

Notebook 28

Paper on Geology of W.A.

In order to make myself acquainted with the topography of the vast State of W.A., as well as with its mineral, pastoral and agronomic possibilities and chiefly her interesting aborigines, I decided on my arrival here that the best thing to do was to go and find out for myself and accordingly in March 1900 I took the steamer at Fremantle for the port of Cossack about 1000 or so miles northward of Perth. The whole of the coast line from Fremantle almost to Derby is low-lying, the shores being shallow, the tide running out sometimes (as at Beagle Bay) five miles from the shore leaving steamers high and dry on the hard mud. We pass the ports of Geraldton, a quaint little old-fashioned town trying its best to look bustling and busied during our stay. The lead mines at Northampton, 40 miles north, once made Geraldton really a busy township and here also the first railway was built - the Geraldton-Northampton line, the trains and fittings rather reminiscent of Stephenson's earliest patterns.

Carnarvon roads come next, for steamers can rarely go up to the jetty, the surrounding water being very shallow. The Gascoyne river has its outlet here and its flood waters bring down much sand with them, the bed of this river being extremely shallow, and the flood waters cover a great portion of the country. Later on when I crossed the Gascoyne from the land side, there was not a trickle of water in its wide shallow bed, the so-called "crossing", 3 miles from Carnarvon, being nearly half a mile wide. Carnarvon exists on its stations, is built on a flat, and looks sunbaked in whatever season of the year you strike it. It has however its mineral possibilities, for the hills about 80 or 100 miles inland are not wanting in auriferous indications and dry-blowing and dollying is carried on in the valleys between these hills.

Onslow, our next port at the mouth of the Ashburton, also forbids a closer approach than the Roads, owing to the flood waters of the Ashburton which carry down with them their usual quantity of sand and earth and anything they can pick up. The Ashburton Goldfields as well as many stations are the *raison d'être* of Onslow's existence. At this point we came in for the tail end

of a willy willy and our double decked and seemingly top-heavy steamer was compelled to hove to for a couple of days. Judging by the force of the wind and the loud play of the elements generally, it was just as well we only came in for the end of the hurricane. Two days steady steaming brought us to Cossack Roads and a lighter took us to the wharf past Jarman Island and its useful little lighthouse. Cossack will never look anything but a bundle of rubbish chained down, for from the beginning of its settlement, it has been and is the sport of every willy willy that comes along. Once a large pearling lugger was lifted up by a huge wave and dumped down three quarters of a mile inland from the wharf. The houses are all chained down with heavy iron chains driven on to posts stuck far down into the ground, but except the shipping and customs stores, none of them look worth chaining.

Cossack is the port for Roebourne nine miles inland, a very archaic and not quite clean train/making the distance in something under 4 hours. Roebourne is situated on the Harding River and between willy willy's in their season and the flooded Harding in the intervals.....

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The Peewak Hills lie between Balla Balla and Port Hedland and on the flats near these hills are hundreds of anthills varying in height from two to ten feet and looking in the distance like so many grotesque statues. More than 200 years ago Dampier saw some of these anthills nearer the coast and mistook them first for human habitations and afterwards for rocks.

Before coming to Balla Balla and when we were only 3 miles in a direct line from the township we had to make a horseshoe route round the edge of a marsh, the detour covering nine miles. All along the coast downwards from Beagle Bay these marshes run inland from the sea sometimes for many miles. On the flat country and in the dry season their apparently firm surfaces often tempt the unwary to try and shorten the route. I tried three of them twice on horseback and once driving, but had to dismount before I had gone very far into them and narrowly escaped serious injury, as the mud being so difficult to walk through I was obliged to strug-

In looking mentally over the three different journeys I undertook through the North West portion of W.A. I decided that neither of the three was sufficient in itself to form the basis of a paper that would be of sufficient interest to this learned society, to justify its being written, and so being desirous of making you, scientifically speaking, as much in love with what some geologists have called the "oldest land in the world" as I am myself, I will relate only the most interesting portions of the three trips - the first one being undertaken from Port Hedland to Carnarvon along a route between 50 and 100 miles inland from the coast, the second a trip with the Roman Catholic Bishop of this State to the Trappist (Aboriginal) Mission at Beagle and Disaster Bays, and the third and most gruesome, a journey undertaken behind a mob of 770 cows and calves from near Roebuck Bay to Ethel Creek, one of the head waters of the Fortescue River. Later on I travelled through the Murchison and Eastern Goldfields, but the results of that journey cannot be included in the present paper.

I will begin with the geological features of the country traversed. West Australia is chiefly known to outsiders as a country composed of sand. Traducers say that it is not plain sand, it is sandstone. They tell you that if you dig down into the depths you find compressed sand. You find it trying to hide itself in clay, ironstone, shale, pyrites, gravel, mud, mundie, even in Collie coal, but it is still the same sand. It may be soft or hard, dark, white, grey, yellow, red, brown or black, drift or cemented, coarse or fine, but its character never alters. It occasionally takes unto itself high sounding words and becomes argillaceous, micaceous, ferruginous, calcareous or silicious. It will even pretend it is decomposed granite, or fine grained red blue, black sandy clay. It will be running sand, loose sand or pebble sand, but all these are summed up by the aforesaid traducers as sand pure and simple.

Now that same old sand has covered and is still covering some of the richest gold mines in the world. On the same sand areas we have the most fattening pasturage lands of the Nor'West and without fertilisers of any kind I have known it to produce vegetables which, if not quite as enormous as the far-famed Gippsland

pumpkins, are still highly creditable to its productiveness and tend to prove that notwithstanding its unloveliness it possesses undoubted and valuable agronomic properties of its own.

