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THE

TASMANIAN JOURNAL

OF

NATURAL SCIENCE.

JANUARY, 1847.

ART. VII. *Lectures on the Geology, Botany, Natural History, and Capabilities of the Country between Moreton Bay and Port Essington.* By Dr. LEICHARDT.

LECTURE I.

ON my arrival in Sydney I published a short account of my journey to Port Essington, which contained, however, only a very superficial description of the country. There remained necessarily untouched several very interesting points, to which I should like to direct your attention, as they bear equally on physical geography in general, and on the practicability of colonization.

If we examine the country according to the conformation of its surface, the nature of its soil and vegetation, its supply of water, and its meteorological relations, the whole line of route may be divided very naturally into about eight sections, each of which bears its peculiar character. Three belong to the East Coast, three to the Gulf of Carpentaria, and two to Arnheim's Land, and the north-west coast of Australia.

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1. The first comprises the scrubby country between Darling Downs and Peak Range, with the Dawson and the Mackenzie (latitude 27° 23′.)

2. The Plains of Peak Range, the Isaacks, and the Upper Suttor, of which the Isaacks forms the outlet to the sea, between 23°—20° 50′ latitude.

3. The Lower Suttor, the Burdekin, and its table land (21°—18°.)

4. The Lynd, the Mitchell, and the east coast of the Gulf of Carpentaria, between 18°—16° of latitude.

5. The "Plains of Promise," so called by Captain Stokes, at the head of the Gulf, in 18° of latitude, with the Flinders, the Albert, and the Nicholson.

6. The scrubby west coast of the Gulf, with the Van Alphen, the Abel Tasman, the Seven Emu River, the Robinson, the Macarthur, the Limnenbight River, and the Wickham, between 18°—15°.

7. The River Roper and Arnheim Land, 15°—13° 40′.

8. The Alligator River and the Coburg Peninsula (latitude 13° 40′—11° 21′.)

The country between Darling Downs and the Mackenzie, between the 27° and 23° of latitude, is eminently characterised by the frequency and by the peculiarities of its scrubs. It is principally composed of sandstone, which, judging from its coal beds, and the impressions of plants contained in it, is identical with the sandstone formation of the Lower Hunter. But in several localities it has been broken by basalt (whinstone,) which forms either peaks, as Mount Aldis and Mount Nicholson, or the spine of large ranges, as Expedition Range. The sandstone ranges are remarkable for the number and steepness of their gullies, and for their scrubby vegetation. The basalt is generally connected with plains or with very openly timbered and treeless downs, clothed in a rich vegetation of herbs and grasses. The country was, with a few exceptions, well watered; and almost daily thunder-storms cooled the atmosphere during October, November, December, and January. But not only the high level land west of Darling Downs, which sloped almost imperceptibly to the south-west, but

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the valleys of the rivers and the sides of the mountains were covered with extensive scrubs principally composed of a species of acacia, which has received the name of bricklow from the squatters, between the Severn and the Condamine. This shrub or small tree has a foliage of greyish green colour, and grows so close that it is impossible, or only with the greatest difficulty, that a man on horseback can make his way through it. Along the hills which bounded Palm-tree Creek and the Dawson, at their junction, this scrub surrounded the Downs (frequently several miles in extent), which were rendered extremely pleasing, not only on account of the open view which they allowed to the eye, tired of the uniform density of the scrub, but also on account of small copses of bricklow, fusanus, and Bauhinia, which were picturesquely scattered over them, and which often clustered round stately bottle-trees, the shady retreat of numerous kangaroos and wallobis. These downs and plains were covered with various grasses and herbs; but the vervain, a wiry plant, prevailed to such a degree on many of them, that I called those Vervain Plains. Whenever the grey dense barrier of the bricklow met our eyes, either in travelling across an open forest or following down the banks of rivers, it was a disheartening dismal sight; but never was the extent of misery so apparent as when we stood on one of the steep gullies at the north-west side of Expedition Range, and looked over a valley almost boundless to the eye, which was filled with one almost uninterrupted sea of scrub.

This country was, however, not devoid of some redeeming characteristics, which were hailed with the greater delight, inasmuch as they formed a pleasing contrast with the inhospitable character of the surrounding scrub. The upper part of the Dawson, Palm-tree Creek, with its swampy Lakes, its fine flats, and noble palm-trees, part of Robinson's Creek, the Creek of Ruined Castles, and the country south-east of Expedition Range, will be remembered by the members of the party as so many places of rest and enjoyment, on which our hopes brightened and our energies revived.

Though the banks of the Mackenzie, so far as we travelled along it, partook of the scrubby character of the country, I have reason to believe that the scrub ceased a little lower down, and its large

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supply of water makes me suppose, that it forms a considerable stream towards the sea-coast. It disembogues very probably at Broad Sound, in latitude 21° 30′, as the natives pointed to the north-east, when we asked them about the course of the river.

The country south-east of Expedition Range, between Zamia Creek and Erythrina Creek, was, for a great distance to the eastward, flat and openly timbered. It was well grassed and tolerably well provided with water at the foot of the range. Its latitude was 24° 50′, but the course of its waters seemed to be directed either to Port Curtis or to Keppel Bay. Should a practicable communication with the sea-coast be found, I have no doubt that this will become a valuable district for pastoral purposes, and that even the good country of Castle Creek, Robinson's Creek, and Palm-tree Creek, will be accessible from this side.

2. The second part of my journey, which extended from lat. 23° to lat. 21° 40′, comprising Peak Range, the Isaacks, and the Upper Suttor, bears a character very different from that of the first. Here a long range of noble peaks, composed of domite, extends far to the W.N.W., and offers to the west and south-west a wide view over basaltic plains and open downs, which alternate with low and openly-timbered ridges. To the eastward of those peaks, basaltic ridges, with gently-undulating outlines, narrow plains, and abrupt sandstone ranges, form numerous valleys, along which creeks descend to the eastward, winding in their lower course through an immense level country, and joining the Isaacks, which comes from the north-west, and forms the chief outlet of the waters to the sea. An open forest covered the whole district, with the exception of some narrow belts of scrub along the Isaacks and on the sandstone ranges; and the most luxuriant grass clothed not only the black soil of the basaltic plains, but the stiff flats and the sandy bergs along the creeks and river. The supply of water was, however, not in proportion to the number or size of the channels; and it was on those magnificent downs of Peak Range that Mr. Calvert and myself nearly perished for want of water. It was here that we felt for the last time a hot wind, from the west and south-west, which direction points to that desert interior which even the persevering boldness of Captain Sturt has

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not been able to conquer. Water-holes existed, however, in the upper part of the eastern creeks, and swampy lagoons seemed to become numerous down the Isaacks, which joins the sea very probably near the Mackenzie, in Broad Sound. The Upper Suttor partakes of the character of the Isaacks; and as it was by far more accessible from the head of the latter than from its own lower course, I have placed it in the second division of my journey, though it belongs to the system of the waters of the third.

If, at a close examination, a sufficient quantity of water should be found, a wide extent of country will be opened to the squatter, who will travel with his herds without difficulty over the level country along the Isaacks and its tributaries, and will ascend on gentle ridges to the plains of Peak Range, and probably still farther to the westward, beyond another range of peaks, which we perceived in that direction. He will stock the beautiful country at the head of the Isaacks and the Suttor, over which at present numerous flocks of emus roam; and will fill with animation that immense tract of country which spreads out round the foot of Coxen's Peak.

During the month of February, till March, we were favoured with frequent thunder-storms, from the west and south-west, which enabled us to pass along the driest part of the Isaacks; and after having left the Mackenzie, we enjoyed every night a strong refreshing breeze from the northward, which set in at half-past eight o'clock at the Mackenzie, but every day earlier as we passed Peak Range and travelled along the Isaacks to the north-north-west. During the day, gentle easterly and north-easterly breezes prevailed.

3. The third division of my journey comprises the Lower Suttor, the Burdekin, and the country intervening between the latter river and the Lynd (the upper part of which is more accessible from the east than from the westward). It extends from latitude 21° to 18°, and is characterised by its supply of running water, by its primitive rocks, its limestone, its numerous ranges, and its fine open well-grassed forest.

If you bear in mind that it comprises three degrees of latitude

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and two and a half of longitude; that the elevation on its upper course renders the climate much cooler than might be expected from its latitude; and besides that several large tributaries, as the Cape, the Clarke, the Perry, drain in all probability large tracts of available country; you will on consideration agree with me that if a settlement is to be established on the east coast it ought to be at the mouth of the Burdekin, which I suppose to be at Cape Upstart, on the southern extremity of Halifax Bay. Should the entrance of the river be barred, as is the case with all the rivers of the east coast south of Wide Bay, it must be remembered that the inner barrier, which extends from Cape York down to Bunker's Islands, forms along the coast a channel of smooth water, which may be considered in the light of a river, the navigation of which has been repeatedly recommended by Captain King, the best authority to whom an appeal can be made.

The flats along the river are chiefly formed by the detritus of coarse granitic rocks, the feldspar of which has been transformed into clay, mixed with grains of quartz derived from the same source. Stiff clay soil was limited, and confined to hollows and depressions, round which the poplar-gum generally formed a belt of bright green foliage. Rotten ground was not uncommon, but it always proved to be a mixture of clay with sand; for the funnel-ant, which forms its habitations in such a soil, requires clay to cement the moving grains of sand.

I wish I was capable of giving you an adequate idea of the beauty and richness of the basaltic table land. The open forest of narrow-leaved iron-bark and box, on a sound rather stony ground, alternated with plains of various extent, richly grassed and frequently watered by numerous running brooks and springs. Large and deep lagoons were scattered over the valley, or were parallel to the river. The latter was still running strongly over its sandy, pebbly, or rocky bed, with a rich and luxuriant pasture everywhere around it. But the approach to this interesting country is intercepted by a very mountainous region, and by many deep creeks, over which more practicable roads will no doubt be found in the progress of colonization. The basalt

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appeared to have been broken by a still more recent eruption of lava, which expanded partly over it, and formed as wild and irregular fields of rock as ever covered the slopes of a volcano.

We travelled along the Burdekin during April and May, and we had, with two trifling exceptions, neither rain nor thunderstorms; but though the days were frequently exceedingly hot, we still felt the night breeze from the northward, and the clear nights were so cold and dewy that we greatly enjoyed our fires.

From the ridges and mountains which rose above the table-land, the waters descended not only to the valley of the Burdekin in a south-east direction, but also to the north-east and to the westward. The country along the creeks was open and flat, as long as they passed over the table-land; but when they descended, their channels deepened, their banks became surrounded with steep ranges, and their beds were either formed by solid rock or covered with loose shingle and boulders, which rendered it impossible to travel within or along them, and compelled us to find a circuitous passage beyond the neighbouring ranges and gullies.

4. The fourth division of my journey embraces the Lynd, the Mitchell, and the east coast of the Gulf of Carpentaria. The fall towards the level country, which forms a broad belt round the Gulf of Carpentaria, is much more rapid than the ascent from the east coast; and the course of the Upper Lynd is much more mountainous and wild than that of the Upper Burdekin.

It is extremely interesting to the geologist to observe the same succession of rocks, granite, talchiste, porphyry, and sandstone, in descending to the Gulf, which he found at the east coast in ascending to the table-land. But limestone was not met with on the west side of the York Peninsula, though it appeared extensively developed on the Burdekin. Basalt has broken through the various rocks, but the level country itself is formed of a clayey ironstone with grains of quartz, which extended all round the Gulf to Port Essington, and may be considered of a newer formation.

The Lynd was joined by several running creeks, and was in its whole course well supplied with water. The country was openly timbered, and well grassed, and at the lower part of the Lynd

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and parallel to the Mitchell, very large and deep nymphæa ponds existed, around which the pasture was particularly rich.

The rivers within the tropics are almost all remarkable for the immense width of their beds, which are filled with sand, with the exception of those spots in which the naked rock cropped out. They were overgrown with small trees, and the number and size of the latter depends upon the frequency and strength of those rushes of water which occasionally sweep down. The Upper Lynd was, for instance, covered with trees, whilst the bed of the Mitchell was entirely free from them. We observed water marks fifteen and eighteen feet above the level of the bed—evidently showing that a large body of water flows down to the sea in, perhaps, unusually rainy seasons.

In finding these large channels, whether dry or with tiny streams, occasionally lost in the loose sands, are we then to suppose that the power of the floods which formed them was formerly greater than at present, and that the decrease of moisture, which has been remarked by the old inhabitants of the colony, has equally taken place in the tropics? Analogy certainly justifies such a conclusion.

Large tracts of country on the east coast of the Gulf were covered with box (a species of eucalyptus,) and with a small tea-tree with broad lanceolate leaves. These trees generally indicated a stiff soil, which in the level country was never free from shallow holes, such as are called melon-holes by the squatters, formed, no doubt, by the infiltrating rain and standing water. In many of these holes we found dead crabs, and even fresh-water turtles, and many shells, which also proved that long drought had prevailed and destroyed these animals.

Another feature of the country are slight undulations, on which grew a few scattered rather stunted trees, amongst which a species of grevillia (gr. mimosoides R. Br.) with long, narrow, drooping, silvery leaves, particularly attracted our attention.

The finest and most available country was along the creeks and rivers. Here the soil was much lighter, and the bloodwood, the leguminous iron-bark, and the pandanus, grew well on it, forming an open forest.

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All the rivers of Australia have lines of holes and hollows parallel to them. These are generally filled by high floods, and keep the water much longer than the rivers themselves. Lagoons of this description were very numerous along the Staaten, the Van Diemen, the Gilbert, and the Caron, and appeared to be the constant resorts of the natives. To the north of the Staaten towards the sea coast, there is a succession of plains, but the grass was generally stiff and wiry.

If we compare the course of the rivers on the east coast of the Gulf of Carpentaria, it will be considered remarkable that the Lynd, which rises in the latitude of the head of the Gulf, from the table-land of the York Peninsula, should go to the north-north-west, and belong to a system of waters which joins the sea in latitude 15°, instead of taking a direct course to the westward, and of disemboguing in or near the head of the Gulf. A number of coast rivers, of probably very short courses, the Nassau, the Staaten, the Van Diemen, Gilbert, and Caron, take their origin, from the moderately elevated country which bounds the valley of the Lynd and Mitchell to the westward.

