O., S. Orgeig, **C.B. Daniels** and D. Palmer. 1998. Alterations in the surface properties of lung surfactant in the torpid marsupial *Sminthopsis crassicaudata*. *J. Appl. Physiol.* 84:146-156. (I.F. 3.351) (%contr.=25%) **Number of citations = 29**

55 *Lopatko, O.V., S. Orgeig, D. Palmer, S. Schürch, and **C.B. Daniels**. 1999. Alterations in pulmonary surfactant after rapid arousal from torpor in the marsupial *Sminthopsis crassicaudata. J. Appl. Physiol*. 86:1959-1970. *(Reviewed in "This month in the Journal").* (I.F. 3.351) (%contr.=15%) **Number of citations = 28**

56 *Miller, N.J., **C.B. Daniels**, S. Schürch, W.M. Schoel, and S. Orgeig. 2006. The surface activity of pulmonary surfactant from diving mammals. *Respir. Physiol. Neurobiol.* 150: 220-232 (I.F. 1.660) (%contr.=30%) **Number of citations = 20**

2.4 Evolution of the development of the surfactant system

2.4.1 Non-mammalian vertebrates

57 *Orgeig, S., **C.B. Daniels**, and A.W. Smits. 1994. The composition and function of the pulmonary surfactant system during metamorphosis in the tiger salamander *Ambystoma tigrinum*. *J. Comp. Physiol.* B 164:337-342. (I.F. 1.947) (%contr.=30%) **Number of citations = 23**

58 *Johnston, S. D., S. Orgeig, O.V. Lopatko and **C. B. Daniels**. 2000. Development of the pulmonary surfactant system in two oviparous vertebrates. *Am. J. Physiol. (Reg., Int and Comp. Physiol.).* 278: R486-R493. (I.F. 2.982) (%contr.=15%) **Number of citations = 41**

59 *Johnston, S.D. and **C. B. Daniels** 2001. The development of the surfactant system in non-mammalian amniotes. *Comp Biochem Physiol A:* 129: 49-63. (I.F. 1.812) (%contr.=40%) **Number of citations = 12**

60 *Johnston, S.D., **C.B. Daniels** and D.T. Booth 2001. Development of the surfactant system in the green sea turtle (*Chelonia mydas*). *Respir Physiol*. 126:75-84. (I.F. 1.660) (%contr.=30%) **Number of citations = 15**

61 *Sullivan, L.C., S. Orgeig, P.G. Wood and **C.B. Daniels**. 2001. The ontogeny of pulmonary surfactant secretion in the embryonic green sea turtle (*Chelonia mydas*). *Physiol. Biochem. Zool.* 74:493-501. (I.F. 2.104) (%contr.=15%) **Number of citations = 19**

62 *Johnston, S.D., **C.B. Daniels**, D. Cenzato, J.A. Whitsett and S. Orgeig. 2002. The pulmonary surfactant system matures upon pipping in the freshwater turtle, *Chelydra serpentina*. *J. Exp. Biol.* 205:415-425. (I.F. 3.320) (%contr.=20%) **Number of citations = 13**

63 *Johnston S.D., A. Starrs, **C. B. Daniels** and S. Orgeig. 2002. Ontogeny of the pulmonary surfactant and antioxidant enzyme systems in the viviparous lizard, *Tiliqua rugosa*. *Physiol. Biochem. Zool.* 75:260-272. (I.F. 2.104) (%contr.=20%) **Number of citations = 7**

64 *Sullivan, L.C., S. Orgeig, **C.B. Daniels**. 2002a. Regulation of pulmonary surfactant secretion in the developing lizard, *Pogona vitticeps*. *Comp. Biochem. Physiol. A* 133 133:539-546. (I.F. 1.812) (%contr.=20%) **Number of citations = 12**

65 *Sullivan, L.C., S. Orgeig, **C.B. Daniels**. 2002b. Control of the development of the pulmonary surfactant system in the salt water crocodile *Crocodylus porosus Am. J. Physiol.* 283: R1164-R1176 (I.F. 2.982) *[Refs 32 & 33 are back-to-back articles]* (%contr.=20%) **Number of citations = 16**

66 *Orgeig, S., **C.B. Daniels**, S.D. Johnston and L.C. Sullivan. 2003. The pattern of surfactant cholesterol during vertebrate evolution and development: Does ontogeny recapitulate phylogeny? *Reprod. Fert. & Develop.* 15:55-73. (I.F. 2.656) (%contr.=30%) **Number of citations = 49**

67 *Sullivan, L.C., S. Orgeig and **C.B. Daniels**. 2003. **Invited**: The role of extrinsic and intrinsic factors in the evolution of the control of pulmonary surfactant maturation during development in the amniotes. *Physiol. Biochem. Zool* 76:281-295. (I.F. 2.104) (%contr.=20%) **Number of citations = 8**

68 *Blacker, H.A., S. Orgeig and **C.B. Daniels**. 2004. Hypoxic control of the development of the surfactant system in the chicken: Evidence for physiological heterokairy. *Am. J. Physiol.* 287 (2): R403-R410. First published online April 29, 2004; 10.1152/ajpregu.00399.2003. (I.F. 2.982) (%contr.=35%). **Number of citations = 35**

69 *Miller, N.J., A.D. Postle, S. Schürch, W.M. Schoel, **C.B. Daniels**, and S. Orgeig. 2005. The development of the pulmonary surfactant system in California sea lions. *Comp. Biochem. Physiol.* 141: 191-199 (I.F. 1.812) (%contr.=10%) **Number of citations = 15**

70 *Orgeig, S. and **C.B. Daniels**. 2009. Environmental selection pressures shaping the pulmonary surfactant system of adult and developing lungs, Chapter 10, pp. 205-239. *In:* Glass, M.L. and S.C. Wood (Eds). *Cardio-Respiratory Control in Vertebrates: Comparative and Evolutionary Aspects.* Springer Verlag, 546 pages. **Number of citations = 10**

2.4.2 Mammals

71 *Miller, N.J., S. Orgeig, **C.B. Daniels** and R.V. Baudinette. 2001. Postnatal development and control of the pulmonary surfactant system in the Tammar wallaby, *Macropus eugenii*. *J. Exp. Biol.* 204:4031-4042. (I.F. 3.320) (%contr.=20%) **Number of citations = 20**

72A *Orgeig, S. and **C.B. Daniels**. 2004. The effect of aging, disease and the environment on the pulmonary surfactant system. Chapter 27, pp 363-375. *In:* Harding, R., K. Pinkerton, C. Plopper (Eds). The Lung: Development, Aging and the Environment. Academic Press, London. (%contr.=20%)
72B Orgeig, S. and **C.B. Daniels**. 2014. The effect of aging, disease and the environment on the pulmonary surfactant system. Chapter 26 pp 447-469. *In:* Harding, R., K. Pinkerton, C. Plopper (Eds). The Lung: Development, Aging and the Environment. Second Edition Academic Press, London. 2nd Ed. **Number of citations = 1**

73A *Orgeig, S., **C.B. Daniels** and L.C. Sullivan. 2004. Development of the pulmonary surfactant system. Chapter 10, pp150-167. *In:* Harding, R., K. Pinkerton, C. Plopper (Eds). The Lung: Development, Aging and the Environment. Academic Press, London. (%contr.=40%) **Number of citations = 21**
73B Orgeig S., J. L. Morrison, L. C. Sullivan and **C. B. Daniels**. 2014. The development of the pulmonary surfactant system. Chapter 9 pp 183-210 *In:* Harding, R., K. Pinkerton, C. Plopper (Eds). The Lung: Development, Aging and the Environment. Second Edition Academic Press, London. 2nd Ed

