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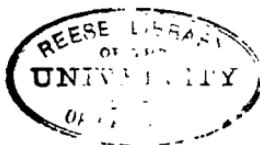
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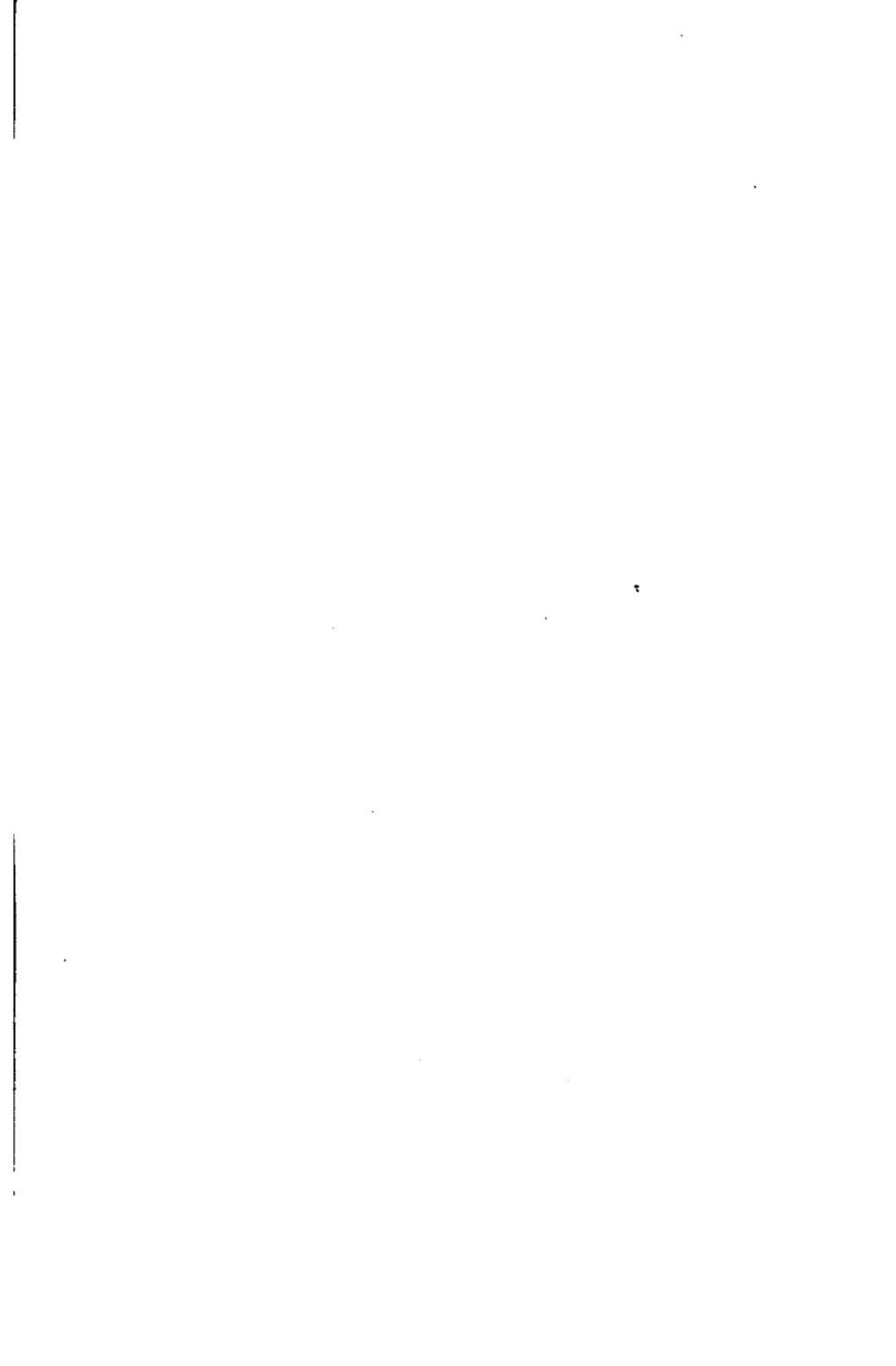
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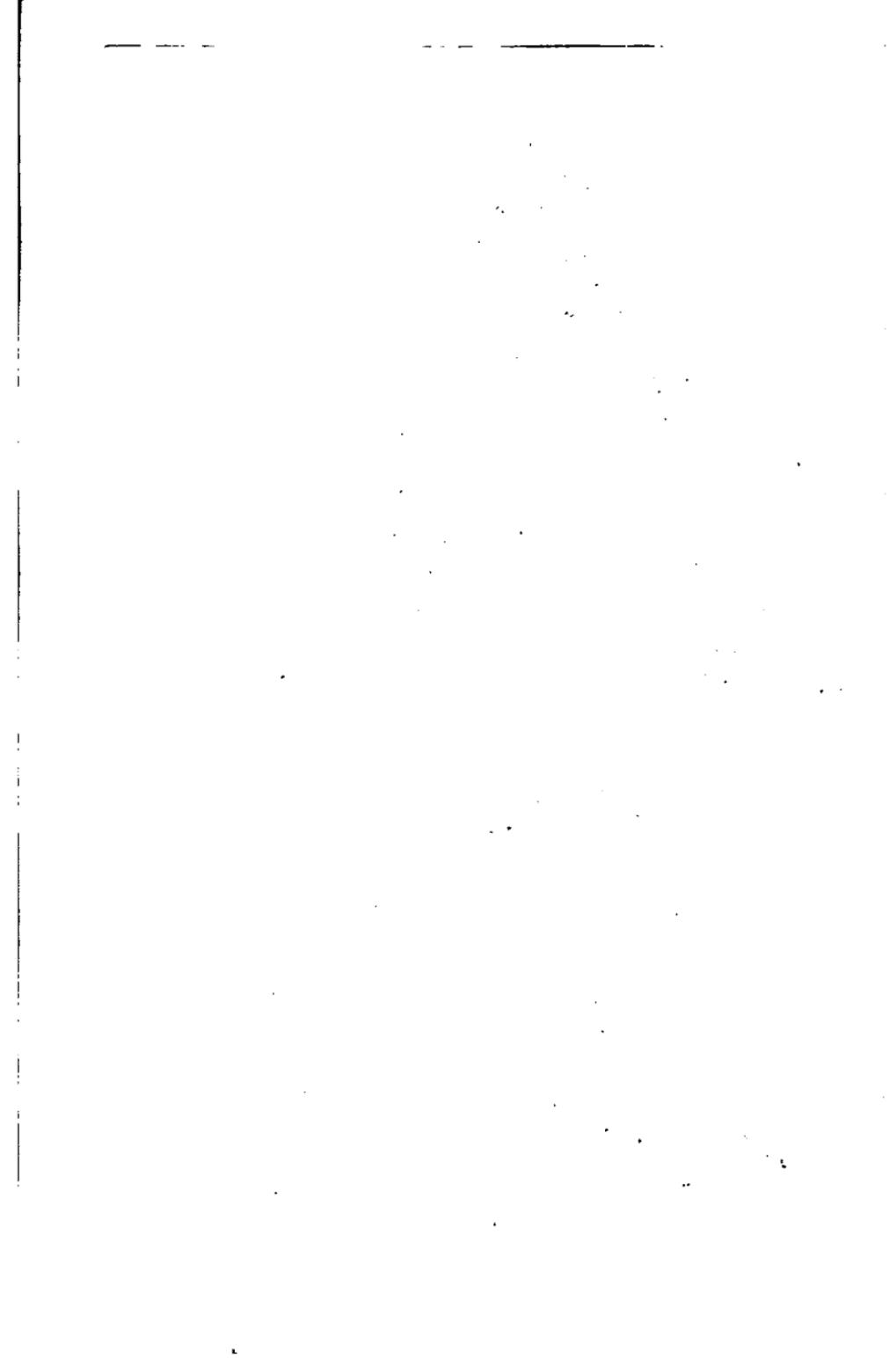


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STANFORD'S
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AUSTRALASIA

VOL. I.

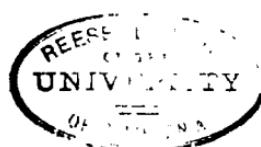
AUSTRALIA AND NEW ZEALAND

BY ALFRED R. WALLACE, LL.D. DUBL., D.C.L. OXON.

AUTHOR OF

'THE MALAY ARCHIPELAGO,' 'GEOGRAPHICAL DISTRIBUTION OF ANIMALS,' ETC.

MAPS AND ILLUSTRATIONS



LONDON: EDWARD STANFORD
26 & 27 COCKSPUR STREET, CHARING CROSS, S.W.

1893



NEW ZEALAND CHIEF

Frontispiece.

EFFECTS OF VARIOUS WIND REGIMES

on SCS

A. S. TIRAWATSIK

and

C. H. LEE AND N. M. ZHANG

and

W. Y. YEH, Department of Ocean Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139

and

J. R. KELLY, Department of Civil Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139

and

R. J. STANLEY, Department of Civil Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139

and

J. R. KELLY, Department of Civil Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139

and

R. J. STANLEY, Department of Civil Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139

and

J. R. KELLY, Department of Civil Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139

and

R. J. STANLEY, Department of Civil Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139

and

J. R. KELLY, Department of Civil Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139

and

R. J. STANLEY, Department of Civil Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139

and

J. R. KELLY, Department of Civil Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139

productions of such, as well as to their more important industries.

The Districts, Counties, and chief Towns are briefly described; while the numerous Maps and Illustrations, and the full Index, will, it is hoped, add greatly to the value of the work as a book of reference.

All the information is brought up to latest date obtainable.

Thanks are due to Mr. John Murray for his courtesy in permitting the use of several blocks from Dr. Lumholtz' interesting volume "Among Cannibals"; and to Messrs. Cassell, Blackie and Son, and the Religious Tract Society, for illustrations borrowed from various of their publications.

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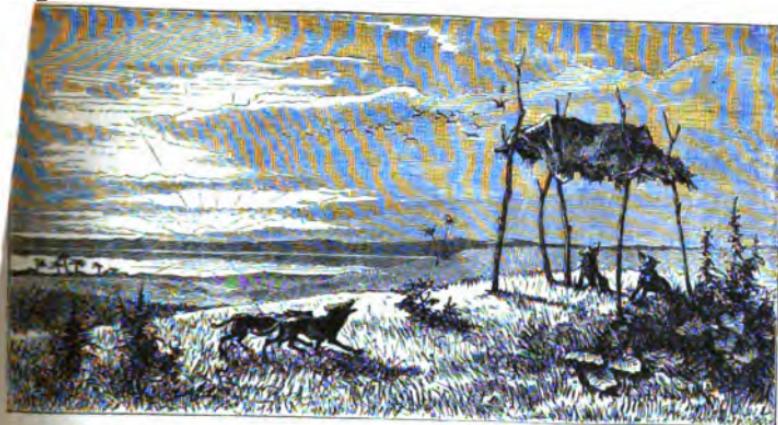
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A BURIAL IN THE AUSTRALIAN STEPPES.

AUSTRALASIA

CHAPTER I

INTRODUCTION

1. Definition and Nomenclature.

THE present volumes will be devoted to a description of the great insular land—Australia, and of all the archipelagoes and island-groups which extend almost uninterruptedly from the south-eastern extremity of Asia to more than half-way across the Pacific Ocean. It thus includes all the islands of the Malay Archipelago, the greater portion of which are usually joined to Asia, as well as the various groups of islands in the Pacific which have received special names—as Micronesia, Polynesia, etc. The term Australasia has been used in very different senses. In Hellwald's *Die Erde und ihre Völker*, on which

the first edition of the present work was founded, it included the whole area as above defined, except the Malay Islands west of New Guinea, which were united with Asia. In the ninth edition of the *Encyclopædia Britannica* (now published) it is held to comprise only Australia and New Zealand, with the large islands as far as New Guinea and the New Hebrides. Oceania is the word often used by continental geographers to describe the great world of islands we are now entering upon; but, as defining one of the six great divisions of the globe, Australasia harmonises better with the names of the other divisions, and at the same time serves to recall its essential characteristics—firstly, that it is geographically a southern extension of Asia; and, secondly, that the great island-continent of Australia forms its central and most important feature.

2. Extent and Distribution of Lands and Islands.

That portion of the equator stretching from the southern extremity of the Indo-Chinese peninsula at Singapore to the opposite shores of America near Guayaquil, occupies almost exactly 180° of longitude, or half the circumference of the globe; and throughout almost the whole of this vast distance it traverses the blue waters of the Pacific Ocean. This boundless watery domain, which extends northwards to Behring Straits and southward to the Antarctic barrier of ice, is studded with many island groups, which are, however, very irregularly distributed over its surface. The more northerly section, lying between Japan and California and between the Aleutian and Hawaiian Archipelagoes, is relieved by nothing but a few solitary reefs and rocks at enormously distant intervals. Between the tropics, islets, reefs, and

groups of coral formation abound; and towards the southern limits of this belt larger islands appear, which increase in size as we go westward, till we reach New Guinea and the other large islands of the Malay Archipelago. To the eastward, the Pacific is almost entirely destitute of islands, till a few occur near the American coast; so that an unbroken belt of ocean, nearly two thousand miles wide, forms a mighty barrier between Australasia and the continents of North and South America. A little to the south of the tropic of Capricorn, islands almost wholly cease in the Central Pacific; but going westward we meet with the important New Zealand group, and farther on the island-continent of Australia with its satellite Tasmania, closely connected with New Guinea and the other Malay Islands. It thus appears that all the greater land masses of Australasia form an obvious southern and south-eastern extension of the great Asiatic continent, while beyond these the islands rapidly diminish in size and frequency, till in the far east we reach a vast expanse of unbroken ocean.

Estimated by its actual land area, this division of the globe is only a little larger than Europe; but if we take account of the surface it occupies upon the globe, and the position of its extreme points, it at once rises to the first rank, surpassing even the vast extent of the Asiatic continent. From the north-western extremity of Sumatra, in 95° east longitude, to the Marquesas in 138° west, is a distance of 127° , or more than one-third the circumference of the globe, and about 1000 miles longer than the greatest extent of Europe and Asia from Lisbon to Singapore. In a north and south direction it is less extensive; yet from the Sandwich Islands in 22° north, to the south island of New Zealand in 47° south latitude, is a meridian distance of 69° , or as much as the

width of the great northern continent from the North Cape to Ceylon. Its extreme limits are indeed much greater than above indicated, for in the West Pacific the islands extend to beyond 30° north latitude; in the east we have Easter Island and Sala-y-Gomez full 30° beyond the Marquesas; while in the south the Macquarie Islands are about 600 miles south of New Zealand.

3. Geographical and Physical Features.

Within the limits above described are some of the most interesting countries of the world. Beginning at the west, we have the Malay Archipelago, comprising the largest islands on the globe (if we exclude Australia), and unsurpassed for the luxuriance of its vegetation as well as for the variety and beauty of its forms of animal life. Farther to the east we have the countless islands of the Pacific, remarkable for their numbers and their beauty, and interesting from their association with the names of many of our greatest navigators. To the south we have Australia, a land as unique in its physical features as it is in its strange forms of vegetable and animal life. Still farther in the Southern Ocean lies New Zealand, almost the antipodes of Britain, but possessing a milder climate and a more varied surface.

Being thus almost wholly comprised between the northern tropic and the 40th degree of south latitude, this division of the globe possesses as tropical a character as Africa, while, owing to its being so completely oceanic, and extending over so vast an area, it presents diversities of physical features and of organic life hardly to be found in any of the other divisions of the globe, except, perhaps, Asia. The most striking contrasts of geological structure are exhibited by the coral islands of the Pacific, the active

volcanoes of the Malay Islands, and the extremely ancient rocks of New Zealand and Tasmania. The most opposite aspects of vegetation are presented by the luxuriant forests of Borneo or New Guinea and the waterless plains of Central Australia. In the Sunda Islands we have an abundance of all the higher and larger forms of mammalia; while farther to the east, in Australia and the Pacific Islands, the absence of all the higher mammals is so marked as to distinguish these countries from every other part of the world. Where the land surface is so completely broken up into islands we cannot expect to find any of the more prominent geographical features which characterise large continents. There are no great lakes, rivers, or mountain ranges. The only land-area capable of supporting a great river is exceptionally arid, yet the Murray of Eastern Australia will rank with the largest European rivers, its basin having an area about equal to that of the Dnieper. Mountains are numerous, and are much higher in the islands than in Australia itself. In such remote localities as Sumatra, Borneo, the Sandwich Islands, and New Zealand, there are mountains which just fall short of 14,000 feet. In New Guinea they probably exceed this altitude, if, as reported, the central range situated close to the equator is snow-covered; while in Australia the most elevated point is little more than half as high.

4. Ocean Depths.

The land and water of the earth's surface are so unequally distributed that it is possible to divide the globe into two equal parts, in one of which (the land hemisphere) land and water shall be almost exactly equal, while in the other (the water hemisphere) there shall be almost eight times as much water as land. The centre

of the former is in St. George's Channel, about midway between Pembroke and Wexford; and the centre of the latter will be about 600 miles S.S.E. of New Zealand. Australasia is therefore situated wholly within the water hemisphere, and many of its islands are surrounded by an ocean which is not only the most extensive but the deepest on the globe.

The Pacific Ocean is deepest north of the equator, where soundings of from 15,000 to 18,000 feet have been obtained over an extensive area; and it is a remarkable fact that the depth increases as we approach the Asiatic continent. Near the Marianne and Caroline Islands a depth of nearly 27,000 feet has been found; close to Japan there is a considerable belt more than 24,000 feet deep; and just south of the Kurile Islands, the enormous depth of 27,930 feet has been measured. In the South Pacific the depths, as far as yet ascertained, vary between 10,000 and 17,000 feet; but here, too, the deepest soundings are near the larger land masses,—close to the New Hebrides 16,900 feet, between Sydney and New Zealand 15,600 feet, and a little south-east of New Guinea 14,700 feet. A comparatively shallow sea extends round the coasts of Australia, which gradually deepens, till at a distance of from 300 to 500 miles on the east, south, and west, the oceanic depth of 15,000 feet is attained. The sea connecting Australia with New Guinea and the Moluccas is rather shallow, with intervening basins of immense depth. In the Banda sea there is a basin at least 12,000 feet deep; while in the Celebes and Sooloo seas are similar basins of over 15,000 feet; and in the China sea, west of Luzon, one of 12,600 feet. Farther westward the sea shallows abruptly, so that Borneo, Java, and Sumatra are connected with each other and with the Malay and Siamese peninsulas

by a submarine bank rarely exceeding 200 or 300 feet deep.

5. Races of Mankind.

Australasia surpasses most of the great continental divisions of the globe in the variety of human races which inhabit it, and in the interesting problems which they present to the anthropologist. We may reckon at least three, or, as some think, five or even six distinct types of mankind in this area. First, we have the true Malays, who inhabit all the western portion of the Malay Archipelago from Sumatra to the Moluccas; next we have the Papuans, whose headquarters are New Guinea, but who range to Timor and Flores on the west, and to the Fiji Islands on the east. The Australians form a third race, universally admitted to be distinct from the other two. Then come the Polynesians, inhabiting all the Central Pacific from the Sandwich Islands to New Zealand. These are usually classed with the Malays on account of some similarity of language and colour, and are therefore erroneously called Malayo-Polynesians. But they present many and important differences, both physical and mental, from all Malays, and the best authorities now believe them to be an altogether distinct race. The now extinct Tasmanians are also of disputed origin, some writers classing them with the Papuans of New Guinea, while others refer them to the same race as the indigenes of Australia. Besides these, we have the dwarfish race called Negritos, who inhabit some parts of the Philippines, and are allied to the Semangs of the Malay peninsula, and perhaps to the Andaman Islanders.

The Australian natives are usually, but perhaps erroneously, classed as the very lowest in the human family.

The Papuans inhabit that division of Australasia collectively known as Melanesia; and the distinction that has been drawn between the Papuans proper and a special Melanesian type seems needless and fanciful. On the other hand, the Papuan must not be identified with the Australian, the results of extensive philological researches being entirely opposed to such a conclusion. The Australian idioms are characterised exclusively by suffix formations, whereas the Papuan tongues show a preference rather for prefixes,—a fundamental difference altogether excluding any relationship between the two linguistic systems.

The black, woolly-haired, Papuan type is found not only in the Melanesian group, but traces of apparently the same dark race may be detected throughout the whole of Polynesia and Micronesia. Everywhere in Polynesia we meet with individuals, who, in their dark and even black complexions and curly or woolly hair, closely resemble the Papuans.

The light type is, on the other hand, represented by the Malays and Polynesians, who in some places, such as Samoa and the Marquesas, are in no respects inferior to the average European, either in their complexion, physical beauty, or nobility of expression. Nevertheless, these higher tribes are all disappearing under the fatal contact of our much-vaunted civilisation; and nowhere is the steady process of extinction developing with such terrible speed as amongst the South Sea Islanders.

Australasia also affords us an unusual number of interesting examples of immigration and colonisation by higher races. The Malay Archipelago was the scene of the earliest European settlements in eastern Asia, the Portuguese and Spaniards taking the lead, to be quickly followed by the Dutch and English. Each of these governments has colonies in some of the Malay Islands,

while the French have more recently established themselves in New Caledonia and Tahiti, and the Germans in the Samoan Islands and New Guinea. Australia and New Zealand are examples of highly successful colonisation, and their recent material progress has been as striking as the contemporaneous development of the Western United States. Here, too, we have examples of the overflow of the vast population of China. In all the cities, towns, and villages of the archipelago, from Malacca on the west to the Aru Islands on the east, the Chinese form an important portion, and often indeed the bulk of the population; and since the gold discoveries in Australia they have extended their emigration into many parts of that extensive country. In Java, and less distinctly in Sumatra and Borneo, there are numerous remains showing an ancient Brahminical occupation, previous to the later Mahometan conquest of the country. And, lastly, throughout the whole archipelago and in Polynesia, we find traces of a recent extension of the Malays and their language at the expense of less civilised tribes.

6. Zoology and Botany.

The larger part of Australasia forms one of the great zoological regions of the earth—the Australian—characterised by possessing a number of very peculiar forms of life, as well as by the absence of many which are common in almost every other part of the globe. Its mammalia almost all belong to the marsupial type, which is only represented elsewhere by a few opossums in America. Honey-suckers, paradise-birds, lyre-birds, and cassowaries are confined to it, as well as numbers of very remarkable parrots, pigeons, and kingfishers; while such widespread and familiar types as vultures, pheasants, and wood-

peckers are altogether wanting. The snakes and lizards are numerous and peculiar; while insects and land-shells abound, and present a number of the most interesting and beautiful species. The western half of the Malay Archipelago belongs zoologically to tropical Asia, and possesses almost every form of animal life found in the Siamese and Birmese countries, but for the most part of peculiar species.

Plants are equally interesting. The Malayan flora is a special development of that which prevails from the Himalayas to the Malay Peninsula and South China. Farther east this flora intermingles with that of Australia and Polynesia. The Australian flora is highly peculiar and very rich in species; while that of New Zealand is poor but very isolated. A sketch of the general character of each of these floras will be given farther on.

7. Geological Relations and Past History.

The western half of the Malay Archipelago, as far as Java, Borneo, and perhaps the Philippines, has undoubtedly, at a comparatively recent period, formed a south-eastern extension of the Asiatic continent. This is indicated by the exceedingly shallow sea which connects these islands with the mainland, but still more clearly by the essential unity of their animal and vegetable productions. Tigers, elephants, rhinoceroses, tapirs, and wild cattle, are found in Sumatra, and many of them even in Java and Borneo; and the mass of the vertebrata of these islands are either identical with those of the continent, or closely related to them. But as we go farther east to the Moluccas, New Guinea, and Australia, we have to pass over very deep seas, and there find ourselves among a set of animals for the most part totally unlike those of

the Asiatic continent, or any other part of the globe. Yet these have certain resemblances to the fauna of Europe during the Secondary period of geology, and it is very generally believed that the countries they now inhabit have been almost completely isolated since the time of the Oolitic formation.

New Guinea, the Moluccas, and the island chain as far as Lombok, or some pre-existing lands from which these have been formed, were in all probability still attached to the Australian mainland for some time subsequent to its severance from Asia. Cape York, at the northern extremity of the Carpentarian peninsula, is continued by a chain of high rocky islets all the way to New Guinea, while the depth of Torres Strait itself, flowing between New Guinea and Australia, nowhere exceeds nine fathoms. On the other hand, the Louisiade Archipelago, north-east of Australia, is nothing more than a submerged portion of the south-eastern extremity of New Guinea. Tasmania must similarly be regarded as the true southern point of Australia, as the intervening Bass's Strait is shallow, and this island was within a comparatively recent geological epoch undoubtedly connected with the mainland.

Hence we may conclude that Australia was formerly far more extensive than at present. It has clearly been encroached upon along its eastern seaboard, for here stretches the dreaded Great Barrier Reef, whose coral walls sink to considerable depths below the surface, and which still shadows forth the former limits of the coastline in this direction. On this same eastern seaboard, though much more removed from the mainland, we meet some larger islands which may once have formed part of the Australian continent (though perhaps before the Tertiary epoch). Conspicuous amongst them is the non-

volcanic island of New Caledonia, which is at present slowly subsiding.

Australia must, in fact, be regarded as an ancient continent of the Secondary or early Tertiary period now gradually diminishing, and this phenomenon of subsidence is also displayed in New Caledonia and in some other islands of the South Pacific Ocean. The "atolls" or true coral islands, so abundant in the Pacific, were formerly thought to prove subsidence wherever they occur; but it is now recognised that this generalisation is not a true one, and that they may be, and perhaps are most frequently, formed on surfaces which have risen from the ocean floor, partly by ejections from submarine volcanoes, partly by the continuous deposit of organic debris from the teeming waters of the tropical ocean.

8. Geographical Divisions.

For the purposes of this work we shall consider Australasia as consisting of six parts, each of which has a distinctive name and is usually treated as forming a geographical unit, although some of them are really heterogeneous, and should be differently subdivided to accord with their zoological relations and geological history. These divisions are as follows:—(1) Australia, including Tasmania; (2) the New Zealand group; (3) Malaysia, including the islands from Sumatra to the Moluccas, and forming the home of the true Malay race; (4) Melanesia, including the chief islands inhabited by the black woolly-haired race, from New Guinea to the Fiji Islands; (5) Polynesia, including all the larger islands of the Central Pacific from the Sandwich Islands southward; and (6) Micronesia, comprising the numerous small islands

of the northern Pacific, from the Ladrones to the Marshall Islands.

The two first divisions, comprising the most important English colonies in the Southern Hemisphere, will be treated in the present volume; a separate volume, forming a distinct work, being devoted to the four insular divisions above enumerated.

AUSTRALIA

CHAPTER II

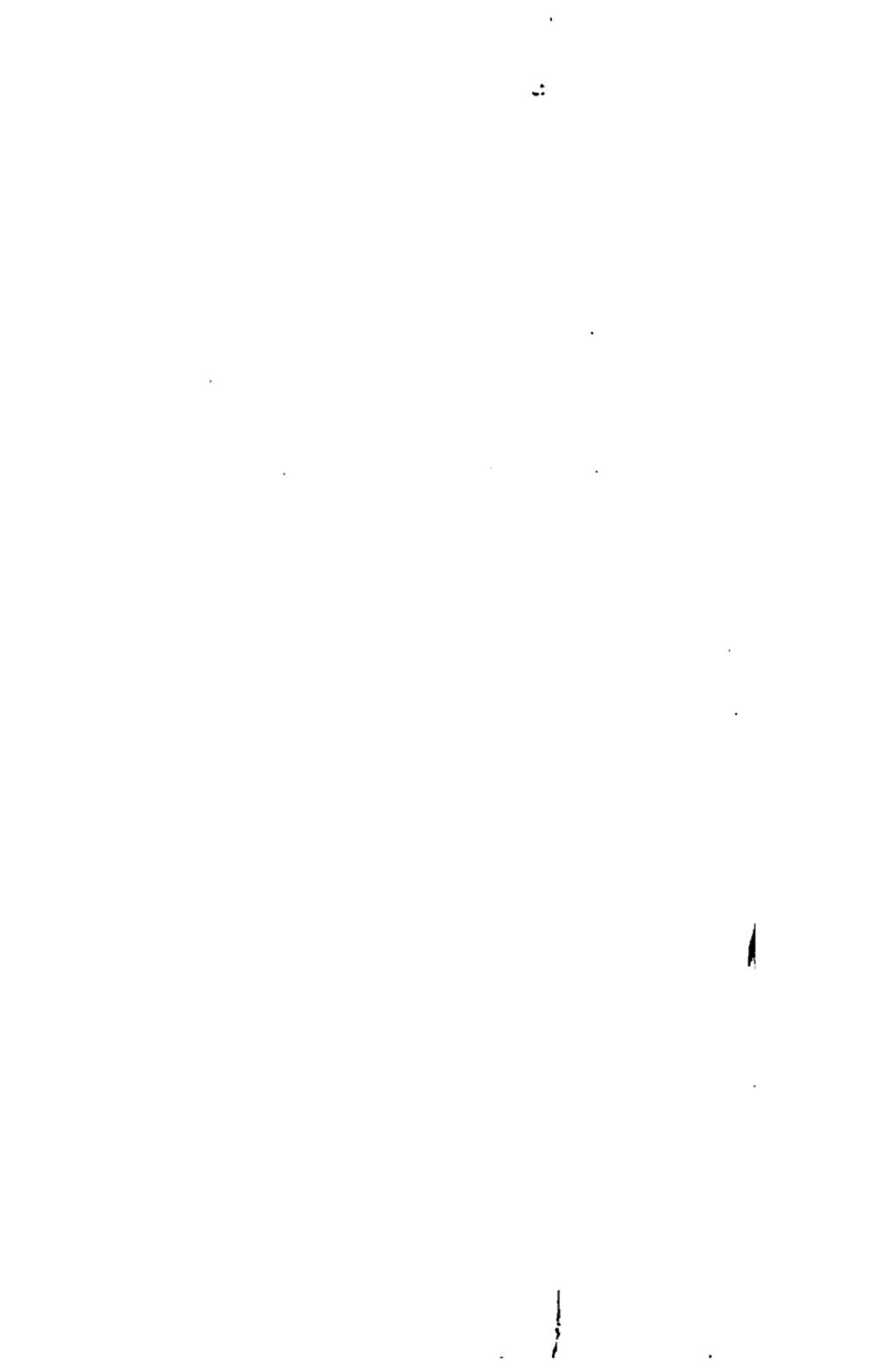
THE PHYSICAL GEOGRAPHY AND CLIMATE OF AUSTRALIA

1. Dimensions, Form, and Outline.

UNTIL recently the Australian continent, especially in its western half, was one of the least known regions of the globe. But for some years past the exploration of the country has made such rapid strides, that we are already in a position to form a clear idea of its general character, while, even regarding its more special features very little now remains to be done.

With a total area of 2,944,600 square miles—that is, rather less than Europe—the Australian continent forms a somewhat unshapely mass of land, with little-varied outlines, and a monotonous seaboard, washed on the west by the Indian, and on the east by the Pacific Ocean. In the north it is separated from New Guinea by Torres Strait, 90 miles in breadth; and in the south, from Tasmania by the much-frequented yet dangerous Bass's Strait. Parallel with, and about 50 miles average distance from the east coast, stretches the Great Barrier Reef, which, throughout its entire length of 1200 miles, presents only





a single safe opening for ships, and which reaches northwards almost to the extremity of York Peninsula. This peninsula, which is the most distinctive geographical feature in the outline of the Australian continent, forms, with the more westerly but far less boldly developed peninsula of Arnhem Land, the great northern bight known as the Gulf of Carpentaria. Corresponding with this inlet is the Great Australian Bight on the south coast, but neither of them materially affects the general character of this continent as a compact and but slightly varied mass of land. The west coast is, on the whole, richer in bights and inlets, and also possesses several good harbours. In the south, besides the already-mentioned Great Bight, nothing occurs to vary the monotony of the coast line except Spencer and Vincent Gulfs, with the neighbouring Kangaroo Island, and the narrow Yorke Peninsula, not to be confounded with that of like name in the north.

2. General Contour of the Country.

The conformation of the land is no less simple than the outlines of the coast. It rises generally, though very irregularly, from south to north, and from west to east. Mountains of considerable size are found in the east alone, where they stretch in several ranges parallel with the coast from Bass's Strait northwards to the low-lying York Peninsula. But even in Western Australia we meet with elevated uplands sinking abruptly in some directions. On the other hand, the assumption that Australia forms a vast table-land, with elevated borders, and sloping towards the interior, where its lowest level is that of Lake Eyre (70 feet above the sea), must be taken with considerable qualifications. It is, however, so far

true in a general way, that lowlands form the prevailing feature of the inland country in the eastern half of the continent, while plateaux of moderate elevation extend over a large portion of the western half.

The Australian highlands themselves form no connected whole, being everywhere intersected by depressions of all sorts, to such an extent, that a subsidence of 2000 feet would probably convert the whole continent into a group of numerous islands, varying in size and elevation. These highlands generally present the appearance of hilly upland plains, and are mostly covered with park-like and grassy forests, but without the under-growth, here called "scrub," which is elsewhere peculiar to Australia. Here the river valleys are generally fertile, and more especially adapted for agriculture. The cultivable land, however, is everywhere distributed somewhat disconnectedly, and in the form of isolated oases, over the country.

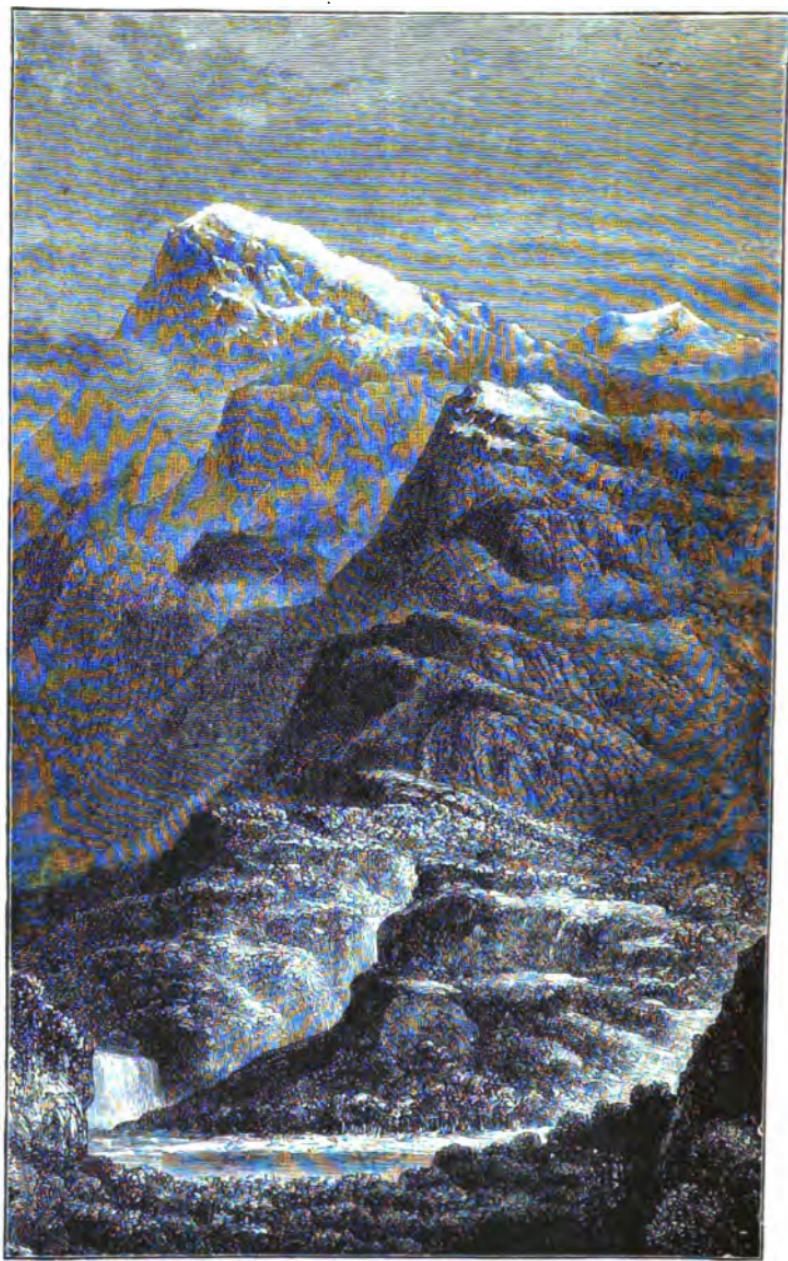
The gorges through which the streams mostly make their way from the hills are usually deep and difficult of access, but are nevertheless distinguished, especially in the south, by a rich and almost tropical vegetation. Above the upland plains there often rise rocky mountains, in most cases forming connected chains, in many places presenting steep and rugged escarpments, elsewhere sloping gently and gradually down to the plains. Nor are terrace-like formations altogether wanting, though these are of limited extent and imperfectly developed.

A further peculiarity of the Australian highlands is their distribution mainly along the coast, round about the interior, where no extensive mountain ranges have hitherto been discovered. Of distinct coast ranges six or seven have already been determined, the most important of which are those of Victoria and New South Wales, in the south-east portion of the continent.

3. Mountains and Table-lands.

The Victoria highlands form a hilly, upland, and mostly fertile plain, above which rise two distinct ranges, running north and south, the Grampians and the Pyrenees, the latter merging into the Great Dividing Range; while the southern slopes are distinguished by a series of low volcanic hills, with craters only recently extinct. Farther east these highlands merge into the chain of the Australian Alps, or Warragong Mountains, culminating in Mount Kosciusko (7308 feet), just within the borders of New South Wales, and the highest elevation of the continent. Separated from them by upland valleys are the wooded but infertile Blue Mountains, and the Liverpool Range running exceptionally east and west, and along whose northern slopes stretch the rich though somewhat arid Liverpool Plains. East and west of them extend other more elevated plains, reaching far north, and forming the fine pasture-lands of New England, which stretch almost to the northern limits of the highlands. These consist of the Dividing Range, skirting the valley of the coast river Brisbane on the west, and sinking northwards down to the valley of the Burnett. On the western slopes of the Dividing Range lie the rich and pleasant grassy plains of the Canning and Darling Downs, watered by the river Condamine, flowing inland.

North of the two last-named rivers begin the Queensland highlands, stretching in a comparatively narrow chain in a north-westerly direction as far as 17° S. latitude, and divided into two formations by a depression in the valley of the Lower Burdekin. There are, however, numerous subordinate ranges extending several hundred miles inland. The greatest elevations are found at the northern extremity of this range, where it attains near



MOUNT KOSCIUSKO.

the coast a height of 5400 feet, while between these and the head of the Gulf of Carpentaria is an elevated hilly tract about 2500 feet above the sea. The inland slopes of these mountains are generally very fertile, and, towards the north, are often distinguished for their exuberant vegetation.

Passing west of the Gulf of Carpentaria, we find an extensive tract of high table-land, which appears to attain its greatest elevation where the Alligator River flows between precipitous walls, said by Leichhardt to be of the enormous height of 1800 feet.¹ This plateau becomes

¹ It is doubtful whether these figures are correct, as they are only founded on an estimate of Leichhardt. Unfortunately, still more erroneous ideas have become current as to this part of Australia, owing to the map illustrating Leichhardt's *Journal* giving 3800 feet as the height of these precipices, and these extravagant figures have been repeated in many maps and referred to by many writers down to the present day. There can be little doubt, however, that it is an engraver's or copyist's mistake, and ought to be 1800 feet, and even that is a mere guess and liable to be much exaggerated. This was pointed out by Mr. Wilson, the geologist of the North Australian Expedition of 1855-56, first in the *Proceedings of the Royal Geographical Society*, vol. i. p. 230, and again in the *Journal* of the same society, vol. xxviii. p. 187 (1858); but no one seems to have taken any notice of his views—another instance of how difficult it is to get an error corrected which has once been promulgated in print on apparently good authority. Twenty years have now passed, and it is time that the mistake should be again pointed out. Messrs. Gregory and Wilson passed across the country about 80 miles south of the point referred to, and they nowhere found it more than about 1600 feet above the sea, and none of the rocky valleys they encountered were more than 600 feet deep. Precipices of 3800 feet exist nowhere but in the vicinity of great mountain ranges, and certainly imply a maximum height above the sea of double that of the precipice, or 7600 feet. In the Blue Mountains, where the plateau reaches from 3000 to 4000 feet above the sea, the celebrated precipices and ravines of Govett's Leap are about 1000 or 1500 feet, and nothing surpassing them is known in Australia. In 1862 M'Douall Stuart passed across the same table-land nearly parallel to Leichhardt's track, and only 40 miles distant from it. His journal shows that the country was here no higher than Mr. Wilson found it a little farther south, and the highest cliffs he mentions are from 250 to 300 feet. If we turn to Leich-

lower towards the head waters of the Roper and Victoria Rivers, and then gradually emerges southward into the great central plateau; but much of it appears to be of exceeding fertility, and full of varied and picturesque scenery.

Amongst the least known regions are the highlands of the north-west, which are intersected by the Victoria River flowing into the Queen's Channel, and separated southwards, by a low ridge, from the desert lowlands of the interior. Northwards, the land descends in broad terraces, interrupted by mountain chains, and forming fruitful plains watered by the forks of the Victoria, while desolate lowlands again stretch away eastwards.

The west Australian highlands are divided into two sections, which, though connected together, are of very

hardt's own *Journal*, expecting to find some full description of what would be one of the greatest geographical marvels in all Australia, we discover nothing whatever about it. On the map we find the "steep walls 3800 feet high" indicated as occurring between his stations of 10th November and 11th November. But on these dates we find no mention of anything extraordinary; but on 17th November a great valley is reached, the descent into which is very difficult and required a considerable circuit, owing to the steep rocky walls estimated at 1800 feet high. The map, we find, was drawn from Leichhardt's materials by Mr. T. A. Perry, the Deputy Surveyor-General of New South Wales, and was engraved in London by Arrowsmith, and there is no statement that Leichhardt supervised or corrected either the draft map or the engraving, which, indeed, he could have had no opportunity of doing, as he had started on his last ill-fated expedition when his *Journal* was published in London. It is now, we think, fully time that this mythical "3800 feet" should be entirely expunged from our maps and geographical works, and that even the sufficiently marvellous "1800 feet" be inserted as merely an estimate and not a measurement. It is necessary to call attention prominently to this error, because, even in a work of such high authority as the new edition of the *Encyclopaedia Britannica*, in the article "Australia," we find the old statement repeated as an established geographical fact, as follows:—"On the north side of the continent, except around the Gulf of Carpentaria, the edge of the sandstone table-land has a great elevation; it is cut by the Alligator River into gorges 3800 feet deep."

different formation. The northern division consists of wide and mostly fertile plains, crossed by isolated chains running east and west, and intersected by the valleys of the De Grey, Fortesque, Ashburton, Gascoyne, and Upper Murchison rivers, all flowing westwards to the Indian Ocean. The southern section, beginning with the Middle Murchison, presents a very different aspect, of a character highly unfavourable to colonisation and agriculture. With the exception of a few small oases with water, grass, and timber, the broad plains are here extremely unproductive, being almost entirely destitute of fresh water, and overgrown with thickets and low brushwood. There are but few mountain ranges, the elevations consisting more frequently of low disconnected hills. A prominent feature of the land are the large salt basins, containing either brackish water or else nothing but mud largely impregnated with alkalies. Many of these basins doubtless form connected river systems, though certainly of the most imperfect and defective character, such as those of the Upper Swan River, and of the Blackwood in the south; but in most cases their claim to be regarded as such has not yet been established. The western limits of these highlands towards the coast form a series of ridges, of which the most conspicuous is the Darling Range; while to the east they merge into the Great Victoria Desert, extending for 500 miles to the South Australian boundary.

Lastly, the South Australian highlands, which are the least in extent, stretch from the south coast northwards along the eastern shores of the St. Vincent and Spencer Gulfs; and are limited eastwards by the lowlands of the Murray and Darling valleys, and on the north by the lacustrine region centering in Lake Torrens. Here the most important chain is the Flinders Range.

4. The Interior.

The interior of Central and Western Australia consists of moderately elevated plains, which penetrate even to the coast at certain isolated points where the outer ranges are separated from each other. These plateaux are almost uniformly of an extremely unfavourable character, forming some of the most forbidding and desolate regions on the face of the globe. The flat and, rarely, hilly plains, though often interrupted by detached rocky mountains, have mainly a sandy, clayey soil of a red colour, more or less charged with salt. They are covered chiefly with thickets and "scrub" of social plants, generally with hard or prickly leaves. This "scrub," which is quite a feature of the Australian interior, is chiefly formed of a bushy Eucalyptus which grows something like our osiers to a height of 8 or 10 feet, and often so densely covers the ground as to be quite impenetrable. This is the "Mallee scrub" of the explorers; while the still more dreaded "Mulga scrub" consists of species of prickly Acacia which tear the clothes and wound the flesh of the traveller.

There is here, moreover, an extraordinary deficiency of water, and an almost total absence of springs; nothing in fact but the rare heavy downpours converting the land for the time being into an impassable swamp, which the long-continued ensuing drought again reduces to a stony consistency. Still there are sections of these lowlands presenting special individual features, besides which there exists in the very heart of the continent a connected series of upland plains and ranges, which may be grouped together as forming collectively a Central Australian highland region.

In the country immediately north of Spencer's Gulf is an extensive area which may be called the lake district of Australia, and which is nearly 1000 miles in length from south-east to north-west. First we have Lake Torrens, more than 100 miles long, but not very wide. Lake Eyre farther north is much larger. To the west is the extensive Lake Gairdner, and to the east of Lake Eyre are Lakes Blanche, Gregory, and several others. All these lakes are salt, and are subject to great fluctuations in size, grassy plains being found in some years where extensive sheets of water at other times cover the country. Around them, and more especially to the west and north, extends for the most part the dreariest country imaginable, consisting of sandy ridges, either bare or covered with scrub, and almost entirely without permanent supplies of water, although in some places small permanent springs have been discovered. Far to the north-west of Lake Eyre is the equally extensive Lake Amadeus, bordered by salt-crusted flats of treacherous mud which have proved disastrous to many of the explorers. To the north and north-west of Lake Eyre for 10° of latitude, the country is almost wholly destitute of permanent water, and this region is also marked by the presence of the "spinifex" or porcupine grass (*Triodia irritans*). This is a hard, coarse, and excessively spiny grass, growing in clumps or tussocks, and often covering the arid plains for hundreds of miles together. It is the greatest annoyance of the explorer, as it not only renders travelling exceedingly slow and painful, but wounds the feet of the horses so that they are often lamed or even killed by it. The tussocks are sometimes 3 or 4 feet high; they are utterly uneatable by any animal, and where they occur water is hardly ever to be found.

If we draw a line from the western entrance of Spencer's Gulf on the south, to the mouth of the Victoria River in the north, we shall have on the west side of this line an almost unbroken expanse of uninhabitable country reaching to the settlements of West Australia. This vast area, extending from the north-west coast to the shores of the great Australian Bight, is, roughly speaking, about 800 miles square. It has been crossed by several explorers with the greatest difficulty; and although a few oases have been found at long intervals, its general character is that of a waterless plain interspersed with low and sometimes rocky hills, at times absolutely barren, but usually covered with dense scrub or with the spiny Triodia.

A little to the east of the same line, and nearly in the centre of the continent, is a group of highlands, the Macdonnell Ranges and Mount Stewart, among which are grassy plains, fertile valleys, and more or less numerous watercourses. These are continued towards the north by the Murchison and Ashburton hills, till they merge into the northern plateau of the Victoria and Roper rivers. Farther east is an unknown country, most of which is probably arid and uninhabitable where it is not absolutely desert, and this stretches away till we reach the more fertile plains of Western Queensland.

It is thus evident that Australia abounds in basins of inland water, which, however, are mostly saline and are seldom flooded all the year round. They also differ from other lakes, in so far as they depend for their supplies mainly on the rainy monsoons, possessing no regular influents or even surface springs, and lying mostly in the centre of waterless, stony deserts. For Australia, in this respect more African than Africa itself, is essentially the land of wastes and steppes. As its most elevated

regions lie to the windward of the continent, the trade-winds in surmounting these lofty ranges already lose a large portion of their moisture before reaching the interior. Hence the unwooded plains begin close to the western slopes of the eastern coast ranges. At first well-watered grazing grounds, such as the Darling Downs, they gradually become drier and drier as we proceed westwards. The air is further heated in the heart of the continent by contact with the burning soil, preventing the condensation of the humidity that still remains in the easterly winds. Of constant recurrence in the journals of the wearied travellers crossing the interior of the continent is the remark, that the clouds gather, the heavens become overcast, threatening a downpour every moment, but always with the same disappointing result. The clouds disperse before the vapours are sufficiently condensed to produce rain. The heated ground raises the temperature of the superincumbent air to such a degree that the already perceptible moisture is again dissolved into vapour. The fatal consequence is, that Australia possesses nothing but coast streams or intermittent watercourses in the interior, and although it appears on the maps as a gigantic island, the heart of the country is characterised by extensive deserts as arid as those of the great continents.

5. Rivers.

Foremost among the river-valleys is the region of the Murray and Darling in the south-east of the continent, forming jointly a water system worthy to be compared with those of the Old and New Worlds. Like the Amazon, it sends out forks and ramifications crossing many degrees of latitude and longitude, and it gathers its waters from the most opposite quarters. All the

inland rivers of East and South Australia between the 26th and 36th parallels drain into one or other of the two main streams, whose joint course stretches across 13° of longitude, forming a triangle the points of which might be represented in Europe by the cities of Turin, Königsberg, and Belgrade. The volume of water flowing through the winding beds of these rivers and creeks, though at times swollen to enormous proportions, is usually far from considerable, and occasionally for months together very limited.

The numerous rivers which combine to form the Murray may be grouped into two systems—the southern or Murray proper, draining the whole northern and western slopes of the Australian Alps and the Great Dividing Range, from the Grampians in the west of Victoria to the sources of the Lachlan and its tributaries about 100 miles west of Sydney; while the Darling and its tributaries receive all the western drainage of the mountains from this point to the sources of the Condamine River, about 80 miles west of Brisbane, and to Mount King in S. lat. $25^{\circ} 20'$, where the Maranoa River takes its rise, these extreme points being nearly 900 miles apart in a straight line, or about 1500 miles if we follow the general curve of the watershed bounding the river basin of the Murray. The two great streams, the Murray proper and the Darling, meet at Wentworth, 60 miles east of the point where the Colonies of New South Wales and Victoria meet South Australia, and the combined streams thence flow in a very winding course for 250 miles to the sea through Lake Alexandra, at a point about 50 miles south-east of the city of Adelaide. The Murray River proper has its source on the side of Mount Cobberas, about 10 miles within the colony of Victoria. For

about 60 miles it flows to the north between precipitous rocky banks, having Kosciusko, the culminating point of the Australian continent, about 10 miles to the east, and Mount Gibbo about the same distance to the west. Here it passes through the Murray gates, where rocky precipices of enormous height shut in the infant



AN AUSTRALIAN RIVER SCENE.

river. Turning westward about lat. 36° S., it reaches Albury in about 50 miles, whence it is navigable for small steamers to the sea. In all this lower course it has the usual character of Australian rivers, being sluggish, very much winding, fringed with trees, dark watered, and almost dried up during long droughts. Yet

the scenery is usually picturesque and not without a grandeur of its own.

Pleasant, undulating, and graceful curves stretching away for interminable distances, and retaining the same character for days together, are succeeded in one place by bold mountain masses, in another by boundless plains, vast as the ocean, and relieved only by the shimmering and hazy reflection of some distant tree, or by the equally deceptive image of a few stunted shrubs exaggerated out of all proportion by the mirage and other atmospheric illusions. Seen from its high banks, the river presents almost everywhere the picture of a majestic stream, the grandeur of which is often enhanced by the numerous channels, lakes, and lagoons adding animation to the surrounding riverain scenery.

The two great tributaries of the Murray proper are the Murrumbidgee and the Lachlan, each nearly equal to the main river. The Murrumbidgee rises in the same range of mountains as the Murray, about 100 miles north-east from the source of that river, and only 40 miles from the sea-coast in Dampier County. It flows northward through a hilly country till it receives the tributary Yass a few miles south-west of the town of that name, after which it turns to the westward, and reaching Gundegai becomes a navigable river. Here it receives the Tumut, a fine mountain stream flowing due south from the vicinity of Mount Kosciusko. The name Murrumbidgee is said to mean "Beautiful River," and the country it flows through is usually both picturesque and fertile.

The Lachlan rises 15 miles north of Lake George and about 80 miles inland from the mouth of the Shoalhaven River, and flows through an upland pastoral country, first to the north-west, then turning west, and

afterwards south-west till it joins the Murrumbidgee after a course of about 400 miles.

The Darling, though considered as an affluent of the Murray, is really the more important stream, as it drains a somewhat larger area and is navigable for a greater distance. Its tributaries extend from the sources of the Macquarie, 50 miles south of Bathurst and about 100 miles west of Sydney, to those of the Condamine and Warrego in the Denham range of Queensland, a distance of more than 600 miles. Almost all these tributary streams unite above the town of Bourke to form the main river, which for part of the year is navigable from this place to its junction with the Murray, and even farther up the stream to the confluence of the Barwon River near Walgett, a distance altogether of more than 500 miles along the general course of the river.

Between the lower portion of the Darling and that of the Lachlan there is an enormous area of dreary waterless plains, usually covered with dense scrub, occasionally relieved by low woodlands and open glades.

The other rivers flowing into the Southern Ocean are comparatively unimportant. The Glenelg, which rises in the Sierra and Victoria ranges south of the Grampians, and whose mouth is close to the boundary between Victoria and South Australia, is the only one worth especial notice here. The area of its basin is 4500 square miles, and some of the scenery on its various tributaries is exceedingly beautiful, comprising a number of picturesque waterfalls. Most of the other rivers of Victoria are violent torrents in winter, while in dry summers they become shallow and often intermittent watercourses.

East of Bass's Straits and flowing into the Pacific Ocean we have in Victoria the Mitchell and the Snowy

rivers, both rising in the mountains of the Dividing Range. The latter is one of the most considerable of the rivers of the south coast, having a length of nearly 400 miles, and a basin of more than 5000 square miles, the larger portion of which is situated in New South Wales. The more important rivers of the east coast are the Shoalhaven, 260 miles long ; the Hawkesbury, 330 miles long, and with a basin whose area is 8700 square miles, and celebrated for its beautiful scenery ; the Hunter, nearly as large, and navigable as far as Morpeth ; the Macleay, with some fine waterfalls near its sources ; and the Clarence, the most northerly important river of New South Wales, and by far the largest. Its drainage basin has an area of 17,000 square miles, and it is navigable for 60 miles by ocean steamers.

Passing into Queensland we have first the Brisbane, a small river, but important for being navigable by large steamers as far as the town of the same name, situated 25 miles from its mouth. After passing numerous streams with short courses we come to the Fitzroy, which has numerous tributaries diverging north and south behind the coast range, and has a drainage basin of nearly 40,000 square miles. Considerably farther north, and nearly as large, is the Burdekin, the sources of whose tributaries are more than 400 miles apart in a north and south direction ; and there is no other important river as far as Cape York.

Flowing into the Gulf of Carpentaria are the Mitchell, Gilbert, Flinders, Leichhardt, Gregory, and Roper rivers. The Flinders is by far the largest, having a course of about 400 miles and numerous important tributaries. The Roper, though not very large, is navigable for nearly 100 miles by vessels of considerable tonnage. The Liverpool, South Alligator and East Alligator rivers, and,

the Adelaide River, are also navigable for 30 or 40 miles. Farther west the Daly River has been ascended by large boats for 100 miles; but the Victoria River is the most important in North Australia, having a course of more than 300 miles. It is navigable for large vessels for over 40 miles, and for boats drawing 3 feet of water for 112 miles.

In the northern part of West Australia we first meet with the Ord River, emptying itself into Cambridge Gulf, a stream of considerable size, but little known. On the north-west coast we have Prince Regent's River and the Glenelg, the latter discovered by Sir George Grey in 1838, but still unexplored. Farther south we come to the more important Fitzroy River, which has a course of more than 300 miles. It is navigable for about 100 miles by small vessels and flows through a fertile country.

Passing a considerable extent of desert coast we come to the De Grey, Fortesque, Ashburton, and Gascoyne rivers, the last two being the more extensive, each having a course of about 500 miles, and the Gascoyne having its mouth in Shark's Bay. After another stretch of desert coast we reach the Murchison River, also of considerable extent; but farther south the rivers are much smaller, being confined to the western slopes of the low mountains of the Darling Range. Farther south we have the Swan and the Murray rivers, each with a course of about 150 miles. These complete the rivers flowing into the Indian Ocean; but passing round the south-western promontory of Australia, we find the Blackwood River, having a course of near 300 miles and flowing into Flinders Bay. Thence along the southern coast the rivers become smaller and smaller, till along the whole extent of the Great Australian Bight, about

1000 miles in length, not a single stream of water enters the ocean. When we reach Spencer's Gulf we find a few small streams flowing into it from the west, but the only river of importance is the Broughton, which flows from the east into the head of the gulf. A few small rivers flow into the Gulf of St. Vincent, the Wakefield, at the head of the gulf, being the most important, while the Light, the Gawler, and the Torrens are unimportant streams.

We have now completed our enumeration of all the more important rivers and streams which reach the various oceans which surround Australia, but besides these there are many inland rivers, which either terminate in the arid desert plains, or flow into the various lakes which have already been described. Many of these rivers are among the largest in the continent next to the Murray and its great tributaries, but they all have the peculiar character that after a considerable course, often receiving many tributaries, they diminish in volume, become a mere succession of water holes, or disappear altogether in the arid sandy plains.

The most important of these inland rivers is the Barcoo or Cooper's Creek, which has two chief sources—one (the Victoria) in about 25° S. lat., in the highlands of Central Queensland; the other (the Thompson) in about 21° S. lat., near the sources of the Flinders. After these meet, in Western Queensland, the stream flows in a south-west direction, and after dividing into two branches empties itself into Lake Eyre. This river has a course of about 850 miles in length.

To the north-west of this is another inland river system, that of the Diamantino or Müller River, which with the Georgina or Herbert River and numerous tributaries disappear in the stony desert before reaching

Lake Eyre. The farthest sources of the Georgina are little more than 100 miles south of the head of the Gulf of Carpentaria.

Lake Eyre receives from the north the Macumba, formed by two streams, the Stephenson and Alberga, the latter having its sources in the Musgrave Mountains, about 300 miles to the north-west of Lake Eyre.

Near the centre of Australia is the Finke River, which rises on the tropic of Capricorn in the Macdonnell Ranges, and flowing southward receives many small tributaries, but after passing Charlotte Waters station on the Northern Telegraph line becomes lost in the desert. Farther north and east are numerous other streams, which after a short course disappear in the sands; while all these rivers are subject at intervals to sudden and violent floods, followed by long periods of drought, during which many of them altogether disappear.

The rivers of Australia are, almost without exception, subject to excessive irregularities of drought and flood. In the eastern half of the continent especially, great floods occur at long intervals, when rivers rise suddenly, overflow their banks, and carry devastation over wide areas. At other times the rains fail for years together, and rivers which are usually deep and rapid streams become totally dried up. The state of the country is then deplorable; not a blade of grass is to be seen, and cattle perish in great numbers. A tract of country may thus be described as a flooded marsh, a fertile plain, or a burnt-up desert, according to what happens to be the character of the seasons at the period when it is visited.

Still more is this the character of the interior; hence while one explorer has found a total absence of water and herbaceous vegetation, another, arriving in the same district after one of the rare rainy periods, has been

delighted with the running streams, luxuriant herbage, and the abundance of animal life.

6. Climate of Australia.

Although Australia is such an extensive country, and is divided between the tropical and temperate zones, it has nevertheless much less variety of climate than might be supposed. It may generally be described as hot and dry, and, on the whole, exceedingly healthy. In the tropical portions the rains occur in the summer, or from November to April; while in the temperate districts they are almost wholly confined to the winter months. The greatest quantity of rain falls on the east coast, being 50 inches at Sydney, diminishing considerably inland, so that at Bathurst (96 miles from the sea) it is only 23 inches, at Deniliquin (287 miles) 20 inches, and at Wentworth (476 miles) 14 inches. In the south, at Melbourne and Adelaide, the rain is about 25 and 20 inches; in Western Australia about 30 inches; in Queensland from 40 to 80 inches on the coast, but much less at a moderate distance inland. From Rockingham Bay northwards the rains are tropical. The temperature of course varies greatly with latitude and position. In the extreme south, at Melbourne, the temperature ranges from about 30° to 100° Fahr. in the shade, the mean being 58° , or the same as Lisbon. At Sydney the mean is about 5° higher. At Adelaide, though farther south, the mean temperature is somewhat greater than at Sydney; while at Perth, farther north, it is about the same. South Australia and Victoria, and in a less degree New South Wales, are subject to hot winds from the interior of a most distressing character, resembling the blast from a furnace. The thermometer then rises to 115° , and occasionally even

higher when extensive bush fires increase the heat. Sometimes the hot winds are succeeded by a cold south wind of extreme violence, the thermometer falling 60° or 70° in a few hours. In the desert interior these hot winds, nearer to their source, are still more severe. On one occasion Captain Sturt hung a thermometer on a tree shaded both from the sun and wind. It was graduated to 127° Fahr., yet the mercury rose till it burst the tube! The heat of the air must therefore have been at least 128°, probably the highest temperature recorded in any part of the world, and one which, if long continued, would certainly destroy life. The constant heat and drought for months together in the interior are often excessive. For three months Captain Sturt found the mean temperature to be over 101° Fahr. in the shade; and the drought during this period was such that every screw came out of the boxes, the horn handles of instruments and combs split up into fine laminæ, the lead dropped out of pencils, the hair of men and the wool of the sheep ceased to grow, and the finger-nails of the explorers became brittle as glass.

Notwithstanding the extreme heat and sudden changes of temperature, the climate of most parts of Australia is universally admitted to be exceptionally healthy. Epidemic diseases are almost unknown, and the death-rate for the whole white population is under 19 per thousand, that of England and Wales being 25. On the east coast, sea-breezes during the day render the heat less oppressive, while in the winter westerly winds prevail. On the west coast, the heat and dryness of summer are also tempered by sea-breezes and by occasional showers and thunderstorms; while in the four winter months north-west winds prevail, accompanied by abundant rains. Although subject to great occasional irregularities, the climate of Australia in the tem-

perate zone is on the whole equable, storms and electrical disturbances being less frequent than in England.

7. Climate of New South Wales.

Mr. H. C. Russell, the Government Astronomer for New South Wales, having recently published a volume devoted to the meteorology of this colony, we will give a summary of his interesting results in further illustration of the specialties of Australian climate.¹

Within the colony of New South Wales itself may be found a great range of climates—from the cold at Kian-dra, where the thermometer sometimes falls 8° below zero of Fahrenheit, and where 8 feet of snow has fallen in a single month, to the more than tropical heat and extreme dryness of the inland plains, where frost is never seen, and the thermometer in summer often for days together reaches from 100° to 116° Fahr., and where the average annual rainfall is only 12 to 13 inches, sometimes even none at all falling for an entire year.

The climate of this part of Australia is beneficially affected by a warm equatorial current setting south along the coast. This furnishes moisture in the summer, and mitigates the cold of winter. Rain here comes from the

¹ The self-registering tide-gauge established by Mr. Russell at Newcastle, near Sydney, has been the means of making some interesting observations on the rate of propagation of vibrations caused by earthquake shocks. In May 1877 there was an earthquake on the coast of Peru, when ships at sea felt powerful vibrations (not waves). Mr. Alfred Tylor, F.G.S., having been making experiments on the rate of transmission of such vibrations, wrote to Mr. Russell to look at the register of his tide-gauge at a date specified, and was informed that unusual vibrations of the registering pencil had occurred at the time indicated. The rate of transmission of these vibrations across the entire Pacific Ocean was about 5 miles a minute.

east or south-east with great storms of wind, and it is sometimes so violent that on several occasions 20 inches have been known to fall in twenty-four hours. On the east of the mountains the average rainfall is 40 inches, and the number of wet days 102; while in the interior, on the west of the mountains, it is about 14 inches with 70 wet days.

The summer heat on the eastern watershed is less than in the interior, but to many persons it is more trying, because it is a moist tropical heat, whereas in the interior it is dry and bracing.

8. Winds.

In order to comprehend the nature and causes of the winds in this country, it will be well to consider, first, what would take place if the greater part of Australia were sunk beneath the ocean. The trade-wind would then blow steadily over the northern portions from the south-east, and above it a steady return current would blow to the south-east, while strong westerly and southerly winds would prevail over the southern half of the country. Into this system of aerial currents Australia introduces an enormous disturbing element, of which the great interior plains, and the main chain of mountains running along the east coast, form the most active agencies in modifying the winds. The former, almost treeless and waterless, acts in summer like a great oven with more than tropical heating power, and becomes the chief motor force of Australian winds, by causing an uprush, and consequent inrush on all sides, especially on the north-west, where it has sufficient power to draw the north-east trade-wind over the equator and convert it into a north-west monsoon, which has the effect of obliterating the south-east trades properly belonging to this region. The

north-west monsoon being heated in the interior, rises up and forms part of the great return current from the equator towards the south pole.

That there is a constant overhead current from north-west to south-east may be traced, day after day and month after month, by the small clouds which mark its lower limits passing in ceaseless streams to the south-east. The height of this current is generally about 5000 feet, but it is sometimes much lower, so that occasionally it is possible to fly a kite at Sydney, which rises into it and is carried away to the south-east, while the sea-breeze below is blowing from the east or north-east. These sea-breezes are also due, primarily, to the inflow towards the heated interior, but meeting with the mountain ranges they are usually diverted towards the south-west, and thus appear as north-east winds, a diversion partly caused by the friction of the great north-west current overhead. When the monsoon is most violent it carries off much of the sea-breeze with it, producing a depression of the barometer, when southerly winds rush in till the barometer rises again. Thunder and lightning usually follow these changes. The heated north-west monsoon has been felt in Tasmania at a height of 5000 feet. In winter the heating influence of the interior ceases, the trade-winds move farther north, and the normal westerly winds prevail with storms and rain from the south.

The well-known southerly "bursters" are violent storms of wind occurring in summer (November to February), when the weather is fine and hot with a north-east breeze. If then the barometer falls fast in the forenoon, a "burster" may be expected before night, usually accompanied by thunder and much electrical excitement. Its approach is indicated by an appearance as if a thin sheet of cloud were being rolled up before the

advancing wind. Clouds of dust, which penetrate everywhere, announce the coming of the wind, which reaches its greatest violence in an hour or two, varying from 30 to 70 miles an hour, though sometimes reaching 90, and on one occasion 150, when great damage was done. The change is sometimes very sudden. There may be a fresh north-east breeze, and in ten minutes a violent gale from the south. These "bursters" usually end with a thunder-storm and rain. In the autumn (February) the rainfall accompanying these storms is often excessive. On the 25th of February 1873 nearly 9 inches of rain fell in about the same number of hours. At Newcastle, on the 18th March 1871, the heaviest rainfall ever recorded in Australia occurred; 10½ inches of rain falling in two and a half hours, accompanied by a fearful squall of wind and rain with thunder and lightning. During the whole storm more than 20 inches of rain fell in twenty-two hours.

The hot winds, which are another remarkable feature of the meteorology of Australia, occur in New South Wales usually from three to seven or eight times during the summer; but many more pass overhead, their only effect being a rise in the temperature. The temperature at Sydney varies from 80° to 110°, though it rarely reaches 100°. These winds are felt over the whole east and south of Australia, and they are even said to be distinctly perceptible as far as New Zealand. The hot wind generally comes on in the forenoon and lasts all day; but sometimes it only blows for an hour or two. It is preceded by very fine weather, with a gradually falling barometer and a diminishing sea-breeze. It sometimes passes away quietly, but is more usually ended by the southerly "bursters" already described. Hot winds are oppressive, but not absolutely injurious to health, yet

their effect on vegetable life is very marked. Plants all droop, and those with tender leaves shrivel up as if frost-bitten ; and there is one instance on record in which all the wheat was destroyed over 30 miles of country on the Hunter River. In Victoria, and especially in South Australia, the hot winds are more frequent and last longer, and their effects are more injurious. They are evidently produced by the sinking down to the surface of that north-westerly current of heated air which, as we have seen, is always passing overhead. The exact causes that bring it down cannot be determined, though it evidently depends on the comparative pressures of the atmosphere on the coast and in the interior. Where from any causes the north-west wind becomes more extensive and more powerful, or the sea-breezes diminish, the former will displace the latter and produce a hot wind till an equilibrium is restored. It is this same wind passing constantly overhead that prevents the condensation of vapour, and is the cause of the almost uninterrupted sunny skies of the Australian summer.

9. Snow.

There is only one instance known of snow having fallen so as to lie on the ground in Sydney. On 28th June 1836 it snowed for half an hour, and lay on the ground in places for an hour. In other parts of the colony, however, the case is different. On the southern mountains and table-lands 3 feet of snow sometimes falls in a day, and in 1876 a man was lost in the snow on the borders of Gipps Land and New South Wales. In the Maneroo plains, east of the Australian Alps, in July 1834 a snowstorm lasted three weeks, and on the mountains the snow lay from 4 to 15 feet deep, burying the cattle in groups. The higher parts of the railway

from Sydney to Bathurst have been seen covered with snow for 40 miles continuously. At Kiandra in the Australian Alps, one of the highest and coldest towns of New South Wales and 4600 feet above the sea, snow falls continually from May to November, sometimes for a month together. Many of the higher mountains are covered with snow all the winter, and in many of the valleys and ravines near the summits snow lies in patches all the summer. Below the summit of Mount Kosciusko a bed of snow 40 feet thick was found on the longest day, and it accumulates in such large masses that some may always be seen from any elevated point commanding a good view of the higher mountains. On Mount Kosciusko it even forms glacier masses in the deep ravines, which are more or less permanent. Even at heights of 5000 feet, in situations favourable for the accumulation of snow, it remains all the year. Yet the highest mountain (7175 feet) is considerably below the line of perpetual snow for this latitude, since on Mont Blanc, 9° farther from the equator, the snow-line is 8500 feet above the sea. The difference is probably due to the presence of the warm oceanic current supplying abundance of moisture from below, while the rapid radiation through a pure and usually clear atmosphere above, lowers the temperature so as to condense the vapour into snow; thus affording an illustration of the well-known maxim, that heat to produce an ample supply of vapours is essential to the production of excessive falls of snow.

Hail is not uncommon in Australia, especially in New South Wales and the adjacent parts of Queensland, while in West and South Australia it is very rare. Some of the hailstorms have been of terrific violence and very destructive. In 1850 hailstones 7 inches in circum-

ference fell at Bathurst, while at Moreton Bay in the same year they formed angular lumps of ice weighing over a pound. In 1856 a hailstorm caused loss of life over a wide area, and in 1871 at Illawarra fowls and even cattle were killed by hail.

10. Droughts and Floods.

The rainfall in all parts of Australia is very irregular, but less so on the west and south coasts than on the east and in the interior. At Sydney the annual rainfall has varied from 22 to 82 inches; the consequence of such irregularity being that the country is subject to alternations of droughts and floods. In the table-land west of the main range, and 25 miles south-west of Goulburn, at an elevation of 2260 feet above the sea, is situated Lake George. In 1824 it was 20 miles long and 8 miles wide, enclosed by thickly-wooded steep hills. It gradually diminished in size, till about 1837 it became quite dry and was converted into a grassy plain. After a few years it gradually filled again, till in 1865 it was 17 feet deep. Two years later it was only 2 feet deep; but in 1876 it was again 20 miles long and about 20 feet deep, and the old water-marks show that it has sometimes reached 3 feet higher.

On the east coast of New South Wales hardly any rain fell in the years 1814 and 1815; and again in 1827, 1828, and 1829 there was a long period of drought, during which the beds of deep and usually rapid streams became dry for miles. Every blade of grass was destroyed over large tracts of country, and cattle perished by thousands. At intervals of a few years similar droughts have occurred, and in 1878 there was one of exceptional severity. Alternating with these droughts are disastrous floods,

caused by the enormous and sudden rainfalls already referred to. On 22nd March 1806 the Hawkesbury River rose in some places 93 feet above its ordinary level; 200 wheat stacks were swept away, many lives were lost, and hundreds of persons only escaped by climbing up trees or to the roofs of houses. In 1809 there was another and still greater flood, when the water rose 50 feet at the town of Richmond. In 1867 this was surpassed by a rise of 63 feet at Richmond, only 5 feet below the highest spot of ground in the town, so that the destruction to property may be imagined. In consequence of these floods landslips occurred; 50 acres of land being washed away at the confluence of the Hawkesbury and Grose rivers. The Hunter, Darling, Murrumbidgee, and many other rivers, have been subject to similar floods.

CHAPTER III

THE NATURAL HISTORY OF AUSTRALIA

1. Characteristics of Australian Vegetation.

IN Australia the vegetable no less than the animal kingdom presents features altogether different from those of other continents; and the naturalist finds himself in a strange and isolated world, having comparatively little in common with other divisions of the earth. In order to exhibit clearly the main peculiarities which distinguish the vegetable world in Australia, we shall first describe the general aspects and prominent features of the vegetation, and then discuss some of the botanical characteristics which throw light upon its early history and relations with other parts of the globe.

The extensive seaboard of temperate Australia is everywhere characterised by a vegetation of a remarkably sombre and uniform colour, occasioned mainly by the peculiar foliage of the Eucalyptus and the small-leaved bushes constituting the "scrub," the leaves of which lack that striking contrast of shade on their outer and under surfaces, which contributes so largely to the shifting tints of our European woodlands. Instead of spreading out horizontally, the foliage mostly hangs vertically from the branches, hence producing little shade in the forests;

travelling through which is thereby rendered all the more fatiguing in the hot midday sun.