5. The fifth division of my route comprises the Plains of Promise, so called by Captain Stokes, which extend from the Flinders to the Nicholson, and are drained by tributaries of three large salt-water rivers or creeks, the most western of which is the Albert of Stokes, and the Maet Suyker of the Dutch navigators. These plains were covered with a variety of tender grasses and herbs, but bare of wood, with the exception of a few straggling trees. The narrow valleys of the creeks were, however, filled with open scrub, formed by a small tree, which we called raspberry-jam tree, because its fresh-cut wood had the scent of raspberry jam.

Should a harbour be found at the head of the Gulf of Carpentaria, which might allow ships to approach and to moor in safety, it would not only open this fine country to colonisation, but would allow the produce of the high land of the York Peninsula, to be brought down to the Gulf of Carpentaria, as well as to the east coast. Cattle and horses could be easily driven from coast to

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coast, and they would even fatten, as water and feed are every where abundant.

6. The sixth part of my journey between the Nicholson and the Roper was as remarkable for the number of large salt-water rivers, as for the density of its tea-tree scrubs, and for the extent of its stringy-bark forest.

Here we came again to hills and ranges; and pebbles of granite and porphyry made it evident that the great arc of high land, which sweeps round the head of the Gulf of Carpentaria, again approached the sea-coast. The Van Alphen, the Abel Tasman, the Robinson, the Macarthur, and the Limnenbight Rivers, formed broad channels of water, and offered to us a magnificent sight, when, after long and harassing stages through a dense scrubby monotonous forest, we came suddenly upon them.

Captain Stokes, when exploring the head of the gulf, was struck with the comparatively low temperature in this latitude. Though the want of a thermometer prevented me from making any exact observations, I was still able to collect a number of facts which tend to corroborate Captain Stokes's statements. In travelling along the east coast of the gulf, we had generally light easterly and south-easterly airs during the day, but a strong cold wind from the south-west and south by west set in at night, from which we suffered the more, as we avoided keeping a large fire, which would have prevented us from watching the approach of hostile natives.

At the head of the gulf the night winds came more and more from the southward, and changed to the south-east, and even east-south-east, as we advanced along the west coast. During the day we had a very regular sea-breeze from the northward, which was particularly strong near the large rivers, the valley of which seemed to condense and to accelerate its current. The stronger the sea-breeze was during the day, the heavier was the dew during the night, which was easily accounted for by the action of the cold southerly land breeze on the warmer moisture with which the sea air was charged.

A phenomenon, which I observed several times, shows clearly

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the action of these two currents of air when they meet and mix. About 10—11 o'clock at night, a veil of loose clouds formed suddenly to the southward, and rose rapidly with a strong puff of southerly wind; another mass of clouds formed in the same quarter, and passed as rapidly as the first, and after that a strong full breeze set in from the southward, with a perfectly clear sky. According to the Rev. Mr. Clarke, something similar takes place over Sydney, about sundown, in the summer season, but is succeeded by a still night.

The bracing nature of the south breeze at night, had a very beneficial influence on our constitutions; as the regular interchange of land and sea breeze contributes every where to render a climate healthy.

7. The seventh division of my route is formed by the Roper and by the high land of Arnheim's Peninsula. The Roper is the only large fresh-water river of the west coast of the gulf, as far as we followed it to the northward. It is fed by a great number of running creeks and brooks, all closely fringed by belts of pandanus. Almost the whole country along the river was open, well grassed, and available for depasturing purposes. At its upper course exist fine plains, which are bound by sandstone ridges, and diversified by pandanus creeks, forming an extremely pleasing landscape. The high land was covered with an open stringy-bark forest on a sandy soil, but its level is frequently interrupted by steep rocky sandstone hills and ridges, at the foot of which tea-tree swamps, with a peaty soil, formed frequently the heads of creeks.

I have mentioned that the fall of the high land of the York Peninsula is more sudden to the westward; the same is the case in a still higher degree in Arnheim's Land, for there is not only a very rapid fall in the creeks, but there are precipices 500—800 feet high, which border the valley of the South Alligator River, and over which numerous cascades rushed down to join their waters with those of that river.

It was very remarkable that the only slope which allowed us to descend into the valley is formed by granite, whereas the whole of Arnheim's land and the ranges of the Roper are composed of

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sandstone, which has been broken through by basalt, near the divisions of the waters of the Gulf of Carpentaria and the north-west coast.

8. The eighth part of my journey comprises the two Alligator Rivers, and the Coburg Peninsula. Its leading features are large swampy lagoons; extensive plains at the lower part of their course, densely wooded ironstone ridges, and a great number of creeks in the Coburg Peninsula, with limited flats of light alluvial soil, which are richly clothed with herbs and grasses during and immediately after the rainy season. These creeks generally enlarge into swamps called "Marairs" by the natives, before they are lost in the mangrove thicket, which covers their junction with the sea.

I have mentioned that at the east coast we enjoyed a regular cool northerly night breeze, which frequently increased to a gale, and that round the gulf the strong night breeze was southerly, from south-west and south-east, whilst the sea-breeze blew during the afternoon from the northward. We were deeply interested in these movements of the atmosphere, not only on account of their meteorological importance, but also on account of the relief which they afforded us whilst under the influence of a scorching tropical sun.

Along the Roper the sea-breeze continued strong and regular from the eastward, but the night-breeze became indistinct, probably in consequence of a great number of parallel ranges, which intercepted its course. At the head of the river, however, we again felt a strong but warm wind from north-north-west—north-north-east, about nine o'clock at night. This I considered to be the sea-breeze from the north coast of Australia, flowing probably up to the high land along the valley of the Liverpool River.

The 14th November, when on the high land of Arnheim's Land, and on western waters, we experienced the first thunder-storm since we had left the east coast. Similar ones rose almost every day to the 23rd of November, and veered invariably from south to west, from north to east. It was the time when the north-west monsoon sets in, and these thunder-storms appeared to be the first indications of the change.

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I had been extremely anxious to reach Port Essington before the setting in of the rainy season, as there was good reason to believe that the peninsula was connected with the main land by a neck of low land and mangrove swamps, which would have been rendered impassable by any continuance of rain. Though I afterwards found that connecting ridges run from the main land into the peninsula, it would notwithstanding have been extremely difficult to cross the plains and flats, which were large and numerous along the Alligator Rivers and Van Diemen Gulf. We were again favoured with fine weather until we were fairly on the peninsula, when the thunder-storms recommenced; and the day we arrived in Victoria heavy rains set in, which rendered the flats boggy and flooded the creeks.

Captain Macarthur gave the following description of the setting in of the north-west monsoon. At sunset, a low body of clouds is seen to the southward and south-west, which draws off to the westward between the main land and Melville Island. These clouds approach nearer and nearer to the zenith every succeeding day. At first they just skirt the settlement, accompanied by brief showers, but at length the whole body passes fairly over the peninsula, and the regular rains commence.

The body of clouds before mentioned forms and rests very probably on the high land, at the head of the Alligator rivers, and is produced by the moist warm north-west wind flowing up the valley to the elevated cooler country, and meeting perhaps cold winds from the west side of the Gulf of Carpentaria, and from the high lands to the southward.

I will here mention that the sea-breeze at Victoria is extremely weak, and I think that Captain Macarthur is right in attributing partly to this fact the fever, from which the garrison has several times severely suffered. It is extremely difficult to assign any other reason for the want of salubrity. The country is undulating and hilly; the soil is sandy, and absorbs rapidly the heaviest showers; the forest is open; the mangrove thickets which cover the mouth of the creeks scarcely deserve the name of swamps, as they are washed by the tide, and form no accumulation of vegetable matter which might produce the miasma or malaria which

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generally renders tropical countries so dangerous. After rain the air is fresh and pure, the ground dry, and a walk most agreeable. Those localities which are freely exposed to the sea-breeze, as, for instance, Crocker's Island, are, according to Captain Macarthur, very healthy.

If you ask me how far the country we have travelled over will be available for colonisation, I would reply that the greatest part is fit for pastoral purposes; and I except only the scrubs of the east coast of Australia, the mountain gorges of the Upper Lynd, and the tea-tree scrubs of the west coast of the Gulf of Carpentaria. But even here broad belts of fine country extend along both sides of the larger rivers, and will very probably be found quite as good as the country of the Roper. Horses and cattle will do well over the whole extent, particularly at Expedition Range, along the Isaacks, the Burdekin, the east coast of the gulf, and on the plains at its head. The rapid increase of the buffaloes on the Coburg Peninsula, and the excellent condition of the herd of cattle which they keep at Port Essington, shows that the north-west coast of Australia is no less favourable for the development of animal life.

The elevation of Peak Range, and of the Table Land of the Burdekin, leads me to believe that these regions are fit for sheep.

I am not sufficiently acquainted with the cultivation of tropical plants to give a decided opinion; but there is such a variety of soil, of aspect, and of elevation, that I feel convinced tropical plants will grow freely, where sufficient moisture exists. The cotton, the indigo, the cocoanut, the banana, the arrowroot, the sweet potatoe, the bread-fruit tree, the jackfruit, the sowersop, the pine-apple, the mango, and mangostine grow well in Port Essington; and Captain Macarthur assured me that, according to the statement of the Malays, who had examined the swamps west of the settlement, they would do excellently for growing rice. The large plains of the Alligator Rivers would suit equally well, and to an almost unlimited extent.

If we draw a line from Halifax Bay to Port Essington, and divide it into three almost equal parts, the points of division would fall on Halifax Bay, on the Head of the Gulf, on Limnenbight,

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and Port Essington. Should good harbours be found, and settlements be established on those points of division, they would scarcely be as far from each other as Sydney from Port Phillip, and the overland communication would be probably equally easy, or would be rendered so after a very short time.

I shall mention once more those facts which have induced me to suppose that part of the country had been remarkably dry for a succession of years.

1. The condition of large channels of rivers and creeks, which were either entirely dry or contained only tiny streams not at all proportionate to their widths.

2. The occurrence of dead crabs and fresh-water turtle on the box flats at the east side of the Gulf of Carpentaria. The turtle requires a great supply of water, and those skeletons which I observed did not seem to have been carried thither by the natives.

3. Extensive shallows at the west coast of the Gulf, surrounded by heaps of dead fresh-water muscle-shells, of large size, which were overgrown by small tea-trees, about four or five years old. The muscles must have lived and grown for a number of years in those hollows, which were now entirely dry.

4. The plains of the East Alligator River were covered by dead fresh-water shells, particularly limnæas, which must have lived and grown in shallow holes and lagoons, which extend all over those plains.

5. Lines of drooping tea-trees along several salt-water creeks at the west coast of the Gulf, were dead, in consequence of the want of the usual freshes, as the tree seems not to live on water entirely salt.

It seems impossible, in the present state of our information, to account for this remarkable phenomenon of the decreasing supply of water on the surface of this continent. The supposition of a gradual rise of the land would explain why arms of the sea recede, and parts of the bottom of these become dry; but it would not explain the decrease of moisture in the atmosphere, or the greater evaporation or absorption of the waters in lagoons, which are not connected with any water-course. The rise of the country would

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rather lead us to expect a greater precipitation of moisture round its elevated points.

My observations on the uninhabited parts of the colony, show that this desication is not dependent upon colonisation, upon the clearing of the ground, and the increase of stock, though there is no doubt that the latter must make a great impression on limited water-holes not supplied by springs. We are, therefore, compelled to look for the cause in some until now unknown change of the atmosphere, which may be periodical, and allow us to hope that the continent will be again favoured with a series of more rainy seasons.

Lecture II.

I shall now give you an account of the change of vegetation we experienced in advancing into the tropics. I shall enumerate all the edible vegetable substances we found, the change of animals, and shall conclude with some observations on the natives we met during our journey.

The vegetation changed very little along the east coast from Moreton Bay to the northward. The open forest was generally formed by the narrow-leaved and silver-leaved iron-bark; the flats were covered by box; the bergs along the rivers and creeks by bloodwood and Moreton Bay ash; and the immediate banks of the creeks were lined by flooded gums and casuarinas, which, farther northward, gave way to the drooping tea-tree. We never met with vine and cedar brushes like those which grow along the rivers of Port Macquarie and Moreton Bay, or on the sides of mountains, like the bunya-bunya brushes. There were narrow belts of palm-tree brush at the Mitchell, and of bamboo brush on the South Alligator River, but nothing to be compared with the dense masses of vegetation which are found in the districts above mentioned. No species of araucaria was seen; but calitris, the cyprus-pine, covers the whole continent wherever a sandy rocky soil favoured its growth. The drooping myall ceased at Peak Range, the bricklow at the heads of the Burdekin and the Upper Lynd, where also the iron-bark disappeared. Several species of

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bauhinia adorned the scrubs with their rich white blossoms; and an arborescent cassia, with very long narrow seed-vessels, was observed between latitude 27° 30′ and 19°. Careya arborea was first met with at the Suttor, the clustered fig-tree first at the Burdekin; grevillea mimosoides and hakea lorea appeared first in latitude 26° 42′. Grevillea lanceolata, a new species with broad lanceolate leaf, thus named by me, showed itself first at the Suttor, where it was growing on a light sandy soil with pandanus spiralis. Grevillea ceratophylla, and acacia equisetifolia, were first met with in latitude 19° 19′. The poplar-gum, a species of eucalyptus with a bright green foliage, formed patches of forest along the Isaacks, and grew on the stiff hollows along the Burdekin. An arborescent zamia was growing on the heads of Zamia Creek and on Expedition Range, in latitude 24° 43′; a cycas about four to five feet high, with pinnate leaves of glaucus colour, on the Burdekin in latitude 18° 45′; and a sciadophyllum in the Valley of Lagoons in almost the same latitude.

Nymphæa was first observed on Brown's Lagoons in latitude 24° 45′, and nelumbium near the Mackenzie, in latitude 23° 21′.

When entering upon the system of the waters of the gulf, the character of the vegetation changed very considerably, and a number of new forms appeared, which bore resemblance to the flora of the Malay Islands and of India. The head of the Lynd was remarkably rich in various plants and trees. Here cochlospermum gossypium and a rose-coloured sterculia attracted our attention by the beauty of its blossoms; and a species of eucalyptus with its butt covered by short foliaceous bark bearing seed-vessels of immense size, and blossoms of an orange colour. A rubiaceous tree belonging to the sarcocephaleæ was distinguished by its rich dark green umbrageous foliage, and a dwarf grevillea by its bunches of crimson-coloured flowers. Two species of terminalia either shaded the creeks or grew on the rocky slopes. Lower down the river, a species of stravadium, with loose drooping racemes of red blossoms, fringed the shallow swampy lagoons; and on the banks of the Mitchell, in latitude 15° 51′, the corypha palm grew to a large size and in great numbers.