74 Orgeig, S., J.B. Morrison, and **C. B. Daniels** 2011. Prenatal development of the pulmonary surfactant system and the influence of hypoxia. *Respiratory physiology & neurobiology* 178: 129-145. (I.F. 1.660) (%contr.=10%) **Number of citations = 16**

2.5. Evolutionary patterns and processes

75 ***Daniels, C.B**., S. Orgeig, and A.W. Smits. 1995a. **Invited:** The evolution of the vertebrate pulmonary surfactant system. *Physiol. Zool*. 68:539-566. (I.F. 2.104) (%contr.=50%) **Number of citations = 53**

76 ***Daniels, C.B.,** O.V. Lopatko and S. Orgeig. 1998. Evolution of surface activity related functions of vertebrate pulmonary surfactant. (In the symposium: “The Evolution of Physiological Processes”). *Clin. Exp. Pharm. Physiol.* 25:716-721. (I.F. 2.010) (%contr.=50%) **Number of citations = 66**

77 ***Daniels, C.B.** and S. Orgeig. 2001. The comparative biology of pulmonary surfactant: Past, Present and Future. (Introduction & Review for the symposium: “Surfactant, Lungs and the Evolution of Airbreathing: A tribute to R.E. Pattle”. Experimental Biology 2000 – Milestones and Goals Conference, Cambridge, UK July/August 2000.) *Comp. Biochem. Physiol.* A 129:9-36. (I.F. 1.812) (%contr.=60%) **Number of citations = 74**

78 *Daniels, C.B. and S. Orgeig. 2003. **Invited**: Pulmonary surfactant: The key to the evolution of air breathing. *NIPS* 18: 151-157. (I.F. 5.037) (%contr.=50%) **Number of citations = 145**

79 *Daniels, C.B., S. Orgeig, L.C. Sullivan, N. Ling, M.B. Bennett, S. Schürch, A.L. Val and C.J. Brauner**.** 2004. The origin and evolution of the pulmonary surfactant system in fish: Insights into the evolution of lungs and swim bladders. (In the symposium: "Evolution of Airbreathing" – 6th International Congress of Comparative Physiology and Biochemistry, Mt Buller, Victoria, February 2003). *Physiol. Biochem. Zool.* 77(5):732-749. (I.F. 2.104) (%contr.=30%) **Number of citations = 58**

80 *Foot (née Miller), N.J., S. Orgeig and **C.B. Daniels**. 2006. The evolution of a physiological system: The pulmonary surfactant system in diving mammals. *Respiratory Physiology & Neurobiology* 154(1-2):118-38. **Invited** in the *Special Issue* entitled "Frontiers in Comparative Respiratory Physiology II: Respiratory Processes and Responses to Environmental Change", edited by W. Milsom, G. Mitchell, F. Powell. (I.F. 1.660) (%contr.=25%) **Number of citations = 42**

81 *Orgeig, S., W. Bernhard, S.C. Biswas, **C.B. Daniels,** S.B. Hall, S.K. Hetz, C.J. Lang, J.N. Maina, A.K. Panda, J. Perez-Gil, F. Possmayer, R.A. Veldhuizen and W. Yan. 2007. The anatomy, physics and physiology of gas exchange surfaces: Is there a universal function for pulmonary surfactant in animal respiratory structures? **Invited to** the First International Congress of Respiratory Biology, Bonn, Germany, Aug 2006. *Integr. Comp. Biol.* 47 610 - 627. (I.F.2.382) (contr.=10%). **Number of citations = 35**

2.5.1 Evolutionary patterns and processes: cholesterol and lipids

82 *Daniels, C.B., S. Orgeig, P.G. Wood, A.W. Smits, O.V. Lopatko and L. C. Sullivan. 1998. The changing state of surfactant lipids: New insights from ancient animals. (Invited Review) in the Society for Comparative and Integrative Biology symposium "The Biology of Lipids: Integration of Structure and Function" *Amer. Zool.* 38:305-320. (I.F. 2.070) (%contr.=40%) **Number of citations = 40**

83 *Orgeig, S. and **C.B. Daniels**. 2001. The roles of cholesterol in pulmonary surfactant: Insights from comparative and evolutionary studies. (Review for the symposium: "Surfactant, Lungs and the Evolution of Airbreathing: A tribute to R.E. Pattle". Experimental Biology 2000 – Milestones and Goals Conference, Cambridge, UK July/August 2000.) *Comp. Biochem. Physiol.* A 129:75-89. (I.F. 1.812) (%contr.=30%) **Number of citations = 86**

2.5.2 Evolutionary patterns and processes: proteins

84 *Sullivan, L.C., **C.B. Daniels**, I.D. Phillips, S. Orgeig and J.A. Whitsett. 1998. Conservation of surfactant protein A: Evidence for a single origin for vertebrate pulmonary surfactant. *J. Mol. Evol.* 46: 131-138. (I.F. 2.434) (%contr.=35%) **Number of citations = 92**

85 *Foot, N.J., S. Orgeig, S. Donnellan, T. Bertozzi and **C.B. Daniels**. 2007. Positive selection in the N-terminal extramembrane domain of lung surfactant protein C (SP-C) in marine mammals. *J. Mol. Evol.* 65(1):12-22. (I.F. 2.434) (%contr.=10%) **Number of citations = 22**

86 *Potter, S., S. Orgeig, S. Donnellan and **C.B. Daniels**. 2007. Purifying selection drives the evolution of surfactant protein C (SP-C) independently of body temperature regulation in mammals. *Comp. Biochem. Physiol. D - Genomics & Proteomics* 2(2): 165-176. (I.F. 2.857) (%contr.=20%) **Number of citations = 7**

2.6 Published Volumes in Refereed Journals

87A ***Daniels, C.B.,** S. Orgeig and A.W. Smits. 2001. Preface to volume: Surfactant, Lungs and the Evolution of Airbreathing: A Tribute to R.E. Pattle. *Comp. Biochem. Physiol.* A 129:1-2. (I.F. 1.812) (%contr.=45%) **Number of citations = 1**
87B ***Daniels, C.B.,** S. Orgeig, and A.W. Smits. 2001. Editors of "*Surfactant, Lungs and the Evolution of Airbreathing: A Tribute to R.E. Pattle*". Proceedings of a Symposium of the same title, SEB Cambridge, UK July/August 2000, 25 papers, comprising a special issue of *Comp. Biochem Physiol*. A 129:1-303. (I.F. 1.812) (%contr.=45%)

88 Orgeig, S., J.L. Morrison and **C.B. Daniels**. 2016. Evolution, development and function of the pulmonary surfactant system in normal and perturbed environments. **Invited Review** *Comprehensive Physiology* 6: 363-422. (I.F. 6.949) (%contr.=35%) **Number of citations = 5**
Invited *>30,000 word Overview Article In: Terjung, R.L. (Editor-in-Chief) Comprehensive Physiology. Respiratory Physiology Section, Pulmonary Mechanics, Fredberg, J., G. Sieck, W. Gerthoffer (Editors). American Physiological Society & Wiley-Blackwell. Invitation as the only Australian authors (total of 91 authors for 51 articles) to contribute to the new online reference work entitled 'Comprehensive Physiology' which is designed as an update of the highly regarded APS 'Handbook of Physiology series' but with a new format to improve timeliness, relevance and flexibility. This invitation indicates that our body of work is of general interest to, and has had a significant impact within, the broader international respiratory community, and is not limited to a specific subdiscipline e.g. comparative respiratory physiology*