Roebourne has frequent chances of being swept out of existence, but the pluck of its inhabitants overcomes all these obstacles. I found some of the ornamental iron work of the English Church which had been completely effaced by one of these willy-willys, five miles from its site. Yet another was built on the same site within the year. Roebourne is a chimneyless town, which gives it a strange appearance, no fireplaces being built in any of the houses. Welcome Hill against which the town nestles marks the beginning of a mineral belt in which copper, gold and other minerals have been found. Squatting stations run close up to the town and it comes forcibly home to one when driving through these stations how ill-advised it is to depreciate the qualities of a country because its appearance is unpleasing. The country looks stony and barren and has the most curious conformation. Here you come upon a kind of kopje country, great huge boulders rise up from the flat to an almost uniform height of about 20 or 30 feet. Climb one of these and all the others seem to at once form themselves into a circle round the mound upon which you are standing. In the formation of these boulders may be found granite, sandstone and many other geological varieties all in the one heap, varying in colour for there are black, brown, blue and grey stones amongst them. On the flats between these kopjes the jagged ends of quartz reefs crop up everywhere, and there are volcanic hills in the vicinity, but they have no trace of actual lava only a sort of vitreous scoria, into which I presume the Tertiary rocks have been converted. Dr. Park Thomson says of these rocks that "Volcanic activity has not manifested itself in W.A. since very probably the Carboniferous period, the physical aspect of the region indicating a long period of complete rest." Granite and sand run inland from the coast near Roebourne at an elevation of about 1000 feet. Welcome Hill forms part of this.

For all its apparent barrenness Roebourne is an excellent squatting country and has in this respect made many fortunes. The Whim Creek and Carlew Castle Copper mines and the Nichol and

other Goldmines are in this neighbourhood.

We cross the Sherlock and George Rivers on our way to Balla-balla, a small township lying behind Depuch Island. A willy willy has also laid this place in ruins more than once, but its two hotels, blacksmith's shop and Post Office have been again and again rebuilt. It is the "wool port" for some of the squatters round, and is also supported by the Mons Cupra and Whim Creek Copper Mine.

Depuch Island lies three miles away from Balla Balla and can be reached by walking across the rocks at low tide. It is one huge mass of igneous rocks, piled quite loosely together, but what forms its chief attraction is the number of native carvings and paintings that are upon every portion of smooth faced rock, in every gully, in every place that an outline can be chipped, animals, birds, fish and man have been chipped for countless ages by the aboriginal inhabitants. An ethnologist would spend many happy weeks on this island alone. The number and variety of the carvings, their undoubted age and the glimpse they give of native art as limned in the days when the world was young, render them well worthy of ethnological investigation, and I only saw one of the gullies! and the unhappy shore people who said "All the gullies were full of them funny things" had no idea how I envied them their nearness to this treasure house of ancient aboriginal art.

I left Balla Balla with reluctance and continued my course to Port Hedland, crossing the Yule and Turner Rivers and several smaller tributaries on my way. This country is pastoral too and is stocked with many thousands of sheep. There is much salt in the soil and round the edges of the "saucer-like depressions" that are to be found all over its surface, salt encrustations were observed, although rain had only recently fallen, when I passed through.

Port Hedland gets an occasional willy willy which levels the town, but these northern townships get accustomed to these little breaks in the monotony of existence and Port Hedland is now pleading for a railway to the Pilbara Goldfields. On the sandstone rocks along the coast the natives have again left marks of

their artistic skill, but it was evident to me that these carvings were quite modern and I found confirmation in this view from an old resident of the neighbourhood who told me that when the native pearlers were put ashore in the "lying up" season they amused themselves by chipping turtles, dugong and other kinds of fish upon the rocks. Although Port Hedland has a comparatively safe harbour the inland march that will have to be negotiated (should the railway become an accomplished fact) will afford abundant material for the exercise of mechanical ingenuity. At present there is a causeway across the marsh three miles in length, but of doubtful stability, owing to the nature of the soil on which it rests. However engineering ability is accomplishing much in these inventive days and as Port Hedland is the chief port of the Pilbara district and the wonderful resources of that great mineral field are being restricted for want of adequate facilities, the railway will now be but a question of time.

Northward from Port Hedland the dreaded 90 Mile Beach has to be crossed before Broome is reached. Before it is entered upon the Strelly, Shaw and De Grey Rivers are crossed, all dry watercourses with a few pools scattered throughout their length but all of them passing through an archaeologist's paradise in the wealth of material still unexplored that lies hidden in their hills and valleys. Here the enthusiastic archaeologist will find all the conditions necessary for the successful prosecution of scientific research. It was thought at one time that the geological formations in W.A. were either granite or sand, but recent discoveries have entirely disproved that theory. We have here the Tertiary, Pliocene, Miocene and Eocene formations. IN the various hills and outcrops scattered so curiously and apparently so promiscuously about the State, the geologist will find Archaean, Cambrian, Silurian, Devonian, Carboniferous, Mesozoic and Cainozoic materials for his special study, West Australia offering in this branch of science alone the most interesting field of study in the whole universe. Dr. J. Park Thomson and others denied us a glacial age, but the W.A. Government Geologist, A. Gibb Maitland, during his examination of the country inland from Carnarvon and between that district and the Murchison discovered,

associated with the Carboniferous rocks, an extensive deposit of glacial origin which he traced and proved over 70 miles. With the deposit were a large number of ice-scratched boulders. I may also add Dr. Park Thomson draws particular attention to the fact that in this Western portion of Australia the Archaean and crystalline rocks are developed to a far greater extent than in any other part of the world, and so our geological attractions alone surpass those of the whole known world in their variety and completeness.

There are hills eastward of the Ophthalmia Ranges that have never been explored. Giles and Hann went north and south of them, but did not touch them. There is abundant evidence that the whole of the N.W. coast is moving upwards. You will notice this more particularly in the raised beaches that are to be seen along the coast from Beagle Bay to Port Hedland and further south. These beaches of which the 90 Mile Beach is the chief, are, according to Hardman, about 10 or 15 feet above sea level, some extending very far inland, about 25 miles. The surface of these beaches is covered with salt grass and samphire.

About 20 miles down the coast from Broome parallel lines of sandhills enclose what I shall call reclaimed beaches, but at one spot I climbed over the last sandhill and looked over a rich grassy plain about a mile in width, flat almost as a bowling green and apparently quite level with the sea from which it was only separated by a thin strip of young mangroves which grew in the soft ooze near its edge. There seemed to be not the slightest break in the level where the grass ceased and the ooze began. This green beach was some miles in length and Mr. Roe, the owner of Thangoo Station, told me the grass which grew upon it was good fodder although at the other side of the sandhill only salt grass and samphire grew.

The 90 Mile Beach with its rotten soil in which burrow millions of short tailed bloated rats, is the dreariest and most desolate looking portion of W.A. For the whole length of the beach we were obliged to carry the wood with us which was to boil our billies, not a tree to be seen except far away to the eastward where a low dark line defined the place where the beach ceased

and the pindan began. (I may mention that Woodward and others gave the name pindan to the cracked plains, so frequently met with here in W.A. but amongst travellers and settlers in the Nor'West it is the general name for "waste bush country".)