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A yellow villarsia shared with nymphæa the ponds, and several yellow ipomæas twined round the trees at the very edge of the water.

Various species of melaleuca took the place of the eucalyptus, which disappeared, with the exception of the box, as we approached the coast. One species of pandanus was growing on a light sandy soil in the open bloodwood forest, and formed broad belts at the outside of the forest land along the levels of the Alligator Rivers. Another species crowded round the running creeks in an almost impassable jungle on the west side of the Gulf. The nonda-tree, which belongs in all probability to the rhamnaceæ, was a fine shady spreading tree, laden with yellow plums, between the Lynd and the Van Diemen. The raspberry-jam tree covered the slopes of the salt-water rivers and the valleys of those creeks which intersected the plains at the head of the gulf. The stringy-bark tree re-appeared on the sandy flats of the Upper Lynd; but on the west coast of the gulf it formed the principal part of a scrubby forest. Over Arnheim's Land and the north-west coast towards Port Essington, the orange-blossomed eucalyptus, a leguminous tree with a dark fissured bark, and the Livistona-palm had an equal share in the composition of the forest. Inga moniliformis was first seen at a tributary creek of the Mitchell; but was afterwards, with a broad-leaved terminalia, a white gum, and the mangrove myrtle (stravadium), a constant companion of creeks and waterholes. A species of bossiæa, with flat stem, composed principally the scrub of the west coast of the gulf, and it was here we observed grevillea pungens with thirsi of scarlet flowers. A noble cycas-tree, which frequently attained the height of fifty feet, formed large groves on Cycas Creek and the Robinson; but disappeared as we left this river, and was not observed again until we arrived at Port Essington, where two or three small trees are growing near Victoria.

The Corypha-palm, which we had observed on Palm-tree Creek, and under Expedition Range, was found again on the Mitchell, at Beames's Brook, and on the South Alligator River. Very low specimens of seaforthia grew on Arnheim's Land, but

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noble trees of it were on the patches of brush along the Alligator Rivers, and formed groves and even a whole tract of forest between Raffles Bay and Port Essington.

It is generally believed that Australia is poor in edible fruits and vegetables. There is no doubt that very few are good, but it will be seen by the subjoined catalogue, that the number of the edible productions of the vegetable kingdom was by no means small.

We boiled the young shoots of native spinach (mesembrianthemum), the goose-foot (chenopodium), portulacca, and the sow-thistle (sonchus), as vegetables. The seaforthia, corypha, and livistona palms, yielded young edible shoots; but the two latter were either bitter or gave only a small supply, whilst the seaforthia shoots (myroin of the natives of Port Essington) afforded most excellent eating. Salicornia, a small plant with articulate fleshy stem, which grows always on soil impregnated with salt, tasted well when boiled with our stewed meat, particularly when we were without salt. The youngest leaves of typha (bullrush) and the lower part of the leaf-stalks of nelumbium were good to eat. The stem of a species of cymbidium was edible, but very glutinous and insipid.

A small round tuber, about three quarters of an inch in diameter, of a sweet agreeable taste, was found in a camp of natives at Comet River, and belongs probably to a water-plant, with floating leaves like potamogeton. In the scrubs between the Mackenzie and Peak Range and along the Isaacks, we found large watery slightly pungent tubers of a vine, which bore blue berries of a still more pungent nature.

At the head of the Lynd, two sorts of potatoes were found in great abundance in a camp of the natives; but they were excessively bitter, and neither roasting nor boiling would render them palatable; at last I pounded them carefully, washed the pounded pulp, and obtained a tasteless starch, which very much resembled arrowroot.

The seed-vessels, the stems (ombelborro), and tubers (toori) of nymphæa were eaten by the natives of the Upper Burdekin, and of the east coast of the gulf, and gave us some hearty meals.

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The stems and tubers which the natives pounded were very good indeed. The thick root of a little bean with yellow blossoms, and those of a convolvulus on the plains of the Albert, were found in a camp of natives; and the "imberbi," perhaps the root of the same convolvulus, formed the principal part of the repast of Nywall's tribe, near the East Alligator River. But the finest and most substantial food was the allamur, or murruatt, the mealy rhizoma, or subterranean stem of a sedge, which the natives of the Alligator Rivers and of the Coburg Peninsula obtained in large quantities.

Amongst the fruits I have to mention a small lemon, which had an acidulous taste, and abounded in the scrubs of Expedition Range and Comet River.

The seeds of the dwarf kouradjong (grewia) yielded, when boiled for a long time, an agreeable acidulous drink.

Those of sterculia heterophylla (the kooremin), and of the rose-coloured sterculia, round the gulf, made, when slightly roasted, a fine coffee, and the remaining grounds were good to eat.

The spongy wood of the bottle-tree (another species of sterculia) contained a cellular mealy substance between its fibres, which, when chewed, satisfied the cravings of hunger.

The seeds of the Mackenzie bean, so called from being found first and most abundantly in the sandy bed of that river, formed a good substitute for coffee. Those of nelumbium were however much finer, and the remaining grounds were agreeable to eat and wholesome. The seeds of the vine-bean of the Roper (a species of mucuna?) when pounded and boiled for a long time formed a very satisfying meal.

Several species of capparis, either shrubs or small trees, had edible fruits, which when perfectly ripe we enjoyed greatly, as they contained a sweet pulpy substance, in which the seeds were imbedded. The latter were however very pungent.

At the Isaacks a little tree with coriaceous leaves bore a small oblong fruit, having a surrounding calyx like a little acorn, with a thin but sweet rind. The abundance of this fruit made up for the scantiness of its edible parts. It was much sought after by crows and cockatoos.

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At the head of the Isaacks and in the valley of lagoons we found a purple fruit with a many-celled seed-vessel. The thin rind had a slightly stringent acidulous agreeable taste. The tree had a pinnate leaf resembling that of the red cedar.

Santalum lanceolatum yielded occasionally blue edible berries of the size of small cherries.

Fusanus, which is mentioned in Sir Thomas Mitchell's expeditions, gave us a rich harvest of fruit in the bottle-tree scrubs west of Darling Downs.

I frequently collected the small red fruits of rhagodia; but they were not worth the trouble, and I willingly left them to the bronze-winged pigeons, the crops of which at Comet River were crowded with them.

A native mulberry with small white fruit, of a sweet taste, grew on the fields of lava, at the Burdekin; and an edible fruit of a white colour, with persistent calyx, and viscous, like the fruit of the mistletoe, grew on a small tree along the upper course of the same river.

Several species of figs, the rough purple fig (ficus muntia), the small round yellow fruit of ficus Australis, and the clustered fig of the Burdekin, were successively gathered. The latter yielded by far the richest harvest, as numerous bunches of the fruit were sprouting out of the trunk and largest branches from top to bottom. They were of the size of a small garden fig, of a yellow colour when ripe, but generally full of small flies and black ants. They were very heavy and indigestible, and we several times suffered from eating too many of them.

Careya arborea? (belonging to the Barringtoneæ) bore a harmless fruit, which, however, we never found perfectly ripe.

The little gooseberry-tree (coniogeton arborescens? belonging to the Terebinthaceæ) had a fruit of the size of a small compressed cherry, which we boiled, when not yet ripe enough, to obtain from it an acidulous drink, but which was very agreeable to eat when sufficiently ripened.

The seed vessels of pandanus spiralis, when ripe, contain a very sweet pear-like pulp between their fibres. It is very agreeable

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at the time, but afterwards extremely pungent, and a severe purgative. The natives roast and soak them, and probably drink the fluid with which they have washed out the pulp. I would not even be surprised if this fluid were to undergo fermentation and yield a spirituous liquor. After having used the seed-vessel the natives break it to obtain the kernel, which is also good to eat.

The seeds of cycas seem to form a considerable part of the food of the natives at Cycas Creek and the Robinson. They are cut in slices, and spread over the ground and dried. When brittle, they are soaked for several days in water, and afterwards tied up in tea-tree bark, to undergo a sort of fermentation, which destroys their poisonous principle; for in a fresh state they are violently cathartic and emetical.

We collected three species of rose-apple (eugenia). One was a large scarlet fruit, with longitudinal ribs, of a coarse and strong aromatic taste. Another was of a delicate rose colour, and extremely pleasant. The smaller fruit of a species of acmena was also occasionally gathered along the western creeks of Arnheim's Land.

A small rubiaceous tree at the Upper Lynd bore a rather dry, round, many-seeded acidulous fruit, which tasted like coarse rye bread, and induced us to call it the little bread-tree.

The nonda fruit, oblong in form, about an inch in length, and of yellow colour when ripe, was very agreeable, and it appeared that the emus were very fond of it. But they ate principally the unripe fruit, which was excessively bitter. It seems as if this bird was altogether fond of bitter fruits; for that of a small euphorbiaceous tree, on which the creature principally lived, was perhaps the most bitter fruit I have ever tasted, and this bitterness was imparted to the flesh, and even to the marrow.

At Raffles Bay we found "the lugula," a species of anacardium, the succulent fruit stalks of which were very agreeable; but the envelope of the seed was exceedingly sharp, blistering our lips and skin whenever the juice adhered to them.

The gibong (persoonia falcata), and the fruit of exocarpus latifolia were occasionally found and eaten in Arnheim's Land.

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On the ridges of the north-west coast I picked from a little tree with ternate leaf, a small round black berry, which was of a very agreeable taste.

One species of acacia, a sapindaceous tree, and two species of terminalia, yielded a fine supply of edible gum, and the fruit of one of the terminalia was tolerably good to eat.

The native nutmeg of Port Essington (myristica) is of an oblong form, and not so large as that cultivated by the Dutch, but strongly aromatic.

We washed out the blossoms of the drooping tea-tree (melaleuca leucodendron) to get at the honey, which they contained in great quantity.

The native marjoram, of which we met three sorts, one belonging to the genus "Anisomeles" R. Br., was used for tea and for flavouring our soup.

On one occasion we found an edible mushroom. This grew in the scrubs west of Darling Downs.

In our endeavours to find substitutes for tea, we were once severely punished on using the seeds of a species of acacia, which produced violent sickness and bowel complaints in several of my companions. I mentioned the blistering qualities of the "Lugula." Still more remarkable was that of the glutinous juice which exuded from the seed-vessels of a species of grevillea along the banks of the Macarthur. The pulpy substance which separated the seeds of the arborescent cassia had an acidulous taste, and was a mild and very effective medicine.

I used wood ashes in general, but particularly those of the little raspberry-jam tree, to make a lye or wash, with which I dressed the wounds of my companions, using the quill of bustards or of native companions, as a kind of syringe to inject the fluid, where the wound was deep.

The Animal Kingdom.—Of molluscous animals we observed two species of unio (fresh-water muscles), on which the natives along the Mackenzie, the Suttor, and the lagoons of the east coast of the gulf, seemed principally to live, two species of cyclas, three species of limnæa, one of physa, two of melania, one of ancylus. Several species of helix, of which one species, almost

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as large as the edible helix pomatia, was eaten by the natives of the Isaaks and the Suttor. A species of the elongated form of clausilia was once found in the stomach of a bronze-winged pigeon on Comet Creek. A species of succinea was living in the fissures of the bark of the gum trees, and in the moist grass west of Darling Downs.

Small brown leeches abounded in some water-holes west of Darling Downs. They were very keen within the water, but dropped off as soon as we lifted our feet out of it.

Of crustaceous animals we observed occasionally the crawfish (astacus), which abounds in many creeks of Darling Downs as in other parts of the colony. A land crab, burrowing under logs of trees, or in the mud of water-holes, was caught several times alive. Dead shells were frequently observed in the dried-up water-holes.

Probably in consequence of the extreme dryness of the season, we met with very few insects, and those were generally of familiar forms. A fine grasshopper, however, of a bright red colour, and with blue marks, attracted our attention on the elevated parts of Arnheim's Land. We never observed fire flies; suffered comparatively little from mosquitos and sand flies, but were much annoyed by small flies, and particularly by two species of horse flies, as we approached Port Essington. Various species of ants either attacked our meat or ran over us when lying on the ground. In the latter respect a very minute black ant was particularly troublesome. The green-tree ant, which lives on shady trees and shrubs, was noticed first at the Lower Lynd.

We observed the structures of the white ant (termites) in every form from the narrow cone one of three feet high, to colossal piles fifteen feet high, and more than eight feet in diameter, with various buttresses and turrets. The latter were particularly large near the sea-coast.

The native bee was so abundant in some localities that numbers of them settled on our plates and hands. Their honey was very aromatic in those parts where the native marjoram grew. Hornets attacked us frequently at the commencement of our journey, and stung ourselves and our cattle, which became wild, and in consequence upset their load.

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Of fishes we observed several small ones belonging to the perches, one probably belonging to the carps. Eels were in the water-holes of the eastern waters. A silurus, a guard fish, the broad-scaled fish of the Mackenzie, (a species of ostioglossum,) which attains a great size and is excellent eating, seems to live in the lagoons, in the rivers, and even in the salt water. A saw fish (pristis) which belongs to the sharks, was found far from the sea-coast, in a water-hole of the River Lynd.

Reptiles.—Several species of tiliqua, of scincus, one with a blunt tail and nobby scales, of gheckos, of agamas, gramatophorus, chlamydophorus (the Jew-lizard of the Hunter), chlamydosaurus kingii, and two or three species of hydrosaurus and the crocodile were seen. The latter seems to inhabit the estuaries of all the tropical rivers, and was seen several times in large lagoons far inland. We heard several times a low bellowing noise along the large rivers, which we ascribed to this animal. It is very remarkable that the natives which visited Captain Sturt in the desert recognised the crocodile when shown its outline. We observed very few snakes; the carpet-snake, a small brownish snake, in the water-holes along Comet River, a whip-snake with yellow belly, at the Suttor, and a long greyish snake at the East Alligator, were all we saw.