Part 2: Animals in Our Lives

Section 3. Urban ecology

3.1 Adaptations to urban environments

3.1.1 Refereed articles

89 *Tait C**., C.B. Daniels** and R. Hill. 2005. Changes in species assemblages within the city of Adelaide, South Australia, 1836 to 2002. An urban ecological study. Ecological Applications 15: 346-359 (I.F. 4.314) (%contr.=30%) **Number of citations = 152**

90 *Young, K. M., **C. B. Daniels,** and G. Johnston. 2007. Species of street tree is important for southern hemisphere bird trophic guilds. *Austral Ecology* 32: 541-550. (I.F. 1.708) (%contr.=30%) **Number of citations = 31**

91 Taylor, S.G., Roetman, P.E.J and **C.B**. **Daniels.** 2011. Urban biodiversity. *In*: Roetman, P.E.J & Daniels, C.B. (eds) *Creating Sustainable Communities in a Changing World*. Crawford House Publishing, Adelaide, pp 179-187. **Number of citations = 2**

92 **Daniels C.B.** and Roetman P. E. J. 2014. Urban Wildlife *In*: Byrne, J. Sipe N, and Dodson, J., (eds) *Australian Environmental Planning: Current Problems and Future Prospects*. Routledge Press London. Chapter 10: 118-129. **Number of citations = 2**

93 Karuppannan, S, Baharuddin, Z. M., Sivam, A. and **C.B. Daniels.** 2014. Urban Green Space and Urban Biodiversity: Kuala Lumpur, Malaysia. *Journal of Sustainable Development* 7: 1-16. (I.F. 0.72 – Research Gate) (%contr.=10%) **Number of citations = 0**

94 Ormond, S.E., Whatmough, R.J., I. L. Hudson, and **C B. Daniels**. 2014. Environmental and anthropogenic impacts on avifaunal assemblages in an urban parkland 1976-2007. *Animals* 4: 119-130. (Cites Score 1.46) (%contr.=30%) **Number of citations = 2**

95 **Daniels, C.B**. and K. Good. 2015. Building resilience to natural, climate and anthropocentric change in the Adelaide and Mount Lofty Ranges region: A Natural Resources Management Board Perspective. Invited contribution for the Proceedings of the 2nd Royal Society of South Australia conference on Climate Change November 2013. C Williams Ed *Trans Royal Society of SA* 139(1):84-96. (I.F. 0.763) (contr.=65%). **Number of citations = 2**

96 Pitman, S.D., **C.B. Daniels** and M. E. Ely. 2015. Green Infrastructure as Life Support: Urban Nature and Climate Change. Invited contribution for the Proceedings of the 2nd Royal Society of South Australia conference on Climate Change November

2013. C Williams Ed *Trans Royal Society of SA* 139(1): 97-112. (I.F. 0.763) (contr.=30%). **Number of citations = 9**

97 *Taylor D., **C.B. Daniels** and G Johnston. 2016. Habitat selection by an arboreal lizard in an urban parkland: Not just any tree will do. (published online 1-13 June 2015: DOI 10.1007/s11252-015-0480-6) *Urban Ecosystems* 19(1), 243-255. (I.F. 1.666) (%contr.=40%) **Number of citations = 1**

3.1.2 Publications for Educated Community Impact

98 Tait, C. J., and **C.B. Daniels** 2004 city life_ urban areas as sinks, sources and refuges for plants and animals. TREENET Symposium pp 1-14 .(http://www.treenet.com.au/proceedings.asp) (%contr.=50%)

99 ***Daniels C.B.,** and C Tait. 2006. Introduction. *In:* C.B. Daniels and Tait C (Ed) Adelaide Nature of a City: The ecology of a dynamic city 1836-2036. pp 18-39. (%contr.=75%)

100 ***Daniels**, **C.B.** 2006. The future Predictions In: *In:* C.B. Daniels and Tait C (Ed) Adelaide Nature of a City: The ecology of a dynamic city 1836-2036. pp 525-552 (%contr.=100%)

101 *Tait C., and **C.B. Daniels** 2006a. The Urban Ark 2: The Historical Evolution of the Bird community. *In:* C.B. Daniels and Tait C., (Ed) Adelaide Nature of a City: The ecology of a dynamic city 1836-2036 pp111-137. (%contr.= 40%) **Number of citations = 2**

102 *Tait C., and **C.B. Daniels**. 2006b. The Urban Ark 3:The Historical Evolution of the Mammal community. *In:* C.B. Daniels and Tait C (Ed) Adelaide Nature of a City: The ecology of a dynamic city 1836-2036. pp 138-159 (%contr.=40%)

103 *Tait C., and **C.B. Daniels** and R.B. Hill. 2006. The Urban Ark 1: The Historical Evolution of the Plant community. *In:* C.B. Daniels and Tait C (Ed) Adelaide Nature of a City: The ecology of a dynamic city 1836-2036 pp 87-110. (%contr.=40%)

104 *Tait C., and **C.B. Daniels** and M.N. Hutchinson. 2006. The Urban Ark 4:The Historical Evolution of the Reptile and Amphibian communities. *In:* C.B. Daniels and Tait C (Ed) Adelaide Nature of a City: The ecology of a dynamic city 1836-2036. pp 159-177. (%contr.=40%)

105 Roetman, P. J., and **C.B. Daniels** 2008. Sustainability as Australian Cities grow: Why and How TREENET Symposium Adelaide pp 1-12 (http://www.treenet.com.au/proceedings.asp) (%contr.=50%) **Number of citations = 4**

106 **Daniels C.B.** , B. Curran, M. Ely, P. Guerner-Hall, C. Goodwin, G., Hopkins, T. Johnson, T. Nottle, S. Pitman, D. Ray, P. Roetman, K. Smith, J. Zwar. 2010. Watering Street trees in times of drought: Why, how, and is it worth it? 11th

TREENET Symposium, Adelaide. Pp 13-24. (http://www.treenet.com.au/proceedings.asp) (%contr.=50%)

107 Daniels. C.B., G. R. Johnston and C.J. Gray. 2010. Biodiversity of the Waterways Chapter 5 *In:* Daniels C.B. (Ed) *Adelaide Water of a City* Wakefield Press Adelaide p 105-130.

108 Daniels C. B. 2014. Urban Ecology. *International Innovation*: 151:69-71. http://www.research-europe.com/index.php/international-innovation (%contr.=100%)

3.1.3 Books and DVD

109 *Daniels C.B and C. Tait 2005. Editors of "*Adelaide Nature of a City: The ecology of a dynamic city 1836-2036*". 23 chapters 609 pages. BioCity Press (%contr.=75%) ISBN : 0 9758115 1 7 **Number of citations = 22**

110 *Johnston G.R., and **C. B. Daniels**. 2006 Editors of "*City Life: New Perspectives in Urban Ecology*". Proceedings of symposia of the same titles held at the Australian Society of Ecologists, The Australian Evolution Society and The Australian Society for Animal Behaviour meetings in Adelaide South Australia in 2004. 15 papers comprising a special issues of *Austral Ecology*. 31: 113-292 (I.F. 1.708) (%contr.=40%)

111 Daniels CB. 2010. *Adelaide Water of a City* Wakefield Press Adelaide 29 chapters 600pp (Editor in Chief) ISBN : 978 1 86254 861 9 (%contr.=90%) **Number of citations = 16**