The grass upon the 90 Mile Beach looked green and flourishing but proved barren herbage when tested, as the more it is eaten, by stock, the thinner they get. Early pioneers deceived by its apparent luxuriance, settled upon portions of it and fenced it, but soon found out their mistake and abandoned it. Every day about noon on our journey over the beach we saw the smoke of a native fire in advance of us. After a little time this smoke would be answered by one further down. As soon as the second smoke was visible, the first one gradually died out. I concluded that the inhabitants were signalling our progress to their friends. More than once I rode eastward towards the smoke in the endeavour to come in touch with the natives but distances on this beach are woefully deceptive and a two hours' ride brought me seemingly no nearer to the pindan than when I started, and so I returned unsuccessful. In the whole line of beach from Wallal where it begins, to La Grange, where it ends, there was not a native to be seen. At one of the wells along the beach - Nambheet Well - a white man named Horrigan had been murdered by his native and the grave was made beside the well, with a small wooden slab relating the event nailed to an upright piece of corrugated iron. The well is in a narrow valley between the sandhills and the desolate scenery was accentuated by this lonely grave. Along the sides of the hills the remains of many old rush breakwinds showed that the natives had frequently camped there, but since the murder the well has never been visited by them. Very heavy dews fall in these parts. Low sand ridges separate the beach from the sea.

There were about 100 natives camped at Wallal, amongst them being many characteristic types. The Malay element was very apparent both here and at La Grange Bay. There is a hermaphrodite at Wallal and a man at La Grange Bay who, from congenital arrest of development in the length of the trunk has a child's body and a man's limbs! He is nearly six feet in height. It would be interesting to obtain the skeletons of these aberrant types.

The La Grange Bay native being consumptive, I asked the kindly telegraph master if he would let me know when the man died so that his skeleton might be secured for anthropological purposes. I fear I gave the gentle master a shock, but the skeleton is really worth obtaining. The hermaphrodite looked too vigorous for me to broach a request for her bones. It was a woman's face, head and bust that I looked at.

At Wallal I climbed a sandstone ridge that marks the coastal edge of the desert and I looked over an endless sea of short stunted shrub. Far as the eye could reach not a break occurred in the evenness of growth of this shrub, not a sign of watercourse or the faintest depression or elevation was visible from my vantage point, but on walking over it for a few miles I found the ground more uneven than it appeared from the hill, and small hummocks of sand here and there amongst the shrub. The Wallal cattle and sheep were able to find succulent herbage in this "desert" judging by their appearance and apparently right in the midst of it about 50 miles E.N.E. of Wallal some pastoral country has been taken up, so that it cannot be the barren waterless sandy desert one reads about.

Inland from La Grange Bay there is also good pastoral country whose possibilities hardy pioneers are now testing, with good results, I am told. I understand that the wells along the 90 Mile Beach pass through some little change in certain seasons. One year they will contain a fair supply of good water and the next for some unaccountable reason the water in the sandhills is scanty and brackish. We came upon one tree growing beside a well called by the stockmen the thorny sandpaper tree. It is not wood that will burn, otherwise it would not have been left standing. A tiny patch of spinifex was met with on the beach between Nambett and Maimbull Wells.

I must mention a very curious well at Enjidine Plains, 12 miles north of La Grange Bay. Two wells had been dug quite close to each other and one was fresh, the other salt water. The salt well had two jets of fresh water issuing from one side of it and two jets of salt water from the other side, the salt jets coming in from the land side and the fresh ones from the sea side of the well.

Large clay pans and much good surface water was to be found here and excellent herbage, though there is some magnesia in the soil. Between this point and until about 30 miles below Broome there is a break in the coast line which is of red sandstone, broken and rugged, and about ten or twelve feet above the sea. Near Gordon Bay, a few miles north of La Grange I saw some basaltic rocks jutting out into the sea, very similar to those I saw at the Causeway in Bunbury, 116 miles south of Perth.

I saw a native well near here too. It was almost round, the opening being about 4 feet in diameter, but widening towards the bottom. It appeared to be about 12 feet deep, and contained very good water. The Nor'West natives usually use a large shell as a spade, in digging out these wells. They have also used a kind of wooden shovel, but I have not come upon a specimen of these implements.

La Grange Bay marks the northern boundary so called, of the 90 Mile Beach, and from here one gets in again to broken country. Ironstone, granite, red sandstone and other formations are visible and rugged protuberances - they cannot be called hills - rise up here and there above the level, broken, serrated and waterworn. Two pinnacles called Barn and Church Hill respectively rear their little heads above the level, and serve as landmarks to the pearling luggers along this coast. Beyond these two no further elevation is to be met with between Wallal and La Grange; marsh flats, with excellent pasturage are found up to and beyond Broome from La Grange Bay. I believe your esteemed member Mr. Panton visited this district in the 80's and furnished a description of its topography. It is capital cattle country, but, sheep do not seem to thrive upon it and in the pindan, (inland) from the marsh flats, poisonous weeds grow that are fatal to horses, though cattle do not seem to experience any ill effects from them. It is difficult to rear horses in these parts. The first and second generation is somewhat less liable to the weed or soil or whatever it is, the cause of their frequent mortality, not yet being discovered. Consequently horseflesh is dear. After the Port Hedland district is passed, and if you need a horse you pay famine price for it - I speak feelingly. I purchased some ten horses in the

neighbourhood, five of which were outlaws, two were unbroken and the sons of outlaws, and the remaining three should have been "retired" a decade or so before I bought them. Shallow lakes are scattered all over this district which in the wet season is one vast swamp. At this season the cattle retire to the pindan as a rule, but the rich herbage tempts many of them to feed on the swamp which after a time softens their hoofs to such an extent that these sometimes drop off. This West Kimberley country is famous cattle breeding country, watered throughout by springs, lakes or claypans and wells. The De Grey was the last river bed we saw. There are no watercourses as such until the Fitzroy is reached, but my furthest point was Disaster Bay on King's Sound.

