

# North Australia : its physical geography and natural history

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1846

# NORTH AUSTRALIA :

ITS

PHYSICAL GEOGRAPHY AND NATURAL HISTORY.

BY THE

Rev. Julian E. Tenison Woods,

F.R.G.S., F.L.S., F.G.S., ETC., ETC.

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*Largior hic campos æther et lumine vestit  
Purpureo. — Virg. Æn. VI., 636.*

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ADELAIDE :

PRINTED BY W. C. COX, GOVERNMENT PRINTER, VICTORIA-SQUARE.

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# Dedication.

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TO

DR. FERDINAND MUELLER,

CHEVALIER OF THE LEGION OF HONOR, KNIGHT OF THE DANISH  
ORDER OF DANEBROG AND OF THE IMPERIAL ORDER OF FRANCIS  
JOSEPH OF AUSTRIA, F.R.S., F.R.G.S., F.L.S., C.M.Z.S., FELLOW  
OF THE ROYAL SOCIETIES OF VICTORIA AND TASMANIA, HON.  
MEMBER OF THE PENOLA AND VARIOUS OTHER INSTITUTES:

DEAR DR. MUELLER—

Allow me to dedicate this little work to you. I offer it not only as a tribute to your eminence as a man of science, but as a memorial of your valuable explorations upon the North Coast, in connexion with Mr. A. Gregory. Above all, I should wish you to accept it as an acknowledgment, however insufficient, of your kind assistance to me in my studies and pursuits during our happy friendship, which has now extended over many years.

Very faithfully yours,

JULIAN E. T. WOODS.



## PREFACE.

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THIS small pamphlet will, I think, explain itself without any preface; but I should wish to offer an excuse here for attempting to describe a country in which I have never been. I am acquainted with only one book written expressly on North Australia, and that is the work of Mr. Earl. Had it been published in the Colony, I should never have presumed upon my present task; but it was scarce in Adelaide, and, under any circumstances, was perhaps a little too dear for general circulation. With a view of giving information upon a subject, about which so little was known, and so much interest felt, I entered upon the present publication. My qualifications were, that in attempting a History of Australian Exploration, I had not only read and re-read, but copied and condensed, the accounts of every exploration yet made upon the north coast; this, together with some little experience in writing upon kindred matters, has enabled me, as I hope, to direct attention to the most important features, and to draw conclusions with regard to the sources of the rivers and the localities most likely to possess good land, which may prove valuable. If I have succeeded in establishing the physical geography of the country upon an intelligible basis, I must claim no more credit than for having derived it from the opinions of no less than thirty-seven different authors, which I have consulted on the matter; and having said this, as a guarantee of my good faith, I will only add, that before placing this small volume in the hands of the public, I have consulted every work I could find in which North Australia has ever been mentioned. I offer it, however, with some diffidence to Australian readers, and only until more is known of the country do I give it to them as a guide.

Penola, September 8, 1864.

# NORTH AUSTRALIA.

## CHAPTER I.

### DISCOVERY AND EXPLORATION.

THE PORTUGUESE—TASMAN—FLINDERS—BAUDIN—KING—STOKES—  
LEICHHARDT—GREGORY—BURKE AND WILLS—NORMAN—  
WALKER—LANDSBOROUGH—MCKINLAY AND STUART.

IN the early days of ocean exploration, North Australia occupied a very prominent position in the researches of navigators. When it was discovered we cannot say, neither can we tell by whom; but there is good reason for believing that it was known to some explorers about the early part of the 16th century. In those days both Spaniards and Portuguese made voyages of discovery in that neighborhood. The Portuguese had been particularly active. They had established themselves in India, and from thence had been slowly creeping down by the Malabar coast and Ceylon, until they had got a footing in the Moluccas. Here they had to contend with the Spaniards; but this did not entirely check them, for it is probable that they discovered Australia very shortly after. The date of that event is a matter for conjecture alone; but we need not trouble ourselves about it. Though there is a curious mystery attached to the subject, which would be most interesting to have cleared away; it is only very remotely connected with the purpose of this little work, and therefore we can afford to leave it unexplained.

The earliest authentic discoveries of which we know give us no idea of the nature of the country. Singularly enough, the first map of the north-west, which has pretensions to exactness, results from a voyage made by Abel Tasman in 1644, and no account of the voyage has been preserved. A few fragments of notes made by Burgomaster Witsen have come down to us, scanty in words and void of information. He tells us that the coast was low and barren, and yet supported a numerous population. The people were very savage and wicked, shooting at the Dutch without provocation. They went naked, and lived poorly, on yams and other roots. Van Diemen's Gulf, as it is now called, was especially indicated as being densely populated by cruel, treacherous, and murderous savages.

To our countryman, Dampier, we are indebted for the first detailed information about the north coast. He visited it twice—once in 1688, and again at the close of that century. I shall here give an abridgment of his remarks; but it should be borne in mind that he refers to North-west Australia, not very far from where Mr. F. Gregory has since made such important discoveries. Dampier begins by saying that it had not been determined whether the great southland were an island or a continent; but he at least was certain that it joined neither Africa, Asia, nor America. He then describes the appearance of the land as level tableland, which was very sandy near the coast; but the promontories and islands were rocky. I now quote his own words:—"The land is of a dry sandy soil, destitute of water, except you make wells, yet producing divers sorts of trees, but the woods are not thick, nor the trees very big. Most



of the trees that we saw were dragon trees,\* as we supposed; and these, too, are the largest trees. They are about the bigness of our large apple trees, and about the same height, and the rind is blackish, and somewhat rough. The leaves are of a dark color. The gum distils out of the knots or cracks that are in the bodies of the trees. We compared it with some gum dragon's blood that was aboard, and it was of the same color and taste. The other sorts of trees were not known by any of us. There was pretty long grass growing under the trees, but it was very thin. We saw no sort of animal, nor any track of beast, except one, and that was the tread of one as big as a great mastiff dog. There are a few small land birds, but none bigger than a blackbird, and but few sea fowl. Neither was the sea very plentifully stored with fish, unless you reckon the manatee and turtle as such. Of these creatures there is plenty, but they are extraordinarily shy, though the inhabitants cannot trouble them much, having neither boats nor iron. The inhabitants of this part of the country are the miserablest people in the world. The Hodamadods of Manamatapa, though a nasty people, yet for wealth, are gentlemen to these, who have no garments, houses, sheep, poultry, fruits of the earth, ostrich eggs, &c., &c., as the Hodamadods have. Setting aside their human shape, they differ but little from brutes. They are tall, straight-bodied, and thin, with small long limbs. They have great heads, round foreheads, and great brows. Their eyelids are always half closed, to keep the flies out of their eyes, they being so troublesome here, that no fanning will keep them off one's face; and without the assistance of both hands to keep them off, they will creep into one's nostrils, and mouth too, if the lips are not shut very close. So that from their infancy being thus annoyed, they cannot see far, unless they hold up their heads as if they were looking at somewhat over them."†

Dampier goes on to give a description of the North Australians, which is anything but flattering to them; and his account of the country, taken altogether, is decidedly unfavorable. On his second visit, he cruised for some time amid the islands near North-west Cape; but his observations do not much increase our knowledge of the nature of the country, and an unfortunate encounter with the natives, prevented his going any distance inland.

Small as the knowledge was that Dampier obtained of the north coast, geographers were obliged to content themselves with it, for a very long time. Other visits were made, but no results were made public. I need not give a list of names. It will be sufficient to say that the close of the seventeenth century, saw the farewell of Dampier to the north coast; and the beginning of the nineteenth brought Flinders to its shores. The intervening period is a blank, as far as geographical discovery is concerned. Flinders, Baudin, and King, followed each other in quick succession. First of all, Flinders explored Carpentaria; and then came Admiral Baudin's expedition along the whole of the north coast, from Van Diemen's Gulf, to Cape Leveque. The French expedition, however, added little to our knowledge, for the ships kept so far from the land, as barely to lay down, with accuracy, the more prominent capes and islands. It is

\* NOTE.—Eucalypti or Acacias; Dampier calls them by the name of dragon trees, because of the exudation of red gum from the bark, which resembled the vegetable substance known as dragon's blood.

† NOTE.—New Voyage round the World. By William Dampier. London, 1697, p. 461.

to Flinders and to King, that we owe all our acquaintance with that part of Australia; for King took up Flinders's survey where it was discontinued, and explored thence westward, leaving only a few short blanks in the map for Wickham and Stokes to fill up.

On the 3rd November, 1802, Flinders commenced his survey of the Gulf of Carpentaria. Up to that time nothing was known of its character. It had been very accurately laid down by the Dutch, in their charts, and was represented as a broad deep opening, with a perfect fringe of rivers emptying into it. From what we can gather, imagination had depicted it to Flinders, as a high bold shore, girded inside with forest-clad hills, amid whose woody slopes he expected to find a country at once picturesque and fertile. But he was sadly disappointed. The country was low, and the shore shallow and swampy. It was completely devoid of interest, and Flinders could not even find all the rivers marked by the Dutch upon their charts.

The west side of the Gulf, was, however, found to be in every way more interesting and important. The land was high and rocky, and the soil better. It is easy to find a reason for this difference. The English Company's Islands were remarked by Flinders, as stretching out from the west side of the Gulf, like the continuation of a chain of mountains. The Islands also sloped down to the water on their west side, while on the east, they presented steep cliffs to the ocean. We may, therefore, regard the east and west ends of the Gulf, to be the terminations of two mountain ranges, which both present precipitous sides to the eastward, and gentle slopes to the west. This arises probably from a similar geological origin, if not synchronous, at least, I should think, comprised in the history of the same disturbing cause. The east side of the Gulf is, therefore, the western slope of the east coast range, while the west side is the eastern face of a new range. The second is not so high as that which terminates at Cape York, but still of great importance in the geography of the north coast, as I shall have occasion to show. Flinders did not see very much land upon the west side of the Gulf, which would be considered at all available; but he found the coast generally interesting, and well worthy of further exploration. This, it has never since received. We know, however, that somewhere on its shores the Roper River empties itself; and though that stream may not be navigable for even boats, yet as the outlet of an extensive basin of drainage, it must run in its low course through extensive and rich alluvial plains. These will be found more extensive and encouraging than the Plains of Promise: because, the Roper is so much larger than the Albert, and must have brought down much richer soil from its extensive basaltic table lands. The natives about this part have always been considered numerous and warlike, and appear to have given the Malays much trouble.

Flinders was the first who met with Malayan fishermen on the north coast. The fleet was encountered near Blue Mud Bay, at a place named, in consequence, Malay Roads. The chief, or rajah, told Flinders that he was the first who had come to Australia to fish.

After Flinders came King, who, in January, 1818, commenced his survey near North-west Cape. After a tedious examination of the Dampier Archipelago, he sailed at once for Arnheim's Land, which he explored from Raffles Bay to Clarence Strait. It was during this part of the survey that all those places were discovered upon which settlements were



afterwards attempted; these were Melville Island, Raffles Bay, and Port Essington. They do not appear to have struck King as very fertile localities, but he approved of them in a marine point of view, because of their possessing such excellent shelter for ships. Of the quality of the land he says generally that it was thickly wooded with a dwarf species of eucalyptus, with here and there the fan palm and acacia gum in groups. The soil, although it was shallow and poor, was covered with grass and a variety of shrubs. It was also thickly strewn with nodules of ironstone, the decomposition of which gives to all the cliffs a red appearance in the upper part.

King, on his second voyage, went round the east coast, through the Barrier Reef, and across the Gulf of Carpentaria, resuming Flinders's survey from where it had been left at Wessel's Islands. This was in 1819. At the commencement of his survey he discovered the Liverpool River. When he reached Raffles Bay he went across to Clarence Strait, and continued exploring from his old ground. The general result of his observations will best be given in treating of the physical description of the coast; but it may be as well to describe what he says about the country near Paterson's Bay, because it is somewhere near there the projected settlement upon the north coast is to be made. "The land hereabouts," he says, "is low and thickly-wooded to the brink of the deep red-colored cliffs that form the projecting heads of the coast. The wood near the sea had not the appearance of being of large growth, but the abundance and verdure of the trees gave this part a pleasing and picturesque character. At the bottom of the opening is a remarkably flat-topped hill, under which the waters of the inlet appear to flow in a south-east direction; the entrance may possibly form a convenient port, for there was no appearance of shoal-water near it. The land, which forms its westernmost head, appears, at first, like an island, but was afterwards presumed to be a projecting head separating the opening from a deep bight which was called Paterson Bay. The western side is formed by very low land, off which many patches of dry rocks were seen to extend; beyond this the coast appeared low and sandy. The next day we made but little progress along the coast to the south-west, which is so low as not to be visible from the cutter's deck at a greater distance than six miles. The land appeared to be barren, and, were it not for a few bushes and mangrove trees scattered about the beach, it might be called a complete desert."\*

After passing Port Keats, King tried to examine the next opening, which we now know as the mouth of the Victoria River. He did not succeed, owing to the fog, the strong tide, and the loss of anchors. In the latter respect King was most unfortunate. In every one of his voyages, his first adventure, generally, was the loss of a couple of anchors. This very much crippled his exertions, and explains why so few of the openings he discovered were not examined to the bottom. Close to the mouth of the Victoria is Cambridge Gulf, and this King explored pretty carefully. It did not answer his expectations. There was no river, and the inlet was surrounded by very bad land. He described it as a gulf divided into two arms, of which the western was the largest. On the west side of this the land is high and rocky, while the east shore is low

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\* NOTE.—Narrative of a Survey of Intertropical and Western Coast of Australia. By Capt. P. P. King. London, 1827. Vol. I., p. 269.



and apparently marshy. The lowest part of the inlet opens out into a broad basin, at which point the west shore also becomes low, and covered with mangroves, while here and there a sandstone hill juts out above the level.

King found the coast from Cambridge Gulf to Cape Londonderry (a distance of ninety-five miles) without an opening or bay of any importance. It is chiefly rocky, with a few sandy beaches, more or less open or exposed. No part of it was thickly wooded, but of the interior nothing could be seen, except a table-topped hill which Admiral Baudin had named Mount Casuarina. From Cape Londonderry the aspect of the coast changed completely; instead of being low and sandy, it was lofty and precipitous. I shall have occasion to speak more in detail of its character in another place, and, therefore, shall only add now that King's second voyage terminated at Port Warrender. For his third voyage, in 1820, he almost completed the examination of the north-west, which, from Collier's Bay to Exmouth Gulf resumed its usual low, sandy character, and was very thickly fringed with rocky islands.

The next explorer on these shores was Captain Wickham, who, in conjunction with Captain Stokes, surveyed all that was left to be explored. They discovered the Fitzroy River first, and then the Victoria, in the opening which King had been obliged to pass by. The latter was found to be a wide and magnificent inlet. As a river, it affords a proof of what I regard as almost a law in the case of Australian streams: wherever they are found broad and straight, they will be also short and shallow; and wherever they are narrow and tortuous, they will be also deep, and run from a considerable distance inland. The Victoria is a broad stream, and at first almost like an inlet of the sea; but it is full of shallows, and the basin it drains is not nearly so important as the basin of the Flinders, or, probably, that of the Fitzroy. Beyond the Victoria, Wickham discovered the Adelaide; and in Carpentaria, the Albert, the Flinders, and several smaller streams. It was in the upper part of the Albert that the Plains of Promise were discovered—a magnificent tract, whose extent bears no proportion to its richness. With Wickham and Stokes's survey all the marine explorations in the north coast terminated. Other surveys were made, but no important discovery resulted from them. Lieutenant Helpman examined the Adelaide River very minutely, but in his boat expedition he could add to our knowledge of the river only. He gave us, however, particulars enough to enable us to state that it may be reasonably doubted whether Stuart, on his journey across the continent, ever saw the Adelaide at all.

