

From the Register
June 28th 1882.

PROFESSOR TATE'S REPORT ON THE NORTHERN TERRITORY.

The following report, with illustrative maps, was laid on the table of the Assembly on Tuesday, June 27. It embodies the results of the observations of Professor Tate during his visit with the Parliamentary party, of which the Minister of Education was the head, to the Northern Territory:—

May 13, 1882.

Sir—In submitting to you the following report, based on personal observation, of the mineralogical, geological, and botanical features of the Northern Territory of South Australia, I beg, in the first place, to thank you for the high compliment which the appointment conferred upon me; and, secondly, to express publicly my obligations to the Council of my University for granting me the necessary leave of absence to accompany you on your official visit to the Northern Territory, to assist in the task which has been so energetically and successfully accomplished by you. Whatever may be the immediate results of this report, yet I do not hesitate to say that information on some matters therein contained ought to have weight in determining the directions which development of the resources of the Northern Territory must assuredly take. The geological phenomena of the Northern Territory are such as to determine, to a large extent, the nature of the future industries; and though we need not enquire into the causes of this effect of geology, yet the force of my statement will be seen to have foundation in fact as I proceed with my report. Particularly, in this connection, is it to be regretted that I had so very few opportunities for extended and specific observations, and in consequence the geological work is for the most part a reconnaissance while in the saddle, and more frequently than otherwise under the most trying circumstances, to which you yourself can testify from your own experience. Nevertheless, the general features have been, I think, correctly read, certainly as far as regards the prevailing character and area of the metalliferous rocks and their relationship to those barren in minerals. By consulting the writings of explorers who have visited the Northern Territory, and by information communicated by Government officers and others who have recently traversed previously unknown ground, I have been able to supplement the facts acquired by my own personal observation, the outcome of all of which is the geological sketch map and mineral map accompanying this report.

SURFACE CONFIGURATION AND GENERAL BOTANICAL FEATURES.

The country traversed, from Southport to Pine Creek, consists for the most part of parallel ranges of hills of moderate elevation, having a general trend of north and south in the northern part, and of north-west and south-east in the southern area. Intervening between the ranges are broad plains, which are, however, occasionally interrupted by low spurs and ridges of rocky ground. The road follows the low ground, and the incline from Southport is very gradual, being about 50 feet per mile. Pine Creek, the most southern point reached, is 755 feet above Southport by aneroid measurement, or about 800 feet above sea-level at ordinary low watermark. Yam Creek is 730 feet above Southport. Immediately to the west of the telegraph line from Yam Creek to Pine Creek there confronts the traveller the bold and picturesque escarpment of the "Sandstone Tableland," which is the northern edge of the great plateau of Central Australia, with which it is physically and geographically connected. This precipitous rampart of sandstone has, near Yam Creek, where I studied it, an elevation of about 600 feet, or of about 1,400 feet above sea-level; but at the point Leichardt descended from it, into the valley of the S. Alligator River, it is 1,800 feet high. The character of the landscape, as far as it depends upon trees, shrubs, and grasses, presents along the whole route very little variation; and it is only by the margins of some of the sluggish watercourses that the vegetation assumes a tropical aspect. In the jungles, always of limited area, such as at Fannie Bay, near Palmerston, at Rum Jungle, at the Stapleton, and those on the margin of some of the tributaries of the McKinlay River, there abound bamboos, reaching to 40 feet and 60 feet high, screw pines, umbrageous fig-trees, tall eucalypts, and the paper-bark melaleuca or tea-tree, amongst which climb certain convolvulaceæ, true vines, sarsaparilla vine, &c. The rest of the country is grassy and lightly timbered. The flats, the soil of which is a stiff clay, have much grass and little timber; the slopes of the hills are covered with a pisolitic-iron, quartz-sand, and gravel; and as we recede from the swampy ground the grass becomes shorter and scantier and the trees closer and smaller. The timber is of a scrubby kind, the chief constituents being two or three eucalypti (*E. clavigera*, &c.), iron wood (*Erythrophloeum Labouchei*), and *Grevillea chrysodendron*. There is a general absence of shrubs; and the grasses, which make up the rest of the landscape, if we except the grotesque ant-hills, which almost equal in height the trees amongst which they occur, are comprised of about three species.

GEOLOGY.