Birds.—Very few new, and no striking species of birds were observed along the east coast of Australia. The bustard and the emu frequented the plains, both very inferior in size and condition to those of the southern parts of Australia. The nest of the native turkey (tallegalla lathami), and the bower of the bower-bird (chlamydera maculata, Gld.), attracted occasionally our attention in the scrubs. The cockatoo was, as usual, fond of shady creeks; the laughing-jackass chaunted our matins and vespers; the boobook or barking bird, and the curlew called during the night; the fan-tailed fly-catcher and a warbler of the reeds cheered us with their pretty song by day. Kites and crows contended with us for our meat, as the harpies with Æneas, or came to pick the few bones we left, as their share. The black cockatoo was still the most wary bird of the bush. The Moreton Bay rosella, red shoulders,

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blue mountaineers, betsherrygahs, (melopsittacus undulatus, Gld.), a new parrot which Mr. Gilbert had first observed on Darling Downs, partridge, and bronze-winged pigeons, several species of doves and various finches, came to share the water with us. The black duck, the wood duck, the teal, grebes, and pelicans, inhabited the large lagoons. The black swan disappeared to the northward, and was observed last at the junction of the Suttor with the Burdekin. Parra gallinacea, Gld. was first seen in the valley of lagoons, lat. 18° 42′. The wonga-wonga pigeon (leucosarcia picata) was seen last at the north side of Expedition Range, 24° 40′.

When we entered into the river system of the gulf, new birds appeared, which Mr. Gilbert had only observed at Port Essington, or which had been collected by Dr. Bynoe at the north-west coast. A smaller species of laughing jackass (dacelo cervina, Gld.), with a voice a little more melodious than that of the large one, was first heard on the Upper Lynd; the crested partridge pigeon, geophaps plumifera, lived along the ridgy banks of that river; the whistling duck, leptotarsis eytoni, Gld.; the shield-rake, tadorna rajah; and the black-winged pelican occupied the lagoons. Cocatua sanguinea (a small species of cockatoo), the rose cockatoo, cocatua eos, Gld., the betshirygah, the harlequin pigeon, peristera histrionica, lived on the plains at the head of the gulf. The Torres Strait pigeon, carpophaga luctuosa, and geophaps Smithi were first seen in lat. 16° 51′ west of the gulf; Brown's parrokeet (platycercus Brownii) was observed at the head of the Roper; a new species of Rock pigeon (petraphassa, Gld.) lived amongst the sandstone cliffs in Arnheim's Land. The lagoons of the Alligator Rivers abounded with wild geese (anseranas Melanoleuca), and with myriads of whistling ducks, black ducks, teal, shieldrakes, dwarf geese (nettapus pulchellusæ, Gld.), and spoonbills (with black and yellow bills), ibisses, and native companions. Its plains abounded with the small cockatoo (cocatua sanguinea). The most interesting bird of Port Essington was the jungle fowl, (megapodius,) the eggs of which would indeed never be expected to be found in the huge mounds of clay which seem to have been accumulated by several generations of birds in succession.

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One bird seemed to be closely attached to the cypress pine; for its remarkable note was heard whenever we were near these trees. It was heard at night, and particularly towards morning; the note was a melodious repetition of "gluck, gluck," which terminated in a kind of shake. Mr. Gilbert did not know it, and we could never get a sight of it; its voice was besides extremely deceiving as to distance. The very pleasing note of another bird was heard in the most rocky intricate part of Arnheim's Land; it was the repetition of a long full whistle, rising each time about half a note.

Quadrupeds.—Respecting the quadrupeds, it may be mentioned that the common grey kangaroo (macropus major) lives along the whole east coast of Australia, and that we killed the last at the Van Diemen River; the open grassy forest of which abounded with them. At the west coast of the gulf, the red forester of Port Essington (osphranter Antilopenus, Gld.), took its place, and was tolerably numerous in small flocks. The walluru (osphranter robustus) was observed last in the rocky wilds of the Upper South Alligator River. Rock wallabies, resembling petrogale lateralis, Gld., were living amongst the cliffs of Ruined Castle Creek, in lat. 25° 9′. At the Mitchell we met a brush wallabi of a brownish colour and very coarse hair (halmaturus agilis, Gld.), which was common all round the Gulf of Carpentaria. At the head of the gulf a dark grey kangaroo was killed; it had a nail at the end of the tail, but appeared to differ from macropus unguifer of Gould, in its darker colour. Lagorchestes was killed at the table land of the Burdekin. The kangaroo-rat (Bettongia) was observed wherever dry grass offered a hiding place. It did not differ from the species of Moreton Bay (B. rufescens); in the scrubs one of my blackfellows saw, however, another species with a tawny back, which became black towards the hinder extremities.

The opossums and flying squirrels seemed to disappear to the northward, or were at least so silent at night that we became rarely aware of their presence. On the Upper Burdekin, on the Lynd and Mitchell, the ring-tailed opossum (Phalangista Cookii) was caught, and at Port Essington opossums and sugar-squirrels (Petaurus sciureus) had been very numerous according to Captain

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Macarthur, but had now almost disappeared. The bandicoot (perameles nasuta) was occasionally seen and killed as far as the Lynd, where it used to come at night into our camp. The native cat (dasyurus maugei) was very numerous along the Upper Lynd, and frequently visited our larder when it contained fresh game.

Most useful to us were two species of flying fox (pteropus), a small one with a bright fox-coloured neck, and a larger one of a generally darker colour. These animals were exceedingly numerous at the head of the Roper, and in the patches of brush along the Alligator River. The large species was remarkably fat, and we killed several times great numbers of them, which were most welcome at our dinner. They were living on the blossoms of several gum trees, and when feeding during the night used to make an incessant screeching noise.

Several mice or rat-like rodentiæ were killed at the commencement of our journey; but they were very rare, and never attempted to make free with our provisions.

The want of insects explains sufficiently the rare occurrence of bats.

The native dog was frequently heard howling round our camp, particularly in countries which abounded with game. Several times they came at night into the camp to gnaw bones which we had left. That of Port Essington seems larger and more daring than others, as it attacks goats, and will come even into the enclosures to carry away fowls.

The buffalo, which we met first at the east Alligator River, is not indigenous, but imported from the Malay Islands.

I have seen no difference in the physical constitution of the natives of the east coast of the Gulf of Carpentaria, and of the north-west coast. The coast black of Moreton Bay is a fine well-made man, and so is the coast black of the Alligator River.

Farther in the interior he is generally not so well fed, and has consequently a weaker frame; but when there is abundant food the native of the inland country is not inferior in strength to that of the coast, and Captain Sturt describes his ichthyophagist friends as equally well made and strong. The natives of the gulf we met

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with were rather slim, but very intelligent. In the interior the families were more scattered, the tribes smaller, the intermixing between each other was less rapid.

Mr. Eyre remarked, that at the south coast the presence of natives does not indicate a supply, or at least an abundance of water. This, I think, may be the case at the sea-coast, where an abundant supply of food constantly invites the natives, who are consequently trained from childhood to do with the smallest possible quantity of water. In the interior the fires and burnings of grass were almost invariably the indications of an approach to water. At the Alligator Rivers the natives generally resorted to wells, which they had dug along the outlines of large plains, which abounded not only with animal but also with vegetable food.

In their habits there were decided differences. In the first account of my journey, published in the *Herald* and *Australian* newspapers, I have alluded to the remarkable custom of circumcision of the natives of the Gulf of Carpentaria. Having compared my notes, I find that the custom was only observed at the west side of the gulf; but Captain Flinders mentions it as characteristic of all the natives of the Gulf of Carpentaria.

At the Macarthur we still saw the bommerang, which is unknown at the Alligator Rivers and Port Essington, where the throwing stick and the goose spears are the means of obtaining game; and the common spear made of wood or strong reeds, and headed with a sharp quartzose stone, form their means of offence and defence. The barbed spear, either on one side or on both, and spears jagged with sharp pieces of quartz were also common. Kangaroo nets made of the bark of kooremin (sterculia heterophylla), nets of various size for fishing were found in the camps of the natives. At Port Essington their baskets are made of the fibres of the young pandanus leaf. The rock crystal was found in their dillis as far as the gulf, but never precious stones or brilliant ores were observed.

Of their language I have but little to say. That there was a difference, at least of dialect, between three tribes of the Alligator Rivers whose territories joined, was indicated by the name of the

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little edible root, which was called "allamurr" by one, "murruatt" by another, and a still more different name by a third.

The two black fellows, Brown and Charley, who accompanied me, were of course unable to understand even the first tribe of natives we met, and I am sure that variations of language exist all over the distant country we have seen, similar to those which are observed in the known parts of this colony. Language not fixed by literature is constantly and rapidly changing, and though I feel satisfied that the Australian natives belong to one stock, I am equally sure that it would be in vain to trace the various dialects to one root.

The limited custom of circumcision is indeed exceedingly remarkable, and its appearance at the Gulf of Carpentaria, and at the south-coast of Australia, makes a migration of tribes very probable. But could such a custom not be connected with endemic disorders, which have led the reasoning mind of man to the same preventive.

When we see the Asiatic grinding the various cerealia to make a wholesome bread, and the native of the interior of Australia pounding one of its largest grass-seeds to make a cake, we do not think of a tradition of the custom from Asia to Australia, but we naturally conclude that our Maker has given to all races of men the same reasoning power, which will lead them, if not to the same, at least to analogous results.

The same may be said of those rude traces of art, to which my attention was drawn by the Rev. Mr. Clarke and Mr. Miles, as being found at Port Jackson, which were observed at Clack's Island by Allan Cunningham, at the north-west coast by Captain Grey, and at Arnheim's Land and the East Alligator River, by my party and myself. We saw the foot of an emu cut very carefully and accurately into the bark of a tree, and other fanciful forms which we could not understand. A turtle and fish were depicted very accurately with red ochre on a rock, in caves in which the natives were accustomed to paint themselves for corrobories. It is extremely interesting to compare these efforts of the Australian native with those of more advanced nations, and we are

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involuntarily induced to suppose meanings which we know as belonging to the latter. These imitations of the human body were, however, too near, and too easy, and could be as well the produce of play and accident as conventional design.

The gentlemen of Port Essington, comparing my own blackfellows with the natives of the place, were of course inclined to think that the natives of the southern part of the continent were superior to those of the north-west coast. I have had, however, opportunity of observing the native of the east coast in his natural state, and I rather think that the north-west coast black is more advanced; I would explain this by their long intercourse with the Malays, who have frequently taken them to the Malay Islands.

I shall advert now to a circumstance with which I was frequently struck on my meeting with the natives—I mean their perfect incapability of supposing that there is in existence anything stronger or more powerful than themselves, or that any dangerous enemy could be near them when walking in the open forest, which forms their well-known dwelling-place. Their ear, so sensitive to noises with the origin of which they are acquainted, to the rustling of a lizard or snake, or to the rapid start of a kangaroo rat, did not perceive the foot-fall of our horses, and we were once with our whole train near a camp of jabbering, laughing, moving natives, without their being aware of our approach. Once, a native walked at dusk into our camp, and was surrounded by our horses before he knew that other beings were present. The discharge of a gun made generally a great impression on them; it seemed to remind them of supernatural agency. We noticed several times the screams of natives on hearing the reports of our guns without seeing us.

Having now given you a digest of my late journey, I shall lay before you the plan of an expedition on which I intend to start in October next. Captain Sturt's expedition has shewn that the interior, in the longitude of the head of the gulf, is a desert at least to latitude 24°, where the explorer was compelled to return. It would therefore not be advisable were I to attempt to cross the continent in that or a higher latitude; I shall, therefore, proceed at once to latitude 23°, where I found the Mackenzie and Peak

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Range, during my last journey; and as the Mackenzie was well supplied with water, I shall follow it up to its sources, which I expect to find about 80 or 100 miles to the westward of the spot where we first came on the river; I might then be able to ascertain whether the western branches of the supposed water-shed go down to the southward to join the system of the Darling, or whether they turn to the northward, and form the sources of the largest rivers of the head of the Gulf of Carpentaria. Should the latter be the case, and should the country be sufficiently well watered, I would of course proceed to the westward, keeping the same latitude, and try to reach the waters of the north-west coast. But should want of water not allow me to continue my journey to the westward, or even to the northward, I will retrace my steps down the Mackenzie, and follow the track of my last journey up to the Burdekin, where it is joined by the Clarke, in latitude 19° 12′.

I would follow the latter river, and I have no doubt of finding the heads of the Flinders, after having crossed either a table-land or a dividing range. I would then continue my journey to the Albert, and follow that River up to ascertain the latitude of its sources, and the nature of the country.

Again, I would try a westerly course, to come successively to the heads of the Nicholson, the Van Alphen, the Abel Tasman, the Robinson, and the Macarthur, and from the latter River I would hope to reach the waters of the west coast, in about latitude 17° to 18°. Should I succeed in this, I shall turn to the southward and work my way parallel to the north-west and west coast until I reach Swan River.

This journey I hope to complete in two years, though I am aware that unforeseen difficulties may retard my progress. Be it as it may, I feel confident, after the kind reception I experienced on my arrival from my late expedition, that, borrowing the words of that beautiful lyric in which I have been honoured by the Australian Muses—

"A nation's smiling welcome, will be my greeting home again!"

I thank you, Ladies and Gentlemen, for the attention with which you have listened to this lecture, in which I have

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endeavoured to give you such information on the nature of the country as I thought most interesting; though I am not able to add those ornaments of your language with which a more experienced English scholar would have endeavoured to embellish the all-engrossing subject of discovery.

I rely on your generosity, of which I have so abundantly felt the effects already, to pardon all my defects of idiom and expression; and I now, earnestly desiring that my labours and those of my companions may not be found altogether useless to the colonists at large, or a mere subject of momentary curiosity, respectfully and gratefully bid you farewell!

When the "Prince of Explorers" reached head quarters in April last, in high spirits, after discovering a country surpassing in richness any that he had previously seen in Australia, the attention of almost every individual in New South Wales and the neighbouring colonies was so completely absorbed with the wonderful route performed by the gallant leader, as almost to banish from their memories the *public expedition* and the progress it is making, or the prospects held out to them by its further discoveries. To the credit of the benevolent character of New South Wales, a public subscription was immediately set on foot; and this was not closed until £2,520 18s. 6d. were raised,—£1,520 18s. 6d. by the generous Australians, and £1000 by a liberal government. The learned Explorer will take with him in his second expedition a quantity of goats, which are to have bells suspended to their necks, and which will not only carry small burthens, but afford a supply of milk at times, perhaps, when water could not be procured. Mules, trained for the purpose, will also form part of the expedition.*

* Dr. Leichardt has since started upon his second expedition to cross the Continent of New Holland from east to west,—with the warmest wishes of the Australian community.—*Ed.*

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THE

TASMANIAN JOURNAL

OF

NATURAL SCIENCE.