The township of Broome, with its waving cocconut and palm trees, its brilliantly flowering ponciana trees which give one one's first glimpse of tropical verdure, its pearling and squatting industries, its conglomerate population, is a mixture of Port Said, Singapore and a little bit of Hong Kong. The business portion of the town when I first arrived there was in the midst of the Japanese and Chinese quarter, and as you lost your way amongst the narrow passage, sometimes not more than two feet across, between the Japanese houses, it was difficult to imagine you were in an Australian township. I will give you a few of the nationalities that may at times be encountered there : Manilamen, Japanese, Greeks, Afghans, South Sea Islanders, Port Darwin natives, Malays, Esquimaux, Maoris, Cingalese, Keepangers, Chinese, West Indians, Hindoos, Eurasians and the unspeakable Turk - these are the coloured mixtures. Of the white nationalities that are represented at any pearling township will supply the varieties. The aborigine from the interior has been attracted to this pearling centre by the unusual inducements and has shown his possession of the faculty of adaptability in the manner in which he falls in line with the to him new condition of things.

Although Broome, from the number of coloured population, does not give one the impression of being an Australian township, yet Cooktown and Thursday Island have passed through a similar experience. I visited these places 20 years ago. During the last

three years the steady stream of respectable citizens and their wives, which has flowed towards Broome, has gone far towards the regeneration of the township. The pearling industry is yearly increasing, showing no signs of decadence as yet, in the quantity and quality of shell and pearl. A pearling fleet is most interesting sight. Bishop Gibney and myself were taken out in a pearler's schooner into a fleet of over 100 luggers working on the grounds between Broome and Beagle bay. Whether by accident or design all the luggers arranged themselves in a semicircle. (We went out on a day when the luggers were rationed) with our schooner in the centre. The sea was beautifully calm and the sight of the huge half-circle of boats made a strange and curious seascape. We were too far from the low shore for any land to be visible beyond a thin grey line to the eastward. The boats remained in position for some little time and then one by one they approached the schooner, those which belonged to the schooner bringing in the fruits of their labours and receiving their rations and water supply at the same time. A motley crowd they were too! Most of the Malay and Manila divers are Roman Catholics and so when the word went round that their Bishop was on board, we had a very busy time for some hours. Several white men in Broome are "dummy" owners of pearling luggers, which means that they are given a certain share for the use of their names, the law requiring that pearling luggers should be owned by white men only. It is creditable to the coloured man that he scrupulously keeps his word in the matter of these shares. Still there is much illicit or "snide" pearl dealing carried on and many a pearler buys his own pearls from persons to whom his divers have sold them and so this excitement is added to pursuit of pearling. I happened to strike Broome again during the "lay-up" season between December and March. The luggers had chosen Broome as their mooring ground and the whole place was so much and so completely given over to coloured misrule that during the short time of my stay I was obliged to confine myself to the miserable dirty bedroom of the one decent hotel the place then possessed. It is - or was - a season of madness with both the yellow and white, particularly the white. "This is very dreadful," I remarked to the Cingalese cook who brought me a little

food in the moments when the passages were somewhat free of howling drunken madmen. "They've got no education, Madam," was the reply of the cultured Cingalee. Yet to my own knowledge there were Varsity men leading the revels at that particular time.

Sometimes Cygnet Bay, Whistler's Creek (between La Grange and Broome), Beagle Bay and Carnot Bay come in for a share of the fleet at Christmas time, but wherever the pearling boats moor with their coloured crews there vice reigns supreme. However I will not dwell on this subject. We journeyed up towards Beagle Bay in the pearling schooner (it had at one time been the pleasure boat of a Rajah!) and arrived in the Bay just as the tide was turning. As the water receded the schooner gradually listed to starboard and in a few hours was lying gently on her side in the dry mud, but what was more wonderful still, a bullock dray was seen wending its way across the (now dry) way and soon hitched up alongside the Sree-pas-Sair (Belle of the Beach) to receive the Mission Cargo, and I witnessed the unique sight of unloading from a ship direct to a wagon in a part of the bay that is covered with many feet of water at high tide. Two old and decrepit horses were also brought over to the ship's side and I got into the saddle from the gangway. The Mission lies 9 miles from the Bay. On the shore here some enterprising speculators had started a Turtle Soup Factory, which was to turn out a huge success. There was one turtle in the "enclosure" which I was told would shortly make 80 pints of the aldermanic delicacy. The aborigines of whom I saw about 50, none belonging to the Mission, were the factory hands and were superintended by two white men. The apparatus was very primitive and altogether the impression was at once conveyed that this industry had not come to stay. Shortly afterwards the factory closed down. Nevertheless there is scope for such an industry at Beagle Bay for turtles abound in these waters. Lacepede Islands 20 miles S.W. of the Bay is a favourite hatching ground for them.

The marsh lands we passed over on our way to the Mission area; if I judge by the cattle I saw grazing upon them, the finest fattening lands in the North. We killed a beast while there which

weighed over 900 lbs. Of course there is no scenery as such, indeed from Disaster Bay right down to Geraldton I did not see a single grand or beautiful or soft feature in the whole of the country traversed. It is unlovely and cheerless to a degree. Wide treeless plains stretch out before you without a single undulation to break the level greyness, or a forest of bush is entered upon scraggy and stunted and also grey, the dominant colour of the Nor'West. The Trappist Mission was started in 1890 by Bishop Gibney for the benefit of aborigines and during the 10 years of its existence as a Trappist fraternity a great number of the natives of the surrounding districts came under its influence. At the time of our arrival there were 117 natives "attached" to the Beagle Bay Mission and 55 at Disaster Bay, an outlying branch.

There was certainly no doubt that the Trappists had the good of the natives entirely at heart from the outset, and had never sought to make the Mission what it could easily have been made, self supporting. Their only wish was to wean the natives from their cannibalism and from those other aboriginal customs which did not hold with the tenets of the Roman Catholic religion, and to make them honest truthful and "clean living" and in all these they succeeded, but they could not instil either industrious habits or cleanliness into the lives of the natives. The native camp at Beagle Bay was all the "housing" the natives cared for. Here on cold nights they burrowed holes in the sand, lighted great fires in them, threw the sand over the hot coals and at bedtime scraped it aside and getting into the cavity covered themselves again with the warm sand and lay thus till they heard the sound of the conch shell that summoned them to Mass and breakfast. They worked intermittently in the gardens and paddocks; they were fed when they worked but the Trappists also fed them when they didn't work. At the end of 10 years' devoted labour these Trappists abandoned the Mission, the expenses having been at the rate of £1000 yearly, which has now been handed over to a German (Pallatine) Order of monks. As regards the material which the Trappists had to work upon, Bishop Gibney testifies to the honesty of the native when he first journeyed over that district (1890) in quest of a suitable

site for the Mission; he said that he went unarmed through the length of the bush from Derby to Beagle Bay and back again. Stores were landed at various points and remained untouched by the blacks; he met with the greatest kindness and friendliness from them in his progress through their country, they passed him on from tribe to tribe, each furnishing him with a guide to the next watering place. His party of that time consisted of himself, the Abbot (a Frenchman) and an Ex-Constable who afterwards joined the Order. The natives carted the stores from the shore to the Mission and never once attempted to appropriate any of the goods. When the Bishop saw them again after 10 years, he could bestow no higher praise upon them, than he did when he first met them in the bush.