112 Daniels C.B. 2010. *Adelaide: The Nature of Our City* DVD 53 min

113 Daniels, C.B. 2011. *A Guide To Urban Wildlife: 250 Creatures You Meet on Your Street.* Harper Collins/ABC Books Sydney 318pp. ISBN 978-0-7333-2803-9 (%contr.=100%) **Number of citations = 6**

114 Roetman, P.E.J and **C.B**. **Daniels** (eds). 2011b. *Creating Sustainable Communities in a Changing World*. Crawford House Publishing, Adelaide, 262 pp. 30 chapters. ISBN 978-1-86333-335-1. (%contr.=40%) **Number of citations = 5**

Section 4. Human connections to nature

4.1 Participatory Research methods

4.1.1 Citizen Science

115 Roetman P.J. and **C.B**. **Daniels.** 2009. *The Possum-Tail Tree* Barbara Hardy Centre Adelaide 144pp. ISBN :978 0 646 52199 2 (%contr.=40%) **Number of citations = 6**

116 Roetman, P.E.J. and **C.B. Daniels** 2011a*. The fearsome flute players: Australian magpies in our lives*. Crawford House, Adelaide, 144 pp. ISBN 978-1-86333-333-7. (%contr.=40%) **Number of citations = 4**

117 Roetman, P.E.J and **C.B. Daniels.** 2011b. The benefits of citizen science in research, education and community engagement*. In*: Roetman, P.E.J & Daniels, C.B. (eds) *Creating Sustainable Communities in a Changing World*. Crawford House Publishing, Adelaide, pp 249-260. **Number of citations = 3**

118 Sequeira, A.M.M., P.E.J. Roetman, and **C.B. Daniels**, and C.J.A Bradshaw. 2014. Distribution models for koalas in South Australia using citizen science-collected data. ***Ecology and Evolution*** 4: 2103–2114. (I.F. 2.440) (%contr.=30%) **Number of citations = 34**

119 Hollow, B., P.E.J. Roetman, M. Walter, and **C.B. Daniels.** 2015. Citizen science for policy development: the case of koala management in South Australia. *Environmental Science and Policy*. 47: 126-136. (I.F. 3.751) (%contr.=40%) **Number of citations = 15**

4.1.2 Teaching science in schools

120 Paige, K, Lawes, H, Matejcic, P, Taylor, C, Stewart, V, Lloyd, D, Zeegers, Y, Roetman, P. and **C. B. Daniels.** 2010. 'It feels like real science': How operation magpie enriched my classroom. *Teaching Science,* 56: 25-33. (I.F. N/A) (%contr.=10%) **Number of citations = 6**

121 Paige, K; D. Lloyd, Y.; Zeegers, P. Roetman, **C. B**. **Daniels,** B. Hoekman, L, Linnell, L. George, and D. Szilassy. 2012. Connecting teachers and students to the natural world through Operation Spider: An Aspirations Citizen Science Project. *Teaching Science* 58:13-20. (I.F. N/A) (%contr.=10%) **Number of citations = 0**

122 Paige, K., R. Hattam and **C.B. Daniels**. 2015. Two models for implementing Citizen Science projects in middle school. *Journal of Educational Enquiry:* 14: 4-17. (I.F. 0.55 Research Gate) (%contr.=40%) **Number of citations = 3**

4.1.3 Humans and nature

123 Pitman, S.D. and **C.B. Daniels** 2016. Quantifying Ecological Literacy in an Adult Western Community: The Development and Application of a New Assessment Tool and Community Standard *PLoS ONE* 11: e0150648. https://doi.org/10.1371/journal.pone.0150648 (I.F. 2.806) (%contr.=40%) **Number of citations = 6**

124 Pitman, S.D., **C.B. Daniels** and P.C. Sutton 2016. Ecological literacy and socio-demographics: who are the most eco-literate in our community, and why? *International Journal of Sustainable Development & World Ecology* DOI

10.1080/13504509.2016.1263689. (I.F. 1.864) (%contr.=40%) **Number of citations = 2**

125 Pitman, S. D., **C.B. Daniels** and P.C. Sutton 2017a. Ecoliteracy and psychographics: Lifestyle contributors to ecological knowledge and understanding. *International Journal of Sustainable Development & World Ecology* doi10.1080/13504509.2017.1333. (I.F. 1.864) (%contr.=40%) **Number of citations = 1**

126 Pitman, S.D., **C.B. Daniels** and P.C. Sutton 2017b. Characteristics associated with high and low levels of ecological literacy in a western society, *International Journal of Sustainable Development & World Ecology,* DOI.1080/13504509.2017.1384412. (I.F. 1.864) (%contr.=40%) **Number of citations = 2**

127 Schebella, M.F., D. Weber, K. Lindsey and **C.B. Daniels**. 2017. For the Love of Nature: Exploring the Importance of Species Diversity and Micro-Variables Associated with Favourite Outdoor Places. *Frontiers in Psychology* (Environmental Psychology) 8:2094 https://doi.org/10.3389/fpsyg.2017.02094. (I.F. 2.323) (%contr.=20%) **Number of citations = 2**

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COMPLETE BIBLIOGRAPHY

- Total Publications 255

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- Symposia articles 17
- Refereed invited large Reviews in Journals 7
- Refereed research journal articles 89
- Non refereed Full articles 6
- Media Publications 4
- Forewords 7
- Book reviews 5
- Fact Sheets 1
- Books containing more than 3 break out boxes 3
- Published Abstracts to International Scientific Meetings 41
- Unpublished Abstracts 43
- DVD 1

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PUBLICATIONS IN ADDITION TO THOSE LISTED AS THE SUBMISSION FOR THE DOCTOR OF SCIENCE

1. Books / Monographs / Symposia / Book Chapters

1.1.Authored Books and Edited Volumes

1 Faull, K, , K, Good, **C. B. Daniels**; 2019 Natural Resource Management; A primer for Practitioners in Australia based on the South Australian experience; Axiom Press 50,000 words In final Edits

1.2. Refereed Book Chapters

2 **Daniels C.B.,** J.J. Argue, S. Beecham, R.D.S. Clark, J.R. Howard, D.S. Jones, R. Marks, J.M. McKay, P.E.J. Roetman, K.E. Smith. 2010 Introduction *In:* Daniels C.B. (Ed) *Adelaide Water of a City* Wakefield Press Adelaide p 35-50.

3 **Daniels C.B.,** J.J. Argue, S. Beecham, R.D.S. Clark, J.R. Howard, D.S. Jones, R. Marks, J.M. McKay, P.E.J. Roetman, K.E. Smith. 2010. Conclusion *In:* Daniels C.B. (Ed) *Adelaide Water of a City* Wakefield Press Adelaide p 561-672.

4 **Daniels, C.B.** and Roetman, P.E.J. 2011. Introduction. In: Roetman, P.E.J & Daniels, C.B. (eds) *Creating Sustainable Communities in a Changing World*. Crawford House Publishing, Adelaide, p 3.

5 **Daniels, C.B.** and Roetman, P.E.J. 2011. Conclusion. In: Roetman, P.E.J & Daniels, C.B. (eds) *Creating Sustainable Communities in a Changing World*. Crawford House Publishing, Adelaide, p 261.

1.3. Full Refereed Articles in Symposia

6 Johnston G. R and **C.B. Daniels** 2006 Conclusion to the volume "City Life: New Perspectives in Urban Ecology" GR Johnston and CB Daniels Eds. a special issue of *Austral Ecology*. 31: 291-293 (I.F. 1.708) (contr.=45%).