The uniformity of this vegetation is intensified by the great area over which the same forms extend. The change of the seasons also, elsewhere causing the fresh



A WOODLAND.

and vivid green of the early spring to be succeeded by the softer summer hues and glorious golden tints of autumn, is marked by no such striking contrasts in the unvarying mantle of dull olive green clothing the Australian woodlands. Yet in the midst of this apparent

monotony we light occasionally on spots covered by a gigantic and exuberant growth, here and there disposed in stately avenues free of scrub or underwood, elsewhere opening on sunny glades and sloping valleys, watered by purling streams and clothed with the softest verdure. In other places the woodlands form a fringe round an open country, varied with hill and dale, and pleasantly relieved with isolated clusters of forest trees, covered with the richest herbage, and decked with flowers of the most varied hues and forms. Or else the woodlands change to an interminable thicket, where countless flowering shrubs and lovely twining plants form an impenetrable mass of tangled foliage, such as can be matched by the virgin forests of Brazil alone.

A striking contrast to this luxuriant vegetation of the woodlands is presented by that of the various kinds of "scrub" and heath which cover so large a portion of the surface of Australia. An excellent observer, the Rev. J. E. Tenison Woods, remarks on the incorrectness of statements as to the general fertility of a country which, though largely covered with woody vegetation, is yet practically a desert. Just as Tartary is characterised by its steppes, America by its prairies, and Africa by its deserts, so Australia has one feature peculiar to itself, and that is its "scrubs." Not only do they recur constantly with the same soil and the same peculiarities, but even in widely distant districts their flora is very similar. There is something in them peculiarly Australian, and as they are repeatedly mentioned in almost every page of every book on Australian exploration or travel, some account of what constitutes a "scrub" will be interesting to our readers, more especially as the writers of such works almost invariably look upon them as too familiar to need description. One of the most common terms used by

explorers is "Mallee" scrub, so called from its being composed of dwarf species of Eucalyptus, called "Mallee" by the natives. The species that forms the "Mallee" scrub of South Australia is the *Eucalyptus dumosa*, and it is probable that allied species receive the same name in other parts of the country. The appearance of the "Mallee" is something like a bushy willow or osier, the stems growing close together like reeds, so close that there are often ten or twelve in a square foot of ground. They grow 14 feet high without a branch, and when a road is cut through a scrub of this kind it appears like a deep trench, or as if enclosed by high walls. The aspect of such a country is very gloomy. From any eminence you see nothing but a dark brown mass of bushes as far as the eye can reach. The soil is generally a yellow sand, and when a patch of it is visible it gives an air of sterility in exchange for the monotony of the scrub. But the surface is generally unbroken, seeming like a heaving ocean of dark waves, out of which, here and there, a tree starts up above the brushwood, making a mournful and lonely landmark. On a dull day the view is most sad, and even sunlight makes it little more cheerful, for seldom bird or living thing gives variety to the scene, while light only extends the prospect and makes it more hopeless. In the south-eastern parts of South Australia there is a tract about 9000 square miles in extent covered with an unbroken expanse of this scrub, and similar tracts of it occur over every part of the southern half of Australia.

Still more dreaded by the explorer is the "Mulga" scrub, consisting chiefly of dwarf acacias. These grow in spreading irregular bushes armed with strong spines, and where matted with other shrubs form a mass of vegetation through which it is impossible to penetrate.

Fortunately this is far less common than the "Mallee," or the labour of the explorer would be still more distressing than it is. Other scrubs are formed chiefly by the "tea-tree" of the colonists. This is a species of *Melaleuca*, a beautiful flowering shrub allied to the myrtle, and very abundant in all parts of Australia. These do not grow in such dense masses; and, mingled with a variety of other shrubs, form one of the ordinary and least disagreeable of the scrubs which occupy so much of the interior.

Next in extent to the "Mallee" scrub is the country occupied by dwarf shrubs, and generally known as "heath." This usually consists of vast level sandy tracts, dusty in summer and boggy in winter, supporting no grass, and but a few stunted trees, and everywhere covered with a tangled mass of woody vegetation about 2 feet high. In spring this country is excessively beautiful from its varied and bright-coloured flowers, among which are the numerous species of *Epacris*, *Boronia*, *Correa*, *Dilwynia*, and other ornaments of our greenhouses. Mingled with these are larger bushes of *Melaleuca* and *Banksia*. The latter is sometimes abundant, and is called the native honeysuckle. It is an irregularly branched bushy tree, with wedge-shaped leaves, and studded all over with yellow flowers, but as the old decaying flowers and seed-vessels remain for years on the tree, it always looks more or less unsightly. The *Melaleucas* are mostly shrubs allied to the *Eucalyptus* and having very beautiful crimson, yellow, or white flowers with numerous long stamens, the flowers being arranged in cylindrical spikes on the branches, whence they are commonly known as bottle-brush trees, as are also the *Banksias*, whose flowers are usually arranged in a similar manner.

The most terrible production of the Australian in-

terior is, however, the "spinifex" or porcupine grass (*Triodia irritans*), which extends for hundreds of miles over sandy plains, and probably covers a greater amount of surface than any other Australian plant. It does not, however, appear to extend south of about 28° south latitude, so that the settled districts are wholly free from it.

The spinifex is a hard spiny grass, growing in tussocks from 18 inches to 5 feet in diameter, formed of exceedingly stiff and sharp-pointed shoots. They are of a yellowish colour when full-grown and quite uneatable, even by camels, who are accustomed to devour thorny desert vegetation. When, as is frequently the case, the whole surface of the ground is covered with this grass it is most painful, and even destructive, to horses, whose feet and legs become wounded and irritated to such an extent that they have to be destroyed. It frequents the most arid sandy wastes, where no water is to be found either on or beneath the surface, and is therefore on all accounts the dread of the Australian explorer.

Many remarkable types of vegetation give a special character to Australian scenery. Foremost among these are the noble gum-trees of the genus *Eucalyptus*. These often attain a height of more than 250 feet, and a girth of from 12 to 20 feet. The banks of the rivers and watercourses are generally bordered with these gigantic trees, which mark the course of the stream from a long distance as it wanders through the open plains or low desert scrub. Other species form dense forests on the mountain slopes, and among these have been discovered the true giants of the vegetable kingdom, equalling or even surpassing the far-famed Wellingtonias of California. In the Dandenong Range, about 40 miles east of Melbourne, the ravines contain numerous trees over

420 feet high, and one fallen tree was discovered of the enormous length of 480 feet—undoubtedly the grandest tree in the world. These belong to the species called “white gum” (*Eucalyptus amygdalina*), but in Western

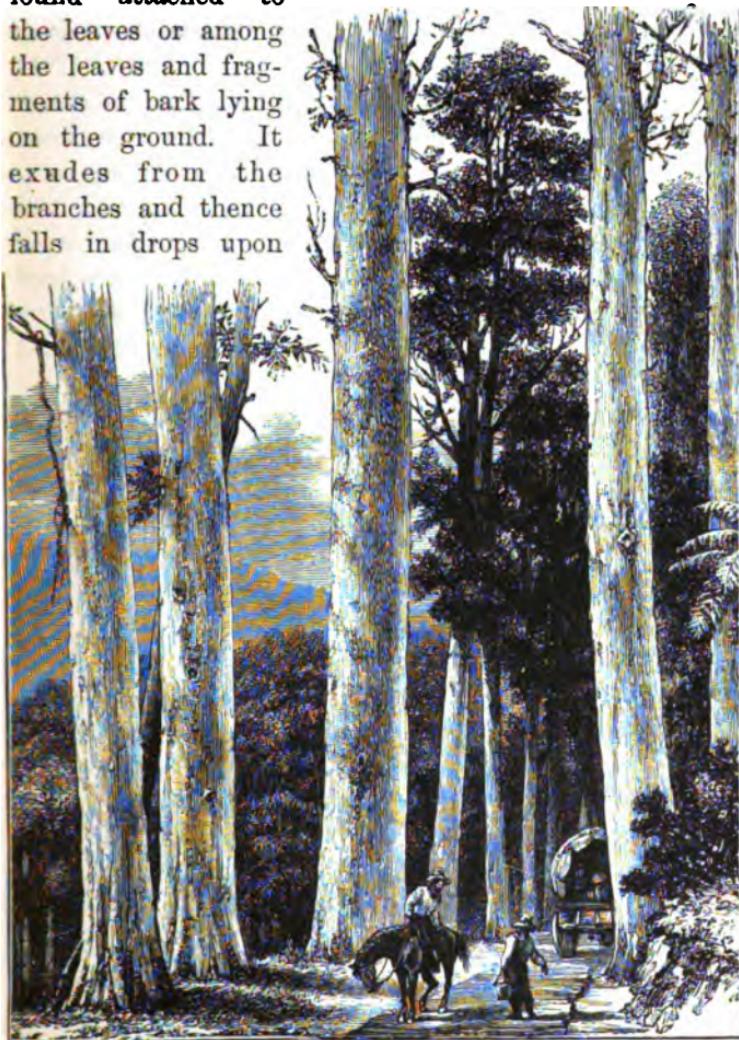
Australia another species (*Eucalyptus colossea*) is often 400 feet high, while the species most commonly grown in Europe and California, the blue gum (*Eucalyptus globulus*), is nearly as large when growing under the most favourable conditions. There are more than 160 species of *Eucalyptus* in Australia, many of which produce timber of great value. Among these are the red gum, the stringy-bark, the karri, and the jarrah, the latter being one of the most durable hardwoods known. The name “gum-tree” is derived from the fact that a gummy resin exudes from the bark of many species when cut, and sometimes spontaneously. When first it issues from the tree it is of the consistence of thick syrup of a beautiful

LEAVES, FLOWERS, AND FRUIT OF
Eucalyptus amygdalina.



light red colour, becoming of a dark shining red and hardening on exposure to the air; but it has so little tenacity that when detached it crumbles into minute fragments. It has a strong astringent quality and is allied to the Kino of commerce, which comes from Africa.

One species (*Eucalyptus mannifera*) secretes a peculiar substance called *manna* in the form of white flakes found attached to the leaves or among the leaves and fragments of bark lying on the ground. It exudes from the branches and thence falls in drops upon



EUCALYPTI.

the leaves or on the ground, forming small white flakes resembling pieces of starch. In taste it is sweet and mucilaginous, very pleasant and wholesome to some persons, though to others it acts as an aperient. It is collected and eaten by the natives.

The Casuarina, Beefwood, or Shea-oak of the colonists, are names applied to a remarkable group of leafless trees, whose long drooping rigid branchlets, resembling those of our "horsetails," render them the most singular and picturesque objects of the Australian flora. The wood though soft is tough, and of the colour of raw beef, whence its local names. These trees are most abundant in the south and west, and are often found in the barren wastes of the interior.

The grass-trees (*Xanthorrhoea*) are a peculiar feature in the Australian landscape. From a rugged stem, varying from 2 to 10 or 12 feet in height, springs a tuft of drooping wiry foliage, from the centre of which rises a spike not unlike a huge bulrush. When it flowers in winter, this spike becomes covered with white stars, and a heath covered with grass-trees then has an appearance at once singular and beautiful.

Nowhere in the world are Acacias so abundant as in Australia, which contains nearly 300 species of the genus. They abound in all parts of the country, and are called "wattles," their elegant yellow blossoms, usually fragrant, adding greatly to the beauty of the country in early spring. Aromatic foliage and odoriferous flowers are especially abundant in Australia, so that the "bush" is more or less fragrant throughout the year.

Notwithstanding this variety of beautiful flowering plants, every traveller remarks on the sombre aspect of Australian woodlands, and the deficiency of those bright

and varied green tints which are so charming a feature of the woods and forests of Europe; and Dr. Bennett remarks, that the deficiency of animation in the Australian vegetation casts a gloom over the mind of the traveller, producing none of those mental delights which the fresh and lively tints of the vegetable kingdom excite in other countries.

Yet in contrast to the usually arid and somewhat monotonous aspect of Australian vegetation, many of the deep ravines and sheltered valleys of the eastern slope of the mountains of New South Wales are clothed with forests of wild luxuriance. One of these districts, which from being easy accessible is better known than the rest, is Illawarra, situated about 50 miles south of Sydney, between the coast range and the ocean. On descending into these valleys we leave a dry and arid country with a stunted vegetation, and find ourselves in a damp and humid atmosphere sheltered by rocky barriers, and presenting on every side a luxuriant wealth of foliage. Here are graceful palms rising to 70 or even 100 feet; the Indian fig with its tortuous branches, clothed with a drapery of curious parasites; while graceful tree-ferns, 30 feet high, flourish in the damp atmosphere of the sheltered dells. The forest is often so rank with creepers, ferns, and vines as to be quite impassable, and the gigantic stag-horn fern grows from the topmost limbs of the loftiest trees. One of the most striking plants of Australia, the "flame-tree," belonging to the natural order Sterculiaceæ, when covered with its large racemes of red flowers, renders the Illawarra mountains conspicuous for miles out at sea.

Among the more remarkable individual plants of the Australian flora, we may mention the fire-tree of West Australia, which belongs to the same natural order as

our mistletoe (*Loranthaceæ*), and is the only non-parasitical plant of the order. When in flower it is so covered with its orange-coloured blossoms that it is compared to a tree on fire. The *Stenocarpus Cunninghamii* of Queensland is a tree which grows 50 feet high, and when in bloom displays one gorgeous mass of orange-tipped crimson stamens. The "Warratah" of New South Wales grows with a single stem about 6 feet high, bearing at its extremity a crimson blossom resembling a full-blown peony. This and the last belong to the Proteaceæ, a family highly characteristic of Australia. Still more remarkable is the rock-lily, a giant among its allies; for it sends up a flower-stalk 30 feet high, bearing at its summit a crown of lily-like flowers several feet in circumference. Lovely bulbous plants and strange-flowered terrestrial orchids also abound; so that, although much of the Australian landscape is barren-looking, and for many months in the year the grass and herbage are almost completely parched up, yet no country in the world, except perhaps South Africa, affords a greater variety of lovely flowers or more strange and interesting forms of vegetable life.

Besides the vegetation of the plains and lower hills, the loftier mountains of Australia possess a singular and beautiful alpine vegetation, in which the productions of the two hemispheres are strangely intermingled. Here are found species of *Ranunculus*, *Geum*, *Gentiana*, *Gaultheria*, *Myosotis*, *Senecio*, and many others, exactly corresponding to the alpine plants of Europe, though mostly of distinct species; while mingled with these are dwarf alpine forms of purely Australian groups, such as *Oxylobium*, *Brachycome*, *Acacia*, *Hovea*, and *Bossiæa*. These distinct types occur on all the mountains of Victoria and New South Wales, which reach an altitude of 5000 feet;

and, strange to say, not only are many of the genera peculiarly northern, but a considerable number of species are absolutely identical with those of Europe. Sir Joseph Hooker has given a list of thirty-eight species of plants which are almost entirely restricted to the colder parts of the Northern Hemisphere, but which yet reappear on the mountains of Australia, a few of them also extending to New Zealand and temperate South America.

2. Botanical Features and Relations of the Australian Flora.

The Australian flora is so remarkable and instructive, and has been the subject of such a philosophical treatise by one of the first of living botanists,¹ that no apology is needed for the introduction of a popular account of its more interesting features into a geographical manual.

The flora of Australia, taken as a whole, is distinguished by several peculiarities. Thus, it contains more genera and species peculiar to itself, and fewer plants belonging to other parts of the world, than any other country of equal extent. Many Australian plants have a peculiar habit or physiognomy, giving in some cases a peculiar character to its forest scenery, such as the Eucalypti, the Proteaceæ, the Casuarinæ, as well as the Grass-trees, the Banksias, and many others. A great many species possess anomalous organs, as the pitchers of Cephalotus, the deciduous bark and remarkable vertical leaves of Eucalyptus; the phyllodia, or dilated petioles, which take the place of leaves in many Australian

¹ *On the Flora of Australia; its Origin, Affinities, and Distribution: being an Introductory Essay to the Flora of Tasmania.* By Joseph Dalton Hooker, M.D., F.R.S., L.S., and G.S. London: Lovell, Reeve, and Co. 1859.

species of *Acacia*; the ragged foliage of many *Proteaceæ*, etc. Yet, notwithstanding these marks of specialty, the proportions of the great botanical subdivisions to each other is the same as in other parts of the world; there are no widely distributed orders absent from Australia, and there is no Australian order (with two small exceptions) that is not found also in other parts of the world. It is also to be noted that even the most characteristic types of Australian vegetation are closely allied to other groups which are widely spread over the globe. Thus the Australian *Epacries* are allied to the heaths, the *Goodeniaceæ* to the *Campanulas*, and the *Casuarineæ* to the *Myricaceæ*. It follows, that although the Australian flora is highly peculiar, it is not a peculiarity which implies a distinct origin, but merely a great isolation from the rest of the world. Nearly 9000 species of flowering plants and ferns have been discovered in Australia; and it is now so well known that probably not more than 1000 remain to be discovered, making a total of 10,000 species. This is a greater number than are contained in all Europe, which is so much more varied in climate and aspect, while the surface of fertile ground clothed with a varied vegetation in Australia is hardly more than a fifth of the similarly clothed surface of Europe.

Contrary to what we might expect to be the case, this enormous variety of plants is due to the richness of the temperate rather than of the tropical parts of the country. The temperate flora is estimated by Dr. Hooker at 5800 species; the tropical at only 2200; and the results of recent explorations seem to show that both have increased so as not materially to alter their proportions. The tropical flora, too, is far less peculiar, being characterised by the addition of certain Indian, Malayan,

and Polynesian groups to a portion of the temperate Australian flora.

The peculiar vegetation of Australia is thus mainly extra-tropical, and is fully developed in the belt of fertile and mountainous land surrounding the desert interior on the south, east, and west. Two-fifths of its genera, and no less than seven-eighths of its species, are altogether confined to it; yet no less than 200 of the genera are found also in Europe. Of the total Australian flora rather less than six-sevenths are peculiar.

The most remarkable feature of the temperate Australian flora is the great difference between its eastern and western portions; and, what is more remarkable still, Western Australia, which is much poorer in soil, has less extensive and less lofty mountains, and a much smaller area of fertile land, yet actually possesses as rich a flora as Eastern Australia, and a much more peculiar one. The south-western flora consists of about 3500 species; the south-eastern flora (including that of Tasmania), of nearly the same number; and of these numbers only a few hundreds are common to both. It is to be observed that it is in the number of *species* that the south-western flora is so rich in a limited area; in the number of distinct genera and natural orders represented, the south-eastern has the advantage. The large genera common to both sides of the continent are remarkably distinct, only 4 per cent of the species of *Acacia*, *Melaleuca*, or *Eucalyptus* being common to the two, although these three genera comprise more than 570 species.

The difference between these two floras is also very remarkable, if we consider genera instead of species. There are about 180 genera in the west, which are either absent or represented by very few species in the east; yet these 180 genera include about 1100 species. No

less than 17 large genera are entirely peculiar to the west, while such a characteristic Australian genus as *Epacris* is altogether absent.¹ In order to make up the same number of species with a smaller number of genera, we find that the West Australian genera have, on the average, more species than those of the east; the former having 17 genera with 30 species and upwards in each; the latter only 11. Many of the species of Western Australia have a wonderfully restricted range, so that Swan River and King George's Sound, only 200 miles apart, and with continuous land between, are much more distinct in their plants than Tasmania and Victoria, separated by a wide arm of the sea. It is to be noted, too, that this Western Australian flora is purely Australian, having no intermixture of those European, Antarctic, or Malayan types which abound in the flora of East Australia. South Australia occupies an intermediate zone, and appears to have received its rather poor flora by migration from both the east and west. It possesses hardly any special features, and is therefore of little importance.

The wonderful assemblage of plants so peculiarly Australian in character, and so abundant in genera and species, crowded together in the south-western extremity of the continent, on a comparatively narrow tract of land between the interior deserts and the sea, offers a difficult problem to the naturalist. It is evidently not derived from any other existing country, and it is equally clear that it must have been developed in some wider and more varied area than that in which it now exists; where, indeed, it has all the appearance of being the remnant of an

¹ Some of these figures may require modification, as similar estimates have not yet been made based on the data in Mr. Bentham's *Flora of Australia*.

even richer flora compressed within narrow limits, since the rarity and limited range of many of its component species are usually held to be the precursors of extinction. Dr. Hooker suggests, as a pure speculation, that the antecedents of the peculiar Australian flora may have inhabited an area to the westward of the present Australian continent, and that the curious analogies which the latter presents with the South African flora may be connected with such a prior state of things. When treating of the geological history of Australia, we shall give some reasons for believing that we have, in this suggestion, a clue to the solution of the problem.

3. The external Relations of the Australian Flora.

The most interesting external relations of the Australian temperate flora are, with the Antarctic islands, with South Africa, and with Europe.

There are about a dozen genera of plants, especially characteristic of Antarctic lands (including in that term all the islands south of New Zealand, and America south of Chili) which are also found in the mountains of South-Eastern Australia; while there are more than twenty species common to these two regions. There is, however, nothing to show whether these were originally Australian or Antarctic plants, or in what direction the migration has taken place.

The South African flora is as distinct from that of tropical Africa as the temperate Australian is from that of Malaya and India: any resemblance between these two widely-separated south-temperate floras is therefore of great interest. The resemblance consists, first, in the prevalence of certain types of plants,—as terrestrial Orchidace, Dros-

eraceæ, Liliaceæ, Capparideæ, etc.—but this is probably due to a similarity of climate and physical conditions. More important is the occurrence of certain families and genera which are found nowhere else. Thus the two families Proteaceæ and Restiaceæ are abundant in both countries, but have only a few straggling species in any other part of the world. There are also five genera which are strictly limited to these two regions, and ten more, common to these and the Antarctic lands, but not found elsewhere. Again, some groups of one country are closely represented by allied forms in the other; the true heaths (*Ericæ*) swarming in South Africa, and their close allies the Epacrideæ being almost equally abundant in Australia and the immediately adjacent lands. These undoubted affinities between the two floras are the more remarkable because their radical distinctness is no less certain. There are sixteen natural orders in each which are altogether wanting in the other. Myrtles, which include the Eucalypti, are exceedingly abundant in Australia, but very rare in South Africa; while Geraniums, Oxalisæ, Crassulas, and Asclepiads abound in South Africa, but are rare in Australia. The aspect of the two floras is also very different; succulent plants—such as Crassulaceæ, Mesembryaceæ, Aloes, and Euphorbiaceæ—giving a special character to the Cape flora, but being almost entirely absent from Australia, where, on the other hand, Coniferæ and lofty forest-trees with evergreen foliage abound to an extent unknown in South Africa. We have here evidently two radically distinct temperate floras, between which some small amount of interchange may perhaps have taken place at a remote epoch; but the more probable explanation of whose slight resemblances is that some ancient and once widely distributed types have been preserved in each owing to similar

favourable conditions, while they have become nearly or quite extinct in other parts of the world.

The European element in the Australian flora is far more prominent than either of the preceding, and is perhaps more difficult to account for. Dr. Hooker gives a list of thirty-seven species of British plants, all especially characteristic of Northern Europe and Asia, and quite unknown in the tropics, yet inhabiting Australia, mostly on the mountains at considerable elevations, and therefore not at all likely to have been introduced. Besides these, more than fifty European *genera* are represented in Australia by allied species. On the other hand, the existing European flora does not contain one Australian species or representative, or betray the most remote direct botanical affinity with the Australian. There are, however, a few Australian forms in China, the Philippines, and Java, and a remarkable small group of Australian types on the summit of Kinibalou, the highest mountain in Borneo. These may perhaps be the remnants of a once wide-spread type of vegetation, for we have good evidence that groups of plants now peculiar to Australia formerly inhabited Europe. In the rich Miocene deposits of Switzerland, Professor Heer has discovered a number of Australian genera, such as Banksia, Grevillea, Hakea, and Dryandra, all belonging to the Proteaceæ; together with others resembling Leptomeria, Pimelea, and Eucalyptus. Fossil wood belonging to a Banksia has also been found in the Eocene deposits of Staines, near Windsor; and as in several cases the fruits have been found and the foliage has the same microscopical structure as that of living Australian species, there seems no reason to doubt that some of the most characteristic Australian groups of plants were then found also in Europe, and probably in the intervening regions.

The high antiquity of the Australian flora is proved by its great amount of generic and ordinal peculiarity. A genus is rendered peculiar by the extinction of the intermediate species connecting it with other genera, and when many genera are very peculiar the extinction must have been proportionally great. There must thus have been an extraordinary destruction of the species which once linked the Australian flora with that of the rest of the globe ; and as such extinction is mainly due to geological and geographical changes, which are slow in operation, it follows that the isolated Australian flora must be a very ancient one. But the flora is not only very isolated but also very rich, and as highly organised as any on the globe. But a rich and highly organised flora or fauna must (on the evolution hypothesis) have required a very large area for its development, and we must therefore (Dr. Hooker thinks) assume not only the antiquity of the Australian flora, but that it was developed in a much larger area than it now occupies. The same author concludes, from his study of the whole subject, that the European and Australian floras are essentially distinct, and not united by those of intervening countries, though fragments of the former are associated with the latter in the Southern Hemisphere. There are many bonds of affinity between the three southern floras, the Antarctic, Australian, and South African ; and these may all have been members of one great vegetation which once, perhaps, covered as large a southern area as the European now does a northern. When this great southern flora originated, or where it acquired its maximum development, it is vain to speculate ; but the geographical changes that have resulted in its dismemberment into isolated groups scattered over the Southern Ocean, must have been great indeed.

THE ANIMAL LIFE OF AUSTRALIA.

4. General Features of Australian Zoology.

The animal kingdom as developed in Australia presents us with anomalies and peculiarities perhaps even more remarkable than are exhibited by the plants; but owing to the great difference in the powers of dispersal of the various animal groups, there is less uniformity in the phenomena they present. Judged by its highest group—the mammalia—Australia is by far the poorest and the most extremely isolated of all the continents, and this class affords us the most certain proofs that no part of the country has been united to the Asiatic continent since the latter part of the Mesozoic period of geology. Every one of the most characteristic and wide-spread groups of the entire Northern Hemisphere are here wanting. There are no apes or monkeys; no oxen, antelopes, or deer; no elephants, rhinoceroses, or pigs; no cats, wolves, or bears; none even of the smaller civets or weasels; no hedgehogs or shrews; no hares, squirrels, porcupines, or dormice. The only representatives of all these familiar groups, or of the orders to which they belong, are a number of peculiar species of rats and mice—all small; and the “dingo,” a half-wild dog, which, although found in a semi-fossil state in some of the caves, was almost certainly introduced by or with the earliest human inhabitants. Yet there are a considerable variety of mammals indigenous to the country, but they are all so peculiarly Australian as to belong to distinct sub-classes—the Marsupials and the Monotremes, of which the only representatives in any other parts of the world are the opossums of America. These marsupials, or pouched animals, offer many peculiarities of organisation and habits; and the strange forms and

motions of the kangaroos and wallabies, their erect attitudes, short fore-legs, and enormous powers of leaping, give perhaps its most special character to the animal life of this continent.

None of the other classes of animals afford such a peculiar and isolated set of types. The majority of the birds, which are abundant and varied, do not materially differ from those of the other continents, though there are a number of interesting and some exceptional forms; such as the mound-builders, which do not incubate their eggs, and are perhaps as low a type as the marsupials. Reptiles, fishes, and insects offer a still smaller number of peculiarities, though each afford some isolated and remarkable forms, which will be noticed under their several classes.

5. **Mammalia.**

Australia, with Tasmania, possesses about 160 species of mammalia. This is very much less than the numbers inhabiting either Europe or North America; yet, considering the much smaller area, the less diversity of surface and of climate, the isolation from all adjacent lands, and the limited amount of structural variation in the animals themselves, it must be considered as exhibiting an extraordinarily rich development. Of the above number twenty-four are bats, a group which, having the power of flight, agree with birds rather than with mammals in their relations with the species of surrounding countries. The bats of Australia belong, in fact, to groups either of world-wide distribution, or which, at all events, extend to India or Africa. The large fruit-eating bat, or flying-fox, a species of *Pteropus*, is the most remarkable. It is found in New South Wales and Queensland.

There are no less than thirty-one species belonging

to the Muridæ or mouse family. Some of these are true mice, closely allied to such as are found with us; others belong to distinct genera confined to Australia. Some live in trees, others are aquatic; but they are all rather small, and to an ordinary observer do not differ from such types of rats and mice as are found in Europe and Asia. In connection with the theory that Australia has never been joined to the Asiatic continent or any of its larger islands during the whole Tertiary epoch, it is a most suggestive fact that the only truly indigenous terrestrial mammalia allied to Old World forms should consist of these very small creatures, which, of all other, are most likely to have been conveyed to its shores by accidental causes. When floods devastate the banks of tropical rivers, and carry out to sea uprooted trees and islands of floating vegetation, some of these very small mammals might find protection in holes and crevices which would not suffice to shelter larger animals, and might thus be sometimes floated to distant lands. Those which established themselves at a remote epoch have become modified in their new abode, and now form distinct generic groups; while the more recent arrivals are closely allied to the species of other lands. The "dingo" or native dog has already been referred to as probably not truly indigenous. It is, in fact, difficult to understand how such an animal could, without assistance, have arrived in the country except by means which would have equally admitted the entrance of many other animals. It differs very little from the wild or half-wild dogs of India and other countries, and this is an indication that it is, geologically speaking, a recent immigrant; and there is no improbability in the supposition that the entrance of man into the country dates as far back as the cave-deposits in which its bones have been found. The shores of Australia are inhabited by several species of seals and

sea-lions allied to those of the other Antarctic lands, while on the warmer coasts of Queensland is found the sea-cow or dugong (*Halicore australis*), allied to the animal found in the Indian seas, but believed to be a distinct species.

It was no doubt one of these animals that the old voyager Dampier referred to, when he states that they captured a very large shark on the north-west coast, "in which we found the head and bones of a hippopotamus, the hairy lips of which were still sound and not putrefied, and the jaw was also firm, out of which we pluckt a great many teeth, two of them eight inches long and as big as a man's thumb small at one end and a little crooked, the rest not above half so long." This has been supposed to be a traveller's tale, but the details he gives of the hairy lips and the *two* long curved incisor teeth are quite correct as applied to the dugong, while the calling it a hippopotamus was very natural to a person ignorant of natural history.

We now come to the Marsupialia, which are so especially characteristic of Australia. These are distinguished from all other mammals by the young being born in an excessively imperfect state, and then transferred to a pouch, or bag of loose skin, with which the mother is provided. Here it attaches its mouth to the nipple, and completes its development. As the young creature grows the pouch is extended, and even when it can run about and feed itself, it still returns to the pouch for concealment or protection. This pouch is supported internally by bony processes termed the marsupial bones, and there are several other anatomical peculiarities by which the remains of marsupials of either sex can usually be distinguished.

The largest and most remarkable marsupials now

living are the kangaroos, forming the family Macropodidæ, of which about nine large and more than forty smaller species inhabit Australia. The great red kangaroo is 5 feet high, and sometimes weighs 200 pounds. The



KANGAROO.

smaller species are called wallabies, hare-kangaroos, and rat-kangaroos; and some of these abound in every part of the country. The larger kangaroos are hunted with dogs bred for the purpose. They are very swift, and, when at bay, dangerous; sitting upright against the trunk of a

tree, and ripping open the dogs as they spring at its throat with the nail of the large and powerful middle toe.

The Peramelidæ, or bandicoots and rabbit-rats, are small animals with sharp nose and long claws, allied to the kangaroos, but running on all fours like most quadrupeds. One genus, *Peragalea*, is called the rabbit - rat, because it forms burrows underground. Another peculiar form, the *Chœropus* or pig-footed bandicoot, is entirely tailless. In this family the marsupial pouch opens downward, instead of upwards as in the kangaroos. They all feed upon bulbs and roots.

The Phalangistæ or phalangers are arboreal and nocturnal animals, feeding on leaves. They are commonly called opossums in Australia, but are quite distinct from the true opossums of America. They live in hollow trees, and are very active on moonlight nights. They constitute a favourite food of the natives, and their skins form the "opossum" rugs, now an article of commerce. Some of the species are as large as a hare, while others are not larger than a dormouse, one indeed being even smaller. Allied to these are the beautiful flying-opossums, which have a lateral membrane between the fore and hind limbs, and a flat tail with diverging hairs, exactly as in the flying squirrels of Asia, which they greatly resemble. The largest species, which is nearly black, measures almost 3 feet in length to the tip of the tail, and presents a startling appearance to the stranger who sees it for the first time, by moonlight, pass silently through the air in the stillness of the forest. Other species are smaller, the flying-mouse of the colonists being one of the smallest of Australian quadrupeds, and able to sleep comfortably in a good-sized pill-box. It frequents the blossoms of

the Eucalypti, feeding on the honey. Allied to the



other phalangers, but very distinct in form and habits, are the *Tarsipes* of West Australia and the Koala of the eastern districts. The former is a true honeysucker with an extensile tongue, and is no larger than a mouse; while the latter is a comparatively large and thick-limbed animal, entirely tailless, and about 2 feet long. It forms the genus *Phascog-*

BASS RIVER OPOSSUM.

arctos, and is called by the colonists "native bear" or "native monkey."

The Phascolomys, or wombat, is another large and thick-limbed animal, about 3 feet long, and, next to the kangaroos, the largest of the marsupials. It is terrestrial



NATIVE BEAR WITH ITS YOUNG.

and nocturnal, feeding upon roots and grass, and forming deep burrows. It is slow in its movements, and its flesh is said to resemble pork. It has powerful gnawing and grinding teeth, and it possesses two more pairs of ribs than any other marsupial. It therefore constitutes a distinct family of the order.

We now come to the Dasyuridæ, or "native cats," which are carnivorous marsupials preying upon the other groups. These are elegant creatures, variously marked and spotted, but fierce and intractable. They dwell among rocks and in holes, and feed chiefly on small mammals and birds. The larger species form the genus *Dasyurus*; but the genera *Phascogale* and *Antechinus* are no bigger than rats and mice, and feed probably on insects and molluscs. Somewhat allied to these is the rare and curious banded ant-eater of Western Australia (*Myrmecobius fasciatus*). It is the size of a squirrel, beautifully



WOMBAT.

banded with white stripes, and with a long and somewhat bushy tail. It has fifty-two teeth, a greater number than any known mammal except the great Armadillo, and it is believed to feed chiefly upon ants. It is probably a representative of one of the most ancient types of mammal, since, more nearly than any other living animal, it resembles some of the marsupials of the Secondary period, especially the *Microlestes* from the Trias of Wurtemburg. Two much larger and more destructive Dasyuridæ inhabit Tasmania—the *Thylacinus*, or "tiger-wolf," and the *Sarcophilus*, or "native devil." The former is the size of a wolf, the latter somewhat smaller. Both are ferocious and

untamable, and very destructive to sheep. Though now confined to Tasmania, their remains are found fossil in the



YARRI (*Dasyurus maculatus*).

caves of New South Wales, showing that they inhabited the mainland of Australia at a not very distant epoch.

We now come to the lowest group of mammals—the sub-class Ornithodelphia or Monotremata, consisting of two of the most remarkable animals on the globe, the

duck-billed Platypus, and the Echidna or spiny ant-eater. These differ from all other groups of mammalia anatomically, and are the lowest in organisation. They have no teeth, nor a marsupial pouch, but they have the peculiar bones characteristic of marsupials. They were long believed not to be true mammals, but to be more allied to birds; but this is now known to be incorrect, as they really suckle their young. The Platypus, or water-mole of the colonists, is about 20 inches long, has very short legs with broad webbed feet, and a flat head, from which project two flat horny jaws almost exactly resembling the bill of a duck, but not laminated, and the upper jaw has a broad membranous border. It is covered with thick brown



DUCK-BILL.

fur, and inhabits the rivers and lagoons of the south and east of Australia as well as Tasmania. It makes burrows in the river-banks, sometimes 40 or 50 feet long, in the extremity of which it forms a nest. The statements of the natives that this animal lays two eggs is now ascertained to be correct. Both in form and internal structure the eggs are more like those of reptiles than of birds; and as the creature also possesses mammary glands and suckles its young, it offers a most interesting example of a rudimentary type somewhat intermediate between mammalia and reptiles. The Echidna, or porcupine ant-eater, somewhat resembles a hedgehog in size and appearance, but it has a long snout, and a long cylindrical and flexible tongue, like that of the true ant-eaters, covered also with a viscous secretion, and

used in the same way for capturing the ants on which it feeds. It rolls itself in a ball like the hedgehog. It is found in sandy and sterile districts. Two closely-allied species are known; the one inhabiting South and East Australia, the other Tasmania.

6. Birds.

Among the temperate countries of the world, Australia stands unrivalled for the variety of form, the beauty of plumage, and the singularity of habits, of its birds. Its parrots and cockatoos are more numerous and beautiful than those of many tropical countries. The golden-yellow and velvety-black regent-bird, and the intensely vivid metallic plumage of the rifle-birds, are almost unrivalled;



LYRE-BIRD.

many of the pigeons are exquisitely beautiful; while some of the warblers and fly-catchers, the curious little Maluri or Australian wrens, and many of the finches, are unsurpassed for beautiful combinations of vivid colour. The strange yet elegant tail of the lyre-bird is altogether unique; while the curious habits of the brush-turkeys and the bower-birds are equally remarkable.

Taking the Australian birds as a whole, there is little of that marvellous isolation from the other continents that is so prominent a feature of the mammalia. All the chief orders, and most of the important and wide-spread families,

are well represented; yet there are certain deficiencies of great importance. Two great families which range over almost all the rest of the globe—the vultures and the woodpeckers—are quite unknown in Australia. The pheasants are also wanting, as well as two families excessively abundant in tropical Asia—the bulbuls and the barbets. But these deficiencies are more than compensated by the presence of a number of families which are altogether peculiar to Australia and the surrounding islands. These are the Meliphagidæ, or honeysuckers; the Platycercidæ, or broad-tailed parroquets; the Trichoglossidæ, or brush-tongued lories; the Megapodiidæ, or brush-turkeys; and two small families, the Menuridæ or lyre-birds, and the Atrichidæ or scrub-birds.

Australia is pre-eminently a land of flowers; its largest forest-trees—the Eucalypti—having blossoms like a myrtle, while the flowering shrubs are innumerable. No less remarkable is the paucity of soft and juicy fruits; and, in accordance with these peculiarities, we find that an extensive and varied family of birds have been developed, which frequent blossoms almost as constantly as do the humming-birds of America, and for the same purpose—to feed upon the secreted honey and the small insects attracted to it. Their organisation is, however, totally unlike that of the humming-birds, the Meliphagidæ having a brush-tipped tongue, and exceedingly powerful grasping feet with which they cling to the flowers while rifling them of their sweets. Being thus specially adapted to its flora, we may consider the honeysuckers as the birds which more than any others characterise Australia. A group of honey-sucking parrots—the Trichoglossidæ, or brush-tongued parroquets—are also peculiar to the Australian region, but abound more in the tropical islands, from the Moluccas to the Pacific.

Next to these, as a special Australian type (or even before them, as some may think), come the brush-turkeys or mound-makers—birds of low organisation, and allied, though remotely, to the curassows of South America. There are three species of these birds in Australia, the Talegalla or brush-turkey, the Leipoa or scrub-pheasant, and the Megapodius, which is only found in the tropical parts of the continent. All these birds have the curious reptilian character of never sitting on their eggs, which they bury under mounds of earth or decaying vegetable matter, allowing them to be hatched by the heat of the sun, or that produced by fermentation. Their eggs are enormously large in proportion to the size of the bird, and are laid at intervals of several days.

The Australian species of *Megapodius* is found in the dense scrubs near the sea-shore of the tropical regions, and the mounds it makes are enormous. In one instance where a mound was measured it was 15 feet high and 60 feet in circumference at the base. The whole of this enormous heap was formed by the industrious bird gathering up earth, stones, shells, or sticks, and throwing them backwards, its enormously large grasping toes and strong feet being exactly adapted to this purpose. The mound is usually placed under the shade of some thick-leaved trees, where the sun cannot shine upon it. This is supposed to be for the purpose of preventing the sun from evaporating the moisture, which aids the fermentation of the mass, producing a steady heat, but it may be also to prevent the loose materials from being blown away by violent winds. The eggs are laid in holes which the bird excavates from the top of the mound to nearly the bottom, afterwards filling the hole with loose materials. These holes are usually in an oblique direction, and only one egg is laid in each hole. There



EMU

is a considerable interval between the laying of each egg, the period of egg-laying lasting for half the year. This is supposed to be the cause of the singular mode of nidification, since the hen bird could not obtain the necessary food if she were to incubate in the usual way for so long a time. When hatched the young birds work their way out of the hole, and thenceforth are able to provide for themselves.

The Tallegalla or brush-turkey of New South Wales, which is a much larger bird, makes a somewhat similar mound, but in this case the eggs are watched by the male bird and periodically uncovered till hatching takes place. The young birds remain in their holes for twelve hours, then come out for a few hours and retire again, being carefully covered up by the male; and only on the third day is it able to fly, and then takes care of itself. These interesting facts were observed at the Zoological Gardens in London.

The parrots of Australia are wonderfully varied and very beautiful. There are white, and rose-crested, and black cockatoos; gorgeous broad-tails; pretty lorries, and elegant grass-parroquets and love-birds. The pigeons are hardly less beautiful; the green fruit-doves, the bronze-wings, the crested pigeon, and the "magnificent" fruit-pigeon, being the most notable. The emu and the cassowary are the well-known Australian representatives of the ostrich tribe. The kingfishers are of strange forms or brilliant colours, one of the largest, a reptile-eater, being called the "laughing jackass" from its singular cry; while the enormous mouths of the Podargi, very large goatsuckers, called "more-porks" from their singular cry, render them one of the strangest and most unsightly of birds. Song-birds, too, are not wanting. There are many musical warblers equal to our own

favourite songsters; while the wonderfully modulated whistle of the piping-crow or musical magpie, and the mocking notes of the lyre-bird, are unequalled among European birds. Not less remarkable on account of their



LAUGHING JACKASS.

habits are the satin-birds or bower-birds, which construct bower-like structures of twigs and branches, and decorate them with coloured feathers, bones, and shells. Some of these bowers are several feet long, arched over at the

top, and are the resort of many individuals, both males and females, which run in and out as if for amusement.

If we consider the limited area of Australia, the great extent of its desert interior, and its isolation from all the great continents, the abundance and variety of its bird-life are very remarkable. It possesses about 630 distinct species of birds; whereas Europe, with a much larger area, has less than 500; and North America, with its enormous area and its immense accessions of migratory birds from the arctic regions and from the tropics, has only 720. Of the land-birds of Australia, not more than one-twentieth are found elsewhere—an amount of specialty not equalled by any other continent or extensive tract of country.

7. Reptiles, Fishes, and Insects.

These groups of animals, being less generally interesting, may be more briefly noticed. Reptiles are very abundant in Australia, there being no less than 140 different kinds of lizards, and between 60 and 70 snakes. The largest lizard is one of the monitors, which reaches a length of from 4 to 6 feet. Most of them belong to the Old World families of the skincs and geckoes, but there are three small families which are peculiar. The lizards of West Australia are very peculiar, no less than twelve genera being restricted to this colony with South Australia, while Victoria and the eastern colonies have a much less number of special types. In this respect lizards agree with plants.

Snakes are very abundant in individuals, and there are a large number of venomous species. The two chief poisonous families of the rest of the globe, the vipers (*Viperidæ*) and the pit-adders (*Crotalidæ*), are entirely

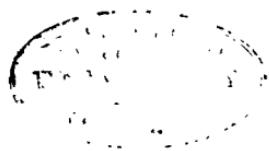
absent, their place being supplied by the Elapidae, a family which includes the Indian cobras, but which have not the broad venomous-looking head of the vipers. Two-thirds of the Australian snakes belong to this family, and all are poisonous, though only about five are believed to be fatal to man. The number of species of snakes increases regularly from the temperate to the tropical districts. In Tasmania there are only three species, all of which are poisonous; in Victoria there are twelve; in South Australia fifteen; the same number in West Australia; thirty-one in New South Wales; and forty-two in sub-tropical Queensland. The diamond snake, one of the boa family, reaches 12 feet long, but is quite harmless. The black snake, one of the commonest and most venomous species, is from 5 to 8 feet long. There are many species of small sea-snakes on the warmer coasts, which have flattened tails, and are all very venomous.

Australia possesses a large number of frogs and toads, belonging to nine distinct families; but there are no tailed Amphibia corresponding to the newts and salamanders of northern countries. The freshwater fish of Australia are tolerably plentiful, considering the paucity of large and permanent streams. The extensive carp and salmon tribes are absent, but ten families found in other warm and temperate countries are represented. The most remarkable of the Australian fishes is the Ceratodus, recently discovered in the rivers of Queensland. It is allied to the Lepidosiren of tropical America and the Protopterus of tropical Africa, the three constituting a distinct sub-class, the Dipnoi, an exceedingly ancient type, as shown by fossil remains, closely allied to the living Australian fish, which are found in the Triassic formation.

Insects, as a whole, are abundant, and are both handsome and remarkable; yet the most conspicuous group,

the butterflies, are very scarce in the temperate parts, and only become tolerably abundant as we approach the tropics. Tasmania and the southern colonies of Australia are, in fact, not so rich in butterflies as Great Britain. Beetles, on the other hand, are very abundant and varied, and many of them are exceedingly brilliant. Those belonging to the family Buprestidæ are not surpassed in any other temperate country for numbers and beauty. The Mantidæ or praying-insects, and the Phasmidæ or walking-stick insects, are also very abundant; and some of the latter are of enormous size, being over a foot long, and curiously knobbed or spined so as to resemble dead sticks.

About 300 distinct kinds of land shells inhabit Australia, and many of them are curiously shaped or elegantly coloured.



A GEOLOGICAL MAP
OF
AUSTRALIA
AND TASMANIA

From a Map by A. Everett.
Containing the most recent information supplied
by the Survey Departments of the several Colonies.



Lively Sh.

CHAPTER IV

THE GEOLOGY AND PAST HISTORY OF AUSTRALIA

1. General Considerations.

OWING to the energetic researches of the various colonial geologists, many of the details of the geology of Australia have now been worked out, and we are able to form a tolerable notion of the past history of the country. Reserving some local peculiarities to be noticed when describing the several colonies, we shall here give a brief sketch of the chief classes of rocks, and the light they throw upon the present condition of the land and the more important changes through which it has passed.

For a long time it was believed that no Secondary formations existed in Australia, which was thought to consist wholly of very old and very new deposits; the inference being that during the whole of the Mesozoic or Secondary period the country was above the sea, and that no elevations and subsidences of importance occurred throughout that enormous lapse of time. This is now known to be erroneous; and Australia, in this respect, offers no exception to other parts of the world, although the amount of Secondary rocks visible on the present land surface is somewhat small. We will now give an outline of the distribution of each of the great classes of

rocks—Palæozoic or primary, Mesozoic or secondary, and Cainozoic or tertiary, as well as of the most recent quaternary or Post-Pliocene deposits.

2. Palæozoic Formations.

These ancient deposits constitute what are now the chief mountain ranges of the greater part of Australia. The Blue Mountains of New South Wales, the Australian Alps, the great Dividing Range of Victoria, as well as the Pyrenees and Grampians in the south-west, consist mainly of Silurian deposits of two periods, the lower or more ancient, perhaps corresponding to the Cambrian or even the Laurentian formations of Europe and North America, and the upper or more recent. Granite, syenite, and porphyry also abound, often constituting the highest summits; but these are in many instances intrusive igneous rocks, and are believed to be of much later date. They probably correspond to the period of elevation of the Silurian beds, not to that of their deposition, though both have been subsequently much disturbed, the Palæozoic strata having often an almost vertical dip. In South Australia the same rocks form the mountainous backbone of the colony, extending far into the interior. Similar rocks constitute the dividing ranges of Queensland; and rocks of the same age, though of different character, are believed to constitute the high table-lands and mountains of the north. When we come to the west coast, however, we find the Palæozoic rocks far less developed, though they occur in the Darling Range and near Champion Bay. Here the mountains are much less lofty and less extensive, and the older rocks are more concealed by recent deposits; while inland there is an

extensive area of granitic rocks, forming isolated hills and peaks in a mostly desert country.

In Queensland the carboniferous formation is very largely developed, extending 200 miles inland between latitudes 29° and 15° south, and covering an area of more than 50,000 square miles; and in some places the deposits of this age are thousands of feet thick. Fine coal occurs here as well as in the later Mesozoic formation. Sandstones and limestones belonging to the carboniferous or to the permian formations also occur in the south-eastern district of Victoria. All the older settlements of New South Wales are situated on a sandstone deposit which contains the coal-field of the Hunter River. This has been sometimes classed as a Secondary formation, but is now believed to be Palæozoic, and to correspond with the true coal of Europe. No carboniferous rocks are known to occur in South or West Australia. The tin mines of Queensland are in granite, which rises through the carboniferous rocks, and which may be of a much later age.

3. Mesozoic Formations.

Mesozoic deposits have now been discovered in numerous localities, most abundantly in Queensland, less plentifully in New South Wales, Victoria, and Western Australia. The two southern peninsulas of Victoria consist largely of limestones and coal-bearing beds of Mesozoic age, but coal has not yet been found in large quantities. The Wannon valley, a tributary of the Glenelg in West Victoria, is another region of Secondary rocks, which, altogether, occupy an area of about 4000 square miles in this colony. In New South Wales the extensive sandstone deposits to the east of the Blue Moun-

tains are, as above mentioned, sometimes classed as Mesozoic. Trias occurs at the Clarence River in the north, and there is a coal deposit at Parramatta, near Sydney, of Mesozoic age. In Queensland much of the interior, west of the Dividing Range, appears to be of Secondary age and to belong to the Oolitic formation, which includes the southern coalfield. In the north and north-west of this colony, extending almost to the Gulf of Carpentaria, and southward to beyond the Darling, is an extensive area of cretaceous beds, said to occupy about 200,000 square miles, or about one-third of the entire colony. In West Australia, on the margin of the table-land, there is a considerable belt of rocks which appear to correspond to the oolite and lias of Europe, while to the north some cretaceous deposits have been found.

These various formations have been determined by means of fossils corresponding to those of other parts of the globe. The Silurian fossils are similar to those of Europe and North America. The carboniferous formation contains fish, corals, and zoophytes, allied to those of the same period in Europe, while the coal produces such familiar plant-forms as *Sigillaria*, *Calamites*, and *Lepidodendron*. In these older deposits some of the species appear to be the same as those of Europe, but in later times, as might be expected, greater differences appear. The cretaceous rocks are, however, clearly defined by Belemnites and Ammonites, and by remains of huge *Plesiosauri* and *Ichthyosauri* of peculiar species; and the Rev. J. E. Tenison-Woods thinks that formations of this age have very wide extension over the desert interior.

4. Tertiary Formations.

Tertiary rocks are now known to occupy a very large

portion of Australia, especially in the south and the eastern interior; and all the European deposits from the Eocene upwards are represented. The oldest Tertiary rocks are found on the east shores of St. Vincent's Gulf, on the York Peninsula, and probably on all the shores of Spencer's Gulf. This is termed the Aldinga basin, and its lowest beds contain fossils of which only 3 per cent are recent, and are therefore classed by Professor Tate as Eocene. The limestone deposits of Mount Gambier at the southern extremity of South Australia and the lower beds of the Great Australian Bight are of the same age. These old tertiaries, consisting of marine limestones and sandstones, have been found to be 300 feet thick under the city of Adelaide, where they are covered with newer Tertiary sandstones and drifts.

Miocene deposits are far more extensive, occupying a large part of the Murray basin with others at Muddy Creek and at Corio Bay, near Geelong. Most of the cliffs of the Great Australian Bight, from 300 to 600 feet in height, consist of Miocene limestones full of fossils. These rocks extend at least 300 or 400 miles into the interior, and perhaps much farther. In the interior of the colonies of Victoria and New South Wales the Miocene limestones are largely overlaid by volcanic deposits, those on the borders of the table-land being also of Miocene age, while farther east they are more recent. There are also enormous superficial beds of sands, clays, and marls, formed by the weathering and sub-aerial denudation of the granite and ancient stratified rocks. The rough limestone of Gipps Land, in the south-east of Victoria, is also probably of Miocene age.

It is an interesting fact that no *marine* Tertiary deposits have been found in any part of New South Wales and Queensland, while many such occur in the

south and west, reaching in Victoria a height of 600 feet above the sea. Numerous plant-beds have, however, been found in the deepest sinkings for gold. Thus, at Haddon, in the Ballarat district, numerous fossil fruits were found at 150 feet deep in the lowest auriferous deposit. These fruits all belong to extinct genera, but are allied to Australian plants of a sub-tropical character. Other deposits show species closely allied to those now living in the same localities. A bed of black clay, full of leaf-remains, occurs at a height of 4000 feet in the Australian Alps, near the Kiandra gold-field.

More recent discoveries of fossil plants are very interesting as showing the changes the flora of Eastern Australia has undergone. In Eocene or early Miocene deposits in New South Wales and Victoria abundant remains have been found of plants very different from the present vegetation, such as willows, alders, birches, oaks, and beeches, intermixed with a few existing Australian types. In Tasmania also a fresh-water limestone supposed to be of Miocene age has produced all the above-named forms of European trees together with maples, and the genera *Myrica*, *Aralia*, and *Sequoia*, the latter genus being that to which the mammoth trees of California belong, and which is found fossil in the Miocene beds of Switzerland and Greenland. These curious and unexpected discoveries throw much light on the early history of Australia, and on the way in which its present peculiar vegetation has been developed. This problem will be alluded to farther on.

5. Quaternary or Post-Pliocene Deposits.

Numerous superficial deposits of drifts and gravels which belong to the Quaternary period occur in many

parts of Australia. In the gold districts such deposits form "flats," and are always subsequent to the latest lava-flows. In the interior the cave-deposits of Wellington on the Upper Macquarie River, and those of the Upper Murrumbidgee, belong to the same period. These, as well as superficial clay-deposits in the Liverpool Plains, Darling Downs, and many other localities, have yielded abundance of interesting fossils, which give us some knowledge of the past condition of the Australian fauna. The extinct species all resemble, in general character, those now living in Australia; but, as in most other countries, many of these recently extinct animals were of enormous size. One of the kangaroos was fully a third larger than any living species; while the Diprotodon, a huge, thick-limbed animal allied to the kangaroos, was nearly as large as an elephant. An extinct wombat (*Phascolomys*) was as large as a tapir; while the *Nototherium*, a creature intermediate between the wombat and kangaroo, equalled in size the living rhinoceros. Besides these, forms of kangaroo have been found allied to the *Dendrolagi* or tree-kangaroos now confined to New Guinea; while the *Thylacoleo* was a huge phalanger as large as a lion, and supposed by Professor Owen to have been, like it, a beast of prey. The *Thylacinus* and *Dasyurus*, which now live only in Tasmania, were formerly inhabitants of Australia also. Remains have been discovered in several localities of a huge bird larger than an ostrich, but allied to the emus and cassowaries still inhabiting the country. It has been named by Professor Owen, *Dromornis*.

In the Lower Murray there are some basaltic rocks overlying the coral limestone, which are believed to have been produced by submarine volcanoes during this period.

6. Extinct Volcanoes and their Products.

Although there is no active volcano in any part of Australia, there are several districts where extinct volcanoes abound, and where they have played an important part in determining the character of the country, both as regards scenery, soil, and mining operations. Beginning at the south, the first important group of extinct volcanoes are those of Mount Gambier, in the southern extremity of the colony of South Australia, which have broken through the coral limestone, the beds of which are perfectly horizontal. The craters of these are now occupied by beautiful lakes, but they do not seem to have emitted any extensive lava-streams. In the colony of Victoria extinct volcanoes are very numerous, and this district appears to have been the seat of volcanic action from very early times, much of the plains on both sides of the mountain range being basaltic, the product of volcanoes of all periods, from the Palæozoic to the Tertiary. In the neighbourhood of Ballarat extinct volcanoes may be counted by the score from any commanding eminence. The most remarkable of these are Franklin, 2092 feet high; Buninyong, 2452 feet; and Warrenheip, 2437 feet. Near the Werribee River are the Anakies and Cotterill; while farther west are Tower Hill, Rouse, Pierrepont, Eccles, and Napier, from the last of which miles of lava have covered the surrounding country. Scattered over this volcanic area are numerous lagoons and basin-shaped cavities, probably the sites of extinct volcanoes. Lake Guotuk is 300 feet deep, while Lake Purrumbete is 150 feet deep and 4 miles in circumference. Some of the volcanic cones rise from the level of the plains, and dozens are passed in journeying westward from Melbourne. Some of these are nearly closed at the summit, while others have a

crater-rim of miles in extent. The craters are sometimes filled with water, and vary from a few feet to hundreds of feet in depth. Some of these craters are 2000 feet above the sea. Many of them were active during the Miocene and Pliocene periods, while some are believed to have continued in eruption almost down to historic times.

In New South Wales extinct volcanoes are far less numerous, and what there are seem to be less perfectly preserved. There were, however, many outflows of basalt during the Tertiary period.

In Queensland the volcanic area is much more extensive, occupying about 30,000 square miles of downs and mountains. To the west of Ipswich and Gympie is an extensive tract of this nature. Another area is in the Port Curtis and Kennedy districts, near the sources of the Isaac and Fitzroy rivers in the Peak Range. Farther north, between 21° and 17° south latitude, is a still more extensive volcanic area in the district around Mount Lang and Mount Dalrymple, the latter 4200 feet high, where there are numerous dome-shaped craters and conical volcanic mountains. There are also some indications of recent volcanoes on the north-west coast between the De Grey and Fortesque rivers.

7. Geological Features of the Gold Mines.

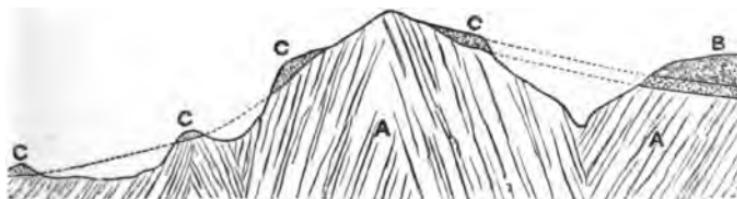
The extensive workings for gold have thrown so much light on the geological structure of Australia and on the changes which have occurred during the Tertiary period, and the formations in which the gold occurs are so interesting in themselves, that a somewhat fuller sketch of this portion of the subject will not be out of place. The following description applies more especially to the

Ballarat district, but the features of many of the other gold-fields do not offer any material difference.

The Tertiary gold-drifts of Victoria belong to four well-defined epochs, which are classed as "oldest," "older," "recent," and "most recent," and they are believed to date from the older Pliocene period, although a few isolated patches occur which may be Miocene. These "drifts" all rest upon, or have been derived from, the lower Silurian strata, which is termed the "bottom" or "bed-rock" by the miners, and contains the "reefs" or auriferous quartz veins whence all the gold of the "drifts" has been derived. These quartz-veins are now largely worked, the quartz being crushed and the gold extracted by washing and amalgamation. Quartz mines have been sunk to the enormous depth of 1500 and 2000 feet, the quartz yielding on an average about half an ounce of gold to the ton, sometimes rising to three and a half ounces. By far the greater number of miners are, however, still employed on the "drifts," which often lie at great depths. These have to be penetrated to the bottom, sometimes a depth of 200, 300, or even 500 feet, where the gold is found collected in *leads* or old river beds, called also "gutters." In penetrating to these "*deep leads*," beds of hard basaltic rock or ancient lava-flows of great thickness are often met with. These were at first thought to form the bottom of the drift, but it was soon discovered that by piercing through them the drift might be followed to the "bed-rock," where alone any quantity of gold could be usually found. If the sinking did not happen to reach one of these *leads* or old water-courses, lateral exploration had to be made till it was found, when its course was followed with more or less success.

8. The "Oldest" Drifts.

The "oldest" drifts are those which antedate not only many of the existing valleys, but also those old watercourses now buried in drift, in which rich gold deposits are found, and which are termed "leads" by the miners. They consist of loose quartz gravel, sandy iron-stone, or even hard siliceous rock enclosing quartz pebbles. Isolated patches cap various points of considerable elevation on the opposite sides of the valleys of the Silurian ranges, but never on the lower spurs of these ranges. Sometimes the drift is covered by a layer of basalt. It is often non-auriferous or only containing a mere trace of gold, but in a few localities near Ballarat it



SKETCH SECTION ILLUSTRATING MODES OF OCCURRENCE OF THE
"OLDEST DRIFT."

A A. Silurian rocks.

B. Basalt.

C C C C. Oldest Drift.

is very rich. It is believed to have spread over a large portion of the country, but to have been since removed by denudation. No fossils have been found in it, except a few remains of wood in too fragmentary a state for identification. It is believed by some geologists that the old drift must have been formed by marine action during a period of elevation of the mountain ranges above the sea. Under such conditions it is generally admitted that marine fossils would rarely be preserved. The accom-

panying illustration, taken from the Reports of the Geological Survey of Victoria, well illustrates the manner in which this formation occurs, and its relation to the existing outline of the country.

9. The "Older" Drifts.

Under this term are included the gutter-drifts, the volcanic lava-beds, and the drift deposits intervening between the latter. The gutter-drifts occupy well-defined channels in the Silurian bed-rock, more or less tortuous in their course, and with a steady fall towards the valley-bottom or the seaboard. This drift is heavy, consisting principally of fragments of quartz, with hard slates and sandstones and some clay and sand. Numerous remains of vegetation occur in the gutter-drift. Large trunks of trees, branches, and fragments of wood, and, in some instances, trees *in situ*, their roots embedded in the ancient soil, and their upper portion enveloped in lava, are met with in the gold-workings.

Immediately above the gutter-drift comes the "fourth rock" of the miners, really the first lava-flow, which took its course along the principal valleys and ascended a short distance up their tributaries. It is confined to the deepest ground. Above it are various deposits of clay, sand, and gravel, separating it from the "third rock," or second lava-flow in point of time. Among these deposits ancient surface-soils with the remains of vegetation can sometimes be detected. This second lava-flow spreads rather more widely than the first, and is also covered by varying thicknesses of clay and drift. Next comes the "second rock," or third lava-flow, which covers a wider area than any of the others in Victoria. Over this come clays, and then we have the "first rock" or fourth

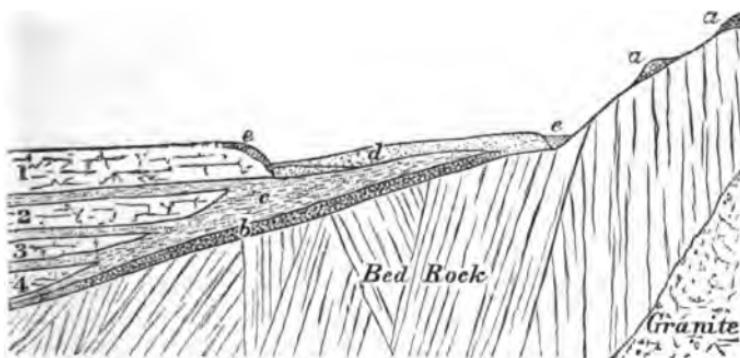
and latest lava-flow, which forms the surface rock of the plateau west of Ballarat, but it does not extend far southward.

10. "Recent" Drifts.

Since the last lava-flow the formation of clays and gravels has gone on, and has been greatly aided by the surface waters having been in places dammed back by the lava. Many of the older deposits of drift have been denuded and redistributed in these more recent deposits. They form tolerably level flats, and sometimes cover the lower hills, the intervening valleys having since been emptied by denudation.

The "most recent" drift consists of lava, clay, and gravel, occupying the beds of recently eroded gullies or forming surface-deposits over the lower portions of the older drifts, from the denudation of which it is principally derived.

The accompanying sketch-section shows how these several deposits occur.



SECTION SHOWING THE VARIOUS DRIFTS AND LAVA-FLOWS.

aa. Oldest drift; *b*, gutter drift; *c*, older drift, covering successive lava-flows; *d*, recent drift; *ee*, most recent drift; *1,2,3,4*, successive lava-flows. The "bed rock," is Lower Silurian, with granite sometimes intruding.

Gold is sometimes found in the few inches of surface soil and rubble overlying the Silurian rock on the slopes and spurs of the hills, especially in the vicinity of quartz veins. In other places a few scattered pebbles of quartz show that the drift which once was there has been removed by denudation, but the accompanying gold, from its superior weight, often remains in the crevices of the rock, or entangled among the roots of grass or trees. The thicker deposits at the foot of the hills and in the gullies intersected by auriferous quartz reefs, are often gold-bearing from surface to bottom. On mapping the *leads* which have been worked, it becomes evident that they represent a system of ancient watercourses. These correspond generally to existing valleys, but in many cases no indication of their position is to be detected by the contour of the surface.

11. Quartz Reefs.

The quartz reefs being the source of all the gold found in the drifts, it was natural to suppose that where the latter were most productive the former would be the richest. This, however, is not found to be the case, because the richness of the gold drifts and *leads* will depend chiefly on the amount of denudation of quartz they represent. Of the denuded rock a large proportion will have been carried away by streams and rivers to the sea, so that the accumulations of drift, large as they are, only represent a portion—perhaps only a small portion—of the rock ground down to produce them. Owing, however, to the great specific gravity of gold, by far the larger portion of it sinks at once to the bottom and remains not far from the parent rock; and even successive floods will not carry it away, but only cause additional deposits in the

lower beds. Where the quartz reefs are numerous and have been subject to great denudation, a very rich deposit of drift may be formed, even though the quartz itself is very poor in gold.

12. Probable Past History of Australia.

Although much remains to be done in working out the details of Australian geology, yet sufficient is known to enable us to speculate with some confidence on the changes that must have occurred in its physical condition, to bring about the present state of things. The subject is of extreme interest on account of its connection with the striking peculiarities of vegetable and animal life—peculiarities which must be dependent on the long-continued isolation of Australia from the rest of the globe, and on its area having always been sufficiently large to support and develop a varied population of animals and plants. Let us then endeavour to sketch out the probable history of Australia during successive geological epochs.

Palæozoic Epoch.—The great extent of Palæozoic sedimentary formations all round Australia, as well as in some parts of the interior, plainly tells us that at this period there must have been an extensive land area in the vicinity from whose denudation these rocks were deposited in the surrounding ocean. We have at present no evidence of the direction in which this land mainly lay; but the occurrence of extensive strata of the carboniferous age, with numerous coal beds, over a large area of the eastern side of Australia, would lead us to conclude that in this direction there was once a considerable continental area, in whose inland lakes, seas, or estuaries these plant-bearing deposits were formed.

Mesozoic or Secondary Epoch.—The granite and other

igneous intrusive rocks piercing through or upheaving the Palæozoic beds in numerous localities, or forming isolated mountains in the interior, are probably of various ages, but are believed to date, for the most part, from the Mesozoic period. The character and position of the Secondary rocks in Australia is *prima facie* evidence of the existence at the period of their formation of a large extent of dry land, with adjacent seas and gulfs of no great depth ; and this supposition agrees with the remarkable development of vegetable and animal life, whose differences from those of the other great continents are such as to imply isolation from them during a period dating back to some part of the Secondary epoch. The oolitic and cretaceous deposits of the western districts of Queensland and New South Wales, imply a considerable area of rather shallow sea in this direction, with abundant coral reefs. There may be, it is true, deposits of Secondary age buried under the Tertiary formations of the interior ; but this is not probable, and even if it were the case, it would equally imply a considerable area of Secondary land to supply the sediments for such extensive deposits. At this time the early connection of Australia with the Asiatic continent had probably ceased ; but the former country may have extended over what is now New Guinea and the Moluccas, as well as southward over Tasmania, and for some distance westward in the direction of the Cape of Good Hope.

Kainozoic or Tertiary Epoch.—It is when we come to the Tertiary epoch that we obtain some more adequate notion of the condition of Australia in the immediate past. The abundant mammalian fauna, so completely isolated from that of all the rest of the globe, and the proofs that this fauna was once even richer without being less isolated than it is now, compel us to the conclusion that during a considerable portion of the Tertiary epoch a

more extensive and more fertile continent occupied nearly the same geographical position as Australia does now. Every other department of nature presents analogous peculiarities, which equally force us to adopt this view; and it is supported by the fact of the absence from every part of the country, except the southern coast of South Australia, of any extensive marine deposits which can be certainly classed as belonging to the earliest Tertiary age (Eocene or Lower Miocene). This implies that, during a vast period, the greater part of what we now know as Australia was dry land, and there are indications that it also comprised lands which have since sunk beneath the ocean, or been carried away by its waves and currents. The highly peculiar flora of West Australia, so much richer in proportion to its area than that of the eastern colonies, clearly implies a great extension here towards the west and south, so as to afford an area sufficiently extensive and varied for the development of so many special types, and also to explain that slight affinity with the Cape flora which is a marked feature of West Australian botany. The islands of St. Paul and Amsterdam may indicate where an intervening land once formed a stepping-stone for the intermigration of the plants of Australia and South Africa.

Coming down to later Tertiary times (Pliocene), we find proofs of great subsidence and enormous denudation. A large area near the coast in South and West Australia consists of an arenaceous limestone, the *débris* of coral reefs of Pliocene age. The fossil corals found here are said by Dr. Duncan, who has specially studied them, to be mostly peculiar forms, some few being identical with European Pliocene corals, and some with species now living in the China Sea, Red Sea, and Caribbean Sea, but none identical with living Australian corals. This implies

a change of climate and of distribution of marine animals analogous to what has occurred in the Northern Hemisphere. A considerable expanse of country must, therefore, have sunk beneath the sea-level at this period, and have been subsequently raised again; but this depression does not appear to have extended far inland or to the eastward, where no marine Tertiary formations have yet been found.

13. Origin of the Desert Sandstone.

Another late Tertiary formation—the desert sandstone—is far more remarkable, and may, in fact, be termed the geological mystery of Australia. It is supposed to occupy one-third of the entire country, covering vast areas of the interior from the western plains of Queensland and New South Wales, right across the continent to West Australia. Owing to the absence of organic remains, except some imperfect plants and fresh-water shells, it is impossible to tell its age, or whether it is all of the same age; but it is generally considered to belong to some part of the later Tertiary or Pliocene period. In Northern Queensland it rests on chalk, and is, again, in parts covered by lava-beds. It consists of extensive plains, plateaus, and low hills; the latter probably indicating the level it once attained all over the country, the intervening plains having been lowered by sub-aerial denudation. This is also shown by the numerous examples of isolated rock-pillars in many parts of the country. One of these, known as Chambers's Pillar, and situated nearly in the centre of Australia, is 150 feet high, and stands on a low hill about 100 feet above the plain. The pillar itself, which is about 10 feet by 20 in cross section and of nearly equal width from top to bottom, is of a soft white

sandstone, as is the hill on which it stands. The upper part of the pillar is red, and it may owe its preservation to the somewhat greater hardness and durability of this upper layer. In the same neighbourhood are many other remarkable rocky hills, resembling old castles in ruins, standing on and among sandhills. The manner in which these pillars were probably formed is well illustrated by the observations of Captain (now Sir George) Grey on a remarkable group of pillars found on high table-land in the northern part of West Australia. Several acres of land were here covered with lofty isolated sandstone pillars of the most grotesque and fantastic shapes. In one place was a regular unroofed aisle, with a row of massive pillars on each side; and in another, there stood upon a pedestal what appeared to be the legs of an ancient statue, from which the body had disappeared. The height of some of these columns which were measured was found to be upwards of 40 feet; and as the tops of most of them were nearly at the same level, that of the surrounding country must at one period have been as high as their present summits—probably, indeed, much higher. From the top of one of these pillars an extensive view was obtained showing everywhere signs of similar degradation, on so large a scale that it was at first difficult to account for; but the sound of gurgling water soon offered a clue to the mystery. On descending into a fissure between some rocks, Sir George Grey discovered beneath the surface a cavern much resembling the remains that existed above-ground. Through it ran a small stream which, in the rainy season, would become a torrent; and it was evident that before many years elapsed the roof would give way, and what were now the buttresses and supports of a gloomy cavern would emerge into day, and become columns draped with creepers,

surrounded by vegetation, and resplendent in the bright sunshine.

In South Australia and Victoria similar extensive caverns, supported by stalactites, are formed in the Tertiary limestone by the underground passage of water, and where calcareous deposits extend beneath the desert sandstone the falling in of its caverns would lead to the breaking up and more rapid denudation of the overlying sand-rock. The denudation of such a soft and friable material may also be rapidly effected by the wind alone, which, carrying sand particles with it, carves out exposed faces of rock even more rapidly than water. The denudation of so much of this deposit is not therefore difficult to account for ; the great problem being—How was it first formed ? Most writers assume that it is a marine deposit, and that almost all Australia must have been at this period depressed beneath the sea-level. But the abundance of fossils in the coralline limestone of approximately the same age, renders it certain that so widespread a deposit, if marine, would also contain many remains of shells and other marine animals, of which, however, not a trace has been found. Such an extensive depression is also inconsistent with what we know of the abundance of large mammalia in the immediately succeeding age (the Quaternary), which would certainly have required an extensive land area for their support. A large continent, with lofty mountain ranges, is also necessary to supply the amount of denuded rock required to build up so extensive and massive a deposit, and this is inconsistent with its formation during a period of extensive submergence.