The Trappists' buildings being of bark and cajeput saplings twice caught fire during their 10 years' stay and stores, clothing, books and vestments were consumed. But there were still only bark buildings when we arrived. How much I should like to dwell upon this visit which lasted from August till the beginning of December, of how I worked with the native women while the Bishop took the men under his care, of our survey of 10,000 acres which the Bishop and myself undertook with our native friends as helpers, ourselves being "chainmen" and our only instruments a ship's compass and two patient brothers to fix the posts. (One of my most valued possessions is a gold watch presented to me by the Bishop "for my services in connection with the Survey work") but the enumeration of all the incidents that occurred during that memorable visit would fill two papers and so I must reluctantly leave it.

Mr. Panton mentioned the mound springs along this part of the coast. At Beagle Bay there are many of these and they are not only to be found on the shores of the Bay but they bubble up in the Bay itself, for once when the tide was out we walked a considerable distance over the hard mud and I was shown a spot where the fresh water was forcing itself through about 12 feet of water. Another curious circumstance I must mention in connection with these mound springs. Your esteemed member Mr. Panton says of them "They are caused by the artesian water forcing its way

upwards through the superincumbent strata and carrying with it mineral matter which accumulates as dried mud on the surface", but a singular fact connects itself with the mound springs at Beagle Bay. The mud thrown up is really excellent soil upon which maidenhair ferns, pandanus trees and other plants grow luxuriantly. The Bishop and myself with the aid of some native women decided to open up one of those mounds. We cut with our spades on the top of the mound (which at its highest was not more than 3 feet above the ground) about seven feet square and then, getting within this square we shovelled out the earth. As we got level with the surface of the ground we were obliged to give up the spade and work with our hands, for the earth covering the top of these mounds was not more than two feet in depth and below this earth we came upon fibrous matter exactly like that of which some Irish bogs are composed. At a depth of about  $3\frac{1}{2}$  feet from the surface I desisted from active work but remained standing in the well until we had gone down six feet. If any of you have travelled over an Irish bog you will understand what I mean when I say that the ground in the well at that depth seemed to sway and move as I jumped upon it exactly as the bogs do at home. The next morning the water was level with the embankment and the remarkable thing is that a fortnight afterwards when we visited the well we observed tiny fishes moving about in it and a quite perceptible motion in the water itself.

I may say that the Banana gardens at the Mission are watered by five of these artificial wells, tranches being dug between them through which the water flows well to well always moving gently to and fro. In all the wells in the banana and vegetable and sugar cane gardens the same species of fish were to be seen and the same quiet movement observed in the water.

None of the artificially made wells were more than 7 feet deep. Occasionally the fibrous material was pushed upwards, probably by the force of water from beneath, but the monks told me that the wells have never overflowed since they were opened up. The surplus "earth" was taken out as soon as it was observed and the wells were always kept at a uniform depth. There was a large

pool at Beagle Bay which really was a self made well, and another at Disaster Bay, both very deep and both containing tiny fish. The water in all the wells was of excellent purity.

There was a good deal of timber on the Mission land, eucalypts, cajeputs, jamwood and acacia being the principal. All kinds of fruit grow in the gardens and it is a "Chinaman's Heaven" as regards vegetables, the potatoes being exceptionally good. It is the finest land for tropical agriculture in the State. Sorghum and sugarcane grow to perfection and a specimen of arrowroot that I brought back with me, when shown to a Queensland expert, was stated by him to be better than any he had seen in Queensland. 10,000 acres of this land are now held in fee simple by Dr. Gibney in trust for the aborigines, besides the 100,000 acres of Reserve. Of the 10,000 acres 8000 are at Beagle Bay and 2000 at Disaster Bay.

The distance across the pindan from Beagle Bay to Disaster Bay was about 60 miles as we made it. I may say that the "marsh country" with its mound springs and fine pasturage runs inland at Beagle Bay for about 15 miles from the coast and about 10 miles at Disaster Bay, there were thus left 35 miles of "pindan" through which we had to cut a track for the dray which was carting some rations for the natives. In all this distance there was not a drop of water, and the highest speed of our horses not averaging more than two miles an hour, we took 17 hours to negotiate the distance. We turned aside to Alex Forrest's, Lake Flora, but its surface was dry and so hard and sunbaked that the pick made no impression upon it. We fared equally badly with Lake Louisa which was merely a saucer-like depression of baked and cracked clay. We had no water bags for the dear unpractical monks had but one tiny canvas bag at the Mission capable of holding three pints of water, and never having used it, the silver fish had made their home in it. We suffered greatly from thirst, for the heat during the day must have reached 120°, and the pindan affords no shelter. We had two native women with us and we shared our horses with them during the trip, riding and walking alternately. We did not reach Disaster Bay and water until about 2 a.m.. A corrugated building had been erected here with six open bunks (bags stretched on cajeput trestles) and I was housed here till daylight, my two native

friends sleeping on the floor beside me.

We found 55 natives at this Mission, although the monks had not been there for six months previously, but word had been sent to the natives and they had made a great muster in honour of the occasion. Bishop Gibney received the real aboriginal greeting from an old man who had been one of his guides 10 years before. Buyamin gave the native welcome as far as circumstances would allow. He literally fell on the Bishop's neck and wept and after indulging in this emotion for some minutes, he went through the other little ceremonies of stroking his friend's face, pressing him to his breast, etc., the Bishop remaining quite passive during the performance.