The first land expedition upon the north-west, was that of Messrs. Grey and Lushington, in 1837. The actual distance explored by them was very trifling, but the discoveries made were of considerable importance. After crossing the tableland, a new world as it were, broke upon the explorers. They found not only large rivers and huge basaltic mountains, where nothing of the kind could be seen from the sea, but the land also proved to be excellent in places, and more richly grassed than any part of the north coast discovered up to that time. The expedition was however, most rashly conceived; the plan was to land upon the coast with a well-equipped party, and having procured ponies from Timor, to push through the interior to Swan River. Capt. Grey had never been upon the north coast; had never even been in Australia, neither had any of his

party, and yet he was sanguine enough to believe that he understood the difficulties of his undertaking, and the nature of the country with which he had to deal. The attempt was begun at Hanover Bay; but why this place was chosen I cannot even guess. It is true, that King had spoken favorably of the water supply there, but he had also stated that the shore was fringed with bold inaccessible hills and bluff headlands, which are anything but favorable for exploration—and so indeed Grey found them. At the very commencement of his journey he had to make arrangements for scaling precipices nearly as inaccessible as the Blue Mountains of Sydney. In one respect this was fortunate, for it enabled him to understand the difficulties of his undertaking before his communications were cut off from the vessel which had brought him to the coast. It is easy to realize what Grey had to accomplish, if we bear in mind that this part of the coast is one where the tableland abuts upon the ocean without any intervening alluvial sea margin. It is just as if the Sydney Blue Mountains were to breast the sea, with nothing but the beating waves upon their base. Had the shore been only a range of hills, or an unbroken tableland, the difficulties might have been great, but the first would have been the only one; it was, however, a tableland close to the sea, cut down into numerous gorges by the drainage of the water. As soon, therefore, as Grey found himself at the top of one precipice, a journey of half a mile brought him to the edge of another. Thus, the difficulties of getting up were matched by the labor of getting down on the other side, and when this was accomplished the work had to be done again. It is true, some gorges were wider than others, and the quality of the soil varied very much in richness. They were all watered by clear fresh streams, and in one was found a river, nearly four miles wide. On the sides of this wide valley were high basaltic mountains, so richly grassed, that it met above the heads of the explorers, who were only kept together by calling to each other. What with gorges, deep rivers, and high mountains—what with a very rainy season, and hostile savages, who succeeded in wounding Grey rather severely, the party did not proceed very far. Yet they saw quite sufficient to enchant them with the nature of the country. I hardly know whether all will participate in the enthusiasm, no matter how fertile the soil may have been, when it is borne in mind that it lies amid an almost impracticably mountainous and rocky country, with tropical seasons, and rank tropical vegetation around it. But we have at least a right to take, first of all, the opinion of those who have seen the locality, and they were perfectly charmed with it, in spite of concurrent circumstances, which would render the recollections of even the Garden of Eden anything but agreeable. One cannot help regretting that the explorations have not been followed up.\* Grey had the satisfaction, if it was a satisfaction, of finding that the sources of his wide river (the Glenelg) had dwindled down to a mere rivulet in a very few miles; but this might have been guessed from the great width of the stream near its mouth. For the rest, Grey is our informant for all that we know of the interior of this part of the coast, and that is very little indeed.

The next land expedition which further explored the northern interior,

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\* NOTE.—Since this was written, news has been received of the re-exploration of this country. Grey's report is in all respects confirmed, and the land very highly spoken of. It was examined by a party sent from Western Australia to Camden Sound.



was that of Leichhardt, on his celebrated overland journey to Port Essington, in 1844. Proceeding along the coast range, he descended to Carpentaria by one of its western watercourses, the Mitchell. He then went round the gulf at no great distance from the sea. Thus, he discovered all the rivers flowing between the tableland and the ocean. It must be understood that the shores of the gulf, for a considerable distance inland, consist of alluvial flats, probably formed of the detritus brought down by the streams from the tableland. As they are traced up these flats, which are at first mere mangrove swamps, become separated from each other by sandstone ridges or spurs. Leichhardt discovered about thirty of such channels, but it was impossible for him to state their importance, because he was too near their terminations to form an opinion. The most remarkable were the Carron, the Gilbert, the Flinders, the Albert, the Nicholson, the Calvert, the McArthur, the Wickham, and the Roper. With regard to the Albert, Leichhardt fell into an error. He mistook for it another stream, which has since received his name, and is next to the Flinders in importance. It was owing to his mistake that he was unable to confirm Stokes's account of the fertility of the Plains of Promise. The Roper was not met with until Leichhardt's party had passed out of the longitude of Carpentaria. It proved a most important discovery, since by its aid they were enabled to cross the watershed, and descend to the north coast of Arnheim's Land.

When the results of Leichhardt's journey became known, it was seen that the Dutch had good reason for placing around the Gulf the numerous rivers which appeared upon their maps. When so many marine surveyors had only succeeded in discovering two or three streams, it was thought that Tasman had jotted down at hazard the watercourses marked upon their charts. But further discovery showed that this was a very incorrect assumption, and we must presume that physical change has rendered these streams less visible from the sea, or that the Dutch executed their surveys with a great deal more accuracy than such men as Flinders or Stokes. I need hardly say that the former supposition, remarkable as it may be, is by far more probable.

After Leichhardt, the shores of the Gulf remained unvisited for a period of ten years. Mr. A. C. Gregory and his party were the next visitors. He had been sent, late in 1855, to the Victoria River, towards the exploration of which nothing had been done since its discovery by Wickham and Stokes. In a journey, remarkable for its boldness and rapidity, Mr. Gregory traced the river to its sources, and, after crossing the dividing table range at 1,800 feet above the level of the sea, followed one of the inland watercourses for 300 miles, until a perfect desert stopped his further progress. He then returned to the Victoria, and struck to the eastward across the tableland to Carpentaria. Of this intervening tract Gregory said that sterile monotony was the chief characteristic. The interior of the country appeared to consist of a tableland of sandstone, averaging 800 feet above the sea level, from the edge of which all the rivers of the north coast seemed to take their rise. By following the base of this elevated plateau, he was enabled to pass near the sources of all the Carpentaria rivers except two—the Flinders and the Leichhardt. The whole of the others were found to originate in miserable sandstone ridges, thinly covered with grasses of very inferior quality. The season was certainly a dry one, but Gregory gave it as his opinion that no country

available for settlement would be found on the south-west shores of Carpentaria. He spoke, however, in cheering terms of the banks of the Flinders and Leichhardt, and gave a word of praise to parts of the Victoria River. The general tone of his observations upon the north coast was decidedly despondent.

Carpentaria was next explored from the land side by poor Burke, who accomplished his heroic task and met his own glorious fate by crossing to it. It has been understood by some that he traced down the Flinders from its sources, but this is not correct. He did not reach the river until within a short distance of its termination. Cloncurry Creek was the stream he followed, and this is only one of its many western tributaries. McKinlay found a great many more, all probably flowing from the range which bears his name. It was the subsequent search for Burke which led to the complete exploration of the Flinders. Among the many expeditions sent to obtain tidings of the unfortunate traveller, one was directed to proceed to Carpentaria by sea, while another was directed to make its way to the same rendezvous by a journey overland. Mr. Fred. Walker had command of the latter. Proceeding from Rockhampton to the Barcoo, he made his way to the sources of the Alice, to the north of which he found an immense basaltic plateau, Walker's Table Mountain. Along its base a large river was discovered, and it was named the Barkly—for Walker never dreamed that it was the Flinders, as he was nearly 300 miles distant from the coast. Wishing to find the latter river, he struck to the eastward, and, of course, sought in vain. At last he reached an eastern tributary named the Norman, and, by following this, was enabled to accomplish his wishes. Mr. Walker seems imperfectly to have comprehended the value of his own discovery at the basaltic plateau, or he would never have allowed Landsborough to complete what he had begun. The so-called Barkly, was no other than the upper Flinders. Landsborough, in his celebrated overland journey, ascertained this, and more. He followed up the Flinders for 300 miles until it led him on to Walker's tracks, and on to his table mountain. Thus it appeared that the Flinders is certainly the most important river upon the north coast, not even excepting the Victoria. It has its sources in Walker's Plateau, and from the east is fed by such tributaries as the Norman, which of itself is a most important river. From the west it is supplied by Cloncurry Creek and many other streams, all of which are described as large channels by McKinlay.

The search for Burke gave rise to many important discoveries in Carpentaria. Landsborough, in his south-west exploration, followed up the Albert to its sources, and then, by means of a tributary named the Gregory, reached the basaltic ridges on the edge of the tableland. By the aid of the O'Shanassy, a small stream, he was enabled to cross the watershed, and make his way to the Herbert, a creek running inland and southward. It is a matter of regret that his investigations were not pushed very far; but McKinlay's journey in some measure completed the work, for his point of crossing the watershed was not very remote from Landsborough's. One important point obtained was the confirmation of Gregory's observation, that the watershed was close to the coast, and that on its southern side streams were found running towards the interior. The country on the banks of these streams is, for a limited extent, well grassed.

McKinlay's experience was the most singular of all. It is well known that he crossed the continent from Lake Torrens to the Gulf. About



lat.  $19^{\circ}$  he came upon a magnificent range of mountains, giving rise to many streams, some of which are tributaries of the Flinders. Crossing all these, he came upon the Leichhardt, but still at some distance from its sources. Probably this river will be found next in importance to the Flinders. All its tributaries cannot come from the McKinlay Range, so that there is good ground for the conjecture that large and important tablelands, with good tracts of country, will be found upon the southern sources of its waters.

Next to McKinlay, and last upon the list of northern explorers, comes Stuart. I do not allude to the journey of Frank Gregory upon the north-west, because that does not properly come within the limits proposed in this work. It will be sufficient to say here that his discoveries showed the uniformity of the physical features of the whole north side of the continent. He found low alluvial flats, tableland, and then basaltic hills, giving off a southern and a northern watershed.

Stuart's experience is familiar to most South Australian readers, and was in some way very like Leichhardt's. He descended from the plateau in the first instance by means of the River Strangways—a stream which he traced from its sources. It was found to be a narrow, deep river, with steep banks and a clay soil. The banks were well lined with a large species of casuarina; and, very likely this is the stately *C. Decaisneana*—Dr. Mueller reports having found this tree in the interior, towards the centre of the tableland.

The Strangways was found to lead into the Roper, and thus Stuart placed himself in the same position that Leichhardt was in before him; with this difference, however—when Leichhardt was on the river it was scarcely flowing, and in Stuart's time it was so flooded that he had to search for a long time for a ford to cross it. His object was to cross the tableland, and descend to the Adelaide. Instead, therefore, of tracing up the Roper to its sources, he followed a tributary named the Chambers, which came from a more northerly direction. This new stream was found to wind very much, and was almost concealed from view by the thick growth of palms, canes, and other vegetation upon its banks; but as soon as it got fairly clear of the Roper, it was more open. When the party left that river, the country became a poor, stony, sandstone country, covered with porcupine grass, and intersected by creeks, though this was interrupted occasionally by well-timbered, and nicely-grassed flats; then the tableland succeeded, with its usual rocky and barren character of quartzite rises and spinifex grass. But there were swamps, and apparently plenty of fresh water, until the party found themselves on the edge of the plateau, with a river flowing through the flat below them, which they knew must take them to the sea. I shall have occasion, by-and-by, to speak of the physical feature of the continent thus laid open to us; in the meantime, let me add that though Stuart's journey lay latterly amid country already partially known, it was by its course able to give a solution of one of the most interesting problems remaining for solution upon the north-west, and that was, the character of the intervening tableland between the head of the Roper and the Adelaide.

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## CHAPTER II.

## PHYSICAL GEOGRAPHY.

THE COAST LINE—THE TABLELAND—THE SANDSTONE PLATEAU—  
THE VOLCANIC ZONE.

Let us commence our effort to understand the physical features of the north-west, as far we can, from the explanations recorded in the previous chapter, by trying to obtain a good general notion of the figure of this part of the continent. Let us place a map of Australia before us. Commencing on the east side, remark first, how the sea goes in with a tremendous indentation from Cape York, scooping out the great Gulf of Carpentaria. On the western side of the Gulf, the land does not reach so high a latitude again, neither does it terminate in a sharp peak, like Cape York. It is evidently not a similar mountain range; yet even here there are indications of a ridge of some kind in the interior, because there is a double chain of flat-topped islands, which run out to the north-east, and are known as the English Company's and Wessel's Islands. But these outliers are low, and their only claim to be considered as forming part of a mountain system is, that they are precipitous on their east sides, and on the west incline gently to the water. These peculiarities have been already alluded to.

West of this point, the coast is low and flat as far as Van Dieman's Gulf; it is broken occasionally by the outlines of isolated flat-topped hills, and once by the jagged outline of a mountain range—the Wellington Range. The sinuosities of the shore are very peculiar meanwhile; they form deep bays and remarkable inlets, rocky enough to be considered part of a mountain chain were the country not so very level. Coburg Peninsula is almost like an island, and I think from its shape can scarcely be considered a spur from a mountain; neither does it form part of the tableland, which I shall mention just now. What relation does it then bear to the rest of the coast? The answer is not exactly easy to give, with only imperfect data to guide us; yet I think its case must not be considered apart from the neighboring islands, Melville and Bathurst. Professor Jukes thought the formation at Port Essington was tertiary, and similar in age to those found at Brighton in Port Phillip; the latter are regarded as older pliocene (crag?) by Mr. Selwyn. I shall enter more into geological particulars in a future chapter, but I want to point out now, that if Coburg Peninsula be regarded as older pliocene, there is no difficulty in accounting for such a physical feature as the neighboring islands. There are no deposits in Australia so irregularly stratified, or laid down at such various levels; and such irregularity does not arise from subsequent upheaval, but partly from the nature of the deposit, and partly from the foundation upon which its work was begun. A universal and sudden (for so I consider it to have been) upheaval would give rise to such great differences of outline in the land raised. At sea it would leave islands; near the land, peninsulas; and within the coast, table hills and flat-topped ranges.\* Coburg Peninsula is not therefore a tumefaction caused by

\* The limits of the present work, prevent me offering even an outline of the evidence which has caused me to arrive at the conclusions given in the few preceding sentences. I hope, one day, to lay before the public, the reasons which induce me to believe that the close of the miocene period in Australian seas was accompanied by the disturbance of what was then sea bottom; that the upheaval of the greater part of the continent was sudden, and that it took place after the older pliocene period and before the newer.

volcanic disturbance, neither is it all that denudation has left of a large tertiary bed. It is the remains of some swelling slope, on the ancient sea bottom.

Beyond the islands the country is still low, though very uneven and much broken by sandstone hills. I do not particularize rivers and gulfs, for it need only be borne in mind, that from the sea, at least, all this line of coast appears to be of very trifling elevation. At Cambridge Gulf a great change occurs. Look upon the map, and you will see that the coast juts out from thence again northward, with an apparently rounded outline, though in truth rough and jagged enough in detail, it forms a kind of peninsula, smaller in scale and lower in latitude than Arnheim's Land. This continues to the Fitzroy River, and then monotonous sandhills, and a low coast of dreary mud flats continue, until the territory can no longer be called North Australia. The peninsula, just alluded to, has been called Dampier Land. It has a very remarkable line of coast. No longer are sombre rocks and sandhills, or solitary marshes, the only tokens of land; for the shore consists of lofty, bold escarpments of sandstone. High tablelands, and sharp, stony hills stand like ramparts against the beating of the waves, and the rock is cut into such smooth blocks, by the wearing of the regular strata, that it looks like an unfinished cyclopean wall. Such a coast must of course be very irregular. It is cut into by fiords, more like docks than arms of the sea; it has bays and narrow inlets, rivers, and fortlike islands, so high and so compact, that the sea wells in and out between them, like the dark smooth waters of a deep canal.

This then is the character of North Australia from Carpentaria to the west coast—Either a low wooded or marshy land, with but few hills, or a high lofty coast, very rocky and bold. This is what the sea margin tells us—let us look at the information we can gather from explorations made elsewhere.