7 Baharuddin, Z. M., A. Sivam, , S. Karuppannan, and **C.B**. **Daniels.**. 2009. *Role and Perception of Green Spaces: Attitudes Towards Urban Wildlife in Kuala Lumpur and Adelaide,* Refereed paper presented at the International Symposium on *Construction in Developing Economies: Commonalities Among Diversities*, 5-7 October, University of Sains Malaysia, Penang, Malaysia. 607-618. (I.F. N/A) (contr.=10%). **Number of citations = 2**

2.1. Refereed Invited Review Articles
2. Journal Articles

2.1. Refereed Research Articles

8 **Daniels, C.B.,** 1983. Running: An escape strategy by enhanced autotomy. *Herpetologica*. 39:162-165. (I.F. 1.333) (%contr.= 100%) **Number of citations = 109**

9 **Daniels, C.B.,** 1984. The importance of caudal lipid in the gecko *Phyllodactylus marmoratus*. *Herpetologica* 40:337-344. (I.F. 1.333) (%contr.=100%) **Number of citations = 71**

10 **Daniels, C.B.** and M.P. Simbotwe, 1984. The biology of acanthocephalan parasites of Australian lizards. *J. Herpetol.* 18: 211-213. (I.F. 0.911) (%contr.=90%) **Number of citations = 3**

11 **Daniels, C.B.,** 1985a. The effect of infection by a parasitic worm on swimming and diving in the water skink *Sphenomorphus quoyii*. *J. Herpetol.* 19:160-162. (I.F. 0.911) (%contr.=100%) **Number of citations = 19**

12 **Daniels, C.B.,** 1985b. Economy of autotomy as a lipid conserving mechanism: An hypothesis rejected for the gecko *Phyllodactylus marmoratus*. *Copeia* 1985:468-472. (I.F. 0.980) (%contr.=100%) **Number of citations = 20**

13 **Daniels, C.B.,** 1985c. The effect of tail autotomy on the exercise capability of the water skink *Sphenomorphus quoyii*. *Copeia* 1985:1074-1077. (I.F. 0.980) (%contr.=100%) **Number of citations = 44**

14 **Daniels, C.B**., S.P. Flaherty and M.P. Simbotwe, 1986. Tail size and effectiveness of autotomy in a lizard*. J. Herpetol*. 20:93-96. (I.F. 0.911) (%contr.=75%) **Number of citations = 65**

15 **Daniels, C.B.,** 1987. Aspects of the aquatic feeding ecology of the riparian skink *Sphenomorphus quoyii*. *Aust. J. Zool*. 35:253-258. (I.F. 0.766) (%contr.=100%) **Number of citations = 11**

16 **Daniels, C.B.,** H. Heatwole and N. Oakes, 1987. Heating and cooling rates in air and during diving of the Australian water skink *Sphenomorphus quoyii*. *Comp.Biochem. Physiol*. 87A:487-492. (I.F. 1.812) (%contr.=80%) **Number of citations = 6**

17 **Daniels, C.B.,** N. Oakes and H. Heatwole, 1987. Physiological diving adaptations of the Australian water skink *Sphenomorphus quoyii*. *Comp. Biochem.Physiol.* 88A:187-199. (I.F. 1.812) (%contr.=70%) **Number of citations = 6**

18 **Daniels, C.B.** and H. Heatwole, 1990. Factors affecting the escape behaviour of a riparian lizard*. Proc. 3rd Aust. Herp. Symposium, Mem. Qld. Mus. 29*:375-388. (I.F. N/A) (%contr.=70%) **Number of citations = 9**

2.2 Non Refereed Invited Review Articles

1 **Daniels, C.B.** and H. Heatwole, 1984. Predators of the Australian water skink *Sphenomorphus quoyii. Herpetofauna* 16:6-16. (I.F.N/A) (%contr.=95%)

2 Roetman, P.E.J & **C.B. Daniels.** 2014. The benefits of citizen science in research, education and community engagement. (The Journal of the Scientific Expeditionary Group SA) *SEGments* 30: 5-11. (%contr.=50%)

3. Other

3.1. Major Community Publications and Media

3 **Daniels C.B.** 1999. "*Reason for the World*" For Education special Feature 1000 years of Science Published in The Advertiser South Aust. Millenium series. 1000 words.

4 Savage R. and **C.B. Daniels**. 2000 "*Dinosaurs*" 15-part series. Published in *The Advertiser* South Aust June/July 2000 (250 words/part). (%contr.=50%)

5 **Daniels C.B.** and E. Kingsley 2003. "*Reel Science"* Published in Teacher: The Times Educational Supplement, London, UK 2,500 words. June 6th issue. (%contr.=60%)

6 **Daniels C. B.** 2005-2006 Do You Believe It? 15 articles in the Advertiser Weekend review (300 words/article)

3.2 Foreword in books by other authors:

7 *In* Stanley R, Reynolds S, Baker C, and Catterall H. 2009. The Elements of Senior Chemistry: Book 1 the Core Enterprise Press Adelaide South Australia

8 *In* Stanley, R and Reynolds, S. 2009 The Elements of Senior Chemistry: Book 2 Advanced Higher level. Enterprise Press Adelaide South Australia

9 *In* Lawrence R 2011 *Start with the Leaves: A simple guide to common orchids and lillies of the Adelaide Hills* Heritage Bushcare Adelaide

10 *In* Crouch N and V. Wales 2015. Tennyson Dunes Too good to lose; Tennyson Dunes Group

11 **I***n* Smith J.I.D. 2016 *Wildlife of Greater Adelaide* Axiom Press Adelaide

12 *In* Mirtschin P., A Rassmussen and S. Weinstein. 2017 Australia; Dangerous Snakes; Identification, Biology and Envenoming. CSIRO Publishing Melbourne

13 *In* Anninos J. 2018 Willunga Birds Axiom Press Adelaide

3.3 Published Book Reviews

14 **Daniels C. B.** 1996. Review of Nesse, R.M., and G. C. Williams. 1995. Evolution and healing: The new science of Darwinian medicine. Weidenfeld and Nicholson. London. SEARCH 27:224.

15 **Daniels C.B.** 1999. Review of King, D. and B. Green 1999. Goannas: The Biology of Varanid Lizards. UNSW Press Sydney. for *Bulletin of the Limnological Society of Australia.*

16 **Daniels CB**. 2005 "Its life Jim, but not as we know it" Review of Willmer P., G. Stone and I. Johnston 2005 Environmental Physiology of Animals. Blackwell Press. *Journal of Experimental Biology* 208: 2621-2622.

17 **Daniels C.B.** 2014. Review of Hostetler M.E. The Green Leap: A Primer for Conserving Biodiversity in Subdivision Development. Univ California Press. *Quarterly Review of Biology* 89:171.

18 **Daniels CB.** 2015. Review of Glavovic B.C. and G. P. Smith (Editors) Adapting to Climate Change: Lessons from Natural Hazards Planning. Springer Press. *Quarterly Review of Biology* 90:330.

3.4 Fact Sheets

19 Roetman, P.E.J. and **C.B. Daniels** 2008. Biodiversity in urban developments. Your Development online resources, CSIRO Sustainable Ecosystems, Canberra. (%contr.=50%)

3.5 Breakout boxes in books (at least 3 per book)

20 **Daniels C.B** and C. Tait 2006. Editors of "*Adelaide Nature of a City: The ecology of a dynamic city 1836-2036*".