It seems more probable, therefore, that the desert sandstone is a lacustrine or inland-sea formation, and that during its deposit the surrounding land was both more extensive and more elevated than it is now. Instead

of being submerged, and reduced in area, Australia was probably then at nearly its greatest size, and possessed of all the features of a great continent. Its mountains were loftier and more extensive, its rivers permanent, and its whole area well watered and productive. Its interior, instead of being parched and desert, was a great lake-country, perhaps even more remarkable than eastern equatorial Africa is now. These lakes or inland seas were probably formed by the gradual shutting up of all outlets from the central plateau by volcanic eruptions or by elevations of the land, so that the drainage towards the interior had no means of reaching the ocean. All extensive plateaus have, or have had, such enclosed basins, which are probably due to the upheaving forces being greater near the coast than inland. Thus, we have in North America the region of the great lakes, and the more elevated basin of the great salt lake of Utah, a portion of which has been drained by the cutting of the great cañon of the Colorado. In Asia the great basin of the Gobi desert is more extensive than the lowland interior of Australia; and were this basin nearer to the seaboard, so as to be supplied with vapour-laden air, it would soon be changed into a vast inland sea. It is evident, then, that under the conditions we have supposed,—that of Australia having been, as a whole, more elevated and more extensive, and with far loftier mountains on its borders to condense the oceanic vapours and become the source of perpetual streams,—all the lower portions of the interior would become flooded, till enormous fresh-water lakes were formed, bounded by the various ranges of granitic and palæozoic rocks. In these lakes the whole of the products of the denudation of the interior slopes of the mountains would be deposited, till, after countless ages, the highlands would be considerably lowered, and the lowland

interior proportionally filled up. The extent of these lakes at any one time may probably have been very much smaller than that of the country now covered with the desert sandstone. When the water area became very large, evaporation would equal the supply, and the level would remain for a time stationary ; but, as the lakes became gradually filled up by the growth of deltas at the entrance of every stream that supplied them, the waters would rise and again extend the area of water-surface, while slow risings or sinkings of certain areas would change the centre of greatest deposition. The lapse of time required for such a formation must have been enormous ; and over such a large area,—always, as we know, the theatre of volcanic action,—we must suppose that the subterranean forces would have been constantly at work, though the chief seats of their energies might gradually change. By this means the more elevated tracts might subside, and the old depressions become elevated, and thus the area would become widened over which the fresh-water deposits were formed. At length outlets were made by depressions in the mountain barrier at the north and south, while slight changes on the watershed enabled some of the rivers to obtain access to the ocean. A general subsidence of the country followed, greatest probably on the west, and leading to the destruction of a large portion of the old continent. Wide areas of sandy lake bottoms were thus exposed, and the general lowering of the mountain ranges causing diminished rainfall, the climate became deteriorated, and the interior gradually assumed its present sterile aspect. The last remains of the great bodies of fresh water which once covered so much of the interior are to be seen in the numerous salt swamps and intermittent lakes of the south, the centre, and the west of the Australian interior.

The late Rev. J. E. Tenison-Woods, who paid much attention to the geology of Australia, was of opinion that much of the so-called "desert-sandstone" is a recent eolian deposit, formed by the gradual decay of the granitic rocks and their degradation by the agency of the wind. He points out that it is usually found around granitic ranges, and that the grains of sand of which it is composed have the true desert-character of being rounded by long-continued attrition. The sand-hills alternate with yellow clay flats, formed by the decomposition of the felspar and mica, as the sand is of the quartz, which together compose the granite rocks. The general character of this kind of country is a perfect level, except where the drifted sand ridges or the rugged granitic ranges break its monotony; and the larger portion of the interior of Australia is covered with formations of this character.

14. Subterranean Waters.

Although the rainfall in the interior of Australia is scanty and intermittent, often failing for several years together in the arid central regions, yet it is nowhere altogether wanting, and is quite sufficient to supply a considerable number of running streams in countries whose geological structure is favourable to the retention of the water on the surface and its protection from the powerful rays of the sun. It is the opinion of the best observers that only a small portion of the actual rainfall can be accounted for by evaporation and by the few perennial streams, and that consequently there must be a constant accumulation of underground water. The extremely porous nature of a large portion of the surface favours this belief; and as the area of the central plateau is very great and the height above the sea moderate, the

escape of the water to that level must be very slow, and thus we should expect to find great water reservoirs at moderate depths wherever impermeable rocks favoured their retention. Mr. Tenison-Woods has pointed out that this view is confirmed by the fact of a line of hot and cold springs for several hundred miles across Central and Northern Australia. Some of these evidently come from great depths, as indicated by their high temperature and by the mounds of sinter or travertine which they have formed around them. So long ago as 1863 he urged in a paper read before the British Association at Newcastle, that the whole geological structure and meteorological conditions of Australia were favourable for the construction of artesian wells, by which many portions of the country now quite uninhabitable from want of water might become fertile, and be capable of supporting a considerable population.

This view, which was long considered improbable, has now been proved to be to some extent correct, and its further development may be of vital importance to the future of Australia. Among the wells which have now been bored the following are the most remarkable. At Buckalow Station, near the Stanley Range, close to the boundary between New South Wales and South Australia, a plentiful supply of water was obtained at 160 feet deep. In the cretaceous deposits of Queensland near Mount Wilson a boring of 488 feet was made, and the water rose to within 90 feet of the surface; while at Wee Watta, in a bore 144 feet deep, the water rose 26 feet above the surface and discharged 60,000 gallons a day. But the most remarkable results have been obtained in South Australia, where in some of the most arid districts true artesian wells have been found. Thus in the ninety-mile desert crossed by the Intercolonial Railway to

Victoria, water was obtained in 1886, and flows above the surface. In the interior along the Northern Telegraph line and Transcontinental Railway there are already four large wells, the water from which flows above the surface in large quantities. At Hergott 100,000 gallons a day, at Coward 1,250,000 gallons, at Strangways 1,250,000 gallons, and at Mungamurtiemurtie 53,000 gallons, the last mentioned being 580 miles from Port Augusta, or almost in the centre of the desert interior. The Water Conservation Department of the South Australian Government has now ten drills in constant use, capable of boring holes from 3 to 13 inches diameter, and to a depth of 3000 feet. The excellent results already obtained afford promise of a great future for the apparently uninhabitable desert interior, since water alone is required in sufficient quantities for irrigation to render it abundantly fertile.

For some hundreds of miles to the north of Lake Eyre there is a limestone formation in which the whole country is studded with what are called "mound springs." Mr. Giles describes these mounds as being usually about 50 feet high, and ornamented on the summit with clumps of tall trees or bulrushes. They are natural artesian wells, through which the water forced up from below, gushes out over the top to the level ground, where it forms small water-channels. Some of the mounds have little lakes on their summits large enough to bathe in. Some of these springs are perfectly fresh and good, but others are more or less saline, being impregnated with various minerals, though seldom to such an extent as to render the water unfit for animals. It is this mineral or earthy matter brought up by the springs which has gradually built up the conical mounds from the summits of which they issue, just as volcanic cones have been built up by ejections from the earth's interior. They are, in

fact, water-volcanoes, in which the water rises from a moderate depth, and they afford good proof of large subterranean reservoirs, which are only able to reach the surface where the porous limestone allows them an exit.

15. Origin of the Drifts and Alluviuma.

It was probably while the last great physical changes were in progress in the interior of the country that another kind of denudation and deposition was taking place on the slopes and plateaus of the eastern mountains, resulting in the "gold drifts," whose origin we have already sufficiently explained as due in great part to successive lava-flows intercepting local drainage and checking the dispersal of the detritus of the Silurian rocks. Some of the drifts on the east coast have been found to be below the sea-level; and this supports the view that the whole country was elevated rather than depressed during the later Pliocene period. Near Smythesdale, in the Ballarat district, a number of fossil fruits were discovered at a depth of 150 feet, in a layer of black clay,—probably an old surface soil, just above the gold-bearing gravel. Baron von Müller, the Government botanist, considers these to be all of extinct genera, but allied to various plants now living in the more tropical parts of Australia. The facts all point to their being at least as old as the later Pliocene, and the more tropical aspect is quite consistent with the country having been somewhat more elevated, if the general climate was then, as in the Northern Hemisphere, either warmer or more uniform. In the interior plains, both of New South Wales and Victoria, plant remains have also been found in gold-drifts, at various depths, all indicating that the country has never been submerged beneath the sea during the whole period of their formation.

Some of the sea-cliffs also, near Cape Howe, formed of sand and clay, are full of plant remains; clearly indicating a former much greater extension of the land in this direction, admitting of the formation of lacustrine deposits of great thickness.

The alluvial deposits in caves and on the interior plains, with their wonderful fauna of extinct animals of huge size, but allied to those still living in Australia, carry down the history of the country to the period immediately preceding the human epoch, and add their confirmation to the view, that during the later stages of the Tertiary epoch the country must have been more extensive, more fertile, and in every way more fitted to support an abundance of animal life, than it is now. We may very reasonably impute the extinction of so many of these animal forms, to the last great deterioration of the climate which reduced so much of the interior to the condition of a desert, and rendered vast tracts of fertile country subject to severe and protracted droughts, almost equally inimical to animal life.

In addition to the proofs of subsidence already adduced, we must add that afforded by the Great Barrier Reef, which stretches for 1200 miles along the eastern coast of tropical Australia, at a distance of from 20 to 90 miles. On the outer side the sea-bottom sinks abruptly to a depth of 2000 feet or more, and this may be taken as a measure of the subsidence since it began to form. The manner in which the reef increases in width from north to south, renders it probable that the subsidence has been greater as we go southward, and this agrees with the belief of Australian geologists, that the eastern side of Australia has been greatly reduced by subsidence and denudation.

It thus appears that alike on the west, south, and

east, there are indications that Australia was formerly more extensive and more elevated ; and we have seen that this wider area and greater altitude offer the best explanation of its many geological peculiarities, while they are absolutely indispensable to a comprehension of its wonderful development of animal and vegetable life, of whose richness and variety we only now behold the diminished remnant.

The period of subsidence has probably now ceased, and in the south and west of Australia elevation appears to have taken its place. In the district east of the Murray in South Australia, recent shells are abundant for 50 miles inland, and to an elevation of a few hundred feet, and raised beaches are found in various places all along the coast. The land too is still believed to be rising, for reefs off the coast have become more extensive, and soundings have decreased several yards in the last fifty years, though it does not appear that any actual difference of the water-level has been noticed at the seaports ; so that the changes last referred to may be due to a change in the sea-bottom rather than to any general elevation of the coast. There can be no doubt, however, that there has been a recent slight elevation of land in many parts of Australia.

CHAPTER V

THE AUSTRALIAN ABORIGINES

1. Physical Characteristics.

ALMOST as peculiar and isolated as its flora and fauna are the black aborigines of Australia, who are now rapidly disappearing before the European settler, and whose low social culture, recalling the earliest stages in the history of the human race, stands in strange though by no means exceptional contrast to their fully developed speech. The portion that still survives is split up into a considerable number of tribes, forming collectively a special type, to be carefully distinguished both from the dark, woolly-haired Papuans, and from the brown or olive-yellow, lank-haired Malays and Polynesians.

On the whole the Australian falls little short of the average European in height, while far inferior to him in muscular development, the limbs being thin and excessively lean, combined sometimes with an abnormal corpulence. The bones are delicately formed, and there is the usual small development of calf so characteristic of the dark races generally. The cranial formation, somewhat finer in the male than in the female sex, is on the whole narrow and lengthy, with high cheek-bones, the lower portion of the forehead about the brows projecting, the

upper receding rapidly. The nose, narrow at the root, thereby causing the eyes to appear drawn together, be-



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comes broader and somewhat squat farther down. The ears are inclined a little forward, the mouth is large and

unshapely, while the teeth are, on the contrary, fine and white, the upper row, like the upper lip, mostly overlapping the lower. The jaw-bone is contracted, the chin small and retiring, the complexion oftener coffee-brown or very dark copper colour than actually black, the hair richly developed, not only on the head, but on the whole body, the men showing a thick growth of beard and whiskers. The pitch-black hair itself is somewhat curly, without, however, being woolly, and when cleaned from the mass of grease and dirt that usually clogs it, is fine and glossy. The effluvium arising from the skin, in itself peculiarly offensive to our sense of smell, is rendered still more unendurable by the body being greased with the oil of various large species of fish. The duration of life rarely exceeds fifty years.

2. Mental Qualities.

The mental qualities of the Australian may be pronounced fairly developed, though decidedly inferior as compared with those of many other savage races. In everything pertaining to daily life he displays uncommon skill, and his arms and implements, though highly primitive, are still well adapted to their purpose, and are used with great ingenuity in the pursuit of game. In fact, the native is almost unrivalled in tracking and running down his quarry; hence may be employed in such arts as call for mere mechanical dexterity. He is an excellent sportsman and herdsman, and not a bad artisan, provided the work is carefully and clearly explained to him beforehand. Possessing a considerable imitative faculty, he easily acquires foreign tongues, and even displays a rude talent for art. In caves on the north-eastern coast have been found tolerable figures of sharks, porpoises, turtles, lizards,

starfish, canoes, and of some quadrupeds. On some flat rocks in New South Wales are figures of men dancing, as well as of kangaroos, sharks, and other animals, and many native implements are rudely ornamented with carved designs. It is stated, however, that they are quite unable to recognise accurate portraits of themselves, while rude outlines with the head greatly enlarged are appreciated. The higher mental qualities of foresight and self-restraint are very slightly developed. No care is taken for the morrow, and life is passed in alternations of eating and sleeping, hunger and the chase. Each recurring winter brings famine and privation, but no attempt is ever made to store up food in time of plenty.

The opinions of different writers and travellers as to the mental and moral characteristics of the Australians are very divergent. Sir Thomas Mitchell does not think them by any means the lowest in the scale of humanity, adding that he found those who accompanied him in his journeys superior in penetration and judgment to the white men of the same expedition. Mr. Eyre found them to be frank, open, and confiding, and easy to make friends with. He declares that they have been greatly misrepresented and traduced, and that much of their assumed treachery and bloodthirstiness is the result of the cruelty and ill-treatment of the settlers. Sometimes they display the greatest cruelty and heartlessness, while in other cases they are affectionate and generous. They often show great affection for their male offspring, giving up to them the choicest food, carrying them when they are weary, and lamenting their death for months or even for years. Yet their old men and women are often abandoned when ill or wounded, and their wives are treated with the most atrocious barbarity. Although an unmitigated selfishness seems to be the ruling principle of their actions, yet

in certain cases they give up self for the good of others. A successful hunter always shares his game with the rest of the tribe, even taking the worst and smallest portion himself; yet when unsuccessful and hungry he will cruelly beat or spear his wife, and if severely pressed by famine kill and eat his own children. No such virtue as female chastity is recognised; and as a wife is treated solely as a slave, and severely punished whenever the husband's wants are not fully supplied, it is not to be wondered that infanticide should be common. The rights of property are recognised, and form the sole foundation of morals; and wives, being property, are wholly subject to their masters. No one takes a woman's part, even though known to be quite innocent of that for which she is punished. And their punishment is most fearful. They are knocked on the head with heavy clubs, speared through the legs and arms, or deeply gashed with flints in various parts of the body; so that an Australian woman is usually a mass of scars, and the majority are said not to live much beyond the age of thirty.

Summing up the mental characteristics of the Australian aborigines, Mr. Wake says: "It is evident that these people are, as compared with more advanced races, in the condition of children. Among all the tribes, whether the more hostile ones of the East, or those which in the West appear to give evidence of a milder disposition, there is the same imperfect development of moral ideas. In fact, none of them have any notion of what we call morality, except the simple one of right and wrong arising out of questions of property. With this moral imperfection, however, the Australian natives exhibit a degree of mental activity which, at first sight, may be thought inconsistent with the childish position here assigned to them. It is evident, however, that this

activity results from the position in which the Australian is placed. Extremely indolent when food is plentiful, when it is scarce the greatest exertions can be made for its acquirement, and the repeated exercise of the mind on the means of accomplishing the all-important end of obtaining food, has led to a development of the lower intellectual faculties somewhat disproportionate to the moral ideas with which they are associated.”¹

Other writers give a rather more favourable estimate. Mr. Curr, who for more than forty years was in constant communication with them, and, having been for many years “Protector of the Aborigines” in Victoria, had excellent opportunities of observation, thus describes them :—

“The Black, especially in his wild state, is quicker in the action of his mind, more observant, and more self-reliant than the English peasant, but less steady, persevering, and calculating. In our aboriginal schools it has been found that the pupil masters reading, writing, and arithmetic more quickly than the English child. He will also amuse himself with reading stories as long as he is under the influence of the Whites. At this point, however, he stops. Could our Blacks part with their knowledge of reading and writing, I am persuaded that they would do so for a trifle. As for their Christianity, it seemed to me to begin and end with singing psalms. . . .

“Socially, the Black is polite, gay, fond of laughter, and has much *bonhomie* in his composition. As regards courage, he is inferior to the White man, for though his nerve is superior his resolution is less. His tactics in

¹ C. S. Wake on the Mental Characteristics of Primitive Man as exemplified by the Australian Aborigines. *Journal of the Anthropological Institute*, vol. i. p. 74.

war are such that he will never undertake an enterprise in which the death of even one of the party is inevitable, or nearly so. Hence no Blacks, however numerous, will attempt to rush a hut in which there is one armed man on guard. On the other hand, a Black has been known, in a place far removed from civilisation, to resist, single-handed, the advance of an exploring party with the greatest intrepidity, though the horses must have seemed to him goblins or devils.

"Touching the moral feelings of the Blacks, writers say little or nothing; but observation has convinced me that they are not without them nevertheless, though they are much blunted from constant repression, and that they discriminate between right and wrong, though unable to formulate the difference. I believe their horror of consanguineous marriages proceeds from a feeling of this sort which they are unable to analyse or explain. I am convinced from personal observation that, after the perpetration of infanticide or massacres, though both are practised without disguise, those engaged in them are subject to remorse and low spirits for some time afterwards."

It has been observed that the natives are very strict in obeying their laws and customs, even when alone among Europeans, where the offence would be unnoticed, and even under great temptation. Thus the young are forbidden to eat certain kinds of food, and even when suffering from hunger nothing can induce them to partake of such. The horror of marrying a woman within the prohibited degrees of relationship, the extreme grief they manifest at the death of children or relatives, and sometimes even for white men, as illustrated by the native boy who was the sole companion of the unfortunate Kennedy when he was murdered, are sufficient to indi-

cate that they possess affections and a sense of right and wrong not very different from our own.

3. Clothing, Dwellings, and Food.

In most places the Australians go quite naked, and seem almost wholly unconscious of the sense of shame. In the south, during the cold season, they wrap themselves in a mantle of kangaroo skins, covering the shoulders and back; while when traversing thorny scrubs they sometimes use an apron of skins as a protection, though they never adopt such an article of clothing for decency. No covering to the head is ever worn, though it is always more or less decorated with teeth, fish-bones, feathers, or the bushy tail of some animal. A girdle of hair is worn for the purpose of supporting the dowak or digging-stick and the apron when required, and a similar band is often tied round the head to keep the hair out of the eyes, though this object is sometimes obtained by plastering the hair with a mixture of fat and ochre.

Of all the more extensive races of mankind there is perhaps none whose dwellings are inferior in construction, comfort, or permanence, to those of the Australians. In parts of the country where caves and rock-shelters abound, some of the tribes are true **cave-dwellers**; but for the most part they construct rude huts or screens of twigs and bushes, sometimes covered over with bark, foliage, or turf, so as to keep out the rain. As they are constantly wandering about, these huts are never permanent constructions, but are hastily put together to afford shelter for a few weeks or months in some locality where food can be obtained. Most of them are very small and low, just sufficient for a single family to shelter under; but occasionally long huts are met with in which

from five to ten families sleep in common. During the fine Australian summer they live without any shelter. Where the gum trees grow to a large size, pieces of bark are obtained from them sometimes 12 feet long and 8 or



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10 wide, which alone form a sufficiently good hut. More rarely huts are built of logs of wood and turf under the slope of a hill, so substantial that they can be ridden over on horseback.

In erecting the hut or shelter great care is taken to place it with the back to the wind, so that the smoke from the fire in front may not incommodate the occupiers. Should the wind change the hut is taken down and

rebuilt, an operation which requires a very short time. During settled fine weather a break-wind of boughs or a similar shelter from the sun is all that is required.

Living so nearly like the animals, the Australian native suffers little from the inclemencies of weather, although in the southern parts of the continent the cold at night is considerable; and even in the interior, not far from the tropic, Mr. Giles observed the thermometer to sink at night to 18° F., while thick ice was formed on exposed water. Mr. Curr states that he once saw two black boys asleep covered only with a single shirt, while around them the ground was white with hoar frost, and ice of considerable thickness was found in the camp utensils.

The food of the native Australians is very varied, and is generally obtained in tolerable abundance. Of animal food they eat almost everything living, even those creatures most repugnant to civilised peoples. All the mammalia and birds of the country are of course eaten when they can be caught; but besides these, lizards, snakes, and frogs are highly esteemed, as well as the larvae of many insects, white ants which are very abundant and are eaten alive, and even a kind of moth which is sometimes caught in great quantities, and whose body is a fat and delicious morsel. Frogs are dug out of swamps or caught in ponds, and devoured in all stages from the tadpole upwards. All kinds of snakes are esteemed, the head alone being rejected. Fish are caught in the rivers or sea; as well as many kinds of shell-fish, especially mussels. The common mode of cooking is to roast the animal, if small, by throwing it for a few minutes on the embers; but the intestines and fat are often eaten raw. All kinds of eggs are highly esteemed, and both these and flesh are often eaten in a state of semi-putrefaction. Occasionally the

earth-oven is used to roast animals whole; and sometimes even water is thrown on heated stones, and then covered up with the vegetables and other food—the most perfect form of cookery among the Australian natives, who have never so far advanced as to make the rudest pottery, and are thus quite ignorant of the use of boiling water for culinary purposes. A large variety of vegetable food is also obtained, although no country is less productive than Australia in fruits or vegetables acceptable to Europeans. But even in the most sterile parts of the country the inhabitants manage to obtain food. One of the best vegetables consists of the roots of a species of wild yam, which is in some districts very abundant, and often more than 3 feet long. Next in importance is the *Typha latifolia*, a species of bulrush. It is dug up by the women, the roots roasted, then pounded and kneaded into small cakes. The young leaves of the grass-tree also furnish abundance of food. Many other kinds of roots are eaten, and in some cases the bark or outer skin of the roots of trees is roasted. There are a few eatable fruits and berries. The seeds of the *Acacia sophoræ* and of many other Leguminosæ; the gum of several acacias, the fleshy leaves of mesembryanthemums; various species of herbs, such as nasturtium, cardamine, and chenopodium, which often cover acres of ground on the banks of rivers and on flooded grounds; several kinds of fungi, and manna from the leaves of *Eucalyptus mannifera*, all supply food in more or less abundance. Honey, too, is obtained from banksia flowers, from the body of the wild bee, and from its nest, which is found by gumming a small white feather to a captured bee and then following it till the store of honey is discovered.

As illustrating the variety of food obtained by the natives, Sir George Grey informs us that in West

Australia, besides almost every kind of mammal, bird, fish, reptile, shell-fish, and grubs, as well as the eggs of every bird and lizard, they have a very varied assortment of vegetable food. These include twenty-nine different roots, seven kinds of fungus, four of gum, two of manna, four nuts of palms and other trees, and the seeds of several leguminous plants. Some writers have supposed that the gum is only resorted to in cases of scarcity, but Sir George Grey assures us that they consider it as a luxury, and make special expeditions to obtain it in large quantities ; and he assures us that, with few exceptions, the natives procure abundance of food at all seasons of the year. The population being very scanty, and the district occupied by each tribe very extensive and considerably varied, they are able to utilise all the different animal and vegetable productions it contains by visiting each part in succession at the proper season. They thus obtain a considerable variety in their food from one season to another, and the change of scene and occupation in obtaining it must render the life of the native Australian an exceedingly interesting and enjoyable one.

Much ingenuity is shown in discovering water, and natives will live for months where Europeans will die of thirst. Not only is every spring and rock-hole in the country known, but water is often obtained in the driest sand by making excavations 10 or 12 feet deep. Even where no water can be obtained by these means, the Australian will support life on the water to be obtained from the roots of certain trees and shrubs. These are followed through the sandy soil for 20 or 30 feet, and on being extracted and broken into small pieces exude a sufficiency of water to satisfy the thirst ; while at other times the dew collected on long grass is utilised for the same purpose.

4. Cannibalism.

There can be no doubt that in almost all parts of Australia cannibalism has been occasionally practised before the advent of Europeans, while in some tribes it is even now a prevalent custom. It occurs generally at times when animal food is scarce, and when an exclusive vegetable diet, without salt, excites a craving for flesh. When young persons are killed by accident or in war, their flesh has been known to be devoured, while sometimes children, and even wives, are killed for the purpose.

In Northern Queensland Mr. Carl Lumholtz, who lived alone among the natives to study their habits, declares that they made no secret of their fondness for human flesh, and that they often made expeditions solely to procure it. They have a special fondness for certain parts of the body, but the greatest delicacy of all is the fat about the kidneys. They usually kill strangers of another tribe, but in some cases they will also eat those of their own tribe, or even of their own family. Many Chinese were killed and eaten in Northern Queensland, and they are much esteemed by the Blacks, probably because they are usually fat.

5. Weapons and Tools.

The weapons of the Australian exhibit more ingenuity and skill than their houses, their clothing, or their mode of cookery. They are, it is true, entirely ignorant of the bow and arrow; but they possess weapons of their own which exhibit an equal amount of invention—the boomerang and the throwing-stick.

By far the most important weapon is the spear, which

under various forms is in universal use all over the Continent, and takes the place of the more effective bow and arrow of New Guinea and of most of the American Indians. Some of the spears used only in war with other tribes are 8 or 9 feet long, and often 4 pounds in weight. Some have barbs cut out of the solid extending about a foot from the point, others have sharp flints or pieces of quartz fastened by strong gum in two grooves near the point. These are thrown by hand or are used occasionally as lances. Fishing spears are somewhat shorter and barbed with a piece of bone neatly tied on to the point. A very heavy spear is sometimes used for killing the emu. The hunter ascends a tree, in a position where the birds are likely to pass to get water, and lying concealed among the branches, plunges the weapon into its back as it passes beneath him.

The most common and most useful weapon, both in hunting and war, is the light spear used with the throwing-stick or *wommera*, as it is now generally termed in Australia, owing to that being the native name among the tribes near Sydney. This is a piece of wood from 20 inches to a yard long, usually much thicker in the middle, narrowed to a convenient size for grasping at one end, while at the other a hook or notch is formed to receive the lower end of the spear. This hook is either cut out of the solid wood or formed separately, and tied on with sinews. The lower end of the spear has a hollow which receives the point or tooth formed by the notch at the end of the *wommera*. This is inserted by the native quickly and mechanically, the throwing-stick and the spear then lying parallel to each other; but while the former is grasped firmly in the hand the latter passes between the fingers so as to be let go when thrown. The heavy spears can be thrown by the hand from 50 to 70

feet, while the light reed spears thrown by the *wommera* will reach 70 or 100 yards, though at these distances they are very easily avoided by a native. At 50 yards, however, they can be thrown with accuracy and effect.

Undoubtedly one of the most remarkable of savage weapons is the boomerang, as it is constructed and used in Australia. It consists of a flat piece of hard wood about the size and form of a very broad scimitar, often somewhat irregularly or angularly bent in the middle, flat on one surface and a little rounded on the other. It is made of a piece of wood naturally curved, and is thus very strong, and when made for use in war is comparatively large and heavy, with pointed ends, and when properly thrown is capable of inflicting very serious wounds. The smaller boomerang used in the chase, and especially for killing some kinds of birds, is more angularly bent in the middle, and the ends are slightly twisted in opposite directions. This gives it the remarkable property of changing its course while in the air, and of finally returning towards the thrower. As illustrating the use of this weapon the following account by Sir George Grey is very interesting:—

“Perhaps as fine a sight as can be seen in the whole circle of native sports is the killing cockatoos with the *kiley* or boomerang. A native perceives a large flight of cockatoos in a forest which encircles a lagoon; the expanse of water affords an open clear space above it, unencumbered with trees, but which raise their gigantic forms all around, more vigorous in their growth from the damp soil in which they flourish; and in their leafy summits sit a countless number of cockatoos, screaming and flying from tree to tree, as they make their arrangements for a night's sound sleep. The native throws aside his cloak, so that his motions may not be impeded, draws his *kiley*

from his belt, and, with a noiseless elastic step, approaches the lagoon, creeping from tree to tree, from bush to bush, and disturbing the birds as little as possible; their sentinels, however, take the alarm, the cockatoos farthest from the water fly to the trees near its edge, and thus they keep concentrating their forces as the native advances; they are aware that danger is at hand, but are ignorant of its nature. At length the pursuer almost reaches the edge of the water, and the scared cockatoos, with wild cries, spring into the air; at the same instant the native raises his right hand high over his shoulder, and, bounding forward with his utmost speed for a few paces, to give impetus to his blow, the *kiley* quits his hand as if it would strike the water, but when it has almost touched the unruffled surface of the lake, it spins upwards with inconceivable velocity, and with the strangest contortions. In vain the terrified cockatoos try to avoid it; it sweeps wildly and uncertainly through the air, and so eccentric are its motions, that it requires but a slight stretch of the imagination to fancy it endowed with life, and with fell swoop is in rapid pursuit of the devoted birds, some of whom are almost certain to be brought screaming to the earth."

Mr. Carl Lumholtz thus describes the use of the boomerang in Western Queensland: "When an Australian is throwing a boomerang, he seizes one end, which is usually made rough in order to afford a better grip, and holds it backward in such a manner that the concave side of the weapon turns forward. Grasping it firmly, he runs a couple of paces forward, and then throws his boomerang in a straight line before him. The moment it leaves his hand it turns into a horizontal position, and starts off, buzzing like a spinning-wheel. While going with great speed it revolves round its own axis, and in this manner

takes a slanting direction upward through the air. It does not return the same way as it went, but curves toward the left, and thus describes an ellipse. Gradually it loses its momentum, and so falls slowly, sometimes only a couple of paces from its starting-point.

"Dexterity rather than strength is needed to throw the boomerang with success. Above all it is important to hold it firmly till it is suddenly let loose. It cannot fail to astonish everybody to see how far, and at the same time gracefully, this weapon can whirl through the air. . . . The natives frequently make the boomerang touch the ground ten or twelve paces from where it is thrown; but this, far from diminishing the speed, gives it, on the contrary, increased velocity. It may even touch the ground a second time, and then whirl off in the above-described circle from the right to the left. It is impossible to aim accurately with the returning boomerang; with the plain one, which does not return, it is much easier to do so, and the mark is not missed."

Although this weapon in its highest development, when twisted so as to return, is altogether peculiar to Australia, the war weapon is not unlike that used by the ancient Egyptian fowlers, who are represented in their pictures throwing a flat curved stick into the midst of a flight of wild ducks. This weapon appears to be still used by some of the Abyssinian tribes. Sir Samuel Baker says: "There is a curious weapon, the *trombash*, that is used by these people, somewhat resembling the Australian boomerang; it is a piece of flat hard wood, about 2 feet in length, the end of which turns at an angle of about 30°. They throw this with great dexterity, and inflict severe wounds with the hard sharp edge; but unlike the boomerang, the weapon does not return to the thrower." This last-named peculiarity, however, is a

refinement, and the above description will very well apply to the war boomerang. The twist which causes the weapon to whirl and return may have been discovered by accident, or, as Carl Lumholtz suggests, by imitating the curve in the leaves of one of the acacias, which resemble the boomerang in shape, and which, when flicked with the finger, will start off and then return. The natives also use pointed sticks about 2 feet long to throw at game, and when taken unawares will break off any stick for the purpose, and may thus by accident have learnt the use of the flat curved form peculiar to the boomerang.

Clubs for attack at close quarters and shields for defence from spears complete the Australian's weapons. Clubs of various kinds are formed of heavy wood, some sharpened like swords, or with pieces of sharp flint let in to form a cutting edge. Long and narrow shields are made, which are very skilfully used in stopping spears. Owing to the natives having no cutting tools but flint and shells, the labour bestowed on some of these weapons is enormous. Their spears and boomerangs are repeatedly heated and straightened, and each time proved till the owner is satisfied. The clubs and shields are often cut out of solid blocks of wood. Mr. Oldfield found a large gum-tree with an enormous excavation in it about ten feet from the ground. This cavity was about five feet long, three broad, and the same in depth, cut somewhat obliquely so as to follow the grain of the wood, and having in its centre a mass of wood in the form of a native shield. It had evidently been intended to detach this completely from the tree, but either some defect was found in it, or the workman was prevented from finishing his task. The excavation had been made deep enough to go beyond the sap wood, and it was calculated that about

30 cubic feet of timber had here been absolutely scraped away, the only tool used having been a piece of flint fixed in a handle.

Among the various tools and implements used by the Australians are stone hatchets of several kinds, digging sticks, spades, bone awls for boring skins, netting needles, nets made of sinews, fibres, or hair, baskets and mats, water-skins and cloaks of opossum or kangaroo skin. The flint tools are shaped by means of a wooden hammer, and they are secured in their handles chiefly by means of a hard and tenacious cement made from the gum of the grass-tree, tempered by fire, kneaded, and mixed with powdered charcoal. Canoes are formed from the bark of gum-trees, about fifteen feet long, three feet wide, and eight inches deep, held open by cross sticks. These are used on the Murray and in many parts of the south coast, but in the west canoes seem to be quite unknown, and in the north and north-east they are dug out of tree trunks. Some tribes make fish-hooks, which are never used by others. The whole household goods of the Australian savage often consist only of a dowak, or short club, and some spears carried by himself, and a few digging sticks with a small net bag carried by his wife. This bag usually contains a few packages of pigments, some pieces of flint, a piece of the Xanthorrhoea gum, some sedge and kangaroo-tail sinews for sewing, opossum teeth or bone needles, and scallop shells for drinking.

As the tribes of various parts of the country continually come in contact with each other during their wanderings, they obtain by barter products which their own district does not supply. Thus the Watchandies of West Australia buy a particular kind of fishing-net, shells for drinking-vessels, and a much-esteemed kind of flint from the north; boomerangs, shields, and red ochre from

the south; and a kind of pipeclay used as a mourning pigment from the east. In return they supply the northern tribes with ty-a-lo—the gum from the Xanthorrhœa or grass-tree; to the southern men they give the beautiful rose-coloured crests of a species of cockatoo; and to the eastern men flints. Of these articles the flints and red ochre are the most valued, owing to their being found in few localities, while they are both necessities of savage life. The native Australian can never have too much of these, as they can always be exchanged for other articles, and thus to some extent supply the place of money. Fire is obtained by rubbing together two pieces of wood, but as this is laborious and almost impossible in very wet weather, they take great care to prevent their fires from becoming totally extinguished, and should this occur, will prefer to go to a neighbouring encampment to procure it. It is even stated that some tribes cannot procure fire for themselves, but this is very improbable.

6. Occupations and Amusements.

The life of the Australian native is one of alternate abundance and privation, idleness and activity. The chief occupations of the men are hunting and war; of the women the procuring of vegetable food and cooking. In hunting and fishing great ingenuity is shown, either alone or in combination. Kangaroos are either speared, netted, or caught in pitfalls. Hunts are sometimes arranged by large parties, in which the game is skilfully driven down ravines or valleys, along which hunters are secreted at intervals to spear the animals as they pass. Rude fences of bushes are often made to leeward of thickets, in which a few openings are left; and on the game being driven by a party to windward, it makes for

these openings and is there speared or captured. Trees are climbed to get opossums out of their holes; while wombats and other burrowers are dug out of the ground. Birds are wounded by the boomerang, or are caught in nets or snares. Long nets are often suspended between trees over water, and wild ducks driven into them, the birds being made to fly low by a native secreted in one of the trees imitating the cry of a hawk as they approach. Others are snared by nooses suspended from reeds. Fish are caught with nets of various kinds, or, by some of the tribes, with hooks and lines. Weirs too are constructed; or the fish are speared from a canoe by firelight. During the summer the Australian obtains an abundance of food, and lives luxuriously, but in the wet season it is much more difficult for him to procure either game or vegetable food, and he often passes months in a state of semi-starvation. The making of weapons and tools, digging for water and building houses or canoes, complete the usual occupations of the men; while the women are laboriously employed in digging up roots or tubers, searching for fruits or cresses, collecting shell-fish, grubs, ants, and other such eatables, procuring firewood, carrying water, making nets and bags, preparing skins for clothing, and carrying the whole household wealth whenever the family or tribe are moving about.

The following enumeration by Sir George Grey of the usual contents of a native woman's bag will further serve to illustrate the life of the Australian savage, and show what a heavy burden, in addition often to a child, the women have to carry: "A flat stone required for the pounding of roots; earth of a peculiar quality used to mix with the roots; pieces of quartz for making spears and knives; stones suitable for hatchets; prepared cakes of gum for fixing or mending weapons; kangaroo sinews

for tying on spear-heads or for sewing; needles made of the shin-bones of kangaroos; opossum hair to be spun into waist-belts; the shell of a kind of mussel to cut hair, etc.; a knife and hatchet; pipeclay, red ochre and yellow ochre; a piece of bark to carry water in; waistbands and spare ornaments; banksia cones or pieces of a dry white fungus to kindle fire rapidly, or to carry it from place to place; some lumps of grease; their husband's spare weapons, or pieces of wood for making them." Skins partially prepared are carried in a bundle on the back, forming a sort of pad for the heavy bag to rest on; and besides all this, the woman has to carry whatever roots she may collect on the journey, and usually a lighted fire-stick, with which to quickly prepare a fire for the evening meal.

The account given by Sir George Grey of one of the native modes of hunting is so admirable, and gives such a vivid picture of Australian habits and life, that it must be quoted in full:—

"The moment an Australian savage commences his day's hunting, his whole manner and appearance undergo a wondrous change: his eyes, before heavy and listless, brighten up, and are never for a moment fixed on one object; his gait and movements, which were indolent and slow, become quick and restless, yet noiseless; he moves along with a rapid stealthy pace, his glance roving from side to side in a vigilant, uneasy manner, arising from his eagerness to detect signs of game, and his fears of hidden foes. The earth, the water, the trees, the skies, each are in turn subjected to a rigid scrutiny, and from the most insignificant circumstances he deduces omens—his head is held erect, and his progress is uncertain; in a moment his pace is checked, he stands in precisely the position of motion as if

suddenly transfixed, nothing about him stirs but his eyes, they glance uneasily from side to side, whilst the head and every muscle seem immovable, but the white eyeballs may be seen in rapid motion, whilst all his faculties are concentrated, and his whole soul is absorbed in the senses of sight and hearing. His wives, who are at some distance behind him, the moment they see him assume this attitude, fall to the ground as if they had been shot; their children cower by them, and their little faces express an earnestness and anxiousness which is far beyond their years; at length a suppressed whistle is given by one of the women, which denotes that she sees a kangaroo near her husband—all is again silence and quietude; and an unpractised European would ride within a few yards of the group, and not perceive a living thing.

"Looking about a hundred yards to the right of the native, you will see a kangaroo erect upon its hind legs, and supported by its tail; it is reared to its utmost height, so that its head is five or six feet above the ground, its short fore-paws hang by its side, its ears are pointed, it is listening as carefully as the native, and you see a little head peering out from its pouch to inquire what has alarmed its mother; but the native moves not, you cannot tell whether it is a human being or the charred trunk of a burnt tree that is before you, and for several minutes the whole group preserve their relative position; at length the kangaroo becomes reassured, drops upon its fore-paws, gives an awkward leap or two, and goes on feeding, the little inhabitant of its pouch stretching its head further out, tasting the grass its mother is eating, and evidently debating whether it is safe to venture out of its resting-place, and gambol about amongst the green dewy herbage.

" Meanwhile the native moves not until the kangaroo, having two or three times resumed the attitude of listening, and having like a monkey scratched its side with its fore-paw, at length once more abandons itself in perfect security to its feed, and playfully smells and rubs its little one. Now the watchful savage keeping his body unmoved, fixes the spear first in the throwing-stick, and then raises his arms in the attitude of throwing, from which they are never again moved until the kangaroo dies or runs away ; his spear being properly secured, he advances slowly and stealthily towards his prey, no part moving but his legs ; whenever the kangaroo looks round he stands motionless in the position he is in when it first raises its head, until the animal, again assured of its safety, gives a skip or two, and goes on feeding ; again the native advances, and this scene is repeated many times, until the whistling spear penetrates the devoted animal ; then the wood rings with shouts ; women and children all join pell-mell in the chase ; the kangaroo, weak from loss of blood, and embarrassed by the long spear which catches in the brushwood as it flies, at length turns on its pursuers, and to secure its rear places its back against a tree, preparing at the same time to rend open the breast and entrails of the enemy by seizing him in its fore-paws, and kicking with its hind-legs and claws ; but the wily native keeps clear of so murderous an embrace, and from the distance of a few yards throws spears into its breast, until the exhausted animal falls, and is then soon despatched ; when, with the assistance of his wives, he takes its fore-legs over his left and the hind-legs over his right shoulder, and totters with his burden to some convenient resting-place, where they can enjoy their meal."

Their amusements consist chiefly of spear-throwing,

dancing, story-telling, string-puzzles, and singing ; and in adorning themselves with paint, grease, and feathers,—an adornment confined wholly to the men. The dances usually take place on moonlight nights, and are either warlike, licentious, or in imitation of the motions, habits, and chase of animals. Whole tribes often meet on these occasions, and many ceremonies are gone through. They get greatly excited at these corroborees as they are called, and will sometimes continue the amusement through the whole night.

Mr. Curr says : "The corroboree may be described as a performance which partakes in its characteristics both of a spectacle and of a dance. It generally aims at reproducing in a dramatic way some phase of aboriginal life, and which is calculated to interest the spectator while it immensely pleases the performer. As in all things Australian, the corroboree displays throughout the continent a great similarity in its principal features, whilst details vary considerably, for new features and songs are constantly being invented and old ones forgotten. For the most part the men are the performers, and the women the musicians. Sometimes they have boughs tied to their ankles, feathers in their hair, the down of birds attached to their skin here and there with drops of their own blood, and other ornaments. They also paint themselves with various coloured clays, in all kinds of horrible and fantastic patterns. It is very common for a man to paint himself to represent a skeleton. The dances consist of figures, generally of a warlike character and occasionally lascivious. They are accompanied by appropriate songs. The dancers have weapons in their hands in many of the performances. In some of them they imitate the actions of the kangaroo or emu. On almost all occasions the corroboree takes

place at night on a piece of flat ground selected for the purpose, from which anything that might hurt the feet is removed, and between two fires which light up a certain portion of the forest, and beyond which all is darkness. The scenic effect of this is excellent. The performance entails an immense deal of muscular exertion. . . . The females who are seated around give out during the performance, with a strong nasal accent, the songs proper to the various figures. An old man usually stands near the singers. His duty is to sing the first few words of each song as its turn arrives, and to beat time with two sticks which he holds in his hands. . . . Corroborees, when invented, are often passed on from one tribe to another, and find their way long distances, so that the songs which form part of them are eventually sung by women who, speaking a different language from their author, have no idea of their meaning. In fact, preference is generally given to songs and dances of foreign origin."

7. Government and War.

It is often stated that the Australians are without any form of government other than that of the family, but this does not seem to be quite correct. It is true that they have no hereditary or formally elected chiefs, yet there is an authority in each tribe, and in each subdivision of a tribe, which takes cognisance of breaches of the tribal customs, inflicts punishment for such offences, and decides on war or peace with other tribes.

According to Mr. A. W. Howitt, who has made a special study of this subject, there is in each Australian tribe a local and a social organisation, distinct from each other, and if not kept in view likely to lead to much confusion. Each tribe, as a local entity, occupies a

definite area of country, and uses a common language or dialect. These are often subdivided, sometimes two or three times, each subdivision also having a defined area as its dwelling-place and hunting-ground, and the smaller of these divisions or hordes sometimes includes only two or three families, or even a single family.

But besides these local divisions, there are class-divisions of a very singular kind. The whole tribe is divided into two (or sometimes four or six) classes, each of which has a class name derived from some animal or "totem," as the "Dog," the "Rat," the "Emu" class. Each of these classes, sometimes called clans or totems, is exogamous—that is, each member of it must marry out of his or her class, the members of each "totem" being held to be blood relations. The descent of these classes is in the female line only, every boy or girl belonging to the class of its mother and having the same "totem." On the other hand, the land of each tribe, or subdivision of a tribe, descends in the male line, each boy or girl belonging to the tribe, horde, or family of the father. The Local Organisation is thus patriarchal, while the Social Organisation is matriarchal. This peculiar organisation, or some modification of it, is believed to exist throughout Australia.¹

This organisation and the respect paid to old age (at all events to old men) leads to the form of government, if it may so be called, which prevails in Australia. Mr. Howitt says: "As a matter of course there is in each totem some man who is older than all other men. By reason of this superior age he becomes the head of the totem, and is called (in the Dieri tribe of Central Australia) 'Pina-pinaru'—that is to say, the 'oldest

¹ For further details on this subject see the various papers by Mr. Howitt in the *Journal of the Anthropological Institute* from 1882 to 1890.

of the old,' or also 'the greatest of the great.' He is the head of his totem, and has authority in it as such. But though he is thus the head of his own totem, it does not necessarily follow that he has the greatest authority and influence in it. He may be at the head of his totem by reason of seniority without being necessarily what may be called the headman of it, unless he adds great ability of some other kind." He must be a great warrior, orator, or doctor, to be the recognised headman ; and thus the headman is not always the oldest. It is the headmen of the various totems and of the hordes or subdivisions of the tribe, together with the very old men and the most distinguished of the warriors and orators, and the greatest doctors or wizards, who form the council of the tribe. These hold secret meetings at which they decide all matters affecting the welfare of the tribe, and deal with offences committed against it, or against public morality. Sometimes one of the headmen will be so superior to all the others in bravery, eloquence, and general influence that he will possess almost supreme power in the tribe. Such a man was Jalina Piramurana, the head of one of the totems of the Dieri tribe, but who had acquired supreme control over the whole of it. He is described as a man of extremely polished manners and gestures. He possessed wonderful powers of oratory, making his hearers believe anything he suggested, and at all times ready to execute his commands. It was he who decided disputes, and his decisions were received without appeal. He decided when and where the ceremonies of circumcision and initiation should take place. His messengers called together people from a circle of 100 miles to attend the peace festivals, councils, or other meetings of the chief men of the tribe. He frequently put a stop to disputes or fights, even chastising the

offenders, and not unfrequently being himself wounded in so doing. On such an occasion there would be great lamentation, and the person who had inflicted the wound on him would usually be beaten. Mr. Gason, who knew him well, thus characterises him : " His disposition was not naturally cruel or treacherous, as was that of many of the Dieri, but he was, when not excited, kind, considerate, patient, and very hospitable. . . . I never heard any one speak of him but with the greatest respect, and even reverence." It must have been a man of influence such as this one who in 1830 prevented an attack on Sturt's boat while descending the Darling river. Sturt describes him as rushing up to the foremost of the assailants, seizing him by the throat and pushing him backwards, forcing all who were in the water to return to the bank, and exhibiting a vehemence and agitation that were very striking ; at one moment pointing to the boat, at another shaking his clenched hand in the faces of the most forward, and stamping with passion on the sand.

Under the influence of such recognised authorities as have been now described, the Australian natives strictly follow certain rules of conduct sanctioned by public opinion, which hardly any one is bold enough to infringe. The private property of individuals is rigidly respected, insomuch that every robbery, whether it be of a weapon or a wife, has its appointed punishment, which is generally the having a spear thrust through some part of the body, usually the arm or thigh. The offender generally submits to this punishment, coolly standing still while the injured party spears him in the proper form. In some tribes of Western Australia the punishment for taking away another man's wife is that the offender should hold out his leg while each male of the tribe sticks his spear

into it. This he endures stoically, though the wounded limb becomes a shapeless mass of torn flesh ; but so hardy are these savages that with no remedy but a little fine dust, the wounds, however severe, heal quickly. For the woman there is no fixed punishment, as she is absolutely in the power of her husband, who can beat, maim, or kill her, just as he pleases. There are also many complex rules as to names and marriage ; as to not naming or looking at certain relations ; as to revenging death caused by an enemy ; as to the abstaining from certain foods by women and young persons ; and many other customs whose details would be out of place here.

When one tribe has cause of war with another at a distance, formal notice is sent, and a time appointed, so that the encounter has all the character of a duel according to rule and custom. On such occasions there is much spear-throwing ; but both parties are so skilful and so cautious, that comparatively little mischief is done. Sudden fights, however, sometimes occur during the friendly meetings of tribes, and these are more bloody ; while worst of all are the massacres of small parties surprised or surrounded by hostile tribes.

If a native kills another accidentally, he is punished according to the circumstances of the case, and usually has to submit to be wounded in a similar way himself. Wilful murder is always punished by the death of the murderer, or, in case he escapes, of any of his relatives ; and this rule applies to many other crimes. When, therefore, it is known that any crime which calls for heavy punishment has been committed, great consternation prevails ; and when it is further ascertained that the culprit has escaped every one in the remotest degree connected with him becomes filled with anxiety. The brothers of the criminal conceive themselves to be quite as guilty as

he is, and only those who are quite unconnected with the family of the guilty person feel safe. Little children of seven or eight years old, if, whilst playing, they hear that some murder has taken place, can tell in a moment whether they are liable to be punished, and even at this tender age take their measures accordingly.

The holiest duty a native is called upon to perform is that of avenging the death of his nearest relative. Until he has fulfilled this task he is constantly taunted by the old women ; his wives, if he be married, would soon quit him ; if he is unmarried not a single young woman would speak to him ; his mother would constantly cry and lament she should ever have given birth to so degenerate a son.

Directly, therefore, the funeral ceremonies have been performed, the avenging parties start in pursuit of the murderer, and follow his footsteps. Unweariedly and relentlessly they press like bloodhounds on his track, and with a speed that would scarcely be credited. They sleep at night upon the track that darkness has prevented them from following farther, and pursue it again with the earliest light of dawn. With such energy success is usually attained, and the overtaken criminal falls, pierced by many spears.

Most other crimes may be compounded for by the criminal appearing and submitting himself to the ordeal of having spears thrown at him by all the persons who are sufferers by his offence, or by permitting spears to be thrust through certain parts of his body ; such as through the thigh, or the calf of the leg or the lower arm. The part which is to be pierced by a spear is fixed for all common crimes, and a native who has incurred the penalty usually submits to it, as already described.

8. Religion—Ceremonies of Initiation, Marriage, and Burial.

The Australians have no religion except the dread of ghosts and demons. There is no belief in a supreme deity, and no form of worship. There are even no idols, and no forms of propitiation to the spirits, except that the sorcerers profess to cure diseases which demons are supposed to have produced; for, according to the belief of the Australians, as of most other primitive peoples, all evils and misfortunes are occasioned by wicked spirits and magicians, and hence can be removed only by breaking or counteracting their power. Nevertheless they seem to believe in a future existence analogous to the happy hunting-grounds of other savages; but success in reaching these does not depend on any kind of conduct, but on the deceased person being properly buried. Men who are slain in battle, and their bodies left to rot or be devoured by wild dogs, are supposed to become evil and wandering spirits. A great number of caves, thickets, and even pools of water, are believed to be haunted by such spirits, and will not be willingly approached by natives. Owing probably to the superior power of the white races, and their occupation of many of the best hunting-grounds, it has become a common belief that white men are really the spirits of the natives come to life again; and that they themselves will, after death, change into white men, and enjoy all the privileges of that superior race.

The belief in sorcery plays such an important part in the life of the Australian savage that a few more particulars must be given about it. Every death, except when from extreme old age or from accident, is believed to be due to sorcery, and the sorcerer who causes it has to

be found out and punished. If a man has an enemy and can get possession of a portion of his hair, a fragment of anything he has worn, or even a bit of his refuse food, he takes it to a sorcerer, who by his incantations will cause the enemy to fall sick and to die. In many tribes it is believed that a man may be bewitched by the use of his name, and to avoid this danger, as soon as he becomes a man his name is given up and he is described as the son or brother of such a woman; for the women keep their names, because they are supposed to be less frequently bewitched. When a man is believed to suffer from the enchantments of another tribe the doctor in his own tribe is called upon to counteract it, and if he cannot do so and the man dies, he is sometimes punished by being speared. Sorcerers are also believed to have the power of making rain. If they do not succeed they impute it to the stronger incantations of some other tribe. It is to sorcery, Mr. Curr thinks, that may be traced most of the blood-thirst and brutalities of the Blacks. It causes them to fear and hate every stranger, and to be the enemy of every one not of their own tribe. Many tribes carefully burn the refuse of their food as a safeguard against sorcery; and so much is it dreaded that individuals have been known to die through fear of it.

Notwithstanding their very low condition as regards religious beliefs or practices, the Australians make use of some of the initiatory ceremonies usually associated with religion. Circumcision is used in the north and in the south, but not in West Australia or on the Murray River. In South Australia the males have to pass through three distinct ceremonies of initiation. At about ten years of age the boy is covered with blood from head to foot, several men bleeding themselves for the purpose. This

is to accustom him to the sight of blood. At about twelve or fourteen circumcision is performed ; and when about twenty he has to submit to a process of tattooing or scarring, which is produced by cutting gashes in the back, shoulders, arms, and chest, so as to leave scars or raised cicatrices. These vary for the different tribes, and the scars are sometimes made prominent by the patient lying down with the freshly cut wounds close to a hot fire. On the east coast the two front teeth are knocked out instead of circumcision ; and the septum of the nose is almost universally pierced, and a long bone or other substance thrust through it. In some parts, as on the Murray River, girls are subjected to a horrible process of scarring, the whole back being cut in horizontal bands of gashes made with sharp flints ; and sometimes the belly and arms are treated in the same way. The torture of this operation is dreadful, yet the screams of the patient are the subject of merriment to all around. In most cases, however, the girls voluntarily submit to it, because the scarred back resulting from the process is greatly admired. In some parts of the country both males and females are subjected to other initiatory rites even more horrible and disgusting.

There are no rites of marriage, the wife being obtained either by purchase from the father or brother, or by a forcible abduction. There are, however, certain rules by which marriages are forbidden between parties having the same class-name or totem, while in other cases females are devoted from birth to certain men in accordance with rules and customs not yet fully understood. If these regulations are broken, the woman is killed and often eaten, while the man is subject to a severe punishment by spearing. When a man has once obtained a wife in a proper manner, he is her absolute master. She is

expected to provide him with an ample supply of roots and other kinds of vegetable food, and to be in every way his willing slave. From him she receives nothing but the bones and refuse of the game, and is liable on the slightest caprice to be cruelly beaten or speared ; while, when ill or seriously injured, she is left to die without the slightest compunction. Few women are free from frightful scars on the head, and marks of spear-wounds on the body, while some are completely covered with such proofs of the ill-treatment of their husbands. A good-looking girl is nevertheless much admired, and the result is that she is frequently abducted, or bought and sold ; and thus the early life of a young woman at all celebrated for her beauty is generally one continued series of captivities to different masters, of ghastly wounds, of wanderings in strange families, of rapid flights, of bad treatment from other females amongst whom she is brought, a stranger, by her captor ; and rarely does a girl possess unusual grace and elegance, but she is soon marked and scarred by the furrows of repeated wounds.

Polygamy is practised to a limited extent, some old men having three or four wives ; but owing to the ill-treatment of women, and the infanticide of female children, there is always a surplus of men ; and as women are slaves, who not only add much to the comfort of their masters as providers of food and carriers of burdens, but who also serve as objects on which to give free vent to their brutal passions, they are much coveted. Hence, women are constantly stolen from other tribes, and expeditions for this purpose form one of the chief occupations of the younger natives.

Infanticide is due to a combination of causes, all dependent on the mode of life of the natives. Owing to the

coarse, hard, and indigestible food usually obtained children cannot live upon it till their teeth are fully developed, and on this account their mothers continue to suckle them till they are often three or four years old. During their continual wanderings the women have to carry not only the young children, but also a considerable amount of household goods, and as it is impossible for them to do this if they have more than one child which cannot walk, infants which are born at intervals of less than three or four years are almost necessarily sacrificed. When there is absolute scarcity of food, as in many of the desert regions, these causes are intensified, and infanticide becomes still more frequent.

The mode of burial varies much in different parts of the country. Sometimes a circular grave is made, four or five feet deep, and the body placed in it with its face towards the east; and a high mound is made over it, often covered with bark or thatch. In New South Wales the body is often burned on a regular pile of wood, and the ashes buried. On the Lower Murray the body is placed on a high raised platform of sticks, covered with grass, and left to decay. In the north it is placed in the branches of a tree and covered with bark and mats. Sometimes rude huts of boughs are built over graves. Young children are not buried for months, but the bodies are carried about constantly by the mother till they become dry and mummy-like. Women are often not buried at all, or, if they are, it is without any ceremony, and merely for the sake of getting rid of the body. In some tribes women are killed and eaten as soon as they become old. At burials of men the women-relations cry and lament, and cut themselves with flints and shells; and the graves are often visited by the women for months afterwards, when they always

renew the weeping and laceration. As a sign of mourning they cut or burn the hair off and whiten themselves with pipeclay, sometimes plastering their foreheads and noses with it, or forming a complete plaster cap over the whole head. For females no such mourning ceremonies are permitted.

9. Language.

The languages of the native Australians are very numerous, which is readily explained by the existence of so many isolated tribes, some consisting of only a few families. But notwithstanding their great variety all these idioms seem to be fundamentally connected. But beyond this mutual relationship to each other they have no clear affinity with any other linguistic families of the Old and New World, occupying, like the race itself, an absolutely independent position. They are of poly-syllabic formation, and as the accent generally falls on the penultimate they are by no means inharmonious. Besides this happy outward feature they are also well developed in their inner structure, and are especially rich in expressions for such sensuous phenomena as are most attractive to the savage. On the other hand, they are incapable of expressing abstract conceptions of any sort. Yet they are fully adequate to the limited intellectual requirements of the native, whose world of thought is entirely restricted to the material wants and impulses of his daily existence. It is also remarkable that the Australian, as is evident from his speech, has little sense of number—that is of abstract thought—most of the tribes being able to count only up to three, and some few to five, which then becomes an indefinite expression of multitude. As might be expected from their low mental culture, their national

poetry is of a very humble order, their songs consisting of short, disconnected snatches of thought, without any deeper associations than such as are prompted by momentary excitement. There are but scanty traces of fables, legends, and epigrammatic or proverbial poetry, such as are found in abundance, and often happily expressed, amongst the Hottentots and many other African races.

Language is supplemented to some extent by signs and gestures, but no complete gesture language has been developed. When messages are sent to distant tribes, or communities of the same tribe, with news of death, challenge to war, or invitation to initiation ceremonies, or other public meetings, curious notched sticks are carried by the messenger which were at first thought to imply the knowledge of some form of writing. But although the notches on these sticks have conventional meanings, they merely serve as an aid to the memory of the messenger, and that of the person to whom he delivers it, and who may have to repeat the message to a tribal council or to his friends and relations. Thus there is a notch for each person who is a party to sending the message; other notches represent those to whom it is sent; others again the number of days to the time of meeting, and so on.

The Australians, like most savage races, show some inclination to art. They execute figures of men and animals on the sheets of bark which form their huts, or on the walls of caverns. They also carve, often very elaborately, their shields, clubs, boomerangs, throwing-sticks, and other weapons. As a rule the wood-carving of the natives is made up of patterns worked out in straight lines, on account of the difficulty of forming curves with such inferior tools as flints, shells, or bones.

Some rude sculptures of fish, snakes, and other objects have also been occasionally found. Some of the shields are perhaps the most highly ornamented objects, being covered with zigzags or concentric squares forming a rude geometrical tracery; but, even in the best examples, far inferior to the work of the New Zealanders or other inhabitants of the Pacific Islands.

10. Probable Origin of the Australian Race.

The aborigines of Australia differ remarkably from those of all the surrounding countries, while they agree so closely among themselves in every part of the continent that they evidently form a single race. To recapitulate their main characteristics: they may be described as men of medium stature, muscular, but with slender arms and legs, rather large heads with broad foreheads and overhanging brows, the nose thick and very broad at the nostrils, as with many of the lower races, the mouth large and lips thick, but far less so than in the negro races. In colour they are a deep copper or chocolate, never sooty black as in the negro; the hair is long, glossy black or very deep auburn, usually wavy or curly and very abundant, and the face is adorned with a luxuriant growth of moustache, beard, and whiskers, usually with an auburn tinge. These characters, in their combination, give to the face as a whole a familiar appearance resembling that of the coarser and more sensual types of western Europeans; while they are as totally removed from any of the beardless Malayan and Polynesian tribes, or the woolly or frizzly haired Papuans. They have sometimes a considerable growth of hair on the body, especially on the chest and back, while the infants are much lighter in colour than the adults, and

have a considerable amount of soft fur on the neck and back.



NATIVE WOMAN.

If we turn to habits and customs for some light as to their probable derivation, we find equally clear proofs that

we must go far beyond the limits of all immediately surrounding peoples. While Malays, Papuans, and Polynesians all cultivate the ground, and all build good permanent houses, the Australians never do one or the other. The pottery of the Malays and Papuans, the bows and arrows of the Papuans and other Melanesians, and the elaborate canoes of all these races are equally unknown to the Australians, who thus remain among the savage tribes who have made the very smallest advance on the road to material civilisation.

In Mr. Curr's elaborate work on "The Australian Race" an attempt is made to show that there is a great resemblance in language and in many customs between the native races of Australia and Africa. By comparing some words of the numerous languages of Australia with the words of the same meaning in some of the still more numerous African languages and dialects, a considerable number of striking resemblances are found. But it is probable that an equal number of resemblances could be found if the languages of any other part of the world were taken for comparison, because many of the words used are either onomatopœic or what may be described as functional. Thus words for the "lips," "mouth," or "head" are expressed by labial sounds, for the teeth by dental sounds, for the nose by nasals, such as *n*, *ng*, or *ny*; and thus the names for these parts of the body often resemble each other in the most remote parts of the world. So in the names for father and mother the infantile *ba*, *pa*, and *ma* occur in every part of the world, though sometimes transposed in their meaning. Similar resemblances have been found by other writers among the languages of the hill tribes of India, and with these races there is rather more accordance in physical characters. Mr. Curr also adduces a considerable

number of curious customs which are common to Australia and Africa: such as the great importance attached to sorcery, the forming raised scars on the body, the habit of knocking out the front teeth, of circumcision, of prohibition of marriage within certain class divisions, the forms of burial, and some others. But some of these customs are very widespread among savages; and unless it can be ascertained that a considerable number of them are strictly limited to Africa and Australia, they can afford no proof of a common origin to the two races. More interesting is the fact that the peculiar Australian weapon, the boomerang, finds its nearest representative in Abyssinia and among the ancient Egyptians. This may indicate that the weapon had a wider range in early times, but was gradually supplanted by the bow and other superior weapons, but can hardly be held to prove identity of race in opposition to so many characteristic differences.

Looking broadly, and without prejudice, at the physical features of the Australians, they evidently belong neither to the Negroid nor to the Mongoloid types of man, while in all essential characters they must be classed as Caucasians. If we look abroad for other isolated fragments of the same type, we find one in the Ainos of Japan. These singular people agree wonderfully with the Australian type, but are somewhat more hairy and of a lighter colour. They are also in a more advanced stage of material civilisation, and are probably on a somewhat higher intellectual and moral plane. Other fragments of the same great primitive race exist in the Khmers and Chams of Cambodia, who are said to be decidedly Caucasian in type; while their language has affinities with those of Polynesia, where also Caucasian affinities are shown, especially in some of the in-

habitants of Micronesia. Of all these widely scattered Caucasian fragments we must look upon the Australians as the lowest and the most primitive. Their antiquity is, in all probability, very great, since they must have entered their present country at a time when their ancestors had not acquired the arts of making pottery, of cultivating the soil, of domesticating animals, of constructing houses, or of fabricating the bow and arrow. They thus afford us an example of one of the most primitive types of humanity yet discovered.

What renders their uniform low condition more remarkable is, that they must have been many times brought into contact with more advanced races. There are some signs of intermixture in the north with both Malays and Papuans, but this has had little or no effect on the customs of the people. Some still higher race has evidently at one time formed a settlement on the north-west coast, as indicated by the very remarkable cave-paintings and sculptures discovered by Sir George Grey. These exist in the valley of the Glenelg River in North-West Australia, about 60 miles inland, and about 20 miles south of Prince Regent's River, in a very rugged tract of country. The figures consist of representations of human heads and bodies, apparently of females clothed to the armpits, but all the faces are without any indication of mouths. The heads are all surrounded with a broad kind of headdress or halo, and one of the figures wears a necklace. They are executed in bright red on a clear white ground, the clothing marked with a red pattern, and the broad hat or halo in some of the figures is executed in blue, red, and yellow. The figures are nearly life-size, and the largest is on the sloping roof of a cave, appearing to look down upon the visitor. There are also some drawings of kangaroos far

more finished than anything done by modern Australians. On the roof of another cave was found a full-length figure 10 feet high dressed in a loose red garment from neck to ankles, the hands and feet well executed, and the latter apparently covered with shoes. The white face is mask-like, showing the eyes only, around which are circular concentric bandages, the inner one yellow, the outer red, looking something like a broad cap and outer bonnet. On the upper part of this are five letters or characters having an oriental aspect. Although poorly executed, these figures all have a refined appearance as utterly out of place among the Australian natives as would be any modern work of art. Very near one of the caves there was found on a large vertical sandstone rock a well-executed human head hollowed out to about an inch and a half deep in the centre, the head being 2 feet in length and 16 inches broad. The singularity of it is that it is perfectly European in type, both in form of head and features. The only other paintings which appear to have a similar character are those discovered by Captain Flinders in Chasm Island on the north-east coast, and which have been preserved in a sketch by W. Westall, A.R.A., who accompanied Flinders as artist. These form a long procession of human figures in pale red colour, rudely executed but all apparently clothed in long garments. Near the head of the procession is a much taller male figure, with arms outstretched and holding a stick, and towards the middle is an equally tall female figure. There are also some turtles and a swordfish pretty well drawn.

Whoever were the people who executed these singular paintings, they were probably the makers also of the two large square mounds found by Sir George Grey in the same district. These were formed of loose stones, but

were perfect parallelograms in outline, and were placed due east and west. From the drawing given of them they must have been heaped up with great care, since they are finished to a sharp ridge with triangular ends just like the roof of a building. Both were exactly the same length, $22\frac{1}{2}$ feet, but they differed somewhat in width and height. One was opened, but nothing was found inside it but a quantity of fine mould.

In this same district Sir George Grey noticed among the dark-coloured natives a few individuals who were very much lighter in colour, he says, "almost white"; and he thinks that these lighter people exercised authority; and he also describes the native houses as being better constructed here than in other parts of Australia.

A good deal farther south, on the upper Gascoyne River, Mr. Giles met with some natives who were exceptionally good-looking. He says: "Some of these girls and boys had faces, in olive hue, like the ideal representation of angels; how such beauty could exist among so poor a grade of the human race it is difficult to understand, but there it was."

It is quite evident that some colony has once existed on the north-west coast either of shipwrecked Europeans, or of some of the higher or more civilised Malays, and that after maintaining themselves for some time and leaving behind them the curious paintings and carvings here described, they have either left the country or been exterminated by the natives. The remarkable costume of the figures should give a clue to the designers, and there is, so far as I know, only one locality where a similar costume is in use—the islands of Siau and Sanguir north of Celebes. It is, however, difficult to see how these islanders could have wandered so far away

from home. Is it possible that some Chinese Christians, converts of the early Jesuit missionaries, may have been wrecked on this coast, and that the figures may represent their recollection of the pictures of saints with haloes round their heads? Whoever the people were who executed these paintings, it is quite certain they were not Australians.

The conclusion here reached that the Australians, usually classed as one of the lowest of existing races, are really of Caucasian type, and are more nearly allied to ourselves than the civilised Japanese or the brave and intelligent Zulus, may appear to some to be improbable or even absurd. But I venture to think that it nevertheless most nearly accords with all the facts of the case; and since it has been admitted that even some of the darkest Hindoos are nearly allied to Europeans, there is less improbability in the existence of some more archaic and less developed examples of the same type. It also accords with all we are now learning of the vast antiquity of the human race; since, if all the tribes now living can be classed in one or other of the three great divisions of mankind, Negroid, Mongolian, and Caucasian, or as probable mixtures of them, we are impressed with the conviction that we must go back to periods to which the earliest historical dates are but as yesterday in order to arrive at an epoch when the common ancestors of these three well-marked types alone inhabited the earth. Even then we shall have made no perceptible approach to the "missing link"—to the common ancestor of man and the higher quadrupeds.

It has been estimated that when Australia was first settled by Europeans the native population could not much have exceeded 150,000. They have since greatly diminished, owing to the occupation and settlement of

the more fertile parts of the country, as well as from the diseases and vices introduced among them by the convicts and lower class of settlers. Notwithstanding all these causes of depopulation, great numbers still roam over the interior, and it is believed that they still amount to from 30,000 to 40,000 ; and as so much of the country they inhabit is not of a nature to invite occupation by the white race, it seems not improbable that the degraded Australians may continue to exist long after the much higher New Zealander and Tahitian have disappeared.

CHAPTER VI

THE BRITISH COLONISATION OF AUSTRALIA; THE DISCOVERY AND EXPLORATION OF THE COUNTRY

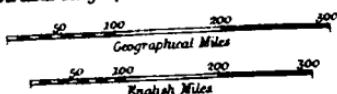
1. Outline of Australian Colonisation.

ALTHOUGH first visited by French navigators, later on by the Dutch and Spaniards, and last of all by the English, the latter nation first established itself in Australia, and has obtained undisputed possession of the whole country. The physical aspect of the land, as already described, sufficiently explains the fact that other less foreseeing peoples felt little inclination to make permanent settlements in a country which produced neither marketable slaves, nor spices, nor apparently any of the precious metals—nothing in fact but rich pasturages. Hence, when gold was here actually discovered in 1851, drawing universal attention to this region, as it had to California a short time previously, other nationalities found that it was too late to form independent settlements anywhere on this continent, which had already been either permanently settled by the enterprising Anglo-Saxon race, or else formally declared to be attached to the Crown of Great Britain. Since that event the progress of discovery has been very rapid, and British colonies have been everywhere established, some of which have already



AUSTRALIA AND TASMANIA WITH EXPLORERS' ROUTES.

Overland Telegraphs shown thus —————



risen to a high degree of material prosperity under the fostering influence of enlightened institutions modelled on those of the "mother of empires." The whole of the mainland is now parcelled out into five such colonies; more or less extensive tracts on the seaboard being actually inhabited, while much of the desert interior remains desolate and unpeopled.

Each of these colonies possesses a separate administration under a special governor appointed by the Crown, and two Houses of Parliament, in most cases freely elected by the people. So practically independent, and yet so firmly attached to the mother country, are these colonies, that for some years past the regular troops have been withdrawn, their immunity from foreign aggression being secured partly by bodies of local volunteers, but perhaps still more by the silent influence of the tremendous power symbolised by the presence of the British flag. The financial condition of the colonies is, on the whole, satisfactory, the revenue being in most cases considerably in excess of the expenditure. Liberty of conscience is everywhere established as in England, and as in that country the Protestants are in a large majority. But the religious sentiment is perhaps less active than either in England or in America. Science and art, as might be expected, are still somewhat backward, though rapidly progressing; and the same may be said of popular education, while the manufacturing industries have of late years greatly increased in magnitude, but this has as yet hardly reduced the commercial intercourse with the mother country.

2. Early History, Discovery, and Maritime Exploration of Australia.

Under the name of Jave le Grand, Australia is repre-

sented on French maps dating as early as about 1530 ; and a Provençal pilot named Guillaume le Testu, whose name is appended to a map dated 1555, is believed to have been its discoverer. But the earliest distinct reference to Australia in any book is the following passage from the *Descriptionis Ptolemaice Augmentum*, by Cornelius Wytfliet, printed at Louvain in 1598 : "The *Australis Terra* is the most southern of all lands, and is separated from New Guinea by a narrow strait. Its shores are hitherto but little known, since after one voyage and another that route has been deserted, and seldom is the country visited, unless when sailors are driven there by storms. The *Australis Terra* begins at one or two degrees from the equator, and is ascertained by some to be of so great an extent, that if it were thoroughly explored it would be regarded as a fifth part of the world." It is evident, therefore, that the northern part of the country was tolerably well known long before Torres, in 1606, sailed in a Spanish ship through the straits which have received his name ; or Dirk Hartog in 1616 explored the extreme western coast. The extent of the country southwards was first ascertained in 1627, when the Dutch ship *Gulden Zeepard* sighted much of the south coast from Cape Leeuwin eastward. A few years later, in 1642, Tasman discovered the country which he named Van Diemen's Land, and which he believed to be the southern extremity of the great *Terra Australis*—which it really is, although separated from it by an arm of the sea.

Dampier was the first Englishman who visited Australia (in 1688), but only the north-western coast ; and it was not till nearly a century later, in 1770, that the finest portion of the country, the east coast, was discovered and explored by Captain Cook during his first

voyage round the world. He came upon the Australian mainland in April 1770, at Gipps Land in Victoria, and from this point skirted the entire eastern coast to Cape York, and thus first made known to the world the extent and outline of the Australian continent. The expedition stayed a week at Botany Bay, and the naturalists who accompanied it—Sir Joseph Banks and Dr. Solander—revelled in the many curious and entirely unknown forms of vegetable and animal life which this locality produced. During their stay here and at several other places on the east coast, nearly a thousand species of plants were collected, disclosing to botanists a new world of strange shrubs and beautiful flowers.

Twenty-seven years later Mr. Surgeon Bass explored the straits which have been named after him, and subsequently, accompanied by his friend Lieutenant Flinders, circumnavigated the island of Tasmania. Two years afterwards Flinders explored Moreton Bay and Hervey's Bay, the entrances to which only had been seen by Cook, and in 1801 he was sent as Captain of H.M.S. *Investigator* to complete the survey of the coasts of Terra Australis. On this voyage he carefully examined the south and east coasts from King George's Sound, surveyed Spencer's Gulf and Gulf St. Vincent, as well as much of the coast farther east and north. The shores of Victoria were explored in 1800 by Captain Grant, and in 1802 by Lieutenant Murray, who discovered the spacious land-locked bay of Port Phillip, at the head of which now stands the populous city of Melbourne. Captain P. P. King surveyed the N.W. coasts in 1818-1822; while from 1837 to 1843 the surveying-ship *Beagle* under Captains Wickham and Stokes, completed our knowledge of the Australian coasts, all the more frequented parts of which are now accurately laid down on our charts.

3. Inland Exploration of Australia.

The first British settlement was made at Port Jackson in 1788, and for twenty-five years inland exploration was limited to a tract of some 50 miles wide between the Blue Mountains and the sea. Several attempts were made to pass these mountains, but without success; till, in 1813, when a summer of severe drought made it very important to discover new pastures, three colonists—Messrs. Wentworth and Blaxland, and Lieutenant Lawson—succeeded in passing the barrier, and reached the valley of the Fish River and the fertile Bathurst Plains. The Government surveyors then carried on the work. In 1815 the Lachlan River was discovered, and being traced in a south-westerly direction for 300 miles, ended in a vast extent of marsh, and was thought to empty itself into a great inland sea. Soon after the Macquarie River, flowing to the north-east, also led its explorers to a marshy tract, and was supposed to confirm the inland sea theory. The exploration was continued to the east over the Arbuthnot Range, the Liverpool Plains, and the Peel and Hastings Rivers, reaching the sea at Port Macquarie, and adding much to the knowledge of the interior of the country. The same surveyor, Mr. Oxley, starting in 1823 from the Hastings River northward, traversed the elevated district of New England, and entered what is now the colony of Queensland, discovering the Brisbane River and Moreton Bay.