Many inland explorations had not been made before it was seen that North Australia is a tableland. Let me explain my meaning. Some mountains are upheaved as crests which fold back the strata on either side, and the edges of the break are worn down afterwards to hills and valleys by drainage and decomposition. Other upheavals take the forms of downs, or large rounded elevations. But others, from causes, which we must take for granted here, cover an immense territory, and the pressure, instead of being centred in one spot, is diffused over a large space, and raises to an equal elevation a huge continental mass. Such a plateau abuts upon the north coast of Australia. But it is not always apparent at the coast. Causes have been at work which we cannot estimate as yet. It may be that a slight upheaval has interposed muddy, low, level land between some parts of the plateau and the ocean, or it may be from causes which are hidden now; but one thing, very evident, is that in Dampier's Land the elevated area is met with close to the shore, while in nearly every other place it recedes, and allows low alluvial or sandy land to intervene. The distance of the tableland from the coast varies. At Carpentaria it may be judged from the length of the rivers, except at the Flinders and Leichhardt. In Arnheim's Land the distance is considerable. Leichhardt crossed it when he descended from the plateau beyond the head of the Roper River; but, before he could get to this Land of Promise, he had, for many days, a wearisome search before he could find a passage. The precipice was 1,800 feet high; and, while the explorer peered in vain for a



path down the craggy escarpments, he could see the valley of the Alligator River spread out in the most tantalizing manner before him. Stuart appears, also, to have experienced considerable difficulty in descending into the alluvial margin of the north-coast, though in his case there were many rocky gorges at hand. He says in his journal of July 10, lat  $13^{\circ} 24'$ —"At half-past one crossed the tableland, breadth thirteen miles. The view was beautiful. Standing on the edge of a precipice, underneath, lower down a deep creek, thickly wooded \* \* \* We had to search for a place to descend, and had great difficulty in doing so; but at last accomplished it without accident. The course of the tableland is about N.N.W. and S.S.E., and the cliffs appear to be from 250 to 300 feet high. We were now, without doubt, upon the Adelaide River." Other instances of the character of the edge of the tableland need not be given, for it would appear to be very much alike in the various places where its limits have been crossed by Gregory, Burke, Landsborough, Walker, and McKinlay.

This then is the character of the tableland—a high, precipitous rampart of sandstone, either jutting out upon the sea, or standing like a wall at some distance inland. From its base or declivities all the drainage flows down to the sea as rivers or creeks, and their character depends upon the height of the plateau and the length of the flat.

We have thus before us two of the physical features of the north coast—the sandstone tableland, and the alluvial flats; and there remains yet one more feature to be mentioned. I do not intend just now to enter into geological subjects, but it can easily be seen that the upheaval of a vast mass of tableland must have been, in some way, connected with one of those fiery subterranean forces of which so many evidences remain at present upon the earth's surface. Neither shall I stop to inquire how those forces were exercised, nor in connection with what particular disturbance; but I shall take it for granted that such causes were connected with the upheaval of the plateau, and for this reason, we find inside its cliffs large masses of such igneous rocks as domite, diorite, porphyritic trap, and other members of the felspar family of minerals. They have been remarked only along the inner side of the higher lands, though I can see no reason why they should not also occur upon their edges. Sometimes, however, they occur almost upon the edge, and sometimes at a very considerable distance inland. At the head of the Glenelg and the Gregory they are very near the margin of the plateau; while at the head of the Flinders, the Victoria, and, probably, the Leichhardt, they are only met with far away from the sea coast and the lower lands. Wherever they do occur they give rise to rivers; in fact, it is my opinion that they are the only sources of the rivers upon the north coast. Wherever they are near the sea, the rivers will be short; and this is why the Albert, the Glenelg, and other streams have such a small course. Wherever they are far away, no matter where the tableland is—no matter how high, the streams will be found to go on to the volcanic hills. This is why the Flinders, the Victoria, and, probably, the Leichhardt seem to have courses quite independent of the sandstone plateau. I only give this as my opinion—so I had better give a reason, though it may savour too much of mere speculation. Sandstone tracts are always arid, and extensive sandstone plateaus are rainless regions. Some geographers explain this by showing that in every case the rainfall depends

upon the peculiar position of all the sandy deserts, with reference to the trade winds. This, I venture to submit, does not satisfactorily explain all the circumstances of the case. I think, I could offer, on the other hand, evidences that regions of volcanic soil are more humid and have a greater rainfall than the mere geographical position will explain. If I am right, the fact has an important bearing upon the exploration of the north coast. One has but to lay one's finger upon the sources of any river, as it is laid down in the map, and to say, "Here is volcanic soil, and in all probability fertile land." It will be seen from the same source, also, that the zone of volcanic hills does not correspond with the contour of the coast, nor even with that of the tableland. Its character has a marked influence upon the physical geography of the north coast, its soil and capabilities as a settlement, which, in the following chapter, we shall consider.

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### CHAPTER III.

#### MINERALOGICAL FEATURES.

##### THE SANDSTONE SOILS—THE BASALTIC SOILS—THE ALLUVIAL FLATS.

From what has been said in the last chapter, the main physical features of the north coast may be easily borne in mind. These are, the tableland, the slopes or alluvial flats between the plateau and the sea, and the basaltic or trap rocks upon its inner edge. Let us now consider them separately. First of all the tableland deserves the most attention, because it occupies by far the largest portion of the country with which we have to deal. According to Mr. A. C. Gregory, the plateau rises to about 800 feet above the level of the sea, and is connected geographically and physically with the sandy desert of the interior, where the rock, as it decomposes, only drifts into loose shifting hillocks of red sand. No such features are seen upon that portion of it which abuts upon the north coast; yet it is a sandstone, and highly ferruginous. The rocks appear to have been but little disturbed by its upheaval, and the regular strata are seen in their horizontal position, weathering out into courses until they appear as if they had been laid by the hands of a skilful mason. The composition of the soil appears to vary very much, dependent, of course, upon the nature of the underlying rock, which does not preserve a uniform character. It is always mixed to a greater or less extent, with oxide of iron. This mineral often comes to the surface as the stone decays, and covers it with nodules of ironstone. They sometimes collect grains of sand around them, and look like pieces of porphyry; or they become smooth and shining, metallic in fact, much resembling iron itself darkened with a rich brown. Quartz rock, also, is found on the plateau. It would seem that this mineral owes its origin to siliceous segregation from the sandstone, and not from injected veins; but the quartz, near trap or granite rocks, and in the alluvial flats, may have a different origin. I have never seen any mention of quartz veins occurring



in schists or slates in connection with granitoid rocks, such as we might expect were the quartz auriferous. They may, however, be found, and it is well that these characters should be borne in mind. Other minerals besides iron have been mentioned, but, I think, not as occurring on the plateau, and in no place in large quantity.

It need scarcely be said that sandstone rock alone must give rise to a poor and worthless soil. This will be thought discouraging, since I have said that the greater part of the territory is occupied by the tableland. Let me, however, be understood distinctly to refer only to those portions which have no admixture of any eruptive rock. Of these areas, no matter how small the mixture of other soil, too much cannot be said in praise. I shall have occasion to describe them presently; in the mean time, let me state that their area is large, probably larger than those tracts where the rock is sandstone alone. But where the sandstone occurs alone, the vegetable products would tell us a tale of desolation and aridity, had we no other evidence. The better sort of grasses are almost entirely wanting, and their place is taken, completely and thickly taken, unfortunately, by unnatural children of the order Graminaceæ. That an order so useful to man should have such discreditable relatives, is a wonder; but one can scarcely recognize the connection in the *Triodia*—better known, and more dreaded, by colonists under the name of porcupine and spinifex. The species found upon the north coast, three in number, differ considerably from those in the southern portion of the continent, except in their horrid peculiarities. They are just as spiny, just as thick, and just as useless in the north as in the south. They cover the ground at times, and conceal its inequalities, so that if the surface is strewn with rough blocks, this bane of the wilderness embraces the rugged edges, and smooths them over, concealing the obstructions, and letting them only be felt by the exasperated traveller. I have read no journal of exploration which does not contain a description of the porcupine grass in undisguised terms of hatred. I shall speak more at length of the botany of the tableland, in a subsequent chapter; but it is right to state now that porcupine grass is not the only vegetation. There are trees of the eucalyptus and pine (*Callitris*) family, and palms, which, if unproductive, are, at any rate, graceful. But at best the soil is poor, and the vegetation in keeping. Yet it must not be supposed that the tableland is a level, and therefore, quite uniform in character. There must be drainage there, as elsewhere, and along the valleys which serve as channels, no terms can be too high for the luxuriance of the vegetation and the richness of the soil. These valleys cut deeply into the sandstone, in most cases like gorges or ravines; but sometimes like wide open valleys, richly grassed, and of picturesque appearance. The latter are not common; indeed, it would be more correct to say, that they depend more upon the basaltic rocks for their soils, than upon the sandstone. They are rich in soil and products according to their worth, according to which also is inversely the liability to floods. At their sources, of course, neither the width nor force of the torrent would allow much surface soil to accumulate, but as they are followed down, they open out and become luxuriant. It would be invidious to say how many of such valleys we know, because our knowledge is so limited. Besides the creeks, there are, no doubt, many places where the inundation of the land is a consequence of the moderate inclination through which the waters flow. These swamps are filled occasionally,



and are generally large tracts of rich clay, liable to inundation. Whether they are capable of cultivation, I should think would depend upon the facilities for drainage.

Thus far I have been speaking of the tableland, where it is not interrupted by trap rocks, such as basalt, greenstone (diorite), and other igneous intrusions. Fortunately, the basalts are the most extensively developed, or explorers would not have had to speak so highly of these soils. There are plenty of igneous rocks in the interior of Western Australia; but instead of being fertile, they are dreary elevations, surrounded by scrubs, and only indifferently grassed. But in North Australia, the basalts are the prevailing igneous mountains, and they are certainly connected with the most available soils to be found there. No description would exaggerate their fertility. Sir George Grey was one of the first who came into contact with them, and he writes in the most enthusiastic manner, though his position was enough to damp the enthusiasm of any one. He speaks of a rich black soil, unequalled in any region he had ever seen; of grass reaching over the heads of the men, so that they had to call to each other to indicate their whereabouts. Stuart's description of the basaltic country, at the Roper River, must be in the memory of all. Leichhardt had been in the same place before him, and was quite as enthusiastic as to the nature of the soil. In fact, we find that every explorer, no matter how disheartened by the arid appearance of the tableland, had his courage quite restored, and his interest excited by the beauty and fertility of the land in the vicinity of the basaltic rocks. Certainly, some portion of the soil is stony, as all volcanic soils must be, and some small portion poor; but, no doubt, the general character is the same as that basaltic country which forms the richest agricultural inheritance of the Colony of Victoria. Of its extent little is known. Mr. Wilson mentions about a million of acres at the head of the Victoria alone. Probably it extends, as a somewhat broken zone, all round the north-west, with a varied width; but not very broad wherever it has been crossed.

Of the third tract of country, that which lies between the tableland and the sea, a good deal must be said, because it possesses no uniform character. Round the Gulf of Carpentaria the tract is thickly threaded with streams, and their alluvial deposits make up for the other deficiencies of the soil. Here, as elsewhere, the streams have rich alluvial banks, even when their beds are sandy. Beyond the Gulf the country is only known where it has been crossed by the tracks of one or two explorers. In North-west Australia, Sir George Grey never penetrated below the basaltic belt. Gregory kept upon the tableland between the Victoria and Roper Rivers; so that the intervening low lands remain unexplored. The testimony of Leichhardt and Stuart goes no further than as to the nature of the streams. We know more of Carpentaria than any other place; and in this case the description of the country between the various rivers is not very encouraging. Leichhardt, though rather too near the sea to make his observations of importance, described open box forests or scrubby thickets, interrupted here and there by well-grassed plains, evidently liable to inundation from the rivers. This is said of the Gulf generally, but of particular parts we have more detailed description, and can compare them.

The tract between the Flinders and the Albert is one of them. Probably no part of the north coast has been crossed and recrossed so often.

Gregory, Walker, Landsborough, McKinlay, and Norman have all explored there in succession, so that its features ought to be well known. Walker's opinion on the subject is very precise. He says that he differed from Mr. Gregory in thinking that the plains at the foot of the tableland were such as would be caused by the retirement of the sea. He points out that they are crossed by sandstone ridges, which divide the basins of the rivers. These ridges, he remarks, are very fine downs in many places, and the country between a succession of plains. The latter vary in character from very good to very bad, but the general character is good; if those portions are included which are scrubby and stony (!) A great portion of them are liable to inundation, so that they cannot be very unproductive. We learn this from many sources. Nearly every one can remember how Burke and Wills had to flounder through the flooded flats at the mouth of the Flinders. They struggled manfully against such an unlooked for difficulty; but at length it baffled them, and they were unable to reach the sea side.

These flooded flats would not, perhaps, be all equally well grassed, and the soil, perhaps, more or less light and sandy, but still available. So say the majority of explorers, though they are far from unanimous. But they all agree as to the richness of such places as the Plains of Promise; and we may be sure that there are some more of such tracts besides those found upon the Albert. The soil there would be fit for anything. We must suppose, unfortunately, that similar chosen spots, if they exist, are limited in extent, or they must have been seen. They cannot be considered so valuable as the grassy country upon the volcanic belts. It would be worse than useless to attempt a settlement upon any part of the Gulf, except near such soils; and this, it would appear, must confine the selection of sites within very narrow limits. Indifferent lands may be rendered available for settlement in many ways, once a town is established for a central depôt; so that, in spite of all that has been said to the contrary, a Colony in Carpentaria appears a reasonable undertaking, provided excessive anticipations were not formed in the commencement. The settlers should not be speculators, but steady, practical old colonists, who would take an interest in the experiment, and have knowledge enough to give the country a fair trial.

Thus far Carpentaria. Of the other portions of the low land between the tableland and the sea, little has been seen, except in connection with rivers. This is not the best way to explore a country, nor to obtain a good general idea of its capabilities, but is one to which explorers have been driven by their peculiar exigencies. We may say that the interior of the country between Carpentaria and the Victoria is almost unknown. Whether good or bad we cannot decide with certainty, but, probably, we should be right in thinking that it is better than the low lands of the Gulf. The reasons for this conclusion have only been obtained from the rivers, and these form the subject of the next chapter.

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## CHAPTER IV.

## THE RIVERS OF THE NORTH COAST.

THE LIVERPOOL—PORT DARWIN—THE EAST, WEST, AND SOUTH  
ALLIGATOR—THE ADELAIDE—THE VICTORIA—CAMBRIDGE GULF  
—THE GLENELG—THE FITZROY.

The rivers of North Australia, about which anything is known, are few in number if we exclude those of Carpentaria. The most important which have been examined are, the Liverpool, the South and East Alligators, the Adelaide, the Fitzmaurice, the Glenelg, and the Fitzroy. These can bear only a small proportion to those which really exist, because the coast has been surveyed from the sea alone, and the only inland excursions have been absolutely confined to following the course of one of the above-named streams. Coast explorations are always very unsatisfactory; they generally leave a great deal unexplored, and, as a means of finding rivers, they are useless. A good instance of this was seen in the alterations made in the map of Carpentaria after Leichhardt's journey; but, probably, the best illustration was furnished lately by the result of F. Gregory's expedition. The country explored lay between Exmouth Gulf and Breaker Inlet upon the north-west coast—a line along which several marine surveys had been made. They were those of the Dutch, of Dampier, of Baudin, King, Wickham, and Stokes; and yet not the sign of even a streamlet had been discovered. Frank Gregory, who followed the same coast-line at some distance inland, discovered no less than ten large rivers—the Fortescue, the Sherlock, the Yule, the Strelley, the Shaw, the De Grey, the Oakover, the Harding, the Ashburton, and the Hardey. Doubtless, then, if the coast were followed, other streams besides the few enumerated would be found between the Fitzroy and the Liverpool. If they exist in proportion to those upon the north-west coast, we might look for at least thirty more.