Daniels CB Box 13 Starlings. p115.
Daniels CB Box 14 The feral pigeon or rock dove. p121.
Daniels CB Box 17 Ducks . p126
Daniels CB Box 19 parrots: Colourful and noisy birds of the city. p130.
Daniels CB Box 43 Dunbg beetles (a successful biological control initiative. p197 (with C Tait)
Daniels CB Box 73 South Australian sharks. p313.
Daniels CB Box 119 Remnants of past agriculture present today. p509. (With G. C. Auricht)

21 **Daniels CB**. 2010. *Adelaide Water of a City* Wakefield Press Adelaide

Daniels CB Box 14 Why conserve the field river? p87.
Daniels CB Box 23 Evolution of waterbirds. p116. (with G Johnston)
Daniels CB Box 24 Common waterbirds of Adelaide. p120.
Daniels CB Box 126 Water for wildlife. p553

22 Smith J.I.D. (2016) Wildlife of Greater Adelaide Axiom Press Adelaide

Daniels CB Box , Landuse in the Adelaide & Mt Lofty Ranges region. p16.
Daniels CB Box A wildlife book created through Citizen Science. p186.
Daniels CB Box Cities as Refuges for Wildlife. p 348.

3.6 Published Abstracts

(Abstract published in an International journal)

1. **Daniels, C.B.,** P.J. Hayball, H.A. Barr, P.B. Frappell, and T.E. Nicholas, 1988. Lizard lung surfactant acts as an antiglue at low body temperatures. Proc. Aust.Physiol. Pharmacol. Soc. 19:148.

2. Garland, T., A.F. Bennett and **C.B. Daniels**, 1988. Quantitative genetics of activity metabolism in *Thamnophis sirtalis*. Amer. Zool. 28:448.

3. Nicholas, T.E., **C.B. Daniels**, H.A. Barr and P.J. Hayball, 1989. Body temperature (Tb) alters the lipid composition of pulmonary surfactant in the lizard *Ctenophorus nuchalis*. FASEB J. 4:1146.

4. Mautz, W., **C.B. Daniels**, and A.F. Bennett, 1991. Thermal dependence of locomotion and aggression in a Xantusiid lizard. Amer. Zool. 31:142

5. Smits, A.W., S. Orgeig and **C.B. Daniels**, 1995. Surfactant functions as an anti-edema agent in the lungs of the lizard (*Pogona vitticeps*). FASEB J. 9:861.

6. **Daniels, C.B**., S. Orgeig, P.G. Wood, A.W. Smits, O.V. Lopatko and L. C. Sullivan, 1996. The changing state of surfactant lipids: New insights from ancient animals. Amer. Zool. 36:3.

7. Lopatko, O.V., S. Orgeig and **C. B. Daniels**, 1996. The evolution of the surface activity of pulmonary surfactant in air-breathing vertebrates. Amer. Zool. 36:46.

8. Orgeig, S., **C. B. Daniels**, C. Langman and O.V. Lopatko, 1996. The effect of torpor on the pulmonary surfactant system, lung compliance, and ventilatory pattern in the marsupial *Sminthopsis crassicaudata*. Amer. Zool. 36:46.

9. Wood, P.G. L.K. Andrew and **C.B. Daniels**, 1996. Autonomic control of surfactant release in the lizard. Amer. Zool. 36:46.

10. Wood, P.G., L.K. Andrew and **C.B. Daniels**. 1996. Autonomic control of surfactant release in the lizard. Proc Aust. Neuroscience Soc. 7: 169.

11. Wood, P.G., L.K. Andrew and **C.B. Daniels**. 1996. Autonomic control of lung compliance in the lizard. Proc Aust. Neuroscience Soc. 7:168.

12. Orgeig, S., **C. B. Daniels**, P. J. Hope and G. A. Wittert. 1997. The metabolic response torpor and arousal in *Smithopsis crassicaudata*: Is there a “cost” to rewarming? Proc. Aust. Physiol. Pharmacol. Soc. 28:64.

13. Orgeig S., A.W. Smits, **C.B. Daniels** and J.K. Herman. 1997. Clearance pathways and lung alveolar fluid as affected by pulmonary surfactant in turtles . FASEB J. 11:303.

14. Wood, P.G., O.V. Lopatko, A.W. Smits and **C.B. Daniels**. 1997. Autonomic control of pulmonary surfactant release in the bullfrog *Rana catesbiana*. Proc. Aust. Physiol. Pharmacol. Soc.28:65

15. Sullivan, L.C., **C.B. Daniels**, I.D. Phillips, S. Orgeig and J.D. Whittsett. 1997. Conservation of surfactant protein A: Evidence for a single origin for vetebrate pulmonary surfactant. Proc. Aust. Physiol. Pharmacol. Soc. 28:67.

16. **Daniels C.B.,** Wood, P.G., Lopatko, O.V.,Codd, J.R., Johnston, S.D. and Orgeig, S. 1999. Surfactant in the gas mantle of the snail *Helix aspersa*: Comp. Biochem. Physiol. 124A: Suppl: S32.

17. Johnston, S.D., Orgeig, S., Lopatko, O.V. and **Daniels, C.B**. 1999. Development of the pulmonary surfactant system in a bird and reptile. Comp. Biochem. Physiol. 124A: Suppl: S110.

18. Slocombe, N.C. Codd, J.R., Wood, P.G., Orgeig, S., and **Daniels, C.B.** 1999. Alterations in the surfactant system in response to diurnal fluctuations in activity and body temperature of the heterothermic bat *Chanilolobus gouldii*. Comp. Biochem. Physiol. 124A: Suppl: S56.

19. Wood, P.G., Lopatko, O.V., Orgeig, S., Joss, J.M.P., Codd, J.R., Smits, A.W. and **Daniels C.B.** 1999. Control of pulmonary surfactant secretion: An evolutionary perspective. Comp. Biochem. Physiol. 124A: Suppl: S37.

20. Codd, J.R., N. Slocombe, S. Orgeig and **C. B. Daniels**. 2000. The response of the surfactant system to temperature cycling in small heterothermic mammals. Comp. Biochem. Physiol. 126: B suppl 1:S25.

21. **Daniels, C.B.** 2000. The comparative physiology of pulmonary surfactant: The next 20 years Comp Biochem Physiol : 126: B suppl 1:S29

22. **Daniels C.B,** and S. Orgeig 2000. A history of the comparative biology of pulmonary surfactant. Comp Biochem Physiol : 126: B suppl 1:S28

23. Johnston, S.D. and **C. B. Daniels** 2000. Developmento f the pulmonary surfactant system in amniotes. Comp Biochem Physiol : 126: B suppl 1:S54.

24. Ormond, C. J., **C.B. Daniels** and S. Orgeig. 2000. Neurochemical and thermal control of surfactant secretion by alveolar type II cells isolated from the marsupial *Sminthopsis crassicaudata*. Comp Biochem Physiol: 126: B suppl 1:S74.

25. Smits,A. W., S.Orgeig, J Herman, and **C. B. Daniels**,. 2000. The role of pulmonary surfactant in lung fluid movement. Comp Biochem Physiol : 126: B suppl 1:S87.

26. Wood, P.G., P. J. Ponganis, R. G. Spragg and **C.B. Daniels** 2000. The composition of pulmonary surfactant in the northern elephant seal (*Mirounga angustirostris*). Comp Biochem Physiol. 126: B suppl 1:S108.

27. **Daniels, C.B.** 2001. The role of the surfactant system in the evolution of air breathing: Insights from developmental, functional and control processes. J. Morphol 248:220.

28. **Daniels, C.B.,** B. C. Lewis, S. L. Munns, C. Tsopelas, S. Orgeig, M. Baldwin, S. Stacker, M. Achen, B. E. Chatterton and R. D. Cooter. 2002. Reptilian VEGF-C and lymphangiogenesis: Wagging the tail of lymphoedema. ANZ J. Surg. 72 Suppl:A89
29. **Daniels, C.B.,** S. Orgeig, L.C. Sullivan. 2002. A phylogenetic perspective on the evolution of vertebrate surfactants. The Physiologist 45: 334.