4. Early Explorations of Hume, Sturt, and Mitchell.

In 1819 a young colonist, Mr. Hamilton Hume, commenced his career as an explorer. He discovered the

Murrumbidgee River, and in 1824 the Murray, and after tracing them a long way marched south, rounding the spurs of the mountains till he reached Port Phillip. Captain Sturt then took up the work, with Hunie for his guide. He traced the Macquarie River downwards to



JUNCTION OF THE MURRAY AND THE DARLING.

the marshes, and then pushing on discovered the Darling. In a second expedition in 1831, he traced the course of the Murrumbidgee and Lachlan into a great river—the Murray, into which the Darling was also found to empty itself about a hundred miles farther down. Still floating

down the stream, Captain Sturt at length reached the Lake Alexandrina, a deep inlet of the sea forming the mouth of the great Australian river. This grand discovery solved the mystery of the drainage of the whole interior of New South Wales, and opened up a great and fertile country for colonisation.

Major Mitchell, Surveyor-General of New South Wales, carried on the exploration of the upper waters of the Darling; and it was while accompanying these expeditions that Mr. Cunningham, the botanist, was murdered by the aborigines on the Bogan River, the first of the martyrs to Australian inland discovery. Major Mitchell afterwards tracked the course of the Lachlan through the marshes which had stopped previous explorers, and discovered much fertile country where Mr. Oxley had met with nothing but arid desert—one of the early indications of the now ascertained uncertainty of Australian seasons. In 1836 the country beyond the Murray in Victoria was examined, the Loddon and Wimmera Rivers discovered, the Grampians crossed, and the river Glenelg traced to the sea. Returning over the Dividing Range, he passed through what are now the gold-diggings, and descended the Goulburn River to the Murray. He thus traversed much of the finest part of Victoria, and was so much struck with its fertile soil and beautiful scenery, that he named the district "Australia Felix," declaring that he had at length found a country ready for the immediate reception of civilised man, and fit to become the abode of one of the great nations of the earth.

5. Journeys of Eyre and Sturt to the Desert Interior.

Soon after the colony of South Australia was founded in 1836, and its capital fixed at Adelaide, exploration

was commenced towards the unknown interior. In 1839 Mr. Eyre (since so well known as Governor of New Zealand and of Jamaica) discovered Lake Torrens, connected with the head of Spencer's Gulf by a narrow channel of mud and water; and in 1840 he explored a portion of its eastern shores and the adjacent Flinders Range, but was obliged to return for want of water. He had intended to cross the lake, but found it an impassable swamp of salt mud. He then turned westward and commenced his perilous journey along the shores of the Great Australian Bight, and after great danger and many sad disasters, he reached King George's Sound, in Western Australia (a distance of 1209 miles), with a single native boy, having left Adelaide more than a year before. This was the first extensive journey across the waterless deserts of Australia, and well exhibited the perils of such an attempt, which in this case owed its success to a fortunate accident. When Mr. Eyre had reached 250 miles from his starting-point (the head of Spencer Gulf), he had already lost four of his best horses, which deprived him of the means of carrying provisions for his whole party. He therefore sent back his companion Mr. Scott, with three others, and continued the journey accompanied only by Baxter his overseer, two natives who had started with him, and a native servant of his own, named Wylie. He had with him ten horses, six sheep, and provisions for nine weeks. Before moving the animals it was necessary to secure water for them, and Eyre himself explored in advance, sometimes five or even six days at a time, without finding a drop. They were reduced to collecting dew with a sponge and rags, and most of the horses died from fatigue and thirst. When still 650 miles from their destination they had only three weeks' provisions left, and Baxter proposed to return, but Eyre was resolute to go

on. The two natives then deserted, but after a few days came back starving and penitent, and were permitted again to join the party. But in the night they shot the overseer and ran away, taking with them the two most serviceable guns and almost all the ammunition, and were never more heard of. Eyre was now left with his servant Wylie and two horses, with a very small store of provisions, and more than 600 miles of unknown desert to traverse. Their whole stock consisted of 40 lbs. of flour, four gallons of water, and part of a dead horse. The last water had been left three days before, and they knew not when more might be obtained. It was 150 miles farther before they obtained a fresh supply. Thus they struggled on for a month, living on horse-flesh, fish, or occasional game, with a little flour-paste or damper. They then fortunately discovered a whaling-ship near the shore, and were kindly received on board for a fortnight, and this almost certainly saved their lives. Being sufficiently recruited, they continued the journey, and after undergoing further hardships for twenty-three days, succeeded in reaching King George's Sound.

In 1844 and 1845 Captain Sturt, who had so successfully explored the great rivers to the west of the coast-ranges, made the first real attempt to penetrate into the very centre of Australia. Starting from a bend of the Darling, about 130 miles above its confluence with the Murray, in October 1844, he travelled in a north-westerly direction for about 250 miles till he reached an easterly extension of Lake Torrens. Returning some distance, he struck due north to the Grey Ranges, where he established a dépôt, in which he was delayed six months waiting for rain to furnish a supply of water in advance. He then pushed on in a north-west direction, passing over a barren country and endless sand-ridges,

and at length over a plain thickly covered with fragments of quartz rock, and entirely without vegetation. This was succeeded by an equally barren mud plain, and then more sand-ridges stretching away into the unknown interior. A remarkable feature of the sand-ridges was their perfect straightness and parallelism, while on both sides of the low desert tract, 50 miles wide, they lay in exactly the same direction. Farther on he was again stopped by an extensive plain covered with the dreaded spinifex grass and a mesembryanthemum; the soil being salt, and of such a nature that rain would have rendered it absolutely impassable. He then came to a creek or watercourse with water abundantly at intervals, and followed it for about 60 miles, when it became salt and then terminated in the sandy desert, whose parallel ridges with spinifex and mesembryanthemum stretched on every side. Crossing this for 34 miles with no sign of grass or water, he turned back from a point beyond which still lies the largest blank on the central portion of the map of Australia. It was a horrible country, which Captain Sturt believed to have no parallel on the earth's surface. The spinifex grass was close and matted, and the horses were obliged to lift their feet straight up to avoid its sharp points. From the summit of one of the sandy undulations ridges were seen extending northwards in parallel lines beyond the range of vision, and appeared as if interminable. To the eastward and westward they succeeded each other like waves of the sea. The sand was of a deep red colour, and a bright narrow line of it marked the top of each ridge. Not a blade of grass was visible, and the aspect of the country was declared even by these experienced explorers to be "terrible." This is Sturt's Desert, and the nature of the country is such that it must be always uninhabitable.

About 200 miles to the west, however, the telegraph-line passes through a comparatively fertile district.

6. Lieutenant (now Sir George) Grey's Exploration in North-West and West Australia in 1836-39.

These expeditions, though not leading to any important results as regards colonisation, are remarkable for the energy displayed by the young and inexperienced leader in circumstances of difficulty and hardship which have rarely been surpassed even in the records of Australian exploration; and also for the curious discoveries of ancient rock-paintings and tombs, and for the valuable observations of native habits and characters, referred to in the preceding chapter, which are exceptionally trustworthy owing to the fact that the young explorer took every opportunity of acquiring the native languages.

The expedition was sent out from England by the Colonial Office, most of the equipment being obtained at the Cape of Good Hope; whence the party sailed in a small vessel to Hanover Bay, on the north-west coast of Australia, near the mouth of the Prince Regent's River. Half-wild Timor ponies were obtained to serve as pack-horses and were a great trouble. The country traversed, as in so many parts of Australia, consisted of rugged plateaux cut up by ravines whose rocky walls were so precipitous as to be in most cases altogether inaccessible for horses, while the broader valleys were subject to dangerous inundations or were too marshy to be traversed. Mr. Grey was seriously wounded by a spear in a native attack, and persevered in his exploration under the greatest difficulties, and while suffering continual pain from his wound. The exploration was generally parallel

to the Prince Regent's and Glenelg Rivers, the latter stream being about 250 yards wide at about 60 miles from its mouth ; to reach this point, however, a distance of about 150 miles was traversed, owing to the difficulties of the ground. The rocks were basalt or sandstone, forming grand precipices and often isolated pillars, the semi-tropical vegetation very luxuriant, water abundant in numerous small streams, good grass in places, and abundance of animal life. Notwithstanding these advantages, the district seems never to have been visited during the fifty years that have since elapsed, owing no doubt to the extremely rugged character of the country, and the superior attractions of the larger rivers, Victoria to the north and Fitzroy to the south of it.

Returning to Perth, Mr. Grey shortly after started on another expedition, which, landing on an island in Shark's Bay from a whaler, with three whale boats, and a party of twelve, one a native, proposed to make a general exploration of the coast and interior by ascending the rivers, or in any other way that might appear to be practicable. Misfortunes attended them from the very outset of the journey. One of their boats with a quantity of stores was lost in the surf. The island had no water, so they buried their stores in a sand-hill, and went to the mainland to get water. After many difficulties and damage to the boats, from storms which prevented them from moving for a week, they returned to their dépôt only to find that the violence of the hurricane had unburied their stores, almost the whole of which had been washed away ; half a barrel of flour much damaged by salt water being all that could be recovered. The weather was still very stormy, but they were obliged to put to sea and endeavour to make their way to the colony. After some days of exhausting toil

they reached Gantheaume Bay, at the mouth of the Murchison River, but in landing one boat was dashed to pieces in the surf and lost, while the other was so much damaged that it became useless.

The explorers were now more than 300 miles from Perth, with an altogether unknown country to traverse, while their only provision was twenty pounds of damaged flour and one pound of salt pork to each man. All were weak, they were exposed to alternate storms and tropical heat, and they had no means of obtaining additional provisions, as they only had one gun, and were too much exhausted to hunt or watch for game. Mr. Grey, feeling that their only chance of safety lay in marching every day to the utmost limit of their strength, started on this principle. But some of the party refused to follow, and declared that only by taking long rests could they possibly make the journey. Mr. Grey decided to push on with the strongest of the party, and after tremendous hardships succeeded in reaching the first settlers' huts, and in sending back a relief party, by whom the others were rescued from imminent starvation, one only, an English lad of eighteen, named Smith, who had joined the expedition as a volunteer, having died two days before.

In these two unfortunate expeditions Mr. Grey had shown some of the best qualities of an explorer, indomitable courage, endurance of wounds, hunger, and fatigue, and considerable power of organisation and command. His total inexperience in such journeys and his ignorance of the dangers to be guarded against both on the coast and inland led to misfortunes which a more experienced traveller might have avoided. The two volumes in which he has described his explorations are, however, full of interest, and give us more information as to the

natural productions of the country and the character of the aborigines than is usually to be found in the narratives of Australian explorers.

7. Leichhardt and Kennedy in the North-East.

We must now turn awhile to the north-eastern portion of the country, where an enthusiastic German naturalist, Dr. Ludwig Leichhardt, assisted by the liberality of personal friends in Sydney, devoted himself, from 1843 to 1846, to the exploration of Eastern Queensland, from its southern border to the Gulf of Carpentaria. His great journey in 1844, from the upper branches of the Condamine River to the head of the gulf, and thence along its western shores to Port Essington, a distance of 3000 miles, was performed in little more than fourteen months, and places Leichhardt in the first rank of Australian explorers.

When near the Gulf of Carpentaria, on 28th June 1845, Mr. Gilbert the naturalist was killed and two others wounded by native spears while in camp at seven in the evening. Having seen very little of the natives for some time, they were quite unprepared, the guns being uncapped, but a few discharges dispersed the assailants. Later on four horses were lost in the Roper River, and on 17th December the party reached the settlement at Port Essington almost destitute of food, and having been obliged to sacrifice the whole of Dr. Leichhardt's much prized botanical collections.

During this journey many important rivers were discovered, especially the Mackenzie and the Burdekin, and a large extent of luxuriant or fertile country. Eager to apply the experience gained during this expedition, he conceived the gigantic project of traversing the

entire continent across its centre from east to west. The success of his first expedition had attracted much attention, and the public subscribed liberally towards his new project, enabling him to start from the Hunter River with two years' provisions, 450 sheep and goats, 40 bullocks, and 28 horses. But on this occasion he was unfortunate. Rains in the dense scrubs of the Dawson and Mackenzie rivers brought on fever; the tents were insufficient; no medicines had been brought; the animals strayed or died, and after seven months' wandering without reaching any new country, his whole supplies were expended or lost and he was obliged to return.

Still anxious to prosecute his great journey across the continent, Leichhardt tried hard to get up another outfit, and at last succeeded; but the party was comparatively small and ill provided. Little is known of its members, but it is supposed to have consisted of six white men and two natives. Besides the leader there were Classen, a German, and three Englishmen named Hentig, Stuart, and Kelly. They had 50 bullocks, 13 mules, 12 horses, and 270 goats, with a comparatively small quantity of flour, ammunition, and other necessaries. A letter was received from him dated from M'Pherson's station on the Cogoon River, less than 300 miles from Brisbane, and this was the last ever heard of the explorer or of his entire party; and the total disappearance both of his men and animals, and of all his stores and implements, is one of the mysteries of the Australian interior. Had they been simply destroyed by attacks of the natives some relics would long since have been recovered, if only the iron of the implements they had with them.

Mr. Favenc in his *History of Australian Exploration* gives a detailed sketch of their probable fate—death by

thirst in the central desert, and subsequent destruction by fire. As the author has been an explorer himself, his solution of the mystery is probably not far from the truth, and as it is given with much graphic power, we extract it for the benefit of our readers:—

“Once across the waters that wend their sluggish way into the lake district of South Australia, Leichhardt and his followers would be in the great region of fragmentary watercourses; rivers and creeks, when met with, pursuing no definite courses—now lost in miles of level country, now reforming again for a brief existence, but always delusive and disappointing. Here they would one day find themselves in a position that left them no other chance but the slender one of still pushing forward into the unknown. Probably it was during one of the cycles of rainless years that periodically visit the continent. Led on mile after mile, following the dry bed of a creek to lose it in some barren flat, whereon the withered stalks of blue-bush alone told of a time of past vegetation; again picking up another creek, to lose it in like manner, knowing that to retrace their steps was impossible; making at last for a hazy blue line in the distance that turned out to be spinifex and stunted forest, still, however, struggling forwards, weak and disorganised.

“Then would come the beginning of the end. As they pressed on, the forest became scantier, and the spinifex higher, spikier, and harder to march through. One by one their animals had fallen and died, and the desperate resort of drinking the blood had been tried by some. What little water they had in their canteens was fast evaporating. Still some of them would keep heart. The ground was getting stonier and bare patches of rock were constantly passed; surely they were getting to some higher country, and suddenly, they hoped, the ground

would break away at their feet in deep gullies and ravines shading some quiet water-hole. How anxiously they looked for any sign of life that might be a good augury of this, but none could be seen. It was useless to stop to rest, the ground was blistering to the touch and there was no shade anywhere. . . . Some lost their reason, and all lost hope. Then came the end ; they separated and straggled away in ones and twos, and fell and died. Day after day the terrible and pitiless sun looked down at them lying there, and watched them dry and shrivel into mummies, and still no rain fell on the earth.

" Years may have passed. Higher and higher grew the spinifex, and its long resinous needles entangled themselves in each other unchecked by fire ; for no black hunters came there in that season of drought, and the men's bodies lay there scorched by the seven times heated earth beneath and the glaring sun above ; untouched save by the ants, those scavengers of the desert, or the tiny bright-eyed lizards. At last the thunder clouds began to gather afar off, and when they broke a few wandering natives ventured into the woods, living for a day or two on the uncertain rainfall. This failing, they retired, leaving perhaps behind them a trail of fire. Then this fire, fed by the huge banks of flammable spinifex, the growth of many years, spread into a mighty conflagration, the black smoke covering half the heavens. The great silence that had reigned for so long was broken by the roar and crash and crackle of a sea of flames ; and beneath this fiery blast every vestige of the lost explorers vanished for ever.

" When on the blackened ground fell heavy rain once more, the spinifex sprang up fresh and green to look at, only in spots here and there, where a human body had fertilised the soil, it was greener than elsewhere."

This forcible though imaginary description probably arrives as nearly at the truth of Leichhardt's fate as we shall ever attain. Several attempts have been made by subsequent explorers to find some trace of him, but except one or two trees marked with an L, nothing has been found, and these are not demonstrably his. If, as Mr. Favenc reasonably supposes, the expedition perished in the terrible desert beyond Sturt's farthest point in 1845, it is almost certain that nothing more will ever be known of its fate.

About the same time Sir Thomas Mitchell was exploring farther to the east, and opened a great deal of fine country in what is now the centre of the colony of Queensland. He here discovered a large river (the Barcoo), which, after tracing for about 150 miles towards the centre of Australia, he hastily concluded was the same as the Victoria of the north-west coast. His assistant, Mr. Kennedy, however, traced it to the south-west and south, till it was swallowed up in the great central desert.

In the following year Kennedy was appointed to explore the country between Rockingham Bay and Cape York. He had 12 men, including Mr. Carron, a botanist, and Mr. Wall, a naturalist. They had 28 horses and 100 sheep, with carts and all necessary rations. Starting from Rockingham Bay, where they had been conveyed from Sydney in a small vessel, which was to await them at their destination, Port Albany (now Somerset), they at once discovered the difficulty of travelling in the tropical Queensland jungles, bound together by the terrible lawyer vine and the home of the equally dreaded tree-nettle. The former is a species of rattan (*Calamus australis*), armed with hooks and spurs, which once fast never let go, and the stem being hard, elastic, and very

tough, renders a passage through the scrub in which it abounds a work of great labour. The other is a forest tree belonging to the nettle family (*Urticaceæ*), and its broad leaves sting so severely as to cause great pain and inflammation; and horses, which on being first stung have plunged about and thus got stung all over, have sometimes died from the effects. This tree (*Laportea gigas*) sometimes grows to 100 feet high, and is peculiar to tropical and sub-tropical Australia.

Through these scrubs, and hardly less difficult swamps and marshes, Kennedy attempted to reach the high land, and in doing so had to abandon his carts, while he lost half his sheep and some of his horses. When the hills were reached the scrub was found to be equally dense, in addition to the rugged and often inaccessible nature of the country. At last they crossed the watershed, and found the country somewhat better on the side of the Gulf of Carpentaria; but many horses had died, the stores were greatly reduced, and by the 10th of November Mr. Kennedy determined to push on to the rendezvous at Port Albany and send back relief to the main party, who formed a camp within sight of the coast at Weymouth. He took with him three men and a native boy. This boy, Jacky Jacky, alone reached Port Albany, and gave an account of what had happened. It took them three weeks to reach Shelburne Bay, a distance of about 60 miles in a straight line, but much scrub had to be cut through and many rivers crossed. Then one of the men, Costigan, accidentally shot himself and became very weak from loss of blood, while another, Luff, was ill, so Kennedy left them with the third man, Dunn, to look after them, and went on himself with the boy to endeavour to send back help. They reached Escape River and were in sight of Albany Island when they met a

number of natives, who were friendly at first, but followed them in ever-increasing numbers. They had to sit up all night to watch. The next night there were still more, and they threw spears and hit Mr. Kennedy in the back. The rest must be given in Jacky's own words :—

"Mr. Kennedy said to me, 'Oh, Jacky ! Jacky ! shoot 'em ! shoot 'em !' Then I pulled out my gun and fired, and hit one fellow all over the face with buck shot. He tumbled down and got up again, and again, and wheeled right round, and two blacks picked him up and carried him away. They went a little way and came back, again throwing spears all round, more than they did before—very large spears. I pulled out the spear from Mr. Kennedy's back and cut the jag with Mr. Kennedy's knife. Then Mr. Kennedy got his gun and snapped, but the gun would not go off. The blacks sneaked all along by the trees and speared Mr. Kennedy again in the right leg, above the knee a little, and I got speared in the eye, and the blacks were now throwing always, never giving over, and shortly again speared Mr. Kennedy in the right side. There were large jags to the spears, and I cut them out and put them in my pocket. At the same time we got speared the horses got speared too, and jumped and bucked about and got into the swamps. I now told Mr. Kennedy to sit down while I looked after the saddle-bags, which I did, and when I came back again I saw blacks with Mr. Kennedy. I then asked him if he saw the blacks with him. He was stupid with the spear-wounds and said, 'No.' I then asked him where was his watch ? I saw the blacks taking away watch and hat as I was returning to Mr. Kennedy. Then I carried Mr. Kenedy into the scrub. He said, 'Don't carry me a good way.' Then Mr. Kennedy looked this way, very bad (Jacky rolling his

eyes). Then I said to him, ‘Don’t look far away,’ as I thought he would be frightened. I asked him often, ‘Are you well now?’ And he said, ‘I don’t care for the spear-wound in my leg, Jacky, but for the other two spear-wounds in my side and back, and I am bad inside, Jacky.’ I told him black fellow always die when he got spear-wound in there (the back). He said, ‘I am out of wind, Jacky.’ I asked him, ‘Are you going to leave me?’ And he said, ‘Yes, my boy, I am going to leave you.’ He said, ‘I am very bad, Jacky; you take the books, Jacky, to the captain, but not the big ones; the Governor will give you anything for them.’ I then tied up the papers. He then said, ‘Jacky, you give me paper and I will write.’ I gave him paper and pencil and he tried to write, and he then fell back and died, and I caught him as he fell back, and held him, and I then turned round myself and cried. I was crying myself a good deal until I got well—that was about an hour, and then I buried him.”

Jacky was still pursued, but he managed to escape and struggled on for thirteen days, living on what small vermin he could catch till he reached Port Albany. The schooner then sailed for Shelburne Bay to rescue the three men left there, but a canoe captured on the way contained articles belonging to them and left little doubt of their fate. The camp was far inland, and it was thought better not to waste time in going to it, at considerable risk, when there were eight men equally requiring relief at Weymouth Bay.

This party had fared badly. Three men died. The natives were sometimes friendly, sometimes hostile, compelling those who were able to be constantly on guard. On the 28th December, six weeks after Kennedy had left them, two more died, and the blacks came and

surrounded the camp, the two helpless survivors being hardly able to stand and hold their guns. On the 30th relief arrived ; Captain Dobson, Dr. Vallack, and Jacky, with another man, Barrett, who received a spear-wound in his arm, forced their way for 3 miles through the dense scrub, surrounded by about 100 armed natives, and saved the two survivors, Goddard and Carron, at the peril of their own lives. Another expedition was sent to search for the three men left at Shelburne Bay, but they were never found, but some of the papers secreted by Jacky were recovered. That any Europeans survived to tell the tale of this unfortunate expedition was entirely due to the devotion and untiring perseverance of the native boy Jacky, which constitutes the one bright spot in this melancholy story.

8. Gregory in the North-West.

There was now a lull in actual exploration of the interior for nearly ten years, when it was again energetically taken up, and prosecuted on the whole with wonderful success. During 1855 and 1856 Mr. A. C. Gregory, accompanied by Dr. Müller, the celebrated botanist, and a well-equipped party, was engaged in exploring the Victoria River of the north-west coast. He traced it first in a south-easterly and then in a southerly direction for a distance of 300 miles, when its course became dry, passing through a sterile desert. Crossing a dividing ridge of hills, a series of pools and dry channels was found named Sturt's Creek, and this was traced several hundred miles to a point in lat. $20^{\circ} 30' S.$ and long. $128^{\circ} W.$, where it terminated in a salt lake in the desert.

On the 21st of June, the schooner having been sent to Timor for more provisions, Mr. Gregory, with his brother, Dr. Müller, Mr. Elsey, and three men, started on their homeward journey by the north-eastern route, having arranged for the schooner to meet them at the head of the Gulf of Carpentaria. On the way they crossed the Roper, Nicholson, Gregory, and Leichhardt Rivers. They were attacked once by natives, who were easily repulsed by the death of their leader, and the schooner not having arrived they decided to proceed home overland. They soon got into the country traversed by Leichhardt on his first journey, and on the 22nd of November reached a station on the Dawson River, about 50 miles west of Rockhampton.

This expedition, during which he had travelled nearly 5000 miles in the space of fifteen months, gave Gregory the reputation of a first-rate explorer, and led to his employment in 1858 to command an expedition in search of some traces of Leichhardt. Starting from Brisbane, he reached the head waters of the Warrego, and thence to the Victoria, a tributary of the Barcoo. This river he followed down, and then ascended the Thompson to about the latitude of the tropic, finding nothing but the stumps of felled trees and the enigmatical letter L. Returning by Cooper, Strzelecki, and Taylor Creeks to Adelaide, he completed a successful journey, but without making any important discovery, except the identity of the Barcoo with Cooper's Creek.

9. McDouall Stuart's Journey across the Continent.

We now come to one of the greatest and most successful of Australian explorers, John McDouall Stuart, who had been draughtsman to Sturt during his memor-

able expedition, and, in 1858 and 1859, had examined the whole district of Lakes Eyre, Gardner, and Torrens. On 2nd March 1860 he started from Adelaide on a journey across the whole continent to the north coast. Passing to the west of Lake Eyre, he found a tolerably fertile country till he crossed the Macdonnell Ranges close to the tropic of Capricorn. On 23rd April he reached a mountain in S. lat. about 22° , and E. long. nearly 134° , which is said to be the centre of the Australian continent and has been named Central Mount Stuart. It is, however, very far to the north-west of the true centre, though it is almost exactly midway between the head of the Great Australian Bight and the extreme north coast at Port Essington on Melville Bay. Passing beyond this point about 300 miles, and when less than 200 miles from the Gulf of Carpentaria, he was forced to turn back by the hostility of a numerous tribe of natives. Nothing daunted, on New Year's Day 1861 Mr. Stuart again left Adelaide (aided by a liberal grant from the Colonial Government), and succeeded in reaching, about 100 miles beyond his former position, to lat. 17° , long. 133° ; but an impenetrable scrub here barred all farther progress. He made strenuous and prolonged efforts to pass the obstacle, his horses being on one occasion 106 hours without water, but without success, and was reluctantly compelled to return for want of provisions. Arriving safely in the settled districts in September, he again started in less than a month on the route now familiar to him; and this time well-deserved success rewarded him. Leaving the Gulf of Carpentaria far to the right, he found a passage through the scrub, and succeeded in reaching the shores of the Indian Ocean on the west side of Chambers Bay, in July 1862. In December he reached Adelaide in

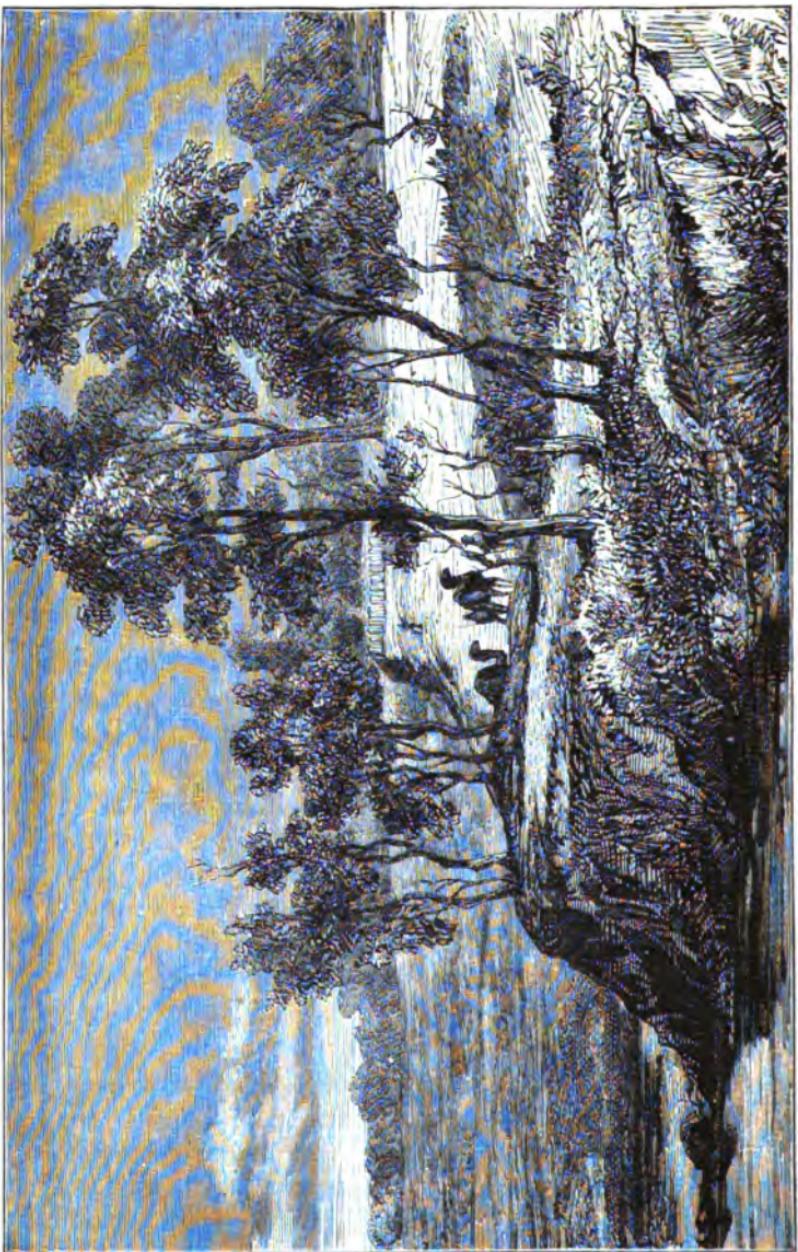
safety, though greatly worn out with exhaustion and scurvy; but neither on this nor on any of his previous journeys did Mr. Stuart lose a single man of his party.

This journey is perhaps the most important in its results of any of those which have been made in the interior of Australia. It has marked out a track from the settled districts of South Australia to the extreme north, along which it has been found possible to construct a telegraph line, with fixed stations; and it has also led to the discovery of perhaps the most fertile district of tropical Australia, watered by a fine navigable river, the Adelaide, and which, from its position in regard to the islands of the Malay Archipelago, is best fitted to become a flourishing and populous settlement. Mr. Stuart's party consisted of only three persons on his first attempt, and ten on his second and third (successful) exploration.

10. The Fatal Expedition of Burke and Wills.

About the time that McDouall Stuart commenced his attempt to cross the continent, a great expedition was despatched from Melbourne, chiefly at the expense of the Victorian Government. It consisted of eighteen persons, several waggons, many pack-horses, and twenty-seven camels, imported from India for this special service. Mr. O'Hara Burke was appointed leader, with Mr. W. J. Wills, a young and promising astronomer, as second in command. After much trouble, owing to the unwieldiness of the expedition and the insubordination of some of its members, an advanced party reached Cooper's Creek (the lower course of the Barcoo River), where they formed a dépôt and left a detachment in charge of it, while Burke

and Wills, with two men, King and Gray, pushed on with one horse and six camels for the Gulf of Carpentaria. The person left in charge of the dépôt, named Brahé, received instructions to await their return, or till failure of provisions compelled a retreat. The small party of four men with great difficulty passed the M'Kinlay range of hills, and succeeded in about six weeks in reaching the Gulf of Carpentaria near the mouth of the Flinders River, being thus actually the first to cross the continent, though on a somewhat shorter route and through much less new country than Stuart. But in this case the result was most disastrous. The homeward journey to the dépôt was toilsome and difficult. The camels broke down, and were most of them left behind. The horse was killed for food. One of the party, Gray, died on the march, the other three being so weak that they could hardly dig a grave to bury him; but four days afterwards, with two camels, they succeeded in reaching the dépôt. And now occurred one of the most melancholy episodes in the history of Australian exploration. The dépôt was reached on the evening of 21st April 1861; while on that very morning Brahé had started homeward, having left what provisions he could spare (but no clothing, tea, or stimulants) with an indication of their position. Burke and Wills were far too weak and exhausted to follow on his track with any chance of success till recruited by rest and food, and the two camels were too ill to travel more than a very few miles a day. After a few days' rest they endeavoured to make their way down Cooper's Creek to Mount Hopeless, where, at a distance of only 150 miles, there was a sheep station; but want of water drove them back, and the camels both broke down and had to be shot. They found friendly natives who supplied them with food, and they discovered the "nardoo"



COOPER'S CREEK.

plant, the seeds of which pounded form a kind of native bread. The explorers found it agreeable, but while it satisfied hunger it did not nourish, and they got weaker and weaker. About six weeks after their return to the dépôt Burke and Wills both died within a few days of each other, and King joined a party of natives who treated him kindly, and with whom he was found about three months later by Mr. A. W. Howitt, and brought safely home to Melbourne.

After Brahé left the dépôt to return, he fell in with Wright, who had been left in charge of the remainder of the party. Wright's instructions were to follow on to the dépôt at Cooper's Creek, and he appears to have been amply supplied with provisions and stores; though these had been greatly diminished during his slow journey. He, however, returned with Brahé to the dépôt on Cooper's Creek, where they arrived on 8th May, while Burke and Wills were making their attempt to reach the station at Mount Hopeless. They could find no trace of any one having been at the dépôt since Brahé had left, and, with incredible carelessness, seeing that the lives of the leaders of the expedition might be dependent on their judgment and conduct, did not test their opinion by opening the buried store of provisions, in which case they would have discovered a paper left by Burke, and might still have saved the party. Instead of doing so, they at once left, leaving no indication of their having returned there. They reached the Darling on 18th June, whence Brahé went to Melbourne, which he reached on 30th June, by which time both Burke and Wills were dead.

No sooner was it known that the dépôt had been deserted and the explorers left to their fate, than four distinct expeditions were organised for the relief of the

missing travellers, or the discovery of their remains. Mr. Howitt was sent along their outward track, and, as already stated, rescued the sole survivor. The South Australian Government sent out Mr. J. M'Kinlay from Adelaide, who, after visiting Cooper's Creek, traversed the whole continent to the Albert River at the head of the Gulf of Carpentaria, and thence turning east reached the Burdekin River and Port Denison in Queensland. The Victorian Government also sent an expedition to the north coast, in case the Burke expedition should have been unable to get away from that district. Mr. Landsborough was taken by sea to the Albert River, whence he explored about 200 miles to the south-west, and then in a general south-south-east direction till he reached the Warrego River, a tributary of the Darling, about 450 miles west of Brisbane. The Queensland Government sent Mr. Walker with a party of native police, from the Nogoa River, 200 miles south-west of Rockhampton, who thence explored in a general north-west direction to the Gulf of Carpentaria. All these expeditions were brought to a successful termination; and they have given us a sufficient general knowledge of the interior of the entire eastern half of Australia, the most important gap being the desert region east of Central Mount Stuart, and between Sturt's farthest north and Landsborough's farthest south points.

Two other explorations of less extent belong to this period. The first is that of Mr. F. T. Gregory in North-West Australia, in 1861, when he explored about 800 miles of country at an average distance of 200 miles from the coast, about the upper courses of the De Grey, Ashburton, Fortescue, and Oakover Rivers. The other is that of Messrs. Jardine, who, in 1864, explored a new route along the western side of the great northern peninsula from Port Denison to Cape York.

11. Establishment of the Telegraph Line to the North Coast.

There was again a lull of several years, during which time the electric telegraph was successfully carried by the South Australian Government along the track discovered by Stuart from Adelaide to Port Darwin. The establishment of numerous stations along this line, where permanent water and food supplies could be obtained, offered a tempting base of operations for new explorers; and the desire of the colonies of South and West Australia to communicate by an overland route led to the concentration of their efforts in this direction. Previous to 1872 the entire region between the telegraph line and the settled districts of West Australia was a vast blank covering fully one-third the area of the Australian continent; and wherever it had been touched on or pierced, it had been found to be a waterless waste, though often covered with dense scrub. Eyre had traversed its southern border; Gregory had penetrated from the north to a little beyond lat. 20° ; Stuart had explored its south-eastern corners; and Forrest, in 1869, had entered it from the west for a distance of nearly 300 miles; but all alike had been driven back by want of water.

12. The Western Deserts, traversed by Giles, Warburton, and Forrest.

In the exploration of this vast unpromising area, the first place is due to Mr. Ernest Giles, who, in 1872, at his own expense, but at the suggestion of Baron Von Müller who aided him with pecuniary assistance, started from Chambers's Pillar, near the Charlotte Waters telegraph station, with the intention, if possible, of crossing in a westward direction to the sources of the Murchison

River. In this he was not successful; but he discovered the extensive salt lake Amadeus, and explored for about 100 miles north of it, the whole country being arid, with sandstone ridges and spinifex or mallee scrub. The mountains diminished in height as he proceeded westward. The following year he started again, aided by the South Australian Government, and travelling about 200 miles south of his former course, reached a point nearly midway between the telegraph and the known part of West Australia. Here the country consisted of open sandhills or gravel, covered with spinifex, and absolutely without water. Turning back, he struck due north about 100 miles, finding only one small water-hole on the way, and then came upon some fine hilly country, with rocky gorges, running streams, a beautiful waterfall, and abundant pasture. Exquisite flowers decked the ground, and the place was an oasis of beauty in the midst of a huge wilderness. But it did not last long. The streams ran dry as soon as they left the shade of the hills, and both north and south there was nothing but parched desert. Packing out water in kegs, he pushed due west, with one companion, for 120 miles over an arid country, when, one of the horses breaking down, he was obliged to return. Giving the horse that remained to Gibson, he instructed him to go back to the kegs, 30 miles off, give the horse a good drink, and then push on for the camp, and bring back water, adding, "I depend on you to bring me relief." Gibson lost his way, and was never seen again. Mr. Giles walked on the whole way to the kegs without water. Then, carrying the keg and his other baggage, a load of 50 lbs., he started, and was seven days reaching his dépôt, having been without food for five days, and being able to walk only about five or six miles a day. On his return track he passed a range

of hills to the south of Lake Amadeus, which lake is probably more than 200 miles long.

While Mr. Giles was thus engaged, several other expeditions had been sent out by the South Australian and West Australian Governments. Mr. Gosse, with camels, horses, and a dray, started in 1873 nearly in the same direction as Mr. Giles, but did not succeed in reaching so far west. He discovered the remarkable Ayer's rock, a pillar or pyramid of granite about 1000 feet high, and not far from it Mount Olga, a precipitous mass of rock 2 miles long, 1 mile wide, and more than a quarter of a mile high.

In April 1873 Colonel Egerton Warburton started from Alice Springs (just north of the tropic) with seventeen camels, and succeeded in reaching the Oakover River, in Western Australia, in December, after extreme hardships, with only three of the camels alive. The line of this exploration was about on latitude 21° and 22° , passing a little south of Gregory's farthest point. The country, for the greater part of the distance, was a fearful desert, with not a drop of surface-water for hundreds of miles at a stretch, and in every way inferior to that traversed by Giles. Colonel Warburton was nearly starved on this journey, and part of the time had to travel, strapped at full length, on his camel; but he was the first to traverse the great Australian desert from east to west.

It was during this journey that the great value of camels for Australian exploration was first demonstrated. The desert vegetation was found to be admirably adapted for them, so that they appeared to thrive better in poor than in rich districts. Their great height and their long necks enable them to feed upon acacia and other bushes at a distance from the ground which no horse or bullock could

reach, and thus they are able to live and flourish where either of the latter animals would infallibly starve. Grass is often scarce or altogether absent, while the most sterile tracts are usually clothed with scrubby bushes. Prickly acacia, saltbush, mulga, casuarina, and other shrubs are all devoured with apparent relish, while, if really hungry, they will also eat mallee, wattle, eucalyptus, or in fact almost every tree or shrub indigenous to Australia. Still more important is the peculiar organisation of the camel's stomach, which enables it to pass many days without water, apparently without serious inconvenience. This faculty is developed by training, and the best trained camels will sometimes travel ten days without water.

In the following year (1874) a still greater feat was accomplished by Mr. Forrest, who, with horses only crossed through a longer extent of uninhabited country, from the Murchison River to the telegraph line a little north of Peake station. His route passed close to the point whence Giles and Gosse were turned back in 1873, and he was delayed seventeen days at his last station before reaching his destination, in endeavouring to find water sufficient to enable him to go on. For two-thirds of the distance across the country is without permanent water and thoroughly uninhabitable, though often covered with a scrubby vegetation. Towards the telegraph line, however, it becomes more hilly, and with more frequent streams and water-holes; and there are here and there patches of fertile country.

In 1875 the veteran explorer Giles was furnished with camels and assisted by the South Australian Government, and succeeded in crossing from Port Augusta, at the head of St. Vincent's Gulf, to Perth by an entirely new route (see Map). From the Youldeh Depôt to the

first settlements in West Australia was traversed in about four months. After leaving a small native dammed-up pond, in longitude $128^{\circ} 40'$, no water was found for a distance of 325 miles, when a fine spring was accidentally hit upon among barren sandhills. This probably saved the party from destruction, as for 150 miles beyond this point no more water was found. Southward towards the coast the country was open and grassy; northward, mostly covered with scrub and spinifex, but all equally waterless. In this expedition Mr. Giles travelled 2500 miles, and found no country available for settlement.

On his return journey in 1876 he took a new route by the sources of the Murchison, Gascoyne, and Ashburton Rivers, then nearly due east to the Alfred and Marie Range, which he had seen but was not able to reach in 1874. Here he had to travel for ten days over an entirely waterless desert, while no permanent water was seen for about 450 miles, between the sources of the Ashburton River and the springs of the Rawlinson Range. During this journey Mr. Giles suffered dreadfully from ophthalmia, yet he did not relax his explorations. While ascending some of the picturesque gorges of the upper Ashburton, the water sometimes became so deep and so hemmed in by rocks that the camels refused to go on; they would hang back, break their nose-ropes, and then lie quietly down till they were nearly drowned. "It was rather disagreeable," Mr. Giles writes, "for a blind man to slip off a camel up to his neck in cold water, and lifting up his eyelids with both hands, try to see what was going on. . . . It was with the greatest difficulty we got out of this watery glen. . . . Our clothes, saddles, blankets, and food were soaked to a pulp. . . . I called this singular glen in which the

camels were nearly drowned, Glen Camel." The plague of flies is one of the almost intolerable torments of the explorer. Mr. Giles says : " In consequence of my eyes being so bad, we remained here for the next two days. The heat and the flies were dreadful; and the thermometer indicated 93° one day and 95° the next in the shade. It was impossible to get a moment's peace or rest from the attacks of the flies; the pests kept eating into our eyes, which were already bad enough. This seemed to be the only object for which these wretches were invented and lived, and they also seemed to be quite ready and willing to die, rather than desist a moment from their occupation. Everybody had an attack of the blight, as ophthalmia is called in Australia, which with the flies was enough to set any one deranged. Every little sore or wound on the hands or face was covered by them in swarms; they scorned to use their wings, they preferred walking to flying; one might kill them in millions, yet other and hungrier millions would still come on, rejoicing in the death of their predecessors, as they now had not only men's eyes and wounds to eat, but could fatten on the bodies of their slaughtered friends also. Strange to say, we were not troubled here with ants; had we been, we should only have required a few spears stuck into us to complete our happiness." At another camp near Mount Gould the annoyance was such as to call forth the following graphic picture : " The flies at the camp to-day were, if possible, even more numerous than before. They infest the whole air; they seem to be circumambient; we can't help eating, drinking, and breathing flies; they go down our throats in spite of our teeth, and we wear them all over our bodies; they creep up one's clothes and die, and others go after them to see what they died of. The instant I inhale a fly it acts as

an emetic. Their bodies are full of poisonous matter, and they have a most disgusting flavour, though they taste sweet. They also cause great pain and discomfort to our eyes, which are always full of them. Probably, if the flies were not there we might think we were overrun by ants ; but the flies preponderate ; the ants merely come as undertakers and scavengers ; they eat up and take away all we smash, and being attracted by the smell of the dead victims, they crawl over everything after their prey."

Giles had thus successfully twice crossed the Australian desert from east to west and from west to east, the two lines being from 300 to 400 miles apart, while he had previously explored an intermediate line for half the distance, as well as great tracts of country between Lakes Eyre and Amadeus, northward to the Macdonnell Ranges as well as in the south-western part of South Australia. He must therefore be regarded as one of the most intrepid and successful of the modern Australian explorers ; while his narrative of these journeys in the two handsome and well-illustrated volumes entitled *Australia Twice Traversed*, is one of the best written works of its class, and gives a vivid picture both of Australian desert scenery and of the difficulties and dangers of its exploration.

13. Further Exploration in South Australia and Queensland.

The greater part of the country between the telegraph line and the settled districts of West Australia having been thus shown to be very largely a waterless desert, exploration was for the next few years devoted chiefly to filling up gaps in our knowledge of the eastern portion of the continent.

The northern part of Queensland, to the 14th parallel, was explored for the Government, in 1872, by Hann, with a geologist and botanist, during which the Palmer River gold-fields were discovered. In attempting to reach the coast the party became entangled in the scrubs that had so embarrassed Kennedy, and were finally obliged to return to the Palmer River, and come home by the inland route.

In 1875 Mr. Lewis headed an expedition which succeeded in tracing the chief streams which enter South Australia from Queensland, especially Eyre's Creek, Cooper's Creek, and the Diamentina or Müller Creek, into Lake Eyre.

In 1878, in view of a project for an overland railway from Brisbane to Port Darwin, an expedition was organised in the former city to ascertain the nature of the country on the route. It was under the leadership of Mr. E. Favenc, and started from Blackall on the Victoria or Upper Barcoo River, crossing in a W.N.W. direction to the Diamentina. Thence by a north-westerly route the party reached the Herbert, and followed its farthest westerly tributary, the Rankine, for some distance, and then across to Buchanan Creek. Farther on some extensive but shallow lakes were discovered, and beyond these a large creek named Creswell Creek. This was followed down to the last permanent water, where the party had to remain some time for rain, as the remainder of the distance to the telegraph line was quite waterless. Around this creek much good country was discovered.

In 1879 the West Australian Government sent Mr. Alexander Forrest to explore the north-western territory between the De Grey River and the telegraph line. The first part of the journey was along the coast to the

Fitzroy River. This was ascended for about 240 miles, when further progress was stopped by the Leopold Range, whose precipices were quite inaccessible. In hopes of finding a way to the plateau these cliffs were followed till the sea was reached, but here the party were entirely enclosed by precipices. In attempting to climb these a horse was killed, and after reaching a height of 800 feet the country was found to be so rugged and so cut up by precipitous gorges as to be quite impassable. It was, in fact, the same district in which Sir George Grey had struggled more than forty years before. Returning to the Fitzroy, a tributary—the Margaret River—was ascended for some distance, and at length a way was found to the table-land, where they came upon a good grassy country, more or less intersected by rough ridges till the Victoria River was reached. Beyond this the country was almost waterless, and it was a hard struggle to reach the telegraph line. This journey opened up some valuable country, which has since been stocked with sheep and cattle.

14. General Result of these Explorations.

The western half of Australia has thus been traversed in three nearly parallel lines about 300 miles apart; while various shorter explorations have made known large portions of the intermediate country. The southern and northern coasts are also fairly known; and we are forced to conclude that about one-third of the entire continent of Australia is, in its present state, uninhabitable by Europeans. Nowhere else perhaps on the globe do we meet with the strange phenomenon of a scattered or even a dense vegetation combined with an

aridity equal to that of the Sahara. For the traveller the country is worse even than the Sahara. For hundreds of miles at a stretch the sandy undulations are covered with the dreaded spinifex, or porcupine grass, which renders it impossible to walk without painful precaution. Again, for hundreds of miles is found the dense scrub of dwarf eucalyptus, covering the ground like the rods of an osier bed, 10 or 12 feet high, hindering all view of the country, and rendering it necessary almost to bore one's way, like a mole, underground. Then come acacia scrubs, which add the annoyance of sharp prickles to those of the other kinds. Mr. Giles tells us that horses dread the Triodia, or spinifex, like a pestilence. The constant pricking of this grass causes raw and bleeding swellings round their feet; and to escape from it they will prefer to force their way through the densest scrubs, where the ground is soft and the spinifex does not grow. Here they rush along, tearing the coverings off their loads, and frequently forcing sticks between their backs and their saddles ; then comes a frantic crashing through the scrub, loads are forced off, and horses are lost sight of, and it may take hours or days to recover them. Nor do the travellers escape ; for their clothes get torn and ripped to pieces, and their bodies scratched and often seriously wounded. Sometimes stinging ants abound to such an extent that the wearied explorer can get no rest. However hot and tired he may be, he dare not lie down in the shade, but must remain exposed to the sun or lie on the heated soil, in order to escape this torment. In other parts the whole country is a mass of angular stones, over which the traveller has to pass for days together, without finding a spot of easier ground ; while in some districts loose sand is heaped up in ridges, like the long swell of the ocean, and appearing almost as

interminable. Often, after passing days without water, when at length it is discovered, it turns out to be undrinkable brine, or it exists in such small quantity as to be insufficient to supply the wants of both men and horses for a single day. Again, the extreme uncertainty of the climate and rainfall renders it impossible to depend on the accounts of previous explorers in the same district. Where water is at one time abundant and herbage luxuriant, there may be found a year or two later a burnt-up desert. The lake described by one traveller may be found an expanse of baked mud by his successor; while where one marched over grassy plains, another may be stopped by inundations which cover the whole country.

Exploration, for mere discovery's sake, has now done its work in Australia, and the rest may be left to the unaided expansion of agriculture and commerce. So many outlying stations are already occupied, and the overland telegraphs afford such admirable bases of operations, that every spot available for settlement will be found and occupied quite as quickly as desirable. The work that has been already done in so inhospitable a country and so trying a climate is little less than marvellous; and the story of Australian exploration, with its episodes of heroism and martyrdom, affords a convincing proof of the undiminished energies of our countrymen in their southern home.

CHAPTER VII

MATERIAL PROGRESS OF THE AUSTRALIAN COLONIES

1. Growth of the Population.

WHILE the exploration of Australia has thus rapidly gone on, every available part of the country has been converted to the uses of civilised man, at a rate which has sometimes rivalled that of the Western United States. The progress at first was comparatively slow. In 1788 the first settlement, at Botany Bay, consisted of about 1000 individuals, and in 1835 the entire European population of Australia, with Tasmania, was about 80,000. By 1851 it had increased to 350,000; when the discovery of gold-fields gave an enormous impetus to emigration, and subsequently to agriculture and commerce. The population thence increased with marvellous speed, and at the present time Australia probably contains over 3,000,000 inhabitants, more than one-third of whom (1,120,000) are congregated in one of the smallest of the colonies, Victoria; while more than one-fourth of the whole (840,000) are to be found in the two great cities, Melbourne and Sydney and their suburbs within the 10 miles radius.

2. Agriculture.

An enormous extent of the central interior is, as

has been shown, absolutely uninhabitable, yet about 100 million acres of Crown lands have been sold, equalling nearly one-twentieth of the entire area of the country. Of this amount more than 7 million acres are actually under cultivation, the rest being devoted to grazing purposes. The great agricultural specialty of Australia is its wool, the produce of about 85 millions of sheep. In 1889 the total produce of wool was 340 million pounds; and its quality is so fine that it realises the highest prices in the English market, and reaches an annual value of 18 millions sterling.

Besides sheep, there are more than 8 millions of cattle, nearly one and a quarter million of horses, and three-quarters of a million of pigs, in Australia; and from these there is a great export of hides, tallow, and preserved meats.

The value of Australia as a wool-producing country was perceived so early as the end of the last century, when the Merino breed of sheep was first introduced; and these are still by far the most abundant, though other choice breeds have been imported, and have been found more suitable for certain districts. The stock has been improved at various times by the importation of the very highest quality from Europe, and these have been so carefully selected and increased that Australian sheep are now probably the finest in the world. As an indication of the high value set upon them, a Saxon Merino ram, bred in Tasmania, was sold for the enormous price of 1150 guineas, and others have been sold for almost as much.

On the great sheep farms, where there are often 50,000 or 100,000 sheep to be sheared, enormous sheds are constructed for shearing and packing the wool, and numbers of shearers employed at high wages,

who shear from 60 to 70 sheep a day each. Washing the sheep or the wool has now been generally given up, as the manufacturers prefer to buy it as it comes from the animal. Of late years shearing machines have come into use. These cut the wool more regularly, and obtain a rather greater amount from each animal; injury to the sheep by accidental cuts is avoided, and about 20 per cent more work can be done by each man. The machine consists of a small comb, which is passed along close to the animal's skin, while a cutter, moving laterally backwards and forwards 4000 times a minute, cuts the wool close above the comb. The motion of the cutter is given by a flexible rope-like shaft making 2000 revolutions a minute, which allows the workman to move the machine freely over the surface of the sheep's body. The flexible shafts are all connected with machinery overhead, to which motion is given either by steam, wind, or horse-power, and each shearer can stop or start his cutter at pleasure. Some men are professional shearers, who do little else all the year round, beginning in Queensland, and working their way southward to Victoria, and afterwards to New Zealand.

Since 1880 there has been a considerable exportation of frozen sheep, and although the greater quantity has come from New Zealand, Australia has also sent a large number. For this purpose extensive freezing establishments have been built, and large steamers specially constructed to carry the carcases in a frozen condition. Owing to the demand for frozen meat, it is found profitable to shear sheep for three or four years and then kill them for export, the maximum of quality and quantity both of wool and meat being thus obtained.

Cattle have also been carefully improved by the importation of the best English breeds, but they chiefly

serve for the supply of beef to the great cities and towns, as well as of milk, butter, and cheese. A considerable quantity of meat-extract and of tinned beef is, however, made for export, the whole of the refuse of the animals slaughtered for this purpose being made into an excellent animal manure.

Cattle have served an important purpose in Australia in preparing the land for sheep. A great deal of the interior consists of light loose soil, which in the dry season is trodden into dust, which collects in the wool and injures its quality. When land has been occupied for some years by cattle the surface becomes more consolidated, a better turf is formed, and it becomes in every way more adapted for sheep. The effect of the loose soil is seen in the elongated growth of the hoofs of cattle, and sometimes also of horses, which prevents them being driven long distances without becoming lame. As the ground becomes consolidated this peculiarity disappears, and the animals become quite healthy. In the remote interior of New South Wales and Queensland there are numbers of entirely wild cattle, locally called "scrubbers." These are a source of annoyance to the outlying stations, as they entice the station cattle to follow them and adopt their wild mode of life. The tropical buffalo was introduced into North Australia from the Malay Islands when that district was first settled, and these have also become wild, and are found in abundance about Port Darwin and other parts of tropical Australia.

In certain favourable districts dairying forms a special industry, and is carried on by co-operation. In the Kiama district and on the Hunter River numerous co-operative factories are established, which collect the milk from the surrounding small farms, and make it

into butter on the most approved methods. The skimmed milk is sold at a low price to feed calves and pigs. The milk is taken from the producers at a low fixed rate, and the profits at the end of the year are divided among them, as they are all shareholders in the concern. Some of the Kiama butter has been sent to London, where it has commanded a high price, being equal to the best Danish butter.

The chief agricultural products are also extensively grown. In 1889 the wheat crop amounted to about 34 million bushels; potatoes to 330,000 tons; hay to 1,600,000 tons; while the vineyards produced 2,690,000 gallons of wine. Tobacco and sugar-cane are also extensively grown in suitable parts of the country. The average yield of the various crops per acre was as follows:— Wheat, 7·34 bushels; oats, 24·22 bushels; barley, 18·23 bushels; maize, 26·82 bushels; potatoes, 3·60 tons; hay, 0·68 tons. These averages must, however, be somewhat reduced, as they include Tasmania and New Zealand, where, owing to the more favourable climate, the crops, especially cereals and roots, are considerably finer than in Australia itself.

3. Irrigation.

For the last few years the importance of irrigation for Australian agriculture has attracted much attention, and efforts have been made, both by governments and by private companies, to carry out irrigation works. In Victoria a weir of solid masonry has been constructed to dam back the waters of the Goulburn River, and thus provide a large supply for the irrigation of the alluvial plains lower down. Two canals will carry the water, one being 31, the other 84 miles in length, and these will be capable of supplying from 20,000 to 100,000 cubic feet

of water per minute. Other works are proposed on the Loddon River, Campaspe River, Broken River, and several others. These various schemes will irrigate about two million acres of land.

The Mildura and Renmark Irrigation Colonies are on the Murray River, Mildura being in the north-west corner of Victoria, while Renmark, lower down the river, is in South Australia. A company, established by two Canadian gentlemen, has obtained from the two governments a grant of 250,000 acres of land, and water within a fixed limit is to be taken from the Murray to irrigate the colony. The water is raised about 35 feet by pumping machinery of 2000 horse-power, but an extensive lake or reservoir has been formed which will be filled from the river when it is in flood, and the pumps will only be required during the height of the dry season. About 10,000 acres have already been sold, and 3000 people are settled on the two colonies, which are believed to be especially adapted for the cultivation of fruit, such as grapes, apricots, oranges, etc. Time only will show whether such fruit-cultivation on so extensive a scale will be permanently profitable. One irrigation company has also been started in New South Wales for the purpose of fertilising about 18,000 acres of land about 30 miles from Sydney, by water taken from the Nepean River.¹

4. Mines.

Australia owes the greater part of its rapid development to the discovery of gold, followed by that of many other

¹ For the greater part of the information on Australian agriculture I am indebted to the recent valuable work of Professor Robert Wallace of Edinburgh, *The Rural Economy and Agriculture of Australia and New Zealand*. Sampson Low, Marston and Co., 1891.

minerals of equal or even greater importance to the progress of a civilised community, and to the present day the various kinds of mining constitute important industries in all the colonies. Victoria stands first as a gold-producing country. New South Wales, while also rich in gold, is far richer in its valuable coal mines. South Australia has the richest copper mines in the continent, and among the richest in the world. Queensland has rich gold-fields, with some copper, tin, and coal; and West Australia has tin, lead, and copper. Diamonds have been found in New South Wales, Victoria, and Queensland. Tin occurs abundantly in Queensland, and less plentifully in New South Wales, Victoria, and Tasmania. Iron is often plentiful, and there are also mines of antimony, bismuth, cobalt, zinc, and manganese, as well as sulphur and bitumen. Coal is extensively worked in New South Wales, and it is also abundant in Queensland.

The value of the gold obtained at the various Australian and New Zealand gold-fields, from 1851 to the end of 1888, reached the enormous amount of £328,000,000. Tin, copper, and some other metals are produced in considerable quantities, while the annual produce of the coal-fields of New South Wales is over three and a half millions of tons.

5. Commercial Activity.

The trade of the colonies is already in a very flourishing state, and is continually on the increase, so that in this respect Australia takes a foremost position among civilised nations. In 1880 the imports amounted to over £59,000,000, and the exports to over £50,000,000. If we compare Australia with the Canadian Dominion, as the most extensive of the British colonies, we find that, with a

much greater population, the exports of the latter country are considerably lower; so that while Australia exports about £15 per head, Canada exports less than £5 per head. It is true that Australia has gold; but it is equally true that the labour, skill, and energy, represented by each pound's worth of gold obtained from the mines, is nearly equal to that required for the production of any other article of commerce. The shipping employed in the trade of the Australian colonies consists of about 18,000 vessels, reaching an aggregate of 14,700,000 tons. The gross revenue of the Australian colonies for the year 1880 amounted to over twenty-four and a half millions sterling.

6. Railways and Telegraphs.

Up to the epoch of the gold discovery little had been done towards facilitating internal communication within the several colonies, or between one colony and another, and much loss and suffering resulted from the absence of roads between the great seaports and the interior. Excellent roads now traverse most of the colonies, connecting all the chief towns with their respective capitals; the navigable rivers are covered with steamers, and a system of railways is rapidly being extended over the more populous portions of the country. In the year 1889 there were in Australia and Tasmania 8272 miles of railroad already constructed, and 1915 miles in progress; while the electric telegraph has received a still greater proportionate development, no less than 34,415 miles having been constructed up to the end of the year 1888. All the colonies are now linked to each other, to New Zealand, and, by the overland telegraph, with the mother-country *via* Java and India. Several magnificent lines of steamers keep up frequent communication with Europe and

America, by the Atlantic, Pacific, or Suez Canal routes; while others connect the several colonies with each other, with New Zealand, and with the Fiji Islands and New Caledonia. Throughout all the colonies a postal system, modelled on that of Great Britain, is in full operation, the inland postage being generally 2d., while money-order offices and postal savings-banks are scattered abundantly over the remotest parts of the interior.

The Telephonic Exchange is largely employed in all the chief cities of Australia, and upwards of 8000 telephones are now in use. Steam, horse, or cable tramways supply easy communication between all the large cities and their surrounding suburbs.

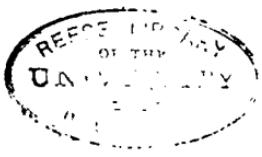
7. General Condition of the People.

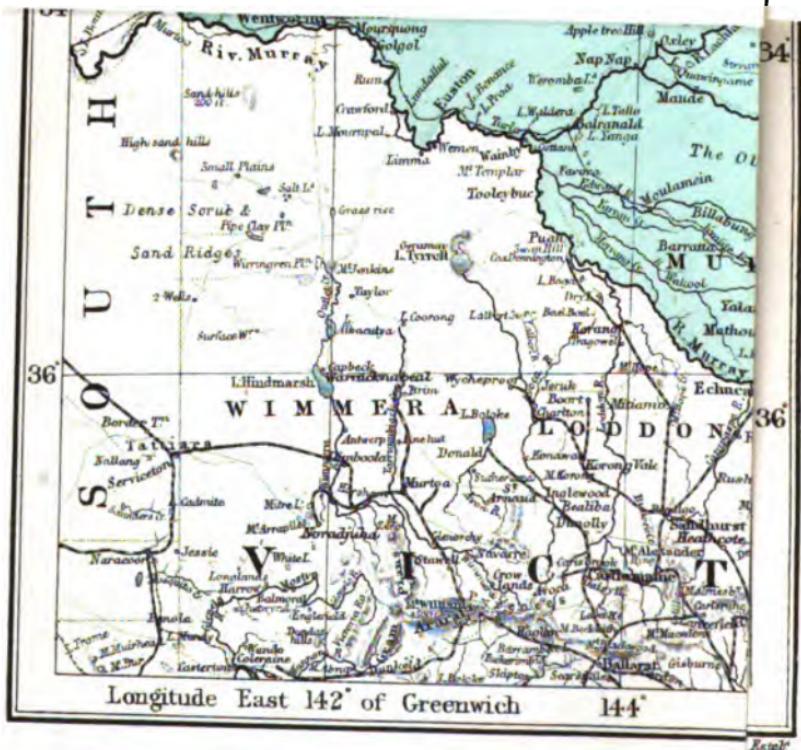
The condition of the working classes throughout the Australian colonies is very good. Wages of mechanics are from ten to twelve shillings a day, and of unskilled labourers seven to eight shillings, while eight hours is everywhere the usual day's work. Food of all kinds is very cheap, and other necessaries not much, if any, dearer than in England. As a consequence of this general wellbeing, with leisure and free education, the great mass of the people seem to enjoy life to an unusual degree. Every kind of outdoor sport and amusement is encouraged by the whole population, cricket, football, boating, and horse-racing being especial favourites, and exciting everywhere the greatest interest; while the climate is such as to render these amusements available throughout the entire year.

Another most agreeable feature of Australian life is the general interest taken in gardening and horticulture by the mass of the people. On this subject Sir Charles

Dilke, in his *Problems of Greater Britain*, has the following observations: "All the cities of Australia have botanic gardens, and, as a general rule, gardens laid out both as landscape gardens, or 'recreation-reserves,' and as botanic gardens proper. The present taste lies in the direction of the formation of outdoor ferneries, many of the smaller towns having gardens in which there are acres upon acres of tree-ferns from 5 to 30 feet in height. While the Melbourne gardens are the most scientific in the colonies, and as mere gardens also perhaps the best, the Sydney gardens also have the advantage of an exquisite situation on a gentle slope leading down to a lovely bay. The Brisbane gardens, with their magnificent tropical effects of wild luxuriosness, stand comparison with either of the others. It is the belief of the more cultured colonists that the taste for the beautiful in gardens is having a considerable effect on national character, and is producing a tendency towards refinement." The gardening fervour of Australia exceeds that of any other English-speaking country, and the fondness of the people for their public gardens and recreation-reserves, and the fact that in their warm climate full advantage is taken by the population of their beauty and picturesqueness, must bring out the more poetic side of human nature in the inhabitants. Even more important perhaps in its effects on character is the wide extension of gardening as a recreation. "Throughout the towns gardening is universal: immediately outside the business-portion of the cities pretty gardens surround the houses, and the inhabitants almost universally compete at shows. Water is dear in Sydney, and in the dry weather of the summer it is not easy to keep lawns in order, as they have often to be soaked in water; yet the number of fathers of families who not only pay a heavy water-rate,

but water their lawns twice a day, and themselves mow them three times a week, is amazing to those not Australian-born. The immense amount of space devoted by the weekly papers to horticultural matters bears witness to the interest taken in them. The prevalence of gardening among the tradespeople and the mechanics of Australia is striking to Americans who have visited the colonies; but when we contrast the American winter with midwinter in Australia, the pall of snow with the blue sky and the rich earth full of narcissus and hyacinths, one cannot wonder at the difference. In the very depth of winter, in the greater portion of non-tropical Australia, besides the bulbs and the anemones, the geraniums and the camellias, pansies, violets, and roses continue in bloom. In America, as in England, gardening is an amusement for six months; in Australia a long procession of beauties, changing from season to season, but unbroken as regards continuance, gives zest to the delight."





CHAPTER VIII

THE COLONY OF NEW SOUTH WALES

1. Origin, Geographical Limits, and Area.

OF all the Australian colonies the oldest is New South Wales, it having been settled in 1788; and, till West Australia was established in 1829, it included all the English settlements in the country. It was originally much more extensive than it is now, including much of Victoria and Queensland, which were separated from it in 1851.

New South Wales now contains an area of 323,437 square miles, lying within the limits of 28° and 37° south latitude, and between the meridians of 141° and 154° east longitude. Its greatest length is 900 miles, with an average of 500, while its greatest breadth is 850 miles, also with an average of 500. Its area in acres is 206,999,680, or about five times that of England and Wales, and more than half as large again as France. It is bounded on the north by Queensland, from which it is separated by Macpherson's Range, the Dividing Range, and the Dumaresq River; on the east by the Pacific Ocean; on the south by Victoria, from which it is separated by the river Murray, as far as its source, and thence by a straight line to Cape Howe; while on the west the

meridian of 141° E. separates it from South Australia. In general form it is a quadrangle, of which the eastern side is much longer than the western.

2. Physical Features.

The surface of this colony is greatly diversified. A range of mountains runs parallel to the coast at an average distance of about 30 miles from it. The country on the eastern side of this range is an elevated undulating plain intersected by numerous streams. On the west of the mountains is a considerable breadth of high table-lands, which farther west sink into vast plains. The coast district has a fertile soil, and is by far the most populous. Its rivers periodically overflow their banks, and cover the valleys with a rich alluvial deposit that is excessively fertile, so that crops can be produced on the same land year after year without manure. The higher land is much of it good pasture, with orangeries and vineyards in favourable localities.

The mountains of New South Wales cover a wide extent of country, though their elevation is not great. Far in the interior, near the western boundary of the colony, are the Grey and Stanley Ranges, the loftiest elevations being Mount Arrowsmith and Mount Lyell, each about 2000 feet high. These form the western watershed of the Darling valley, though, as is so frequently the case in Australia, many of the streams dry up as soon as they quit the mountains. The great Dividing Range runs in a general direction from N.N.E. to S.S.W., and is very broad. It consists of seven main divisions—(1) The New England Range, on the north-east, culminates in Ben Lomond, 5000 feet high; (2) the Liverpool Range, south of the last, and extending in a westerly direction,

reaches a height of 4500 feet in Oxley's Peak; (3) the Blue Mountain Range, to the west of Sydney, and which long formed an impassable barrier to the interior, only reaches a height of 4100 feet. Then follow (4) the Culalarin, (5) the Gooruck, and (6) the Manero Ranges, all about the same height; while (7) the Muniong or Warragong Range, forming the northern extension of the Australian Alps of Victoria, culminates in Mount Kosciusko, whose summit (7308 feet high), although below the actual snow-line for the latitude, usually retains some patches of snow throughout the year. Farther to the east lie the Coast Ranges, generally forming the edge of a table-land upon which the dividing chain is based. The northern Coast Range reaches a height of 6000 feet at Mount Sea-view, about 40 miles inland from Port Macquarie, and the southern culminates in Mount Budawung, at an elevation of 3800 feet. There are also many isolated mountains, which reach a considerable altitude.

As already stated, the western parts of the colony consist of immense level plains. The principal of these are the Liverpool Plains, in the northern part of the country, situated between the Liverpool and Hardwick Ranges. They cover an area of about 17,000 square miles, and are supposed to have once formed the bed of a vast inland lake, the hills or ridges of sandstone or basalt rising from them like islands. They are but scantily watered, and are therefore only suitable for pasturage. Another extensive series of plains is known as the Manero Plains or Brisbane Downs, situated in the southern part of the colony, near the sources of the Murrumbidgee River. They form an undulating plateau of rich and fertile soil, about 2000 feet above the sea, and extending for a length of 70 miles.

All the rivers of New South Wales take their rise in the great Dividing Range, or in some portion of its northern or southern extensions ; and they may be divided into two great groups—those which flow eastward into the ocean, and those that flow westward, and ultimately join the Murray River, or some of its numerous tributaries. The eastern rivers have comparatively short courses, the largest, the Hawkesbury, being only 330 miles long. They flow rapidly in deep channels, varying greatly in volume, and are subject to great and sudden floods. Several of them are partially navigable for vessels of light draught, but their entrances from the ocean are usually difficult and dangerous. Those which exceed 100 miles in length are, the Hawkesbury, the Hunter, the Shoalhaven, the Clarence, the Macleay, the Richmond, and the Manning. The great rivers flowing west are the Darling, the Lachlan, the Murrumbidgee, and the Murray, with many tributary streams. The approximate length of the Darling, the largest and most westerly of these rivers, is about 850 miles, without taking account of its innumerable smaller windings ; but its numerous tributaries, spreading out like a fan over the northern half of the colony, drain an area of 198,000 square miles. Next comes the Lachlan, whose sources approach within 60 miles of the east coast, and which has a course about 500 miles in length. Farther south the Murrumbidgee sends its branches to the east of the Australian Alps till its sources in the Gooruck Range are only 30 miles from the coast. The Murray itself, which forms the southern boundary of the colony, rises near Mount Kosciusko in the Muniong Range of the Australian Alps. These rivers are all navigated at certain seasons by small steamers, which reach Albury on the Murray, Wagga-Wagga on the Murrumbidgee, and Fort Bourke on the Darling. No less than

seven tributaries of these rivers are from 350 to 750 miles long, the largest of these, the Macquarie, passing by Bathurst 122 miles west of Sydney.

The coast-line of New South Wales is bold and rocky, and although almost straight in general outline, is broken up in detail so as to present a number of important capes and headlands, and many remarkable bays and inlets; Port Jackson being one of the safest, deepest, and finest harbours in the world. The lakes are really of little importance, although Lake George, situated on a table-land of the Dividing Range at an elevation of 2129 feet, makes an imposing appearance on the map, being 25 miles long by 8 miles wide. It is, however, very shallow, and at intervals of a number of years altogether dries up, so that cattle can pasture all over it. Having no outlet, it has saline deposits which render its water undrinkable. Lake Bathurst is a smaller lake in the vicinity; and the only other lakes are in the lowlands, and are rather depressions subject to being filled by floods than true lakes.

The scenery of New South Wales cannot, on the whole, be termed beautiful, owing to the monotony of the vegetation, the vastness of the plains, and the frequent aridity of extensive areas, yet it contains certain features of remarkable beauty. First among these stands Port Jackson, the harbour of Sydney, which for variety, extent, and picturesque combinations, rivals, if it does not surpass, the celebrated harbour of Rio de Janeiro. Mr. Anthony Trollope—a man not given to enthusiastic praise—speaks of it as “so inexpressibly lovely that it makes a man ask himself whether it would not be worth his while to move his household gods to the eastern coast of Australia, in order that he might look on it as long as he can look at anything. Some of the estates



ENTRANCE TO PORT JACKSON.

and pleasure-grounds on its shores are perfect. They leave nothing for the imagination to add." Another traveller, the late Sir David Wedderburn, M.P., thus describes it: "We passed the narrow cliff-guarded entrance, and found ourselves in Port Jackson, one of the most beautiful land-locked bays in the world. Promontories, inlets, and islands, wooded to the water's edge, open out in picturesque succession as the ship advances; and the shores are everywhere studded with charming villas and country-houses, with gardens and groves of varied foliage, among which towers conspicuous the Norfolk Island pine. On various commanding points batteries have been erected, with guns grinning in all directions, and vessels lie at anchor in every sheltered cove, their masts and cordage apparently mingling with the branches of the trees. Allowing for difference of latitude, Sydney reminds me much of Stockholm in its situation."

Less known, but almost equally remarkable, is the scenery of the Hawkesbury River, which surpasses in natural beauty the finest parts of the Rhine. Govett's Leap, on the route from Sydney to Bathurst, is a ravine or chasm of unsurpassed grandeur, and it possesses a waterfall superior to the Staubbach. The district of Illawarra, about 40 miles south of Sydney, is remarkable for its picturesqueness in rock and ravine, and the almost tropical luxuriance of its vegetation; while many parts of the mountain ranges are grand and imposing.