Apart from the streams, rich land cannot be expected; but it may be well to add a few words about Mr. F. Gregory's experience. He found the intervening plains rich, and well grassed, and even luxuriant, near volcanic rocks. In other places the soil was rather light, scrubby, in fact, and of a sandy nature. Once only was a desert met with; an absolute desert of large extent, and destitute of any redeeming feature. Like Sturt's Desert, the red sand was drifted into high ridges, and as far as Gregory went, this rolling plain seemed boundless, except to the east, where a change seemed very far away. Thus mixed and mingled, we may suppose the land to be upon the north coast.

The Liverpool River was discovered by King, in 1819. It is situate in longitude  $134^{\circ} 15'$ , that is a little to the west of Carpentaria. Like all the tropical rivers in Australia, its banks are thickly covered with mangroves, for the first twelve or fourteen miles; and, subsequently, it runs through a low level country almost destitute of trees. King followed it for about forty miles, and when its further examination was abandoned, it was twenty yards wide, with a depth of twelve feet. From the rapidity with which its width diminishes, I should conclude two things, for reasons which I have explained in a preceding chapter. I should suppose first, that the channel is principally used by the swollen torrents of a mountainous interior; and secondly, that high basaltic mountains will be found at no great distance from its mouth. On looking at the map, one natu-

rally concludes that the sources of the Liverpool must be in the basaltic tableland on the banks of the Roper. If this be the case, it is not the only channel which drains the north side. There must be many others yet unknown, which irrigate the margin of Arnheim's Land.

It is upon this part of the coast that Port Darwin occurs, as well as the Alligator Rivers, and the Adelaide. The Port has been spoken of as a likely locality for the projected settlement, so that a few words may here be added about it. There must be plenty of streams about Port Darwin, which, to be found need only be carefully looked for. The search should not, however, be made in a boat, nor from the sea-side. A properly-equipped land party should strike from the head of the bay, to the eastward, and it will not have to proceed far in search of fresh-water streams. The experiment will have probably been made, before these pages can possibly be in the hands of the public.

Of the Alligator Rivers not much need be said. There are three of them, all discovered by King, and named respectively the East, South, and West Alligator Rivers. The description of the Liverpool might be made to apply to them equally well. First, mangroves; then, low banks as usual; and plains like rolling prairies. The latter were relieved by a few wooded hills, and some clumps of timber, very solitary and tropical in appearance—for palm trees, were conspicuous above all. In these lonely expanses, an extra appearance of desolation was added in King's time, by the rank thick grass having been recently burnt. He saw no natives, but birds in plenty. They were of that kind which love to haunt places of melancholy loneliness; and they shared the dreary morasses with crawling slimy alligators. It was down the South Alligator that Leichhardt travelled on his celebrated journey. His opinion of its character is of great value; because it must have been tempered by a knowledge of nearly every stream in Australia. He described the valley as being thickly clothed with the richest grasses, and the river most gracefully fringed with pandanus and drooping trees. The banks were surrounded by sedgy grassy swamps, lying between the spurs of hilly country which protruded upon the valley of the river. These swamps formed the leading features of the Alligator, and gave it whatever richness it possessed. They must be regarded as a sign that the level of the valley is regular, and the amount of moisture received, very great. The explorers found no inconvenience from sleeping on the ground in these places, and such a proceeding in every other tropical climate, would have cost them their lives. On the whole, therefore, we may regard these swamps as available land, and if drained, would be among the richest portions of North Australia. The country between the South and East rivers, is poor and stony. It was not destitute of water, and there were occasionally well grassed plains, and beautiful valleys, which would have done honor to any country.

The tributary of the Adelaide River, described by Stuart, takes its course like the Alligator, through a valley very much occupied by large swamps and morasses. Mr. Stuart first came down upon a tributary which he called the Mary, and then reached what he considered the Adelaide. Mr. Waterhouse, in an able *resumé* of the physical character of the whole of Stuart's journey, gives some reasons for believing that Stuart did not come upon the Adelaide at all, but upon some neighboring stream from the tableland, which discharges its waters upon the east side of Cape Hotham. One of the facts upon which he grounds his opinion



is, that the Adelaide was described both by Stokes and Helpman, as a river with a strong tidal current; and none of Stuart's party were able to see the slightest movement in the waters of the river they were upon. Mr. Waterhouse has good ground for his opinion, if I am justified in the belief that an immense amount of drainage comes down from the table-land of the Roper, to the west. But without having recourse to a supposition of a fact so rare in geography, as that which would make two large rivers disembogue upon the coast, close to each other without uniting their waters, is it possible to reconcile the discrepancy between Helpman and Stuart? It is certain that the river described by Stokes and Helpman, in no way corresponds; and in longitude and latitude the difference is remarkable. It is certain also that Stuart did not trace his river to its mouth, and settle the question as to what part of the coast it emptied itself upon. They may be different streams, but may they not also be different branches of the same? It is objected that neither Wickham (for Stokes did not ascend the river, and only described it from Wickham's account), nor Helpman saw any signs of so large a branch as that described by Stuart, but they might easily have passed it, if the river was wide. No boat expedition has ever been able to see all the branches of any river on the north coast nor even all the branches upon its lowest part. The Flinders and the Albert are instances of this. Stuart's Adelaide is, very probably, therefore, a branch of the main river. If a name were wanted for it, I am sure it deserves his own.

Let us now see what is the character of these different branches. Mr. Stuart's river was like the South Alligator, very marshy upon its banks, and the country around was low and level. Still, there were ranges to the westward, while the east side of the marsh was skirted by a low rise of well-timbered ground. As the banks of the stream were too boggy to be followed to the sea, it was along the low eastern rise that Stuart proceeded. This course brought the party over well-wooded and watered country, with occasionally (says Mr. F. G. Waterhouse), some fine open grassy flats of rich black soil. The last part of the journey was through a very dense scrub of luxuriant foliage, too thick to be passed through without an axe to clear the way. This ended abruptly at the sea-side. Altogether, not much of the river was seen.

Of the Adelaide, we learn that fifteen miles from the mouth it was fringed with mangroves, and higher up, many points were thickly wooded. The banks were low, not more than five feet above the water level, while on either side a vast prairie country extended, whose monotony was broken here and there by clumps of timber. Somewhat less than half way up, rose on both banks a thick jungle of bamboo, which, in places where the water was always fresh, attained the gigantic height of sixty to eighty feet. For only thirty miles of the upper part of the river was the water fresh. Between twenty and seventy miles from the mouth, the soil was a good light-colored mould; then, at a place where the bank of the river was marked by a coarse red gritty sandstone projection, the aspect of the country changed. Instead of low plains, the surface became gently undulating, lightly wooded, and, in some places, stony. From the highest tree at Wickham's furthest point, one wearisome level extended as far as the eye could reach; except that, about ten miles to the southward, there was a small rocky eminence. Latterly, the river was only fifty yards wide, with banks from six to twenty feet high. It was sub-



ject to a tidal change of level, about three feet in all, but there was no perceptible current. There was drift timber in the trees, eight or ten feet above the highest level; and, from the hollows in many of the plains, it could be seen that the channel overflowed periodically. The furthest points reached in the boats, was, latitude  $12^{\circ} 57'$ , longitude  $131^{\circ} 19'$ . One has but to refer to the map to perceive how far this was from any part of Stuart's track. From the description, it is plain that the Adelaide is a very important river; in fact, one of the most important yet discovered upon the north coast. Its winding course, its many branches, its narrow deep channel, and the long extended tidal reach, are all features which in Australia show an important and large stream, with many affluents, and with sources a long way removed from the sea-board. The Flinders is just such a narrow winding river, but the permanent water is not so wide.

Granted then, the importance of the Adelaide, what is its watershed, and where are we to look for its sources? From the map of Gregory's route, we gather something of its nature. When he left the Victoria to return to Brisbane, he followed up an easterly tributary, in latitude  $15^{\circ} 38'$ . The country he described as very rocky, and of poor quality, except on the banks of the creek. At its sources, however, he found a fine tableland, with splendid soil and grass. These eruptive rocks are doubtless part of that belt which lines the inner side of the tableland, and I have strong reasons for thinking that Gregory saw at this part, only the lowest and worst-watered portion. There must be higher and better tracts to the northward, to give rise to the Adelaide and Fitzmaurice Rivers. It ought to be very high and very extensive to give rise to the Adelaide alone, because it would only be 180 miles from the mouth of that river; but when we bear in mind that the same basaltic tableland is of extent sufficient to supply the Fitzmaurice, and some of the tributaries of the Victoria, its importance cannot be overrated. It must fill a considerable portion of Arnheim's Land with excellent country; and it is probably sufficiently elevated above the sea, to be available for sheep.

The west side of Arnheim's Land may, therefore, be considered as the most favorable locality for a settlement; and the selection of this locality has been a most wise one. Let it be borne in mind, that if it offers facility for settlement, the best parts of it are supposed to be upon the higher land, and therefore at some distance from the coast. Very likely, the impression conveyed upon first landing, will be unfavorable, and the country near the sea, will in no case be found very available. Even in the best places, I apprehend the vegetation will be rank and unwholesome for stock. But this should not condemn the inland country. The coast is bad in Queensland, and yet see what beautiful basaltic downs are found some few hundred miles up the country. The land is even bad and unhealthy for stock upon the south coast; but who says that Southern Victoria, or the South-east District of Adelaide, is not a splendid inheritance. Settlers must push into the interior wherever they are, so let it not be forgotten on the north coast.

I have already said that the nature of the country between the Adelaide and the Victoria Rivers is unknown—that is to say, the portion of it which lies between the tableland and the coast. A. Gregory passed along the plateau, and he does not give a very flattering account of what he saw, except at the head of the creek already spoken of. Beyond this, he says, a low sandstone tableland commenced, elevated about 700 feet

above the level of the sea. The country was a thinly-grassed, stringy-bark forest, destitute of any watercourse, except one small creek. In another place he remarks, that the country appeared to be a northern extension of the interior desert; and this is all we know as yet of this tract. Of the coast, we do not know very much more. King was unable to make a complete survey of it. Port Darwin, an inlet at the bottom of an opening missed by King, was named by Stokes after the former naturalist of the *Beagle*, the since celebrated Charles Darwin. The name was suggested by a new feature in the geological character of this part of the continent. The formation was a fine-grained sandstone with quartz rock, and talc slate. This geological peculiarity has been since referred to by Lieut. Pascoe (one of the officers of the *Beagle*) as worth the attention of the settlers on the north coast. Something, it is true, may result from it; but quartz and even talc slate in sandstone rock, do not necessarily result from metamorphism; and, if they did, it would be still a question how far such indications were connected with auriferous deposits. Port Darwin itself is worth a more lengthened description; and, in giving it, I follow Stokes's narrative, for I am not acquainted with any other.

After stating that a great portion of the harbor was filled by large shoals, he says they proceeded to explore a considerable opening to the north-east, which was about six miles off. An extensive islet and reef left the entrance only a mile wide; but, beyond this, it expanded into two arms, between small groups of peaked hills about 250 feet high. The most easterly of the arms was the largest, and curved round to the southward. It soon became shallow, muddy, and densely fringed with mangroves. The alligators were as plentiful as usual. Captain Stokes only proceeded about thirty miles from the entrance, and was then, as he thought, scarcely fifteen miles from the Adelaide. We might imagine that this was one of the outlets of that river, but that the latter has large saltwater arms to the westward, and the intervening country was rocky, and not like the delta of such a river. Stokes said that the Adelaide was the deepest river in Australia; and this fact, with such a short course, decides against the idea of a delta. The description of the country around is not encouraging; but the *Beagle* visited it in September, and, probably, during a very dry season. It was stated to be a most thirsty-looking level, with low brushwood, which cracked and snapped, as the explorers walked through it, with a brittle dryness which testified how everything was perfectly parched. "A single spark," says Stokes, "would have instantly wrapped the whole face of the country in one sheet of fire. A single blast of heated, withering air, as from an oven, would occasionally strike the face as we walked along. Sometimes they were loaded with those peculiar disagreeable odours that arise from different kinds of gums; still the white eucalyptus and the palm wore, in comparison with the other kinds of vegetation, an extraordinary green appearance, derived, probably, from the copious falls of dew, which is the only moisture this part of the continent receives during the present season." After this small exploration of Captain Stokes, other examinations of the port were made. The opening on the eastern part of the harbor was tried by Mr. Fitzmaurice (of the *Beagle*) for twelve miles in a south-easterly direction, which was as far as a boat could navigate. The remaining branch in the large opening, on the south-east corner of the harbor, was explored for



three miles, beyond which it was impossible to advance. Large blocks of granite were strewed upon the ground. The rock gives a strong presumption in favor of the metamorphic character of the talc slate observed at the opening of the port. But, I think, this coast will be found similar to Western Australia, where a sandstone and granite rock is associated with quartz and igneous dykes. There are small injections of copper and lead, but no trace of gold has been found. The general description of the coast was, that it was low. "There was no variety," Stokes adds, "in the shores of this inlet, composed, like all others, of an impenetrable thicket of mangroves. A few conical hills to the westward were the only elevations to be seen."

There were two other ports near Port Darwin, remarkable as being long, winding sheets of water, almost like lochs. It is difficult to account for this peculiar outline of the shore. One can explain irregularity where the coast is high and rocky, and where the abutment of a stony tableland upon the ocean gives rise to fiords and inlets almost castellated in appearance; but at Port Darwin there is nothing of the kind. The land is low, and not interrupted by any swelling elevations, or spurs from mountain ranges. If we look for an analogy to such a sea-shore, we shall not find any either in Australia or elsewhere, except in connection with great rivers. Are we to suppose that they exist in this place, or that it is a simple curiosity in physical geography? I think, we shall hesitate to adopt the latter opinion, when we remember how unsatisfactory coast explorations are as a means of finding rivers; and, I repeat that this part of the north coast furnishes greater probabilities of an extensive freshwater drainage than any hitherto discovered. The mere upheaval of a solitary mass of granite would give rise to irregularity; but the low alluvial ground is strongly indicative of something more.

I pass now to the consideration of the physical feature of the Victoria River. It will be remembered that I have said that this is an instance of a stream which cuts down a bed through the tableland, and does not take its rise merely at its base. Stokes gives a most enthusiastic account of it; but, probably, Gregory's description is the fairest, and I shall principally follow it. He says that the country is fine and grassy, but very stony in places. The soil would appear not to be different from what is usually found upon the banks of rivers; and, at some distance from the channel, it is what might be expected to result from the decomposition of a sandstone rock. On entering further into the tableland, the character of the river alters considerably. It runs through a deep gorge or ravine bounded by cliffs of sandstone from 50 to 100 feet high. Through this ravine the river winds, forming deep reaches, sometimes several miles in length, and only separated by narrow reaches of shingle rock. This valley suddenly expands into a vast plain, covered with splendid grass, and so fertile in appearance, that Mr. Wilson, the geologist to the expedition, is quite unbounded in his praises of it. The plain was studded with several isolated hills of trap or basaltic rock, and the soil was rich and fertile. It seems to continue to the basaltic watershed, which is nearly 1,800 feet above the sea level; and, therefore, probably cool enough to be available for sheep. Beyond the watershed the country was well grassed at first, but soon became an inhospitable desert, with little water and less grass, except spinifex.

Probably there is no river so available for the purposes of settlement,

after the Flinders and Adelaide, as the Victoria; and it is astonishing that it has as yet attracted so little attention. The navigation is, certainly, dangerous; but if the soil be good, water abundant, and the climate healthy, this difficulty ought not to be unsurmountable. A glance at the map will show that the position of the dividing range is peculiar. If the volcanic zone were to follow the coast line, this would be, as it were, an indentation, and would sweep round north by east to join the sources of the Roper. Thus it would correspond with the sources of the streams connected with the east side of the Victoria. It is in this direction, therefore, that more good land must be sought—though, as far as we know, it is not certain that the trap rock comes to the surface all round the tableland.

The next inlet to be considered is Cambridge Gulf, explored by King, as already mentioned. This opening looks so very much like the mouth of a large river, that we read with great disappointment of King's being unable to find fresh water in any part of it. Two things must, however, be stated. He did not see every inlet, neither did he completely examine all those he did see. As far as I am aware, Cambridge Gulf has not been visited since; and I cannot help thinking that there must be some fresh water drainage into it. It is too near the watershed of the Victoria, not to receive some portion of its rainfall; and even the large hills around, seen by King, ought to give no inconsiderable supply.