The general geological features may be summarized as follows:—1. The coast cliffs of Arnhem Land are composed of sandstone and calciferous

sandstone, the lower bed of which conform with the denuded surface of the metamorphic slates on which they rest; but with increasing thickness the horizontal stratification is gradually approached. Sections displaying the junction of the two dissimilar formations are those of the scarped face of Fort Hill, at Palmerston, and Talc Head, on the west side of the entrance to Port Darwin. 2. Beyond the confines of the formation of the coast cliffs there is an extensive and well-marked region, which may be named the region of the river basins of North Arnhem Land. Here the prevailing rock is of the metamorphic class, being either a micaceous or a talcose slate, with which are interstratified quartzites and felspathic sandstones and grits. The latter series constitutes the hilly country, whilst the former has been more extensively denuded to form the intervening depressions of the surface. The axes of the ranges and of the plains, where unaffected by igneous intrusions, coincide with the direction of the strike of the rocks. 3. Intrusive rocks, as granite, diorite, and porphyritic felstones, occupy here and there, in the midst of the metamorphic rocks, not inconsiderable tracts of country. All these are of later date than the metamorphic rocks, but older than the "desert sandstone." 4. The table land of Central Australia, constituted of sandstones and gravels horizontally bedded, terminates in South Arnhem Land in a bold escarpment, as already referred to. Its position in the stratigraphical scale is presumably upper miocene, but, for distinction sake, the formation has received the name of the "desert sandstone." The line of escarpment within the area under review approximates in outline to the letter V, the apex of which is at about twenty miles north from the crossing at the Katherine River, and the ends of the two limbs near to the mouth of the Alligator River on the north, and at about the limit of the tides on the Daly River on the south-west. The base line of this triangular space is occupied by the coast cliffs, which are undoubtedly outlying portions of the "desert sandstone." The area within these lines is the region of the rivers of North Arnhem Land. This vast sheet of "desert sandstone" is barren of useful minerals, and conceals from view the productive metamorphic rocks which underlie it. The "desert sandstone" is reported to contain layers of coaly matter, quite within the range of probability; but it is extremely unlikely that coals of passable quality occur. It is a question well worthy of investigation if the bottom gravelly beds of the formation do or do not contain detrital gold, though its presence is somewhat incompatible with the probable origin of the materials composing the "desert sandstone," inasmuch as the detritus of the local metamorphic rocks has not apparently contributed to its formation. The metalliferous area is included within that of the metamorphic rocks, the boundaries of which are defined by the inland escarpment of the desert sandstone and the coast cliffs, as previously described. It is worthy of notice that the schistose formations which lie to the north of the granites on the River Finniss seem to be non-metalliferous, whilst similar formations between Bridge Creek and Pine Creek are exceptionally metalliferous; and from the circumstance that the strike of the beds is not coincident, it is not improbable that the rocks of the two areas belong to different periods. In no case has it been proved that the igneous eruptions have directly contributed to this wealth of minerals, though it might have been so inferred from the prevalence of granite and diorite in the richer parts of the metalliferous area. Whether or no the richer alluvial gold drifts of Yam Creek and the Margaret have been derived from reefs included in the diorite, or in rocks in contact with it, could not be ascertained. At any rate, no reefs have as yet been discovered in that rock or in near proximity to it. On referring to the accompanying mineral map it will be seen that the metalliferous deposits are situated for the most part within a few miles east or west of the telegraph line; but we must except those which are on the line of road from Port Darwin Camp, via Twelve-Mile McKinlay River, to Pine Creek. This detour will be seen to coincide with the north-easterly projection of the "desert sandstone," and with the line of outcrop of granite which is traversed by the telegraph line between Yam Creek and Pine Creek. The rock formation over the whole of the metalliferous area is almost entirely of metamorphic origin, and there cannot be a doubt that much, if not all, of the outerlying area, extending probably to the escarpment of the great tertiary plateau, is of a similar character, here and there doubtlessly broken through by eruptive rocks. We have thus a very extensive metalliferous country awaiting exploration. Year by year the area of the mineral-bearing ground is extended by discoveries beyond previously known limits. A little while since Mount Wells was proved to be stanniferous, and later the more distant diggings at Chinaman's and Saunder's Rush have considerably enlarged the known area of the auriferous country. Though the metamorphic rocks occupy a circumscribed area, approximately an equilateral triangle, yet that area is absolutely large, as it contains 7,800 square miles; and should the portions not hitherto prospected prove to be as metalliferous as the known tracts, then may be realized that prosperity which has been so long hopefully anticipated. The circumstance that the telegraph line has followed the "run of the metal" is explained by the