The Government of New South Wales has set an excellent example to other colonies in establishing a National Park for the purpose of preserving some of the most characteristic and beautiful features of the scenery and indigenous vegetation of the colony; and they are fortunate in having a district well adapted to the purpose

and of very easy access from the capital. It consists of a tract of country with a frontage of $7\frac{1}{2}$ miles to the Pacific and extending about the same distance inland, comprising 36,300 acres, or nearly 56 square miles. This is hardly half as large as our New Forest, and, considering the enormous area of New South Wales and the small value of such land, it is a pity it was not made considerably larger. A railway passes through the park to Illawarra, and its northern boundary is only 15 miles from Sydney. The Port Hacking River flows through it for nearly 10 miles, 5 of which are navigable for small boats and steam-launches. Salt-water fish are plentiful, and there are trout and perch, which have been introduced. The park generally has a good aspect, and abounds with beautiful picturesque, fairy-like scenes. From the high table-lands at numerous places extensive views are obtained of the Pacific Ocean, Botany Bay, and Sydney; of the coast-line towards the Illawarra Mountains on the south, and of the Blue Mountains on the west. The high table-lands consist of stony heaths situated at elevations of from 350 to 800 feet above the sea, and abounding in flowering shrubs. The valleys of the chief streams, especially of Port Hacking River and Bola Creek, are to a large extent covered with rich foliage, including stately cabbage-trees (*Livistona australis*) and bangalo palms (*Ptychosperma elegans*), as well as tree-ferns, Christmas myrtles, waratahs, gigantic lilies, and other handsome plants, growing in tropical luxuriance and brilliancy of colour. There are many fine forest trees of varied species, some in the southern part of the park growing nearly 200 feet high, often overshadowing beautiful streams with long reaches of deep pure fresh water. About 50 miles of carriage roads have been formed through the park, and others are in

course of formation, securing an abundance of beautiful drives and pleasant walks.

It is to be hoped that other colonies will secure to posterity the enjoyment of similar illustrations of the native scenery and vegetation which are especially characteristic. Victoria should preserve a considerable area of its grand forests of giant eucalypti, as well as the best examples of the scenery among its extinct volcanoes; West Australia should preserve a portion of its southern sandy wastes, which produce more beautiful and peculiar dwarf flowering shrubs than any other country in the world, as well as an example of its grand forests of eucalypti; while Queensland should preserve a considerable area of its tropical jungle, which, if once allowed to be destroyed, can never be reproduced in its native luxuriance and grandeur.

3. Climate, Natural History, and Geology.

The climate of New South Wales has already been sufficiently described in our account of the climate of Australia generally. It varies greatly according to latitude and distance from the sea. The interior plains are excessively dry, while the coast districts have abundant rains. The winters are very mild; and, though the summer heats are great, sunstrokes are far less numerous than in the United States. The hot winds of the warm season are annoying, but do not appear to be unhealthy; while storms and electrical disturbances are comparatively rare.

New South Wales exhibits in perfection the special flora and fauna of Eastern as contrasted with Western Australia. The beautiful genus epacris, the representa-

tive of the heath tribe in Australia, is especially abundant, as are the acacias, and the eucalypti or gum-trees. The crimson-flowered "waratah" (*Telopea speciosissima*) is a great ornament of the coast districts, and is almost peculiar to this colony, as is the gorgeous "flame-tree" (*Brachychiton acerifolia*), which bears a profusion of scarlet flowers in coral-like racemes so as to look at a distance like a tree on fire. It is abundant in the Illawarra district as well as in much of the lowlands in the north-eastern part of New South Wales. The beautiful banksias, called "honeysuckles" in Australia, are very abundant, as well as giant fig-trees in the northern districts. Terrestrial orchids are more abundant than in any of the other temperate colonies, as are the beautiful amaryllis and lily tribes, palms, and ferns, so that on the whole a better illustration of the variety and beauty of the Australian flora can be obtained in this colony than in any other.

Among native Australian animals kangaroos of various species still abound, together with bandicoots, wombats, native opossums, and the koala, or native bear, as well as the curious duck-billed platypus. Birds are numerous and varied, and the larger part of the Australian fauna is well represented, while many remarkable species are almost peculiar to this colony and Queensland. Such are the beautiful and unique lyre-bird (*Menura superba*), the gorgeously-coloured ground-thrush (*Pitta strepitans*), the curious bower-birds, the golden *Sericulus aureus*, the large cuckoo-like *Scythrops*, the fine crested pigeon (*Lopholaimus antarcticus*), the brush-turkey (*Tallegalla lathamii*), and many others. To give any adequate picture of the natural history of this colony, it would be necessary to enumerate almost all the peculiar Australian groups, because almost all are here represented. The reader is

therefore referred back to the third chapter of this volume for further details on this subject.

There is one curious insect, however, which deserves a special notice—the Bugong moth, which serves as a luxurious article of food to the natives in the limited district where it abounds. This is on a mountain, called the Bugong Mountain by the natives, near the Tumut River, a branch of the Murrumbidgee, and it is also said to be found in the lofty mountains southwards to the boundary of Victoria. About the height of summer, from November to January, these moths assemble in countless thousands on bare granite rocks which are found in enormous piled-up masses near the summit of the mountain. Fires are lighted under these rocks, and the smoke causes the moths to fall down stupefied, when they are collected by bushels. They are then partially roasted so as to get rid of the wings and the down with which the body is covered, and are then either eaten at once, or beaten into cakes resembling lumps of dirty fat, which can be preserved for some weeks. During the season the natives gather together from all parts of the surrounding country to collect this favourite food. Crows also come in numbers to feed upon the moths, and these are captured in the hollows of the rocks, and being very fat from feeding on the moths, form another item in the feast. It is said that the first time the natives eat the moths severe vomiting is produced, but after a few trials they become accustomed to the food and thrive and fatten upon it. The insect is small, being about an inch and a half across the wings, of a dark brown colour, with two black ocellated spots on the upper wings, the thick downy body being full of a yellow oily substance. It is allied to our common Turnip Moth (*Agrotis segetum*) and other allied forms called "Dart Moths" from the

dart-like markings. It has been described under the name of *Agrotis spina*, and specimens of it may be seen at the Natural History Museum, South Kensington.

The mountain ridges and table-lands of New South Wales consist mainly of the older Palæozoic formations, pierced and rent by intrusive igneous rocks of various ages. The older settled districts of the east coast lie mostly on rocks of the carboniferous formation, or on newer deposits of Mesozoic age; while the great western plains and valleys are almost wholly Tertiary sandstone, or more recent deposits, with intervening areas covered by overflows of igneous trap rock. The oldest sedimentary rocks are Silurian, consisting of crystalline sandstones and limestones. Their strike is in a meridional direction, and the quartz veins, or "reefs," as they are locally termed, running north and south for miles, serve as a guide to the wandering bushman.

The Silurian rocks form the bed on which the gold-bearing gravels are deposited, while its quartz veins or reefs form the matrix from which the gold of the drifts has been derived. These reefs are worked by means of deep mines, and furnish the larger part of the gold now procured. Granitic rocks of various kinds are abundant, and are believed to be generally of later date than the Palæozoic rocks. Syenite forms the summit of Kosciusko, the highest mountain in the colony and in Australia. Gold occurs in granite, both in quartz veins and in beds of iron pyrites; while the tin of New England is all derived from granite.

The carboniferous rocks cover an immense area, and are largely coal-bearing, so that the coal-fields of New South Wales are among the most extensive in the world. These deposits were once thought to belong to the Secondary formation, but they are now ascertained to be

Palæozoic, and to correspond to the true coal of Britain. Cannel coal and mineral oils are also produced by these carboniferous rocks. The Secondary formation is scantily represented by small patches of trias at the Clarence River, and by some coal-bearing beds near Parramatta.

Tertiary deposits are almost unknown in the east, while to the west of the Dividing Range they cover enormous areas, forming in many places ranges of flat-topped sandstone hills. There are also immense deposits of sands, gravels, marls, and clays, of late Tertiary or Post-tertiary age; and these descend far below the present level of the country, as shown by a well sunk at Billebong, on a tributary of the Lachlan River, which passed for 160 feet through such deposits without reaching any older rocks. More recent still are the deposits of drift and boulders, with the red earth in caves, which latter has yielded abundance of remarkable fossils, as already described in our account of the geology of Australia.

Igneous rocks occur abundantly, and of all ages, from the basalt of the Palæozoic formation to the products of volcanoes of Post-tertiary age. In the southern part of the Dividing Range columnar basalt is abundant, and is found as high as 5000 feet above the sea. Greenstone dykes cut through granite at Naas Valley, and alter sandstone to quartzite at Mount Tennant. Trachyte crowns the summit of Mount Lindesay. Igneous dykes at Illawarra, Murrundi, and other places, have changed coal into coke. Great outflows of basalt occur at most of the gold-fields. Volcanic ashes are found at Mount Lindesay. The number of true volcanic cones and craters is much fewer than in Victoria, nor are there any so perfect. No active volcano is known to exist in the colony.

In the mountains west of Sydney there are some very remarkable illustrations of denudation, in the numerous valleys surrounded everywhere by sandstone precipices and with no outlet but through narrow ravines. Views of remarkable grandeur are obtained from the margins of these valleys near the Weatherboard and at Govett's Leap. Darwin in his *Journal of Researches* thus describes them: "These valleys, which so long presented an insuperable barrier to the attempts of the most enterprising of the colonists to reach the interior, are most remarkable. Great arm-like bays, expanding at their upper ends, often branch from the main valleys and penetrate the sandstone platform; on the other hand, the platform often sends promontories into the valleys, and even leaves in them great, almost insulated masses. To descend into some of these valleys it is necessary to go round 20 miles; and into others the surveyors have only lately penetrated, and the colonists have not yet been able to drive their cattle.¹ But the most remarkable feature in their structure is, that although several miles wide at their heads, they generally contract towards their mouths to such a degree as to become impassable. The Surveyor-General, Sir Thomas Mitchell, endeavoured in vain, first walking and then crawling between the great fallen fragments of sandstone, to ascend through the gorge by which the river Grose joins the Nepean; yet the valley of the Grose in its upper part, as I saw, forms a magnificent level basin some miles in width, and is on all sides surrounded by cliffs the summits of which are nowhere less than about 3000 feet above the level of the sea. When cattle are driven into the valley of the Wolgan by a path (which I descended) partly natural

¹ This was written in 1836. One of these valleys is described in the Australian story, *Robbery under Arms*.

and partly made by the owner of the land, they cannot escape; for the valley is in every other part surrounded by perpendicular cliffs, and 8 miles lower down it contracts from an average width of half a mile to a mere chasm impassable to man or beast. Sir T. Mitchell states that the great valley of the Cox River, with all its branches, contracts, where it unites with the Nepean, into a gorge 2200 yards in width and about 1000 feet in depth. Other similar cases might be added."

Darwin goes on to discuss the probable mode of formation of these valleys, and rejects the popular explanation that they are ancient sea gulfs, and also that they can be due to ordinary denudation by rain and rivers, favouring the idea that they are original depressions of the sea-bottom formed by currents, and that they have been merely finished off, as it were, by sub-aerial causes. But since the time when Darwin wrote much study has been given to the formation of valleys, and our conceptions of the powers of sub-aerial denudation have been greatly extended. We now see that these remarkable valleys of New South Wales are but extreme cases of a very general phenomenon, that of more or less extensive inland or upland valleys having their only outlet through a narrow gorge. Such are, in our own country, the valley of the Avon, where the whole of the rock which once filled it to the level of the Clifton plateau must have been denuded and carried away through the narrow gorge at St. Vincent's rocks. In Switzerland we have the tremendous gorges of the Via Mala and Devil's Bridge, through which has been carried off the whole of the denuded rock from the upper valleys of the Hinter Rhine and the Reuss; while the whole of the valleys and plains of Bohemia have their

only outlets in the deep narrow valley by which the Elbe cuts through the Erzegebirge Mountains.

The peculiarity of these Australian valleys arises from the flatness of the plateau, the nature of the rock—a rather soft horizontally stratified sandstone—and the moderate rainfall. Thus the greater portion of the rain soaks into the surface soil, or into fissures of the rocks, to appear again as springs at lower levels. Thus there is hardly any surface denudation by rain except on the slopes of valleys, and, as these deepened, the character of the rock led to its vertical fracture, falling away in great masses and thus forming precipices. This would probably be facilitated by two causes; the great difference of temperature between day and night, especially on the exposed rock-faces, would cause fresh cracks and fissures to form behind the cliffs, and the roots of trees penetrating into these fissures would gradually force them out and cause them to fall away in fresh precipices, forming a talus of broken fragments below. This would be loosened and degraded by rain and by vegetation, and would gradually be carried away into the streams that drain the valleys. The cause of the other feature, the narrow outlet, sometimes a mere rocky gorge, is a very common phenomenon and is easily explained; since it everywhere depends on the presence of a belt of rock of a harder texture, less liable to fracture, and which resists the ordinary denuding agencies. Thus while in the valley itself the surrounding cliffs are everywhere slowly receding, at the outlet they remain for long periods unchanged, protected probably by an upper layer of exceptional resisting power. The existence of so many projecting points or promontories, in some cases almost or completely detached from the rest of the plateau, affords a striking proof that this is the true explanation

of the formation of the valleys, since the varying degrees of hardness of the rock will account for these features as it does for the varied surface of hill and vale, which is the chief feature in the charm of natural scenery.

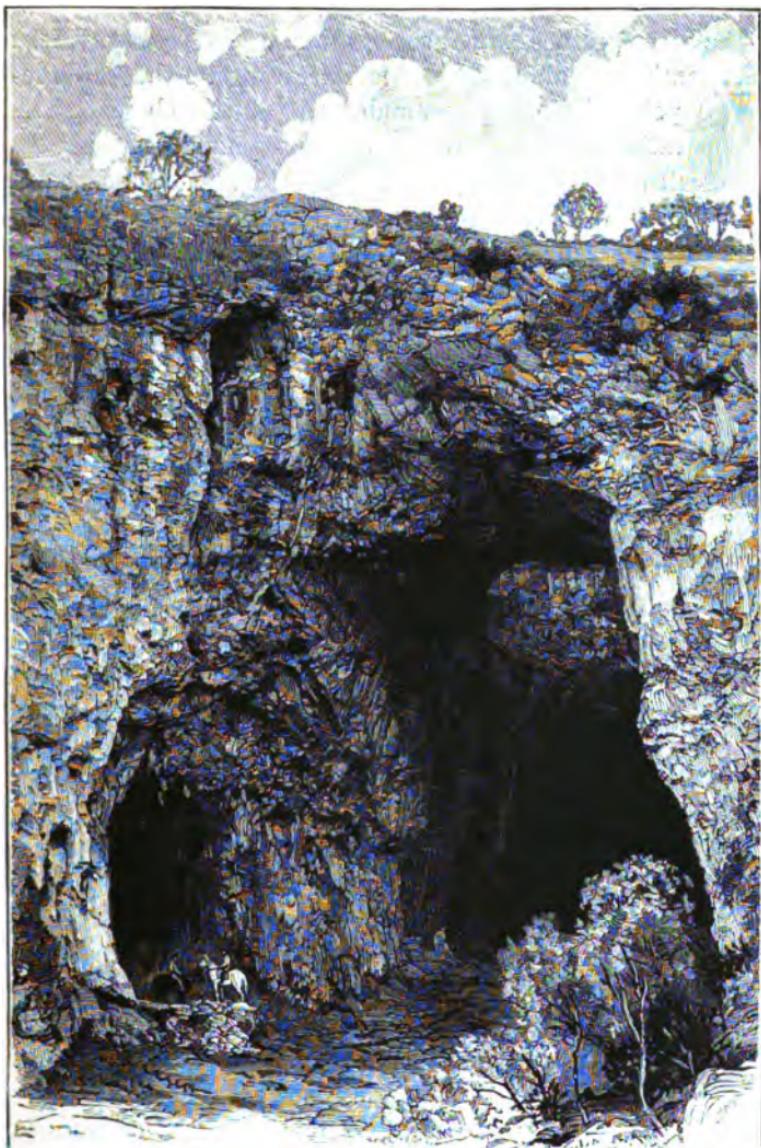
In the southern part of the colony the upper waters of the Shoalhaven River run through a remarkable series of ravines called the "Shoalhaven Gullies," which are of the most romantic character and of enormous depth. Dr. Bennett, who only saw a small portion of them, describes them as affording "as splendid a scene as has yet been discovered in this interesting and peculiar country." They are formed in the limestone, and the district is said to abound in caverns.

4. Caves and Caverns.

New South Wales contains a number of very remarkable caverns, interesting both geologically and for the great beauty of their stalactites and stalagmites. So far back as 1832 Sir Thomas Mitchell discovered caves in the Wellington valley near Wellington on the Macquarie River, from which he obtained great quantities of fossil bones, which were sent to England, and enabled Professor Owen to determine the former existence in Australia of the gigantic marsupials already described (p. 89). About twenty years ago another exploration of these caves was made, and a few additional species of the same character were discovered. The bone breccia is here 35 feet thick, and there is a large quantity of it still unworked. There are other caves near Cowra on the Balubala River in Bathurst county; at Wollombi about 110 miles north of Sydney; at Wallerawang on the Cox River in Cook county; at Cargo in Ashburnham county, at Godarigby near the sources of the Murrum-

bidgee River; at Kempsey on the Macleay River in Dudley county; and the Jenolan caves on the Fish River in Westmoreland county. Most of these caves contain more or less fossil bones of recent and extinct animals, and many of them are very interesting from the number and beauty of their stalagmites. Thus, of the Godarigby cave Dr. Bennett says: "We found ourselves in the most lofty, beautiful, and spacious part of this extensive cavern; immense masses of stalagmites had a beautiful appearance; enormous hanging stalactites adorned the lofty roof, and the whole scene had, by torch-light, an inconceivably grand and splendid effect."

But by far the most beautiful and extraordinary caves yet found in Australia are those of Jenolan, which were first discovered in 1841, through their being the hiding-place of a celebrated bushranger. Few persons visited them, however, till about 1860, and it being soon noticed that the magnificent stalactites were broken and defaced by visitors, the Government was induced to come to the rescue, and in 1866 an area of about 6 square miles around the caves was declared to be a public reserve. A keeper and guides are now engaged, who show the caves freely to visitors, and there is a comfortable house where board can be obtained at moderate terms. The district in which the caves are situated contains some of the wildest and most beautiful mountain scenery in Australia, and is very rich in indigenous plants, insects, birds, mammalia, and reptiles, so that it is attractive to the artist, naturalist, and geologist, quite independent of the central attraction, the caves themselves. Here are found the beautiful lyre-bird, the satin-bird, and numerous parrots, parroquets, and cockatoos, as well as the wonga-wonga and bronze-winged pigeons, and many others. Tree-ferns grow in



THE GODARIGBY CAVES, NEAR KIANDRA, N.S.W.

the deep gullies, with the waratah, the rock-lily, the clematis, and abundance of orchises; while the cabbage-tree palm, the grass-tree, and most of the characteristic Australian shrubs and trees are represented. About 20 miles south from these caves there is a rugged mountainous district containing some of the wildest and most beautiful scenery in Australia, with several waterfalls, one of which is said to be the finest in the Blue Mountains. Here are lofty cliffs on the face of which are rude aboriginal drawings. It is to be hoped that this district also will be soon declared a national reserve, to preserve it from injury either by felling the timber or in any other way.

The limestone in which the caves occur is of Silurian or Devonian age, and consists of a narrow belt of from 200 to 600 yards in width, which traverses the country in the midst of slates, shales, or other rocks of similar age. Owing to the porous nature of the limestone and the facility with which it is dissolved by rain water, it has become permeated in every direction by caves and tunnels, and often remains completely blocking up valleys, whose drainage finds its way through the limestone by underground channels. The limestone has thus escaped the superficial denudation which has gradually cut valleys in the other rocks, except where the caverns have fallen in and the debris has been dissolved away, leaving ravines with absolutely perpendicular or even over-hanging precipices, which are so characteristic of limestone formations everywhere, and of which we have excellent examples in Wales and Derbyshire wherever valleys traverse the older limestones.

At Jenolan there are three natural arches or tunnels, besides innumerable deeper caves. The Grand Arch is a tunnel 450 feet long, from 35 to 180 feet wide, and

from 40 to 60 feet high, and being somewhat curved the central portion is almost completely dark. A stream runs through it, and there are some fine stalagmites. The Devil's Coach House is another tunnel almost as large as the Grand Arch, and much better lighted, owing to there being openings in the roof. In some places it is 200 feet high, and is beautifully adorned with fine stalactites of varied forms and colours from gray to fawn, salmon, pink, blue, yellow, and various tints of green. This beautiful variety of tints is a special feature rarely found in stalactites. The views from the depths of these caverns of the rocky and wooded mountains outside are very beautiful. The Carlotta Arch is a natural bridge 100 feet high and 40 feet wide; a path goes over the top from which magnificent views are obtained.

The caves proper are exceedingly numerous, and many are as yet only partially explored. Some can only be reached by creeping along narrow passages two or three feet high, or by ladders up chimneys or down wells. They are of various sizes and are all more or less adorned with beautiful stalactites or crystals, whence they have obtained such names as the Imperial Cave, the Coral Grotto, the Fairies' Bower, the Shawl Cave, the Exhibition, the Lurline Cave, the Gem of the West, and many others; while special objects have been named the Crystal Cities, the Jewel Casket, the Bridal Veil, the Flowering Column, the Architect's Studio, the Queen's Diamonds, and many others. From the descriptions and photographs in Mr. Cook's beautiful volume on these caves, almost every form of stalagmite and stalactite appears to be represented, and they resemble in this respect the Luray Cavern in Virginia, U.S.A., where beautiful shawl-like stalactites of immense size and exquisite transparency are a characteristic feature. The



JENOLAN OR FISH RIVER CAVE.

Jenolan caves contain also the usual number of chance imitations of natural objects : a man's head with a cap on, a woman's arm and hand pointing upwards, a lady on horseback, a woman's face, and many others. The specialties of these caves appear to be the beautiful colours of some of the stalactites, the perfect transparency of others, and the great display of crystals of various tints appearing like superb jewellery.¹

5. Colonisation, Population, etc.

Originating as a penal settlement at Botany Bay in 1788, the colony at first made little progress, so that in 1825 the total population was only 33,675. In the next nine years it nearly doubled, being 66,212 in 1834 ; but fully one-third of this number were convicts. The early governors were often despotic, and persons were liable to disabilities, and even to prosecution for the too free expression of their religious or political opinions. In 1836, however, all such disabilities were abolished, the immigration of free settlers was encouraged, and the country rapidly increased in prosperity. In 1840 transportation was abolished, at which time the population had reached 129,463. In 1850 it was 265,503 ; and the following year Victoria was established as a separate colony, taking away more than a fourth part of the total population. The gold discoveries at this time diverted the stream of emigration to Melbourne, and it took four years to bring up the numbers of the population to that of the date of separation. Notwithstanding the rivalry of the sister colony, and the superior

¹ For fuller particulars see *The Jenolan Caves: an Excursion in Australian Wonderland*, by Samuel Cook. Eyre and Spottiswoode, London, 1889.

attraction of its gold-fields, New South Wales continued to increase; and although in 1859 Queensland was taken from it, with 28,000 inhabitants, its population immediately afterwards, in 1860, was 348,546. This has since increased with almost equal rapidity, and at the last census taken in April 1881 amounted to 740,836, while the estimated population at the end of 1889 was 1,122,000. Besides the colonies which have been actually separated from New South Wales, it has sent considerable portions of its population to the newer settlements in South Australia and New Zealand, standing in some respects in the place of a mother country to all the other Australian colonies. When this is taken into account, the steady growth of its population must be considered as highly satisfactory. There is no such mixture of races here as in some of the other colonies. The Chinese number about 7000 or 8000, many of whom are market gardeners or domestic servants. Polynesians have been introduced as labourers, but the experiment was unsuccessful, and there are at present very few in the colony. The indigenous inhabitants are few in number, and are rapidly dying out.

6. Productions, Trade, Shipping, etc.

The great staple productions of New South Wales are wool, gold, and coal; and in the first and last it is pre-eminent over all the other colonies. In 1889 the number of sheep was 50,106,000, exceeding the number in all the rest of Australia. The wool of New South Wales is perhaps the finest in the world, the choicest breeds of Europe having been introduced; while the dry climate, the peculiar vegetation, the genial temperature,

and the absence of beasts of prey, all favour its development. In 1829 only 71,299 lbs. of wool were exported, while in 1878 it reached the enormous amount of 111,833,000 lbs., an increase of sixteen-hundred-fold in fifty-nine years. In 1889 it had again increased to 231,400,000 lbs. Accessory products are tallow, skins, and preserved meat. Meat-preserving was commenced in 1862 by salting; the tinning process only began in 1866, and the freezing still later.

The devotion to pastoral pursuits implied by these large figures has led to the comparative neglect of agriculture, so that the colony still imports flour to supplement its own wheat crop. This, however, is partly due to the population entirely subsisting on wheat flour, while the country is better adapted to the growth of maize, which is actually produced in much greater quantity, but is only used as food for cattle, horses, and pigs. Tobacco, sugar, and wine are also produced in considerable quantities; and these articles will probably soon show a great increase, as the climate and soil seem eminently adapted to them all. In 1887, 275,000 cwts. of sugar were produced, and about 600,000 gallons of wine. The climate is equally suitable to sericulture, and silk will soon be added to the exports from New South Wales.

Of late years dairy-farming has greatly extended in New South Wales, and Irish butter has ceased to be imported. There are fine dairy-farms in the Illawarra district, in the Camden and Mittagong districts on the Great Southern Railway, in the Macleay and Hunter districts to the north, in the Glen Innes district to the north-west, and in the sub-alpine Kiandra district in the extreme south. Cream-separators, and all the best methods of butter-making are used, and co-operative factories are established in most districts through which the small

farmers obtain fair prices for the milk they supply, as well as a share of the profits derived from the sale of butter and cheese. In 1889 about 17 million lbs. of butter were made in the colony, while a small quantity was still imported, though against this an almost equal quantity was exported to the other colonies and to Great Britain. Cheese is also largely produced, nearly 5 million pounds being made in 1889, less than one-tenth of that quantity being imported and nearly as much exported ; so that the production both of cheese and butter now about supplies the home consumption.

Gold was found at Port Macquarie as early as 1840, and subsequently at several other places, but the first "gold-field" was announced in 1851 at Ophir, on Summerhill Creek, not far from Bathurst. Almost immediately other gold-fields were discovered all along the great central range of mountains, and a period of the wildest excitement followed. There are now about eighty gold-fields in the colony, giving employment to 22,000 miners. In 1852, 962,873 ounces were produced, and the yield has never since been so high. In 1885 it was 100,667 ounces. In 1889 there were in the colony over 10,000 miners—one-third engaged in quartz mining, and two-thirds in alluvial ; and the total yield of gold in the thirty-eight years since 1851 has reached the value of 38 millions sterling. The gold-fields are most numerous and productive in the western districts.

Copper is found abundantly in the Orange district, Monaro, and several other localities, but is not yet extensively worked. Silver-lead is found on the Yass River, in the basin of the Upper Murrumbidgee and in other places, and cinnabar has been raised near the Cudjegong River. Iron is abundant, but is not much

worked owing to the cost of carriage. Tin has recently been worked in New England, near the Queensland border, and has proved very rich, and in 1885 £415,626 worth was exported. Diamonds are found in the tin streams, and in some places they average six to each ton of wash-dirt.

The most really valuable of all the mineral products of New South Wales is undoubtedly the coal, which occurs in great profusion and of excellent quality, is capable of vast extension, and is the needful basis of so many other industries. The coal-fields extend over an area of 10 million acres, and during 1889 the coal raised was more than three and a half million tons. There are also vast deposits of kerosene shale at Maitland and in the Illawarra district, and £77,600 worth was raised in 1889. Plumbago and meerschaum have also been discovered; while limestone, slate, and granite are abundant.

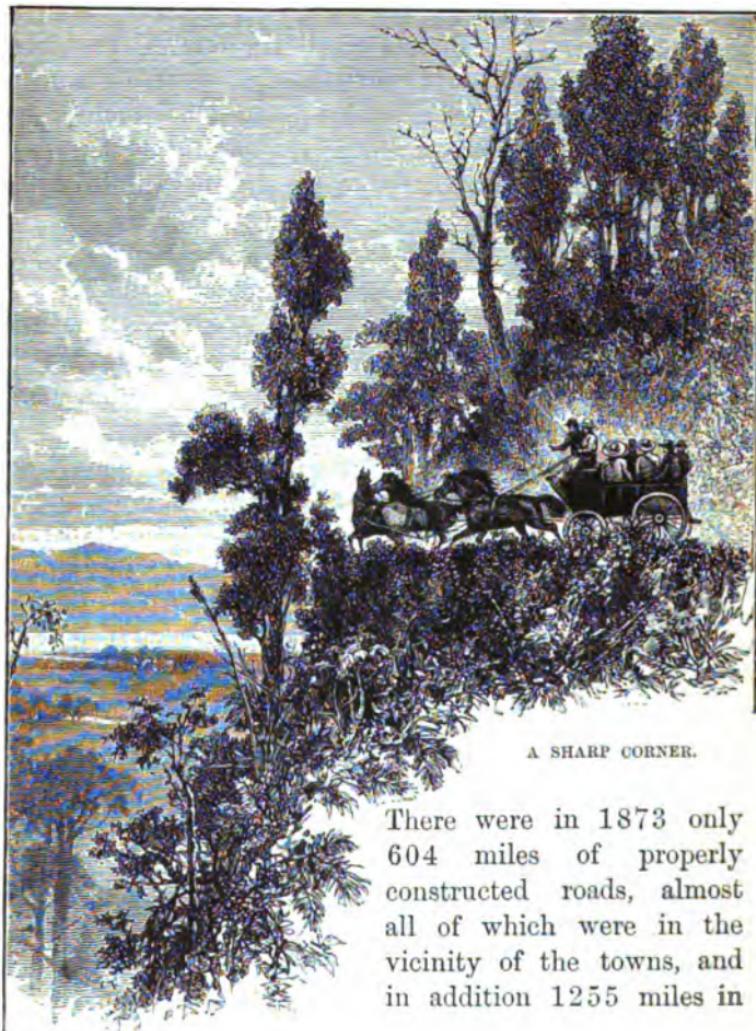
The only manufactured articles exported from New South Wales appear to be cheese and butter, sugar, tallow, preserved meats, and wine. In the year 1889 the exports to the United Kingdom amounted to £8,962,000; but the total exports were £23,255,000, there being a very large trade with the other colonies of Australia, as well as with India and foreign countries.

The shipping consists largely of steamers plying along the coasts and up the rivers; and these belong to twelve companies. There is a considerable trade between Sydney and the South Sea Islands, as well as with the Sandwich Islands and California.

During 1889 there were 3254 vessels entered inward, while the outward entries comprised 3229 vessels, the aggregate tonnage being over 5 millions.

7. Roads, Railways, and Telegraphs.

Compared with the vast extent of the colony and the energy of its people, the roads seem exceedingly deficient.



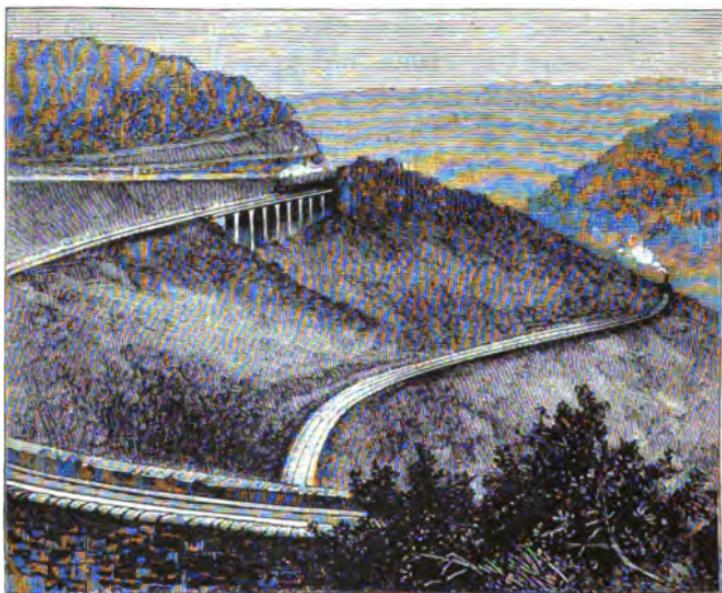
A SHARP CORNER.

There were in 1873 only 604 miles of properly constructed roads, almost all of which were in the vicinity of the towns, and in addition 1255 miles in

process of construction, most of which had then been simply cleared of forest. Long journeys are made over these cleared tracks with tolerable speed and regularity in dry weather; but where there is much traffic such roads become a succession of mud-holes in the wet season, and where possible détours have to be made through the uncleared ground. Regular stage coaches travel along these roads by day and night, passing in and out through the trees, up and down across the creeks, sticking here and there in the mud, and sometimes upsetting, in which case the passengers often have to pass the night in the bush as best they can. The average pace of such coaches is about 6 miles an hour. The deficiency of roads is due in part to the high price of labour, and in part to the vast distances to be traversed in every direction. It must be considered also that, till the gold discoveries in 1851, the country was too thinly peopled and the revenue too small to admit of much expenditure on roads, and during the excitement of the gold fever it was found that an enormous traffic could be maintained to the remotest diggings often without any roads at all. Just at that time, too, the Government had begun to construct railways, and in these a large amount of capital has been invested.

The first railway was commenced in 1850, and by the end of 1875, 437 miles were in operation, having been constructed at a cost of over £7,000,000. In June 1890 considerably over 2000 miles were open. The net earnings of these lines pay a fair interest on the capital expended. The most important line is that in a south-west direction from Sydney through Goulburn to Wagga-Wagga at the head of the Murrumbidgee navigation, with a continuation to Albury on the Victorian frontier, which now completes the railway

communication between Sydney and Melbourne. It is also extended westward to Hay on the Murrumbidgee River, with branches to Jerilderie, Tumut, and other places. Another line runs from Sydney across the Blue Mountains to Bathurst, now extended to Dubbo and to Bourke on the Darling River, 503 miles from Sydney, with several branches. In the north there is a line from



ZIGZAG RAILWAY IN THE BLUE MOUNTAINS.

Newcastle to Murrurundi, now extended to Tenterfield, and on into Queensland, passing through a fine pastoral, agricultural, and mining district. The gauge of all the great lines is 4 feet $8\frac{1}{2}$ inches, like that of the British railways. The trunk line from Sydney to Parramatta (14 miles) is double, but from this point the western and southern extensions are single lines. The

western line over the Blue Mountains was a great feat of engineering, as there is only one available route, and the line has to be zigzagged up and down, with gradients sometimes of 1 in 30 ; and is often carried along the face of precipices, necessitating countless bridges, viaducts, and tunnels. The traveller over this line obtains magnificent views of mountain scenery, and in the vicinity of the line in many places, the gorges and waterfalls, among which may be mentioned Govett's Leap, the Katoomba and Wentworth Falls, the Glens at Lawson, and many others, are wild and grand in the extreme.

The electric telegraph is also well developed in New South Wales, more than 20,000 miles of wire having been constructed up to the end of 1889. It is carried to every important place in the colony, and is being constantly extended. There is also communication with Victoria and South Australia, and a submarine cable to New Zealand. Colonial telegrams are charged 1s. for ten words ; to other Australian colonies, 2s. A telegram can also be forwarded from Sydney to London at the rate of 9s. 6d. a word.

8. Government, Public Institutions, Education, etc.

The Government of New South Wales consists of a Governor nominated by the Crown, and a Parliament consisting of two houses, called respectively the Legislative Council and the Legislative Assembly. The Legislative Council consists of members nominated by the Crown for life (now 71 in number); and the Assembly of 137 members elected by 74 constituencies, one of which is the university. The Assembly is chosen by universal suffrage and by ballot, and there is no property qualification for members.

Parliaments are triennial. Imperial laws have effect in the colony, unless superseded by local Acts. All enactments require the sanction of the Queen before becoming legal. The executive consists of the Governor and a Council of six ministers.

Justice is administered by means of a Supreme Court, District Courts, Courts of Quarter Sessions, and Courts of Petty Sessions. There are four Judges and six District Court Judges, besides Justices of the Peace.

Until 1880 the educational system comprised the public schools, the grammar schools, the university and its affiliated colleges. In May 1880 a new Public Instruction Act came into operation, under which the following classes of schools are established.

(I.) Public schools for primary education without sectarian or class distinction.

(II.) Superior public schools in towns and populous districts for higher education.

(III.) Evening schools for the instruction of persons who have not received primary education.

(IV.) High schools for boys to complete the public school education and to prepare students for the university.

(V.) High schools for girls.

The fees are not to exceed 3d. per child weekly, or 1s. per family, and free railway passes are to be issued to children to attend schools at a distance. Attendance between the ages of six and fourteen is compulsory.

On 1st January 1886 the number of educational establishments in the colony was 2669, with 110,710 boys and 107,570 girls under instruction.

Schools of art, free libraries, mechanics' institutions, an observatory, museums, and botanic gardens, are also liberally assisted or supported by the State.

9. Political and Civil Divisions.

The first-settled portion of New South Wales was divided into twenty counties, containing about a million acres each, and being generally about 40 miles in width by 60 or 70 in length. Nearly a hundred other counties have since been formed, some of which are considerably larger, and there is a portion of the Riverina and Albert districts in the west still undivided. Those portions of the country beyond the original twenty counties are divided into thirteen pastoral districts as follows : ALBERT, comprising the extreme north-western portion of the colony, and consisting for the most part of arid plains in which the streams from the mountain ranges lose themselves. It has an area of about 60,000 square miles. WARREGO, in the north, has an area of about 10,000 square miles. CLARENCE, in the extreme north-east, contains about 5000 square miles. MACLEAY, on the north-east coast, is small, containing only 3180 square miles. NEW ENGLAND, in the north, is a fine and varied table-land containing 13,100 square miles. BLIGH, in the upper valley of the Macquarie River, has 7800 square miles. LIVERPOOL PLAINS, more to the north, has an area of 16,910 square miles. GWYDIR, on the northern boundary, has 11,075 square miles. WELLINGTON, to the west of the Macquarie River, has an area of 16,695 square miles. LACHLAN, in the south-west, has an area of 22,800 square miles. MURRUMBIDGEE, on the southern boundary, has 26,897 square miles. DARLING, in the south-western corner of the colony, extends to 50,000 square miles. MONARO is a high table-land in the south, and not far from the east coast. It contains 8335 square miles.

The counties being so numerous, it will be most convenient to give them in alphabetical order, adding the general position and the names of two of the adjacent counties. This will enable our readers easily to find any county on the map, and thus more readily discover any town or place which they know to be situated in a certain county.

List of Counties in New South Wales.

1. ARGYLE. South-east. Joins Murray and St. Vincent counties. Chief town, Goulburn.
2. ARRAWATTA. North-east, on the Queensland boundary. Joins Stapylton and Burnett counties.
3. ASHBURNHAM. Central. Joins Cunningham and Bathurst counties, and is bounded on the south by the Lachlan River.
4. AUCKLAND. South-east corner of the colony. Chief town, Eden.
5. BARADINE. North central. Joins Leichhardt and White counties, and is bounded on the north by the Peel River.
6. BATHURST. East central. Joins Roxburgh and Georgiana counties, and is bounded on the south by the Upper Lachlan River. Chief town, Bathurst.
7. BENARBA. North, on Queensland boundary. Joins Stapylton and Finch counties.
8. BERESFORD. South-east. Joins Dampier and Wallace counties; contains the Maneroo plains and sources of the Murrumbidgee River.
9. BLIGH. Central. Joins Lincoln and Phillip counties, and has the Liverpool range on the north.
10. BLAXLAND. Central. Joins Dowling and Frankland counties, and lies on the north bank of the Lachlan River.
11. BLAND. South central. Joins Monteagle and Bourke counties, and is about 200 miles west of Sydney.
12. BOURKE. South. Joins Clarendon and Mitchell counties, and is bounded on the south by the Murrumbidgee River.
13. BOYD. South. Joins Waradgery and Urana counties, and is bounded on the north by the Murrumbidgee River.
14. BRISBANE. East central. Joins Hunter and Phillip counties, and is bounded on the north by the Liverpool range of mountains.

15. BUCCLEUCH. South-east. Joins Cowley and Winyard counties. Is bounded on the north by the Murrumbidgee, and is traversed by the Timul range, an extension of the Australian Alps.
16. BUCKLAND. East central. Joins Pottinger and Brisbane counties, and lies in the angle between the Liverpool and Peel ranges.
17. BULLER. North-east, on Queensland boundary. Contains the sources of the Richmond and Clarence Rivers.
18. BURNETT. North-east. Joins Arrawatta and Murchison counties. Lies about 150 miles from the coast and 30 from the Queensland boundary.
19. CADELL. South. On Victoria boundary, midway between Albury and the mouth of the Lachlan River.
20. CAIRA. South-west. At the junction of the Lachlan and Murray Rivers.
21. CAMBELEGO. North-central. Joins Gregory and Cowper, and is bounded on the east by the Bogan River.
22. CAMDEN. South-central, on coast. Chief towns, Camden and Picton. Traversed by the southern railway from Sydney.
23. CLARENCE. North, on coast. Traversed by the Clarence River. Chief town, Grafton.
24. CLARENDON. South. Joins Winyard and Bourke counties. Bounded on the south by the Murrumbidgee River, and traversed by the southern railway from Sydney to Wagga-Wagga.
25. CLARKE. North-east. Joins Gresham and Sandon counties. Situated in New England, 50 miles from the coast.
26. CLIVE. North-east, on Queensland boundary, 80 miles from the coast.
27. CLYDE. North. Joins Narran and Cooper counties, and is situated in the angle between the Bogan and Darling Rivers.
28. COOK. East. Joins Cumberland and Westmoreland. Bounded on the west by the Blue Mountains, and traversed by the western railway from Sydney.
29. COOPER. South. Joins Bourke and Boyd counties. Bounded on the south by the Murrumbidgee River, and is about 300 miles W.S.W. from Sydney.
30. COURALLIE. North. Joins Stapylton and Benarba counties. Traversed by the Gwydir River, a branch of the Upper Darling.
31. COWLEY. South-east. Joins Murray and Beresford counties.

- Traversed by the Upper Murrumbidgee River, and about 170 miles south-west of Sydney.
- 32. COWPER. North-central. Joins Clyde and Yanda counties, and is situated south of the Bogan and Darling Rivers.
 - 33. CUMBERLAND. South-central, on coast. Chief town, Sydney.
 - 34. CUNNINGHAM. Central. Joins Kennedy and Gipps counties. Bounded on the south by the Lachlan River, and is about 200 miles W.N.W. of Sydney.
 - 35. DAMPIER. South, on coast. Bounded on the west by the Gourrock range of mountains.
 - 36. DARLING. North-east. Joins Hardinge and Inglis counties. Bounded on the north by the Hardwicke Mountains, and contains the northern sources of the Peel River.
 - 37. DENHAM. North. Joins Finch and Benarba counties, and is situated in the angle between the Peel and Darling Rivers.
 - 38. DENISON. South, on Victoria boundary, midway between Albury and Echuca.
 - 39. DOWLING. South-central. Joins Blaxland and Gipps counties, and is bounded on the north by the Lachlan River.
 - 40. DRAKE. North of New England, close to Queensland. Traversed by the Clarence River.
 - 41. DUDLEY. North of Port Macquarie, on coast. Traversed by the Macleay River.
 - 42. DURHAM. East. Joins Gloucester and Northumberland. Bounded on west and south by the Hunter River.
 - 43. EWENMAR. Central. Joins Lincoln and Oxley counties. Situated between the Macquarie and Castlereagh Rivers.
 - 44. FINCH. North-central, on Queensland boundary, west of the Darling River.
 - 45. FITZROY. North, on coast, a little south of the Clarence River.
 - 46. FLINDERS. Central. Joins Oxley and Cunningham counties, and is bounded on the east by the Bogan river.
 - 47. FORBES. South-central. Joins Bathurst and Gipps counties, and is bounded on the north by the Lachlan River.
 - 48. FRANKLIN. West-central. Joins Blaxland and Waljeers counties, and is situated on the north-west bank of the Lower Lachlan River.
 - 49. GEORGIANA. East. Joins Westmoreland and Argyle. Bounded on the east by the Blue Mountains, and on the west by the upper part of the Lachlan River.
 - 50. GIPPS. Central. Joins Cunningham and Bland counties, and is bounded on the north by the Lachlan River.

51. GLOUCESTER. Central, on coast, and extends from the mouth of the Hunter to the Manning River.
52. GORDON. Central. Joins Lincoln and Ashburnham. Bounded on the north by the upper course of the Macquarie River.
53. GOUGH. North-east, in New England. Joins Clive and Hardinge counties. Contains the sources of the Severn and Macintyre Rivers.
54. GOULBURN. South, on Victoria boundary, at the head of the Murray navigation.
55. GOWEN. Central. Joins Lincoln and Napier counties. Lies south of the Arbuthnot range, and west of the sources of the Castlereagh River.
56. GREGORY. North-central. Joins Leichhardt and Cambelego counties, and is traversed by the lower part of the Macquarie River.
57. GRESHAM. North-east, in New England, near the coast. Is traversed by the southern feeders of the Clarence River.
58. GUNDERBOOKA. North-west, on Queensland boundary, north of the Darling and east of the Warrego Rivers.
59. HARDEN. South-east. Joins King and Clarendon counties, and is traversed by the southern railway from Sydney to Wagga-Wagga.
60. HARDINGE. North-east. Joins Gough and Murchison counties. Situated west of the Dividing Range, and contains the sources of the Gwydir River.
61. HAWES. East. Joins Macquarie and Durham counties. Contains the northern sources of the Manning River.
62. HUME. South, on Victoria boundary, west of Albury, on the Murray.
63. HUNTER. East. Joins Northumberland and Cook counties. Bounded by the Goulburn and Hunter Rivers on the north.
64. INGLIS. North-east. Joins Darling and Parry counties. Situated west of the Darling range, and north of the Peel River.
65. JAMISON. North. Joins Courallie and Durham. Situated on the north bank of the Peel River.
66. KENNEDY. Central. Joins Narramie and Cunningham counties. Bounded on the north by the upper course of the Bogan River.
67. KILLARA. North-west. Joins Rankin and Young counties, and is situated on the west side of the Darling, about 250 miles from its mouth.

68. KING. South-east. Joins Georgiana and Murray counties. Contains the sources of the Lachlan River, and is traversed by the southern railway from Sydney.
69. LANDSBOROUGH. North-west. Joins Yanda and Rankin counties. Situated to the north-west of the Darling River, near the northern boundary of the colony.
70. LEICHHARDT. North-central. Joins Gregory and Baradine counties. Is traversed by the lower portion of the Castlereagh River.
71. LINCOLN. Central. Joins Napier and Gordon counties, and situated between the Macquarie and Castlereagh Rivers.
72. LIVINGSTONE. West. Joins Menindee and Werunda counties. Situated on the east bank of the Darling, about 150 miles from its mouth.
73. MACQUARIE. North-central, on coast ; extending between the mouths of the Manning and Macleay Rivers.
74. MENINDEE. West, on South Australian boundary. Situated on the west bank of the Darling and south of the Stanley ranges.
75. MITCHELL. South. Joins Urana and Winyard counties. Situated on the south bank of the Murrumbidgee to the west of Wagga-Wagga.
76. MONTEAGLE. South-central. Joins King and Bland counties, and is about 160 miles west of Sydney.
77. MURCHISON. North-east. Joins Burnett and Darling counties, and is bounded on the south by the Hardwicke Mountains.
78. MURRAY. South-east. Joins St. Vincent and Cowley counties. Situated on the west side of the Upper Shoalhaven River, and contains Lake George and part of the Gourock range.
79. NANDENAR. North-east. Joins Jamison and Murchison counties, and situated on the north-eastern side of the Peel River.
80. NAPIER. Central. Joins Bligh and Lincoln counties, and situated on the east side of the upper Castlereagh River.
81. NARRAN. North-central, on Queensland boundary, between the head waters of the Culgoa and Narran Rivers.
82. NARBOMIE. Central. Joins Oxley and Gordon counties. Bounded on the east by the Hervey range, and on the south by the Upper Bogan River.
83. NICHOLSON. South-west. Joins Dowling and Franklin counties, and situated to the south of the Lachlan River, about 150 miles from its mouth.

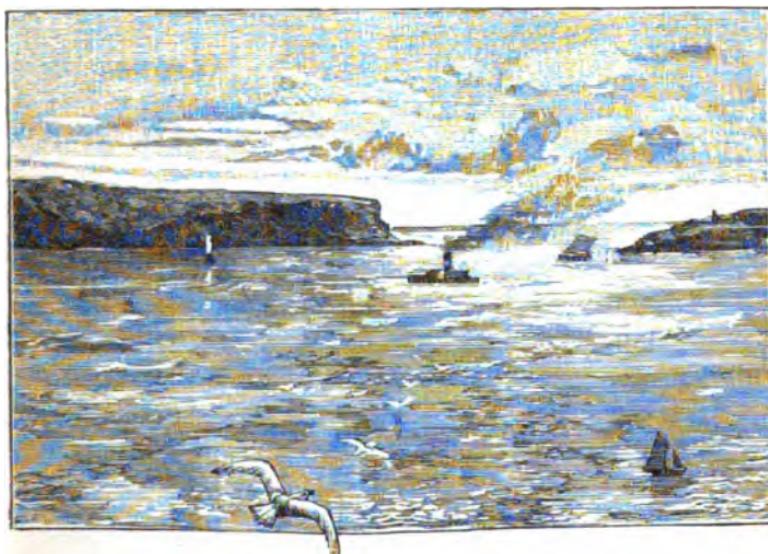
84. NORTHUMBERLAND. Central, on coast. Chief towns, Newcastle and West Maitland.
85. OXLEY. Central. Joins Ewenmar and Flinders counties. Lies between the Bogan and Macquarie Rivers.
86. PARBY. North-east. Joins Vernon and Buckland counties. Lies north of the Liverpool and Peel ranges, and contains the sources of the Peel River.
87. PERRY. West. Joins Wentworth and Windeyer counties. Lies on the east bank of the Darling, near its mouth.
88. PHILLIP. East-central. Joins Hunter and Wellington counties. Lies south of the Upper Goulburn River, and is traversed by a north-western extension of the Blue Mountains.
89. POTTINGER. North-central. Joins Buckland and Napier counties. Lies to the south-west of the upper Peel River, and contains the southern portion of the Liverpool Plains.
90. RALEIGH. North, on coast, and is bounded on the south by the Bellenger River.
91. RANKIN. North-west. Joins Killara and Landsborough counties, and is bounded on the north-west by the Darling River.
92. RICHMOND. North, on coast. Bounded on the north by the Richmond River.
93. ROUS. North-east corner of the colony. Bounded on the south by the Richmond River.
94. ROXBURGH. East-central. Joins Wellington and Bathurst counties. Lies west of the Blue Mountains, and is traversed by the western railway from Sydney to Bathurst.
95. ST. VINCENT. South, on coast. Bounded on the north and west by the Shoalhaven River.
96. SANDON. North-east. Joins Rayleigh and Hardinge counties. Bounded on the north by the Macleay range, and contains the chief sources of the Macleay River.
97. SELWYN. South-east, on Victoria boundary. Lies west of the Australian Alps, and contains some of the sources of the Murray River.
98. STAPYLTON. North, on Queensland boundary, at the junction of the Dumaresq and Macintyre rivers.
99. STURT. South-west. Joins Nicholson and Waradgery counties. Lies north of the Murrumbidgee, about 100 miles from its mouth.
100. TAILA. South-west, on Victoria boundary, just below the confluence of the Lachlan and Murray Rivers.

101. TARA. South-west corner of the colony, on the Murray River, below the confluence of the Darling.
102. TOWNSEND. South, on Victoria boundary, midway between the coast and the western boundary of the colony. Chief town, Deniliquin.
103. URANA. South. Joins Denison and Hume counties, and situated in the great plain between the Murrumbidgee and Murray Rivers.
104. VERNON. East. Joins Sandon and Dudley counties, and lies 200 miles north of Sydney, and 50 miles inland.
105. WAKOOL. South-west, on Victoria boundary, a little east of the mouth of the Lachlan River.
106. WALJEERS. South-west. Joins Franklin and Caira counties, and lies north of the confluence of the Lachlan and Murrumbidgee Rivers.
107. WALLACE. South-east, on Victoria boundary. Lies east of the Australian Alps. Chief town Kiandra, one of the coldest places in the colony.
108. WARADJEBY. South-west. Joins Caira and Wakool counties. Is traversed by the Murrumbidgee River, above the mouth of the Lachlan.
109. WELLESLEY. South-east, on Victoria boundary. Bounded on the east by the Wanderer range, and on the west by the Snowy River.
110. WELLINGTON. East-central. Joins Phillip and Ashburnham counties. Lies near the sources of Macquarie River, about 130 miles W.N.W of Sydney.
111. WENTWORTH. South-west. At junction of Darling and Murray Rivers.
112. WERUNDA. West. Joins Rankin and Livingstone counties, and is bounded on the north-west by the Darling River.
113. WESTMORELAND. East. Joins Cook and Georgiana counties. Traversed by the Blue Mountains, and contains the sources of the Macquarie River.
114. WHITE. North-central. Joins Pottinger and Baradine counties. Is situated in the Liverpool Plains, and bounded on the north by the Peel River.
115. WINDEYER. South-west, on South Australian boundary, and bounded on the east by the Darling River.
116. WINYARD. South. Joins Mitchell and Buccleuch counties. Bounded on the north by the Murrumbidgee River, and south by the Tumberumba range. Chief town, Wagga-Wagga.

117. YANDA. North-west. Joins Cooper and Rankin counties, and is bounded on the north by the Darling River.
118. YOUNG. West. Joins Livingstone and Werunda counties, and situated on the west bank of the Darling River, about 200 miles from its mouth.

10. Cities and Towns.

SYDNEY, the capital of New South Wales, situated on Port Jackson, in latitude 34° S., and $151\frac{1}{4}$ E. longitude, is the oldest city of Australia. It is well built, with fine broad streets and

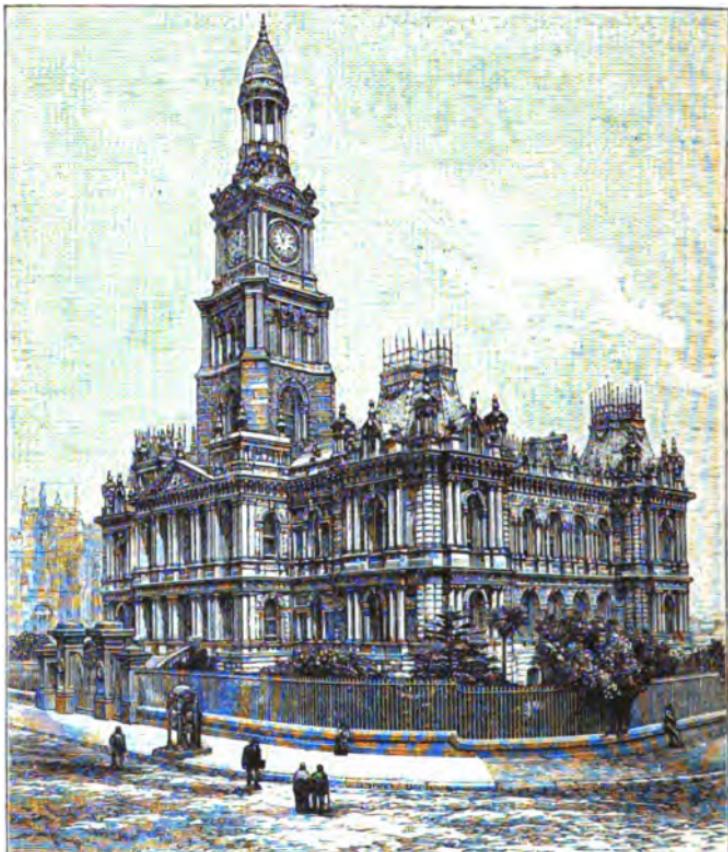


THE HEADS, SYDNEY HARBOUR.

imposing public buildings, which, combined with its commanding situation on a splendid harbour, has gained for it the appellation of "The Queen of the South."

Including the suburbs, Sydney now contains about 280,000 inhabitants; the city proper containing 100,000. Its corporation expends £300,000 a year. It has two fine cathedrals, an extensive university, a grand post-office, and other handsome public buildings. It has also six parks, and extensive botanic gardens. The harbour

of Port Jackson contains 9 square miles; but owing to its numerous bays, coves, and inlets, the coast-line is 54 miles in length. Sydney harbour is protected by five powerful forts, well armed with heavy Armstrong guns.



TOWN HALL, SYDNEY.

Sydney now consists of three distinct districts:—The Old City, in which are George Street, Pitt Street, and others named after the early governors, Macquarie, King, Bligh, Hunter, and Phillip. Here are the Houses of Parliament, the Treasury buildings, and Government House, with its park and botanic gardens. To the south is

the town of Wooloomooloo, almost as extensive as Sydney itself, and forming its fashionable quarter. More distant is the "North Shore," reached by steam ferry from Sydney cove in ten minutes. Mr. Anthony Trollope tells us that Sydney is less regular and more picturesque than most other new cities in Australia and America. The streets occasionally converge, and bend, and wind about, so as to give intricacy and variety. The presence of the sea in numerous bays and coves, the jutting promontories, and the beautiful gardens, add further to its variety and beauty. The walks immediately around the city are unsurpassed for picturesqueness, while the public gardens probably excel any in the world owing to their combination of sea and land, hill and valley, rock and wood and grassy slopes, with a climate that permits all the beautiful forms of vegetation both of tropical and temperate zones to luxuriate side by side.

The other important buildings of Sydney are—the large and handsome Town Hall, the Museum, and the Railway Station ; while there are three theatres, many handsome banks, the Exchange, and numbers of magnificent private houses.

The parks consist of—Hyde Park, an open treeless plateau in the centre of the city ; the Domain, a fine expanse of 138 acres of park land, on the north-east side of Sydney ; the Botanical Gardens, 38 acres in extent, exceedingly rich and beautiful. More recently formed are Prince Alfred Park, 18 acres ; Belmore Park, 10 acres ; and a tract of 600 acres on the south-east, named Moore Park, adjoining which is the metropolitan racecourse.

Besides Sydney, New South Wales possesses only three towns with more than 10,000 inhabitants, and two others nearly reaching that amount.

NEWCASTLE is the principal shipping port of the northern coast, the amount of its tonnage nearly equalling that of Sydney. It is situated at the mouth of the river Hunter, and receives all the coal as well as the varied agricultural produce of the rich Hunter River district. The town is well laid out, and is situated chiefly on high ground, although so near the sea. Its population, including the seamen of the shipping, is not much short of 20,000. It is protected by two powerful forts.

GOULBURN is a city, and the principal dépôt of the southern inland trade. It is in the county of Argyle, and situated at an elevation of 2129 feet above the sea-level, and 134 miles south-

west from Sydney, with which there is direct communication by the Great Southern Railway. The population in 1890 was 12,000. There are some gold-fields in the neighbourhood, though of little importance, and copper is also worked ; but the city chiefly depends on the agriculture of the district, wheat and other valuable products being largely grown. Goulburn is well laid out, and has many fine public buildings, comparing favourably in this respect with any other town in the colony.

PARRAMATTA is, next to Sydney, the oldest town in the colony. It is situated on the Parramatta River, which is really an extension of Port Jackson, and it is only 14 miles west of Sydney, with which it is in constant communication by steamers and railway. It is in the midst of a picturesque and fertile district, and has many fine public buildings, as well as a beautiful park, in which are some of the largest oaks in Australia. The district around is mostly devoted to fruit-growing, the orchards and orangeries of Parramatta having almost a world-wide reputation. It has 100 miles of streets, and about 12,000 inhabitants.

MAITLAND, situated on the Hunter River, about 20 miles from the sea. The Hunter is subject to great floods, which have often done enormous damage to this town ; yet to these same floods it owes much of its prosperity, the alluvial flats which fringe the river being among the most productive soils in the world. In favourable seasons they yield such prodigious crops that this district is called "the Granary of New South Wales." The town is divided into two distinct municipalities, East and West Maitland. It contains tobacco and boot factories, many extensive warehouses, and good public buildings. In the vicinity grapes are largely cultivated, the annual produce of wine being 200,000 gallona. Its population is 9000.

BATHURST is the principal town to the west of the Blue Mountains. It is situated on the south bank of the Macquarie River (a tributary of the Darling) not far from its sources, and is at an elevation of 2150 feet above the sea, and surrounded by a fine hilly country. It is laid out symmetrically, with wide streets crossing each other at right angles. It has a railroad direct to Sydney, from which it is distant 122 miles. The country around it is agricultural and pastoral, and is especially adapted to the production of wheat and other cereals. There are several gold-fields within a radius of 30 miles from Bathurst, but none in its immediate vicinity. The population is between 8000 and 9000. It possesses five flour-mills, and several tanneries, and other large manufactories of soap, candles, glue, and boots and shoes, and is

better provided with schools and colleges than any other town in the colony of similar population.

The following list of the other more important country towns of the colony is abridged from Gordon and Gotch's *Australian Almanac* for 1891. It contains all which have more than 1000 inhabitants :—

ALBURY, an important town on the confines of New South Wales and Victoria, in the county of Goulburn, and situated on the right bank of the Murray, over which there is a bridge. Its population is about 6000. The district round is agricultural and quartz-mining. Grapes and tobacco are largely grown, the Albury wines having acquired a reputation. From the opposite bank of the river there is a railway to Melbourne, and there is direct railway communication with Sydney, from which it is distant 351 miles.

ARMIDALE is situated on the main northern road, 313 miles north of Sydney. It is in the county of Sandon, in the district of New England, and has a population of about 3500. The district around is pastoral and agricultural, with some alluvial gold-diggings. The scenery is mountainous, rugged, and picturesque.

ASHFIELD is a town of about 7000 inhabitants, situated 5 miles west of Sydney on the railway, and almost forms a suburb to the capital.

BALLINA is a seaport town situated on the north side of the mouth of the Richmond River, 330 miles north of Sydney. Several river steamers run daily to Liamore, a distance of 70 miles. There is a large trade with Sydney in cedar, pine, beech, and iron-bark timber from the forests of the Richmond River. Oysters are also obtained here, and some sugar is grown and manufactured. Population about 2000.

BEGA is a small town situated on the Bega River, 255 miles south-west of Sydney, and 12 miles from the seaport of Tathra. The district is largely occupied by dairy farms, whose produce is sent to Sydney. The geological formation is granite, and there is beautiful mountain scenery within a few miles. It is reputed to be one of the prettiest and healthiest places in the colony. The population is about 2250.

BINGARA is situated on the Gwydir River, in the county of Murchison, and is 352 miles north-west of Sydney. There are gold and diamond mines in the vicinity, and the district abounds in mineral riches. The population is about 8000.

BLAYNEY is a town and railway station on the western line, 172 miles west of Sydney, at the junction of the western and southern lines. It is 2840 feet above the sea, and is in an agricultural and gold-mining district. Much wheat is grown, and there are two large flour-mills. The population is about 1500.

BOURKE is a remote town, situated far in the interior on the Darling River, 576 miles north-west of Sydney. Its population is about 4000, but it is increasing. During part of the year it has communication by river steamers with Adelaide. The district around is mainly occupied by sheep and cattle stations, and suffers much from drought; but this has been partly remedied by the construction of artesian wells, which are very successful, several yielding from 300,000 to half a million gallons of water daily. Rich copper ore has recently been discovered here, and is now being worked.

BRAIDWOOD is a small town of about 1200 inhabitants, situated in the southern part of St. Vincent county, on the eastern slopes of the Gourock range, at an elevation of 3357 feet above the sea. It is the principal town of the southern gold-fields, many of which are situated within a radius of 20 miles. The country also produces large crops of wheat.

BROADWATER, a township in the county of Richmond, 342 miles north of Sydney. The Colonial Sugar Company's Mills employ about 700 hands, and produce 10,000 tons of sugar annually. Population about 1500.

BROKEN HILL is situated in the extreme west of the colony, 809 miles from Sydney, beyond the Darling River, but in railway connection with Adelaide. It is the principal silver-mining centre in Australia, and contains among others the Proprietary Mine, said to be the largest silver mine in the world. It produced more than 6 million ounces of silver in 1889. Up to 1890, 16 million ounces of silver had been produced. The population of the township is about 15,000, and it has a weekly and two daily newspapers.

BULLI is situated 59 miles south of Sydney, between the Illawarra Mountains and the coast, about 7 miles north of Wollongong. It is the head-quarters of the Bulli Mining Company, whose mines produce coal, which is taken by steam colliers to Sydney, Melbourne, and Brisbane. On the summit of a mountain near the town, 1000 feet high, one of the finest panoramic views in Australia is obtained. Population 2000.

CAMDEN, situated about 40 miles south-west of Sydney, is one

of the oldest places in the colony. It is in a fine agricultural country especially favourable for vineyards, and there are numbers of gentlemen's seats in the vicinity. Much dairy produce is sent to Sydney. The population is about 1000.

CASINO, a town on the Richmond River, 505 miles north of Sydney, and 90 miles from the port of Ballina. It is the centre of a large cattle-raising district, and sugar-cane is also grown successfully. There is also excellent timber in the vicinity. Population about 1500.

COBAR is a mining town 550 miles west of Sydney, in the county of Robinson, and about 110 miles south of Bourke. It is the site of the Cobar copper mines, which employ about 500 people, and which produced in 1889 nearly £40,000 worth of copper. There are other copper mines as well as gold mines in the vicinity, and the soil is exceedingly rich for fruit and agricultural produce. The population is about 3000.

COOMA is 257 miles south-west of Sydney, in the county of Beresford, in the Monaro district, 2660 feet above the sea. The surrounding country is pastoral and agricultural. Population 1300.

COONAMBLE, on the Castlereagh River, 375 miles north-west of Sydney, in the county of Leichhardt, is situated in a very fine sheep district. Population 1400.

COOTAMUNDRA is 253 miles south from Sydney, and 36 miles north-west from Gundagai. It is situated over 1000 feet above the sea, and is in a district famous for wheat; and there is also much garden produce and good pastoral land, the soil being a rich loam on granite. Population 2200.

COWRA is situated on the north bank of the Lachlan River, 219 miles west of Sydney, and about 60 miles south-west from Bathurst on the branch line of railway. It is in the centre of a good pastoral district, with vineyards, fruit orchards, as well as some silver and gold mines. Population 2100.

DENILIQUIN, a town of about 3000 inhabitants, is situated in the county of Townsend, and is 488 miles south-west from Sydney. It is connected with Echuca in Victoria by railway, and has easy communication with Melbourne. It is the centre of a great sheep and cattle district, the country around consisting of vast grassy plains often not suitable for cultivation.

DUBBO is a town of about 4000 inhabitants, in the county of Lincoln, 226 miles north-west of Sydney. It is situated on the Macquarie River, over which there is a fine bridge. The country around is pastoral and agricultural, with a few gold mines.

EMMAVILLE, a mining town (formerly VEGETABLE CREEK), 403 miles north of Sydney, and 20 miles west of Deepwater Station, on the Great Northern Line. Tin and silver are worked here, and there is good agricultural land in the vicinity. Population over 3000.

FORBES, a town of about 3000 inhabitants, in the county of the same name, is situated 240 miles west of Sydney, on the Lachlan River. It was formerly celebrated for its gold mines, but is now chiefly occupied with agriculture and commerce, being advantageously situated between the chief northern and southern markets.

GLEN INNES is pleasantly situated at the foot of a hill, at an elevation of 3700 feet above the sea-level. It is in the county of Gough, 373 miles N.N.W. of Sydney by railway, and has about 2000 inhabitants. The district around is pastoral and agricultural, but there is some mining, and tin exists in the neighbourhood. It is in a granite district, and has a rich soil, well adapted to the cultivation of cereals.

GOSFORD, a town and railway station on the shore of Brisbane Water, 50 miles north of Sydney. It is a good timber district, and is also well adapted for fruit-growing. Population about 1000.

GRAFTON is a small city, containing 5000 inhabitants, situated in Clarence county, on the river of the same name, 45 miles from the sea, and 350 miles N.N.E. of Sydney, with which it has regular steamship communication twice a week. The lowlands of the Clarence River are very rich, producing many tropical products, such as maize, tobacco, and sugar-cane, all of which are very extensively grown, though the crops are sometimes injured, or even totally destroyed, by floods. There are rich gold-fields on the Upper Clarence, and there is also abundance of tin, and some copper and antimony. The celebrated meat-preserving works at Ramornie are situated on the Oraru River a few miles west of Grafton.

GREETA (formerly ANVIL CREEK), a colliery village and railway station, 107 miles north of Sydney and 32 miles west of Newcastle. There are several collieries. Population about 2000.

GRENFELL is a town with about 1600 people, in the county of Monteagle, 233 miles due west of Sydney. It was originally a gold-field town, and gold-mining is still extensively carried on in the quartz reefs that abound in the neighbourhood. One of the shafts is 700 feet deep. The town now depends, however, chiefly on agriculture, the soil being rich, and well suited for vines, fruit-trees, and cereal products, all of which are largely grown, and rapidly increasing.

GULGONG, a mining town in the county of Phillip, 198 miles north-west from Sydney and 20 miles from Mudgee railway terminus. There is a large alluvial gold-field here, and much rich land, which is now being taken up for farming. Population about 1600.

GUNDAGAI is a small town of about 1500 inhabitants, in the county of Clarendon, and situated on the Murrumbidgee River, 245 miles south-west of Sydney. The river is navigable by steamers as far as this place, and it is here crossed by a fine bridge and viaduct, five-eighths of a mile long, which cost £38,000. The river flats are subject to floods, and the original town was washed away in 1852, when many lives were lost. It is now built at a higher level. There are some gold and copper mines in the vicinity, and there is also a considerable amount of agriculture, wheat, maize, and tobacco being largely grown.

GUNNEDAH, an agricultural town on the Namoi River, 271 miles north-west of Sydney, and on the north-western railway from Newcastle. Land is being irrigated for agricultural purposes, and there are flour- and saw-mills. Population over 1200.

HAMILTON, a town on the Great Northern Railway, 77 miles north of Sydney. It has about 2000 inhabitants, and is chiefly remarkable for its patent fuel works, which utilise the small coal from the mines, forming it into egg-shaped blocks at the rate of 60 tons a day.

HAY, in the Riverina district, and county of Waradjery, 460 miles south-west of Sydney, is a small town of about 3500 inhabitants. It is situated on the Murrumbidgee River, which is here crossed by a fine iron swing-bridge, so as not to stop the navigation. The surrounding country is pastoral, and is wholly taken up by sheep and cattle stations.

INVERELL is a flourishing township in Gough county on the Macintyre River, 341 miles north of Sydney, and 42 miles west of Glen Innes on the Northern Railway. It is surrounded by a rich pastoral and farming country. Grapes are also extensively grown, and tin and diamond mining is carried on in the vicinity. Population about 2000.

JUNEE is a thriving town and railway junction on the Great Southern line, 287 miles from Sydney. It is nearly 1000 feet above the sea, and is in a good pastoral and agricultural district. There is a railway locomotive dépôt here. Population about 2000.

KATOOMBA, a town and railway station on the western line, 66 miles from Sydney. It is on the eastern slope of the Blue Mountains, 3330 feet above the sea, and commands very extensive views. There are waterfalls and fine mountain scenery in the neighbourhood, and it is much visited by tourists and as a sanitarium. There is a large colliery near. Population about 2000.

KEMPSEY, an agricultural town on the Macleay River, in the county of Dudley, and 280 miles north-east of Sydney. Maize is the staple product, but some sugar is also produced. Population 2000.

KIAMA, a seaport town in the county of Camden, and 90 miles south of Sydney, with a population of about 3000 persons. It has a large export trade in butter, eggs, and poultry, and produces also maize, wheat, and barley. There are also good coal and iron in the district.

LAMPTON, in the county of Northumberland, 81 miles north of Sydney, and 5 miles north of Newcastle. It is a colliery township. Population 2000.

LISMORE, a township on the north arm of the Richmond River, 520 miles north of Sydney, and at the head of the navigation for sea-going vessels. It is in a pastoral and agricultural district, with a rich soil suitable for sugar, maize, and potatoes. There is a large export trade in pine and cedar timber. Population about 6000.

LITHGOW is a rising town on the Great Western Railway, at the base of the Blue Mountains, in Cook county, and 96 miles west of Sydney. It has numerous collieries, ironworks, and foundries, as well as copper-melting works, brick-making, and *terra cotta* works. It has a population of about 3500 persons.

LIVERPOOL, one of the earliest settlements of the colony, is situated on the George's River, 22 miles south of Sydney, and on the Great Southern Railway. Its population is about 2000, and it is surrounded by an agricultural district in which dairy farms predominate. There are also extensive paper-mills.

MACLEAN (formerly ROCKY MOUTH) is situated at the junction of the north and south branches of the Clarence River, 320 miles north of Sydney. There are passenger steamers to Grafton. Coal and ironstone abound and there are manufactories of aerated waters, and also engineering works. Population about 1000, but increasing.

MANLY, a watering-place, 9 miles north-east from Sydney, near the North Head. Population about 1500.

MINMI, on the creek of the same name, is 89 miles north of Sydney and 14 miles from Newcastle. There are large collieries in the neighbourhood. Population 2000.

MITTAGONG, a town in the county of Camden, 77 miles south of Sydney, on the Southern Railway, and over 2000 feet above sea-level. There are coal and iron mines and kerosene oil works in the vicinity, and the land is pastoral and agricultural. Population 1200.

MOAMA (formerly MAIDEN'S PUNT), a town on the north bank of the Murray, opposite Echuca in Victoria. It is in the county of Cadell, and 516 miles south-west of Sydney. It is in direct railway communication with Melbourne, and is in a grazing district. Population 1200.

MOLONG, 172 miles west of Sydney, on the borders of Ashburnham and Wellington counties, is in a good farming district, with copper mines in the vicinity. Population 1500.

MORPETH, a thriving town situated at the head of the navigation of the river Hunter, 3 miles from Maitland, in the county of Northumberland, and 95 miles north from Sydney. There are many coal mines in the neighbourhood, and the rich river-flats yield maize, sugar-cane, and other products. The population is about 1280 persons. There is a branch railway to Maitland.

MORUYA, a small town in the county of Dampier, 198 miles south of Sydney, in a good agricultural district, with gold and silver mines, as well as slate and granite quarries, in the vicinity. Population over 1000.

MOSS VALE, a town on the Bong-bong River, in the county of Camden, 86 miles south of Sydney, on the Great Southern Railway. It is in a rich dairying and agricultural district. The governor has a summer residence near the town, as have many wealthy residents in Sydney. Population 1200.