Of the land, the account is not favorable; but King did not see much of it. He described it as a low level plain, covered with mangroves, and encrusted with salt. There were hills here and there, and the upper part of it was surrounded by the peculiar bastion-like eminences which form the flat-topped outliers of the sandstone plateau. It was a desolate, arid-looking place when King visited it; but the season of the year was unfavorable, so that it was seen at its worst. Upon the whole, no one would recommend Cambridge Gulf as a settlement; but it may be an important place in its way as the future of Australia unfolds.

Beyond the Gulf, the high bold coast ensues, as already described in connection with Grey's expedition. Fresh water and good harbors are to be found in every part of its extent, but slightly difficult of approach. The soil, in its picturesque fiords, ravines, and glens, must necessarily be limited, and on the top of the tableland it is bad. Future explorations must tell us more of the nature of the inland country, before the good land-locked harbors, and cascades of fresh water, dashing out between the crevices of the sandstone, can be made of any use.

Passing over the intervening high coast, we come to what is called Dampier Land, and the Fitzroy River. This stream has never been explored but once. Captain Wickham made a boat excursion up it about twenty-seven years ago; and it is astonishing that so important a stream has since attracted so little attention. Again, I have only Stokes's narrative as a guide, and I hope I shall be pardoned for giving the quotation nearly entire.

The mouth of the stream was very wide, and closed by a sand bar larger than most of the Australian rivers. This bar becomes a series of mangrove islands, at high water; and a short distance beyond, the river contracts to the width of one mile. Some miles further south, small low grassy islets extend almost across the river, leaving confined narrow channels, only passable for boats. After this, it widens out again, and though



gradually diminishing in depth and width, yet, at the end of the second day's journey, the explorers found it still from 300 to 500 yards wide. It was quite fresh, though the tide rose and fell in it daily. The depth frequently varied. In some of the long, still reaches, it was very deep, and in other places extremely shallow; in this respect, in fact, like all Australian rivers. On the third day, it was found to divide into two branches; one having an east-south-east, and another a south-south-east direction. The former was unimportant, but the latter came through a densely-wooded country, with large trees on the eastern bank. There were flood marks twenty feet above the level of the stream, showing what a large body of water the channel conducts at times. Captain Stokes adds this important observation; that the flood did not seem to depend immediately upon the quantity of rain; for, while the whole face of the landscape indicated large and recent supplies, the river appeared little, if at all affected by them. This points, not only to a distant source for the stream, but shows that it must owe its supplies to a number of different tributaries.

Beyond the division just spoken of, the explorers found the river again widening to nearly 200 yards, but a chain of small islets nearly stopped the boats. This obstacle was overcome with difficulty, and proceeding another mile, they came to a rapid on a shallow bed, which rippled forth from a glassy, deep, and beautiful reach, bounded by high grassy banks. At the end of another mile, the channel became entangled with small islets and sunken trees. The river thus pent up, ran through the small openings with great velocity, while above it seemed to have assumed the still character of the other reaches. This was the point where the further exploration of the stream was abandoned, in latitude  $17^{\circ} 44'$ , longitude  $124^{\circ} 34'$  east. Its course had been traced ninety miles from the coast line. The land around the river, was, as we might imagine, excellent. Near the mouth, it was a low grassy flat, subject to inundation, like the mouths of all streams upon the north coast; but further up it improved wonderfully. The eastern bank was thickly wooded, and the country to the westward appeared clothed with verdure. There were rocks here and there, but the general character of the land, was an uninterrupted level, with open woodlands and grassy plains. As far as I am in a position to judge, I think that the Fitzroy is equal in importance to the Victoria or Flinders. Its length, its sinuous course, and its width, all indicate an important stream; while the flood-marks, and the fact of its not being affected by heavy local rains, point to an extensive basin of drainage.

It is a question, whether the exploration of the Fitzroy does not concern Western Australia more than this Colony; but, at any rate, the locality must be of great importance hereafter, as a means of connecting the present settlement of North-western Australia, with that which will be established upon the north coast. Without pretending to any great sagacity, I may predict that there is, about 200 miles from the mouth of the Fitzroy, an extensive and high basaltic tableland, and that the intervening country is fertile and fit for settlement. Of the width of this tract of pasturage I cannot speak; but I conjecture that it was the commencement of it which Frank Gregory saw in the distance, when want of water prevented his further exploration of the desert area which intervened. I therefore draw attention to this river, as worthy of a great

deal more notice than it has received, not so much for itself, as for the country at its sources.

Before leaving this subject, I might offer a conjecture as to whether the sources of the Fitzroy are a continuation of the basaltic zone from which the Victoria proceeds; and whether the tracts of alluvial land between the two are uninterrupted. If we may judge from the analogy of the west of the plateau, we may be certain that they are not. Besides, the high mountainous country between Hanover Bay and Prince Regent's River, intervenes; but there may be, nay, probably there is, a belt of basaltic rocks, at the back of Grey's tableland; and at any rate, the connection of the good land about the Fitzroy, and that about Collier Bay, cannot be very doubtful. If an overland expedition, between the heads of the Victoria and Fitzroy were to be made, it should be on the inland side of the watershed. It would clear up one of the most important questions as to the interior of Australia, which yet remains to be solved.

## CHAPTER V.

### CLIMATE.

THE MONSOONS—CAUSES OF FEVER—CAUSES OF CLIMATE—HEAT—ELECTRICITY—FERRUGINOUS SOILS—LOCALITIES TO CHOOSE—LOCALITIES TO AVOID—CLIMATE AS AFFECTING PRODUCTIONS—ARABIA LIKE AUSTRALIA.

Of the climate of the north coast of Australia, it will not be necessary to say much. It is tropical, and any one who expects very cool weather under these circumstances, will be disappointed. The heat, however, is not so unbearable as many persons imagine; for it depends, perhaps, more upon its constancy than its intensity. It is a very dry heat at times, which is a mitigating circumstance unknown in India and the greater part of the Indian Archipelago. Any person who has resided a summer in Adelaide knows the difference between a moist and a dry heat; and knows, also, that a thermometer at 95°, on a dry, hot day, is infinitely more tolerable than a temperature of 80° after a shower of rain.

The north coast being within the tropics, should be within the influence of the trade-winds, which at sea, on the south side of the equator, always blow in a south-east direction. It is considered by some authors that the heat at the equator is sufficient to raise the trade-winds; but that is not an opinion which is generally adopted. Many meteorologists point out how large quantities of heated air generally divert the trades from their normal course—and Australia is a case in point. Whatever be the explanation, it is certain that large tracts of land offer a better refracting surface than the sea—and, consequently, the air above them gets rarified. Colder air rushes in to supply the vacuum; and, in providing for this supply, the trade winds get taken out of their course. The direction of the current near the coast is almost constant, and, consequently, much cooler than the air whose place it supplies. As long as the monsoons (as these currents are called) continue, the air ought also to be



moist and healthy. The changes always bring rain and sultry heat, at seasons which I shall speak of presently; but my object here is heat of climate in a sanitary point of view, rather than as a speculative branch of meteorology; for that is what interests us most of all just now.

Explorers have been in North Australia at all seasons of the year, and I cannot find that their health suffered much in consequence. In the case of the marine surveys, this, I am aware, proves nothing; but, at any rate, a good trial has been made at Carpentaria and the Victoria River. Captain Norman's crew, when out on the search for Burke, and the crew of the *Tom Tough*, when with Gregory, in 1855, remained for some months upon the land. No signs of fever or dysentery were seen in either instance; and had the places inherited the usual tropical, unhealthy, character, the crews would hardly have escaped such diseases. It is true that explorers have plenty of hard work, and are not, by any means, burdened with too much to eat. But, I apprehend that the same conditions are likely to obtain among settlers for a long time to come; and if affluence should hereafter promote inactivity and indulgence, and the tropical climate should then inconvenience, the remedy will be easy to find.

Port Essington was found unhealthy; but, it is said, from local circumstances. Intermittent fever was, I believe, the disease, and the patients recovered when they were removed to another part of the coast. Melville Island was also unfavorable for Europeans; but Raffles Bay was not. There can be no doubt but the climate is very much affected by the soils and the character of the vegetation. In sandy country the atmosphere is drier, and the tendency to disease less; though I admit that the exceptions to this rule are somewhat numerous. A moist atmosphere, with luxuriant vegetation, and great heat, is supposed to be unhealthy, though it is not very clear why. The explanation may be as follows:—One of the main functions of life is respiration, by which process the blood excretes its carbon, and takes oxygen into the arterial circulation. Now, the lungs being of definite capacity, one inspiration will take in nearly always the same quantity of air. But the quantity of oxygen is not always the same. If the barometer is low (I am speaking in the popular manner), the air will be more expanded, and the actual quantity taken at each respiration would be less; but, I suppose, a compensation is afforded by the pressure then taken off the chest, which increases slightly the capacity of the bronchial tubes. But the quantity of oxygen in a cubic foot of air, of a given density, may be lessened by something else besides expansion. If the air is saturated with moisture, the amount will be less; and, in tropical climates, where the heat and moisture are great, the decrement of oxygen from this one cause becomes something alarming in the course of several days' breathing. For want of sufficient oxygen, the blood becomes deteriorated by excess of carbon. Subsequent disorder of the liver and brain ensues, manifested in fever and its accompaniments. This is one explanation; but I do not mean to say that it is the right one. It is feasible and easy; but, I suppose, that is its fault—because the question is confessedly mysterious and obscure. If it be true, however, it points clearly to one remedy—and that is, to an increase of exercise, and decrease of food in tropical countries. In effect, we find that the natives of such climates are simple as possible in their diet, and seem to live on a very small quantity.

In the absence of fact, then, and in the unsatisfactory state of theory,

only general useful directions may be given. Cleanliness should be studied, and wet or cold avoided; not as one would practice the one and avoid the others in temperate climates; but as particulars on which one's life depends. Rich food and fat meats should be abstained from, and, above all, alcoholic stimulant. As regards particular localities, nothing can be said until our experience be more extensive; but, it should be borne in mind, that perhaps a change of what is called climate, may happen within very short distances. Mr. Glaishier has pointed out that the climate of Cornwall and Devonshire is different from any other part of England; and that, so far from being equal even in those countries, there seems to be different climates in places close to one another. Malte Brun (the highest authority) distinguishes the causes which affect physical climate, as nine in number, namely:—The action of the sun upon the atmosphere—the interior temperature of the earth—elevation above the sea—inclination of surface and exposure—position of mountains with reference to the meridian—vicinity of great seas—the nature of the soil—population and cultivation—and the prevailing winds.

The action of the sun upon the atmosphere depends, as Professor Tyndall has shown, entirely upon the amount of moisture. As the action of radiant heat is much greater on dry, than on moist air, the rainy seasons should be the most unhealthy; because moderate warmth has always been found more unhealthy in those climates than absolute heat. As to the electrical condition of the atmosphere, I really cannot see that it should enter at all into consideration as a sanitary agent. The electric fluid is now only regarded as a mode of force or motion. The same heat which has driven up moisture from the earth into the atmosphere in the form of vapour, is violently returned when the vapour is suddenly condensed by a cold current of wind. Though the lightning may have great influence upon chemical change, I cannot see, unless by direct contact, that such change could affect the human system.

Thunderstorms are of frequent occurrence upon all the north coast. They are attended by violent squalls, and heavy rains; but are never of long duration. They seem only to occur at the change of the monsoons, and may be explained thus. Currents of air from opposite directions, will be generally of different density and temperature. As they mingle, a condensation of moisture takes place in the warmer volumes, and hence precipitation in the form of rain, and liberation of the heat in the form of electricity.

Though the electric fluid may have little direct influence upon health, sudden change of temperature, fall of rain, and the development of ozone, may have a great deal. The changes of temperature alone are most surprising. Stokes relates that the wind and rain became so bitterly cold during the squalls, that at times, his boat's crew used to rush into the warmer waters of the Victoria River (clothes and all), to keep off the cold during the passing of a shower.

Medical men are not agreed as to whether electrical discharges play any part in the human economy. Professor Schönbein, however, considers that its importance has been much exaggerated, and that its office is quite subordinate to heat and light. Electricity, he says, would affect neither taste nor smell, if atmospheric air did not contain oxygen and nitrogen; and the phenomena of sound and light, perceived during electrical discharges, are due to vibrations into which the particles of air are



thrown—electricity having nothing directly to do with them. Some persons, however, have endeavored to connect the magnetic influence of iron, with the fevers which occur in tropical climates, because iron and its ores in the soil, are generally supposed to exert a poisonous influence upon the air. Granted, however, that we can trace the cause to iron, it is far from proving that electricity or magnetism are to be looked upon as the agents.

Leaving magnetism aside, I think it is pretty well proved that the most deadly fever countries in the world, are places where the soil is of a highly ferruginous character. It is so in India, on the coast of Africa, in China, and in South America. In the latter place, Humboldt states that the natives firmly believed their maladies arose from the exhalation of the ferruginous rocks around them. In India, there are hills whose climate is most deadly to Europeans, in spite of their being 1,300 feet above the sea level. They are dry, perfectly exposed to breezes; the land is almost quite denuded of trees, and there are no marshes or decaying vegetation; and all these favorable circumstances do not prevent the atmosphere being almost poisonous, except to natives, and there is nothing to account for the fact, except that the soil is highly ferruginous. Singularly enough, there are hills within a short distance, with similar conditions of height, vegetation, and exposure, but with a different soil, and they are quite healthy. It is said, also, that wherever the ferruginous soil disappears, the fever goes with it. It may be supposed that limestone has a corrective influence; and if it has not, I don't know how we shall reconcile the theory, with the many places upon the south coast, where ironstone prevails, and no fever, unless a tropical latitude is a necessary condition.

It would be easy to find an explanation for this fact, if fact it be, without going very far. Iron readily oxidates, when in contact with water. In doing so, it liberates hydrogen, which may act as a poison alone, and certainly does, in combination with sulphur, and other elementary substances. At any rate, the suspicion even of such a cause, cannot be without its use; and should tropical fever prove troublesome to the northern settlers, they can, in choosing healthier spots, try the experiment of avoiding ferruginous soils. Unfortunately, this kind of rock is, as I have already said, very extensively developed in North Australia. I regard it as a tertiary deposit; and I shall have occasion to indicate the localities more particularly, when I come to speak of the geology of the country.

To finish what concerns climate, as far as it depends upon the soil, let me add, that clay lands, while they retain moisture of every kind, do not readily admit air or heat. If they are impregnated with salt, they cool the atmosphere when moist, and heat it when dry. Sandy soils are dry, and, though warmer, are more healthy than clay soils. Dark soils absorb heat and moisture readily. Being the richest, they are more likely to attract the settler than any other. Finally, I may add a few directions as to the choice of a residence, taken from Dr. Martin's volume on tropical climates, a valuable work by an eminent man, whose suggestions I have found most useful in composing this chapter, and to whom I must attribute whatever merits it may possess.

Open downs are healthy. Such grass-lands as have a sufficient fall are healthy. The elevated banks off rivers, with a sufficient fall either way, as well as tongues of land, or slender promontories jutting well into the

sea. It is said that wherever pure spring water is procurable, the ground is fit for occupation; but that must be only if well drained.

The localities to avoid may be thus enumerated:—Damp ground, even where the surface may appear to be parched up—for if it be damp underneath, it may be found charged with the worst exhalations; half-dried beds of rivers, ditches, narrow gorges; marshy grounds, and such as are elevated immediately above marshes; *all grounds which are exposed to winds passing over marshes*; ground covered with underwood, or the vicinity of such ground; the low, jungly, and marshy beds of rivers and lakes.

I shall conclude this portion of the chapter upon climate with a summary of the precautions directed to be taken by the French army in the East, drawn up under the sanction of the most eminent medical men in France, and which must contain advice of the greatest value to all who are about to travel for the first time in such latitudes. I may state first, however, that cotton should be worn in preference to linen, and wool to either. The underclothes should not be changed too often, because it causes excessive perspiration.