30. **Daniels C.B.** and W.W. Burggren. 2003. Understanding the evolution of developmental complexity:Ontogeny, phylogeny or baloney? Comp. Biochem. Physiol. 134/A Suppl 1:S31

31. Orgeig, S. and **C.B. Daniels**. 2003. The surfactant proteins: a model system for evolutionary biochemistry. Comp. Biochem. Physiol. 134/A Suppl 1:S84.

32. Ormond, C.J., **C.B. Daniels** and S. Orgeig. 2003. Composition, function and control of pulmonary surfactant during torpor/hibernation in three heterothermic mammals. Comp. Biochem. Physiol. 134/A Suppl 1:S93.

33. **Daniels, C.B.** and S. Orgeig. 2003. A homologous system in analogous structures: the role of pulmonary surfactant in the multiple evolutions of airbreathing within the fishes. Comp. Biochem. Physiol. 134/A Suppl 1:S116.

34. Miller, N.J., **C.B. Daniels**, D.P. Costa and S. Orgeig. 2003. Coping with pressure: surfactant secretion from pinniped alveolar type II cells at depth. Comp. Biochem. Physiol. 134/A Suppl 1:S117.

35. Possmayer, F., A.K. Panda, C. Ormond, K. Nag, A. D. Postle, N. O. Petersen, S. Orgeig, **C. B. Daniels**. 2003. Atypical composition and surface molecular organization of pulmonary surfactant from active and torpid fat-tailed dunnarts. Biophys. J. 84: Supplement pp 310a.

36. Torday J.S., **Daniels C.B.**, Orgeig S., Rehan V.K. 2004. Functional, comparative genomics of lung ontogeny, phylogeny and evolution Pediatric Research 55 (4): 94A p535 Part 2 Suppl. S.

37. Orgeig, S., **C.B**. Daniels, N.J Foot and H.A Blacker. (2009). The surfactant system and evolution of the blood-gas barrier. *In:* Perry, S.F., S. Morris, T. Breuer, N. Pajor and M. Lambertz (Eds.) 2nd International Congress of Respiratory Science. Abstracts & Scientific Program, p. 81. Tharax Verlag.

38. Orgeig, S., **C.B. Daniels**, N.J Foot and S.Potter. (2009). To shape or not to shape – the role of temperature and pressure in shaping the evolution of SP-C. *In:* Perry, S.F., S. Morris, T. Breuer, N. Pajor and M. Lambertz (Eds.) 2nd International Congress of Respiratory Science. Abstracts & Scientific Program, p. 163. Tharax Verlag.

39. Baharuddin, Z. M., Sivam, A., Karuppannan, S., & Daniels, C. (2009). *Role and Perception of Green Spaces: Attitudes Towards Urban Wildlife in Kuala Lumpur and Adelaide,* Paper presented at the International Symposium on Construction in Developing Economies: Commonalities Among Diversities, 5-7 October, University of Sains Malaysia, Penang, Malaysia.

40. Baharuddin, Z. M., A. Sivam, S. Karuppannan, and **C.B**. **Daniels**. 2010. *Urban green space: Stakeholders' and visitors' perception in Kuala Lumpur Malaysia*, presented at the Healthy City Conference: Making Cities Liveable, 11-13 July, Brisbane, Australia.

41. Baharuddin, Z. M., S.Karuppannan, A. Sivam, and **C.B. Daniels, C**. 2010. *Visitors' and stakeholders perception of urban wildlife in Kuala Lumpur, Malaysia,* at the 4th International Conference on Built Environment in Developing Countries, 1 -2 December 2010, Penang, Malaysia.

Unpublished Abstracts: (International Meetings Only)

1984 **Daniels, C.B.** and N. Oakes. The effect of diving on heart rate and body temperature in two species of small skink. 2nd Australasian Herpetological Conference, University of Sydney, Australia.

1988 **Daniels, C.B.** The thermal dependence of respiration in the central netted dragon (*C. nuchalis*) with particular reference to the surfactant system. Australian Bicentennial Herpetological Conference. Brisbane, Australia.

1989 **Daniels, C.B**., P.B. Hayball, H.A. Barr, P.B. Frappell and T.E. Nicholas. Lizard lung surfactant may act as an antiglue at low body temperatures. First World Congress of Herpetology, Canterbury, Kent, United Kingdom.

1993 Orgeig, S., **C.B. Daniels** and A.W. Smits. The development of the surfactant system during metamorphosis in the tiger salamander (*Ambystoma tigrinum*). Australasian Thoracic Society, Sydney, Australia.

1994 **Daniels, C. B.** Surfactant and the Evolution of Air-Breathing. Second World Congress of Herpetology, Adelaide, Australia.

1994 Orgeig, S., **Daniels, C. B.** and A. W. Smits. The development of the surfactant system during metamorphosis in the tiger salamander (*Ambystoma tigrinum*). Second World Congress of Herpetology, Adelaide, Australia.

1994 Smits,A.W., **Daniels, C. B.** and S. Orgeig. Composition and function of pulmonary-type surfactant in caecilians: Correlation with aquatic or terrestrial habit. Second World Congress of Herpetology, Adelaide, Australia.

1996 Langman, C., S. Orgeig, and **C. B. Daniels**. 1996. Thermal influences upon the composition and function of pulmonary surfactant in a heterothermic marsupial (*Sminthopsis crassicaudata*). 10th International Hibernation Symposium (Dr Fritz Geizer, Co-Ordinator)

1996 Lopatko,O.V., S. Orgeig and **C. B. Daniels**. 1996. The thermal sensitivity of the surface properties of pulmonary surfactant from torpid and warm-active marsupials (*Sminthopsis crassicaudata*). 10th International Hibernation Symposium (Dr Fritz Geizer, Co-Ordinator)

1997 **Daniels, C.B.,** S. Orgeig, P. G. Wood, L.C. Sullivan and O.V. Lopatko. The evolution and function of the vertebrate surfactant system: Insights into the evolution of airbreathing. International Conference on Comparative Biochemistry and Physiology, Kruger National Park, South Africa.

1997 Lopatko, O.V., S. Orgieg and **C.B. Daniels**. The surface activity of pulmonary surfactant in reptiles and amphibians. 3rd World Congress of Herpetology. Prague, Czech Republic

1997 Sullivan, L.C., **C. B. Daniels**, I.D. Phillips, S. Orgeig and J.A. Whitsett. Conservation of surfactant protein A: Evidence for a single origin for vertebrate

pulmonary surfactant. International Conference on Comparative Biochemistry and Physiology, Kruger National Park, South Africa.

1997 Wood, P.G., O.V. Lopatko, A.W. Smits and **C.B. Daniels**. Autonomic control of pulmonary surfactant release in the bullfrog *Rana catesbiana*. International Conference on Comparative Biochemistry and Physiology, Kruger National Park, South Africa.

1997 **Daniels C.B**. The evolution of the vertebrate pulmonary surfactant system. *In* Evolution of Physiological Processes. Satellite Symposium for the Australian Society of Physiologists and Pharmacologists meeting, Adelaide Australia.

1998 Orgeig, S. S.D. Johnston, O.V. Lopatko, and **C. B. Daniels**. Development of the surfactant system in a bird and reptile. 5th Marburg Surfactant Symposium, Phillips-University Marburg Germany.