MUDGEES is an important mining town in Wellington county, on the Cudjegong River, 153 miles north-west of Sydney. It is in the centre of a rich gold district both alluvial and quartz-reefs, the latter being practically inexhaustible. There is also a large breadth of land under cultivation, wheat, maize, barley, and oats being the principal crops. The population is about 3000.

MURRUMBURRAH, a small town in the county of Harden, 230 miles south-west of Sydney, on the Great Southern Railway, and 1270 feet above the sea. It is in a gold-mining district, and has a population of about 1800.

MURRURUNDI, on the Page River, in the county of Brisbane,

192 miles north-west of Sydney, is situated at the foot of the Liverpool range, and is over 1500 feet above sea-level. It is a pastoral district, and there are kerosene shale works in the neighbourhood. Population about 1000.

MUSWELLBROOK is a small town, with a population of 1250 persons, situated in Durham county on a branch of the Hunter River, and on the Northern Railway, 55 miles from Maitland, and



NEAR MURRURUNDI.

150 miles north-west of Sydney. The chief productions of the surrounding district are wheat and maize, with some tobacco, sugar, and wine.

NARANDERA is a small town on the Murrumbidgee River, in the county of Cooper, 348 miles south-west of Sydney, on the Great South-Western Railway. The river is navigable to this place during half the year. The surrounding country is agricultural. Population 2000.

NOWRA, a comparatively new town on the Shoalhaven River, 10 miles from its mouth and 124 miles south of Sydney, with which there is communication by coach and steamship. It is in a beautiful situation, surrounded by magnificent scenery and luxuriant vegetation, with the richest agricultural land on the alluvial flats of the Shoalhaven River. There is also much dairy-farming.

NYMALEE, a mining town in Mouramba county, 441 miles west of Sydney. There are extensive copper mines. Population 1400.

NYNGAN, a town and railway station in Gregory county, 377 miles north-west of Sydney. Population 1200.

ORANGE is a town situated in the counties of Wellington and Bathurst, at an elevation of 2890 feet above the sea-level, and 192 miles by railway west of Sydney. It is a great business place in the centre of a wheat-producing district, and has a population of about 3000 persons. The chief products are wheat, maize, barley, oats, and potatoes, and there are many large flour-mills, which grind 250,000 bushels of wheat per annum. There are also important gold-fields in the neighbourhood, among which are the Ovens, once so celebrated. Copper also abounds.

PARKES is a new, thriving town in the Billabong gold-field, situated in the county of Ashburnham, 283 miles west of Sydney. Its population is about 2000, owing to its being in the centre of one of the best gold districts in the colony.

PEAK HILL, a mining town in the county of Narramine, on the Bogan River, 272 miles west of Sydney. It is in a rich gold-field. Population 1200.

PENRITH, a town and railway station on the east bank of the Nepean River, 34 miles west of Sydney. It is in an agricultural district, but there are large railway workshops, and most of the inhabitants of the town are railway employés. Population above 3000.

PORT-MACQUARIE, at the entrance of the Hastings River, is 180 miles north of Sydney. It is surrounded by an agricultural district. Population about 1500.

QUEANBEYAN is a small town of about 1350 inhabitants, in the county of Murray, 190 miles south-west of Sydney. It is picturesquely situated in a pastoral and agricultural district, producing abundance of wheat, maize, barley, oats, and potatoes. There are also valuable deposits of copper, silver, lead, iron, and gold in the vicinity, but they are not yet extensively worked.

QUIRINDI, a town and railway station in the county of Buckland, 242 miles north of Sydney, and 1270 feet above sea-level.

It is in a good farming district, and is the nearest station to the Liverpool Plains. Population about 1500.

RICHMOND is situated in the county of Cumberland, within a short distance of the Hawkesbury River, and 38 miles north-west from Sydney, and contains 1400 inhabitants. It is in a rich agricultural district, producing both cereal crops and sugar. The Kurrajong Mountains, about 5 miles west of the town, are the chief seat of the orange and stone-fruit culture, and the Kurrajong Heights are one of the sanatoriums of New South Wales.

SHELLHARBOUR, a small town in a pastoral district, 3 miles from the famous Lake Illawarra. It is 66 miles south-west from Sydney and 3 miles from a railway station. Population about 1300.

SILVERTON is one of the chief centres of the silver-mining district of the Barrier ranges on the borders of South Australia, and 822 miles west of Sydney. The total export of silver, lead, copper, and tin from the Silverton district in 1889 was of the estimated value of £1,726,000.

SINGLETON is a town of 2220 inhabitants, in the county of Northumberland, situated on the Hunter River, 30 miles north of Maitland, and 123 miles north-west of Sydney. It is a place of considerable trade, the surrounding district being rich in agricultural products, the country being flat alluvial land of a very fertile character, though, as is so often the case in Australia, subject to severe inundations. It is one of the prettiest towns in New South Wales.

TAMWORTH is a town of 4000 inhabitants, situated on the Peel and Cockburn Rivers, on the borders of Inglis and Parry counties, 251 miles north of Sydney, and on the line of the proposed extension of the Great Northern Railway. It is built on low ground, surrounded by a range of undulating hills, in the midst of a fine pastoral, agricultural, and mining district. Wheat is largely grown.

TEMORA, a small mining town in the county of Bland, 283 miles south of Sydney. There is a good yield of gold in the district, and tin has also been found. Population about 1500.

TENTERFIELD, a border town and railway station in New England, 314 miles north of Sydney, at the head of the Dumaresq River. There is a considerable gold-field near, and both silver and tin have also been found. Population about 1000.

TUMUT, a pretty town on the south bank of the Tumut River, 264 miles south-west from Sydney. It is on the borders of Buc- cleuch and Wynyard counties, and is the terminus of the branch

railway through Gundagai, 21 miles distant. It is in a rich agricultural district very favourable for cereals. Population about 1200.

WAGGA-WAGGA is a town of 5000 population, situated in the county of Wynyard, on the south bank of the Murrumbidgee, about midway between Sydney and Melbourne, and distant from the former about 315 miles by railway. It does a large business with the surrounding districts, which are principally pastoral. Cereals, however, are grown to some extent, and a considerable quantity of wine is manufactured.

WALCHA, a small town on the river Apsley, 332 miles north of Sydney, and 12 miles from a station on the Great Northern line. The Glen Morrison Gold-field is about 17 miles distant. Population about 1200.

WALLSEND is a coal-mining town, 8 miles from Newcastle, in the county of Northumberland, and, with the adjoining villages, has a population of about 4000 inhabitants. The town is rapidly increasing, the output of the mines being more than 2000 tons a day.

WELLINGTON, on the Macquarie River, is 248 miles north-west of Sydney by the North-Western Railway. It is in a good agricultural and pastoral district, and there are extensive copper mines near. The Wellington Caves in the vicinity are much visited. Population about 2000.

WENTWORTH, a small town on the Darling near its confluence with the Murray, 500 miles west of Sydney. The district is pastoral. There is a large river-steamer traffic. Population 1500.

WILCANNIA, a small town on the Darling River, in the county of Young, 583 miles north-west of Sydney. The town is a centre of considerable trade for the stock-raising and mining communities around. Population about 1400.

WINDSOR is a town of about 2500 inhabitants, situated in the county of Cumberland, on the Hawkesbury River, 35 miles north-west of Sydney. It is seated on a hill, but surrounded by lowlands, which are occasionally devastated by floods, though of unrivalled fertility, often producing 100 bushels of maize to the acre.

WOLLONGONG is a seaport town in the district of Illawarra and county of Camden, 64 miles south of Sydney. It has 8000 inhabitants. There are productive gold-fields in the vicinity, and the country is also rich in dairy produce. A valuable deposit of shale produces kerosene oil, of which 1500 gallons are manufactured weekly. About 330,000 tons of coal were raised in 1889. Iron

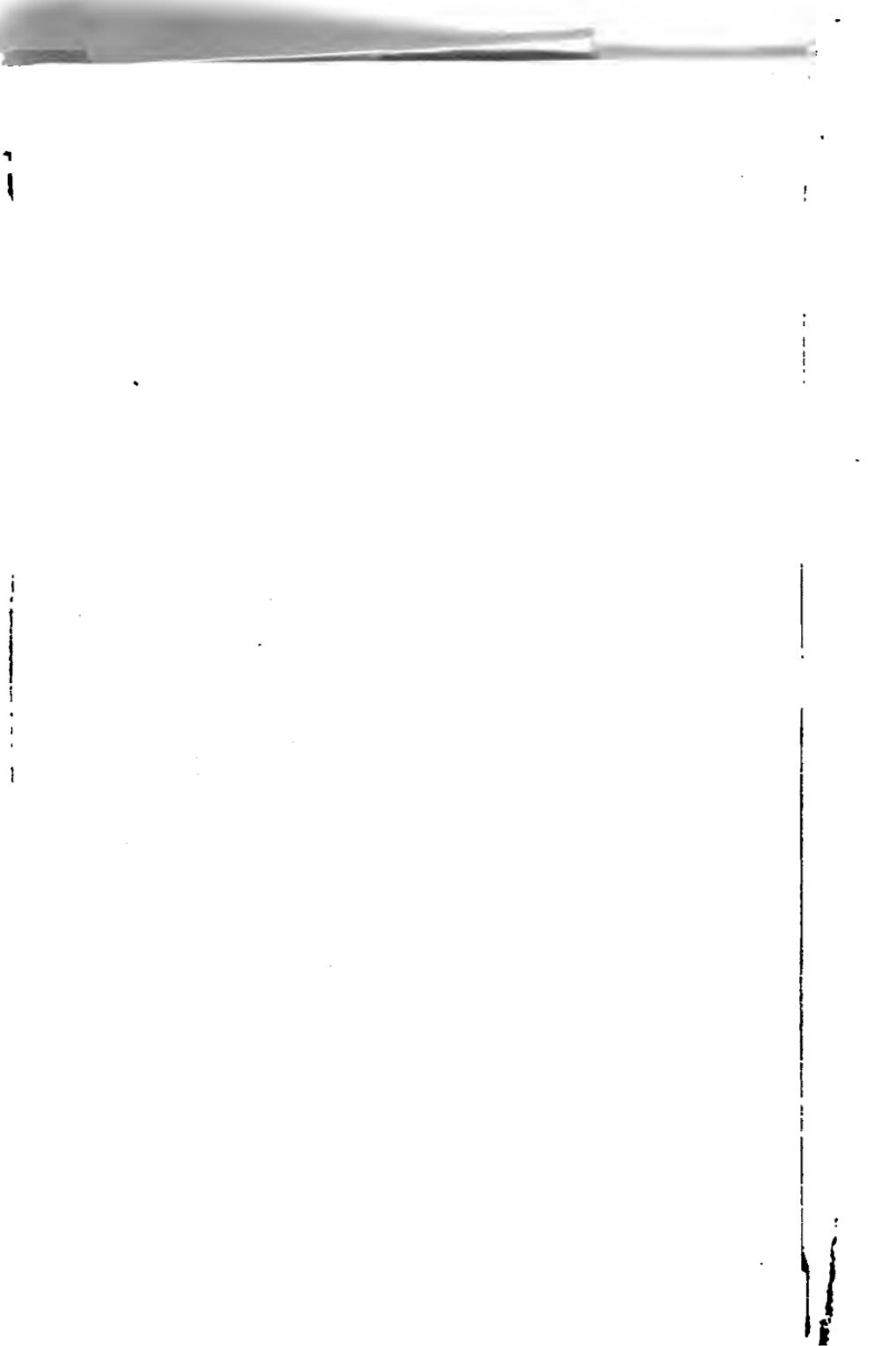
ore and limestone also occur in the neighbourhood. A breakwater and lighthouse have been built, and a basin formed, so that the harbour is greatly improved.

WOODBURN, a small town in the county of Rous, 308 miles north by east from Sydney, and situated on the Richmond River. There are several sugar manufactories. Population over 1000.

YASS is an important and growing town, situated in the county of King, 180 miles south-west of Sydney, on the Yass River, a tributary of the Murrumbidgee, and on the line of the Great Southern Railway. The population is about 2400. The surrounding country is rich in copper, silver, and lead ore, but these are not yet developed, and the district now depends mainly on agriculture, the principal crops being wheat, maize, barley, oats, and potatoes. The geological formation of the district is granite, limestone, and slate.

YOUNG, a rising town in Monteagle county, 250 miles south-west of Sydney. The gold-fields in the neighbourhood, to which the town owes its origin, are now less important than the agricultural resources of the district. Wheat is largely grown, and some wine is made, while fresh land is constantly being brought into cultivation. The population is about 1500.





CHAPTER IX

THE COLONY OF VICTORIA

1. Origin, Geographical Limits, and Area.

VICTORIA, once called Australia Felix from its beauty and fertility, though the smallest of the Australian colonies, is the most populous and the most wealthy, and therefore well deserves to take the first rank after the parent colony, New South Wales, from which it was separated on 1st July 1851.

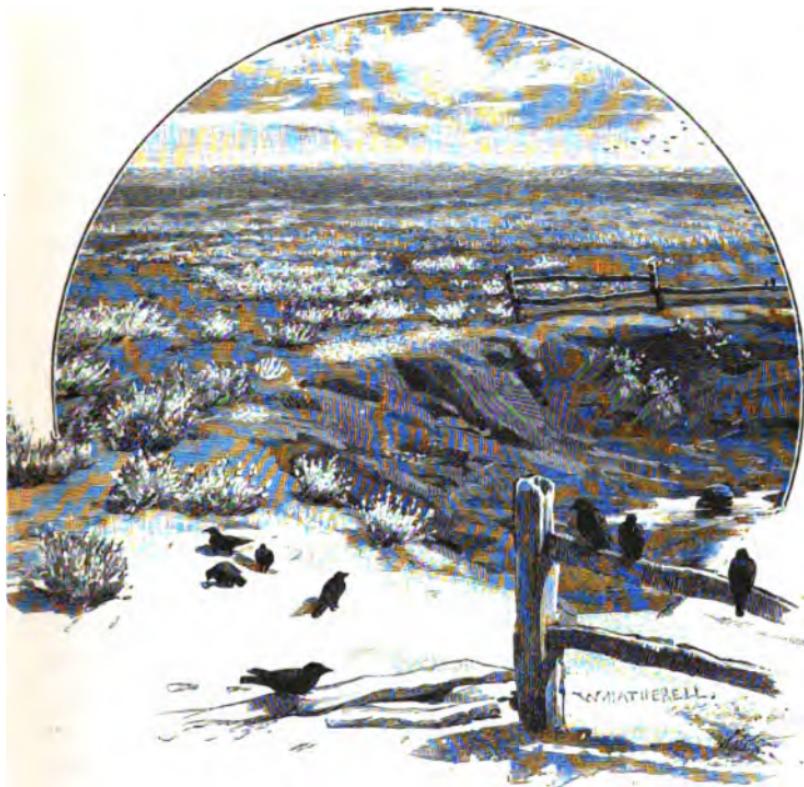
Victoria is somewhat smaller than Great Britain, having an area of 87,884 square miles. It lies between the limits of 34° and 39° south latitude, and between the meridians of 141° and 150° east longitude: thus forming the most southern portion of the continent. Its form is roughly triangular, the western side being 260 miles long, and the length from this base to the eastern point 420 miles. It is bounded on the west by South Australia, the boundary being the 141st meridian. On the north it is bounded by New South Wales, the dividing line being the Murray River to one of its sources at Forest Hill, thence in a straight line to Cape Howe. On the south it is bounded by the ocean, and the coast-line is estimated to have a length of 600 miles.

2. Physical Features.

The surface of this colony is even more diversified and less easy to describe than that of New South Wales. A broad and irregular range of mountains runs through the colony from east to west, dividing it into two unequal parts, all the truly Victorian rivers having their sources on the southern side of the watershed and flowing to the sea, while those rising on the northern slopes all empty themselves into the Murray. The eastern and loftiest portion of the mountain range is known as the Australian Alps, while its extension westwards is termed the Dividing Range. Farther west it is called the Pyrenees, some of whose peaks are incongruously named Ben Nevis and Mount Ararat. Beyond these the range turns northward and forms the Grampians, whose principal peak, Mount William, is 5600 feet high. The highest part of the Australian Alps in Victoria is Mount Bogong (6508 feet), forming part of a northerly spur between the Mitta-mitta and Ovens Rivers, and about 50 miles west of the New South Wales boundary. Farther west a few peaks rise above 6000 feet. All along the main chain are many northern and southern spurs and short ranges, as well as a number of outlying peaks and mountains often extending to a width of 50 or 100 miles. In the central part of the Dividing Range the hills vary from 2000 to 3500 feet, while both here, and more especially in the country west of Melbourne, are hundreds of volcanic mountains, some with very perfect cones and craters. There is no connected system of coast-ranges. To the east are the Wanderer Hills, entering the colony from New South Wales. The Strzelecki Range crosses the southern promontory; while another crosses the south-

western promontory and terminates at Moonlight Headland, a little north-west of Cape Otway.

The larger portion of Victoria is mountainous or hilly, and it is only in the north-western portion that we meet



SUMMER ON THE PLAINS.

with plains at all equal in extent to those of New South Wales. This is the Wimmera district, extending from the Pyrenees and Grampians to the Murray, and covering an area of more than 20,000 miles. Here are vast sandy and sparsely grassed plains intersected with belts of "myall scrub" and forests of Casuarina, Banksia, and

Eucalyptus. Occasionally patches of good agricultural land occur, but by far the larger portion is only suited for pasture. In some parts there are extensive swamps, and the whole district is liable to severe droughts, so that water has to be obtained by means of wells from 80 to 140 feet deep.

With the exception of the Murray, Victoria has few navigable rivers. In winter most of the rivers become angry torrents, carrying devastation over much fertile country. During the summer heats many of them dwindle down to small streams or to detached pools of water, while some entirely dry up in exceptionally dry seasons, bringing terrible loss to the stock-owners, whose cattle die by thousands from want of water. The principal rivers in the order of their length are—the Murray, the chief sources of which are in the colony, and whose main stream bounds it for a distance of nearly 600 miles, its total length measured along its course being 1400 miles; the Goulburn, 230 miles long, a tributary of the Murray, having its source in the great Dividing Range to the north-east of Melbourne; the Glenelg, 205 miles long, rising in the Grampians, and flowing in a westerly and southerly direction to the sea at the south-west corner of the colony; the Loddon, 150 miles long, has its sources in the Dividing Range north-west of Melbourne, and flows nearly due north to the Murray; the Wimmera has its sources in the Pyrenees and Grampians, and, flowing northward, loses itself in salt lakes and arid plains before reaching the Murray; the Avoca, 130 miles long, rises on the eastern slopes of the Pyrenees, and also terminates in swamps and lakes; the Hopkins, 110 miles long, rises in the Pyrenees and flows southward to the ocean; the Ovens, 100 miles long, rises in the Australian Alps, near Mounts Smyth and Selwyn,

and flows in a north-west direction to the Murray; and the Yarra-Yarra, 90 miles long, which rises among the southern spurs of the Dividing Range, and, flowing west, enters the bay of Port Phillip at Melbourne.

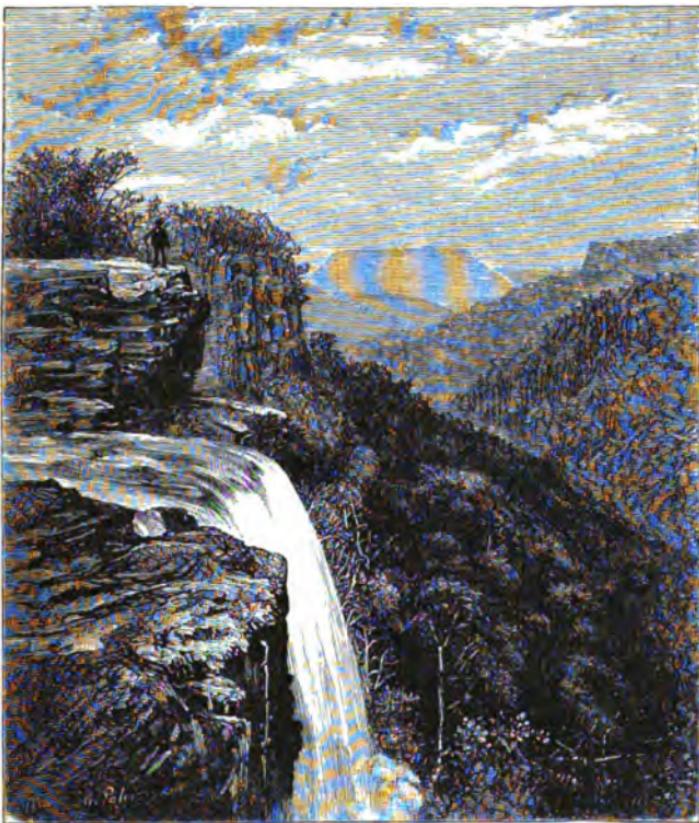
There are numerous lakes in Victoria, but many are saline, and some are depressions near the shore, only separated from the ocean by sandbanks. A few are formed in ancient craters. The lakes of the Wimmera district are mostly salt—as Lake Hindmarsh, which covers more than 25,000 acres. Lake Burrumbeet, near Ballarat, and some others among the mountains, may be true alpine lakes, but these interesting geographical features have not been sufficiently examined. The largest of the Victorian lakes is Lake Corangamite, situated about 50 miles west of Geelong, and 40 miles from the coast at Moonlight Head. It is about 16 miles long by 5 or 6 wide, but owing to its large surface and the absence of any outflow the water is salt. To the south-east is the smaller Lake Colac, occupying about 20 square miles, the waters of which are fresh. These lakes and several smaller ones in the same district, some of which are fresh and some salt, are about 400 feet above the sea-level, and as they are within the volcanic area of Pliocene age they have probably been formed by subsidence.

The scenery of Victoria is diversified and pleasing. The hills and mountains are mostly clothed with dense forests; and the ranges of the Australian Alps offer much grand mountain scenery. Again, in the west, the Pyrenees and Grampians are very picturesque, and some of the rivers are broken by waterfalls of great beauty. The whole country from Melbourne westward is exceedingly rich in soil and varied and beautiful in scenery. Here there is an additional charm in the numerous

extinct volcanoes which occur in extraordinary numbers. In many instances the craters are perfectly defined, leaving not the slightest doubt as to their former character. In general they appear as isolated cones, such as Mounts Elephant, Eles, Napier, and others, standing out conspicuously from the surrounding level; in others, as the Warrion Hills, between the lakes Colac and Corangamite, they assume the form of a small chain comprising about a dozen volcanic hills. Within and around the craters are strewed rocks of pumice and lava; and the lower part is often occupied by a small lake, sometimes of fresh water, at others of salt, or nauseous to the taste and smell from the presence of sulphuretted hydrogen. This fine country is also variegated with salt lakes and lagoons, some of which, by their circular form, their peculiar mineral water, and a sort of escarpment around them, have the appearance of craters, although not in the customary form of cones. Luxuriance of vegetation everywhere accompanies the volcanic deposits, to such an extent as sometimes to be injurious to the animals that feed on it. As Mr. Westgarth well remarks: "The picture of the past, called up by geological science, contrasts strikingly with the present scenery. The most violent commotions of nature have been succeeded by the opposite extreme of tranquillity. Sheep fat for the shambles the whole year round, horses in the highest spirit and condition, oxen half a ton in weight, sport over the verdant grass supported by the deep soil now covering the once livid rocks that were vomited over the country."¹

¹ *Victoria, late Australia Felix*; being an historical and descriptive account of the Colony and its Gold Mines. By William Westgarth, late member of the Legislative Council of Victoria. London, Simpkin and Marshall. 1853.

In other districts also the nature of the rocky substratum gives to the landscape a distinctive character. Where granite occurs, as in several portions of the



FALLS IN THE DIVIDING RANGE.

Dividing Range and on Wilson's Promontory, huge masses of rock jut out from the soil, often weathered into rounded or egg-shaped masses, sometimes piled on one another as if by human agency. The hard Palaeozoic rocks with their accompanying porphyries give rise to

much rugged mountain scenery, the creeks and rivers forming deep and precipitous gorges with a succession of picturesque waterfalls, a good example of which is to be seen in the Turnback Mountain and the higher portions of the Snowy River. Near Mansfield, where Upper Palæozoic rocks prevail, the country is park-like in character, well grassed but thinly timbered. The hills have a tabular appearance, due to their being formed of horizontal layers, the harder of which project in shelf-like contours round the slopes. To the north-east of Cape Otway there is an area of Secondary rocks where the soil is very rich, supporting a dense vegetation of large timber and underwood, while the country is broken up by a network of deep gullies and steep hills. Along the south-west coast the cliffs are mostly tertiary, of Miocene age, and are very picturesque. They are about 200 feet high, almost or quite perpendicular, and jut out into frequent headlands; while the continuous action of marine denudation is shown by the number of detached blocks and islets standing at short distances out at sea.

Mr. Howitt also, in his *Two Years in Victoria*, speaks of the rich black volcanic earth and the greenness of the luxuriant vegetation in the country between Ballarat and Geelong, and westward to the Glenelg River. He describes the upper valley of the Moorabool as being exceedingly picturesque, the river running through deep glens enclosed by lofty precipices and hung with fine forests. For miles the banks of the river display extreme beauty, winding about amid noble promontories scattered with giant trees, and high hollow combes as impressive in their seclusion as they are rich in soil. Here and there mounds rise out of the bottom of the valley so rounded and beautiful that one wonders not to see them seized

upon and crowned with picturesque mansions. Others run in low lines across the valley, looking as if designed by some skilful landscape-gardener to give effect to princely grounds, yet so draped in delicate verdure as only nature could drape them.

3. Climate, Natural History, and Geology.

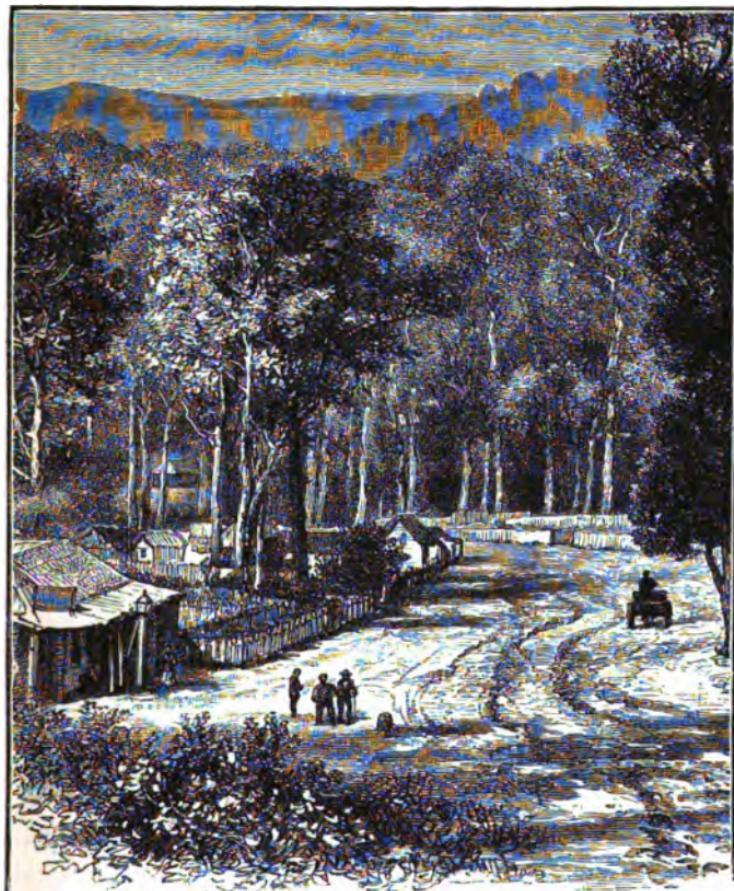
Although Victoria is not so hot as New South Wales or Queensland, there is not much difference in the maximum summer temperature, which often rises to 100° or even to 108° Fahr. in the shade. There is, however, a considerable amount of fine clear weather not oppressively warm, and except when the hot northerly winds blow, the climate is exceedingly agreeable. In the lowlands frost is almost unknown, but in the mountainous districts it often freezes at night, although the days may be of a summer temperature. The mean temperature of Melbourne is 58°. The rainfall is very variable in different years. The mean at Melbourne is 25 inches, but it has been so low as 14 inches and as high as 48. In the mountains, especially towards the east, the rainfall is greater, while the Wimmera district in the north-western interior is very dry, having rarely above 14 inches, and the soil being mostly sandy the evaporation is enormous. On the whole, Victoria has probably the most agreeable climate of any part of the continent of Australia.

Victoria being (comparatively) so small, and divided by no great natural barriers from New South Wales or South Australia, it is not to be expected that it should present many peculiar forms of animals or plants. Its varied surface and rich soil are, however, highly favourable

to vegetable and animal life, and the special Australian flora and fauna are here developed with great luxuriance. Many English quadrupeds and birds have now been introduced and become naturalised ; such as hares, rabbits, deer, goats, pheasants, partridges, quails, white swans, foreign ducks, thrushes, larks, and other song-birds ; and many of these are becoming more or less plentiful. Rabbits have increased in some of the scrubs to such an extent as to be a nuisance. Deer may be found in some of the mountain ranges ; and the Axis deer of India, of which thirty-five were turned out in the Wimmera district a few years since, now number herds of some hundreds in the ranges of the Western Grampians and in many of the surrounding mountains. Angora goats have also been turned out, and many of the birds have increased wonderfully, so that the sweetest songsters of England may be often heard in the woods of this remote colony.

The southern slopes and valleys of the Dividing Range to the north-east of Melbourne are clothed with magnificent forests, and it is here that trees have been found surpassing in height the famed giant trees of California. Mr. Ferguson, the Inspector of State Forests, in an official report made in 1872, states, that among the various tributaries of the Watts River (a northern branch of the Yarra-yarra) several species of *Eucalyptus* attain gigantic dimensions never met with in any other forests. There are large tracts near the sources of the Watts where the trees average from 250 to 300 feet high, mostly straight as an arrow and with very few branches. Many fallen trees measure 350 feet in length, and one huge specimen, which lay prostrate across a stream, was found by actual measurement with a tape to be 435 feet from its roots to where its trunk had been broken off by the

fall. This broken end was 3 feet in diameter, so that at the lowest estimate the entire tree must have been over 500 feet high—by far the loftiest tree as yet



IN THE MOUNTAINS, FERNSHAW.

ascertained to exist on the globe. At 5 feet from the ground it measures 18 feet in diameter. The tree had been much burnt and the broken top entirely de-

stroyed. This tree was a Eucalyptus, probably of the species named *E. obliqua* or *E. amygdalina*. The tallest of the Wellingtonias of California do not exceed 325 feet, but they are usually thicker at the base. This huge fallen tree was however 18 feet in diameter at 5 feet from the ground, and some are said to exceed 20 feet in diameter, but these are rarely more than 300 feet high. It is therefore probable that not only in height but also in the quantity of timber in a single tree, these Victorian Eucalypti may surpass all other trees in the world.

Geology.—The geological formation of Victoria is very varied, and this helps to give the country much of its beautiful and romantic scenery. It possesses far less of the barren Tertiary sandstone than the other colonies, and a larger proportion of Palæozoic and volcanic rocks, to which it owes its extreme fertility. The Dividing Range running through the centre of the country from east to west consists of granitic and Silurian rocks, which extend also to the Grampians on the west and the Australian Alps on the east. South of the mountains there was once an enormous deposit of Upper Palæozoic or Secondary rocks, which have since been greatly denuded. These rocks had a strike at right angles to the mountain range, and the beds of quartz and other hard rocks now stand up in ridges running north and south across the country so regularly that they are used as sure guides by the wandering bushman. These less ancient deposits seldom contain much gold, and it is owing to their extensive denudation leading to the accumulation of the ore in limited areas, that Victoria owes much of its auriferous treasures. The mode in which the gold occurs has already been described in our chapter on the Geology of Australia, and need not be repeated here. Devonian

sandstones, slates, and limestones occur in Gipps Land. Secondary rocks, though scanty, occur in the Cape Otway country, and in the region east of Western Port, as well as in the Wannon district east of the Glenelg River. These regions are poor, and are either uninhabited or pastoral. Coal is found at Cape Otway and Western Port, but it is not of great value, being of Mesozoic age.

Tertiary deposits cover one-third of the surface of the colony. The calcareous or desert sandstone of Pliocene age, which is so largely developed in West and South Australia, enters Victoria in the west and north-west, and forms much of the poor arid pastures of the Wimmera country. To the south of the mountains small patches of it only are found at Port Phillip Heads and Western Port. The quartz gravel, clay, sandstone, and conglomerate, in which alluvial gold is found, are Older Pliocene, while the fresh-water sandstones of Geelong and of the Loddon valley are Newer Pliocene. The coloured clays of Warrnambool on the south-western coast are Post-pliocene. Miocene beds occur in the Moorabool valley west of Geelong and in the Cape Otway region; while the sandstone of Portland in the west and the rough limestone of the Gipps Land lakes are of the same age.

The extinct volcanoes of Victoria are very remarkable, and apparently very recent, so that the traditions of eruptions, existing among the natives, may be founded on fact. Many of the plains, as those north and west of Melbourne, are formed by outflows of basalt, as are some very extensive plains in the western part of the colony. The successive flows of basalt, beneath which the "deep leads" of the gold-miners are found, have already been described. The volcanic cones and craters which are so abundant in the south-west of Victoria and in the Dividing Range have discharged basalt, lava, scoriae, cinders,

mud, and ashes. In many places, as about Ballarat, these extinct volcanoes may be counted by the score. Some are filled up at the summit, others are surrounded by a rim miles in extent, while others again have their craters filled with water. Several of the western lakes appear to have been craters. Many of these volcanoes were in eruption during the Miocene period, others in Pliocene and Post-pliocene, or even in recent times. To the southwest, near Lake Colac, are singular ridges of lava and basalt forming a labyrinthine network of rock, among which caverns of considerable extent have been found.

Some of the lava shows the columnar structure in a marked degree, and on the Bogong High Plains, in places where the rock is bare, it resembles a pavement of five-sided blocks; while on the slopes below the escarp edges of the plateau acres of ground are covered with pentagonal columns of basalt like logs confusedly heaped together.

A very interesting proof of the enormous amount of denudation and change in the surface features of the country, which has occurred since the Miocene period, is afforded by the occurrence of numerous detached patches of basalt overlying Miocene beds on the very summits of the highest points of the Dargo High Plains, forming one of the highest portions of the Great Dividing Range. It follows that what are now lofty mountain summits must, during the Miocene period, have been a great valley surrounded by high mountains and dominated by some great volcano, the lava from which flowed down the valley. Since then the whole of the surrounding mountains have been lowered by denudation, and the great lava stream itself, being so much harder, protected the softer beds beneath it, and must have long remained as the continuous summit of a mountain. At length it

became undermined and eaten away bit by bit, till in the course of countless ages only a few isolated fragments capping the higher summits remain to tell us how much change the earth's surface has undergone during the comparatively short portion of geological time that has elapsed since the Miocene volcanoes poured forth their huge streams of fiery lava, which must have been at least 800 feet thick, while the mountains around were probably several thousand feet higher than they are now.

4. Colonisation, Population, etc.

Victoria dates as a separate colony from July 1851, before which period it formed part of New South Wales and partook of its early history. In the previous year, 1850, it had a population of 76,000. Then came the discovery of gold, and from every part of the globe men rushed to get a share in the treasure. At first the Government attempted to prevent gold-mining, but finding this impossible, licenses were issued in September 1851. Then followed a scene of the wildest confusion. Settlers left their farms, merchants their desks, professional men their offices. Workshops were left without workmen, ships without crews, and the whole country was, as has been well said, "drunk with gold." Any account of the gold-fever belongs to history rather than to geography, but we may here note its effects on the population and development of the colony. The influx of men of all classes from the mother country, and of almost all the races of the world, together with numbers of released or escaped convicts from the neighbouring colonies, led to a struggle for existence, in which the most hardy, the most energetic, the most patient, or the most far-seeing, could alone succeed. Thus, amid much

trouble, much degradation, and much crime, the seething mass of humanity, drawn together by the love of gold, has worked itself into something like order; and the result is a population of almost unexampled energy, which is now steadily engaged in developing all the resources of a fertile and beautiful country. While gold-mining still continues to be the great feature in Victorian industry, it is now carried on by the help of machinery, and of all the refinements of modern science. The wealth which it has brought to the colony has been in part expended in useful public works. Agriculture has extended, manufactures have been established, towns and villages have been built, education and science have been fostered, so that Victoria now stands at a high level of colonial prosperity and civilisation.

The increase of population caused by the rush for gold was amazing. From 76,000 in 1850 it increased to 312,000 in 1854, to 538,000 in 1860, to 726,000 in 1870, while by the census of 1881 the population amounted to 862,346. While the Europeans have been thus rapidly increasing, the indigenous inhabitants have as steadily diminished. In 1835 they were estimated at 5000; in 1851 they had diminished to 2700; while they now do not much exceed 1000 individuals. In the general census of the population are included about 12,000 Chinese, nearly two-thirds of whom are gold-miners. The proportion of the sexes has fluctuated considerably. Just before the gold-fever immigration, the females were about two-thirds as many as the males. In 1854 there were nearly twice as many males as females; but since that date the proportion of females has steadily increased, till it now amounts to about ten-elevenths of the other sex. In 1890 the estimated population was nearly a million and a quarter.

5. Productions, Trade, Shipping, etc.

As New South Wales is pre-eminent in wool and other products derived from flocks and herds, so is Victoria pre-eminent in gold as an article of export. Up to the end of 1889 the quantity of gold raised in the colony was of the value of more than £229,000,000, far exceeding that of all the rest of Australia. Considerable quantities of silver, tin, and antimony have also been worked; with copper, lead, zinc, cobalt, bismuth, manganese, iron, coal, bitumen, and sulphur, in comparatively small quantities. The value of the tin raised, up to 1889, was over £670,000. Diamonds and sapphires have also been found in small quantities. Gold is now obtained from enormous depths. The quartz lodes at Stawell are reached by a shaft 1706 feet deep, and there are many shafts over 1000 feet. Victoria is celebrated for its nuggets or solid masses of gold, which surpass those of any other part of the world. The largest, called the *Welcome Stranger*, weighed 190 lbs., and was found in 1869 within 2 inches of the surface at Moliagul, north of the Dividing Range; while in the same year the next largest, *The Welcome*, weighing 183 lbs., was found at Ballarat south of the range, in a neglected hole 180 feet deep; and many others have been found in various localities from 2 to 74 lbs. weight.

Turning from mining to agriculture, we find Victoria occupying the very first rank in the cultivated products of the soil, although far inferior to New South Wales in wool and other pastoral products. Wheat is grown in such quantities as not only to support the population, but to leave a large surplus for export to other countries. In 1890 the wheat crop amounted to 11,495,000

bushels. Potatoes also are exported, and the surplus manufactured into starch and farina, the crop in 1890 amounting to 157,000 tons. More than 5,500,000 bushels of oats were grown, and nearly 2 million bushels of barley, with a small quantity of maize. Tobacco and wine are also largely manufactured.

Although (as already stated) the flocks and herds of the colony are far inferior numerically to those of New South Wales, yet this is only on account of its much smaller extent, for the proportionate numbers to area would be actually greater. In 1890 there were no less than 10,882,000 sheep and 1,394,000 horned cattle, while the total number of cattle, horses, pigs, and sheep was, in 1881, 10,737,000. In New South Wales at the same period the number was about 28,000,000, with an area about four times as large. Other important articles produced in Victoria for export are hides, leather, bones and bone-dust, preserved meats, tallow, bark, butter, cheese, soap, spirits, and wine.

Owing to a system of bonuses granted by the Government, and a heavy protective tariff, many manufactoryes have been established in Victoria, among which are numerous woollen mills, tanneries, breweries, saw-mills, with iron, brass, copper, and tin works.

The shipping is extensive, there being 129 steamers and 259 sailing vessels on the register; while the clearances amount to over 5700 vessels inwards and outwards per annum.

6. Roads, Railways, and Telegraphs.

With the exception of a few miles near the larger towns, there can hardly be said to be any good common roads in Victoria, though there are tracks and roadways

all over the country, along which coaches and other vehicles travel regularly. Some idea of these roads may be formed from Mr. Anthony Trollope's description of them. He says: "A Victorian coach, with six, or perhaps seven or eight horses, in the darkness of the night, making its way through a thickly-timbered forest at the rate of nine miles an hour, with the horses frequently up to their bellies in mud, with the wheels running in and out of holes four or five feet deep, is a phenomenon which I should like to have shown to some of the very neat mail-coach drivers whom I used to know at home in the old days. I am sure that no description would make any one of them believe that such feats of driving were possible. I feel that nothing short of seeing it would have made me believe it. . . . I made many such journeys, and never suffered any serious misfortune."

Railroads have in fact superseded the necessity for good main roads. These were commenced soon after the gold discoveries, and in June 1890 there were 2470 miles open for traffic. Most of these were made by the Government on a uniform gauge of 5 feet 3 inches, and all now belong to the State. Lines radiate in every direction from Melbourne, while a complete network covers the more populous mining districts. By the North-Eastern line to Wodonga, through railway communication is effected with Sydney, which can be reached from Melbourne in 19 hours. The Western line, through Ballarat and Ararat to Serviceton, on the extreme western frontier, is in connection with the South Australian system, and gives through communication with Adelaide. Other extreme points reached are Portland, Belfast, and Warrnambool, on the south-west coast; Swan Hill and Echuca, on the Murray River; Warracknabeal, Donald, and Wychproof, on the borders of the Wimmera district, and

eastward to Bairnsdale, on the Mitchell River, at the head of the Gipps Land Lakes. The fares are about 2d. a mile first class, 1½d. a mile second class. Coaches connect all the towns not on the line of rail with the nearest stations. Electric telegraphs have been extensively constructed, no less than 8241 miles of line being in operation in 1890; and there are 718 stations in different parts of the colony.

7. Government, Religion, Public Institutions, Education, etc.

The government of Victoria is similar in form to that of New South Wales, but is much more democratic, both Houses of Parliament being elective. The Legislative Council (or Upper House) consists of forty-eight members representing the fourteen provinces, whose tenure of office is ten years; the qualification of voters being freehold or leasehold property of £10 annual value. The Legislative Assembly (or Lower House) consists of ninety-five members elected for three years by manhood suffrage. All the voting is by ballot. Members of both Houses are paid £300 per annum each. The executive consists of the Governor and a ministry termed the Executive Council.

State aid to religion was abolished in Victoria in 1875, and all the churches are now self-supporting. Dividing the several churches into Church of England, Dissenters, and Roman Catholics, their proportionate numbers, as determined by official returns of the average attendance at their several places of worship during 1888, are as follows: Church of England, 60,600; Dissenters, 183,440; Roman Catholics, 73,000. Among the Dis-

senters the Presbyterians are the most numerous, having an average attendance of 73,000.

Education in Victoria is free, secular, and compulsory since January 1873. It is under a minister of education, in whom all school properties are vested. The number of schools in 1888 was 1933, besides 753 private schools. There are also six colleges and grammar schools, two ladies' colleges, and the Melbourne university, whose degrees and diplomas are equivalent to those of any similar institution in the United Kingdom. It has a Government endowment of £9000 a year. There are also 2190 Sunday schools in the colony, with an average attendance of 140,000 scholars. Government also grants £60,000 annually to hospitals, £25,000 to asylums, and £86,000 to lunatic asylums. The Botanical Gardens and Observatory of Melbourne are also public institutions supported by the general Government.

8. Political and Civil Divisions.

Victoria is divided into four districts, six provinces, and thirty-seven counties. The districts are—GIPPS LAND, THE MURRAY, WIMMERA, and LODDON. The provinces are the divisions which return the Legislative Council. They are named according to their position—North-Western, North-Eastern, Central, Southern, Eastern, and Western.

GIPPS LAND, named after one of the early Governors of Australia, occupies the south-eastern portion of the colony, and comprises about one-fifth of its whole area. Much of it on the north and east is unavailable for agricultural purposes from its rugged and mountainous character, though it contains considerable tracts of rich country and alluvial flats. It is for the most part

heavily timbered, and the expenses of clearing are very



RAILROAD THROUGH THE GIPPS LAND FOREST.

great. In the south and west portion much land is occupied for farming and cattle-grazing, Melbourne being

largely supplied with fat cattle from this part of the country. It has also great mineral resources, comprising gold, silver, copper, iron, lead, tin, coal, marble, and limestone. The climate and soil are well fitted for the growth of oranges, hops, tobacco, and opium. Gipps Land is a country of giant mountains, fine streams, and fertile plains. Much of the rugged country to the north and east is still unexplored, and is almost inaccessible from the precipices and ravines with which it abounds.

THE MURRAY DISTRICT is a vast tract of country lying in the north-east, watered by the Mitta-mitta, Kiewa, Ovens, Broken, and other rivers flowing northward from the Australian Alps. It is generally a mountainous and well-wooded country. It contains the celebrated gold-mines of the Ovens, Omeo, Buckland, and Wood's Point. To the north-east are extensive grassy plains, and there is also some good land on which wheat, tobacco, and vines are grown.

THE WIMMERA DISTRICT occupies the whole of the north-west of Victoria, covering an area of 25,000 square miles. It is almost exclusively pastoral, consisting of vast sandy plains, but poorly grassed, and intersected by belts of scrub and forest. In the north-west there are extensive swamps near the Murray River, and most of the rivers—the Wimmera, Ovens, Richardson, and others—are liable to dry up in hot seasons, or become mere chains of water-holes.

THE LODDON DISTRICT occupies the north central part of the colony to the east and west of the Loddon River. It is also chiefly pastoral, but contains some auriferous land towards the south.

The Counties, arranged in alphabetical order, are as follows; with their situation and area:—

1. ANGLESEA. Area, 1707 square miles. It is situated to the north-east of Melbourne, beyond the Dividing Range; it is traversed by the Upper Goulburn River.
2. BENAMBRA. Area, 2757 square miles. It is situated to the north-east, on the New South Wales boundary. It contains the sources of the Murray River.
3. BENDIGO. Area, 1970 square miles. It is situated to the N.N.W. of Melbourne, about midway between the Dividing Range and the Murray. It is traversed by the railway from Melbourne to Echuca.
4. BOGONG. Area, 3094 square miles. Situated in the Murray district west of Benambra; contains the termini of the North-Eastern Railway from Melbourne.
5. BORUNG. Area, 4292 square miles. Situated to the north of the Grampians in the Wimmera district.
6. BOURKE. Area, 1735 square miles. Situated north of Port Phillip Bay, and contains Melbourne, the chief city of the colony.
7. BULN-BULN. Area, 3595 square miles. Forms the southern extremity of the colony, and of the Australian continent.
8. CROAJINGOLONG. Area, 3050 square miles. Situated on the coast at the eastern point of the colony.
9. DALHOUSIE. Area, 1314 square miles. Situated immediately north of Melbourne, beyond the Dividing Range.
10. DARGO. Area, 1690 square miles. Situated south of the Australian Alps, and midway between Melbourne and the eastern point of the colony.
11. DELATITE. Area, 3238 square miles. Situated north-east of Melbourne, beyond the Australian Alps, and to the west of the Ovens River.
12. DUNDAS. Area, 2140 square miles. Situated to the west of the Grampians, between the Upper Glenelg and the Wannon Rivers.
13. EVELYN. Area, 1216 square miles. Occupies the valley of the Yarra-Yarra to the east of Melbourne.
14. FOLLETT. Area, 1108 square miles. Situated between the Glenelg River and the South Australian boundary.
15. GLADSTONE. Area, 1812 square miles. Situated in the Loddon district, north-west of Melbourne, between the Avoca and Loddon Rivers.
16. GRANT. Area, 1852 square miles. Situated on Port Phillip Bay, west of Melbourne.

17. GRENVILLE. Area, 1477 square miles. Situated to the west of Grant. Ballarat is at its northern extremity.
18. GUNBOWER. Area, 1357 square miles. Situated in the angles between the Loddon and the Murray Rivers to the north of Bendigo.
19. HAMPDEN. Area, 1580 square miles. Situated to the west of Grenville and south of Ripon counties.
20. HEYTESBURY. Area, 922 square miles. Situated on the coast to the south of Hampden.
21. KARA-KARA. Area, 2338 square miles. Situated to the north of the Pyrenees, and west of Gladstone county.
22. KARKAROOC. Area, 5900 square miles. In the Wimmera district, between Borung county and the Murray. Mostly covered with "mallee" scrub.
23. LOWAN. Area, 5033 square miles. In the Wimmera district, between Borung county and South Australia. Has much sandy desert and "mallee" scrub.
24. MILLEWA. Area, 3589 square miles. Forming the north-western corner of the colony. Mostly plains covered with scrub and occasional patches of pasture.
25. MOIRA. Area, 3136 square miles. Situated in the north of the Murray district, and west of Bogos and Delatite counties.
26. MORNINGTON. Area, 1700 square miles. Situated on the coast to the east of Port Phillip Bay.
27. NORMANBY. Area, 2013 square miles. Situated on the coast, and at the extreme west of the colony, bounded by the Glenelg and Wannon Rivers.
28. POLWARTH. Area, 1185 square miles. On the coast to the west of Grant county. Contains Cape Otway and Colac Lake.
29. RIPON. Area, 1771 square miles. Bounded on the north by the Pyrenees, and on the south by Hampden county.
30. RODNEY. Area, 1709 square miles. Situated due north of Melbourne, between the Goulburn and Campaspe Rivers, and reaching to the Murray at Echuca.
31. TATCHERA. Area, 3370 square miles. In the Wimmera district, between Loddon county and the Murray.
32. TALBOT. Area, 1645 square miles. Situated north-west of Melbourne, beyond the Dividing Range, and adjoining Bourke and Dalhousie counties.
33. TAMBO. Area, 2140 square miles. In Gipps Land, between the Australian Alps and the sea, and between Dargo county and the Snowy River.

34. TANJIL. Area, 2893 square miles. In Gipps Land, eastward of Melbourne, beyond Evelyn county, and just reaching the sea.
35. VILLIERS. Area, 1641 square miles. On the south-west coast, between Hampden and Normanby counties.
36. WEEAH. Area, 3968 square miles. Part of the Wimmera district, north of Lowan county, and quite unsettled. Consists almost wholly of sandhills, heath, and scrub.
37. WONNANGATTA. Area, 2243 square miles. Situated between the Australian Alps and the Dividing Range; very mountainous, and containing the sources of the Goulburn and Mitchell Rivers.

9. Cities and Towns.

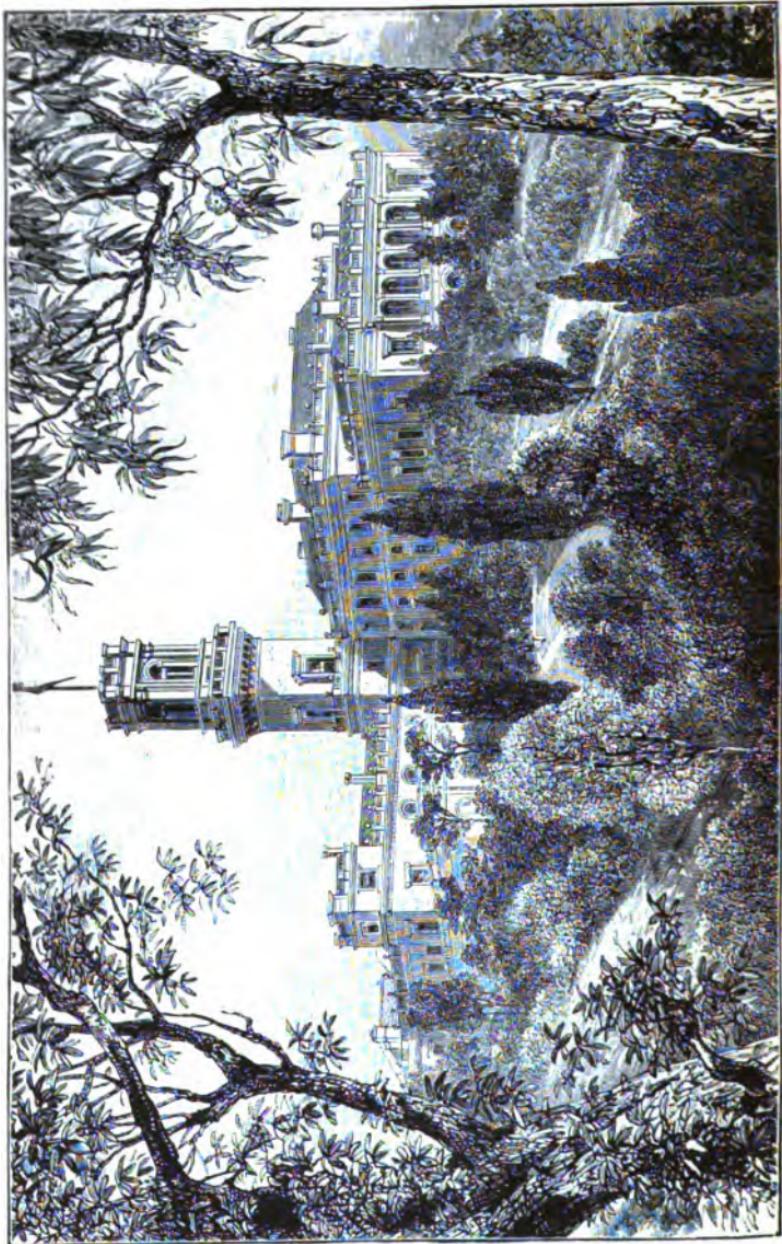
MELBOURNE, capital of the colony, has, in the course of fifty years, become a city of 76,000 inhabitants, or, with the suburbs within a ten-mile radius, about 460,000, thus already taking rank in the ninth place amongst the cities of the British Empire, while in other respects unquestionably one of the best-built and finest in the world. It stands on seven hills, rising gradually from the Yarra-Yarra, and is laid out in broad streets intersecting each other at right angles. It has a number of public squares, gardens, and parks, including the Botanic, Fitzroy, and Carlton Gardens; the Royal, South, and Prince's Parks; Argyll, Lincoln, and other squares. The buildings are massive, and often built at great expense, while many of the warehouses will compare favourably with the best in London. Amongst the noteworthy buildings are the Treasury, the Post-Office, the Library, and the Mint, besides the Town-hall, the University, the Houses of Parliament, and others. The University receives from the State an annual grant of £9000, and each professor a salary of £1000, with a free residence. There are at present 120 matriculated students, and its degrees rank on the same level with those of the English Universities. It has an excellent museum. Melbourne supports four theatres, and during the last few years nearly all the handicrafts which contribute to the comfort and refinement of civilised existence have here taken root. Melbourne stands high for the support it gives to literature and science. It has a Free Library containing about 110,000 volumes; an Observatory fitted up with the best instruments, among which is one of the largest and most perfect reflecting

telescopes in the world ; and Botanical Gardens which are extensive and beautiful, and which contain one of the richest collections of



HOUSES OF PARLIAMENT, MELBOURNE.

Australian and exotic plants ever brought together. The Public Library is a noble institution, being open free to all comers from ten in the morning till ten at night, six days a week ; and we have



GOVERNMENT HOUSE, MELBOURNE.

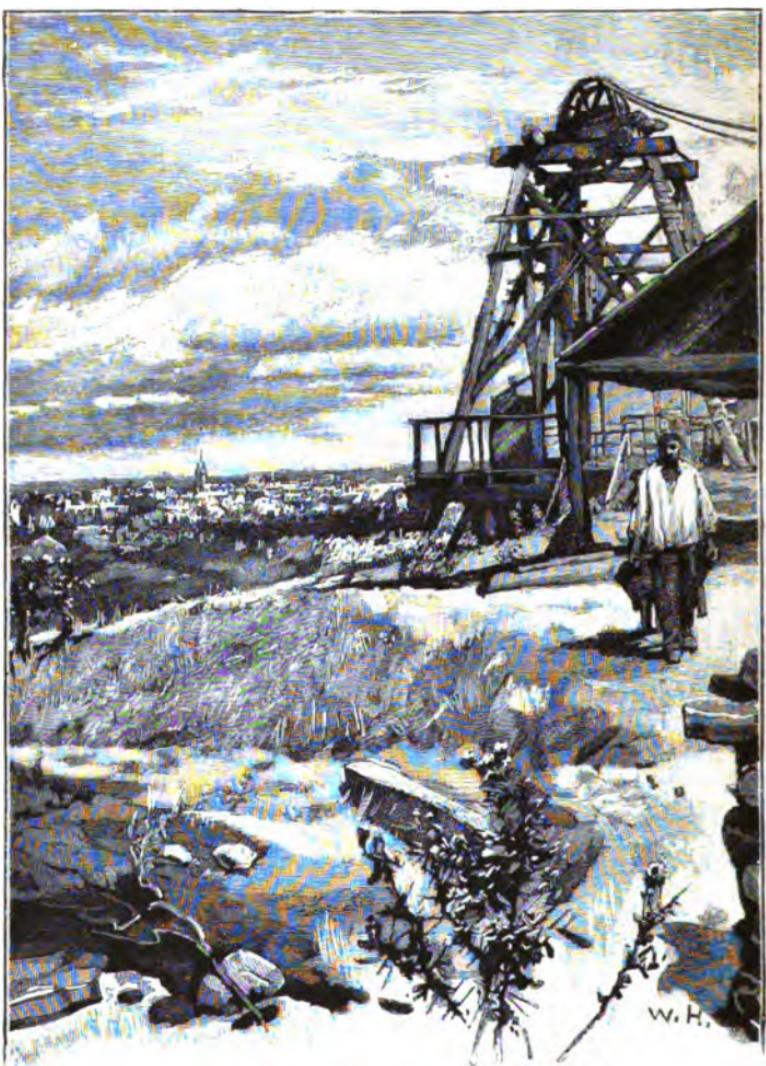
Mr. Trollope's testimony that any book required can be had without trouble or delay. The water-supply of this great city is one of the most ample in the world. The valley of the Plenty (a tributary of the Yarra-Yarra) is dammed up at Yan-Yean, about 20 miles N.N.E. of Melbourne, by an embankment more than half a mile long, forming a lake 9 miles in circumference, with an area of 1330 acres, and a maximum depth of 25 feet. It holds 6400 million gallons of water, and is capable of supplying the city for more than two years at the rate of 30 gallons per head per day for 200,000 persons. The water is conveyed by a double set of immense pipes, with safety-valves at intervals to limit the pressure. The total cost of the works, with maintenance to June 1876, was £1,388,564.

BALLARAT, the great gold-field city, ranks next to Melbourne in importance and population. It is situated in Grenville county, 104 miles W.N.W. of Melbourne, on the southern side of the Dividing Range, and at an elevation of 1437 feet above the sea. It has (1881) 38,469 inhabitants, of whom 433 are Chinese. It is a spacious and well-built town, and though only thirty-five years old possesses most of the advantages and institutions of great cities. It has schools, hospitals, free libraries, and public gardens, and it is situated in a fine undulating country. In addition to the gold mines which created and still largely support the town, the district around Ballarat is well suited for agriculture, wheat, barley, oats, and potatoes being extensively grown; while the pastures are so excellent that the wool produced in the neighbourhood commands the very highest price in the market.

Two other towns in Victoria have populations of above 20,000 -- Sandhurst and Geelong.

SANDHURST, formerly called BENDIGO, is situated in Bendigo county, and on the Bendigo Creek, 758 feet above the sea-level, 100 miles N.N.W. of Melbourne, on the line of railway to Echuca. It is now the greatest mining centre in the colony, and has a population of about 28,000 persons. Although still bearing traces of its origin as a mining settlement, it has many fine buildings, as well as parks and botanical gardens; but in general appearance and situation, as well as in population, it is very inferior to Ballarat. The Sandhurst district gives employment to 6700 miners. There are said to be more than 600 distinct gold-bearing quartz reefs. The yield of gold is between four and five hundred thousand pounds worth annually.

GEELONG, situated on the west side of Port Phillip Bay, and



BALLARAT FROM BLACK HILL.

45 miles south-west of Melbourne, in the county of Grant, is an important seaport, and a comparatively old town, with 21,157 inhabitants. The first woollen mill was established here, and there are now several such mills manufacturing cloth, tweeds, and various kinds of woollen fabrics. There are also meat-preserving works and extensive tanneries. The town is pleasantly situated, and is well laid out on ground sloping to the bay and the Barwon River. Its Mechanics' Institute has a library of over 11,000 volumes, and it possesses two parks and a botanical garden. There are four jetties, alongside which the largest ships can load and discharge.

The following is a list of the remaining towns and places with populations of 1000 and upwards, with a brief indication of their position, and of any matters of special interest pertaining to them :—

ALLENDALE, a small town in the county of Talbot, 90 miles north-west of Melbourne on the Daylesford Railway. The population is about 1500.

ARARAT, in the county of Ripon, close to the Pyrenees Mountains, and near the source of the Hopkins River, 157 miles north-west of Melbourne, and 1028 feet above the level of the sea. The district is equally celebrated for mining and agriculture, and there are also great supplies of timber, which is sent widely over the colony. There are many vineyards in the neighbourhood, producing excellent wine. Ararat is the commercial centre of the great grain- and wool-producing district of the north-west, and there are also many profitable gold-mines, covering an area of about 50 square miles. The population of the town is 3500.

AVOCAS, an agricultural and mining town and railway station, in the county of Gladstone, 127 miles north-west from Melbourne, and nearly 800 feet above the sea. It is situated near the source of the Avoca River and the Pyrenees Mountains, where slate of excellent quality has been found, and is being extensively worked. Population, 1100.

BAIRNSDALE, a town and railway terminus on the Mitchell River, in the county of Tanjil, 171 miles east of Melbourne. Hops are largely grown in the vicinity, and the country around is both pastoral and mineral. Population about 3000.

BEAUFORT, a mining town and railway station (formerly Fiery

Creek Diggings), in the county of Ripon, 102 miles W.N.W. of Sydney, and 1272 feet above the sea. The romantic Fern Tree Gully on Mount Cole is celebrated for its beauty, and there is much picturesque mountain scenery in the neighbourhood. Population about 1000.

BEECHWORTH, in the county of Bogong, 185 miles north-east of Melbourne, and about 25 miles from the Murray River, is the principal town of the celebrated Ovens gold district, and has about 2400 inhabitants. It is 1725 feet above the sea-level, and has a branch railway from the North-Eastern line. There is a large mining population, and the district around is a rich one both for agriculture and fruit-growing.

BENALLA, in the county of Delatite, on the Broken River, 122 miles north-east of Melbourne, and 560 feet above the sea. It is in an important agricultural and pastoral district, well suited for growing grain and fruits, including vines. The population is about 3000.

BUNINYONG, a mining and agricultural town in the county of Grant, 96 miles west by north from Melbourne, and 1470 feet above the sea. There is both alluvial and quartz mining in the vicinity, and a large area of ground is under cultivation. Population about 1500.

CAMPERDOWN is the chief town of the county of Hampden, 120 miles W.S.W. from Melbourne and 75 from Geelong. The district around is mostly pastoral. The population is about 2000.

CARISBROOK, a town and railway station in Talbot county, 107 miles north-west of Melbourne, and 635 feet above the sea. The district is agricultural, and much alluvial mining is carried on. Population about 1500.

CASTLEMAINE, a considerable town in the county of Talbot, $77\frac{1}{2}$ miles N.N.W. of Melbourne, and 920 feet above the level of the sea. This was one of the earliest mining districts in Victoria, and a large number of miners are still employed here. Slate and flagstones are also worked here, and there is a large amount of agriculture, as well as vine- and fruit-culture, in the vicinity. The population of the town is about 6500.

CHARLTON, a small town and railway station in the county of Gladstone, 173 miles N.N.W. of Melbourne, on the Avoca River. It is in a good wheat-growing district, and supports several flour-mills and other factories. Population, 1500.

CHILTERN, in Bogong county, 180 miles north-east of Melbourne, on the North-Eastern Railway, and 690 feet above the sea. It is

in an agricultural and pastoral district, producing large quantities of wheat and oats. Population about 1250.

CLUNES, a town and railway station in the county of Talbot, 123 miles north-west of Melbourne, and 1080 feet above sea-level. There is much quartz-mining in the vicinity, giving employment to a large number of miners. Population about 3500.

COLAC, a town and railway station in the county of Polwarth, 95 miles south-west of Sydney, and 436 feet above the sea-level. It is situated on Lake Colac, on the banks of which there is a well-kept botanic garden. The lake is stocked with English perch and carp, and there are also abundance of wild fowl. The country round is agricultural, but coal, iron, and limestone exist in the vicinity. Population about 3300.

COLERAIN, a small town and railway station in the county of Dundas, 247 miles west of Melbourne. There is a large agricultural population in the district, and the situation of the town is picturesque, being surrounded with hills of volcanic origin. Population about 1000.

CRESWICK, in the county of Talbot, 109 miles north-west of Melbourne and 11 from Ballarat, is an important gold-fields town, with over 3000 inhabitants. The district is also agricultural, producing wheat, potatoes, and wine.

DANDEENONG, a small but pretty town 18 miles south-east of Melbourne, on the railway to Gipps Land. It has good agricultural land and an excellent market. There is a state forest close by and much fine mountain scenery, while the celebrated Fern Tree Gully, 9 miles distant, attracts many visitors. Population about 1000.

DAYLESFORD, in the county of Talbot, 76 miles north-west of Melbourne, is situated on the Wombat Creek, near the source of the Loddon River, and has about 4000 inhabitants. Mining, both alluvial and quartz, is the principal business of the people; but there is also a considerable quantity of land in cultivation. The town is 2040 feet above sea-level.

DONALD, a small town in Kara-Kara county, 182 miles north-west of Melbourne, and the terminus of the railway through Castlemaine and Maryborough. It is situated in a fine farming district. Population about 1000.

DUNOLLY, in the county of Gladstone, 107 miles north-west of Melbourne, and 630 feet above sea-level. It is in a gold-field which produced one of the largest nuggets in the world, weighing 2280 ounces. It is also the centre of a large agricultural district. The population is about 1400.

EAGLEHAWK, in Bendigo county, only 4½ miles from Sandhurst and 105 from Melbourne, is a mining town situated in a hilly district, abounding in quartz lodes. The population is about 7400, and it has a handsome park. The gold mines are very productive, and the prosperity of the town almost wholly depends on them.

ECHUCA, in the county of Rodney, is a border town on the Murray River, 166 miles north of Melbourne, and the terminus of the Murray Railway. The district is pastoral and agricultural. There are extensive vineyards and many saw-mills; and as a port for the navigation of the Murray and its branches the town is of great importance, so that Echuca is sometimes called the Chicago of Australia. The population of the town is nearly 5000.

GORDON, a small mining town 17 miles from Melbourne on the road to Ballarat. It is about 1880 feet above the sea, and is in a good agricultural district. Population about 1000.

HAMILTON, in the counties of Dundas and Normanby, 219 miles west of Melbourne, is the chief town of the western district, and is 576 feet above the sea. It is connected with Melbourne by railway via Ararat, and is the centre from which coaches proceed to all the chief places in the west. It has two important colleges. The district is pastoral and agricultural, and exhibitions of stock and produce are held twice a year. The population is about 3000.

HEATHCOTE, in the county of Dalhousie, 70 miles north of Melbourne and 30 east of Sandhurst, is situated in the centre of the M'Ivor gold-field, and has about 1200 inhabitants. It is prettily situated on a valley at the foot of Mount Ida, and is wholly dependent on the surrounding gold mines.

HORSHAM, a town and railway station in the county of Borung, 230 miles W.N.W. of Melbourne, and situated on the Wimmera River. It is surrounded by a good agricultural district. In the Grampians, 30 miles distant, extensive water storages are being formed for the irrigation of a portion of the Wimmera district. Population about 3000.

INDIGO, a small mining town in the county of Bogong, 187 miles north-east of Melbourne. Population about 1000.

INGLEWOOD, in the county of Gladstone, 128 miles N.N.W. of Melbourne and 28 from Sandhurst, is a mining town of about 1200 inhabitants.

KERANG, a small agricultural town in the county of Gunnedow, 179 miles N.N.W. of Melbourne. Irrigation trusts are

being formed to render farmers independent of the scanty rainfall. Population about 1100.

KILMORE, in the county of Dalhousie, 39½ miles north of Melbourne, on the North-Eastern Railway, has a population of about 1100. The district is agricultural, the land being volcanic and very fertile, so as to produce large crops of wheat.

KOROIT, in Villiers county, 200 miles south-west from Melbourne and 12 miles from Belfast, is in an agricultural district, and has a population of about 1700.

KYNETON, in the county of Dalhousie, 52 miles north-west of Melbourne and 1750 feet above the sea-level, is an important agricultural and mining town, with a population of nearly 3500. It is situated on the river Campaspe, and has several manufactories of implements and coaches. The district produces a large quantity of wheat and potatoes. The mining, though tolerably extensive, is less important than the agriculture.

MAJORCA, a town in the county of Maryborough, 112 miles north-west of Melbourne. Alluvial gold-mining is the chief industry. Population about 2000.

MALDON, in the county of Talbot, 84½ miles N.N.W. of Melbourne, is an important mining and agricultural town, with about 3000 inhabitants. It is situated on the Tarrangower Creek, about 12 miles from Castlemaine. The surrounding quartz reefs are extensive and rich, supporting over 600 miners; and nearly 7000 acres of wheat are grown, besides other crops.

MALMESBURY, in Talbot county, 63 miles north by west of Melbourne on the road to Castlemaine, is an agricultural town of about 1400 inhabitants, with some alluvial and quartz mines in the neighbourhood.

MARYBOROUGH, an important railway, mining, and agricultural centre, in the county of Talbot, 112 miles north-west of Melbourne. There are many factories and extensive railway workshops. There are several public parks and a fine botanical garden. Population about 5000.

MILDURA, a small town on the Murray River, in the county of Karkaroc, 340 miles north-west of Melbourne. It is the centre of the irrigation colony now forming, on which a quarter of a million has already been spent. Population about 1600.

MOUNT BLACKWOOD (locally known as REDHILL) is a small town 54 miles W.N.W. of Melbourne, on the river Lerderderg, in the county of Burke. The chief industry is quartz-mining. Population about 1000.

NHILL, a small town in the county of Lowan, 248 miles west of Melbourne on the railway to the South Australian border. It is in one of the best agricultural districts of the Wimmera. Population about 1500.

NUMURKAH, a small town in the county of Moira, 133 miles north of Melbourne, and 350 feet above the sea. It is a station on the Goulburn Valley Railway, and is in a good pastoral and agricultural district. Population about 1000.

PORT FAIRY (formerly BELFAST), in the county of Villiers, is a seaport at the mouth of the river Moyne, 168 miles W.S.W. of Melbourne. It is surrounded by a good agricultural district, and has a large trade in wool and other produce from the surrounding country and the interior. As a watering-place it now attracts many visitors. It has good botanical gardens, and 9 miles to the north-east is the remarkable volcanic mountain called Tower Hill, which stands in a lake, and has a perfect extinct crater. Population about 1900.

PORTLAND, the chief town of the county of Normanby, a seaport town on Portland Bay, 225 miles west of Melbourne, and having, like its English namesake, a fine breakwater (now in course of construction). The surrounding country is agricultural and very rich. Its chief exports are cattle, wool, butter, and corn. Portland is the oldest town in the colony, having been founded in 1834. Population about 2000.

QUEENSCLIFF, in the county of Grant, is situated at the entrance of Port Phillip Bay, 32 miles south of Melbourne. It stands on a small peninsula, and is a pilot station and watering-place. Population about 2000.

ST. ARNAUD, a town and railway station in the county of Kara-Kara, 158 miles north-west of Melbourne and 784 feet above sea-level. It is situated in a mining, pastoral, and agricultural district, well adapted for wheat and also for grapes, oranges, and other fruits, the climate being warm and the soil fertile. Population about 3000.

SALE, in the county of Tanjil, is the chief town of Gipps Land. It is situated on the Thompson River, 140 miles E.S.E. of Melbourne, and has a population of about 5000. The district is pastoral, agricultural, and mining. Hops are largely cultivated.

SEBASTOPOL, in the county of Grenville, 99 miles from Melbourne and 3 from Ballarat, is a mining town of 2300 inhabitants.

SHEPPARTON, a town and railway station in the county of

Moira, on the Goulburn River, 113 miles north-east of Melbourne. It is in a central position in the fine agricultural district of Goulburn Valley, where a large quantity of wheat is grown. Population about 4500.

STAWELL, in Borung county, 177 miles north-west from Melbourne, is an important station on the Geelong, Ballarat, and Ararat Railway, from which latter town it is 18 miles distant. It is the centre of the rich Pleasant Creek gold-field. It contains the deepest and richest mines in the colony, the Newington mine being 1940 feet deep. There is also a large agricultural population, and wheat and oats are largely produced. The population is under 5000.