JANUARY, 1847.

ART. VII. *Lectures on the Geology, Botany, Natural History, and Capabilities of the Country between Moreton Bay and Port Essington.* By Dr. LEICHARDT.

LECTURE I.

ON my arrival in Sydney I published a short account of my journey to Port Essington, which contained, however, only a very superficial description of the country. There remained necessarily untouched several very interesting points, to which I should like to direct your attention, as they bear equally on physical geography in general, and on the practicability of colonization.

If we examine the country according to the conformation of its surface, the nature of its soil and vegetation, its supply of water, and its meteorological relations, the whole line of route may be divided very naturally into about eight sections, each of which bears its peculiar character. Three belong to the East Coast, three to the Gulf of Carpentaria, and two to Arnheim's Land, and the north-west coast of Australia.

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1. The first comprises the scrubby country between Darling Downs and Peak Range, with the Dawson and the Mackenzie (latitude 27° 23′.)

2. The Plains of Peak Range, the Isaacks, and the Upper Suttor, of which the Isaacks forms the outlet to the sea, between 23°—20° 50′ latitude.

3. The Lower Suttor, the Burdekin, and its table land (21°—18°.)

4. The Lynd, the Mitchell, and the east coast of the Gulf of Carpentaria, between 18°—16° of latitude.

5. The "Plains of Promise," so called by Captain Stokes, at the head of the Gulf, in 18° of latitude, with the Flinders, the Albert, and the Nicholson.

6. The scrubby west coast of the Gulf, with the Van Alphen, the Abel Tasman, the Seven Emu River, the Robinson, the Macarthur, the Limnenbight River, and the Wickham, between 18°—15°.

7. The River Roper and Arnheim Land, 15°—13° 40′.

8. The Alligator River and the Coburg Peninsula (latitude 13° 40′—11° 21′.)

The country between Darling Downs and the Mackenzie, between the 27° and 23° of latitude, is eminently characterised by the frequency and by the peculiarities of its scrubs. It is principally composed of sandstone, which, judging from its coal beds, and the impressions of plants contained in it, is identical with the sandstone formation of the Lower Hunter. But in several localities it has been broken by basalt (whinstone,) which forms either peaks, as Mount Aldis and Mount Nicholson, or the spine of large ranges, as Expedition Range. The sandstone ranges are remarkable for the number and steepness of their gullies, and for their scrubby vegetation. The basalt is generally connected with plains or with very openly timbered and treeless downs, clothed in a rich vegetation of herbs and grasses. The country was, with a few exceptions, well watered; and almost daily thunder-storms cooled the atmosphere during October, November, December, and January. But not only the high level land west of Darling Downs, which sloped almost imperceptibly to the south-west, but

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the valleys of the rivers and the sides of the mountains were covered with extensive scrubs principally composed of a species of acacia, which has received the name of bricklow from the squatters, between the Severn and the Condamine. This shrub or small tree has a foliage of greyish green colour, and grows so close that it is impossible, or only with the greatest difficulty, that a man on horseback can make his way through it. Along the hills which bounded Palm-tree Creek and the Dawson, at their junction, this scrub surrounded the Downs (frequently several miles in extent), which were rendered extremely pleasing, not only on account of the open view which they allowed to the eye, tired of the uniform density of the scrub, but also on account of small copses of bricklow, fusanus, and Bauhinia, which were picturesquely scattered over them, and which often clustered round stately bottle-trees, the shady retreat of numerous kangaroos and wallobis. These downs and plains were covered with various grasses and herbs; but the vervain, a wiry plant, prevailed to such a degree on many of them, that I called those Vervain Plains. Whenever the grey dense barrier of the bricklow met our eyes, either in travelling across an open forest or following down the banks of rivers, it was a disheartening dismal sight; but never was the extent of misery so apparent as when we stood on one of the steep gullies at the north-west side of Expedition Range, and looked over a valley almost boundless to the eye, which was filled with one almost uninterrupted sea of scrub.

This country was, however, not devoid of some redeeming characteristics, which were hailed with the greater delight, inasmuch as they formed a pleasing contrast with the inhospitable character of the surrounding scrub. The upper part of the Dawson, Palm-tree Creek, with its swampy Lakes, its fine flats, and noble palm-trees, part of Robinson's Creek, the Creek of Ruined Castles, and the country south-east of Expedition Range, will be remembered by the members of the party as so many places of rest and enjoyment, on which our hopes brightened and our energies revived.

Though the banks of the Mackenzie, so far as we travelled along it, partook of the scrubby character of the country, I have reason to believe that the scrub ceased a little lower down, and its large

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supply of water makes me suppose, that it forms a considerable stream towards the sea-coast. It disembogues very probably at Broad Sound, in latitude 21° 30′, as the natives pointed to the north-east, when we asked them about the course of the river.

The country south-east of Expedition Range, between Zamia Creek and Erythrina Creek, was, for a great distance to the eastward, flat and openly timbered. It was well grassed and tolerably well provided with water at the foot of the range. Its latitude was 24° 50′, but the course of its waters seemed to be directed either to Port Curtis or to Keppel Bay. Should a practicable communication with the sea-coast be found, I have no doubt that this will become a valuable district for pastoral purposes, and that even the good country of Castle Creek, Robinson's Creek, and Palm-tree Creek, will be accessible from this side.

2. The second part of my journey, which extended from lat. 23° to lat. 21° 40′, comprising Peak Range, the Isaacks, and the Upper Suttor, bears a character very different from that of the first. Here a long range of noble peaks, composed of domite, extends far to the W.N.W., and offers to the west and south-west a wide view over basaltic plains and open downs, which alternate with low and openly-timbered ridges. To the eastward of those peaks, basaltic ridges, with gently-undulating outlines, narrow plains, and abrupt sandstone ranges, form numerous valleys, along which creeks descend to the eastward, winding in their lower course through an immense level country, and joining the Isaacks, which comes from the north-west, and forms the chief outlet of the waters to the sea. An open forest covered the whole district, with the exception of some narrow belts of scrub along the Isaacks and on the sandstone ranges; and the most luxuriant grass clothed not only the black soil of the basaltic plains, but the stiff flats and the sandy bergs along the creeks and river. The supply of water was, however, not in proportion to the number or size of the channels; and it was on those magnificent downs of Peak Range that Mr. Calvert and myself nearly perished for want of water. It was here that we felt for the last time a hot wind, from the west and south-west, which direction points to that desert interior which even the persevering boldness of Captain Sturt has

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not been able to conquer. Water-holes existed, however, in the upper part of the eastern creeks, and swampy lagoons seemed to become numerous down the Isaacks, which joins the sea very probably near the Mackenzie, in Broad Sound. The Upper Suttor partakes of the character of the Isaacks; and as it was by far more accessible from the head of the latter than from its own lower course, I have placed it in the second division of my journey, though it belongs to the system of the waters of the third.

If, at a close examination, a sufficient quantity of water should be found, a wide extent of country will be opened to the squatter, who will travel with his herds without difficulty over the level country along the Isaacks and its tributaries, and will ascend on gentle ridges to the plains of Peak Range, and probably still farther to the westward, beyond another range of peaks, which we perceived in that direction. He will stock the beautiful country at the head of the Isaacks and the Suttor, over which at present numerous flocks of emus roam; and will fill with animation that immense tract of country which spreads out round the foot of Coxen's Peak.

During the month of February, till March, we were favoured with frequent thunder-storms, from the west and south-west, which enabled us to pass along the driest part of the Isaacks; and after having left the Mackenzie, we enjoyed every night a strong refreshing breeze from the northward, which set in at half-past eight o'clock at the Mackenzie, but every day earlier as we passed Peak Range and travelled along the Isaacks to the north-north-west. During the day, gentle easterly and north-easterly breezes prevailed.

3. The third division of my journey comprises the Lower Suttor, the Burdekin, and the country intervening between the latter river and the Lynd (the upper part of which is more accessible from the east than from the westward). It extends from latitude 21° to 18°, and is characterised by its supply of running water, by its primitive rocks, its limestone, its numerous ranges, and its fine open well-grassed forest.

If you bear in mind that it comprises three degrees of latitude

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and two and a half of longitude; that the elevation on its upper course renders the climate much cooler than might be expected from its latitude; and besides that several large tributaries, as the Cape, the Clarke, the Perry, drain in all probability large tracts of available country; you will on consideration agree with me that if a settlement is to be established on the east coast it ought to be at the mouth of the Burdekin, which I suppose to be at Cape Upstart, on the southern extremity of Halifax Bay. Should the entrance of the river be barred, as is the case with all the rivers of the east coast south of Wide Bay, it must be remembered that the inner barrier, which extends from Cape York down to Bunker's Islands, forms along the coast a channel of smooth water, which may be considered in the light of a river, the navigation of which has been repeatedly recommended by Captain King, the best authority to whom an appeal can be made.

The flats along the river are chiefly formed by the detritus of coarse granitic rocks, the feldspar of which has been transformed into clay, mixed with grains of quartz derived from the same source. Stiff clay soil was limited, and confined to hollows and depressions, round which the poplar-gum generally formed a belt of bright green foliage. Rotten ground was not uncommon, but it always proved to be a mixture of clay with sand; for the funnel-ant, which forms its habitations in such a soil, requires clay to cement the moving grains of sand.

I wish I was capable of giving you an adequate idea of the beauty and richness of the basaltic table land. The open forest of narrow-leaved iron-bark and box, on a sound rather stony ground, alternated with plains of various extent, richly grassed and frequently watered by numerous running brooks and springs. Large and deep lagoons were scattered over the valley, or were parallel to the river. The latter was still running strongly over its sandy, pebbly, or rocky bed, with a rich and luxuriant pasture everywhere around it. But the approach to this interesting country is intercepted by a very mountainous region, and by many deep creeks, over which more practicable roads will no doubt be found in the progress of colonization. The basalt

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appeared to have been broken by a still more recent eruption of lava, which expanded partly over it, and formed as wild and irregular fields of rock as ever covered the slopes of a volcano.

We travelled along the Burdekin during April and May, and we had, with two trifling exceptions, neither rain nor thunderstorms; but though the days were frequently exceedingly hot, we still felt the night breeze from the northward, and the clear nights were so cold and dewy that we greatly enjoyed our fires.

From the ridges and mountains which rose above the table-land, the waters descended not only to the valley of the Burdekin in a south-east direction, but also to the north-east and to the westward. The country along the creeks was open and flat, as long as they passed over the table-land; but when they descended, their channels deepened, their banks became surrounded with steep ranges, and their beds were either formed by solid rock or covered with loose shingle and boulders, which rendered it impossible to travel within or along them, and compelled us to find a circuitous passage beyond the neighbouring ranges and gullies.

4. The fourth division of my journey embraces the Lynd, the Mitchell, and the east coast of the Gulf of Carpentaria. The fall towards the level country, which forms a broad belt round the Gulf of Carpentaria, is much more rapid than the ascent from the east coast; and the course of the Upper Lynd is much more mountainous and wild than that of the Upper Burdekin.

It is extremely interesting to the geologist to observe the same succession of rocks, granite, talchiste, porphyry, and sandstone, in descending to the Gulf, which he found at the east coast in ascending to the table-land. But limestone was not met with on the west side of the York Peninsula, though it appeared extensively developed on the Burdekin. Basalt has broken through the various rocks, but the level country itself is formed of a clayey ironstone with grains of quartz, which extended all round the Gulf to Port Essington, and may be considered of a newer formation.

The Lynd was joined by several running creeks, and was in its whole course well supplied with water. The country was openly timbered, and well grassed, and at the lower part of the Lynd

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and parallel to the Mitchell, very large and deep nymphæa ponds existed, around which the pasture was particularly rich.

The rivers within the tropics are almost all remarkable for the immense width of their beds, which are filled with sand, with the exception of those spots in which the naked rock cropped out. They were overgrown with small trees, and the number and size of the latter depends upon the frequency and strength of those rushes of water which occasionally sweep down. The Upper Lynd was, for instance, covered with trees, whilst the bed of the Mitchell was entirely free from them. We observed water marks fifteen and eighteen feet above the level of the bed—evidently showing that a large body of water flows down to the sea in, perhaps, unusually rainy seasons.

In finding these large channels, whether dry or with tiny streams, occasionally lost in the loose sands, are we then to suppose that the power of the floods which formed them was formerly greater than at present, and that the decrease of moisture, which has been remarked by the old inhabitants of the colony, has equally taken place in the tropics? Analogy certainly justifies such a conclusion.

Large tracts of country on the east coast of the Gulf were covered with box (a species of eucalyptus,) and with a small tea-tree with broad lanceolate leaves. These trees generally indicated a stiff soil, which in the level country was never free from shallow holes, such as are called melon-holes by the squatters, formed, no doubt, by the infiltrating rain and standing water. In many of these holes we found dead crabs, and even fresh-water turtles, and many shells, which also proved that long drought had prevailed and destroyed these animals.

Another feature of the country are slight undulations, on which grew a few scattered rather stunted trees, amongst which a species of grevillia (gr. mimosoides R. Br.) with long, narrow, drooping, silvery leaves, particularly attracted our attention.

The finest and most available country was along the creeks and rivers. Here the soil was much lighter, and the bloodwood, the leguminous iron-bark, and the pandanus, grew well on it, forming an open forest.

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All the rivers of Australia have lines of holes and hollows parallel to them. These are generally filled by high floods, and keep the water much longer than the rivers themselves. Lagoons of this description were very numerous along the Staaten, the Van Diemen, the Gilbert, and the Caron, and appeared to be the constant resorts of the natives. To the north of the Staaten towards the sea coast, there is a succession of plains, but the grass was generally stiff and wiry.

If we compare the course of the rivers on the east coast of the Gulf of Carpentaria, it will be considered remarkable that the Lynd, which rises in the latitude of the head of the Gulf, from the table-land of the York Peninsula, should go to the north-north-west, and belong to a system of waters which joins the sea in latitude 15°, instead of taking a direct course to the westward, and of disemboguing in or near the head of the Gulf. A number of coast rivers, of probably very short courses, the Nassau, the Staaten, the Van Diemen, Gilbert, and Caron, take their origin, from the moderately elevated country which bounds the valley of the Lynd and Mitchell to the westward.