It is necessary to be always so clothed as to be proof against the sudden chills to which one is liable at all times from the abrupt changes of temperature which very frequently happen in nearly all parts of the country. To have the head well covered from the sun; cleanliness of person, and of the dwelling indispensable. The face and eyes should be frequently rinsed, especially after exposure to dust. The feet should be repeatedly washed in cold water, especially after walking. The greatest care is needed against the freshness of the night, even when the heat is extreme. It is dangerous to remain with the shirt alone during the night. If a tent is pitched near a marsh, the entrance should be in the opposite direction, and kept closed during the night. It is very dangerous to sleep upon the ground, but less so than upon fresh branches, grass, or any vegetable matter. Large draughts of water are always injurious. Condiments in excess should not be taken, and hot seasonings should only be sparingly used. Saffron increases the digestibility of flour, especially maize. Food should always be taken before going out in the morning.

Having dealt at such length upon the nature of the climate as it is connected with health, let me say a few words on the same subject as far as it concerns the interest of the settler. In the first place it must not be imagined that because the climate is little different from the islands of the Indian archipelago, that necessarily the soil will be as fertile. I cannot say that it will not, but I think it right to state, that all explorers seem to agree in describing the general aspect of Northern Australia as rather sterile and unpromising. I say the general aspect, because the fertility of particular localities has been already insisted upon. No doubt, this air of sterility is, in a great measure, due to its long abandonment to most degraded savages; but still it is from that state it has to be reclaimed, and not from a state of comparative progress, such as the islands already referred to. What cultivation may do, has been, in some measure, answered by Port Essington; but the experiment was made under every possible disadvantage.

If parallels are of any value in a question of the kind, we must look for a parallel to Australia upon the south coast of Arabia. After atten-



tively considering the physical features of every country in the same latitude, I find none that resembles our north coast so much as the country I have just named.\* Besides the resemblance of the climate and the soil, the botany of both possesses striking analogies, and I question if the geology is not similar. Reasons can be found for the parallel in physical geography. If India be regarded, as the tertiary slopes caused by upheaval from a central axes of metamorphic rocks, and Arabia as from a similar chain in Arabia Petræa and Asia Minor, Australia may be considered to bear the same relation to the igneous chain of the archipelago. But, I would not wish to insist on such speculative affinities. It is sufficient for my purpose to point out that there is a great analogy between the physical features of the two places, South Arabia and Australia, and much instruction may be obtained by paying attention to the resources of the former. The soil of Arabia is not generally good, but, where it is fertile it equals that of any country. Most of the vegetable articles of commerce are cultivated, but especially coffee and medicinal drugs. The castor-oil plant, and the senna, kadi (*Pandanus odoratissimus*), whose fragrance is celebrated by Arabian and Indian writers, the *Amyris opobalsamum*, producing the Balm of Mecca, which is one of the most fragrant and costly of perfumes, all grow in Arabia, and would be easily acclimatized in the north.

I need hardly specify other productions—*dhurra* (a coarse millet, but extremely productive), every kind of fruit, grain of many kinds, &c. I merely draw attention to Arabia as the country most resembling North Australia, and settlers have but to make themselves acquainted with productions of the former, to form an idea of what the latter will produce. I have read somewhere, but I cannot just now remember the authority, that seeds and plants introduced from other countries into Arabia became rapidly deteriorated, and at the end of three years must be replaced by newer importations. I don't know that this will prove to be the case in Australia, but it is as well to bear it in mind.

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## CHAPTER VI.

### NATURAL HISTORY.

#### ABORIGINES—ZOOLOGY.

I shall say but a few words with reference to the aboriginal inhabitants of North Australia. They do not differ ethnologically from the natives of the rest of the continent; for it is agreed by all who have written on the subject, that the natives throughout Australia form but different tribes of one vast ethnographical family. This may not appear so evident to those who are aware of the great differences between

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\* NOTE.—A great part of Arabia is very arid, in consequence of the scarcity of water; but *salsolæ* and scrub are found everywhere, even in the desert, and on these the camels feed. It is the mountains alone which are well wooded; and this confirms what I have already said, that a settlement, to be successful in North Australia, must be made far away from the coast, in the hills.

their various languages. But Dr. Latham has proved, that however different in detail, there are some universal points of resemblance, which render their identity unquestionable. These are found principally in the personal pronouns; more in the first than in the second; and more in the second than in the third. There are also resemblances in the method of enumeration, but the materials for the comparison are more limited, because of the inability of the natives to count more than five, and few, perhaps, so much. It is thought that the natives of North-east Australia, that is, about Cape York, have had their language and customs to some extent modified by intercourse with some of the Papuan races of Torres Straits. They are, I believe, the only Australians who have bows and arrows among their weapons, and their physiognomy is certainly an approach to the Israelitic countenance of the true Papuan.

It is also believed by a good many Australian writers, that the south coast, was the last portion of the continent peopled by the aborigines. If this be the case, we can explain the occurrence of those singular cave relics upon the north coast; evidently made by an ancient and somewhat cultivated people, who had some arts preserved amongst them, and who wore long garments. Be this as it may, it is said, that the natives of that coast are a finer race of men than those upon the south, or in the interior. They are also a warlike, implacable, and savage race; with the exception, perhaps, of those who were round Port Essington. I know there is a somewhat different impression abroad upon this subject; but I only follow the testimony of every explorer. Tasman speaks of the natives of Van Dieman's Gulf, as a cruel people; shooting at the Dutch without provocation. King had the surgeon of his ship speared near Hanover Bay. The desperate attacks upon Grey at the same place, are doubtless well known. Stokes, too, was speared at the mouth of the Victoria River; and Gregory, near the same place, was obliged to repulse an attack, by firing on his assailants. These facts should be sufficient at least, to put settlers upon their guard. In an intercourse with the natives, I should be sorry to recommend anything but mild and conciliatory measures; but I should, at the same time, strongly advise that all intimacy be avoided, until they have learned the superiority of the race with which they have to deal. I say this, because, after carefully studying the experience of every explorer, I have seen that premature familiarity has always ended in bloodshed. It should be urged, therefore, upon settlers in the new country, to keep the natives away from their camps; not by violent measures—which are always dictated more by fear than by danger—but by a firm and resolute bearing, which is the only character these poor savages can appreciate and respect. Last of all, one should never expect gratitude from the natives; for it is a virtue, rare even among those who have been long under the influence of civilization. They cannot understand it; and, therefore, settlers should not risk their lives among them by trusting to the gifts they have bestowed.

With regard to the zoology of the north coast, the data as yet are not very extensive. We must not suppose, however, that even these distant and tropical regions will present any great difference from the typical Australian fauna in other parts. The unbroken character of the continent offers such facilities for the spread of species, that great differences need not be expected. Many will not care to know more than that kangaroos are pretty numerous along the whole coast, with



the usual accompaniment of native dogs, opossums, native cats, and flying squirrels. To those who care for more scientific descriptions, there is not much more to tell. The most common genera of Marsupialia, are *Osphanter* and *Helmaturus*. The genus *Helmaturus* differs from the *Macropus*, or true kangaroo, in having shorter ears, a tail nearly naked, or at least with only a few hairs, and a long chisel-shaped premolar tooth in the lower and upper jaw, somewhat like that found in the kangaroo rat (*Hypsiprimum*), but not so large.

The genus *Macropus* is represented by the *M. munguifer*, which is a small brush kangaroo with a nail-like horny excrescence at the end of its tail. Next, and probably the most common, is the *M. antelopinus*, an animal of reddish color and clothed with short stiff hairs. It is larger than our forester kangaroo, and, I believe, easily captured. No doubt, settlers will be soon better acquainted with its culinary qualities, as it abounds upon the north coast. The same animal is called by Cuvier, *Helmaturus*, and by Gould, *Osphanter*; but many European naturalists do not think the generic distinction a good one. Any one who has seen the frightful and disheartening extent to which science has been burdened with new names, according to the caprice of each individual naturalist, will be glad, as I am, of the opportunity of adhering to the original title. In addition to the two kangaroos already mentioned, there are the *M. inornatus*, *M. petrogale* (Gould), and *M. concinnus*. Among what we should call wallabies or small, swift, solitary kangaroos, there are *M. agilis* and *M. brachiotus*, or short-eared rock kangaroos. The *M. agilis* has a sandy yellow-colored fur which is black along the back. By its extraordinary activity in leaping over and along very high crags it can elude the swiftest dogs, and hence its name.

The opossum found upon the north coast is the same as that found throughout the continent, the *Phalangista vulpina*. The squirrel is the *Petaurus breviceps*. The native cat differs from its predacious relative of poultry notoriety, and is classified under the name of *Dasyurus allucatus*. In spite, however, of its removal from bad company, its tastes and habits manifest a family likeness very much to be regretted.

As to the birds of North Australia, the colonist may still expect to find himself among a good many of his old friends upon the south coast. The screaming cockatoo will still be seen about his cultivated land, and he will have as many if not more birds to contend with about his farm yard. Every explorer has drawn attention to the number and boldness of the birds of prey in North Australia. Leichhardt describes the *Milvus affinis*, a kite, as the most audacious bird he ever saw. It used to flap its wings in the men's faces and carry off the meat from the forks as they were eating. There are eagles too, not, however, of the same species as the *Aquila fulcosa*, misnamed eaglehawk, by the southern settlers, but a bird quite as destructive. The owls are represented by three species; and there is one specimen of our handsome Australian robin. There are pigeons and parrots, including the widely-distributed Swainson's lory, the black cockatoo, bustards, turkeys, native companions or an allied species, ducks, rails, quails, waterhens, &c., &c., in all the abundance that a sportsman could desire.

As yet, I believe, no attempt has been made to show the character of the *volatilia* represented in the geographical Province of North Australia. Mr. McGillivray published a list in his Appendix to the voyage of the

*Rattlesnake*; but that only includes the north coast, on its eastern tropical side. I have a list of a few names, kindly furnished by a person who has had as good an opportunity of judging of the natural history of the north coast as any explorer; but I prefer not to insert it, as I am informed by its author that the identifications are doubtful.

The shell-fish of North Australia are not so peculiar, or so distinct in their character as those found upon the south coast, and for an obvious reason. In South Australia (not the Colony, but the coast) the isolation from any contiguous land is complete; but the north coast is connected by islands and shallow seas, with the Indian Archipelago, the Philippines, Japan, China, India, the Persian Gulf, the Red Sea, Africa, and Madagascar. Naturalists divide the sea into various provinces, which are distinguished from each other by their peculiar fauna. Just as various countries possess assemblages of animals and plants peculiar to themselves, so the sea has its provinces of animal and vegetable life. To constitute a province, it is necessary that one-half the species should be peculiar; and, wherever this feature is wanting in small areas, they have to be united to others until the province is established. Now, North Australia forms a portion of the largest marine province known, and includes the shores of all those countries enumerated above as connected together by their shell-fish. This is the Indo-European molluscan province, and extends from Australia to Japan, and from the Red Sea and east coast of Africa to Easter Island in the Pacific. So great a region might, says Mr. Woodward, be divided into many sub-provinces, having peculiar associations of species and some peculiar shells, but a considerable number of species extend through the whole province, and their general character is the same. The strictly littoral species vary, of course, for each line of coast—*Littorina scabra* is the perrywinkle, and *Haliotis squamata*, the ear shell (Venus's ear), for the north coast.

The shells peculiar to the province are *Nautilus*, *Pterocera*, *Rimella*, *Rostellaria*, *Seraphs*, *Cithara*, *Clavella*, *Turbinella*, *Ancillaria*, *Ricinula*, *Magilus*, *Melo*, *Cylindra*, *Imbricaria*, *Pyrula*, *Quoyia*, *Stomatia*, *Broderipia*, *Rimula*, *Neritopsis*, *Scutellina*, *Linteria*, *Dolabella*, *Hemipecten*, *Placuna*, *Malleus* (?), *Vulsella*, *Pedum*, *Septifer*, *Cucullæa*, *Hippopus*, *Tridacna*, *Cypricardia*, *Cardilia*, *Vertriordia*, *Pythina*, *Clementia*, *Glaucomya*, *Anattia*, *Chæna*, *Aspergillum*, *Jonannetia*, *Lingula*. None of these genera are found in the Atlantic, but in European tertiary beds, fossils of half of them still occur. Most of the species are large and beautiful, and in this respect, as well as in corals, there is no part of the world (except the Philippine Islands) so worthy the attention of the collector.

Thus far the scientific peculiarities of the mollusca, to which it must be added that the land shells have not been so carefully studied. They are known, however, to contain forty-eight species of *Helix*, ten *Bulimæ*, one *Achatina*, and six *Vitrinas*. The edible mollusca include oysters, and, no doubt, many others; not, however the trepang, which belongs to the class *Echinodermata*.

Of the fishes peculiar to the northern seas, I have not been able to collect any information. So little has been done in this department of natural history, that there is ample room for the investigation of any enterprising naturalist. It would convey no information to state that there are rock cod, mullet, and others; these names are arbitrary and founded upon fancied resemblances to fishes in British seas, and as these



resemblances do not strike everyone in the same manner, endless confusion arises in attempting any description. It is satisfactory, however, to know that the names have been bestowed as much for their esculent resemblances as anything else; and though warm seas are never good fisheries, yet the north coast of Australia seems to be at least as good in this respect as any of its tropical neighbors.

First in the order of *Reptilia*, for their abundance and disagreeable importance to settlers, are the crocodiles.\* They are repulsive-looking, black and blackish yellow animals of most voracious appetites. Their jaws are often two feet long and fitted with irregular teeth, some of which are an inch and a-half in length. The fore feet have five perfect toes, the three inner or first have long horny nails slightly curved, and the two outer have no nails, nor are they webbed. The third and fourth toes are deeply webbed for swimming. The hind feet have four toes, webbed. From the apex of the tail a central highly-notched ridge runs up about midway of it and then splits into two branches which pass up on each side of the spine as far as the shoulders, generally diminishing in height to their termination. Altogether, they are unsightly creatures; bold enough to attack even horses, as Gregory experienced to his cost at the Victoria River. One captured by Stokes was fifteen feet in length, and his stomach contained about fourteen pounds of pebbles, *faute de mieux*.

The turtle, which frequents the north-east coast, is the *Chelonia midas*, but there are other species, such as green turtle, *Chelonia imbricata*, and the loggerhead, *C. caouana* (*Caouana caretta*, of Gray). The flesh of *C. imbricata* has always been considered unwholesome, if not, in some instances, poisonous.

The lizards of North Australia include the common jew or iguana lizard, so well-known throughout the country (*Agama muricuta*), as well as the large lace lizard, common to the scrub (*Varanus varius*, Bell). The *Chlamydosaurus Kingii* is distinguished by the immense frills which surround the neck, and which, when the animal is not excited, lie on each side of the head like wings. Four or five other kinds of lizards, including a species of clubtail (*Trachysaurus rugosus*) have been described. The snakes include two whip snakes (*Leptophis punctulatus* and *L. spilotes*). I am not aware of any other exception of the north coast to the general character of the continent with regard to reptiles. The seas are, however, marked by the enormous size and number of the sea snakes, one of which (*Hydus Stokesii*) is as thick round the body as a man's thigh. Some of them are venomous, and all are dangerous in the water. They appear most abundantly on the north-west coast, but are distributed throughout the tropics.

In concluding this notice of the natural history of the north coast, it may be mentioned that in the neighborhood of Raffles Bay there are large herds of wild buffalo. They were introduced from Timor, and left on the coast when the settlement at Raffles Bay was abandoned. The species is a variety of the zebu, or *Bos Indicus* of Linnæus and the *Bos zebu* of German naturalists. It has the following specific characters—convex forehead, a large fleshy lump on the withers, with deep waved dewlap. The variety found throughout the Indian Archipelago, is much larger than

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\* NOTE.—Miscalled alligators. They do not, probably, differ from the Asiatic crocodile.

our ordinary domestic cattle. They have long pointed horns with an inclination to curve inwards. They have deer-like legs and rather large cloven hoofs, and their colors vary from deep ash grey to almost milk white. The latter color is, according to Mr. Earl, unknown among the northern herds. The flesh is considered coarse as food, but for draught the animals could not be better built. The breed, in North Australia, has increased very rapidly, but, of course, must be expected to have degenerated a good deal. As they require much water it is not probable that they have extended into the interior.\* If domesticated it would prove a useful animal. It is a smaller variety of the same species which is held as sacred by the Hindoos.