The welcome I received from the women resolved itself into a determined and minute study of my manner of performing my toilet. As soon as I opened my eyes I looked into the faces of some 30 of them, who had been silently regarding me while I slept, and the moment I started to get up and dress, they clustered round me. A number of friendly but dirty hands grasped my bare shoulders and arms, audible comments and free discussion went on, myself being the subject and altogether I was the centre of attraction to a crowd of women most of whom, if not all, I was sure, had never seen a white woman before. They were intensely curious but not vulgarly so. The country along the coast here is similar in many respects to that of Beagle Bay. There are the same beautiful wells, one of which, the natural one before alluded to, is of very great depth and clearness. Sugar cane and vegetables of all kinds grew and flourished here, the sugar cane had been sown just before the Trappists had abandoned this mission and it was nearly 12 feet high when we saw it. The natives are very fond of the cane and it speaks highly for their honesty that they had not touched either the cane field or the stores which were left unlocked in the house for six months. Bishop Gibney gave them permission to eat all the cane and in a few minutes there wasn't a stalk standing. Another thing too, although there had been no monk or priest amongst them for six months, yet when the Bishop held service next morning they took part in it as though

they had never left off! which credits them with a more retentive memory than they are generally supposed to have. There were several Malay features amongst them and many of those present had eaten human flesh. One woman was pointed out to me who eaten three of her own children. She had a decidedly Malay cast of features, and was not pleasant looking. (One of my greatest friends at Beagle Bay was Felix (the son of Diogenes) who had assimilated portions of his own sister. He was really the finest looking specimen of a native I ever saw.) The men were about 5 ft. 8. Benjamin however was nearly as tall as the Bishop who is 6 feet in height.

The tide at King's Sound rushes in and out at the rate of  $6\frac{2}{3}$  feet an hour, there is a rise and fall of 40 feet in six hours. We went down to Disaster Creek about 5 miles from the house to see the incoming tide which rushed in like a mill race. Numbers of fishes are brought in with the tide and these the natives are very clever at spearing. I had to make 20 attempts before I succeeded in pinning one with the thin light fishing spear.

We waited until the tide receded as I wished to see what the banks were like and I found them the same soft ooze mud that I had seen at Balla Balla and elsewhere, except that the water had made a deep channel for itself through the ooze. A rather amusing incident occurred while we were waiting for the tide to go out. Wishing to see the bright coloured fish more closely and finding it impossible to wear foot gear of any kind in the soft glutinous ooze, we accordingly divested ourselves of shoes and stockings and walked some distance down the bank sinking deeper at every step. We were about half way down when a great movement took place in the now narrow bed of the creek. The Bishop called out, "That's an alligator," and we made a quick attempt to turn round and retrace our steps. I will not soon forget the struggle that ensued, for the mud closing round and about our limbs required our utmost exertion to extricate them, and all the while we were struggling we felt sure the alligator had spied us, but it was impossible to hasten our speed up the bank. Eventually however we reached hard ground and then I found that the sharp mangrove roots and stems (the only substances that hold the mud together) which scratched and pierced my feet in my painful journey upwards

caused them to swell to such a size that the Trappist brother who brought the dray had to make me moccasins of bags (each foot almost requiring a whole bag to itself) until the swelling went down, which it luckily took only 24 hours to do. The Bishop suffered no ill effects at all. We spent three pleasant days here amongst the Disaster Bay natives whom I found merry and lighthearted and pleased with our visit. You will notice from the various photographs I have forwarded that their countenances are intelligent and pleasing, and their expression candid and open, Diogenes alone excepted. I always found them fully responsive to friendly overtures, possessing too a certain native courtesy if I may so call it, which exhibited itself in many ways, perhaps a trifling service rendered or in a quiet withdrawal from your vicinity if they noticed your fatigue. It may have been the gentle influence of the Trappists which had bereft the savages of their savage propensities while interfering so little with their native mode of life. Whatever it was that had made the aborigines of Beagle and Disaster Bays so "livable" with I cannot say, I lived amongst them sufficiently long to judge their characters and one of them slept on the floor beside me, yet never once were my sensibilities affected by any action of theirs. Their only fault was that they only washed when it rained. But how many white men have I not met in my journeys against whom a similar charge could not be as justly laid.

I regret to say that one of the Pallotine priests recently told me that the whole of the Disaster Bay tribe have disappeared since our visit and that in consequence the priest in charge there had to return to Beagle Bay. Whether they had died out or become merged into other tribes at Derby, Sunday Island or elsewhere could not be ascertained, the simple fact remains that the Disaster Bay tribe as such has become extinct.

Pardu Creek can scarcely be so called, it is merely the drainage from the hills north of the De Grey, into which its flood waters empty themselves. This part of the country was very broken and full of unexpected gullies. The "yelbah tree", one of the shadiest trees in W.A. grows plentifully about Pardoo and with the mulga and cork trees is a favourite food for cattle.

The hills in the Pardu country have agate, jasper, chalcedony, granite, flint and quartz of many varieties. There are several caves in these hills which form shelters for natives or kangaroos, but there being no smooth surfaces of rock, I found no paintings or carvings. I found a very old net made of spinifex cord and about 8 feet square in one of these caves. The "mulyie reward" gold mine is amongst these hills.

The horse contract a strange disease of the eye, called "pink eye" in this Pardu country. A curious pinkish film gradually spreads over the eyeball and if neglected the eye-sight frequently suffers permanent injury. I used a very primitive remedy with my horses which certainly proved effective. I chewed the <sup>vine</sup> leaves before mentioned very fine and then blew them into my horses' eyes, doing this three or four times a day until the eye becomes clear again. Powdered alum blown into the eye is the usual remedy. I must say I had taken the malady in hand in its first stages.

Our return journey to Beagle Bay was accomplished under better conditions. This part of the Nor'West offers many attractions to the entomologist. Its insects and other "creeping things" are in point of interest unsurpassed by those of any other State. Do you know the little brown rhinoceros beetle? A tiny brown creature not larger than the top of my little finger, with a horn stuck rhinoceros fashion above its nose and with a strength in this horn that is prodigious. I frequently tested the capabilities of this horn by placing the insect underneath an inverted glass bowl, the power of leverage it possesses is amazing. Then there is the M. Beetle *Eupoecila inscripta*, in colour a lovely pale green and having a distinct M on its back and the S. *Gretiosa* or iridescent gold and green, a wonderful creature, and many many others that I cannot remember having seen classified. West Australia has her own peculiar insects as she has her special geological attractions.