5. The fifth division of my route comprises the Plains of Promise, so called by Captain Stokes, which extend from the Flinders to the Nicholson, and are drained by tributaries of three large salt-water rivers or creeks, the most western of which is the Albert of Stokes, and the Maet Suyker of the Dutch navigators. These plains were covered with a variety of tender grasses and herbs, but bare of wood, with the exception of a few straggling trees. The narrow valleys of the creeks were, however, filled with open scrub, formed by a small tree, which we called raspberry-jam tree, because its fresh-cut wood had the scent of raspberry jam.

Should a harbour be found at the head of the Gulf of Carpentaria, which might allow ships to approach and to moor in safety, it would not only open this fine country to colonisation, but would allow the produce of the high land of the York Peninsula, to be brought down to the Gulf of Carpentaria, as well as to the east coast. Cattle and horses could be easily driven from coast to

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coast, and they would even fatten, as water and feed are every where abundant.

6. The sixth part of my journey between the Nicholson and the Roper was as remarkable for the number of large salt-water rivers, as for the density of its tea-tree scrubs, and for the extent of its stringy-bark forest.

Here we came again to hills and ranges; and pebbles of granite and porphyry made it evident that the great arc of high land, which sweeps round the head of the Gulf of Carpentaria, again approached the sea-coast. The Van Alphen, the Abel Tasman, the Robinson, the Macarthur, and the Limnenbight Rivers, formed broad channels of water, and offered to us a magnificent sight, when, after long and harassing stages through a dense scrubby monotonous forest, we came suddenly upon them.

Captain Stokes, when exploring the head of the gulf, was struck with the comparatively low temperature in this latitude. Though the want of a thermometer prevented me from making any exact observations, I was still able to collect a number of facts which tend to corroborate Captain Stokes's statements. In travelling along the east coast of the gulf, we had generally light easterly and south-easterly airs during the day, but a strong cold wind from the south-west and south by west set in at night, from which we suffered the more, as we avoided keeping a large fire, which would have prevented us from watching the approach of hostile natives.

At the head of the gulf the night winds came more and more from the southward, and changed to the south-east, and even east-south-east, as we advanced along the west coast. During the day we had a very regular sea-breeze from the northward, which was particularly strong near the large rivers, the valley of which seemed to condense and to accelerate its current. The stronger the sea-breeze was during the day, the heavier was the dew during the night, which was easily accounted for by the action of the cold southerly land breeze on the warmer moisture with which the sea air was charged.

A phenomenon, which I observed several times, shows clearly

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the action of these two currents of air when they meet and mix. About 10—11 o'clock at night, a veil of loose clouds formed suddenly to the southward, and rose rapidly with a strong puff of southerly wind; another mass of clouds formed in the same quarter, and passed as rapidly as the first, and after that a strong full breeze set in from the southward, with a perfectly clear sky. According to the Rev. Mr. Clarke, something similar takes place over Sydney, about sundown, in the summer season, but is succeeded by a still night.

The bracing nature of the south breeze at night, had a very beneficial influence on our constitutions; as the regular interchange of land and sea breeze contributes every where to render a climate healthy.

7. The seventh division of my route is formed by the Roper and by the high land of Arnheim's Peninsula. The Roper is the only large fresh-water river of the west coast of the gulf, as far as we followed it to the northward. It is fed by a great number of running creeks and brooks, all closely fringed by belts of pandanus. Almost the whole country along the river was open, well grassed, and available for depasturing purposes. At its upper course exist fine plains, which are bound by sandstone ridges, and diversified by pandanus creeks, forming an extremely pleasing landscape. The high land was covered with an open stringy-bark forest on a sandy soil, but its level is frequently interrupted by steep rocky sandstone hills and ridges, at the foot of which tea-tree swamps, with a peaty soil, formed frequently the heads of creeks.

I have mentioned that the fall of the high land of the York Peninsula is more sudden to the westward; the same is the case in a still higher degree in Arnheim's Land, for there is not only a very rapid fall in the creeks, but there are precipices 500—800 feet high, which border the valley of the South Alligator River, and over which numerous cascades rushed down to join their waters with those of that river.

It was very remarkable that the only slope which allowed us to descend into the valley is formed by granite, whereas the whole of Arnheim's land and the ranges of the Roper are composed of

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sandstone, which has been broken through by basalt, near the divisions of the waters of the Gulf of Carpentaria and the north-west coast.

8. The eighth part of my journey comprises the two Alligator Rivers, and the Coburg Peninsula. Its leading features are large swampy lagoons; extensive plains at the lower part of their course, densely wooded ironstone ridges, and a great number of creeks in the Coburg Peninsula, with limited flats of light alluvial soil, which are richly clothed with herbs and grasses during and immediately after the rainy season. These creeks generally enlarge into swamps called "Marairs" by the natives, before they are lost in the mangrove thicket, which covers their junction with the sea.

I have mentioned that at the east coast we enjoyed a regular cool northerly night breeze, which frequently increased to a gale, and that round the gulf the strong night breeze was southerly, from south-west and south-east, whilst the sea-breeze blew during the afternoon from the northward. We were deeply interested in these movements of the atmosphere, not only on account of their meteorological importance, but also on account of the relief which they afforded us whilst under the influence of a scorching tropical sun.

Along the Roper the sea-breeze continued strong and regular from the eastward, but the night-breeze became indistinct, probably in consequence of a great number of parallel ranges, which intercepted its course. At the head of the river, however, we again felt a strong but warm wind from north-north-west—north-north-east, about nine o'clock at night. This I considered to be the sea-breeze from the north coast of Australia, flowing probably up to the high land along the valley of the Liverpool River.

The 14th November, when on the high land of Arnheim's Land, and on western waters, we experienced the first thunder-storm since we had left the east coast. Similar ones rose almost every day to the 23rd of November, and veered invariably from south to west, from north to east. It was the time when the north-west monsoon sets in, and these thunder-storms appeared to be the first indications of the change.

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I had been extremely anxious to reach Port Essington before the setting in of the rainy season, as there was good reason to believe that the peninsula was connected with the main land by a neck of low land and mangrove swamps, which would have been rendered impassable by any continuance of rain. Though I afterwards found that connecting ridges run from the main land into the peninsula, it would notwithstanding have been extremely difficult to cross the plains and flats, which were large and numerous along the Alligator Rivers and Van Diemen Gulf. We were again favoured with fine weather until we were fairly on the peninsula, when the thunder-storms recommenced; and the day we arrived in Victoria heavy rains set in, which rendered the flats boggy and flooded the creeks.

Captain Macarthur gave the following description of the setting in of the north-west monsoon. At sunset, a low body of clouds is seen to the southward and south-west, which draws off to the westward between the main land and Melville Island. These clouds approach nearer and nearer to the zenith every succeeding day. At first they just skirt the settlement, accompanied by brief showers, but at length the whole body passes fairly over the peninsula, and the regular rains commence.

The body of clouds before mentioned forms and rests very probably on the high land, at the head of the Alligator rivers, and is produced by the moist warm north-west wind flowing up the valley to the elevated cooler country, and meeting perhaps cold winds from the west side of the Gulf of Carpentaria, and from the high lands to the southward.

I will here mention that the sea-breeze at Victoria is extremely weak, and I think that Captain Macarthur is right in attributing partly to this fact the fever, from which the garrison has several times severely suffered. It is extremely difficult to assign any other reason for the want of salubrity. The country is undulating and hilly; the soil is sandy, and absorbs rapidly the heaviest showers; the forest is open; the mangrove thickets which cover the mouth of the creeks scarcely deserve the name of swamps, as they are washed by the tide, and form no accumulation of vegetable matter which might produce the miasma or malaria which

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generally renders tropical countries so dangerous. After rain the air is fresh and pure, the ground dry, and a walk most agreeable. Those localities which are freely exposed to the sea-breeze, as, for instance, Crocker's Island, are, according to Captain Macarthur, very healthy.

If you ask me how far the country we have travelled over will be available for colonisation, I would reply that the greatest part is fit for pastoral purposes; and I except only the scrubs of the east coast of Australia, the mountain gorges of the Upper Lynd, and the tea-tree scrubs of the west coast of the Gulf of Carpentaria. But even here broad belts of fine country extend along both sides of the larger rivers, and will very probably be found quite as good as the country of the Roper. Horses and cattle will do well over the whole extent, particularly at Expedition Range, along the Isaacks, the Burdekin, the east coast of the gulf, and on the plains at its head. The rapid increase of the buffaloes on the Coburg Peninsula, and the excellent condition of the herd of cattle which they keep at Port Essington, shows that the north-west coast of Australia is no less favourable for the development of animal life.

The elevation of Peak Range, and of the Table Land of the Burdekin, leads me to believe that these regions are fit for sheep.

I am not sufficiently acquainted with the cultivation of tropical plants to give a decided opinion; but there is such a variety of soil, of aspect, and of elevation, that I feel convinced tropical plants will grow freely, where sufficient moisture exists. The cotton, the indigo, the cocoanut, the banana, the arrowroot, the sweet potatoe, the bread-fruit tree, the jackfruit, the sowersop, the pine-apple, the mango, and mangostine grow well in Port Essington; and Captain Macarthur assured me that, according to the statement of the Malays, who had examined the swamps west of the settlement, they would do excellently for growing rice. The large plains of the Alligator Rivers would suit equally well, and to an almost unlimited extent.

If we draw a line from Halifax Bay to Port Essington, and divide it into three almost equal parts, the points of division would fall on Halifax Bay, on the Head of the Gulf, on Limnenbight,

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and Port Essington. Should good harbours be found, and settlements be established on those points of division, they would scarcely be as far from each other as Sydney from Port Phillip, and the overland communication would be probably equally easy, or would be rendered so after a very short time.

I shall mention once more those facts which have induced me to suppose that part of the country had been remarkably dry for a succession of years.

1. The condition of large channels of rivers and creeks, which were either entirely dry or contained only tiny streams not at all proportionate to their widths.

2. The occurrence of dead crabs and fresh-water turtle on the box flats at the east side of the Gulf of Carpentaria. The turtle requires a great supply of water, and those skeletons which I observed did not seem to have been carried thither by the natives.

3. Extensive shallows at the west coast of the Gulf, surrounded by heaps of dead fresh-water muscle-shells, of large size, which were overgrown by small tea-trees, about four or five years old. The muscles must have lived and grown for a number of years in those hollows, which were now entirely dry.

4. The plains of the East Alligator River were covered by dead fresh-water shells, particularly limnæas, which must have lived and grown in shallow holes and lagoons, which extend all over those plains.

5. Lines of drooping tea-trees along several salt-water creeks at the west coast of the Gulf, were dead, in consequence of the want of the usual freshes, as the tree seems not to live on water entirely salt.

It seems impossible, in the present state of our information, to account for this remarkable phenomenon of the decreasing supply of water on the surface of this continent. The supposition of a gradual rise of the land would explain why arms of the sea recede, and parts of the bottom of these become dry; but it would not explain the decrease of moisture in the atmosphere, or the greater evaporation or absorption of the waters in lagoons, which are not connected with any water-course. The rise of the country would

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rather lead us to expect a greater precipitation of moisture round its elevated points.

My observations on the uninhabited parts of the colony, show that this desication is not dependent upon colonisation, upon the clearing of the ground, and the increase of stock, though there is no doubt that the latter must make a great impression on limited water-holes not supplied by springs. We are, therefore, compelled to look for the cause in some until now unknown change of the atmosphere, which may be periodical, and allow us to hope that the continent will be again favoured with a series of more rainy seasons.

Lecture II.

I shall now give you an account of the change of vegetation we experienced in advancing into the tropics. I shall enumerate all the edible vegetable substances we found, the change of animals, and shall conclude with some observations on the natives we met during our journey.

The vegetation changed very little along the east coast from Moreton Bay to the northward. The open forest was generally formed by the narrow-leaved and silver-leaved iron-bark; the flats were covered by box; the bergs along the rivers and creeks by bloodwood and Moreton Bay ash; and the immediate banks of the creeks were lined by flooded gums and casuarinas, which, farther northward, gave way to the drooping tea-tree. We never met with vine and cedar brushes like those which grow along the rivers of Port Macquarie and Moreton Bay, or on the sides of mountains, like the bunya-bunya brushes. There were narrow belts of palm-tree brush at the Mitchell, and of bamboo brush on the South Alligator River, but nothing to be compared with the dense masses of vegetation which are found in the districts above mentioned. No species of araucaria was seen; but calitris, the cyprus-pine, covers the whole continent wherever a sandy rocky soil favoured its growth. The drooping myall ceased at Peak Range, the bricklow at the heads of the Burdekin and the Upper Lynd, where also the iron-bark disappeared. Several species of

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bauhinia adorned the scrubs with their rich white blossoms; and an arborescent cassia, with very long narrow seed-vessels, was observed between latitude 27° 30′ and 19°. Careya arborea was first met with at the Suttor, the clustered fig-tree first at the Burdekin; grevillea mimosoides and hakea lorea appeared first in latitude 26° 42′. Grevillea lanceolata, a new species with broad lanceolate leaf, thus named by me, showed itself first at the Suttor, where it was growing on a light sandy soil with pandanus spiralis. Grevillea ceratophylla, and acacia equisetifolia, were first met with in latitude 19° 19′. The poplar-gum, a species of eucalyptus with a bright green foliage, formed patches of forest along the Isaacks, and grew on the stiff hollows along the Burdekin. An arborescent zamia was growing on the heads of Zamia Creek and on Expedition Range, in latitude 24° 43′; a cycas about four to five feet high, with pinnate leaves of glaucus colour, on the Burdekin in latitude 18° 45′; and a sciadophyllum in the Valley of Lagoons in almost the same latitude.

Nymphæa was first observed on Brown's Lagoons in latitude 24° 45′, and nelumbium near the Mackenzie, in latitude 23° 21′.

When entering upon the system of the waters of the gulf, the character of the vegetation changed very considerably, and a number of new forms appeared, which bore resemblance to the flora of the Malay Islands and of India. The head of the Lynd was remarkably rich in various plants and trees. Here cochlospermum gossypium and a rose-coloured sterculia attracted our attention by the beauty of its blossoms; and a species of eucalyptus with its butt covered by short foliaceous bark bearing seed-vessels of immense size, and blossoms of an orange colour. A rubiaceous tree belonging to the sarcocephaleæ was distinguished by its rich dark green umbrageous foliage, and a dwarf grevillea by its bunches of crimson-coloured flowers. Two species of terminalia either shaded the creeks or grew on the rocky slopes. Lower down the river, a species of stravadium, with loose drooping racemes of red blossoms, fringed the shallow swampy lagoons; and on the banks of the Mitchell, in latitude 15° 51′, the corypha palm grew to a large size and in great numbers.