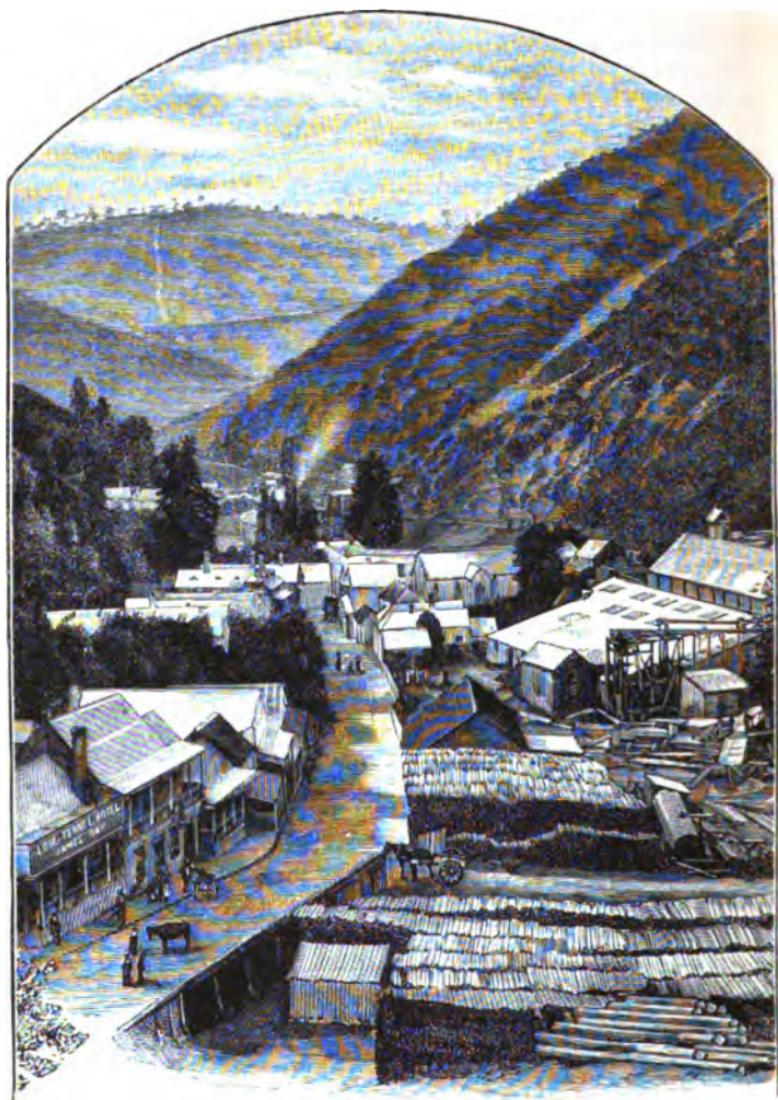
TALBOT, in the county of Talbot, 130 miles north-west from Melbourne on the Back Creek and the railway from Ballarat to Dunolly, is an important mining and agricultural town of over 1700 inhabitants. There are extensive alluvial workings and some quartz reefs, and more than 6000 acres of land are under cultivation. The town contains flour mills, soap and candle factories, and is lighted with gas. It has also a large State school called the Prince Alfred, and a Free Library.

WALHALLA, in the county of Tanjil, 129 miles east of Melbourne, in a valley enclosed by steep hills, is a mining town of about 1000 inhabitants. The reefs here are very rich, one company, "The Long Tunnel," having paid £300,000 in dividends during eight or nine years; and this is only one of many successful companies.

WANGARATTA, in Bogong county, 159 miles north-east from Melbourne at the junction of the Ovens and King Rivers, is an agricultural town with nearly 2000 inhabitants. Besides grain, grapes, oranges, and tobacco are largely cultivated, and there are several large sheep and cattle stations.

WARRENBAMBOOL, in the county of Villiers, is a seaport town of between 5000 and 6000 inhabitants, 170 miles south-west of Melbourne. It has a good harbour, and does a large trade in wool, grain, and dairy produce. The surrounding country is richly agricultural and pastoral, and bacon is largely exported. It contains public parks and botanical gardens, an art gallery, a museum, and fine baths luxuriously fitted up, having shower and swimming baths, with hot or cold, fresh or salt water.

WEDDERBURN, a mining and agricultural town in the county of Gladstone, 151 miles N.N.W. of Melbourne, and 650 feet above sea-level. There is good quartz-mining here, and the country



GENERAL VIEW OF WALHALLA.

around is good for wheat-growing, and also for vines and fruit. Population about 1100.

WOODEND, in the county of Dalhousie, 49 miles from Melbourne on the Castlemaine road and railway, and just over the Dividing Range, at an elevation of 1840 feet above the sea, is an agricultural town of 1200 inhabitants. Mount Macedon and the celebrated "Hanging Rock" are in the vicinity.

YARRAWONGA, a town on the banks of the Murray, in the county of Moira, 161 miles north-east of Melbourne, and 420 feet above sea-level. It is the termination of the branch railway from Benalla, and is surrounded by good pastoral and agricultural land, suitable also for vines and fruit. Population about 1000, but increasing.

CHAPTER X

THE COLONY OF SOUTH AUSTRALIA

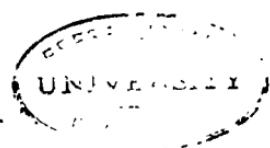
1. Origin, Geographical Limits, and Area.

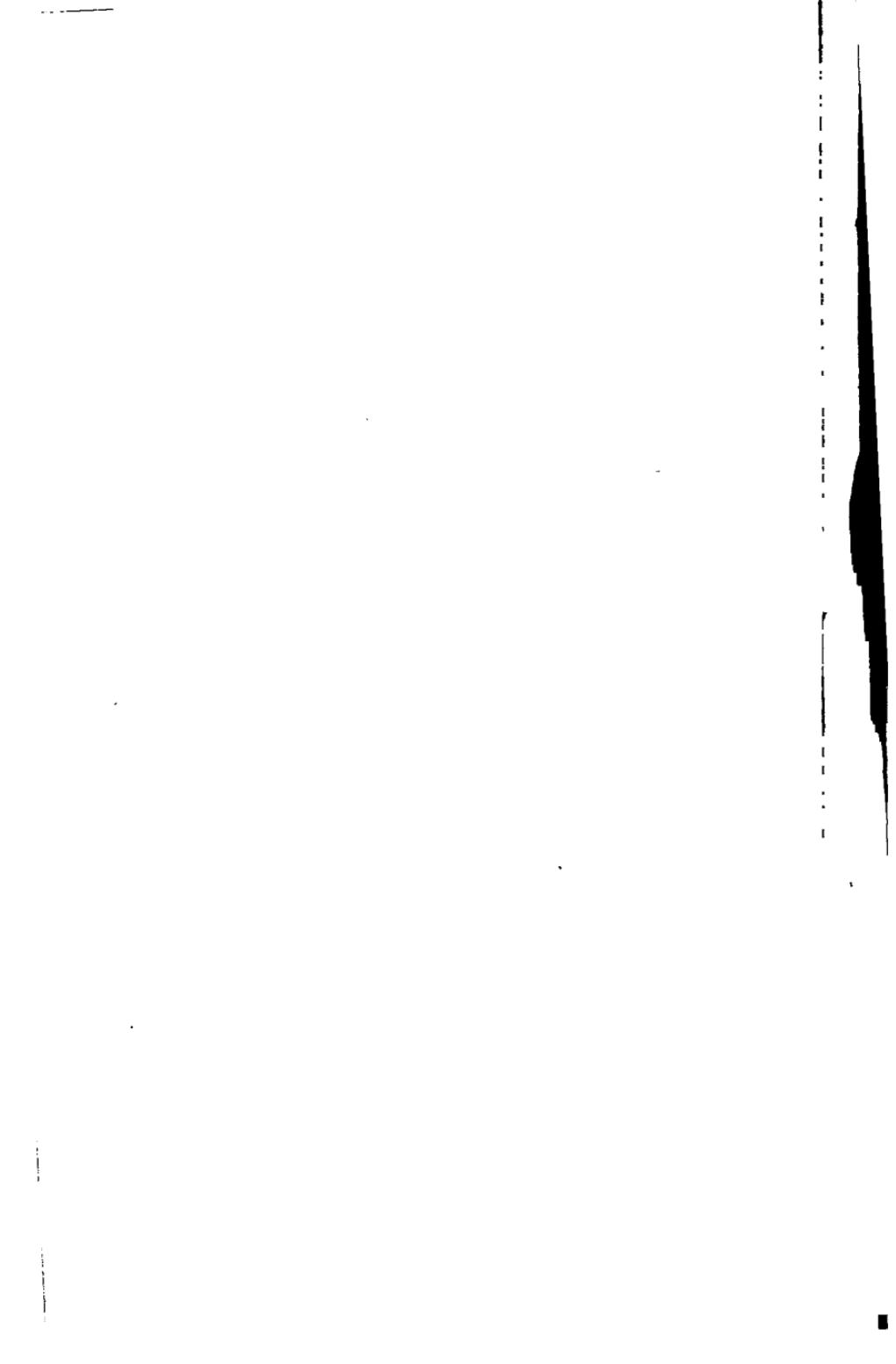
SOUTH AUSTRALIA was established as a separate colony in 1834, at which time the name was appropriate, the only other colonies on the continent being New South Wales and Western Australia. Now that Victoria has been separated and South Australia has been extended to the northern coast the old name is somewhat misleading.

The colony now includes the entire central division of Australia, extending from the south to the north coasts, and from the meridian of 129° E. longitude on the west side to 141° on the east in the southern, and 138° in the northern, half. It is bounded on the west by Western Australia; on the east by Victoria, New South Wales, and Queensland; on the north by the Arafura Sea, and on the south by the Southern Ocean. It thus has an extreme length of nearly 2000 miles by a width of 700, and contains 903,690 square miles. Of this enormous area little more than one-tenth is settled, though many fertile spots in the far interior are now being occupied by pioneer squatters.

2. Physical Features.

South Australia has no such well-marked and easily





described physical features as the eastern colonies. It has no great mountain range dividing up the country into distinct regions, no great system of river valleys, and no striking geological contrasts of ancient and recent deposits. Yet it is sufficiently diversified in its outlines, having magnificent plains of fertile land, mountain ranges well wooded with giant Eucalyptus, lovely valleys, and arid plains, timberless, waterless, and desolate, yet often teeming with metallic wealth beneath the surface. The character of the interior has already been sufficiently indicated in our account of Australian exploration; we will therefore here confine ourselves to a sketch of the more prominent physical features of the three great divisions of the country—(1) the old colony of South Australia, or rather the settled southern portion of it, (2) the great central desert area, and (3) the tropical Northern Territory.

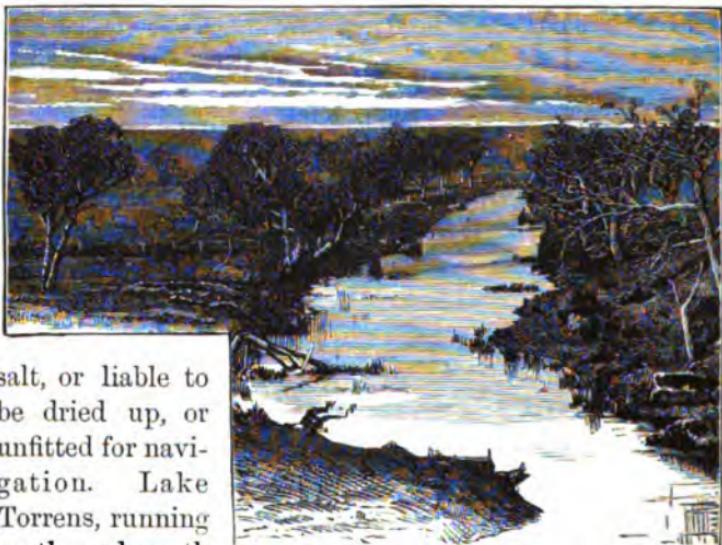
(1) South Australia Proper.

The old colony of South Australia is generally flat, as compared with Victoria or New South Wales. A range of mountains of no great height commences at Cape Jervis on the eastern extremity of St. Vincent's Gulf, and extends northward at the back of Adelaide to the Lake Torrens country. It is called the Lofty Range near Adelaide, farther on the Barossa, the Belvidere, the Bryan, and the Flinders Ranges. The highest point does not much exceed 3000 feet. In the southern portion of the colony are Mount Gambier and other extinct volcanoes, while in the unsettled country in the northern part of Eyre's Peninsula are the rugged Gawler Ranges, about 2000 feet high.

With the exception of the Murray, which runs across

the southern portion of the colony, there are no rivers of importance in South Australia ; the Gawler, Torrens, and other streams that flow into St. Vincent's Gulf being very insignificant, and almost or quite dry for a large portion of the year.

None of the Australian colonies have so many large lakes as South Australia ; but, unfortunately, none of these seem calculated to benefit the country, being either



CURRENCY CREEK, LAKE ALEXANDRINA,
ON THE RIVER MURRAY.

salt, or liable to be dried up, or unfitted for navigation. Lake Torrens, running north and south in a line with Spencer's Gulf, with which it is almost connected by a chain of small lakes, is 130 miles long, and for the greater part of its length 20 miles wide, yet sometimes the water almost entirely disappears and it becomes a huge muddy swamp. Lake Gairdner, about 100 miles to the south-west, is about 100 miles long by 40 wide, with prolongations towards the north-west, and numerous small lakes

between it and Lake Torrens. It is about 360 feet above the sea-level, and is a permanent salt lake surrounded by desert country. About 60 miles north of Lake Torrens are the large irregular Lake Eyre and a cluster of smaller lakes, which are also salt and liable to become changed into plains of saline mud, as is the still more extensive Lake Amadeus, a little west of the centre of the continent. Lake Alexandrina, forming the mouth of the Murray, is fresh, but by dispersing the waters of that large river it renders its entrance from the ocean unnavigable. The only lakes associated with picturesque scenery and fertile country are those of the Mount Gambier region, in the extreme south of the colony, which are situated in the craters of extinct volcanoes. One of these—the “Blue Lake”—is of an oval shape, surrounded by precipitous walls several hundred feet high, and covered with verdure. It is 240 feet deep, and the water is of a fine blue colour.

Although without any very prominent features, South Australia contains a great variety of soils and scenery. Extensive plains, comprising many millions of acres of arable land, for the most part free from timber, extend from 20 miles south of Adelaide to beyond Mount Remarkable, about 170 miles north of the city. These plains are bounded on the eastern side by the mountain chain already described. Beyond this range, to the east and north-east, the country is broken and hilly, with much timber, and a large extent of very rich land. The valley of the Murray, itself from half a mile to a mile wide, bounded by cliffs of recent shell-limestone, is a rich alluvial deposit covered in places with large gum-trees; but between this valley and the eastern boundary of the colony (as well as for some distance on the west) extend vast waterless scrubs such as have already been

described, till, farther south, we come to the rich agricultural and pastoral district of Mount Gambier. Much of the scenery of South Australia is park-like and beautiful, with alternations of hill and valley presenting every variety of landscape; but large areas are sterile and uninviting, and apparently doomed to perpetual aridity and barrenness. Yet much of the scrub land is found to be well adapted for growing wheat, and considerable tracts, once thought to be wholly unsuited to agriculture, are now returning abundant harvests.



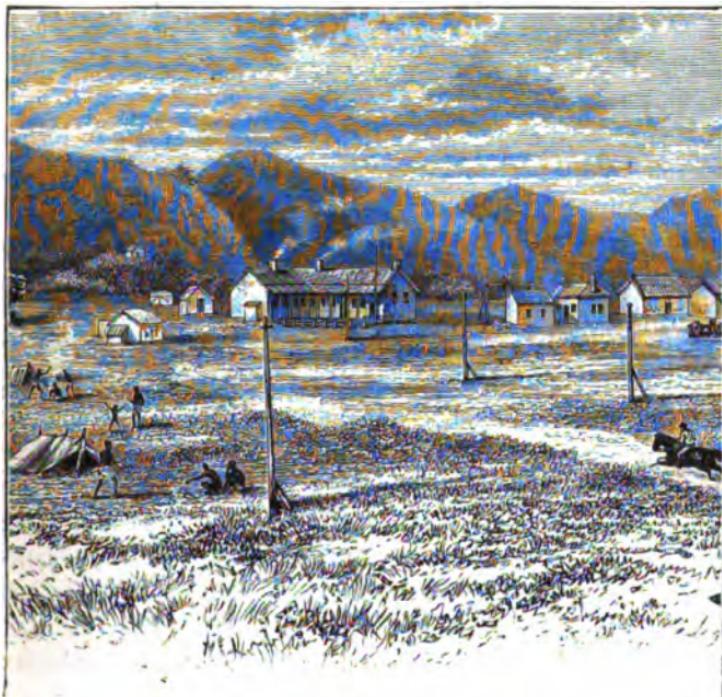
A MOUNTAIN PASS IN THE FLINDERS RANGE, 20 MILES FROM BELTANA.

(2) Central Australia.

Some idea of this great region has been given in the chapter on the Exploration of Australia, but now that a few settlers have established themselves on or near the

line of the overland telegraph we are able to give a more accurate account of it.

Beginning at Beltana, just beyond the boundary of the most northerly county in South Australia proper, the country for 270 miles to the Peake Station is barren and stony, being often thickly strewn with fragments of brown ironstone and gypsum, while in the latter



PEAKE OVERLAND TELEGRAPH STATION.

portion of the route, after passing the southern extremity of Lake Eyre, are many of the curious mound-springs already described. At Peake Creek there is a cattle station, and although the country looks exceedingly stony and barren the cattle are said to thrive.

For the next 200 miles, to Charlotte Waters Station, the country is with a few exceptions absolutely barren and the picture of desolation, there being only two creeks where there is some good herbage. Leaving Charlotte Waters, we have nearly 200 miles of tolerably good country watered by the Finke River and its tributaries the Hugh and the Palmer, rising in the James and Macdonnell Ranges. Here there is generally abundance of running water, with good water-holes at all times, and plenty of timber, scrub, and grass. The Macdonnell Ranges contain much fine country well suited to sheep and cattle, but at present they are too remote to be occupied. Passing on we come to Alice Springs Station, in a country abounding in huge granite boulders and deep narrow ravines bounded by perpendicular rocks. The road then rises till it reaches the Macdonnell table-land, 2000 feet above the sea. The next 130 miles takes us to Central Mount Stuart, through a generally dry country with a few small creeks and water-holes, alternately grassy and barren with considerable tracts of spinifex grass. About 100 miles farther over similar variable country brings us to Sutherland Creek, where the herbage is so injurious to sheep that thousands have been poisoned during exploration and telegraph construction, and Mr. J. A. Giles states that their skeletons are lying along the road for several miles. For the next 150 miles the country is poor and arid, and spinifex prevails over a considerable proportion of it, till we come to the Ashburton Range, where there is more water and good grass, especially in the Newcastle valley.

After leaving this stream about 7 miles we reach Sturt's Plain, which extends in a perfect level for 17 miles, bare black earth subject to inundation and extending westward to the horizon. On the east, at a distance

of 6 miles, there is wood and presumably a better country. We then come to Frew's Pond, a circular basin about 300 yards in diameter, with a maximum depth of 20 feet. In the dry season the water diminishes and becomes undrinkable, owing to thousands of divers, cormorants, and other aquatic birds that frequent it, indicating that at that season it is the only water for a considerable distance round. Immediately round the pond is a thick turf of fine grass, while to the west still extends the barren flat subject to inundation. The next 50 miles, to Daly Waters, is across an arid country partly forest partly scrub, but with no permanent water, though at distances of 12 or 14 miles there are ponds or water-holes the greater part of the year. From Daly Waters we follow the wide open valley of the Birdum Creek for near 100 miles, all subject to inundation but with no permanent water in the dry season. Twenty-five miles farther across dry, undulating, woody country brings us to the Warlock Ponds in the Elsie valley, one of the tributaries of the Roper. Here there is permanent water, and the Elsie, a few miles down, is a strong permanently flowing stream. Twelve miles farther is the Bitter Spring, close to the Roper River. This is a powerful stream, an immense volume of slightly bitter water pouring from under a limestone rock and flowing through a narrow rocky channel to the Roper River.

We have now reached the natural boundary between Central and North Australia. Throughout the whole long route from Beltana the vegetation has had one general character, Eucalyptus and Acacia being everywhere the common trees, with occasional Casuarina and Murray pines (*Callitris*). But from the Roper valley onward we have screw-pines (*Pandanus*) and palms appearing in suitable places, giving a distinct and tropical

character to the vegetation. It is clear from the preceding description (condensed from a paper on Central Australia by Mr. J. A. Giles, said to be one of the best authorities) that Central Australia is in great part desert and uninhabitable, with the exception of the country about the Macdonnell and James Ranges, and probably also in the Reynolds Range to the north-west, and the Hart Hills to the east. Here there is evidently a considerable tract of fertile country, with abundance of water and a fine climate, being for the most part 2000 feet above the sea-level. Elsewhere there is a general scarcity of water, except in a few spots, while there are wide tracts 20 or 30 miles at a stretch of the dreaded spinifex, of stony desert, or of plains subject to inundation. Still, whenever, as in the district of the mound-springs, artesian wells can be formed by which water can be brought up to the surface, very unpromising land can often be advantageously occupied.

(3) The Tropical Northern Territory.

From the Roper River, flowing eastward into the Gulf of Carpentaria, and the Victoria River, flowing westward into Queen's Channel, as its southern boundaries we have a tract of country containing about 100,000 square miles, and constituting the most valuable portion of the Northern Territory. This region, nearly corresponding with Arnhem Land of the older maps, is characterised by an abundant rainfall, and by a considerable number of permanent streams and rivers, many of which are navigable for some hundreds of miles inland. Thus the Roper is navigable for 100 miles by large vessels; the Adelaide and the South and East Alligator Rivers are navigable from 30 to 50 miles; the Katharine River, where it is crossed by the

telegraph line, is a fine stream, which even in the driest season is 150 feet wide and 3 or 4 feet deep, and it flows into the Daly, which has been ascended for 100 miles by large boats; and the Victoria River has been navigated about the same distance. But though there is thus plenty of water, the country has not the luxuriant vegetation of Eastern Queensland, except in some of the valleys, the uplands being open grassy country with the usual Australian vegetation. There are also considerable tracts on the higher plateaus which are covered with spinifex and thus preserve the character of the central deserts even in this tropical region. Much of the country between the river valleys is very rugged, and so cut up by ravines bounded by rocky walls as to be almost impassable. The higher table-lands, usually of no great extent, are about 500 feet, and the mountain summits about 1000 feet above the sea-level, though they are usually stated to be much higher, the rugged and precipitous character of the surface being misleading.

Geologically the country consists of a large area of crystalline Palæozoic rocks in the north-west, extending from near the coast to the valley of the Katharine River, while to the south-east, and also to the north and west, are areas of Mesozoic or Tertiary sandstones. There are also smaller areas of granite, trap, and Tertiary volcanic rocks. North of the Katharine River limestone occurs, which is stated by Mr. Giles to be "piled up in the most singular manner, forming pillars, arches, and passages," while the whole limestone country is full of caves. Near the Victoria River, and towards the sources of the Daly River, is Tower Hill, the counterpart of Chambers's Pillar in Central Australia, since it is described as being "an exact round tower, nearly 40 feet high, standing by itself on the top of a mountain."

On the whole, we see that this Northern Territory has unmistakably Australian characteristics in its forms of vegetation, its precipitous hills and ravines, and its arid table-lands, only slightly modified by its tropical position and more abundant rainfall during the wet season.

3. Climate, Natural History, and Geology.

Although so far south, and therefore farther from the tropics and geographically more temperate than New South Wales, yet South Australia is very hot, and perhaps suffers more from excessive heat and drought during the summer months than any of the other colonies. This is, no doubt, largely due to the absence of a lofty mountain range to cut off the hot winds from the interior—the South Australian range having a north and south direction—and also to its coast being concave instead of convex, and, therefore, less open to the cool sea-breezes from the south and south-east. December, January, and February are very trying months, the thermometer often rising at Adelaide to 110° or 115° in the shade for a few days at a time; but the rest of the year is pleasant, and the winter is mild and rainy.

The usual rainfall is small, only averaging 22 inches, but it is often as low as 15, and in 1869 was only $13\frac{1}{2}$ inches. The wettest year was 1851, when there were $30\frac{1}{2}$ inches. The amount of rainfall varies greatly in different parts of the colony. In the wet year 1861, when there were 24 inches at Adelaide, there were only 7 inches at Port Augusta at the head of Spencer's Gulf, $45\frac{1}{2}$ at Mount Lofty, and $55\frac{1}{2}$ inches at Mount Barker. In the same year the thermometer rose above 90° on forty-five days at Adelaide, but only on five days at Guichen Bay in the southern part of the colony. The

variations of the barometer indicate changes of wind rather than rain. It always falls with a north-east wind, and continues to fall as the wind changes to north and north-west; but whenever there is southing in the wind the barometer rises even during steady and copious rains.

The natural history of South Australia presents hardly any distinctive features, while in almost every department it is far poorer than the other colonies. In botany this is especially the case. It contains a mixture of eastern, western, and tropical forms,—the presence of the latter being due to the proximity of the great central desert; but the eastern types abound. The northern territory has of course, mainly, a tropical flora, and it has produced many new species both of plants and animals; but these in almost all cases extend to one of the adjoining colonies, West Australia or Queensland, whose northern portions are equally tropical.

The flowering plants and ferns of extra-tropical South Australia comprise, according to Dr. R. Schomburgk, about 1240 species; while Victoria, with a much smaller area, has 1894 species, and New South Wales no less than 3250. These last two colonies have fine mountain ranges, which support a large number of species of alpine and sub-alpine plants, which are necessarily absent from South Australia. But the specially Australian groups are equally deficient in variety of species; there being 44 species of *Acacia* and 21 of *Eucalyptus* in temperate South Australia, while the corresponding numbers in New South Wales are 102 of *Acacia* and 54 of *Eucalyptus*. The only timber trees are species of *Eucalyptus*, and there is a deficiency of species of tall trees as compared with the other colonies.

In zoology, as in botany, temperate South Australia is rather deficient in variety of species, though all the

chief Australian types of form are represented. In birds it is rather rich, the honey-suckers and the parrot tribe being well represented, with several peculiar species. An interesting discovery has recently been made of a totally new form of mammal, a small mole-like marsupial found among the sand-hills of Central Australia not far from Chambers's Pillar. It is about 5 inches in total length, of which about half an inch is taken up by the bare, tapering, but blunted tail. It is covered with a long soft and lustrous fur of a light fawn colour, deepening in parts to a glistening golden hue. The nose is covered with a hard horny shield, and the limbs are short, strong, and mole-like, all well covered by the fur. The fore feet have two very large and powerful claws, with three much smaller ones, two of these being almost concealed by the folding up of the palm when at rest. The hind feet have more distinct toes and smaller claws of nearly uniform size, with a broad sole, all well adapted for burrowing in the sand. This animal frequents the sandy deserts among the tussocks of spinifex, burrowing a short distance beneath the surface, occasionally coming up and crawling slowly for a foot or two, then burrowing again. Its native name is "oorr-quámata," and it has been described by Mr. Stirling of the Adelaide University under the name of *Notoryctes typhlops*. It is completely blind, there being no external eye-aperture, nor even any eye visible under the skin, but deeper down, buried in the temporal muscle, there is a distinct rudimentary eye. Remains of ants and other insects were found in the intestines, and as ants are exceedingly abundant in the most arid districts, they probably constitute the chief food of the animal, which in the course of its travels beneath the surface would continually cross the underground passages and nests of the ants. The creature is rare, and difficult

to obtain owing to its small size, its colour corresponding to the sand and dry grass, and the extreme rapidity with which it burrows underground. The same animal or allied species may not improbably be found in similar situations in West Australia, but at present this very curious and interesting modification of the marsupial type is confined to the central desert regions of South Australia.

The geological structure of extra-tropical South Australia is comparatively simple. It consists of an immense formation of Tertiary sandstones and limestones, extending over the whole country, except where interrupted by Palæozoic or volcanic mountains. The backbone of the colony, running from Cape Jervis northwards, is Silurian, and consists of sandstones, slates, and limestones, with intruding granites of diversified character. Fine red granites occur at Barossa and Port Lincoln, and there are lofty granite mountains in the interior. Basalt occurs at Mount Arden, north of Port Augusta, and also farther north in the central lake country ; but it is more common in the south-east, near the remarkable group of extinct volcanoes in the Mount Gambier district. A little to the north, in the Tertiary limestone country of the Mosquito plains, are some very curious and interesting caves, which have been thus described by the Rev. Mr. Woods, in his *Geological Observations in South Australia* : "In the midst of a swampy, sandy country, plentifully covered with stringy-bark trees, a series of caverns is found, whose internal beauty is at strange variance with the wildness of the scenery around. The entrance is merely a round hole on the top of a hill, which leads to a small sloping path under a shelf of rock. Descending this for about 25 feet, one gets a first glimpse of the magnificence enshrined below. The observer finds him-

self at the entrance of a large oblong square chamber, low, but perfectly lighted by an aperture at the opposite end, and all around, above, and below, the eye is bewildered by a profusion of ornaments and decorations of nature's own



INTERIOR OF ONE OF THE CAVES, MOUNT GAMBIER, SOUTH AUSTRALIA.

devising. It resembles an immense Gothic cathedral, and the numbers of half-finished stalagmites which rise from the ground, like kneeling or prostrate forms, seem worshippers in that silent and solemn place. At the farther end

is an immense stalactite, which appears like a support to the whole roof; not the least beautiful part of it being that it is tinted by almost every variety of colour, one side being of a delicate azure, with passages of blue, green, and pink intermingled; and again, it is snowy white, finally merging into a golden yellow. The second cave or chamber is so thickly studded with stalactites that it seems like a carefully arranged scene, which, from the interminable variety of form and magic effect of light and shade, might easily be taken to represent some fairy palace. Very soon the cavern becomes as dark as night, and further exploration to the numerous chambers and fissures beyond has to be made by the assistance of torches. On leaving the last chamber we return to the light: a narrow passage, richly wreathed with limestone, is observed on the right hand going out. Proceeding a little way down, a large vaulted chamber is reached, so perfectly dark and obscure that even torches can do but faint justice to its beauty. Here, above all other portions of the caves, has nature been prodigal of the fantastic ornament with which the whole place abounds. There are pillars so finely formed, and covered with such delicate trellis-work, there are droppings of lime making such scroll-work, that the eye is bewildered with the extent and variety of the adornment. It is like a palace of ice, with frozen cascades and fountains all around."

These interesting caverns are now known as the Narracoorte Caves, from the town of Narracoorte, from which they are 7 miles distant. About 60 miles farther south, in the extreme southern corner of the colony, are a group of extinct volcanoes comparable with those of Victoria. Near these are some beautiful lakes of transparent water and great depth, usually supposed to occupy the craters of extinct volcanoes. One of the most cele-

brated of these, the Blue Lake, near Mount Gambier, covers an area of about 165 acres, and is 675 feet deep. It is now thought, however, that these lakes are probably situated in depressions caused by subsidence of the crust, such subsidences often occurring in volcanic areas.

The Palaeozoic limestones of South Australia are very rich in copper, and this metal has really determined the success of the colony. It was first discovered in the hills near Adelaide; but the most important mine, the Burra-Burra, is about 90 miles to the north. This mine yielded altogether copper worth more than £4,000,000 sterling, but is now exhausted and has ceased working. Another still more extensive deposit of copper ore is at Wollaroo, at the head of Yorke's Peninsula, and there are in all twenty-seven copper mines in the colony. Silver-lead has been found and worked near Cape Jervis, and bismuth in the mountains east of Adelaide. Gold also occurs at Echunga; but the mines are unimportant as compared with those of Victoria. Iron is also known to exist in large quantities; but, as there is no coal, it has not yet been worked.

4. Colonisation, Population, etc.

South Australia differs from most of the other colonies of Australia in its origin and early history. It was established in 1836 by bodies of emigrants from Great Britain, sent out under the auspices of the South Australian Colonisation Association, which had obtained a grant of the lands of the colony from the Imperial Government. It thus escaped the evils of contamination by convicts; but it passed through much adversity in its early days, and it was only when the Burra-Burra mines proved such a splendid success (in 1846) that the colony began to

make substantial progress. These mines yielded, in the first three years' working, 10,000 tons of copper, and this metal has been to South Australia what gold has been to Victoria, and coal to New South Wales.

The growth of the colony was at first slow. In 1840 there were 14,000 people, but in 1850 these had increased to 63,700 ; and although a considerable exodus took place during the gold-fever of 1851 and 1852, so that it was thought the prosperity of the country would be endangered, a reaction soon took place, and South Australia received its share of benefit from the growing wealth of its sister colonies. Thus we find that in 1860 the population had more than doubled, being 126,830. Since then the increase, though less rapid, has been steady. In 1870 there were 183,800 persons, and in 1890 the population was estimated at 317,000. There are in the settled districts about 6000 aborigines ; but though these people are perhaps better treated and more cared for here than in the other colonies they diminish year by year. The civilised population consists almost entirely of English and Germans, there being very few Chinese or other foreigners, for most of whom the gold of the adjoining colony of Victoria has greater attractions.

5. Productions, Trade, Shipping, etc.

South Australia is the agricultural colony of Australia, and is pre-eminent in wheat, and perhaps also in wine. More than two and three quarter million acres of land were under cultivation in 1889, a large proportion of this area being cropped with wheat. The produce varies greatly. It averaged between eleven and twelve bushels an acre in 1875-6, but less than eight bushels in 1889. The land is very imperfectly cultivated ; no manure is

applied ; and many successive grain crops are taken from the same land. Yet the dry warm climate is so suitable for wheat, that sufficient is produced to export largely to the other Australian colonies, and occasionally to England. The climate is equally favourable for vines, which are extensively grown—there being between four and five thousand acres of vineyards, producing about 500,000 gallons of wine. This, however, does not yet command a good price, and a small proportion of it only is exported. Fruits of various kinds are also largely grown ; raisins and currants are being dried, and manufactories for fruit-preserving established. In the specially Australian product, wool, South Australia is far inferior to Victoria and New South Wales as regards the actual quantity produced, though, in proportion to its population, it about equals them. In 1890 it had more than six millions of sheep, and exported between thirty and forty million pounds of wool, or about one-third that exported by New South Wales, with barely more than one-third the population.

In minerals South Australia takes the lead in the production of copper, which is still exported to the amount of one-third of a million sterling per annum. Other metals are worked,—as bismuth, lead, and gold ; but these are of comparatively little importance ; so that the total mineral produce of 1885 was only a little over £344,000.

The most important manufactories of the colony are those of agricultural implements, necessitated by the enormous area of land under cultivation with a very limited supply of labour.

The shipping belonging to Port Adelaide amounts to about 300 vessels, ranging in size from 8 to 700 tons. A large number of steamers and barges are employed in the navigation of the rivers Murray, Murrumbidgee, and

Darling. There are also two regular lines of steamers between Adelaide and Melbourne, while the Peninsular and Oriental Company's steamers from Southampton touch fortnightly at Glenelg, six miles south of Adelaide.

6. Roads, Railways, and Telegraphs.

As in other Australian colonies, railways may be said to have superseded roads before the latter were made. The only properly constructed roads in the whole colony are almost all in the vicinity of the larger towns. Most of the communication, even by mail coaches, is carried on by mere tracks through the bush, without the vestige of anything that can be called a road.

The railways are not yet very numerous, as South Australia has a more extensive sea-coast than most of the other colonies, and is thus able to make use of water communication. There were, up to July 1890, over 1600 miles of railway and tramway, while several hundred miles are either in contemplation or in actual progress. They furnish communication, on the south, to Port Victor, 81 miles; to Servicetown, on the Victoria frontier, 160 miles; and from Bordertown to Kingston, 115 miles. On the West to Moonta Bay, 135 miles, with branches to Blyth and Snowtown. On the east to Morgan, 105 miles. On the north to Petersburgh and Port Augusta, 259 miles, with a branch to Port Pirie. The extension northwards across the continent has been commenced, and is completed as far as Hergott Springs, 442 miles from Adelaide; but the total distance is nearly 1800 miles, and with the present scanty population in the northern territory, or even with any probable increase of it, such a line could only be worked at a heavy annual loss, even were the expenditure (supposed to be about

ten millions) recouped by the increased value of land along the line. It is hardly likely, therefore, that the present generation will see the scheme carried out.

In the construction of electric telegraphs, however, South Australia has far exceeded all the other colonies; for, besides providing for the wants of its own settled districts and taking its share in the communication with other colonies, it has accomplished the gigantic work of forming and successfully working the overland line, by which daily communication is kept up between the Australian continent and the rest of the civilised world. This great work was completed in August 1872. It very nearly follows the line of M'Douall Stuart's exploration, and is 1973 miles long. It was divided into three sections, the southern of which was executed by contract, the middle section was made by the Government, and the northern section, though contracted for, presented such difficulties that it was obliged to be completed by the Government. Almost the whole of the distance was through uninhabited country, and much of it through a waterless desert. Drought was the enemy in one part, while sudden floods impeded the work in others. Every article of food, and all materials, had to be carted out for enormous distances to supply the army of workmen employed. Camels were largely made use of to carry the telegraph poles, 36,000 of which were of wood, and the remainder iron. The wooden poles, prepared at the nearest available localities, had all to be carried distances varying from 1 to 350 miles, while the iron poles had to be taken an average distance of 400 miles by land carriage. In addition to the poles, stations had to be formed at intervals, and over 2000 tons of materials had to be carried into the interior, while thousands of cattle and sheep, for the support of the workmen, had to be driven for distances

up to 1300 miles. For a distance of 500 miles wide tracks had to be cleared through forest and scrub. The total cost of this line was £370,000 ; and it is a remarkable and highly creditable fact, that such a truly international work should have been completed at the sole cost of one of the less prosperous of the Australian colonies. Not content with this great and as yet unprofitable undertaking, South Australia has since completed her share of a line along the inhospitable southern coast to West Australia, a portion of which, between Fowler Bay and Eucla, on the West Australian boundary, presented great difficulties, owing to extreme scarcity of water and herbage.

7. Government, Public Institutions, Education, etc.

The South Australian Government consists of a Governor appointed by the Crown ; a Legislative Council elected in four electoral districts, by electors having a property qualification ; and a House of Assembly, whose members are elected in each county by manhood suffrage. The Executive Council consists of nine members (who must be Members of Parliament), besides the Governor. The Legislative Council cannot be dissolved by the Executive, and is only changed by one-third of its members retiring every three years. The Legislative Council consists of twenty-four, and the House of Assembly of fifty-two members.

In this colony the voluntary principle, as regards religious sects, has been in force ever since its foundation, no aid from the State having ever been given for any exclusively religious purpose. The Wesleyan Methodists are by far the most numerous of the sectarian bodies, judged by the sittings provided for their congregations ;

next come the Church of England, followed by the Roman Catholics, Congregationalists, Baptists, and other dissenting bodies. By the census returns, however, the members of the Church of England are returned as nearly double the Wesleyans, who are about equalled by the Roman Catholics.

Education is being liberally and efficiently dealt with. By the last Act of Parliament on the subject (1875), there is a council with a salaried president and staff of officers responsible to the Minister of Education. The excellent plan is adopted of setting apart every year grants of public lands, whose revenues are to be devoted to school purposes. Thus, as the population increases, the natural increase in the value of the land will provide a constantly increasing revenue for the maintenance of an efficient education. Teachers are all paid by Government, supplemented by small school-fees. The instruction is secular, but the Bible may be read without note or comment; and it is compulsory, but the fees are remitted to all who are not able to pay them. £60,000 a year has been voted for school-buildings, and a similar amount for salaries and other expenses, besides grants of land for all school sites. A university has also been established, towards the endowment of which two wealthy colonists have contributed £20,000 each. There are also several good schools in connection with the Church of England and other religious bodies.

As in the other Australian colonies, public libraries exist in all the larger towns and villages, mostly in connection with the South Australian Institute at Adelaide. The value of such libraries may be estimated by the fact, that during 1879 nearly 200,000 volumes were circulated by the various local libraries, and nearly 60,000 by that of the capital.

8. Political Divisions—Cities and Towns.

South Australia is divided into counties, for electoral purposes, and into districts, which have municipal government. The counties, till recently, were twenty-five in number, but they have lately been increased to thirty-five. There are also four pastoral districts known as Western, Northern, North-eastern, and Kangaroo Land. The older counties are as follows :—FLINDERS, on Eyre Peninsula ; FERGUSSON, on Yorke's Peninsula ; DALY, VICTORIA, FROME, and DALHOUSIE, on the east of Spencer's Gulf ; STANLEY, GAWLER, ADELAIDE, and HINDMARSH, on St. Vincent's Gulf ; KIMBERLEY, BURRA, YOUNG, HAMLEY, ALFRED, ALBERT, EYRE, LIGHT, and STURT, to the east of the more settled districts ; RUSSELL, CARDWELL, BUCKINGHAM, MACDONNELL, ROBE, and GREY, in the south-east district. There are also CARNARVON (Kangaroo Island) ; and LYTTON, DERBY, NEWCASTLE, GLANVILLE, BLACKFORD, HANSON, TAUNTON, MUSGRAVE, and HERBERT, farther in the interior.

ADELAIDE, the capital of South Australia, has a population of about 45,000, or, with the suburbs, as estimated in the other capitals, more than 130,000. It is laid out with the utmost regularity, the streets all directed to the cardinal points—north, south, east, or west ; and it has many fine public buildings, the finest of all being the post-office. It is situated in a plain, on the small river Torrens, which is unfortunately dry for a good part of the year ; but the Mount Lofty range is within a few miles, on the east, and gives interest and variety to the scenery. In these hills reservoirs have been constructed capable of storing more than a thousand million gallons of water for the supply of the city. The Botanic Gardens are extensive and well laid out, and, next to those of Sydney, are the most beautiful in Australia. Adjoining these is an extensive park. The churches are numerous and handsome. Fine new Houses of Parliament are in process of erection, and the South Australian Institute has a library of nearly 25,000 volumes.

In some respects Adelaide is a model city, having been laid out on a plan well worthy of general adoption. The original city is about a mile and a half long and a mile wide; but instead of allowing this city to spread out indefinitely as population increased, reserves of what are termed "Park Lands" surround it on every side. These are of irregular width, varying from a quarter to half a mile wide. They contain football and other playgrounds, the botanic gardens, and a cemetery, the result being that every one of the main streets of the city forms a vista terminating in green trees or open country. Beyond these parks suburbs have grown up as the city proper became more and more devoted to business, and the walk from these suburbs, instead of being through continuous streets, is across pleasant grass or under the shade of trees. There are also five large squares planted with shrubs and flowers, so that no part of the whole city is much more than an eighth of a mile from a pleasant open space. Another excellent feature is, that the whole of the sewage is carried away to a distance and utilised upon the land.

Owing to the agricultural pursuits of most of the population, South Australia has very few large towns besides the capital. None of these possess 5000 inhabitants, and those that exceed 1000 are not many. The following list of the more important towns is extracted from *Gordon and Gotch's Australian Handbook* for 1891.

CLARE, a town on the Hutt River 89 miles N.N.W. of Adelaide, in the county of Stanley. It is prettily situated among wooded hills. It is the chief town in a rich agricultural district, and has a population of over 1000.

GAWLER, a town of nearly 2000 inhabitants, situated on the Gawler River, at the foot of the Barossa Mountains, 25 miles north-east of Adelaide. It is in the centre of a large wheat-growing district, and there are also a few gold and copper mines in the neighbourhood.

GLENELG, a watering-place, almost a suburb of Adelaide, being distant only $6\frac{1}{2}$ miles. Its population is over 2700. The Peninsular and Oriental steamers, and those of the Orient Line, call here every fortnight.

JAMESTOWN, a town and railway station in the county of Victoria, 176 miles north of Adelaide and nearly 1500 feet above the

sea. It has broad streets planted with trees, and reserves for recreation. Population about 1000.

KADINA is a town in the northern part of Yorke's Peninsula, 96 miles north-east of Adelaide. It owes its prosperity to the rich copper mines in the vicinity, and has a population of about 1600.

KAPUNDA is also a mining town, 48 miles north-east of Adelaide, with a population of between 2000 and 3000. Besides the rich copper mines, it is surrounded by a fine agricultural district.

KOORINGA, a town with a population of 2500, situated 101 miles north of Adelaide, owed its importance to the vicinity of the celebrated Burra-Burra mine, which has now ceased working. Silver, lead, and other ores exist in the neighbourhood, and several mines are now being worked. Large quantities of land to the north of the town are under wheat cultivation.

MILLCENT, a town and railway station in the county of Grey, about midway between Mount Gambier and Beachport, 252 miles south-east of Adelaide. It is the centre of a rich wheat-growing district. Population nearly 1000.

MOONTA is one of the largest of the mining towns of South Australia, situated on the shores of Spencer's Gulf, 99 miles north-west of Adelaide, 12 from Wallaroo, and 6 from Kadina. The Moonta mines give regular employment to a large number of persons, and there are several other mines near, so that the total population is nearly 5000. Since their discovery in 1861, the Moonta mines have yielded copper ore valued at £2,761,787.

MOUNT GAMBIER, the largest of the south-eastern towns, in the county of Grey, and 287 miles south-east of Adelaide. It is the centre of a fine agricultural district, the volcanic soil being very fertile. The celebrated Blue Lakes are in the vicinity. The population is between 2000 and 3000.

NARRACOORTE, a thriving town and railway station on the Narracoorte Creek, in Robe county, and 222 miles south-east of Adelaide. It is also connected with Kingston on the sea coast. It is in a pastoral country, and has a population of about 1000.

PETERSBURGH is a mining and agricultural town in the county of Dalhousie, 154 miles north of Adelaide. It is over 1700 feet above the sea-level, and is situated at an important railway junction, where the lines to Port Pirie and Silverton branch off south-west and north-east from the main northern line. The population is considerably over 1000.

PORT ADELAIDE is the chief seaport of the colony, $7\frac{1}{2}$ miles from the capital. It has a pier 1800 feet long and a lighthouse,

and a large dock is now completed. The population is between 5000 and 6000.

PORT AUGUSTA, situated at the head of Spencer's Gulf, in Frome county, is 259 miles by rail north-west of Adelaide. It has a good harbour, and much wool, wheat, copper, hides, and other produce are exported from here direct. The population of the town is nearly 1000.

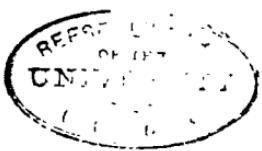
PORT PIRIE, in Victoria county, 227 miles by rail north of Adelaide, is an important town and seaport for the export of wheat. Population nearly 2000.

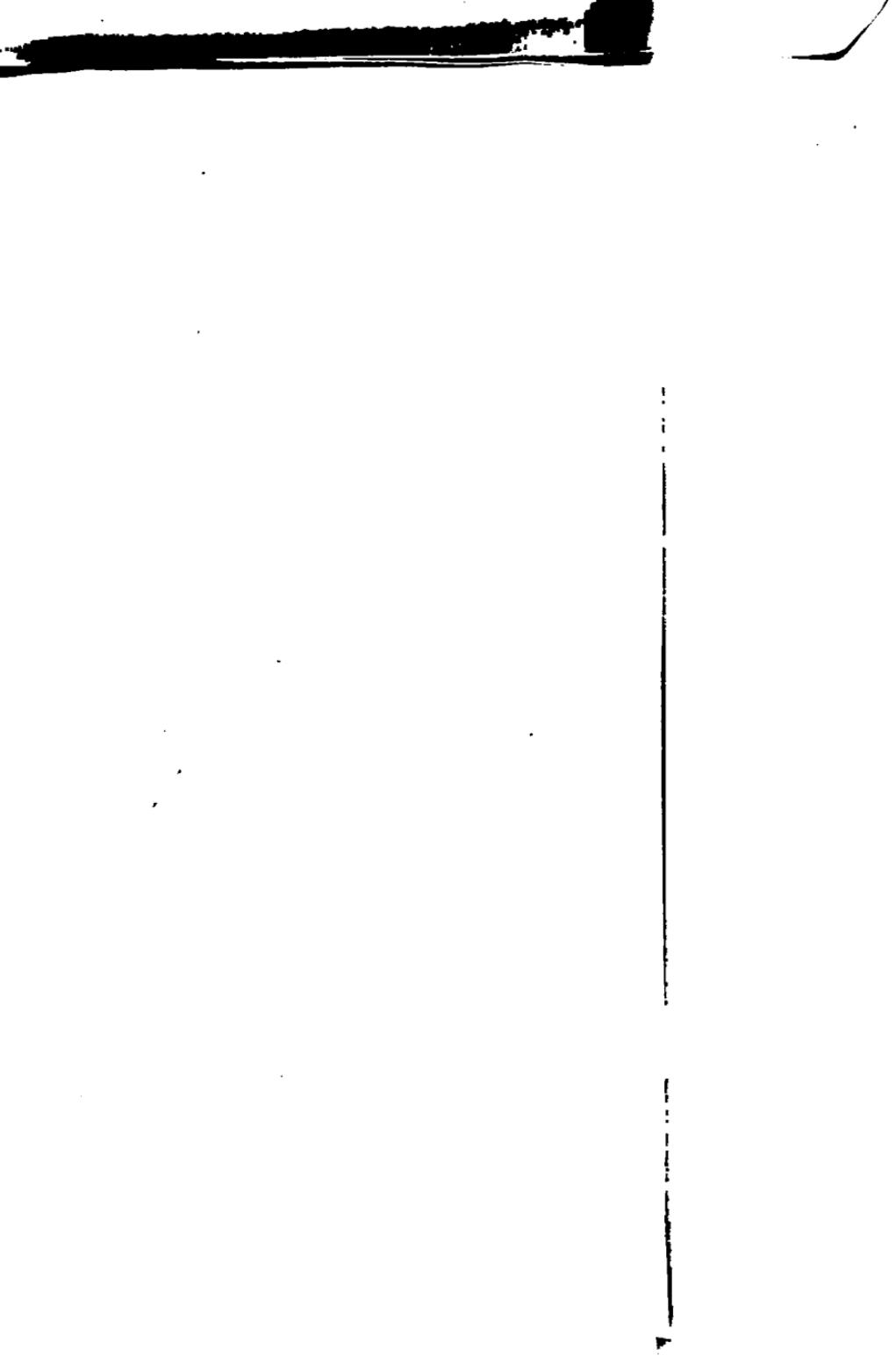
STRATHALBYN, an agricultural and mining town in Hindmarsh county, 51 miles south-east of Adelaide, on the line to Port Elliott. The population is under 1000.

WALLAROO, the seaport of the copper-mining district on the shores of Spencer's Gulf, has a population of about 2000, and is entirely dependent on the mines, smelting furnaces, and the imports and exports for the support of the mining population.

9. The Northern Territory.

This portion of the colony of South Australia has already been described in its physical and geographical aspect, and is here again referred to as a European settlement. It was formerly called Alexander Land, and as a settled country it is limited to the few stations on the overland telegraph line, and the small official establishment at Port Darwin, where the overland telegraph joins the submarine line to Java. Port Darwin is a fine harbour, said to be only second in magnitude and importance to Port Jackson, and it has been made an entirely free port since 1875. The country is comparatively level, rising in the interior to table-lands of moderate altitude. Being situated in $12^{\circ} 30'$ south latitude, the climate is of course perfectly tropical; but though hot it is not oppressive, as the mornings and evenings are cool. The rainfall is about 60 inches. The flora is decidedly Australian in character, most of the

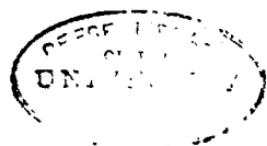




common forms of the temperate regions being present, but interspersed with palms, bamboos, rattan-canapes, wild nutmegs, and other tropical forms. The indigenous fauna too is strictly Australian, but the Indian buffalo and the Timor pony have run wild, and are said to be rapidly increasing; while crocodiles, dugongs, and turtles abound on the coast. Gold, copper, tin, and lead have been discovered, and several gold companies are already at work, some of which have made good returns. From twelve to fifteen thousand ounces of gold are exported annually, and it is believed that the supplies are very large. Much of the table-land is poor, being covered with the hopeless spinifex and scrub, but many of the lowlands and river valleys are extremely rich, and will some day support a large population. A road has been made to the gold-fields 160 miles from the port. The total population of the territory in 1881 was 4554, of whom 3853 were Chinese. The only towns are Palmerston, the capital and terminus of the overland telegraph, and Southport, on the Blackmore River, 24 miles to the south. Although Palmerston has only about 600 inhabitants, it has good public buildings, churches, and chapels, six hotels, and a weekly newspaper. The Government consists of a Resident and Secretary, in constant communication with Adelaide by telegraph. The most recent reports state that a trade is springing up with Java, mining is improving, and land is being taken up for agricultural purposes.



PERTH, WESTERN AUSTRALIA.





CHAPTER XI

THE COLONY OF WEST AUSTRALIA

1. Origin, Geographical Limits, and Area.

THIS colony was founded in 1829 by the Home Government, but at first very little progress was made, so that in 1848 the population only amounted to 4622. In 1850, owing to the want of labour and excessive commercial depression, West Australia asked to have convicts sent to it. This was done till 1868, when transportation to any part of Australia finally ceased.

The enormous extent of this colony, the paucity of fertile land, the remoteness from all the other colonies, and the absence of mineral wealth, have combined to keep it back, so that it remains the smallest in population and wealth, although the largest in area, of all the Australian colonies. It may be very simply described as comprising all Australia west of the 129th meridian; and it has a length of about 1250 miles from north to south, and a width of 800 from east to west. It has an estimated area of nearly 1,000,000 square miles, or almost exactly one-third of continental Australia. The settled portion is confined to the south-western angle, and is about 320 miles long by 160 wide, with an extension of settlements along the coast to the mining districts of

Victoria and the Murchison River. There are also a few settlements on the Ashburton, Fortescue, and other rivers, as far north as the De Grey River in latitude 21° south, and there are some important pastoral settlements towards the sources of these rivers.

In 1886 gold was discovered in the northern part of the colony near the sources of the Margaret and Ord Rivers and about 200 miles south of Cambridge Gulf, and a rush of miners took place from Queensland, Victoria, and New Zealand; but as no great finds were made, many of the prospectors returned disappointed. The country is, however, well grassed, and this portion of the colony has been constituted as two districts named East and West Kimberley, and considerable tracts of land have been stocked with sheep and cattle. In 1889 quartz-crushing machinery was taken to the Kimberley gold-fields, which have now become established as a fairly rich quartz-reef mine. This northern region, so long neglected, appears at length to be in a fair way to become peopled, though it must long be at a disadvantage owing to its remote situation and the vast sandy desert which cuts it off from the rest of the colony.

2. Physical Features.

The older settled parts of West Australia present no such marked physical features as do the Eastern colonies, the mountains being comparatively low and undulating, so that they produce little scenic effect. The highest point, 3600 feet above the sea-level, is in the isolated Stirling mountains, about 40 miles from the coast to the north of Albany, and is far above the average height, which is from 1500 to 2000 feet. The country near the coast is usually flat and sandy, while inland it never

rises abruptly, so that there is no perceptible barrier between the coast and the interior. The Darling range, which runs north and south for more than 400 miles and about 20 miles from the coast, is the most important, but it is nowhere more than 1500 feet high, and has no very striking features.

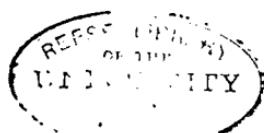
The rivers, which are tolerably numerous, flow for considerable distances in the interior, but are for the most part only channels for storm-waters, and are almost dry at certain seasons. Contrary to what occurs on the east coast of Australia, the best land is towards the sources of these rivers, the coast districts being poor and sandy. There is thus a very large area of good land now almost wholly unoccupied but well suited for agriculture. The chief rivers beginning at the south are—the Blackwood, Swan, Murchison, Gascoyne, Ashburton, Fortescue, and the De Grey or Oakover rivers. There are no lakes of any importance, except the numerous salt lakes and lagoons of the interior deserts. These desert tracts occupy by far the larger part of the colony, stretching everywhere from the South Australian boundary to within distances of the coast varying from 50 to 300 miles. Even within these limits poor sandy soil occupies large areas, while the fertile lands are comparatively limited in extent, and are widely scattered over the country; but the colony is so vast that, even with these limitations, there is ample room for a large population of agriculturists.

The North-Western Division, situated between the rivers Ashburton and De Grey, seems to have more pronounced physical features. Mr. F. T. Gregory, who explored it in 1862, states that it consists of a succession of terraces rising inland for nearly 200 miles, but more or less broken up by volcanic hills near the coast. The first belt averages from 10 to 40 miles in width from

the sea, and is a nearly level plain with an elevation of from 40 to 100 feet, the soil being either clay or loam according as it is formed by the disintegration of granitic or volcanic rocks. Proceeding inland, the next 50 or 60 miles is a granite country which has been once overlaid with horizontal sandstones, and has an elevation of about 1000 feet, consisting towards the south of level plains with a fertile soil, while towards the north it is more irregular and rocky. Still further inland between the Ashburton and Fortescue Rivers there is an elevated country having an altitude of 2500 feet above the sea, with higher mountains, some of which, as Mount Bruce, reach to nearly 4000 feet.

Mr. Gregory thinks that, owing to the elevation of this tract of country, it would be suitable for sheep; and as gold has been discovered in the district, and several gold-fields are now being profitably worked, no doubt the experiment will soon be made. At Pilbarra, 80 miles east of Roeburn, there is a rich alluvial gold-field in which nuggets have been found weighing 35 ounces, 100 ounces, and 160 ounces. Recently some sheep stations have been established by means of native labour.

The physical character of the northern portion of the colony—the Kimberley Division—has been indicated in our sixth chapter by the exploration of Lieutenant (now Sir George) Grey and Alexander Forrest. The whole country for some distance inland appears to be exceptionally rugged and difficult to traverse, both the explorers being again and again forced to turn back on account of cliffs that could not be climbed or precipitous ravines that could not be crossed. Both travellers, it is true, had horses or ponies as baggage animals, but it is evident from their descriptions, that even without the encumbrance of animals, the country is an exceedingly difficult





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one. When these difficulties are surmounted, however, extensive and elevated plains are found, and the district will no doubt ultimately support a considerable population.

The whole of the settled country, from Albany to Perth, and about 100 miles farther north, excepting the parts cleared for cultivation, is covered with woody vegetation varying from low bush or scrub with scattered trees to lofty continuous forest. Immense tracts are covered with the jarrah (*Eucalyptus marginata*), sometimes called mahogany, an almost indestructible timber, which is free from the attacks of teredo and termites, and is valuable for shipbuilding and for all engineering works. Sandal-wood also occurs in some districts, and is an article of export. The karri (*Eucalyptus diversicolor*) produces timber of almost equal value, and grows to an enormous size. It is said to be the most beautiful of the gum trees, its straight, smooth, cream-coloured trunks often rising 100 or even 150 feet to the first branch, and Sir F. A. Weld thinks that they reach nearly double that amount in total height, so that they may rank among the largest, most remarkable, and most valuable of the timber trees of the world.

3. Climate, Natural History, and Geology.

The climate of West Australia is generally admitted to be one of the finest known. It is very dry, though with a rainfall of about 30 inches annually and even 40 inches on south and south-west coasts, and the heat is rarely oppressive. The dryness of the atmosphere, and the prevalence of sand, are highly favourable to health, as there is little luxuriant vegetation to produce miasma by its decomposition, and hardly any morasses or damp

lowlands to breed ague and fever. The annual mortality of the whole colony is about 16 per thousand, which is about the same as that of the other Australian colonies, and considerably below that of Great Britain or of any European country. The comparison, however, is hardly fair, on account of the greater proportionate number of adults owing to immigration, and these have, of course, a lower death-rate than infants or the aged who are proportionately more numerous in Europe. The wet season is from April to September, but during this period there is much bright, clear weather. The rest of the year is dry, but with occasional showers and thunderstorms. During three months hot land winds occur, but they are neither so frequent nor so severe as in the southern and eastern colonies, while the great droughts and heavy floods so prevalent elsewhere are almost unknown in West Australia. Snow is unknown, and ice is only seen in the morning and in the depth of winter. With these excellent qualities the praise bestowed on it by a writer in the *Calcutta Englishman* may not be exaggerated—that it is a climate “such as no other in the world can excel, and few equal, for comfort and health-giving attributes.”

As has been already stated in our chapter on the Natural History of Australia, this colony possesses many striking peculiarities in its flora and fauna. Sir Joseph Hooker, in his *Essay on the Flora of Australia*, gives many interesting details on this subject, which we may here briefly summarise. In South-Western Australia there are more species, but fewer genera and families, than in the south-eastern districts; so that if we take into account the fact that the former district is of very much less extent, we see a wonderful crowding of species in a limited area, to which there is nothing else compar-

able in the world except at the Cape of Good Hope. The diminished number of genera and families is owing to the absence of many European and Asiatic genera which may be said to dilute the peculiar Australian flora in the south-east. This specialty is further shown by the fact that the proportion of species belonging to peculiar genera is twice as great in the south-west as it is in the south-east. Another important feature is the absence from West Australia of a number of genera common over all the rest of the continent, such as *Viola*, *Polygala*, *Epacris*, *Lycopus*, *Smilax*, and several others. As a consequence of this crowding of the species of plants in Western Australia, many of them are very local, and a journey of 200 miles over nearly level country often carries the botanist into the midst of a flora entirely new to him as regards species. We have here, too, a singular illustration of the fact that it is in places where the country is comparatively bare and sterile that the most varied and beautiful assemblage of plants is often to be found. Some of the sandy plains, too poor to support a forest growth, are yet covered with shrubs and flowering plants in infinite variety and of exquisite beauty. Among these are many of the choicest adornments of our greenhouses, such as species of the genera *Chorozema*, *Boronia*, *Hovea*, *Kennedy*, *Dillwynia*, *Grevillea*, *Styphelia*, and many others. The same thing occurs in the south-east, for the celebrated Botany Bay, whose floral treasures so delighted Banks and Solander when they visited it with Captain Cook, is a barren sandy tract, for the most part unfitted for cultivation, and still celebrated for the variety and beauty of the flowering shrubs and herbs with which it is covered.

In its animal life this colony is also very peculiar, though not exceptionally rich in species. It possesses

several curious and anomalous forms, which seem to be remnants of an ancient world. Thus we have here alone the curious little banded ant-eater (*Myrmecobius fasciatus*), which presents the nearest approach in its dentition to the most ancient known mammals whose remains are found in the Oolite and Trias of the Mesozoic epoch. Here, too, is the singular Atrichia or "scrub-bird," whose peculiarities of structure are such as to isolate it from all other known birds. The Geopsittacus is a curious ground parrot; and almost all the mammals, birds, and reptiles are of peculiar species.

The geology of Western Australia is not so well known as that of the eastern colonies, but it does not appear to possess any remarkable peculiarities. There is a central north and south range of Palaeozoic rocks, with intrusive masses of granite, often spreading into plateaus or rising into isolated hills. Beyond and around these stretches the barren Tertiary sandstone, forming those vast arid tracts which produce chiefly scrub and spinifex grass, and seem doomed to perpetual sterility for want of water. The coast consists largely of coralline sand, while inland there is an extensive formation, locally termed ironstone, but which, from the description, appears somewhat similar to the "laterite" of India and Malacca. There are some beds of Mesozoic limestone near the coast in the south-west, containing many fossil shells, which are identical with those of the Lias and Oolite in Europe. Volcanic deposits are not abundant. In the north trap rocks occur, with columns of basalt and green-stone; and there appears to be a volcanic district near Shark's Bay and the Dampier Archipelago. Some quartz reefs occur in the central ranges, and good alluvial deposits of gold are being worked in the north, while the Yelgarn gold-fields about 200 miles east of Perth are

being worked by several companies, and gold has been discovered at many places in the Darling Range. Of other metals, copper and lead have been found towards the north, and considerable quantities of ore have been obtained. Iron-ore, too, exists in large quantities, but no coal has been discovered to render it available.

4. Colonisation, Population, etc.

The progress of this colony has not been at all commensurate with that of the other parts of Australia where gold, coal, or a fertile soil has stimulated population and invited capital. In 1848, nineteen years after its first settlement, West Australia had only 4622 inhabitants. Between 1850 and 1859, however, more than 11,000 persons were added by immigration, nearly half being convicts; so that, although the population was but 5293 in 1850, it had swelled to 14,837 in 1859. In 1870 the numbers were 24,785, and by the census of March 1880, 28,668. The estimated population on December 31st, 1889, amounted to 43,698. Owing to the large proportion of convicts in the colony, there was, and still is, a great disproportion in the sexes. The number of males exceeds that of females by nearly 7000, the proportion being a little more than eight females to eleven males.

5. Productions, Trade, etc.

Although, for causes already mentioned, West Australia cannot rival the other colonies in agriculture or sheep-farming, yet wool forms its most important product, and there are nearly two and a half millions of sheep. Wheat is also grown, and there were over 35,000 acres

under this crop in 1889. The specialty of the colony consists, however, in its production of sandal-wood and pearl-shells. The pearl-shells abound on its north-western shores, and produce about £70,000 annually, to which must be added pearls to the value of £30,000. Sandal-wood is largely exported. Resin and tortoise-shell are also exported, and a trade in horses is springing up with Batavia, Singapore, and India. Another important article of trade is the jarrah wood already mentioned as being so valuable for engineering and marine works. It is estimated that 1000 square miles are covered with this timber, but this will not prevent its destruction, should the demand, as seems probable, increase, unless the Government take steps to prevent reckless destruction and encourage planting to replace what is cut down. The growth of the mulberry and the cultivation of the silkworm have been begun, and from the nature of the climate this industry ought to succeed; and the country is especially well adapted for the growth of fruit and vegetables of all kinds, but at present the absence of markets prevents much being done in this way.

The mineral produce of West Australia is as yet small, but discoveries have been made which indicate that it is perhaps little inferior to the other colonies. Gold has recently been found in paying quantities both in the north and the south, and during 1889 nearly £60,000 worth of gold was exported. Other metals, however, seem to be more plentiful. About 2000 tons of lead were exported in 1880, with a small quantity of copper; and it is believed that large supplies of these metals exist. Stream tin has also been found near Bridgetown, and work was commenced upon it in 1890 with successful results. Mr. Anthony Trollope, however,

is of opinion that the future prosperity of this colony will not depend on its minerals but on agriculture. Nowhere are more advantages offered by the Government to the immigrant; and for men able to work, who possess a very small capital, and have some knowledge of agriculture, there is probably no country in the world where a comfortable and even a luxurious existence may be attained as easily as in West Australia.

6. Communications.

The means of internal communication are at present but limited. There is a good road from Albany, on King George's Sound, to Perth, a distance of 261 miles, regularly traversed by mail-coaches before the railway was completed; and there are similar roads to the other chief towns of the colony. The chief railway is that from Freemantle to Perth and Guildford, now extended to Beverley and southward to Albany; and there are a few other short lines from the coast into the interior. There is also a short line in the south for conveying timber from the hill ranges to the coast on Geographe Bay. The electric telegraph is, however, laid to all the chief towns, and, as already stated, along the southern desert coast to Eucla, on the South Australian boundary, a distance of 750 miles from Albany, thus bringing the colony into direct telegraphic connection with Europe. There is also a line all along the west coast to Derby on King Sound, and thence by way of the Kimberley gold-fields to Wyndham on Cambridge Gulf. The total length of telegraph line is now over 3000 miles. Regular steamers run between all the chief ports of the colony, and the fortnightly mail furnishes the means of com-

munication with the eastern parts of the Australian world, and also by way of the northern ports to Java and Singapore.

7. Government, Education, etc.

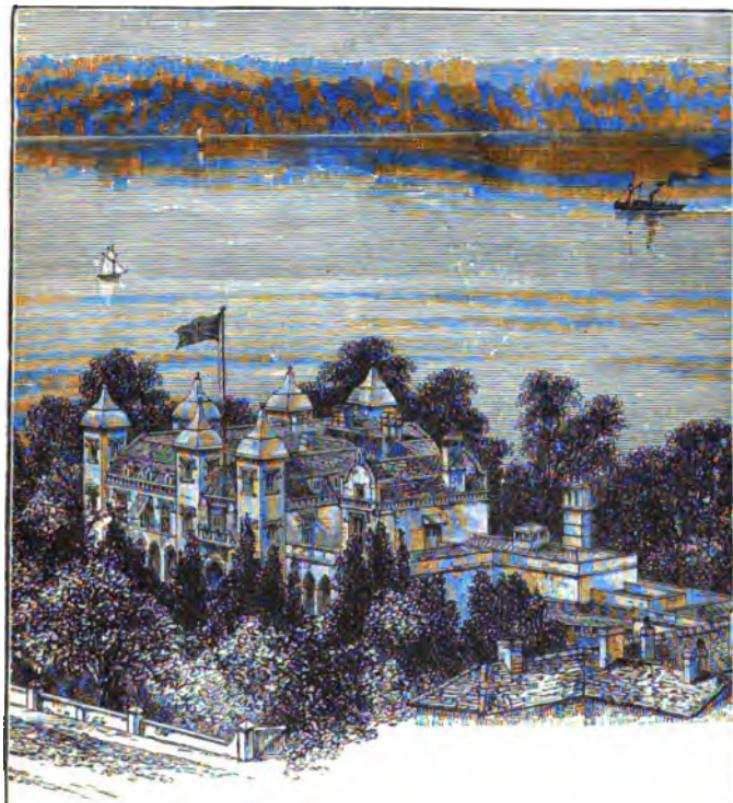
Till quite recently Western Australia continued to be a Crown colony, with a partially representative government; but since 1890 it has been accorded complete home rule with all the privileges and freedom of the other Australian colonies. There is a Legislative Assembly, or House of Commons, of 34 members elected by the 30 constituencies, and a Legislative Council or Upper House nominated by the Governor. An elector's qualification is being a householder to the annual value of £10 or of £100 freehold, while a member must possess landed property worth £500.

The educational system is based on the principles of the English Education Act. Elementary schools are maintained wholly at the cost of the colony, while certain private schools have a capitation grant, given on condition of submitting to Government inspection for secular results, and to the observance of a strict conscience clause. School fees vary from 2d. to 1s. a week. The Roman Catholics have many excellent schools throughout the colony, some of which are assisted by the Government.

Western Australia constitutes a diocese of the Church of England, and, according to the census, about one third of the population belongs to the Church, which is subsidised by the Government. The Roman Catholics are also numerous, and participate in State aid. The various Dissenting churches appear to be less numerous than in the other colonies.

8. Political Divisions—Cities and Towns.

West Australia is divided into thirty electoral districts, while the older settled portion in the south-west consists of twenty-six counties. These are—On the



GOVERNMENT HOUSE, PERTH.

south coast, KENT, PLANTAGENET, STIRLING, LANARK, and SUSSEX; on the west coast, WELLINGTON, MURRAY, PERTH, TWISS, and MELBOURNE; on the north, GLENELG, GREY, and CARNARVON; on the east, and bounded by the

central desert, LANDSDOWN, BEAUFORT, MINTO, PEEL, and HAY; in the interior, GODERICH, NELSON, WICKLOW, GRANTHAM, YORK, HOWICK, DURHAM, and VICTORIA.

PERTH, the capital, is a city of about 9000 inhabitants, pleasantly and picturesquely situated on the Swan River, 12 miles from its mouth. It is built on sloping ground above a fine lake-like reach of the river, and is well laid out, with handsome public buildings among which are two cathedrals. The principal street is nearly 2 miles long, and is planted with beautiful flowering trees—the Cape lilac. The City Hall, containing the Legislative



GOVERNMENT COTTAGE, ROTTNEST ISLAND.

Chambers, is a very handsome building, erected by convict labour. An excellent macadamised road connects the city with the port of Freemantle, and there is also a railway.

FREEMANTLE is the next town in importance, having a population of about 5000. It is situated at the mouth of the Swan River, 12 miles from Perth. The harbour is not good, being exposed to northerly gales, but there is a harbour of refuge at Garden Island, 12 miles distant. On Rottnest Island, 12 miles off the mouth of the river, are a penal settlement and farm for natives, and also the Government salt-works and a marine residence of the Governor.

ALBANY, or King George's Sound, is a small town of about 1200 inhabitants, but important from its situation on a fine harbour, and as being the dépôt and coaling-station of the Peninsular and Oriental mail-steamer. The district around is little cultivated, but abounds with rare and beautiful flowering shrubs.

BUNBURY in the south, and GERALDTON in the north, are the other chief ports of the colony. From the former the chief exports are timber, sandal-wood, and horses; from the latter, wool, wheat, copper, and lead. Very far north (1200 miles from Perth) is ROEBURNE, at the mouth of the Sherlock River, and the centre of the pearl-fishery. A large quantity of wool is also exported from this place direct to London. It is exposed to heavy gales, and in March 1872 every house was levelled to the ground. BUSSELTON, near the coast, in the south, is the place whence much jarrah timber is exported.

The only inland towns worth mention are GUILDFORD, on the Swan River, 9 miles above Perth; GREENOUGH, 251 miles north of Perth, in the centre of an agricultural corn-growing country; and YORK, 60 miles east of Perth, in a district which supplies much sandal-wood as well as agricultural produce.

DERBY and WYNDHAM, the two ports of the Kimberley district in the extreme north, though nominally towns, have at present hardly any inhabitants besides those connected with the local government. EUCLA, on the extreme south-east, is in a similar position.

CHAPTER XII

THE COLONY OF QUEENSLAND

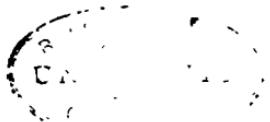
1. Origin, Geographical Limits, and Area.

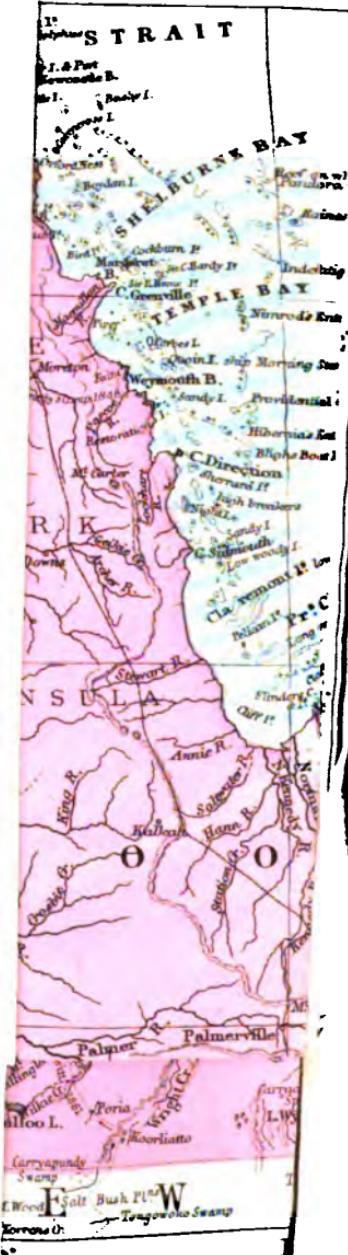
QUEENSLAND is the youngest-born of the Australian colonies, having been established in 1859, before which date it formed part of New South Wales, and was known as the Moreton Bay district.

It occupies the whole of North-Eastern Australia from the boundaries of New South Wales and South Australia to the Pacific Ocean and the Gulf of Carpentaria. It extends between 11° and 29° of south latitude, and between 138° and 154° of east longitude, having a maximum length of about 1300 miles, and a width of nearly 1000 miles; while it has an area of 670,000 square miles, and a seaboard of 2250 miles.