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## CHAPTER VII.

### GEOLOGY AND MINERALOGY.

#### OBSERVATIONS OF GEOLOGISTS—DR. FITTON—MR. JUKES—PLIOCENE DEPOSIT—SECONDARY ROCKS—QUARTZ VEINS—PRIMARY FOSSILS.

A great many of the remarks which belong to the geological section of this little work, have already appeared in that portion which treats of the physical features of the north side of the continent. It would be premature as yet to attempt to fix accurately the chronological order of the strata, or the minerals most likely to be found in them; because so little has been done even towards obtaining a knowledge of the character of the formation with which we have to deal. I shall, therefore, content myself with giving the observations of those geologists who have written on the subject, and add such remarks as I think are justified by the physical features.

Only three geologists have ever undertaken to describe the geology of North Australia. The first were the naturalists of Baudin's expedition, Messrs. Peron and Freycinet, but who were very imperfectly acquainted with a science, then (1802) in its infancy. As an instance of their inaccuracy, it may be mentioned that they described Depuch Island, on the north-west coast, as volcanic; while no subsequent observer has been able to find anything there but sandstone rocks.

Dr. Fitton, F.R.S., and G.S., was the next who described the geology of the country. But he had never been upon the coast. His only opportunity of judging of its formations, was from a number of specimen rocks brought home by King; and about which, the latter doubtless gave every verbal information. Conclusions drawn from the examination of rocks alone, are never very satisfactory; but when made without any opportunity of examining the place from which the specimens are taken, are utterly worthless. I shall, therefore, pass over Dr. Fitton's speculations, and give simply his list of rocks.

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\* NOTE.—Smart saw tracks like those of cattle near Attack Creek; and Mr. James Martin, on his recent journey to Glenelg River, saw large tracks near the river side. They looked, he said, like those of a hippopotamus. Were they the footmarks of crocodiles?



Granite was found in many places on the north coast, including Carpentaria (west-side), Cape Arnheim, and Melville Bay; to which we may add, on the authority of Stokes, Port Darwin, and Camden Sound. Greenstone (properly, I suppose, diorite, or hornblende rock, one of the felspar family), at Vansittart Bay, Careening Bay. Clinkstone (trap?) Carpentaria, (west side), amygdaloid, Port Warrender, Half-way Bay, Bat Island, Malus Island. Slates and schists, about Cambridge Gulf.

Dr. Fitton calls attention also to the development of the ferruginous rocks about Van Diemen's Gulf, which give to the land an appearance sufficient to justify the name of the Red Coast. He says that the general height of Coburg Peninsula is not more than 150 feet above the sea, and it seemed to consist entirely of the same sandstone. The Red Coast is noticed in Mountnorris Bay, about Cape Van Diemen, and on the north-west of Bathurst Island. In fact, the formation appears at intervals right round to Swan River.

The next writer on the geology of North Australia is Mr. Beete Jukes, author of several geological works, who was the naturalist on board the surveying ship *Fly*. This gentleman had more opportunities than any previous visitor for studying the nature of the formations where the vessel touched, and his opinions, therefore, are of especial value. He divides the sandstone formations into two periods—that found upon the tableland, and that found close to the sea. The latter he had carefully inspected, and he describes it thus:—"It was a red and white ochreous sandstone, sometimes rather argillaceous where it was firm and compact, but generally soft and friable. The red and white colours were sometimes confined to different portions of the cliff, but at others they were intermingled in blotches. It frequently contained ferruginous concretions, and these sometimes in such abundance as to occupy the entire thickness exposed, and many of the points and headlands consisted of a pile of these large concretions of iron ore, like a heap of slags from an iron furnace \* \* \* I searched in vain for any organic remains in any of the rocks; but, on visiting Port Phillip, I was struck with the exact lithological resemblance in all these characters which the tertiary rocks on the east side of that port bore to Port Essington. From this circumstance, from their perfect horizontality, from their height above the sea, and from the incoherent and slightly-consolidated state of these rocks of the north coast, I was induced to look upon them as likewise of tertiary age." The rocks to which Mr. Jukes refers in Port Phillip, are now known as the older Pliocene (of the same age as the older gold drifts) of Mr. Selwyn's classification; and if our author is right in the connection between the two, that must be the geological age of the "red coast." I have every reason to believe he is right. The red sand, with or without fossils, is found at intervals throughout the whole continent. It is horizontal in its stratification, and bears mineral characters which cannot be well mistaken. Of course, we must not consider the fact proved without much more extended observation. I have found Lower Pliocene fossils imbedded in hematite (amid ferruginous sand) many hundred miles from the sea. I have very little doubt in my own mind that the same sand, and the red sand of a great deal of our deserts, belongs to the same recent tertiary formation.

But this must not be confounded with the sandstone which forms the lower beds of the plateau. Mr. Jukes regards this as of palæozoic age, probably contemporaneous with the rocks which underlay those con-

taining the coal of New South Wales. He admits that there is slender foundation for any authoritative opinion; but the balance of probabilities appeared to him to be in favor of the one given.

Leichhardt found that, below the cliffs of the sandstone plateau, there was a coarse granite passing into syenite,\* and the slope down to the sea appeared to be of the tertiary formation. Mr. A. Gregory gives the following descending section of the plateau—"1st., ferruginous sandstone, producing red sand (tertiary to me, for the reasons above stated); 2nd, soft shale; 3rd, chert, passing into siliceous limestone; 4th, limestone, apparently lithographic."

The Rev. W. B. Clarke, from whose valuable geological pamphlet I take the above, adds—"No coal was observed till he got south of 20° south latitude, and the coal measures continues for 350 miles, up to 28° south. A sandstone like No. 1, covered the ranges generally over a large area." Mr. Clarke believes that the sandstone plateau will be found to contain jurassic, if not triassic fossils, partly from the facts just given, and because he considers the formation to be continuous with one on the Scoresby's Range, West Australia, in which *Trigonia* and *Ammonites* are found. Mr. F. Gregory describes the latter formation as a white iron calcareous rock, with fossil *Ammonites*, *Trigonia*, and *Pecten*. The continuity with the sandstone plateau, is rather doubtful. On inspecting Mr. Gregory's section, I find that the range in question is an outlier from the tableland, and is probably much lower than the plateau. It rests on a kind of slope descending from the granitic terrace. If the line of flexure were prolonged above the steppe, it would lie at a much higher level there, than the present sandstones, which, in their true position, are justly regarded by Mr. Gregory, as Palæozoic, or the base of the formation. It is the lowest members of the deposit which the summit of the tableland possesses, and the few secondary rocks which occur, will be like islands away from the vast continental plain. They have been denuded away, but not, I think, since their upheaval; for the tertiary rock is found in most places on the plateau. If the *Ammonites* were from the same formation as that described by Dr. Hockstetter, in New Zealand, they would be older than Jurassic.

The above are the only opinions yet formed with regard to the geology of the north coast. They are neither decisive nor satisfactory, I admit; but they offer a clue which may eventually unravel the whole question. It remains to be asked, to what period we are to attribute the upheaval of the sandstone plateau. I have already said that I consider it to have occurred after the Older Pliocene period. The reason for this, is principally that tertiary deposits have been found on the summit of the tableland in many parts of the continent; and I believe that the red sand spoken of, is the red sandstone of the early Pliocene. I know that the arguments in support of this opinion are inconclusive, but they bear a very great weight when they are examined in connection with other facts which are too lengthy to be mentioned here. In fact, I would not enter further into the question, than to express my opinion, for I hope to lay the question before the public in another way, when the argument is more complete. If, however, the upheaval is Post Pliocene, the eruptive rocks which caused it, must be Post Pliocene too. In this respect, the basalts and granites would correspond with some of the granites and

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\*NOTE.—Granite in which the mica is replaced by hornblende.



trap-rocks of the west, east, and south coast—an important fact in estimating their mineral riches.

It has already been mentioned that coal has not been found in North Australia, nor is the formation present. The next question is about gold. With regard to that, the only thing certain, is that the sandstone plateau is too new a formation to be auriferous. The only places spoken of with older schists, slates, and quartz veins, are the McKinlay Ranges, the head of Port Darwin, and the west side of Carpentaria, about Caledon Bay. Quartz veins, in sandstone, it should be remembered, generally arise from segregation, and are not, strictly speaking, “veins” or “reefs.”

No fossils have been described from the north coast. Some were collected by Stokes, at the mouth of the Victoria River, but were subsequently lost. Mr. F. Waterhouse tells me that a fossil sent by him to the Rev. Mr. Clarke, was described by the latter gentleman as bearing a strong resemblance to a Permian species. It was from near the Gregory, a river in Carpentaria, which I have already described as rising at a part of the tableland, where basaltic rocks are seen upon its edge. If this identification could be confirmed, the chances of gold in West Carpentaria, would be much stronger.

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## CHAPTER VIII.

### BOTANY.

#### THE NATURAL ORDERS—PREVALENCE OF GENERA—PREVALENCE OF SPECIES—BOTANICAL PROVINCES.

In no department of natural history has so much information been obtained upon the north coast as in that of botany. This may be owing in some degree to the facility with which the materials are collected, but it has certainly not been the only cause in North Australia. Three of the most eminent men which botanical science has produced, have been employed in connection with parties sent to explore there, and to them do we owe the present advanced state of that portion of Australian science. These men were, R. Brown, who was with Flinders; A. Cunningham, who sailed with King; and Dr. Mueller, the present Government botanist in Melbourne, who was out with A. Gregory, in his celebrated exploration of the Victoria River. The materials thus collected are so vast, that they have not all as yet been made public, but the general results are however ascertained as completely as they can well be, and we need not apprehend that any future discoveries will very much alter the present views held as to the botanical character of the country. There is, however, some little difficulty in approaching the subject so as to render it popular. The results are arrived at with such an abundance of evidence, that it is difficult to give good general ideas, without entering into scientific and technical detail, unintelligible to those who have no previous acquaintance with the subject. My object must be, therefore, simply to give particulars sufficient for a general idea of the character of the vegetation, such as the glance of an inexperienced person, hastily visiting the country would give. In order to obtain this, I have studied

the notes of R. Brown in Flinders's and Sturt's works, the botanical appendix to King's voyages, the notes scattered through Leichhardt's volume, the interesting memoir of F. Waterhouse, Esq., and the volume of the Linnean Society's proceedings, which contains the valuable monograph of Dr. Mueller on the flora of North Australia. I must candidly admit that the latter has been my principal guide; and I take this opportunity of expressing my obligations to its author for that and the other assistance he has rendered me in preparing this chapter. R. Brown's and De Candolle's *Prodromi* I have not seen, but Dr. Mueller had referred to them both. I must also mention that the papers I have had access to treat of the whole of tropical Australia as one botanical province, but such exceptions as are necessary for the east coast and local peculiarities I have referred to in their proper order.

In the first place it must be stated, that though the botany of the country is tropical in character, it still preserves those marked Australian features which every old colonist will easily recognize. There are gum-trees as usual, and tea-trees; and if the palm-tree occasionally lifts its graceful head above the brown foliage, there is not much else to prevent a southern settler recognizing that he is still connected with the country he has left. In one respect, however, the difference is striking—there are no large trees; the timber is small and shrubby. The only exception is the northern tea-tree (*Melaleuca Leucodendron*) or white tea-tree, which is identical with the Indian cajeput and produces the same valuable oil. Some of the pine family were noticed by Mr. Waterhouse on Stuart's last journey, but only one southern pine (*Callitris*) was met with during Gregory's long exploration. Shea-oaks (*Casuarina*) are wanting upon the Victoria River; round Carpentaria, however, large numbers of *Casuarina Equisetifolia* grow, and this tree, singularly enough, forms a common timber tree in Africa and India, and yet is nearly absent from Arnheim's Land.

The natural orders occurring in North Australia, and forming its whole inheritance of trees, shrubs, plants, and grasses, are thus arranged, according to their richness in genera and species:—*Leguminosæ* (legumes), *Myrtacæ* or myrtles, *Compositæ*, *Cyperacæ* or sedges, *Euphorbiacæ* or spurge, *Rubiaceæ* or madders, *Filices* or ferns, *Protacæ*, &c., &c.

It will doubtless excite surprise to find ferns included among the above natural orders, especially when we are told that, owing to the extreme dryness of the atmosphere, mosses and lichens are almost entirely excluded from the flora of North Australia at some distance from the sea, and are smaller in proportion to the other vegetation than in any other country in the world. Ferns are known to inhabit moist and shady places, which is a condition found only on the east side of the tableland in tropical Australia. If we exclude this portion of the continent from our list, the position of ferns must be altered, and be, in fact, only nominal, while under the same circumstances the *Euphorbiacæ*, *Rubiaceæ*, and *Compositæ* will also occupy a much more subordinate and insignificant position.

I will now give a short description of the above orders, for the information of the general reader, and the genera included in each, as far as the botany of North Australia is yet known.

The *Leguminosæ*, or pea tribe, is one of the largest and most important orders in the whole range of plants. The characters are



easily recognized in the long seed pod, or legume, and the papilionaceous flowers, though one of these features are sometimes wanting in peculiar species. The order is most useful to man. It includes the pea, bean, clover, logwood, the shamrock, indigo, laburnum, acacia robinæ, &c. The number of species is certainly not less than 5,000, and the order is distributed over the whole world. De Candolle gives the following distribution for part of the species:—Equinoctial America, 605; Basin of Mediterranean, 463; India, 452; Cape, 353; Australia, 229 (but since largely increased). We see at once, from this list, the fancy the species have for warm climates, and leaving America out of the question, so close together are the countries where the maximum development of the order takes place, that they could easily be included in one botanical province. Dr. Mueller enumerates 212 species for tropical Australia. It would be too long to give all the genera, I will, therefore, here enumerate a few only. There are 12 indigofera; psoralea, 8; crotalaria (brittleworts) 12; cassia, 15 (aromatic plants, including senna); acacia, 50.

The *Myrtaceæ*, or myrtle order, is most extensively developed in South America, India, and Australia. It includes about 1,400 species, some quite heath-like, and others splendid trees. When it is stated that the order includes the *Eucalypti* and the tea trees, it will not excite surprise to find it so largely represented in North Australia. There are 92 species: 40 of these are *Eucalypti*; 8 *Melaleuca*, or tea tree; 7 *Calycotrix* (heathy shrub, something like tea trees); besides *Tristania*, *Angophora*, *Callistemon*, &c. The *Eucalypti* were best represented by the yarra, or flooded gum, *acuminata* (Hooker), and there are two peculiar to the inland desert, of shrubby habit.

The *Compositæ*, as the largest natural order in botany, must be well represented in every country. Its character need not be further described than by mentioning two of its representatives, the thistle and the *Taraxacum* (dandelion). Tropical Australia includes 93 species, but no one genera is very largely represented.

The *Cyperaceæ*, or sedges, are an order of grass-like plants, growing in places liable to inundations. These are best known as rushes, and are by no means considered indicative of good land. There were no less than 82 species found in Tropical Australia, which shows that the order is very extensively developed. Twenty-four species of one genera (*Fimbristylis*), and 14 of another (*Cyperus*) show that rushes must be as characteristic of the soil as *Eucalypti*.

The *Euphorbiaceæ*, or spurge family, numbering 2,500 species, all remarkable for their medicinal properties, of which the castor oil plant is a good instance. The *Excæcaria* is a tree of this order, common about Carpentaria.