I have not spoken of the famous Pilbara district so rich in minerals of all kinds, for that was taken in on my overland journey to the Ophthalmia Range. The formations of this extensive

auriferous region are many and varied. Granite, gnaissic, schistose, limestone, quartz outcrops of all kinds show up here there and everywhere. From the De Grey River down to the Murchison - a long distance - belt after belt of auriferous country is to be met with. Although the De Grey country is supposed to be pastoral, the Illareen Hills 16 miles inland from Condon, or Shellboro' as it was called in the old days, have laid open a little of their wealth to the persevering prospector. Lalla-Rookh Southwest of Cook's Bluff has splendid reefs in its vicinity. The British Exploration Company own the principal mine there and there are many minor workings. It may be interesting to state here that many of the geological specimens which I collected on the De Grey, Shaw, Marble Bay and Nullagine and forwarded to your esteemed Hon. Secretary were shown by him to the consul of Kerguelan Island who remarked on the striking resemblance between the Pilbara rocks and those on Kerguelan Island.

Marble Bay, which received its name from the mottled bar of quartz that crosses the Coongan River and which was supposed to be marble is 130 miles by coach from Port Hedland and is the centre of the great Pilbara district. South of it is the Nullagine, 80 miles away. 18 miles southeast is Warrawoona, in the midst of what are called the Salgash Ranges, 50 miles Nor'East is Bamboo Creek, westward of it are Cooglegong, the Shaw diggings, Moolyella Tinfields are 12 miles N.E., and Nor'West again are New tinfields lately discovered. You will see the characteristics of this great field in the illustrations. In this portion alone the geologists and the archaeologist have a field surpassing any known country in its interest. Along the De Grey and Shaw rivers (the latter discovered and named by Gregory in '61) gold, tin, copper, iron and other minerals are found. On the side of one of the steep hills of the Shaw, near the Gorge, I came upon a limestone patch, and as it was apparently isolated, for the surrounding hills were granite or quartz, schist or shale, I explored its surface and found many crystal cubes of a beautiful transparency. There is so little limestone met with in this portion of the State, except that of the recent breccia that this patch became particularly

interesting from its appearance amongst the granite. In the bed of the river and in the gullies between the hills I found jasper, chalcedony, agate, tin ore, ironstone, crystalline limestone, mica and many other varieties. The Coogligong tinfields 45 miles S.W. of Marble Bay have yielded ore that has contained 76% metallic tin. I believe the New Find 80 miles eastward of Port Hedland is equally valuable, its value being increased by its nearness to Port Hedland. Much of the tin at Cooglegong is a stream tin and seems to have been washed out of the granites and deposited in various parts of the bed of the Coogligong (a tributary of the Shaw) where it is found in very rich accumulations. I saw native miners here, fossicking for themselves and making a very good living too.

Denuded masses of granite form the composition of most of the hills along the Shaw, some of these gigantic boulders being without a shred of vegetation, strange rugged forms whose bareness is sharply defined against the sky. Some of the hills are dome shaped, others pyramidal, others again like the ruins of some mediaeval castle. "Old as the hills" gets a new meaning as you stand on the top of one of those enormous boulders and look round upon mile after mile of hill and valley, all with an indefinable mark of age upon it, the age of millions of years. The country is still in its period of complete rest, how silent it is! not a bird's voice greets you as you climb hill after hill, seeking for some variety. Birds and life are incongruous in this ancient bit of old world.

Near Hillside Station on the Shaw River 60 miles S.W. of Marble Bar, more of the loose boulders similar to those near Roebourne are to be met with, this time as ranges, whose black scoriated tops give them the appearance at a distance of being covered with a gigantic black possum rug with the tails hanging down the sides. These are the Black Ranges. I picked my way up the loose masses round whose base the *Triodia irritans* or buck spinifex grows to a height of about 12 feet. Further up there is not the tiniest scrap of vegetation, the boulders being piled promiscuously as though they had been stacked ages ago by

giants who threw them down in rows forming long low treeless ranges. These hills mark the dividing line between the Tablelands and the coast plains.

Many of the granite outcrops along the Shaw act as reservoirs for the rain water, but the herbage found in their fissures particularly after rain is poisonous. At Illareen also on the De Grey this poisonous herbage grows at certain seasons; in places on the Shaw some of our horses died from the poisonous grass.

Many native carvings may be seen on the rocks about Hillside and at other places where a smooth surface of stone presents itself in the hills by the river. The Shaw River natives generally camp in the river bed. We came upon several families on our way up the river. Once in the 70's I was told, a great rain caused a suddenflood which nearly annihilated the whole of the Shaw River tribe. I may mention that I saw some floodmarks on this river 65 feet above its bed.

The crystalline limestone that goes by the name of marble is not confined to Marble Bar. I saw outcrops of it amongst the Illareen Hills. It reappears here and there between the De Grey and Shaw and Nullagine Rivers, always trending north and south as is usual with the various Nor'West formations. Towards the Nullagine I noticed a fresh formation of ferruginous sands and variegated clay, as well as reef country. This country and that at Warrawoona would richly repay the archaeologist for there is abundant and varied material here and further down in the Tableland country. Bamboo Springs - the only "murmuring brook" I have seen in the Nor'West takes its rise in some springs at the foot of one of the tablelands, and travelling up its length for some distance, I found that it occasionally disappeared under a natural bridge of concrete, appearing again  $\frac{1}{4}$  mile further on as a deep waterhole. It finally "chatters over open stony ways" until it reaches the Shaw where it at once hides itself in the sandy bed. X

(Should description of Pardu country on P. 20 & 21 be inserted here?)

We are in the Tableland country at Bamboo. It seems to begin southwest of the Nullagine. Indeed the Nullagine may be said to be a tableland, it is 65 feet above sea level, and is 300 miles from the coast.

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I stood upon the last hill in "the Gorge" of the Shaw, an immense granite boulder rising about 200 feet sheer from the river bed with broken bits of its surface scattered here and there but with not a particle of vegetation upon it. From its summit I looked round upon range after range of irregular hills branching in all directions, Cook's Bluff and Mt. Edwin being the most conspicuous. Nat Cook was the pioneer who opened this country and the first, I believe, who travelled up the Shaw and through the Nullagine. Mine was the first dray that ever went up the Shaw.

It is highly interesting if unlovely; the flats are mostly stony, hard granite or sandstone, but the flat tops of the hills being covered with clay to a depth of two or three feet produce excellent herbage for sheep or cattle, mulga grass, silver grass and other kinds I found on them. Except along Bamboo Creek itself, there is very little timber in this part. Some "patches" are found here and there, but it is practically treeless. Gold has also been found in these tablelands, but very little prospecting has been done owing to the distance from the coast.