1998 Lopatko, O.V., S. Orgeig, D. Palmer, S. Schurch and **C. B. Daniels**. Surface activity and lipid composition of pulmonary surfactant in the heterothermic mammal *Sminthopsis crassicaudata*: effect of rapid arousal from torpor. 5th Marburg Surfactant Symposium, Phillips-University Marburg Germany.

1998 Lopatko, O.V., Wood, P.G., J. Joss, A.W. Smits and **C.B. Daniels**. Acetylcholine controls surfactant secretion by type II pneumocytes isolated from Australian lungfish and the bullfrogs. 5th Marburg Surfactant Symposium, Phillips-University Marburg Germany.

1998 Orgeig, S., Wood, P.G., O V. Lopatko, and **C.B. Daniels**. Acetylcholine stimulates surfactant phospholipid release by type II pneumocytes isolated from the heterothermic mammal *Sminthopsis crassicaudata*. 5th Marburg Surfactant Symposium, Phillips-University Marburg Germany.

2000 Codd, J.R., N. Slocombe, S. Orgeig and **C. B. Daniels**. 2000. The response of the surfactant system to temperature cycling in small heterothermic mammals. *In* Life In the Cold. Proceedings of the11th Hibernation symposium, Tyrol, Austria.

2000 Ormond, C., S. Orgeig, and **C. B. Daniels**. Neural and thermal control of surfactant secretion by alveolar type II cells isolated from the fat-tailed dunnart *Sminthopsis crassicaudata*. . *In* Life In the Cold. Proceedings of the11th Hibernation symposium, Tyrol, Austria. (won best poster prize)

2001 **Daniels C.B.** and S. Orgeig. The pulmonary surfactant system: An evolutionary constant in a sea of structural diversity. *In* How animals work: 2nd International Conference of Comparative Physiology and Biochemistry. Chobe Botswana.

2001 Sullivan, L.C., S. Orgeig and **C. B. Daniels**. The control of development of pulmonary surfactant in egg-laying amniotes.*In* How animals work: 2nd International Conference of Comparative Physiology and Biochemistry. Chobe Botswana (won best student presentation)

2001 Miller, N.J., S. Orgeig, R.V. Baudinette and **C. B. Daniels**. The extra-uterine development of the pulmonary surfactant system in the tammar wallaby *Macropus eugenii*. *In* How animals work: 2nd International Conference of Comparative Physiology and Biochemistry. Chobe Botswana

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2002 **Daniels C.B**. and S.Orgeig. Embryonic development, fetal growth, and tail regeneration: Similarities, differences and utility as models for understanding the evolution of developmental physiology. Roundtable on Comparative Developmental Physiology, Glen Rose, Texas, USA.

2003 **Daniels C.B.** and S. Orgieg The Development of the pulmonary surfactant in vertebrates: Are humans really different? 20th Conference of the Perinatal Society of Australia and New Zealand. Hobart Australia.

2004 Shepherdley, C. A., S. J. Richardson, J. A. Monk, B K. Evans, **C. B. Daniels**, S. Orgeig, E. R. Kühn, and V. M. Darras. Thyroid Hormone Biology Of Embryonic Saltwater Crocodiles (*Crocodylus Porosus*). 17th Working Meeting of the IUCN-SSC Crocodile Specialist Group, in Darwin

2005 Orgeig S. and **Daniels C.B**. How can comparative biology inform medical respiratory physiology. International Union of Physiological Sciences San Diego USA

2005 Blacker H., S. Orgeig and **C. B. Daniels** Lymophangiogenesis in the regenerating tail of the lizard *Christinus marmoratus*. 5th World Congress of Herpetology Cape Town South Africa .

2006 Orgeig S and **Daniels CB** The surfactant system. 1st International respiratory Congress Bonn Germany

2008 Orgeig, S., N.J. Foot, **C.B. Daniels** (2008). Evolution of a physiological system. I. Molecular and compositional adaptations of the surfactant system in diving mammals. Presentation in the invited symposium “Respiratory stratagems: Diversity & uniformity in the structure & function of the gas exchanger”, 4th International Conference in Africa for Comparative Physiology and Biochemistry, Masai Mara National Reserve, Kenya.

2008 **Daniels, C.B.,** N.J. Foot, S. Orgeig (2008). Evolution of a physiological system. II. Biophysical, cellular and developmental adaptations of the surfactant system in diving mammals. Presentation in the invited symposium “Respiratory stratagems: Diversity & uniformity in the structure & function of the gas exchanger”, 4th International Conference in Africa for Comparative Physiology and Biochemistry, Masai Mara National Reserve, Kenya.

2009 Baharuddin, Z. M., Karuppannan, S., Sivam, A. & **Daniels, C. B.** (2009). *Role and Perception of Green Spaces: Attitudes towards urban wildlife in Kuala Lumpur and Adelaide,* Presented at the State of Australian Cities Conference, 24-27 November, Perth.

2009 S. Orgeig, **C.B. Daniels**, N.J Foot, H.A. Blacker.(2009) The surfactant system and evolution of the blood-gas barrier. Invited presentation to the symposium entitled "Leptin Integrates Vertebrate Evolution: from Oxygen to the Blood-Gas Barrier". 2nd International Congress of Respiratory Science, Bonn, Germany.

2009 S. Orgeig, **C.B. Daniels**, N.J Foot, S. Potter. (2009) To shape or not to shape – the role of temperature and pressure in shaping the evolution of SP-C. Presentation to the symposium entitled "Recent advances in alveolar biology". 2nd International Congress of Respiratory Science, Bonn, Germany.

2009 Lloyd, D; Paige,K; Russo, S; Zeegers,Y;Roetman,P and **C.B Daniels**, Citizen science: engaging primary teachers with science Conference presentation Australiasian Science Education Research Association. Deakin University, Geelong Campus.

2011 Baharuddin, Z. M. Karuppannan, S. Sivam, A. & **Daniels, C. B. (**2011). Healthy living environment and public parks: A case study of Kuala Lumpur, Refereed paper, Inaugural Malaysian Postgraduate Conference 2011(MPC), 26-27 November, Adelaide.

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2015 Pitman, S., and **C. B. Daniels** (2015). Quantifying Ecological Literacy in an Adult Western Community: The Development and Application of a New

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Invited Internal Book Reviews (reviews not published)

1: Daniels C.B. 2006 Internal Reviewer for Knox, Ladiges, Saint, Biology

2: Daniels C.B. 2008 Internal Reviewer for South Australia: The State of the Environment. State Government Press.

3: Daniels C.B. 2012 Internal Reviewer for South Australia: The State of the Environment. State Government Press.

4. Daniels C.B. 2016 Internal Reviewer for Australia. The State of the Environment. Australia; Government Press.

Statement of Authorship and Contribution

Manuscripts submitted by the applicant towards a Degree:
Refereed Journal Articles 8, 9 and 12 in the Curriculum Vitae were published from the work submitted by the applicant for the award of Honours at the University of Adelaide

Refereed Journal Articles 10, 11, and 13-18 in the Curriculum Vitae were published from the work submitted by the applicant for the award of the Doctor of Philosophy at the University of New England

These articles are not included in this application.

All of the manuscripts in the Curriculum Vitae and presented for the D.Sc. resulted from collaborative efforts.

As a general principle:
I had a critical role in all publications on which I am listed as an author.
I had a major contribution to the research presented in any manuscript on which I am listed as either first or last author.
The contribution is progressively less from second author to second last

Appendix 1:

Degrees

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Appendix 2:

Selected Reviews and Awards of My Work

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Appendix 3:

Reprints of Publications

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