The *Rubiaceæ* or madders; an order including such important trees and plants as the chinconna, madder, coffee, and ipecacuanha, is represented by forty-two species; and, as the list is important, I give it entire:—*Asperula*, three; *Pomax*, one; *Opercularia*, two; *Spermacoce*, five; *Cyphælis Psychotria*, four; *Pavetta*, three; *Canthium*, six; *Pogonolobus*, one; *Morinda*, two; *Creocarpus*, one; *Nertera*, one; *Hedyotis*, six; *Rondeletia*, one; *Gardenia*, four; *Guettarda*, one.

The *Protaceæ*, so called from the protean forms assumed by different members of the order, has forty-five representatives. Of these, the

*Crevillea* number twenty-two (a shrub only found, as far as my experience goes, on poor soil); and the *Banksia* (honeysuckle), five; *Hakea*, seven; and *Persoonia*, five. R. Brown, in his appendix to Flinders's Voyage, says of this order, that more than half of its species are natives of Australia, where they form one of the most striking peculiarities of its vegetation. Nearly four-fifths of the *Protaceæ* belong to the principal parallel, in which, however, they are very unequally distributed—the number of species at its western extremity being to those of the eastern as about two to one. The *Protaceæ* are chiefly natives of the southern hemisphere, in which they are most abundant between 32° and 35°, but extend as far as 55° south. The few species in the northern hemisphere occur within the tropic.

*Malvaceæ* or the mallow order, is the one next in abundance. Everybody is familiar with some species of this order, and yet few are aware that it includes the various cotton plants which are so useful to man. It is represented by forty-four species in Tropical Australia, of which only one is a *Gossypium* or true cotton plant. There are no less than thirteen species of *Sida*, a genus of plants much valued on account of the fibrous and mucilaginous qualities possessed by some members. The *S. periplonfolia*, a native of the Malay Islands, and the *S. trilafolia*, a native of China, are cultivated for their beautiful flax-like fibres. A *sida* of Australia also, which has become a regular weed in Queensland, is likely to prove of value for the same purpose. The genus *Hibiscus* has no less than seventeen representatives, remarkable for the handsome character of their flowers, and the fibres of their stems. The other genera of this order in Tropical Australia are *Malva*, two; *Abutilon*, eight; *Pavonia*, one; *Abelmoschus*, two.

The *Goodeniaceæ* is a herbaceous order, almost peculiar to Australia and the islands of the Southern Ocean. It is distinguished more by its botanical peculiarities, than for the importance of any of its members to man. The genera in Tropical Australia are as follows—*Goodenia*, twenty; *Calogyne* and *Velleia*, four; *Dampiera*, two; *Leschenaultia*, one; *Scævola*, nine. One of the *Scævola* genus occurs in India.

The *Solanaceæ* form an extensive order, very valuable to man. Some of its members supply him with food, and others with medicine. It is the nightshade family, which includes the potato, the henbane, tobacco, stramonium. There are twenty-nine species in North Australia, of which twenty-five belong to *Solanum* alone. The potato plant is a *Solanum*, and so are those plants familiar to bushmen as kangaroo apples.

The *Convolvulaceæ* has the same number of representatives as the *Solanaceæ*, and like it is an order distinguished for the utility of its members to man, as both food and medicine. The sweet potato is a convolvulus; scammony and jalap are both from the same genera of plants; and as the genus is a large one, it is painful to reflect on the medicinal qualities it may contain. There are, however, only two species of the order in Tropical Australia, one of which has a kind of yam for its root; but until it is ascertained to be quite free from the medicinal qualities of its brethren, its sequences as an esculent might prove unpleasant. The genera best represented is the *Ipomœa*, which has seventeen species. This is a family closely allied to convolvulus, even in its nauseating characters. Its dolorous importance to man can be gathered from a few



of its specific names, such as *Ipomœa Purga*, *Ipomœa Jalapa*, *Ipomœa Cathartica*, &c. The other members of the order, such as *Evolvulus*, 1, *Breweria*, &c., are hardly worth mention.

The *Sapindaceæ*, or soap worts, is represented by twenty-seven species. The plants of the order are unimportant, except that one species contains in its pulpy fruit a kind of soap (*Sapindus*), and other species have esculent fruits, but poisonous stems and leaves. The latter feature is preserved pretty generally throughout the order, so that it will be as well to give a list of the genera known in tropical Australia. They are—*Dodonœa*, nine; *Distichostemon*, one; *Heterodendron*, two; *Nephe-lium*, five; *Cupania*, five; *Thouinia*, two; *Schmiedelia*, one; *Cardro-spermum*, one; *Apophyllum*.

The *Scrophularinæ* are best known by two representatives, the foxglove and snapdragon. Like the *Solanaceæ*, several of the order possess highly poisonous qualities, and are all suspicious. They are much cultivated on account of their beautiful flowers, which seem to be more showy in proportion to their baneful juices. The *Calceolaria* are extensively grown for the beauty of their flowers in England. There are twenty-seven species in the country we are dealing with in no less than seventeen genera, not one of which is represented by more than three species.

Besides the orders above mentioned there are of course many others, but less numerously represented. *Umbelliferae*, twenty-two species; *Asclepiadæ*, twenty-four; *Verbenaceæ*, twenty-five; *Boraginæ*, twenty; *Labiata*, twenty; *Amaranthaceæ*, twenty-six; *Salsolæ*, twenty-five; *Or-chideæ*, twenty-eight; *Liliaceæ*, twenty-two, are the principal.

None of the following orders were represented in tropical Australia:—*Ranunculacæ*, *Hyttropeltidæ*, *Tremandræ*, *Geraniaceæ*, *Rosaceæ*, *Calli-trichinæ*, *Crassulacæ*, *Canoniaceæ*, *Mesembryanthemææ*,\* *Capusoliaceæ*, *Epacridæ*, *Plantaginæ*, *Irideæ*, and *Hypoxideæ*.

Besides these, the following were absent from North and North-Western Australia, viz., *Anonaceæ*, *Aurantaceæ*, *Hippocrateæ*, *Erythoxylæ*, *Xanthoxylæ*, *Cedreleæ*, *Alangiaceæ*, *Escalloniæ*, *Oleineæ*, *Piperaceæ*, *Aphyllanthaceæ*.

The following have not yet been found in North-Western Australia:—*Cruciferae*, *Guttiferae*, *Oxalideæ*, *Passifloreæ*, *Primulaceæ*, *Scitamineæ*, *Junceæ*, *Restiaceæ*, and *Herotidæ*.

In speaking of the poisonous plants represented in *Sapindaceæ* and *Scrophularinæ* I have unfortunately not exhausted the noxious features of plant life in North Australia. Leichhardt mentions that a drooping *Grevillea* exudes a glutinous secretion from its seed vessels, which stains the skin black and raises most painful blisters. The same explorer lost one of his horses near the Roper River from the effect of some deleterious herb as he suspected. He could find no poisonous plant, and therefore was doubtful of the real cause of death. A. C. Gregory's experience, however, puts the matter quite beyond doubt, for he lost several horses on three occasions somewhere about the same locality. What is most singular also, so experienced a botanist as Dr. Mueller was unable to detect any poisonous plant about the places where the accident happened,

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\* This is doubtful, as Mr. Earl says the *Mesembryanthemææ* are found at Port Essington.

though he says the effects of the poison were more active than those of the *Gastrolobium* and *Gompholobium* which prove so fatal to the herds of Western Australia. The fact is inexplicable, but at any rate is worth the earnest consideration of intending settlers. The losses of horses always occurred on the rocky edges of the tableland, near rivulets lined with *Pandanus Spiralis*.

The other remarkable plants of North Australia include the *Adansonia*, or gouty stem tree; two kinds of silk cotton-tree (*Cochlospermum*), one of which is found in Carpentaria and the other only in north-western Australia.

The esculant plants are, first the seed-vessels and roots of two species of Australian lotus (*Nymphaea* and the beans of the *Nelumbium speciosum*. For the rest I quote Dr. Mueller, who says:—"During the greater part of the journey we were more or less extensively supplied with indigenous fruits. Thus the acidulous drupes of three meliaceous trees, belonging to a new genus of the trichilioid section. The nonda fruit (*Pariarium*), a small kind of cucumber, a species of rose-apple (*Jambosa Eucalyptoides*). The fruit of *Mimusops Kauki* (north-east coast), that of a broad-leaved species of *Terminalia*, the berries of the *Physalis parviflora*, the small lemon of the Brigalow scrub *Triphasia Glauca*, the berries of Leichhardt's bread-tree (*Gardenia edulis*). All these were periodically enjoyed, and added often to our diet those vegetable components so essentially required in the torrid zone. In this regard we had almost daily occasion to praise the value of the purslane (*Portulaca Oleracea*), which not only occurred in every part of the country explored, but also and principally in the neighborhood of rivers in the greatest abundance. We found it in sandy and grassy localities so agreeably acidulous as to use it for food without any preparation. \* \* \* The clustered fig, the produce of an undescribed arborescent ficus, proved second in importance only to the portulac, but it was rarely available, except on the rivers of east and north-east Australia."

The Mackenzie bean (*Canavillia Baueriana*) was very much used by Leichhardt as coffee, and seems to have been highly prized by his party. Last of all come the edible roots, which include the yam (*Dioscorea*), the tubers of *Aponogeton*, *Ouvirandra*, the latter of the same family as the Malagasian lace-leaf and typha.

From all the above facts a pretty good general idea of the vegetation of North Australia should be easily formed. To facilitate this, however, I shall now give a list of the genera which are the richest or most common, in the order of their frequency of occurrence; from which it will be seen at once what the character of the landscape is, as far as it depends upon trees and plants, and that of course is very far indeed. *Acacia* comes first and *Eucalyptus* next, and this immediately stamps the character of the scene upon the mind, as differing from the south coast in the superiority of the *Acacia* to the *Eucalypti*, instead of playing such a subordinate part as they do in all the Colonies south of Sydney. But what is very singular, *Solanum* comes next before *Panicum*, so that it is more common than the species of *Graminæ*. It is a comforting thing, however, to see *Panicum* so high upon the list, for it belongs to one of the richest genera of grasses, and one which includes those valuable and important species *P. miliaceum* or millet, and the *P. frumentaceum* or sarnwak, which forms the principal food of the lower classes in India.



The uses of this genus are not confined to the grain, for several of its species form the most valuable pasture grasses in the old and new world,

After *Panicum* comes *Fimbristilis*, one of the rushes, and it is certainly discouraging to find it so plentifully represented. It is followed in succession by *Grevillea*, *Goodeina*, *Hibiscus*, *Ipomea*, which have been already described. *Stylidium* succeeds, and then *Mitrasacme*, a plant belonging to the order of *Loganiaceæ*, which includes the strychnos\* family. *Andropogon*, a rich kind of grass comes next, then *Cyperus* (rush), *Sida*, *Crotularia*, *Indigofera*, *Loranthus*, *Ficus Terminalia*, *Cassia*, &c. The other genera occupy the ground to such a small extent, that it is not worth while drawing attention to them.

It is to be understood that the mere predominance of certain genera, does not mean the frequency of the occurrence of any particular species. Thus, a large plain may be covered with one species of *Andropogon*, with several species of *Sida*, lying hid here and there among the wattles; yet, in estimating the botanical richness of the genera, the *Sida* would appear first, though much the poorest in individuals. But in large areas it may be almost held as certain, that the genus which is represented by the greatest number of species, is also best represented by individuals.

*Gramineæ* or grasses, are both rich in species and extensive in distribution. An *Ischæmum* reed was very abundant on the banks of the Victoria, and offered good food for the horses of Gregory's party. Upwards of 118 species of grass were met with in all, mostly covering the basaltic downs, the patches of grassy plain, and the valleys of water-courses.

Dr. Mueller divides Tropical Australia into seven botanical provinces, which I shall conclude this chapter by briefly describing.

1. The dense waste forests, which in this case only includes the east coast, and, therefore, not coming within the scope of our work.

2. Brigalow scrubs, which also belong to the coast range, or East Australia. Its plants are various, but only shrubs, and mostly *Acacia*, *Eucalypti*, *Capparis*, *Pittasporum*, *Hetendendron*, &c., &c.

3. The open basaltic downs, which are either surrounded by the Brigalow scrubs, or bordered by the desert. Except along the water-courses they are nearly destitute of trees, and for the greater part of the year utterly devoid of water. The rich soil readily absorbs the rain, and produces thus a luxuriant herbaceous vegetation. Grasses are here, as stated before, abundant, and cannot, in their pastoral value, be surpassed. *Acacia* forests cover the rising ground.

4. The desert varies in its flora according to the soil; but, in general, it agrees in genera, and even species, with similar tracts in South Australia. I think this latter fact is a very significant one, as showing the connection of these tracts.

5. The sandstone tableland in some respects, that is in its scrubby and varied flora, resembles the scrubs of the east coast. A considerable number of *Grevillea* and *Santalum*, with *Aristida*, *Triodia*, and *Triraphis*, for grasses, constitute its principal vegetation, with a *Livistonia* (palm) here and there.

6. The sea coast includes the mangrove plants, with *Ceriops*, *Bruguiera*, *Avicennia*, which usually accompany such growths. On the sandy coast

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\* One species of strychnos is found in Tropical Australia.

Dr. Mueller notices *Colubrinia Asiatica*, *Pandanus*, *Spinifex fragilis*, *Triumphetta procumbens*, &c.

7. The last botanical province includes the flora of the northern rivers. The broad-leaved *Terminalia chuncoa*, which is the same as the raspberry jam tree of Leichhardt (so called from a fancied resemblance in smell between the newly-cut wood and the preserve just named), flowers as a common plant along all the rivers; also, the rose apple (*Jambosa eucalyptoides*), *Morinda Leichhardtii*, *Inga moniliformis*, *Warrnigtonia*, and *Agati*. The lagoons are surrounded with a polygonum (*P. Cunninghami*), and the grassy valleys have the same vegetation as the basaltic downs.

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Before this pamphlet can well be in the hands of Australian settlers, some news will have arrived with reference to the expedition sent to the north coast. It would be expecting too much to suppose that it will be very flattering or encouraging. The difficulties and trials of the attempt must not be lightly estimated, especially as it is made by persons to whom the mode of life and the climate are perfectly new. We may be almost sure that the extremes of enthusiasm and despondency will be well represented; a sensible medium it is better perhaps not to look for. Explorers seldom describe with moderation. They either give things an exaggerated appearance or value, or they gloomily underrate the best features. With this fact for our guidance, we may also bear in mind that a settlement near the sea cannot be considered as giving the country a fair trial, and yet the present expedition is not equipped on a scale to enable it to settle its party very far inland. The capabilities of the country can only be adequately tested when Colonists have made a home for themselves upon the basaltic tablelands, or, at any rate, at some considerable distance from the coast. As far as experience can guide us, in tropical Australia the low lands near the sea are very unfavorable for the purposes of settlement. I think it very necessary that this fact should be borne in mind to prevent disappointment, if the first experiences of the surveyors or settlers are not encouraging. The country we know is not exactly all first-class; but there are parts of it which will compare with any lands elsewhere. It may not be a garden as it lies now; but any one who, before he has been used to the withering effects of tropical heat, estimates it from its dreary wild appearance from the sea, and before he can have seen the best side of the picture, will very much mislead those who trust his accounts. I fear that the greatest evil the country will have to contend against, will be the hasty conclusions of inexperienced new comers. It is not in many parts of the world that several tons of hay can be cut and pressed into bales from the wild vegetation on the sides of a river; yet this has been lately done on the north-western coast; so we can see from this that we have not as yet learned the best features of the country. It would be wrong to tell any persons that they can attempt to settle on a new and almost unknown country, with a tropical climate and an untried soil, without having to



overcome difficulties, trials, and dangers of the sternest character; but at least it can be said on behalf of North Australia that, taken as a whole, it has a larger extent of fertile country, is better watered, has more rivers, and better grass than the south coast from West Australia to Cape Howe. Particular districts may be better, and we may be sure that there is in no other part of the Continent such an extent of good land as Victoria; but take it as a whole, and including the Australian Bight, the south coast will not bear comparison with North Australia.