We came upon the last pool of the Shaw River 12 miles below Bamboo Springs and shortly afterwards reached the "Divide" on the Southern side of which the Fortescue and its tributaries take their rise. There is no range of hills marking the divide, only an upland rise or high tableland of Carboniferous age, with a few isolated hills here and there. Several tributaries of the Shaw rise on the northern side of this divide, but they form no "pools" in their course, the fall being the great for the water to form pools. Although the divide is not sharply defined the herbage varies as soon as it is crossed. From spinifex and broken country with scattered herbage and few trees, we came into a thick mulga scrub, with soft ground and good grass, but no surface water, the mulga merges into saltbush marsh country. This particular district is more affected by drought than any other, owing to the salt bush and blue bush which only thrives in periodically flooded country. Christmas Creek one of the headwaters of the Fortescue rises in the Divide, running in the rainy season for a distance of 35 miles and then simply shallows out into a large grassy flat. There was not a drop of water in its bed when I travelled over it. The absence of a channel at this point of the Fortescue distributes the flood waters over a large area of country, and here the true blue bush flourishes in a good season. Mulga and sandalwood and a few quandong trees were all the timber met with on this part of the Fortescue. Geologists have found several lava flows on this river.

When we reach the Ophthalmia Ranges we are again out of the Carboniferous into the Paleozoic Tableland and here a fresh and interesting field is waiting for the archaeologist. Rudall trav-

elled through these ranges and went between them and the Robertson Range. The Ophthalmia Ranges describe what may be called a semicircle of hills of uniform height, bearing some distant resemblance to Giles' Betermann Ranges. Isolated hills stand sentinel north and south of them, the Governor to the North, Newman Hill, Deadman's Hill and the Sugarloaf to the south being all visible from the top of the ranges. Only one passage has as yet been found through the ranges, called the Ethel Gorge and the Ethel is one of the headwaters of the Fortescue, but the New Davis Stockroute passes between the Ophthalmia and the Robertson Ranges. Excellent mulga flats are found in these ranges with the ugly name. Here I rested for a few days, visited the neighbourhood of Newman Hill, Deadman's and towards the Robertson Ranges.

To try and describe the formation of many of these hills one would have to run the gamut of nine tenths of the ordinary geological terms. Crystalline, quartzite, limestone, hornblende, schists, slates, sandstones, quartz, granite, diorite, galena, actinoloid, antimony, ironstone, copper ore, all these and many others are to be found by the patient scientist. Want of carriage facilities prevented me from obtaining specimens, but the few I succeeded in bringing down are fairly typical of the country. I was not lucky enough to stumble across a Bobby Daggler, although I penetrated creeks and gullies wherever I found an opportunity, but I was not looking for gold. The geological features were so interesting that notwithstanding the great privations that one must undergo when travelling in W.A. notwithstanding that shoe leather and wearing apparel became exhausted and could not be replaced - red turkey twill and hobnailed boots, capped and jewelled, drovers called them, being the only purchasable gear in the little mining townships, notwithstanding that a fastidious appetite frequently turned away from coarse and unpalatable food, and water had to be drunk that apparently had more than its fair share of microbes and also that occasionally owing to the "Major Mitchelling" (the N.W. term for erratic travelling), of the dray, I frequently went twelve hours without food, I would, if occasion required and with all the painful experience of my travels behind me, go through the same journey again with equal enthusiasm and lively interest.

The privations were appalling and for that reason and because the memory of my droving trip from near Broome to the Ophthalmia Ranges is a nightmare. I did not ask you to accompany me on that trip. During the midday camp, while the cattle rested, I was able to examine the country I was passing through and if the result is a somewhat disconnected paper, I will only plead in its excuse that I was desirous of giving you the best and most attractive of my experiences without having regard to consecutiveness or detail.

The various kinds of trees which are to be met in the Pindan of the Nor' West are more or less weedy specimens of bloodwood, beefwood, with its skeleton branches and beardlike needle leaves, jamwood, yeelbah, acacia, several kinds, and a species of shrub called by drovers "poverty bush", because nothing useful will grow in its vicinity; the bush itself is never eaten by stock and it totally destroys all other herbage. The "curly bark" wattle grows in dense patches too here and there below Broome and is not pleasant bush to travel through. The courses of creeks, rivers and tributaries can always be discerned by the flooded gum and other woods on their banks. There is a species of vine which grows on the jamwood and other trees in the Nor' West, the leaves and berries of which have a strong quinine taste. The horses seemed very fond of it and I discovered that it was an excellent tonic for them and made them eat herbage that otherwise they would not feed upon. I tested its tonic properties on two of the horses that had become rather poor and it proved an excellent "pick me up". My own horses were quite fat and strong after carrying me over three thousand miles, owing to my having procured them daily some of this vine. I have found it as far south as the Murchison, but I do not think it grows further south. I tasted the vine and found both leaves and berries tasted like strong quinine.

The only birds I saw upon the 90 Mile were a few hawks and one grey owl amongst the spinifex.

The curious shapes of the stunted gidya, sandalwood shrubs, snake wood and twisted gnarled gum trees add to the desolation of the scene. I climbed every available hill hoping for diversity, in the landscape, but it was plain or hill, hill or plain, and with exactly the same general characteristics in either.

The principal W.A. shrubs and grasses which I observed on my route all of them good fodder were Mitchell, oat, Australian millet, kangaroo, Landsborough, silver grass and mulga grass, blue bush and salt bush, a species of spinach localled "fat hen"

In country where these salt bush plants abound, diseases amongst horses and cattle are comparatively unknown. The Fortescue flats are covered with bluebush.

There is a kind of wild flax growing on parts of the Shaw country; It is very tough with fibrous roots.

The obnoxious grasses include the triodia irritans (although there are four varieties of spinifex that the cattle and horses will eat), corkscrew, and spear grass.

The Ashburton Pea, the Desert Pea, a purple flowered vetch and numerous other edible shrubs. The Ashburton Pea is one of the most fattening plants in Australia and cattle devour it.

The favourite plant with the horses is the purple vetch. When travelling through the Ashburton country I traversed miles and miles of this beautiful flowering plant and in the Gascoyne valleys we were three days amongst the purple vetch which threw up a fragrant perfume under our horses' feet.

A kind of red spinifex grew in the tableland which is good fodder for horses and cattle.