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A yellow villarsia shared with nymphæa the ponds, and several yellow ipomæas twined round the trees at the very edge of the water.

Various species of melaleuca took the place of the eucalyptus, which disappeared, with the exception of the box, as we approached the coast. One species of pandanus was growing on a light sandy soil in the open bloodwood forest, and formed broad belts at the outside of the forest land along the levels of the Alligator Rivers. Another species crowded round the running creeks in an almost impassable jungle on the west side of the Gulf. The nonda-tree, which belongs in all probability to the rhamnaceæ, was a fine shady spreading tree, laden with yellow plums, between the Lynd and the Van Diemen. The raspberry-jam tree covered the slopes of the salt-water rivers and the valleys of those creeks which intersected the plains at the head of the gulf. The stringy-bark tree re-appeared on the sandy flats of the Upper Lynd; but on the west coast of the gulf it formed the principal part of a scrubby forest. Over Arnheim's Land and the north-west coast towards Port Essington, the orange-blossomed eucalyptus, a leguminous tree with a dark fissured bark, and the Livistona-palm had an equal share in the composition of the forest. Inga moniliformis was first seen at a tributary creek of the Mitchell; but was afterwards, with a broad-leaved terminalia, a white gum, and the mangrove myrtle (stravadium), a constant companion of creeks and waterholes. A species of bossiæa, with flat stem, composed principally the scrub of the west coast of the gulf, and it was here we observed grevillea pungens with thirsi of scarlet flowers. A noble cycas-tree, which frequently attained the height of fifty feet, formed large groves on Cycas Creek and the Robinson; but disappeared as we left this river, and was not observed again until we arrived at Port Essington, where two or three small trees are growing near Victoria.

The Corypha-palm, which we had observed on Palm-tree Creek, and under Expedition Range, was found again on the Mitchell, at Beames's Brook, and on the South Alligator River. Very low specimens of seaforthia grew on Arnheim's Land, but

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noble trees of it were on the patches of brush along the Alligator Rivers, and formed groves and even a whole tract of forest between Raffles Bay and Port Essington.

It is generally believed that Australia is poor in edible fruits and vegetables. There is no doubt that very few are good, but it will be seen by the subjoined catalogue, that the number of the edible productions of the vegetable kingdom was by no means small.

We boiled the young shoots of native spinach (mesembrianthemum), the goose-foot (chenopodium), portulacca, and the sow-thistle (sonchus), as vegetables. The seaforthia, corypha, and livistona palms, yielded young edible shoots; but the two latter were either bitter or gave only a small supply, whilst the seaforthia shoots (myroin of the natives of Port Essington) afforded most excellent eating. Salicornia, a small plant with articulate fleshy stem, which grows always on soil impregnated with salt, tasted well when boiled with our stewed meat, particularly when we were without salt. The youngest leaves of typha (bullrush) and the lower part of the leaf-stalks of nelumbium were good to eat. The stem of a species of cymbidium was edible, but very glutinous and insipid.

A small round tuber, about three quarters of an inch in diameter, of a sweet agreeable taste, was found in a camp of natives at Comet River, and belongs probably to a water-plant, with floating leaves like potamogeton. In the scrubs between the Mackenzie and Peak Range and along the Isaacks, we found large watery slightly pungent tubers of a vine, which bore blue berries of a still more pungent nature.

At the head of the Lynd, two sorts of potatoes were found in great abundance in a camp of the natives; but they were excessively bitter, and neither roasting nor boiling would render them palatable; at last I pounded them carefully, washed the pounded pulp, and obtained a tasteless starch, which very much resembled arrowroot.

The seed-vessels, the stems (ombelborro), and tubers (toori) of nymphæa were eaten by the natives of the Upper Burdekin, and of the east coast of the gulf, and gave us some hearty meals.

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The stems and tubers which the natives pounded were very good indeed. The thick root of a little bean with yellow blossoms, and those of a convolvulus on the plains of the Albert, were found in a camp of natives; and the "imberbi," perhaps the root of the same convolvulus, formed the principal part of the repast of Nywall's tribe, near the East Alligator River. But the finest and most substantial food was the allamur, or murruatt, the mealy rhizoma, or subterranean stem of a sedge, which the natives of the Alligator Rivers and of the Coburg Peninsula obtained in large quantities.

Amongst the fruits I have to mention a small lemon, which had an acidulous taste, and abounded in the scrubs of Expedition Range and Comet River.

The seeds of the dwarf kouradjong (grewia) yielded, when boiled for a long time, an agreeable acidulous drink.

Those of sterculia heterophylla (the kooremin), and of the rose-coloured sterculia, round the gulf, made, when slightly roasted, a fine coffee, and the remaining grounds were good to eat.

The spongy wood of the bottle-tree (another species of sterculia) contained a cellular mealy substance between its fibres, which, when chewed, satisfied the cravings of hunger.

The seeds of the Mackenzie bean, so called from being found first and most abundantly in the sandy bed of that river, formed a good substitute for coffee. Those of nelumbium were however much finer, and the remaining grounds were agreeable to eat and wholesome. The seeds of the vine-bean of the Roper (a species of mucuna?) when pounded and boiled for a long time formed a very satisfying meal.

Several species of capparis, either shrubs or small trees, had edible fruits, which when perfectly ripe we enjoyed greatly, as they contained a sweet pulpy substance, in which the seeds were imbedded. The latter were however very pungent.

At the Isaacks a little tree with coriaceous leaves bore a small oblong fruit, having a surrounding calyx like a little acorn, with a thin but sweet rind. The abundance of this fruit made up for the scantiness of its edible parts. It was much sought after by crows and cockatoos.

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At the head of the Isaacks and in the valley of lagoons we found a purple fruit with a many-celled seed-vessel. The thin rind had a slightly stringent acidulous agreeable taste. The tree had a pinnate leaf resembling that of the red cedar.

Santalum lanceolatum yielded occasionally blue edible berries of the size of small cherries.

Fusanus, which is mentioned in Sir Thomas Mitchell's expeditions, gave us a rich harvest of fruit in the bottle-tree scrubs west of Darling Downs.

I frequently collected the small red fruits of rhagodia; but they were not worth the trouble, and I willingly left them to the bronze-winged pigeons, the crops of which at Comet River were crowded with them.

A native mulberry with small white fruit, of a sweet taste, grew on the fields of lava, at the Burdekin; and an edible fruit of a white colour, with persistent calyx, and viscous, like the fruit of the mistletoe, grew on a small tree along the upper course of the same river.

Several species of figs, the rough purple fig (ficus muntia), the small round yellow fruit of ficus Australis, and the clustered fig of the Burdekin, were successively gathered. The latter yielded by far the richest harvest, as numerous bunches of the fruit were sprouting out of the trunk and largest branches from top to bottom. They were of the size of a small garden fig, of a yellow colour when ripe, but generally full of small flies and black ants. They were very heavy and indigestible, and we several times suffered from eating too many of them.

Careya arborea? (belonging to the Barringtoneæ) bore a harmless fruit, which, however, we never found perfectly ripe.

The little gooseberry-tree (coniogeton arborescens? belonging to the Terebinthaceæ) had a fruit of the size of a small compressed cherry, which we boiled, when not yet ripe enough, to obtain from it an acidulous drink, but which was very agreeable to eat when sufficiently ripened.

The seed vessels of pandanus spiralis, when ripe, contain a very sweet pear-like pulp between their fibres. It is very agreeable

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at the time, but afterwards extremely pungent, and a severe purgative. The natives roast and soak them, and probably drink the fluid with which they have washed out the pulp. I would not even be surprised if this fluid were to undergo fermentation and yield a spirituous liquor. After having used the seed-vessel the natives break it to obtain the kernel, which is also good to eat.

The seeds of cycas seem to form a considerable part of the food of the natives at Cycas Creek and the Robinson. They are cut in slices, and spread over the ground and dried. When brittle, they are soaked for several days in water, and afterwards tied up in tea-tree bark, to undergo a sort of fermentation, which destroys their poisonous principle; for in a fresh state they are violently cathartic and emetical.

We collected three species of rose-apple (eugenia). One was a large scarlet fruit, with longitudinal ribs, of a coarse and strong aromatic taste. Another was of a delicate rose colour, and extremely pleasant. The smaller fruit of a species of acmena was also occasionally gathered along the western creeks of Arnheim's Land.

A small rubiaceous tree at the Upper Lynd bore a rather dry, round, many-seeded acidulous fruit, which tasted like coarse rye bread, and induced us to call it the little bread-tree.

The nonda fruit, oblong in form, about an inch in length, and of yellow colour when ripe, was very agreeable, and it appeared that the emus were very fond of it. But they ate principally the unripe fruit, which was excessively bitter. It seems as if this bird was altogether fond of bitter fruits; for that of a small euphorbiaceous tree, on which the creature principally lived, was perhaps the most bitter fruit I have ever tasted, and this bitterness was imparted to the flesh, and even to the marrow.

At Raffles Bay we found "the lugula," a species of anacardium, the succulent fruit stalks of which were very agreeable; but the envelope of the seed was exceedingly sharp, blistering our lips and skin whenever the juice adhered to them.

The gibong (persoonia falcata), and the fruit of exocarpus latifolia were occasionally found and eaten in Arnheim's Land.

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On the ridges of the north-west coast I picked from a little tree with ternate leaf, a small round black berry, which was of a very agreeable taste.

One species of acacia, a sapindaceous tree, and two species of terminalia, yielded a fine supply of edible gum, and the fruit of one of the terminalia was tolerably good to eat.

The native nutmeg of Port Essington (myristica) is of an oblong form, and not so large as that cultivated by the Dutch, but strongly aromatic.

We washed out the blossoms of the drooping tea-tree (melaleuca leucodendron) to get at the honey, which they contained in great quantity.

The native marjoram, of which we met three sorts, one belonging to the genus "Anisomeles" R. Br., was used for tea and for flavouring our soup.

On one occasion we found an edible mushroom. This grew in the scrubs west of Darling Downs.

In our endeavours to find substitutes for tea, we were once severely punished on using the seeds of a species of acacia, which produced violent sickness and bowel complaints in several of my companions. I mentioned the blistering qualities of the "Lugula." Still more remarkable was that of the glutinous juice which exuded from the seed-vessels of a species of grevillea along the banks of the Macarthur. The pulpy substance which separated the seeds of the arborescent cassia had an acidulous taste, and was a mild and very effective medicine.

I used wood ashes in general, but particularly those of the little raspberry-jam tree, to make a lye or wash, with which I dressed the wounds of my companions, using the quill of bustards or of native companions, as a kind of syringe to inject the fluid, where the wound was deep.

The Animal Kingdom.—Of molluscous animals we observed two species of unio (fresh-water muscles), on which the natives along the Mackenzie, the Suttor, and the lagoons of the east coast of the gulf, seemed principally to live, two species of cyclas, three species of limnæa, one of physa, two of melania, one of ancylus. Several species of helix, of which one species, almost

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as large as the edible helix pomatia, was eaten by the natives of the Isaaks and the Suttor. A species of the elongated form of clausilia was once found in the stomach of a bronze-winged pigeon on Comet Creek. A species of succinea was living in the fissures of the bark of the gum trees, and in the moist grass west of Darling Downs.

Small brown leeches abounded in some water-holes west of Darling Downs. They were very keen within the water, but dropped off as soon as we lifted our feet out of it.

Of crustaceous animals we observed occasionally the crawfish (astacus), which abounds in many creeks of Darling Downs as in other parts of the colony. A land crab, burrowing under logs of trees, or in the mud of water-holes, was caught several times alive. Dead shells were frequently observed in the dried-up water-holes.

Probably in consequence of the extreme dryness of the season, we met with very few insects, and those were generally of familiar forms. A fine grasshopper, however, of a bright red colour, and with blue marks, attracted our attention on the elevated parts of Arnheim's Land. We never observed fire flies; suffered comparatively little from mosquitos and sand flies, but were much annoyed by small flies, and particularly by two species of horse flies, as we approached Port Essington. Various species of ants either attacked our meat or ran over us when lying on the ground. In the latter respect a very minute black ant was particularly troublesome. The green-tree ant, which lives on shady trees and shrubs, was noticed first at the Lower Lynd.

We observed the structures of the white ant (termites) in every form from the narrow cone one of three feet high, to colossal piles fifteen feet high, and more than eight feet in diameter, with various buttresses and turrets. The latter were particularly large near the sea-coast.

The native bee was so abundant in some localities that numbers of them settled on our plates and hands. Their honey was very aromatic in those parts where the native marjoram grew. Hornets attacked us frequently at the commencement of our journey, and stung ourselves and our cattle, which became wild, and in consequence upset their load.

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Of fishes we observed several small ones belonging to the perches, one probably belonging to the carps. Eels were in the water-holes of the eastern waters. A silurus, a guard fish, the broad-scaled fish of the Mackenzie, (a species of ostioglossum,) which attains a great size and is excellent eating, seems to live in the lagoons, in the rivers, and even in the salt water. A saw fish (pristis) which belongs to the sharks, was found far from the sea-coast, in a water-hole of the River Lynd.

Reptiles.—Several species of tiliqua, of scincus, one with a blunt tail and nobby scales, of gheckos, of agamas, gramatophorus, chlamydophorus (the Jew-lizard of the Hunter), chlamydosaurus kingii, and two or three species of hydrosaurus and the crocodile were seen. The latter seems to inhabit the estuaries of all the tropical rivers, and was seen several times in large lagoons far inland. We heard several times a low bellowing noise along the large rivers, which we ascribed to this animal. It is very remarkable that the natives which visited Captain Sturt in the desert recognised the crocodile when shown its outline. We observed very few snakes; the carpet-snake, a small brownish snake, in the water-holes along Comet River, a whip-snake with yellow belly, at the Suttor, and a long greyish snake at the East Alligator, were all we saw.

Birds.—Very few new, and no striking species of birds were observed along the east coast of Australia. The bustard and the emu frequented the plains, both very inferior in size and condition to those of the southern parts of Australia. The nest of the native turkey (tallegalla lathami), and the bower of the bower-bird (chlamydera maculata, Gld.), attracted occasionally our attention in the scrubs. The cockatoo was, as usual, fond of shady creeks; the laughing-jackass chaunted our matins and vespers; the boobook or barking bird, and the curlew called during the night; the fan-tailed fly-catcher and a warbler of the reeds cheered us with their pretty song by day. Kites and crows contended with us for our meat, as the harpies with Æneas, or came to pick the few bones we left, as their share. The black cockatoo was still the most wary bird of the bush. The Moreton Bay rosella, red shoulders,

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blue mountaineers, betsherrygahs, (melopsittacus undulatus, Gld.), a new parrot which Mr. Gilbert had first observed on Darling Downs, partridge, and bronze-winged pigeons, several species of doves and various finches, came to share the water with us. The black duck, the wood duck, the teal, grebes, and pelicans, inhabited the large lagoons. The black swan disappeared to the northward, and was observed last at the junction of the Suttor with the Burdekin. Parra gallinacea, Gld. was first seen in the valley of lagoons, lat. 18° 42′. The wonga-wonga pigeon (leucosarcia picata) was seen last at the north side of Expedition Range, 24° 40′.

When we entered into the river system of the gulf, new birds appeared, which Mr. Gilbert had only observed at Port Essington, or which had been collected by Dr. Bynoe at the north-west coast. A smaller species of laughing jackass (dacelo cervina, Gld.), with a voice a little more melodious than that of the large one, was first heard on the Upper Lynd; the crested partridge pigeon, geophaps plumifera, lived along the ridgy banks of that river; the whistling duck, leptotarsis eytoni, Gld.; the shield-rake, tadorna rajah; and the black-winged pelican occupied the lagoons. Cocatua sanguinea (a small species of cockatoo), the rose cockatoo, cocatua eos, Gld., the betshirygah, the harlequin pigeon, peristera histrionica, lived on the plains at the head of the gulf. The Torres Strait pigeon, carpophaga luctuosa, and geophaps Smithi were first seen in lat. 16° 51′ west of the gulf; Brown's parrokeet (platycercus Brownii) was observed at the head of the Roper; a new species of Rock pigeon (petraphassa, Gld.) lived amongst the sandstone cliffs in Arnheim's Land. The lagoons of the Alligator Rivers abounded with wild geese (anseranas Melanoleuca), and with myriads of whistling ducks, black ducks, teal, shieldrakes, dwarf geese (nettapus pulchellusæ, Gld.), and spoonbills (with black and yellow bills), ibisses, and native companions. Its plains abounded with the small cockatoo (cocatua sanguinea). The most interesting bird of Port Essington was the jungle fowl, (megapodius,) the eggs of which would indeed never be expected to be found in the huge mounds of clay which seem to have been accumulated by several generations of birds in succession.

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One bird seemed to be closely attached to the cypress pine; for its remarkable note was heard whenever we were near these trees. It was heard at night, and particularly towards morning; the note was a melodious repetition of "gluck, gluck," which terminated in a kind of shake. Mr. Gilbert did not know it, and we could never get a sight of it; its voice was besides extremely deceiving as to distance. The very pleasing note of another bird was heard in the most rocky intricate part of Arnheim's Land; it was the repetition of a long full whistle, rising each time about half a note.

Quadrupeds.—Respecting the quadrupeds, it may be mentioned that the common grey kangaroo (macropus major) lives along the whole east coast of Australia, and that we killed the last at the Van Diemen River; the open grassy forest of which abounded with them. At the west coast of the gulf, the red forester of Port Essington (osphranter Antilopenus, Gld.), took its place, and was tolerably numerous in small flocks. The walluru (osphranter robustus) was observed last in the rocky wilds of the Upper South Alligator River. Rock wallabies, resembling petrogale lateralis, Gld., were living amongst the cliffs of Ruined Castle Creek, in lat. 25° 9′. At the Mitchell we met a brush wallabi of a brownish colour and very coarse hair (halmaturus agilis, Gld.), which was common all round the Gulf of Carpentaria. At the head of the gulf a dark grey kangaroo was killed; it had a nail at the end of the tail, but appeared to differ from macropus unguifer of Gould, in its darker colour. Lagorchestes was killed at the table land of the Burdekin. The kangaroo-rat (Bettongia) was observed wherever dry grass offered a hiding place. It did not differ from the species of Moreton Bay (B. rufescens); in the scrubs one of my blackfellows saw, however, another species with a tawny back, which became black towards the hinder extremities.

The opossums and flying squirrels seemed to disappear to the northward, or were at least so silent at night that we became rarely aware of their presence. On the Upper Burdekin, on the Lynd and Mitchell, the ring-tailed opossum (Phalangista Cookii) was caught, and at Port Essington opossums and sugar-squirrels (Petaurus sciureus) had been very numerous according to Captain

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Macarthur, but had now almost disappeared. The bandicoot (perameles nasuta) was occasionally seen and killed as far as the Lynd, where it used to come at night into our camp. The native cat (dasyurus maugei) was very numerous along the Upper Lynd, and frequently visited our larder when it contained fresh game.

Most useful to us were two species of flying fox (pteropus), a small one with a bright fox-coloured neck, and a larger one of a generally darker colour. These animals were exceedingly numerous at the head of the Roper, and in the patches of brush along the Alligator River. The large species was remarkably fat, and we killed several times great numbers of them, which were most welcome at our dinner. They were living on the blossoms of several gum trees, and when feeding during the night used to make an incessant screeching noise.

Several mice or rat-like rodentiæ were killed at the commencement of our journey; but they were very rare, and never attempted to make free with our provisions.

The want of insects explains sufficiently the rare occurrence of bats.

The native dog was frequently heard howling round our camp, particularly in countries which abounded with game. Several times they came at night into the camp to gnaw bones which we had left. That of Port Essington seems larger and more daring than others, as it attacks goats, and will come even into the enclosures to carry away fowls.

The buffalo, which we met first at the east Alligator River, is not indigenous, but imported from the Malay Islands.

I have seen no difference in the physical constitution of the natives of the east coast of the Gulf of Carpentaria, and of the north-west coast. The coast black of Moreton Bay is a fine well-made man, and so is the coast black of the Alligator River.

Farther in the interior he is generally not so well fed, and has consequently a weaker frame; but when there is abundant food the native of the inland country is not inferior in strength to that of the coast, and Captain Sturt describes his ichthyophagist friends as equally well made and strong. The natives of the gulf we met

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with were rather slim, but very intelligent. In the interior the families were more scattered, the tribes smaller, the intermixing between each other was less rapid.

Mr. Eyre remarked, that at the south coast the presence of natives does not indicate a supply, or at least an abundance of water. This, I think, may be the case at the sea-coast, where an abundant supply of food constantly invites the natives, who are consequently trained from childhood to do with the smallest possible quantity of water. In the interior the fires and burnings of grass were almost invariably the indications of an approach to water. At the Alligator Rivers the natives generally resorted to wells, which they had dug along the outlines of large plains, which abounded not only with animal but also with vegetable food.

In their habits there were decided differences. In the first account of my journey, published in the *Herald* and *Australian* newspapers, I have alluded to the remarkable custom of circumcision of the natives of the Gulf of Carpentaria. Having compared my notes, I find that the custom was only observed at the west side of the gulf; but Captain Flinders mentions it as characteristic of all the natives of the Gulf of Carpentaria.

At the Macarthur we still saw the bommerang, which is unknown at the Alligator Rivers and Port Essington, where the throwing stick and the goose spears are the means of obtaining game; and the common spear made of wood or strong reeds, and headed with a sharp quartzose stone, form their means of offence and defence. The barbed spear, either on one side or on both, and spears jagged with sharp pieces of quartz were also common. Kangaroo nets made of the bark of kooremin (sterculia heterophylla), nets of various size for fishing were found in the camps of the natives. At Port Essington their baskets are made of the fibres of the young pandanus leaf. The rock crystal was found in their dillis as far as the gulf, but never precious stones or brilliant ores were observed.

Of their language I have but little to say. That there was a difference, at least of dialect, between three tribes of the Alligator Rivers whose territories joined, was indicated by the name of the

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little edible root, which was called "allamurr" by one, "murruatt" by another, and a still more different name by a third.

The two black fellows, Brown and Charley, who accompanied me, were of course unable to understand even the first tribe of natives we met, and I am sure that variations of language exist all over the distant country we have seen, similar to those which are observed in the known parts of this colony. Language not fixed by literature is constantly and rapidly changing, and though I feel satisfied that the Australian natives belong to one stock, I am equally sure that it would be in vain to trace the various dialects to one root.

The limited custom of circumcision is indeed exceedingly remarkable, and its appearance at the Gulf of Carpentaria, and at the south-coast of Australia, makes a migration of tribes very probable. But could such a custom not be connected with endemic disorders, which have led the reasoning mind of man to the same preventive.

When we see the Asiatic grinding the various cerealia to make a wholesome bread, and the native of the interior of Australia pounding one of its largest grass-seeds to make a cake, we do not think of a tradition of the custom from Asia to Australia, but we naturally conclude that our Maker has given to all races of men the same reasoning power, which will lead them, if not to the same, at least to analogous results.

The same may be said of those rude traces of art, to which my attention was drawn by the Rev. Mr. Clarke and Mr. Miles, as being found at Port Jackson, which were observed at Clack's Island by Allan Cunningham, at the north-west coast by Captain Grey, and at Arnheim's Land and the East Alligator River, by my party and myself. We saw the foot of an emu cut very carefully and accurately into the bark of a tree, and other fanciful forms which we could not understand. A turtle and fish were depicted very accurately with red ochre on a rock, in caves in which the natives were accustomed to paint themselves for corrobories. It is extremely interesting to compare these efforts of the Australian native with those of more advanced nations, and we are

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involuntarily induced to suppose meanings which we know as belonging to the latter. These imitations of the human body were, however, too near, and too easy, and could be as well the produce of play and accident as conventional design.

The gentlemen of Port Essington, comparing my own blackfellows with the natives of the place, were of course inclined to think that the natives of the southern part of the continent were superior to those of the north-west coast. I have had, however, opportunity of observing the native of the east coast in his natural state, and I rather think that the north-west coast black is more advanced; I would explain this by their long intercourse with the Malays, who have frequently taken them to the Malay Islands.

I shall advert now to a circumstance with which I was frequently struck on my meeting with the natives—I mean their perfect incapability of supposing that there is in existence anything stronger or more powerful than themselves, or that any dangerous enemy could be near them when walking in the open forest, which forms their well-known dwelling-place. Their ear, so sensitive to noises with the origin of which they are acquainted, to the rustling of a lizard or snake, or to the rapid start of a kangaroo rat, did not perceive the foot-fall of our horses, and we were once with our whole train near a camp of jabbering, laughing, moving natives, without their being aware of our approach. Once, a native walked at dusk into our camp, and was surrounded by our horses before he knew that other beings were present. The discharge of a gun made generally a great impression on them; it seemed to remind them of supernatural agency. We noticed several times the screams of natives on hearing the reports of our guns without seeing us.

Having now given you a digest of my late journey, I shall lay before you the plan of an expedition on which I intend to start in October next. Captain Sturt's expedition has shewn that the interior, in the longitude of the head of the gulf, is a desert at least to latitude 24°, where the explorer was compelled to return. It would therefore not be advisable were I to attempt to cross the continent in that or a higher latitude; I shall, therefore, proceed at once to latitude 23°, where I found the Mackenzie and Peak

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Range, during my last journey; and as the Mackenzie was well supplied with water, I shall follow it up to its sources, which I expect to find about 80 or 100 miles to the westward of the spot where we first came on the river; I might then be able to ascertain whether the western branches of the supposed water-shed go down to the southward to join the system of the Darling, or whether they turn to the northward, and form the sources of the largest rivers of the head of the Gulf of Carpentaria. Should the latter be the case, and should the country be sufficiently well watered, I would of course proceed to the westward, keeping the same latitude, and try to reach the waters of the north-west coast. But should want of water not allow me to continue my journey to the westward, or even to the northward, I will retrace my steps down the Mackenzie, and follow the track of my last journey up to the Burdekin, where it is joined by the Clarke, in latitude 19° 12′.

I would follow the latter river, and I have no doubt of finding the heads of the Flinders, after having crossed either a table-land or a dividing range. I would then continue my journey to the Albert, and follow that River up to ascertain the latitude of its sources, and the nature of the country.

Again, I would try a westerly course, to come successively to the heads of the Nicholson, the Van Alphen, the Abel Tasman, the Robinson, and the Macarthur, and from the latter River I would hope to reach the waters of the west coast, in about latitude 17° to 18°. Should I succeed in this, I shall turn to the southward and work my way parallel to the north-west and west coast until I reach Swan River.

This journey I hope to complete in two years, though I am aware that unforeseen difficulties may retard my progress. Be it as it may, I feel confident, after the kind reception I experienced on my arrival from my late expedition, that, borrowing the words of that beautiful lyric in which I have been honoured by the Australian Muses—

"A nation's smiling welcome, will be my greeting home again!"

I thank you, Ladies and Gentlemen, for the attention with which you have listened to this lecture, in which I have

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endeavoured to give you such information on the nature of the country as I thought most interesting; though I am not able to add those ornaments of your language with which a more experienced English scholar would have endeavoured to embellish the all-engrossing subject of discovery.

I rely on your generosity, of which I have so abundantly felt the effects already, to pardon all my defects of idiom and expression; and I now, earnestly desiring that my labours and those of my companions may not be found altogether useless to the colonists at large, or a mere subject of momentary curiosity, respectfully and gratefully bid you farewell!

When the "Prince of Explorers" reached head quarters in April last, in high spirits, after discovering a country surpassing in richness any that he had previously seen in Australia, the attention of almost every individual in New South Wales and the neighbouring colonies was so completely absorbed with the wonderful route performed by the gallant leader, as almost to banish from their memories the *public expedition* and the progress it is making, or the prospects held out to them by its further discoveries. To the credit of the benevolent character of New South Wales, a public subscription was immediately set on foot; and this was not closed until £2,520 18s. 6d. were raised,—£1,520 18s. 6d. by the generous Australians, and £1000 by a liberal government. The learned Explorer will take with him in his second expedition a quantity of goats, which are to have bells suspended to their necks, and which will not only carry small burthens, but afford a supply of milk at times, perhaps, when water could not be procured. Mules, trained for the purpose, will also form part of the expedition.*

* Dr. Leichardt has since started upon his second expedition to cross the Continent of New Holland from east to west,—with the warmest wishes of the Australian community.—*Ed.*

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