2. Physical Features.

The immense area of Queensland possesses some well-marked geographical features. Parallel with the coast, but at varying distances from it, are ranges of mountains averaging from 2000 to 3000 feet high, but with numerous peaks of greater altitude, especially towards the north. In the southern and more settled parts are





several parallel and transverse ranges extending inland in a north-west direction, and forming the watershed of the Darling and the coast rivers. Farther north a range of highlands goes in a westerly direction, dividing the streams which flow into the Gulf of Carpentaria from those that turn inland. We have thus formed four great systems of rivers:—1stly, Those that flow eastward to the Pacific; 2ndly, those that flow to the Darling, and form part of the great upper valley of the Murray; 3rdly, those that flow into the Gulf of Carpentaria; and 4thly, those that flow westward and lose themselves in the inland desert or in salt lakes, the most important of these being the Victoria or Barcoo, which in its lower course is called Cooper's Creek, and empties itself into Lake Eyre in South Australia. Of these four divisions the eastern or Pacific coast district is the most varied, the most fertile, and in every way the most important. It has the best climate, the richest soil, the highest mountains, and the most beautiful scenery, and it comprises the larger portion of the settled country. Its abundant rains and high temperature make it suited to the growth of almost all tropical and sub-tropical products, while sheep and cattle also thrive in it. It is almost wholly covered with wood, either scrub or forest, and has much fine woodland scenery and a very luxuriant vegetation. The coast is thickly strewn with islands, which often form fine harbours; and within the tropics the great Barrier coral-reef extends itself at some miles from the coast, producing a calm sea in which are numerous islands of various sizes, and offering scenes of great beauty.

The second division, including the upper valleys of the Macintyre, Condamine, Warrego, and other tributaries of the Darling River, is a more open, pastoral country, admirably suited for the production of wool, though

subject, like all the inland parts of Australia, to severe droughts. The third division, or basin of the Gulf of Carpentaria, is a tropical country of plains and rivers, and is partly occupied for grazing purposes.

The fourth division, or that of the inland streams, is very little known, but is mostly an arid country, parts of which may be suited for pastoral purposes, but in which the scanty and uncertain water-supply must always be a drawback.

The highest mountains are the Bellender Ker peaks, 5400 feet high, situated not far from the coast to the north of Rockingham Bay, while Mount Dalrymple, about 100 miles farther south, is over 4000 feet. The ranges in the southern part of the colony are not very lofty, but they contain the "Glasshouses" and other singular volcanic peaks.

The principal rivers are the Burnett, the Fitzroy, and the Burdekin, emptying themselves into the Pacific; the Flinders, the Albert, the Mitchell, the Gilbert, and Norman, emptying themselves into the Gulf of Carpentaria; the Victoria or Barcoo, flowing through Cooper's Creek to Lake Eyre; the Dumaresque, Condamine, and Warrego, flowing towards the Darling.

The Baron River, which reaches the sea at Trinity Bay, a few miles north of Cairns, has its sources in the coast range, and in its upper course falls over a rugged precipice more than 600 feet high. In the flood season there is a considerable body of water, forming a magnificent cataract amid grand scenery; and, as described in the Picturesque Atlas of Australasia, it must rank not only as the finest in Australia, but as worthy of being reckoned among the grandest waterfalls of the whole earth.

The coast of Queensland has many good harbours.

Besides the fine and extensive harbour of Moreton Bay, it has Hervey Bay, Keppel Bay, Port Curtis, Port Bowen, Port Denison, Rockingham Bay, and Port Albany, near Cape York.

Taking a more popular view of the country, we may say that there are three great divisions, each with distinct physical features, and adapted to separate industries. All the coast, varying in width from a few miles to fifty or more, is a broad belt of alluvial soil through which flow many fine rivers and their tributary streams. Then comes a range of mountains of moderate height, the continuation of the Blue Mountains of New South Wales, and beyond these there is a vast extent of undulating table-lands, stretching away like the prairies of North America to the remote horizon. The alluvial coast lands are now entirely devoted to timber-getting and agriculture. The banks of the rivers are everywhere clothed with a luxuriant growth of timber. For untold centuries the decay of leaves, of trees, and of succulent plants has been forming layer upon layer of the richest mould. The frequent recurrence of heavy floods assisted in the process by its fine muddy sediment, and has thus produced a soil of exceptional fertility. The tropical luxuriance of the trees, the palms, the creepers, and the undergrowth is such, that hardly a ray of sun penetrates to the soil, on which there is little grassy vegetation. To clear such land for agriculture alone would have been too laborious and costly; but the trees were soon found to be a source of wealth in themselves. Here grow the stately Moreton Bay pine, the noble red cedar, and the imperishable ironwoods; here also are the yellow-wood, the tulip-wood, the satin-wood, the silky-oak, and many others esteemed for cabinet work. The lumbermen set to work, sawmills sprang up in all

directions, and as the ground was thus partially cleared farmers followed, and completed the clearance with axe and fire, and fields of maize or cotton, tobacco or sugar-cane, soon diversified the scene.

The open plains across the mountains, known as the Darling Downs, the Victoria Downs, the Fitzroy Downs, and many others, abound in nutritious grasses, and were soon found to be specially adapted for sheep, while farther north the country was equally favourable to cattle, and enormous areas are now occupied with sheep and cattle farms.

The mountain range itself was found to be rich in minerals throughout its entire extent. Not only gold, but copper, tin, and coal are also plentiful, and thus a large mining population has been attracted to the country, which consumes much of the produce of the agriculturists.

3. Climate, Natural History, and Geology.

As Queensland extends only five degrees beyond the tropic, it of course possesses a more uniformly hot climate than the more southern settlements wholly in the temperate zone. It may, however, be doubted whether the heat is so oppressive as farther south, since Queensland is almost wholly free from the exceptionally hot winds from which the other colonies suffer; while their sudden and extreme changes of temperature are equally unknown here. During a large part of the year the weather is fine, the sky cloudless, the atmosphere dry and exhilarating. The three summer months—December, January, and February—are hot; and, as much rain falls at this time, tropical moisture and heat are combined. In all the coast districts the rainfall is great, being about 50 inches at Brisbane and Rockhampton, while at Rock-

ingham Bay it is 90 inches. Inland it decreases rapidly. At Gympie, about 30 miles from the coast, it is 44 inches ; at Nebo (70 miles), 21 inches ; while at Springsure, 160 miles inland, it is only 17 inches. At greater distances inland it is much less, and altogether uncertain, the Alice Downs, on the Thompson and Barcoo rivers, having about 10 inches, with excessive evaporation. The north coast has the regular tropical monsoons, giving about seven months dry and five months wet weather. The mean temperature at Brisbane is 69° Fahr., and the changes of the thermometer are far less extreme than at Sydney or Melbourne, while cool southerly breezes prevail throughout the year, so that the heat is rarely felt to be oppressive. Over by far the larger part of the colony frost and ice are unknown, while at Brisbane the winter is a most delightful season, with cool mornings and evenings, bright and warm days, the sky always blue, and the air wonderfully transparent. This colony is almost entirely free from epidemic diseases, and is very favourable to the European constitution, especially to those with a tendency to consumption. Although most of the mining districts are well within the tropics, the dryness and purity of the air are such, that Europeans pursue the laborious occupation of gold-mining as easily as in other parts of Australia.

The natural products of Queensland differ chiefly from those of New South Wales by the presence of a number of tropical forms, which everywhere intermingle with the usual Australian types. Thus, in the vegetation of Australia, we first meet with the screw-pines (*Pandanus*) at Moreton Island, in latitude 27° south, and Araucarias at Port Bowen, just within the tropic. The sea-coasts are chiefly tenanted by an Indian vegetation, including mangroves and Pandani. A little farther inland we have

many Indian genera of leafy trees, very different from the usual Australian type. This is hence called the "Brushwood" or "Cedar" country, and it also contains numerous Malayan forms, especially Cycas and palms of the genera Areca, Caryota, and Calamus. Bamboos and epiphytic orchids are, however, rare; and everywhere Eucalypti, Acaciæ, and other specially Australian forms, make up the bulk of the vegetation. Farther inland, over the elevated sandstone plains, is found a peculiar vegetation of small trees and shrubs, mostly of the families Capparideæ, Pittosporaceæ, and Sterculiaceæ, with Bauhinias, and the curious bottle-trees with swollen trunks—species of Delabechia and Brachychiton.

It was thought formerly that the flora of tropical Australia was poor in species as compared with the temperate portion; and this was decidedly the case when Sir Joseph Hooker published his *Introductory Essay on the Flora of Australia* in 1859. He estimated the known tropical species at 2200, and did not think that the total number would exceed 3000. Now, however (1880), Baron F. von Müller estimates the flora of Queensland alone at 3753 species, and there are many others in northern and western tropical Australia not found in Queensland. It is true that only about half of Queensland is, geographically, within the tropics, but the rich coast region where almost all the peculiar forms are found has an extent of more than 1000 miles tropical to about 350 extra-tropical; and the difference here is more nominal than real, as the scrub or forest from Moreton Bay in lat. 28°, to Keppel Bay on the line of the tropic, is almost as purely tropical as it is farther north.

An indication of the great difference between the vegetation of this region and that of temperate Australia generally is afforded by the large number of new genera

and even new orders of plants that meet the Australian botanist in the Queensland coast forests. No less than 214 genera are found here which are altogether wanting in the rich and peculiar flora of temperate Australia. The large portion of these are Indian or Polynesian forms, but a considerable number of the species are peculiar. Still more noteworthy is the fact that no less than twenty-two natural orders are found in Queensland and North Australia, which are either wholly wanting in the temperate regions or only send a single species into the northern parts of New South Wales. These orders are as follows:—Samydaceæ, Guttiferæ, Ochnaceæ, Malpighiaceæ, Burseraceæ, Anarcardiaceæ, Connaraceæ, Nepenthaceæ, Combretaceæ, Melastomaceæ, Leeaceæ, Balanophoreæ, Sapotaceæ, Aquifoliaceæ, Hydrophyllæ, Podostemaceæ, Scitamineæ, Apostasiaceæ, Burmanniaceæ, Taccaceæ, Nipaceæ, and Pontederiaceæ. Of the above only four—Anarcardiaceæ, Melastomaceæ, Scitamineæ, and Burmanniaceæ—are recorded from any temperate colony, a single species of each and in one case two species, extending their range from Queensland into the adjacent parts of New South Wales.

Although none of the mountains of Queensland are sufficiently elevated to produce an alpine vegetation, the isolated Bellenden Ker peaks, 5400 feet high, possess a species of Rhododendron and a beautiful Vaccinium, solitary outliers of northern types, a few of which are found also on the mountains of Borneo and Java, but in no other part of Australia.

The effect of this varied vegetation is very fine, and probably equals that of the forests of Brazil or Borneo. Here are giant figs with huge winding buttresses standing out on every side, elegant palms of many species, and gigantic tree ferns, covered with orchids and shading

beneath their spreading fronds shining-leaved shrubs and wax-flowered creepers. Epiphytal ferns—the “stag-horn” and “bird’s nest”—grow upon the stems of the tallest trees, like the capitals of the pillars of a giant temple. These trunks are often clad with the arum-like Pothos, and festooned with the “lawyer-palm,” a species of rattan, while the curious reed-like *Flagellaria indica* is sometimes drawn up to a height of more than 100 feet. Huge climbers, species of Wistaria, trumpet-flowers, passion-flowers, and many others, bind tree to tree with their rope-like stems and help to form the dense screen of foliage at a height of 150 feet overhead. Among the many beautiful flowers and fruits which adorn the Queensland “scrubs,” as these grand forests are termed by the settlers, are a beautiful myrtle (*Eugenia Moorei*) whose branches are literally clad with deep crimson flowers having a rich velvety appearance, while a tree allied to the Acacias has scarlet blossoms with long fringe-like stamens. The fruits, too, are often highly ornamental. Some are vermillion, others blue, while those of the *Acronychia Baueri*, a tree belonging to the rue family, are white, and produced in immense clusters. The “bat-and-ball” tree, one of the cinnamon tribe, has bright scarlet fruits which resemble cricket-balls; while those of the native plum, a species of Achras, are of a rich purple.

It is often said that Australia possesses no wild eatable fruits, but this hardly applies to the native flora of Queensland. Davidson’s plum, the fruit of a tree of the same order as our currants but as large as a duck’s egg, is excellent for cooking. The Herbert River cherry, produced by one of the usually poisonous Euphorbia tribe, resembles a juicy acid cherry and makes good preserve or jelly. There are several native limes (*Citrus*), the

native cumquat, produced by a tree of the rue tribe, and several fruits of the genus *Eugenia* are excellent for preserving. There are also some nuts which have sweet almond-like kernels, though their outer cases are usually so hard and stony as to make it difficult to get at them.

In the animal world there is no such striking difference. There are few peculiarly tropical forms of mammals in Australia, except a *Cuscus* allied to those found in the Moluccas and New Guinea, two species of tree-kangaroos only found elsewhere in New Guinea, and a sea-cow (*Halicore*) allied to that of India. There are several distinct species of the various groups of Australian mammalia, and no doubt others will be discovered when the dense forests of Northern Queensland are thoroughly explored; but with the few exceptions already stated, there appears to be little difference between the mammals of temperate and tropical Australia. The great fruit-eating bats of the genus *Pteropus* are, however, almost exclusively tropical, and they are formidable enemies of the fruit-growers, since they congregate by thousands wherever ripe fruit is to be found.

In the interior plains of Queensland the various species of kangaroos increased so enormously, owing it is thought to destruction of their only enemies the dingos and eagles, that they completely destroyed the grass over thousands of square miles of country. About 1880 an Act was passed offering a bonus for their destruction, and in about five years no less than 6,000,000 were paid for. By setting up converging fences, and by organised driving parties as many as 3200 have been slaughtered in one day.

Owing to its great variety of surface and the luxuriance of its forests, Queensland is probably richer in bird-life than any other part of Australia; and out of a total of about 700 species, it is believed that 600 are

found in this colony. Of specially tropical forms there are a few in the northern portion of the country, where are found species of *Manucodea*, *Chlamydodera*, and *Ptilorrhis*, allied to the Paradise Birds of New Guinea, the latter commonly known as "rifle-birds." Here also is a species of Cassowary allied to those of New Guinea and the adjacent islands, and also species of *Megapodius* or mound-builders, curious birds allied to the brush-turkey of New South Wales. Of the kingfisher family Queensland possesses a few peculiar species, and quite in the north one of the beautiful racket-tailed kingfishers, found also in New Guinea and perhaps a visitor from that country. Two groups, the parrots and the pigeons, are very abundant in Australia generally, but much more so in New Guinea and the Moluccas; and tropical Queensland partakes somewhat of the richness of the latter region.

In reptiles also Queensland supports its tropical character by the abundance and size of its various species. Snakes are very numerous, and about half the species are venomous, some, especially those usually known as the Black Snake, the Brown Snake, and the Death Adder, being especially so. The largest snake of all, the Carpet Snake, is allied to the pythons, and is not venomous, but as it is sometimes found 20 feet long, and comes to houses in search of fowls, it is somewhat alarming. Lizards of many varieties, and some of large size, are also common, and there is abundance of turtles both in salt and fresh water. Alligators, too, abound in all the less frequented tropical rivers. They sometimes kill cattle and are dangerous to incautious bathers, but as civilisation advances these noxious animals will become less abundant, and will ultimately be exterminated.

In insects, too, there is a great change in the numbers,

size, and colour of the butterflies. The golden-green bird-winged butterfly (*Ornithoptera*) is found all through Queensland, and even as far south as Richmond River in New South Wales ; but its small size, in comparison with its Papuan relatives, betrays the inferiority in climate and vegetation ; and on the whole, the butterflies of Northern Australia are far inferior in variety and beauty to those of the Moluccas and New Guinea. In Coleoptera or beetles Australia is very rich, and differs greatly from the Austro-Malayan fauna ; and this difference appears to pervade the tropical as well as the temperate regions. The Australian weevils (*Curculionidæ*) abound in large and peculiar forms, while the allied *Anthribidæ*, which abound in Austro-Malaya, are almost unknown even in the most tropical parts of Australia.

The geology of Queensland has been tolerably explored by travellers and colonial geologists. The eastern and northern portions consist of ancient formations, producing coal, gold, granite, slate, and basalt ; while the western interior is largely covered with soft cretaceous rocks, alike unproductive of minerals and deficient both in water and tree vegetation, except where they are covered by basalt, which always produces good soil and supports dense forests. The ranges next the coast are granitic, those farther inland of Palæozoic rocks, and it is in the intervening country that the coal formations are developed. Granite extends with little interruption from Cape York in the extreme north to Broad Sound in lat. 22° S., with patches farther south. It rises to 2500 feet high on Hinchinbrook Island in lat. $18\frac{1}{2}^{\circ}$ S. At the Ravenswood gold-field (200 miles west of Repulse Bay, in the upper valley of the Burdekin River) the formation is described as syenitic granite. It has been estimated that one-sixth of the area of the colony is granitic. Metamorphic rocks

occur near Brisbane, and at the gold-mines to the north. Palæozoic rocks are very extensive. The carboniferous cover 14,000 square miles and the Devonian 40,000, the latter extending 200 miles inland between lat. 18° and 29°. They are found at the Gympie gold-fields on the Mary River, and are of immense thickness from the Burdekin to the Gilbert rivers. The Mesozoic formations are better developed in Queensland than in any other part of Australia. In the southern part of the colony there is an Oolitic coal-field, with fresh-water and estuarine deposits. Rocks of similar age occur on the Barcoo and Thomson rivers far in the interior; while in the west and north-west are vast cretaceous beds, believed to extend over an area of 200,000 square miles, or one-third of the entire colony. Both deposits contain numerous marine shells of the same genera as occur in the Oolitic and chalk formation of Britain. We have here a probable explanation of the curious fact of the poverty and want of specialty in the tropical fauna, and in a less degree, in the tropical flora of Australia; for if so much of the tropics was beneath the sea during the cretaceous period, there may have been no room for special tropical forms to be developed; and when the area in question became dry land it was at once overrun by such of the specialised temperate forms as were suited to it, and by a number of waifs and strays from the tropical lands to the north, thus producing that intermixture of types and want of special character which are now its most prominent features. The coal formations of Queensland are very extensive and of great prospective value, some of the coal having been proved to be of good quality. It consists of Palæozoic or true coal, found in the central parts of the colony about the Mackenzie and Dawson rivers; while farther south, near Brisbane, and on the Upper

Darling, there are almost equally extensive and valuable deposits of Mesozoic age.

Volcanic rocks abound, covering more than 30,000 square miles, and forming open basaltic downs, dome-shaped hills, peaks, or tabular ranges, with precipitous ravines often bounded by ranges of prismatic columns. True volcanic cones also abound in the Dividing Range, extending as far north as the York Peninsula. Well-defined craters and ancient lava-streams are often found, especially about lat. 20° near the Burdekin River. Signs of very recent volcanic action are to be seen in the Murray Isles off Cape York.

Tertiary formations cover about one-fourth of the colony, consisting of conglomerates and desert sandstone. The latter often renders a country uninhabitable, the loose surface being blown or washed into parallel ridges, sometimes forming hilly undulations, at others furrow-like ripples, and almost wholly barren. This sandstone is usually conformable to the cretaceous rocks beneath. When ferruginous it forms the singular flat-topped hills of Central Australia, and near the Cloncurry River in the north reaches 3000 feet above the sea. These sandstone hills are often very picturesque, and have been compared by the explorers to ruined castles or the wild pictures of Salvator Rosa. Gorges and precipitous escarpments abound, with vertical walls 600 or 1000 feet deep, and occasionally even 1800 feet, according to Leichhardt's estimate.¹

Mr. Jack, the Government geologist, considers that this remarkable formation once covered three-fourths of Queensland, since fragments of it are to be found from the Cape York peninsula to the extreme south-west. Opals are found in it in nodules of ferruginous sand-

¹ For a reference to the error on Leichhardt's map as to cliffs "3800 feet high" on the Alligator River, see Chapter II. p. 19, footnote.

stones, but hardly any fossils except a few plants and shells, quite insufficient to determine the geological age of the deposit. It may be either Upper Cretaceous or Tertiary.

Over a large portion of Queensland alluvial deposits or drifts occur, many of which are very rich in remains of extinct mammalia, similar to those found in the cave deposits of New South Wales. They are, however, restricted in the south to valleys descending westerly from the coast dividing range, towards the Darling and Murray rivers. They form the banks of watercourses near the summit of the range, and extend down them to the level plains of the Condamine River, where they attain a depth of more than 100 feet, fragments of bones having been obtained at that depth while sinking wells. In Central Queensland, however, rich bone drifts are found on streams flowing easterly from the Peak downs.

The general conditions under which the bones are found indicate that what are now broad valleys and plains were originally extensive marshes with water-courses flowing westward into lakes, and that the gradual filling up of the lake-beds with drift and the deepening of the channels of the rivers which drain the country, joined perhaps with a decrease in the rainfall, have combined to change a swampy country covered with coarse weedy vegetation into open down and plains, producing short grasses totally inadequate for the support of animals with the heavy frames and peculiar teeth which characterised many of the large extinct species. In the Brisbane Museum there are the remains of no less than 40 distinct species, among which are seven kangaroos allied to living kinds, but some of them of gigantic size, twelve species more allied to the tree-kangaroos, also containing some of huge size, the huge Diprotodon and

Nototherium, rivalling the elephant and rhinoceros in bulk, and many others.

Mr. A. C. Gregory, in his Report on the Geology of South-Eastern Queensland (from which the above facts have been chiefly taken) states that there is no trace, either in the Darling downs or elsewhere, of any violent convulsion of nature which would be adequate to cause the total destruction of the huge Diprotodon and its allies, and that it seems most probable that their extinction was due to a gradual change of climate and vegetation, acting injuriously on the larger and more slowly moving species, and proportionally favouring the smaller and more active, and especially those which were capable of thriving on a drier and more scanty herbage. There is a curious fact stated by Mr. Gregory in support of this view. The fossil bones are only found in the detritus of basaltic rocks, while alluvium of the same age derived from carbonaceous and devonian rocks contains no such remains. Now it is a well-known fact that basaltic *débris* produces a more luxuriant vegetation than that of the other rocks, and thus, during the long period this *débris* was forming, and there was abundant moisture, the gigantic forms of marsupials were developed, to become extinct when these favourable conditions passed away.

The extinction of the larger forms while smaller representatives of the same group continue to exist in the same area, is a phenomenon that has been repeated throughout all geological periods and in every part of the world, and it is therefore probably due to some general cause acting in conjunction with a change to less favourable conditions. Such a cause appears to be found in the general principles on which variation and the struggle for existence act in the modification and extinction of species. So long as conditions become more and

more favourable to a particular type it may become larger and larger, because mere size and strength may be an advantage in the struggle, and may enable it to monopolise the best and most abundant food; and during this process it may also become modified in various parts of its organisation in special adaptation to this food. But directly an adverse change of conditions occurs these large and highly specialised animals will be at a double disadvantage. In the first place, a mere diminution in the quantity of food at any time of the year will cause numbers to die of starvation where smaller animals might be able to live. Secondly, these large animals are always in far less numbers than smaller species, and breed far more slowly; and as the possibility of modification of structure (of size, of teeth, or of stomach) depends primarily upon the occurrence of favourable variations in considerable numbers, a species whose population is a hundred or a thousand times as great to begin with, and which breeds ten or twenty, or even a hundred times as fast—as is certainly the case with the rabbit or the guinea-pig as compared with the elephant or rhinoceros—will have a hundred or a thousand times the chance of being modified by variation and natural selection rapidly enough to save itself from extinction when conditions are becoming unfavourable. This consideration will render it less difficult to understand how it is, that, when large numbers of animals have recently become extinct—as in Australia, in the pampas of South America, and also in Europe—it is the gigantic species which have always entirely disappeared, while the smaller forms have either survived or have been replaced by modified descendants.¹

¹ This explanation was first given in the present writer's work on "The Geographical Distribution of Animals" (vol. i. p. 158).

The Great Barrier Reef of Australia belongs entirely to Queensland, and is one of the most remarkable geological and geographical phenomena in the world. It is 1200 miles in length, and extends along the whole eastern coast from opposite Port Bowen in lat. 23° to Torres Straits. Near its southern end it is 70 miles wide, and nearly 100 miles from the coast; but it is generally of much less width, and the channel between it and the shore usually varies from 5 to 15 miles wide. The navigation is dangerous for ships owing to the numerous sunken reefs. Here and there are openings to the ocean, some very narrow, some 10 or 12 miles wide; and it contains examples of all the various kinds of reefs—atolls, fringing reefs, and other coral formations. The portion of the reef above water, with its numerous islands, is estimated to cover an area of 30,000 square miles. Its outer margin probably indicates the position of the ancient coast-line of Australia. This was fringed with coral reefs, but as the land sank the coral animals continued to build upwards to the level of the sea, and thus a great ridge was formed, which, broken and heaped up by the waves of the Pacific, forms the present huge barrier. Fresh water is very inimical to coral, and openings are thus formed in all fringing reefs at the mouths of rivers. These openings remain in the Barrier Reef, the largest being opposite the mouth of the Burdekin River which drains a considerable portion of tropical Eastern Australia.

4. Population.

Owing to its fine climate, and the mixture of mining adventure with the culture of tropical products, Queensland has attracted to itself a more varied population than most of the other colonies; and this may be said to consist

of four distinct races,—the *White*, the *Yellow*, the *Brown*, and the *Black*. The *White*, or Europeans and Americans, are by far the most numerous, forming about nine-tenths of the whole; then come the *Yellow*, or Chinese and Japanese, forming about two-thirds of the remainder; the *Brown*, or Polynesian labourers (most of whom are, however, Melanesians, and nearly black), forming the other third. This is exclusive of the *Black*, or aboriginal Australians, whose numbers are unknown, but who are probably more numerous than the Chinese and Polynesians combined. The rate of increase has been very rapid. Soon after the formation of the colony, in 1860, the population was 28,056; in 1870 it had increased to 115,567; and in 1880 it had reached 213,525. Of these about 17,000 were of various non-European races.

By the recent census of 1st May 1886, the total population was found to be 322,853, of which 190,344 were males and 132,509 females. The Chinese numbered 10,500, of whom only 56 were females; Polynesians 10,165, of whom 987 were females; and other alien races numbered 1164, of whom 50 were females. These figures show a surplus of more than 68,000 males in the European population alone, but now that the country is becoming more populated this unfortunate difference in the numbers of the two sexes will no doubt, as in the other colonies, steadily decrease. The estimated population at the end of 1889 was 406,658, including Chinese and Polynesians.

5. Productions and Trade.

Queensland is pre-eminent in such tropical products as sugar, rice, maize, sweet potatoes, etc., and these may be considered its specialties. The fine climate and soil,

and abundant moisture of Queensland, make it adapted for a variety of crops. Even wheat is grown largely, 8000 acres being under this crop in 1889, besides more than 20,000 acres of this and other grain grown for hay or green food for stock. The crop of maize covered nearly 100,000 acres; cotton, 50 acres, and sugar-cane, 2500 acres. Arrowroot, tobacco, oranges, grapes, bananas, and pine-apples are also grown in considerable quantities, and the cultivation of these products is increasing.

The number of sheep in 1889 was over 14,000,000, a very large number considering the comparative newness of the industry and semi-tropical character of the country. Though only between a third and a fourth of the number in New South Wales, it is more than double that of any other colony. Much of the country is, however, better suited for cattle, which appear to thrive in every part of it, and in this kind of stock it takes the highest rank, having nearly 5,000,000 in 1889, while New South Wales had less than 2,000,000. Hence it exports large quantities of hides, tallow, and preserved meat, besides great numbers of animals driven for sale into New South Wales.

The colony is very rich in forest trees adapted for house- and ship-building, or for ornamental cabinet work. It has numerous hard-wooded pines; also cedars, yellow-wood, satin-wood, native orange, sandal-wood, ebony, iron-wood, and many other kinds which are close-grained and beautiful, as well as the Casuarinas and Eucalypti of the other colonies. Large quantities of timber are exported, and the supply is practically inexhaustible.

The mineral resources of Queensland are large, and are being rapidly developed. Gold was first discovered in 1857, in the Canoona district; but it was not till ten years later, in 1867, that the rich Gympie mines, on

the May River, were worked; and since then many others have been found, especially in the north. The Canoona district, near Rockhampton, is rich; and in the north are the Ravenswood, the Gilbert, the Palmer River, and the Cloncurry mines. From 1860 to 1875 the gold exported from the colony was valued at nearly £7,000,000. In 1889 the auriferous quartz reefs were over 2000 in number, and over 15,000 square miles of auriferous ground was being worked. The gold produced amounted to 739,000 oz., and the value to more than $2\frac{1}{2}$ millions sterling. This is more than has been produced by Victoria in any year since 1884, so that Queensland now takes the first place as a gold-producing colony. This is of course partly owing to the rush of miners to the numerous new gold-fields, and may not be permanent. Copper is also extensively worked, the mines having produced about £12,000 worth of ore in 1890. Tin was produced to the value of £120,000; also a little antimony and cinnabar. Coal is very abundant, but is not yet very largely worked. The coal-beds are estimated to extend over a surface of 24,000 square miles. During 1889 eleven mines were at work, and produced 265,000 tons, valued at £121,000. The pearl-fishery is now engaging considerable attention on the northern coasts, both native and European divers,—the latter with diving apparatus and dresses,—being employed.

In 1889 the exports of the colony amounted to nearly 7 millions sterling. Among the manufactories are numerous iron and tin works, sugar-mills, steam saw-mills, soap-works, tanneries, agricultural instrument manufactories, steam-engine works, railway-carriage works, brick-works, and cooperages, and many others. The shipping returns show for the year ending 30th June 1889,—inward, 506,000 tons; outward, 494,000 tons.

There are registered in the colony 32 ocean steamers and 58 river-going steamers.

6. Roads, Railways, and Telegraphs.

There are about 10,000 miles of public roads in Queensland, which are kept up at a considerable expense, so that this colony seems better provided than some of the others. Its extent, however, is so vast, that much of the interior must be entirely unprovided with roads.

There are at present but few railways. The Southern and Western Railway extends from Brisbane through Ipswich to the small town of Charleville, a distance of 483 miles; and a southward branch to Stanthorpe on the borders of New South Wales and 184 miles from Brisbane. The Central Railway runs from Rockhampton to Barcaldine, a distance of 370 miles, with a branch from Emerald to the Clermont mining district, a distance of 62 miles. Another line runs north from Brisbane through Gympie to Maryborough and Bundaberg and thence to Mount Perry. In the north there is a line from Townsville to Hughenden, a distance of 233 miles, and there are several other short lines and branches. Coaches run from the railway stations to the principal towns, and communication along the whole coast is kept up by steamers.

The electric telegraph is laid to every town in the settled districts, and there is also communication with all the Australian colonies and with Europe. An overland line also connects Brisbane with Somerset, near Cape York, and with Kimberley, at the head of the Gulf of Carpentaria, 1425 miles distant; and it is hoped that an additional submarine cable may be laid to this point, so as to offer an alternative line between Australia and

Europe. The cost of construction of these telegraphs amounted, up to 1890, to more than £800,000; and the working over such an extensive area shows an annual loss.

7. Government, Religion, Education, etc.

The government of Queensland is carried on by a Governor and two Houses of Parliament, called respectively the Legislative Council and the Legislative Assembly. The thirty-nine members of the former are nominated by the Crown for life, while the Assembly consists of seventy-two deputies chosen by £10 householders for five years. Even Chinese, Polynesians, and Aborigines, have the vote if they have the requisite qualification and are naturalised British subjects. Since 1889 members of Parliament are paid £300 a year and travelling expenses.

Religion is now free in Queensland, state aid to any denomination having been abolished in 1860; but ministers are registered to enable them legally to celebrate marriages. According to the statistics of the census of 1886, the proportions of the various churches were—113,000 Church of England, 100,000 Dissenters, and 76,000 Roman Catholics. This, however, probably gives an undue preponderance to the Church of England, as we have seen to be the case when, in the other colonies, we had the statistics of church accommodation.

Education in this colony is free and secular, religious instruction only being given by ministers or others out of school hours. Primary schools are either wholly supported by the Government, or are assisted by it. The formation and maintenance of higher schools in any locality is also aided by the State. The whole system of education is controlled by a Department of Public Instruc-

tion under a Minister for Education. According to the census return, about two-thirds of the entire population can read and write. There are also numerous Grammar Schools, Schools of Art, Free Libraries, and Miners' Institutes in Queensland, as well as several Public Hospitals, and Orphan Asylums. These are supported by private contributions, and are assisted by the State.

Criminals are made to grow sugar and tobacco on St. Helena Island in Moreton Bay, the result being that the cost of their maintenance is reduced to £3 or £4 a head for the year.

8. Political Divisions.

Queensland is divided into twelve large districts, mostly characterised by distinct natural features. The older settlements are also divided into counties; but, for most purposes, the districts are alone referred to. They are as follows:—

The MORETON District is bounded on the south by New South Wales, on the west by the Dividing Range, and on the north by the Wide Bay District. It has an area of 7700 square miles, and comprises the counties of Ward, Churchill, Stanley, Cavendish, and Canning. It contains the city of Brisbane and the town of Ipswich. It probably contains about one-third the population of the whole colony.

The DARLING DOWNS District includes an extensive tract of upland country to the west of the Moreton District. It is the richest pastoral region of the colony, and also comprises much of the finest agricultural land. Wheat, maize, barley, oats, arrowroot, potatoes, and all kinds of vegetables, are cultivated. It comprises the counties of Merivale, Aubigny, Bentinck, Marsh, Derry,

Lytton, Bulwer, Rogers, Elgin, Pring, and Carnarvon. The towns are Condamine, Dalby, Bowenville, Kogan, Leyburn, Goondiwindi, Warwick, Drayton, and Toowoomba.

The BURNETT and WIDE BAY District lies north of the Moreton District and south of Port Curtis. It is chiefly



SQUATTER'S STATION, DARLING DOWNS.

pastoral, but much tropical produce is grown, especially sugar, on the river flats. At Gympie are valuable gold-mines, and coal has been worked on a branch of the Mary River. It comprises the counties of March, Lennox, Fitzroy, Mackenzie, Newcastle, Wicklow Bowen, and Cook. Maryborough, on the river Mary, is the port. Gympie, Gayndah, and Nanango are other towns. The

western and south-western parts are mountainous, and the area is about 7050 square miles.

The PORT CURTIS District lies northward of the last, from which it is separated by the Dawes Range; and it stretches westward into the interior, with an area of 14,000 square miles. It comprises the counties of Flinders, Clinton, Pelham, Raglan, Deas, Thompson, Packington, Livingston, Liebig, and Palmerston. The chief towns are,—Rockhampton on the Fitzroy River, Gladstone, Yaamba, Marlborough, and Gainsford. In the north-west are mountains 3000 feet high. There are important gold-mines on the Calliope, Boyne, and Fitzroy Rivers, and also some copper-mines; and marble quarries are worked near Gladstone.

The LEICHHARDT District is a large tract of pastoral country, with abundance of grass and water, lying to the westward of Port Curtis. It contains some gold and copper mines. The chief towns are Banana, Plainby, and Taroom.

The MARANOA District is purely pastoral, to the west of the Darling Downs and south of the Leichhardt. It is chiefly table-land and open downs. The towns are Roma, Surat, and St. George.

The KENNEDY District is situated to the north of Port Curtis. It extends 350 miles along the coast, from Cape Palmerston to Rockingham Bay, and inland to Mount Remarkable, 170 miles from the mouth of the Burdekin River. It is well watered, and has extensive pastoral tracts, as well as much land suited to the growth of sugar, maize, and cotton. Its chief town is the port of Bowen, in Edgecumbe Bay. Its other towns are Cardwell, Townsville, and Mackay.

The MITCHELL District lies in the interior, to the west of the Leichhardt. It is entirely pastoral, and very little

settled. Tambo, on the head waters of the Victoria or Barcoo River, is the chief town.

The WARREGO District is in the southern interior, west of the Waranoa. It is entirely pastoral, and little settled. Charleville, on the Warrego River, is the chief settlement.

The GREGORY District is in the far interior, to the west of Warrego and Mitchell. It is purely pastoral, but almost unknown. Cooper's Creek runs through the southern part of it, and Burke and Wills's Creeks more towards the centre. This country has a melancholy interest from its being the scene of the death of the explorers Burke and Wills.

The BURKE District is an enormous tract, occupying the whole north-western part of the colony to the Gulf of Carpentaria. It is watered by numerous rivers, among which are the Norman, Gilbert, Staaten, Flinders, Albert, and Nicholson, all emptying themselves into the Gulf. Some portions are in the hands of squatters for grazing purposes, but very little is occupied, the whole population being a few thousands, while the area is more than 120,000 square miles. It contains the Cloncurry gold-field and copper-mines, and the settlements of Normanton, on the Norman River the present terminus of the overland telegraph, Burke Town on the Albert River, and Chandos on the Leichhardt River.

The COOK District occupies Cape York Peninsula and the extreme northern portion of the colony. It is watered by the Mitchell, Kennedy, and many smaller rivers. The chief settlements are Cooktown, at the mouth of the Endeavour River; Cairns, a seaport on Trinity Bay with a fine harbour, and connected by a good road with the Hodgkinson gold-field; White Island Point, another good port about 40 miles north of Cairns; and Somerset, the

most northern town in Australia, situated at Cape York, and the head-quarters of the missions to New Guinea and the islands of Torres Straits. Thursday Island, a small island off the west coast of Cape York, has, however, recently been settled by the Government as a more healthy and advantageous site than Somerset, being in the track of all vessels sailing through the Inner Channel, serving as a harbour of refuge, and being much frequented by the pearl-fishers. About 120 boats are engaged in the pearl-fishery on the surrounding coasts and islands. The climate is very healthy, a cool south-east wind blowing the greater part of the year, and the temperature rarely exceeding 90°—quite moderate for Australia. The Cook District is, however, chiefly celebrated for its gold-mines, the most important of which are known as the Palmer River and the Hodgkinson gold-fields. The former are situated near the centre of the district, on the upper waters of the river Palmer, a tributary of the Mitchell. They comprise the Palmer, Normanby, and Cook diggings, covering a distance of 70 miles. Cooktown is the nearest port, 45 miles from Normanby. Besides gold, there is tin in the neighbourhood, and coal near the coast. There is also much good land, so that all the elements exist for the support of a thriving population. There are a large number of Chinese and Europeans at these mines; but the natives are troublesome, having speared many of the miners. They are said to be a fine race, far superior to those of the south. The Hodgkinson gold-field lies about 60 miles farther south, and about the same distance from the coast. It was only opened in March 1876, yet roads have been made, towns built, over 1000 square miles of country prospected, and large quantities of gold procured. The reefs are very numerous and rich. There are nine quartz-crushing machines at work, and many

more are expected. Eight townships have been formed, containing about fifty-five licensed hotels, and all kinds of shops, including jewellers, news-agents, circulating libraries ; together with doctors, lawyers, barristers, and all the various components of a settled community, brought together in the centre of a tropical wilderness, in less than one year, by the magic power of gold. It has a considerable but fluctuating population. There are a very large number of Chinese at the Palmer River.

9. Cities and Towns.

BRISBANE, the capital of Queensland, and an episcopal city, is situated on the river Brisbane, about 25 miles from its mouth in Moreton Bay. It is 500 miles north of Sydney, in south latitude $27^{\circ} 28'$, and east longitude $153^{\circ} 6'$. It was originally settled in



PARLIAMENT HOUSE, BRISBANE.

1825 as a penal station. In 1842 the colony was open to free settlers, and from that time the city made rapid progress. The population, by the census of 1886, was 32,567, with the suburbs 73,649. The Roman Catholic cathedral is a fine building, and the new Houses of the Legislature have cost £100,000. The Viceregal Lodge is very handsome. There is a noble iron bridge over the river, more than 1000 feet long, with two swing openings of $60\frac{1}{2}$

feet wide each, to allow the passage of ships. The botanical gardens of Brisbane are laid out with great taste, and are excellently kept, and the almost tropical climate permits of a variety of interesting plants being grown in the open air, which elsewhere have to be separated in different hothouses. Here may be seen the sugar-cane, the tea and coffee shrubs, the Paraguay tea (*Ilex paraguayensis*), the Tolu-balsam tree (*Myroxylon toluifera*), the Malayan india-rubber tree (*Urceola elastica*), and many other interesting plants of the tropical and sub-tropical zones. The Queen's Park, Victoria Park, and Bowen Park also supply means of recreation to the inhabitants of Brisbane. The city is supplied with water from the hills near the head of the Enoggera Creek, almost 7 miles off, and the works have cost nearly £100,000.

Although Queensland has but a small capital city as compared with New South Wales or Victoria, it possesses a rather large number of considerable towns with between 5000 and 10,000 inhabitants.

IPSWICH (population at last census 7576), though not the most populous of these, is considered to be the second town in the colony. It is situated at the head of the navigation of the Bremer River, 25 miles west of Brisbane, and is the capital town of the district of West Moreton. It is pleasantly situated on the slopes of three hills, and is very healthy. The surrounding district is agricultural, but some rich seams of coal, which crop out on the surface, have been worked on the banks of the Bremer and Brisbane Rivers. There is a woollen manufactory in the town. It is connected with Brisbane by railway.

MARYBOROUGH (population 9281) is situated on the river Mary, 25 miles from its mouth, and 180 miles north of Brisbane. It is the port of shipment for most of the produce of the Wide Bay and Burnett Districts, of which it is the chief town. There is here a wooden bridge over the river one-third of a mile long. Sugar is cultivated on the rich land on the banks of the river, and there are several large sugar-factories. Timber is also largely exported, and there are large iron-foundries and soap-manufactories. The produce of the Gympie gold-field all comes to Maryborough for export.

ROCKHAMPTON (population 10,793) is an important town on the Fitzroy River, 45 miles from its mouth, and 420 miles north-west of Brisbane. It originated during the gold rush to Port Curtis,

and is now the port of shipment for a wide extent of country, and for some of the produce of the Peak Davis copper and gold mines. It is the starting-point of the Central Railway, which at present extends to Barcaldine, a distance of 370 miles. There is much mineral wealth in the neighbourhood,—gold, copper, and silver mines being worked at various places within 40 miles of the town. Four miles off are large meat-preserving works, employing 100 hands. There is much good grazing-land in the vicinity, which is being rapidly stocked.

GYMPIE is a large straggling gold-fields town, prettily situated on hilly ground, on the upper waters of the May River, 116 miles north of Brisbane and 54 south of Maryborough. Gold was first discovered here in 1867, and the town has now about 7600 inhabitants. The Gympie mines have already produced gold of the value of more than 2 millions, and are still very productive. The country round is known to contain copper, silver, antimony, cinnabar, bismuth, and nickel, as well as coal; but these have not yet been worked. There is also much good pastoral and agricultural land.

TOOWOOMBA is the principal town of the Darling Downs, situated on the summit of the range, 1940 feet above the sea-level, 102 miles west of Brisbane. The population is over 6000. Wool, wheat, maize, and potatoes are the chief products of the district, which is exceedingly rich agriculturally.

Of towns with between 1000 and 5000 inhabitants there are comparatively few in Queensland.

BOWEN, a seaport town on an inlet of Edgecumbe Bay, known as Port Denison, 725 miles north-west of Brisbane. It is in the county of Herbert, and is the outlet of a large area of pastoral country. The harbour is one of the best on the east coast of Australia. There is a good coal-field within 60 miles. The population in 1886 was about 1000.

BUNDABERG, a port and municipality on the Burdett River, 10 miles from its mouth. It is in the county of Cook, and 272 miles north of Brisbane. The land in the vicinity is very rich, and the staple exports are sugar and maize. Here is the largest sugar factory in the colony, where 90,000 gallons of cane-juice can be treated daily. The population is about 4000.

CAIRNS, a seaport in the county of Nares on Trinity Bay, with a fine harbour. It is 900 miles north-west of Brisbane, with which it

communicates by regular steamers. It is the outlet for the Mulgrave, Croydon, and Etheridge gold-fields, and the Herberton and other tin-mines. It is surrounded by some of the best sugar lands in Queensland, and there are several large factories. Tobacco, as well as bananas and other fruits, are also cultivated. Population about 1500.

CHARTERS' TOWERS is a mining town of about 3300 inhabitants, 820 miles north-west of Brisbane and 90 miles inland from Townsville in Cleveland Bay. The monthly yield of gold here is very large.

COOKTOWN, situated on the northern bank of the Endeavour River, 1050 miles north-west of Brisbane, was established in 1873, and is already becoming one of the most important ports in the colony. It has a resident population of about 3500 whites and a few hundred Chinese. It has a custom-house and many fine warehouses and wharves. It is the port for the Palmer River gold-fields, and is visited by three lines of ocean steamers, giving it a constant communication with the other colonies and with Europe.

DALBY, on the Darling Downs, 1120 feet above the sea-level, and 140 miles from Brisbane by the Western Railway, is the centre of a large tract of rich agricultural and grazing country. Its population was 1317 in 1886.

GEORGETOWN, in the county of Gilbert, 1100 miles north-west of Brisbane, is a mining town near the Etheridge and Lane's Creek gold-fields. Copper and tin are also found in the district, and there is good pastoral land near. Population about 1500.

GLADSTONE, a small seaport town with a fine harbour, in the county of Clinton, 354 miles north-east of Brisbane and 91 south-west of Rockhampton. There is an alluvial gold-field near, and the land is suitable for maize, fruit, and sugar. Population in 1886 about 600.

HOWARD, a small town in the county of Cook, 18 miles by railway north-west of Maryborough, and the commercial centre of the Burrum coal-field, which is 20 miles in length. Population in 1886, 640.

HUGHENDEN, a small town on the Flinders River, in the county of Douglas, 90 miles south-west of Charters' Towers. It is the centre of a large pastoral district, the country round being taken up with sheep stations. Population about 1000.

MACKAY is a town and seaport of 4106 inhabitants, situated on the south bank of the Pioneer River, north of Broad Sound, and 625 miles north-west of Brisbane. It is in a pastoral and agricul-

tural district ; sugar, tobacco, coffee, and other tropical productions thriving here. Sugar and rum are largely manufactured.

MILLCHESTER is a mining town, only $2\frac{1}{2}$ miles from Charters' Towers, and 820 miles north-west of Brisbane. Population in 1886 was 1070.

MOUNT MORGAN, a mining town at the head of the Dee River, 28 miles S.S.W. from Rockhampton, and the site of the celebrated Mount Morgan mine, supposed to be the richest deposit of gold in Australia. The gold is found in a formation unknown elsewhere, "a drusy ironstone and siliceous sinter," supposed to be the deposit of an ancient geyser ; and the metal is of unprecedented purity, assaying 99·7 per cent. The yield from this mine in 1889 was over 323,000 ounces. The population round the mine is about 3000.

NORMANTON, in the county of Normanton, about 1380 miles north-west of Brisbane, is situated on the Norman River (about 25 miles from its mouth), near the Gulf of Carpentaria. Near the mouth of the river it forms a fine land-locked harbour, and on the north head is Kimberley or Karumba, the terminus of the overland telegraph. The country round Normanton is poor, but there is abundance of fine pastoral country in the district. There is a railway from Normanton to the Croydon gold-field about 100 miles distant. Population about 2000.

PORT DOUGLAS, in the county of Cook in York Peninsula, is situated on Trinity Bay, about 70 miles south of Cooktown. It is the seaport of the Hodgkinson and Etheridge gold-fields, and of the Herberton and Tati tin-mines. There is much good land near, suitable for growing tropical produce, and large areas have been occupied for agricultural purposes. Population in 1886 about 640.

RAVENSWOOD is a mining town of about 2000 inhabitants (many of them Chinese), near the sources of the Burdekin River, and 50 miles from Millchester and Charters' Towers. There are many gold-reefs here, and numerous mines in the surrounding country, for which this town forms a centre.

ROMA is a town of 1727 inhabitants (in 1886), on the Western Railway, 330 miles north-west of Brisbane. It is in a fine pastoral district, well stocked with sheep and cattle. The vine and orange are also largely cultivated, as well as other agricultural produce.

SANDGATE, a watering-place on the shores of Moreton Bay, 12 miles north of Brisbane. Population about 1500.

SOUTHPORT, a watering-place at the mouth of the Nerang River, 46 miles south-east of Brisbane. The governor has a marine resi-

dence here. It is surrounded by fine scenery, with good fishing, boating, and shooting. Population about 1000, but variable.

STANTHORPE is a town of about 1000 inhabitants, situated in the county of Bentinck, 184 miles south of Brisbane, and only a few miles from the New South Wales boundary. Its prosperity depends on the tin mines of the surrounding district. It is elevated and healthy, being 2656 feet above the sea, and there is much good grazing and agricultural land in the neighbourhood.

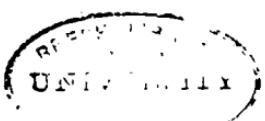
CHAPTER XIII

THE COLONY OF TASMANIA

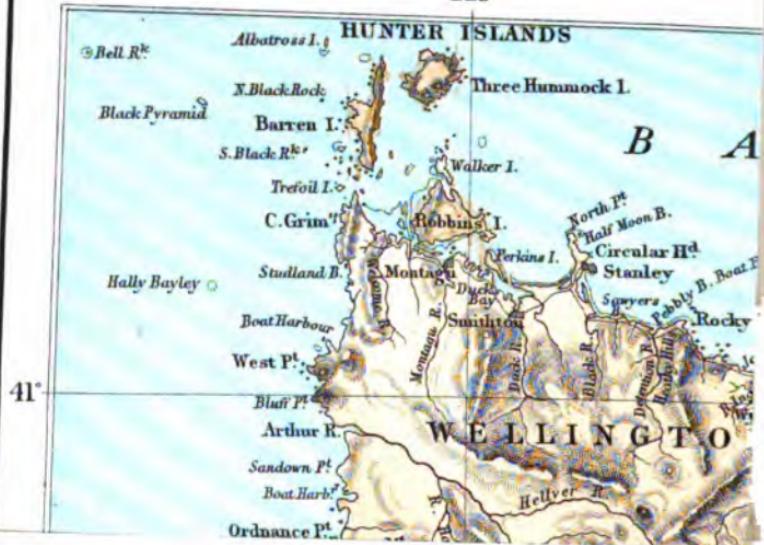
1. Origin, Position, Area.

THE insular colony of Tasmania is in many respects the most interesting, as it is certainly the most beautiful, portion of Australia. Originating as a convict settlement, in 1804, its settlers had many arduous struggles with bushrangers and natives, till the remnant of the latter were induced to surrender in 1832, and the convict system was finally abolished in 1853. It continued to be a dependency of New South Wales till 1825, when, on the petition of the inhabitants, it was made a colony, and in 1855 was granted a constitutional government.

Situated to the south of the most southern portion of Australia, from which it is separated by a strait 150 miles wide, Tasmania is far more temperate and equable in climate than any part of the mainland. It lies between $40^{\circ} 40'$ and $43^{\circ} 38'$ south latitude, and is about 200 miles long, and a little less in width, having the form of a semi-ellipse or heart; the base, which is somewhat hollowed out, to the north, and the vertex to the south, where the coast is more irregular. Its western extremity is nearly due south of Geelong, in Victoria, from which it is distant about 180 miles. Its area is



145°



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about 24,500 square miles, and its numerous dependent islands amount to an additional 1800 square miles, and its size will be better understood when it is stated to be somewhat smaller than Ireland and a little larger than Ceylon. Although the outline of Tasmania is generally even and well defined, it is broken up in detail, so as to afford many bays and inlets, and a number of good harbours. On the north are Port Frederick, Port Sorell, and Port Dalrymple; on the east, Great Swan Port; on the south, Port Arthur, Norfolk Bay, Cloudy Bay, Port Davey, and many others; and on the west (which is for the most part a rocky iron-bound coast) there is only one important inlet, Macquarie Harbour. There are in all 55 Tasmanian islands,—the most important being Flinders Island and Barren Island, at the eastern entrance to Bass's Straits; King Island, on the west; Robbins, Hunter, and the Three Hummocks, at the north-western angle; Schouten and Maria Islands, on the east coast; and Bruny Island, on the south. The 100-fathom line of soundings round Australia includes all these islands and Tasmania itself, indicating the former union of the two countries.

2. Physical Features.

Tasmania may be called the Switzerland of the south, and is perhaps the most thoroughly mountainous island on the globe. It can hardly be said to have any mountain ranges, but is one continuous series of mountains and valleys, peaks and glens. It is, however, divided into two unequal portions by an irregular series of valleys and plains, by which the railway from Hobart reaches the upper waters of the Macquarie River and thence descends to Launceston, the lowest point of the watershed being about 1200 feet above the sea. This divides the island into

two very unequal portions, that to the east of the railway being hardly more than one-fourth of the whole. Both portions are, however, equally mountainous, the second highest mountain on the island, Ben Lomond, being in the eastern portion. The highest mountains just exceed 5000 feet—Cradle Mountain in the north-west (5069), Ben Lomond in the north-east (5010)—but



MOUNT WELLINGTON.

there are no less than twenty named mountains above 4000, and about an equal number between 3000 and 4000; and these are pretty evenly distributed over the whole island, being found in the north-east, north-west, centre, and south. The south-eastern portion only is somewhat lower, but is equally mountainous, the heights ranging from 1000 to 3000 feet. We have here an

admirable example of the effects of sub-aerial denudation, or the eating away of a country by atmospheric agencies,—rain and running water, frost and ice, assisted perhaps by subterranean movements. The island was, doubtless, once a vast undulating table-land, the surface of which is generally indicated by the higher mountain tops now dotted over its whole surface. The valleys have been excavated in the softer or more decomposable rocks. There has probably been a subsidence towards the south-east, indicated by the lower elevation of the mountains, and by the islands, peninsulas, and generally broken character of the coast; though this has been doubtless partly caused by its exposure to the cold south-easterly winds and the waves of the Antarctic Ocean. In this direction is the great line of valleys, which affords the means of communication between the north and south of the island. In the north-east and west-central portions are extensive tracts of high table-land, from which rise the two highest of the mountain-peaks,—Cradle Mountain in the west (5069 feet), and Ben Lomond in the east (5010 feet).

3. Rivers.

Tasmania abounds in rivers, often navigable at their mouths, flowing amid fine scenery and magnificent forests, and often adorned with picturesque waterfalls. The largest is the Derwent, which rises in the central plateau, and enters the sea at Hobart Town; the Tamar, which receives its chief supplies from the north-eastern plateau, and, after passing Launceston, forms a fine estuary, into which flow the united waters of the Macquarie and the Esk. This is navigable for 40 miles from its mouth to Launceston, for vessels of 600 tons. The Heron, in the



HELL'S GATE, TASMANIA.

south, though a short river, is navigable, and has a noble estuary; the Davey River flows into Port Davey through the magnificent rock-bound narrows called Hell's

Gate ; the Gordon and the King Rivers, on the west, flow into Macquarie Harbour. In the north-west are the Pieman and Arthur Rivers ; in the north are a great number of small streams,—the Forth, the Mersey, and the Ringaroma, being the largest ; on the east the water-parting is very near the coast, and there are no rivers till we come to the Swan and Swanport in Oyster Bay, with the Prosser and the Coal River in the south-east.

4. Lakes and Scenery.

Tasmania shows itself to be a truly alpine region by the possession of numerous mountain lakes near the sources of its rivers. The largest are Great Lake and Lake St. Clair, in the central plateau, and forming the sources of the Derwent and its branches. The former is about 12 miles long, is 3820 feet above the sea-level, and has an area of 28,000 acres ; the latter is somewhat smaller, being 10 miles long and covering about 10,000 acres, and is 3240 feet above the sea. Arthur's Lake and Lake Echo are nearly as large, and about the same elevation, and there are a great many smaller lakes and mountain tarns. Most of these are very deep, situated in rock-basins, and owing their origin to the same causes which have produced the beautiful lakes of the European Alps, of Scotland, Cumberland, Wales, and other mountainous countries in the temperate zone.

All the larger lakes are situated in a wild central table-land about 50 miles across in every direction, and usually about 3000 feet above the sea - level. Being exposed to violent winds and an inhospitable climate, and surrounded or intersected by lofty peaks and ranges between 4000 and 5000 feet high, much of its surface

is bare of wood, and is still to a large extent uninhabited and even unexplored.

The scenery of Tasmania is picturesque and varied. Its higher mountains are snow-capped for a large part of



ON THE SOUTH ESK, TASMANIA.

the year, while their slopes and valleys are clothed with evergreen forests. Fine peaks, rocky precipices, rushing streams, and foaming cataracts alternate with fertile plains and valleys, or grassy uplands.

The Huon River is celebrated for its fine scenery, its mountain gorges, waterfalls, gigantic trees, and groves of tree-ferns. In almost every part of the island similar scenes are to be found in the wilder districts, and the following sketches by Mrs. Meredith will give an excellent idea of some of the aspects of Tasmanian scenery :—

"Our cattle track at length brought us into the enchanted valley Mr. Meredith had discovered, and not in my most fantastic imaginings had I ever pictured to myself anything so exquisitely beautiful. We were in a world of fern-trees, some palm-like and of gigantic size, others quite juvenile ; some tall and erect as the columns of a temple, others bending into an arch, or springing up in diverging groups, leaning in all directions ; their wide-spreading feathery crowns forming half-transparent green canopies, that folded and waved together in many places so closely that only a span of blue sky could peep down between them to glitter on the bright sparkling rivulet that tumbled and foamed along over mossy rocks and under fantastic natural log-bridges ; and all around far above the tallest ferns huge forest-trees soared up aloft, throwing their great arms about in a gale that was blowing up there while scarcely a breath lifted the lightest feather of the ferns below. . . . In one place we found a perfect living model of an ancient vaulted crypt, such as I have seen in old churches or castles. We stood in a large level space devoid of grass or any kind of undergrowth, but strewn with fern-leaflets like a thick, soft, even mat. Hundreds, perhaps thousands, of fern-trees grew here, of nearly uniform size, and at equal distances, all straight and erect as chiselled pillars, and, springing from their living capitals, the long, arching, thick-ribbed fern-leaves spread forth

and mingled densely overhead in a groined roof of the daintiest beauty, through which not a ray of light gleamed down, the solemn twilight of the place strangely suiting with its almost sacred character. Openings between the outer columns seemed like arched doors and windows seen through the long-drawn aisle, and stray gleams of sunshine falling across them were faintly reflected on the fretted vault above us."

This, however, is a scene of exceptional beauty; the ordinary forest scenery is by no means beautiful, as may be judged by this companion picture:—"From the Avenue Plain we turned aside, and at once plunged into the dark forest. Gigantic gum-trees rose on every side, and in every variety that such bare, gaunt things can exhibit; for handsome as *single* gum-trees frequently are, and thick-foliaged and massive in their sombre hues, those which grow clustered in the forests are invariably ugly, and these were so close together that it was only possible to see around for a short distance, and so destitute of leaf or branch for a height of 50 or 70 feet, that nothing but timber seemed to shut in the view, except where a stray lightwood or wattle brought the welcome relief of foliage to the drear gray wall of upright trunks. . . . I scarcely know anything more thoroughly wearisome, both to mind and body, than a slow progress through these dreary dark forests, with their huge, tall, gaunt, bare, half-dead trees, standing around you in apparently the same hideous skeleton shapes, however far you go; as different from the verdant, leafy, shadowy depths of an English wood as a decaying, misshapen skeleton is from a perfect human form in vigorous life" (*My Home in Tasmania*, vol. ii. pp. 126, 132).

Passing from wild nature to the more settled districts,

there is much pleasant scenery. The central valley and its branches furnish much fertile land, and it is here that the best cultivated tracts are seen. Here are well-fenced fields, highly-cultivated gardens, good roads, well-built homesteads, and all the characteristics of the best parts of England. Mr. William Howitt (writing in 1854) thus describes the portion of this valley between Campbell Town and Hobart Town: "The country, the farther we advanced towards Hobart Town, increased in beauty. The valley along which we drove became narrower, the hills more lofty, and much more varied in their outline, than any Australian scenery which I had yet seen. The valleys were rich, and, for the most part, as well cultivated as in England. Owing to the difference of tenure here and in Victoria, a very different state of things has been the result. Here the occupiers of the land are the owners, not mere squatters who have no sure tenure of the land, and therefore do nothing to it. Here then, instead of mere isolated wooden huts, standing in the unappropriated forest, we have a constant succession of towns and villages bearing the singular medley of names which colonists delight in,—Ross, Oatlands, Green Ponds, Brighton, Bagdad, Jericho, Jerusalem; and, of course, the river Jordan. All round these villages, which consist of substantial and even elegant houses, extend the richest fields, enclosed with hedges, generally of sweet-brier, or furze, or broom; but also a good many of honest English hawthorn. There you see cattle, sheep, pigs enormously fat, and abundance of poultry of all kinds, feeding and flourishing in their respective resorts—the meadows, the woodland slopes, or the farm-yards. It is England all over. Everywhere you descry lovely country houses, with all the earthly blessings of fine gardens well walled in, with their conservatories and forcing-houses, their

extensive shrubberies, verdant parks and lawns, fields in pasture or under the plough, and woods sloping down solemnly from the hills, with a very tempting aspect. Many of these hills are remarkably steep, yet so rich and smooth are they, that the farmers have ploughed them to their very summits, and grow splendid crops of corn where you would hardly have supposed that a team could have maintained its footing."

This general well-being is, however, not universal, for Mrs. Meredith found small farmers almost as badly off as Irish cotters. She tells us of men who rent land on exorbitant terms, and vainly endeavour to exist on what they can earn besides. She says: "The common course is this: some industrious servant who has saved a few pounds from his wages, or a man with a little money and farm stock, blindly agrees to pay a high rent for a piece of dense forest, covered with the heaviest timber, the land itself being of the richest description. With a portion of his small capital he builds a hut for his family, and then goes on clearing a field for the plough. Meantime nothing is coming in, and money for food constantly going out; rent-day comes round, and if the remaining savings are enough they pay the rent; if not, the cart, plough, or bullocks must go as well. The coming crop is offered as security for other inevitable debts, and is swept off when harvested, leaving only the promise of the next to carry on the work with till it comes; and when it does, in all probability the demands exceed the receipts; the sad finale being that the wretched family goes forth again, bereft of every shilling they possessed, and the place where their all lies buried is let as an 'improved property' to some other adventurer at an advanced rental. Until I came to Port Sorell I could not conceive such poverty as I saw in this land of plenteousness."

5. Climate, Natural History, and Geology.

The climate of Tasmania has many advantages over that of any other part of Australia, and it is hence termed the sanatorium of the south. Owing to its small area and exceedingly uneven surface, a considerable elevation, with a corresponding change of temperature, is everywhere within reach by a journey of a few hours. It possesses the full summer heat due to its latitude, and even some excess, for it occasionally feels the hot northern winds from the Australian plains; but, however hot the days may be, the nights are always cool and refreshing, owing to the proximity of lofty mountains and the cool Antarctic seas. The mean temperature of Hobart Town is $54\frac{1}{2}$ ° Fahr. The mean summer temperature is 62° with a maximum (rarely) of 100°, while the mean of winter is 47° with a minimum rarely falling below 29°; though on the uplands at an elevation of 2000 feet it often sinks to 18° below the freezing point, producing ice of a considerable thickness. Rain varies in quantity in different parts of the island, Hobart Town and the east coast having little more than 20 inches, Launceston about 30, while Macquarie Harbour, on the west coast, has over 100 inches. But it also varies greatly at the same place, Hobart Town having a range of from 14 to 40 inches. The rainfall, though small, is well distributed over the year, the mean number of days on which rain falls at Hobart Town being 145, occurring more or less in every season. There is abundance of wind, often violent, but thunderstorms are rare. The atmosphere is rich in ozone, and epidemic diseases are almost unknown. The climate of Tasmania is highly favourable to infant life, nine out of every ten born surviving the first year; and it is espe-

cially restorative to enfeebled constitutions from warmer countries.

Flora.—Although the physical features and climate of Tasmania are so marked, and the island is separated by a wide area of the sea from the Australian continent, yet its flora is essentially Australian, and is more especially allied to that of the mountainous parts of Victoria. Yet it has a considerable specialty. Of its 1100 species of flowering plants 280 are not Australian, while 22 genera and 267 species are peculiar to Tasmania. It is curious that, although apparently so isolated from all the world except Australia, this island possesses a considerably larger number of European genera and species of plants, as well as a larger proportion of plants characteristic of New Zealand and the Antarctic lands, than are found in Australia itself. The forests abound with valuable timbers, the blue gum (*Eucalyptus globulus*) often reaching a height of more than 300 feet, while the celebrated Huon pine (*Dacrydium Franklini*) is a most valuable timber for shipbuilding. It is said that within 5 miles of Hobart a eucalyptus tree was measured which was 330 feet high and 86 feet round. This last figure must probably be the measurement close to the ground, where there was an unusual enlargement of the stem, but even with this allowance it must have been a wonderful tree. Under the Waste Lands Act nine forest reserves have been set apart in various localities, aggregating 52,000 acres. This seems a very small area considering the enormous extent of wild forest land in the island, and the importance of everywhere preserving a good proportion of forest land not only for a supply of timber, but also for its effect on the climate, and especially for its agency in equalising the supply of water to the mountain streams, and thus diminishing the destructive power of floods.

Tasmania is, comparatively, very rich in members of the Coniferæ; for while Victoria has only 5 species, none of which are peculiar to it, Tasmania possesses 11 species, and of these no less than 9 are not found in any part of the Australian continent. One of these, probably a species of *Athrotaxis* or *Callitris*, is thus described by Mrs. Meredith under the name of "the brushy pine": "It forms a perfect cone of verdure, narrowing to a point at the top, the deep rich green being sometimes tinged with a bluish shade, almost like the bloom on a grape. Not a portion of the stem is visible in a well-grown tree of this kind; but the whole is a compact mass of foliage, more perfect in form than the most accurately clipped box or yew of an antique garden, with the slender terminal sprays all uninjured. Our river-banks are in many places absolute groves of these very handsome trees of all ages and heights."

Beautiful shrubs and flowers also abound; the Euphorbiaceæ, Compositæ, Rutaceæ, and Leguminosæ are rich in species, and there are nearly 80 distinct kinds of terrestrial orchideæ, many of them having the most curious and elegant flowers.

Fauna.—It is somewhat remarkable that the animal life of Tasmania offers even more striking peculiarities than do its vegetable forms. It possesses two remarkable mammals, each forming a distinct genus, and both quite unknown on the mainland. One is the "tiger wolf" of the colonists—the *Thylacinus cynocephalus* of naturalists—the largest of the carnivorous marsupials. It is nearly as large as a wolf, and is handsomely striped across the back and hind quarters. It is exceedingly bloodthirsty, and commits great havoc among the flocks of the settlers whose farms lie near the wooded mountains in which it dwells. The other animal is the

Sarcophilus ursinus or "native devil," a thick-set creature resembling an ugly bear-like cat. It is black with white patches, and, considering its smaller size, is even more destructive than the *Thylacinus*, and is exceedingly savage and untamable. It was formerly very abundant and destroyed great quantities of poultry and sheep, but having been persistently hunted and trapped, is now getting scarce in most districts. Both these animals are nocturnal. It is a very singular fact that both these species have recently become extinct in Australia, their remains being found in the Post-tertiary drifts and cave-deposits. What causes can have exterminated such hardy and ferocious creatures in the one country, and preserved them in the other, it is not easy to conjecture. There are no other genera of mammals peculiar to Tasmania, but several of the species are distinct from those of the mainland; among them are the Echidna or porcupine ant-eater, and the wombat, but the latter, though offering some differences, is not generally admitted by naturalists as a distinct species. Birds are abundant, but they are generally the same as those of the adjacent parts of Australia, no genera and comparatively few species being peculiar. There are only three species of snakes, but all are venomous.

Geology.—The extremely mountainous character of the whole surface of Tasmania leads us to anticipate the wide prevalence of the ancient Palæozoic and metamorphic rocks, and the abundance of granite; and these formations constitute almost the whole of the table-lands and lofty peaks. Mesozoic rocks occur in the lower hills, and are more prevalent than in Australia. Sandstone, supposed to be of Triassic age, occurs near Hobart Town, forming hills capped with basalt. Tertiary beds occupy much of the larger valleys and plains, some of the latter being

basaltic ; beds of fresh-water limestone occur in the south, and there are raised beaches on both sides the Derwent River. Igneous and volcanic rocks abound. Porphyries and greenstones occur on most of the plateaus, and form parts of many of the highest mountains. Dykes or beds of greenstone are the cause of most of the Tasmanian waterfalls. These are probably all Palæozoic, while basalts occur of every age down to the Pliocene Tertiary. There are no true volcanic cones or lava-streams as in Southern and Eastern Australia. The islands in Bass's Straits are granite, which corresponds with that of the north-eastern corner of Tasmania and of Wilson's Promontory on the opposite coast of Victoria. In the south Tasman's Peninsula presents grand vertical precipices of basaltic columns, often so broken as to present the appearance of ruined castles, spires and pinnacles with deep chasms opening between, against which the blue waters of the southern ocean perpetually break in foaming spray, forming a scene of wild and terrific, or beautiful grandeur, according as storm or calm prevails. The Secondary sandstones produce fine building material. Limestone occurs in a longitudinal band in the Derwent valley, and on the north coast, where are extensive caves. Coal and lignite occur in many localities, and are believed to be both of Palæozoic and Mesozoic age. Some of the coal is of good quality, but the character of the country makes the mines difficult of access, and little of it is yet worked. Gold also occurs in quartz veins, as in Australia, but in no great quantity, and the mining operations are of but little importance. Rich iron ore occurs on the north coast and in many other localities. Tin, lead, antimony, manganese, and plumbago also occur, but only the tin has been worked to any extent. There are also some quarries of good roofing-slates.

Tasmania has been described as a network of ridges enclosing numerous small plains and valleys. Many of these ridges are of greenstone, with intervening valleys of Palæozoic rocks, while some of the higher peaks are capped with quartz or syenite. When the geological structure of the island is thoroughly worked out and the whole surface accurately surveyed and mapped, we shall have an admirable illustration of the effects of denudation, controlled and modified by variations in the texture and position of the rocky framework, in producing a highly complex mountain system with its intricate tracery of ravines and river-valleys.

6. Colonisation, Population, etc.

Tasmania was first used as a penal settlement in 1804, the convict establishment being at Hobart Town; but about the same time the northern coast was colonised from Sydney, and a settlement was made at Launceston in 1806. At first the infant colony made little progress, and often suffered from scarcity of food. In 1818 the total population of the island was 3240, but by 1821 it seems to have doubled, while in 1841 it had increased enormously, amounting to 57,420. From this time it continued to progress steadily, but the gold fever in Australia caused a great exodus of adult males, from which it has hardly recovered. The population, by the census of 31st December 1884, was 130,541, and there are over 7000 more males than females. At the end of 1889 it was estimated at 151,000. More than half of the inhabitants are native born, and rather more than a third are natives of the United Kingdom, the proportion of other nationalities being very small as compared with what exists in the other Australian colonies. Tasmania

is, in fact, very English, in the ways and ideas of the people as well as in many of the characteristics of the climate and the scenery.

7. Aborigines.

The aboriginal population, which was never numerous, has now become entirely extinct, the last of the race, an old woman, having died in 1876 at the age of seventy-three. At the time of the colonisation of the island it is estimated that they numbered 6000 or 7000. These people were in many respects a peculiar race, quite distinct from the Australian natives, and more resembling the races of Melanesia. They were shorter and stouter than Australians, with flatter noses; but the great difference was in the hair, which, instead of being fine and silky, was rough and woolly, like that of most of the African and Papuan tribes. Their distinctness from the Australians is further proved by their total ignorance of the two characteristic weapons of that country—the boomerang and the throwing-stick. They used no weapons but a spear thrown by the hand, and a club. They had no shields, which are almost universally used in Australia. Their huts were as rude as those of the Australians—mere open shelters from the rain and wind. They had no clothing, no pottery, and no agriculture. Although living on an island, and everywhere near the sea or navigable rivers, they had no boats, and only a few tribes on the south and west coasts constructed rude rafts propelled with common sticks in place of paddles or oars. Their only other manufactures were baskets and string. They were long believed to be ignorant of the art of making fire, as they were so very careful never to let it become extinguished; but “fire-sticks” similar to those used by

most savages have been found among them, and it is therefore more probable that the women were made to keep up a constant supply of fire in order to save the men from the considerable labour and delay of procuring it by friction in a country where suitable, dry, and easily ignited wood was not always to be found. They were not cannibals, and do not appear to have treated their women with the same reckless barbarity as the Australians. They burnt their dead, and are said to have had a distinct belief in a future state. Although opposed to Europeans with firearms, they exercised so much skill and caution that they almost always succeeded in their attacks, and, aided by their knowledge of a very rugged and difficult country, almost always escaped from their pursuers. Their method of attack on a house or farm showed much ingenuity and organisation. They divided into a number of small parties, only one of which showed itself, the rest remaining in ambush among the rocks or scrub that more or less closely surrounded every house. The attacking party either set fire to some outhouse or threw spears at the windows of the house, shouting their war-cries and making themselves in every way conspicuous, and when pursued, retreating so as to draw on their pursuers. While this was going on the parties in ambush attacked and plundered the house, usually killing those remaining in it; and then all joined in surrounding and destroying their assailants. It is positively asserted by those who best knew them that they did not generally kill women, but that one chief of an especially ferocious character, and imbued with a deep hatred of all Europeans, invariably did so, though opposed and blamed by his countrymen. This man devoted himself to the attack of isolated dwellings, and the atrocities he committed were

erroneously supposed to be a characteristic of the whole race.

There are some interesting facts which serve to show that the Tasmanians had many good qualities, and that, as in the case of so many savages in their intercourse with Europeans, they were more sinned against than sinning. Only one individual—Mr. George Augustus Robinson, a builder by trade, and a man of little education, though of exceptional acuteness, courage, and good feeling—appears to have taken any trouble to study the natives, and to make himself their friend. During the period when the whole island was in a panic from the attacks of the few natives who then remained (about 1828), Mr. Robinson took every opportunity of becoming acquainted with them, learning their language and doing what friendly offices he could for them. In this way he gradually obtained their confidence, and the report soon spread over the island that there was one white man who was a real friend to the blacks, not merely by personal kindness when they came in his way, for many of the settlers were kind to them, but by taking trouble to understand their characters, by learning to speak to them in their native tongue, and by teaching those who wished to learn some of the arts of the white men. When the governor had spent, it is said, £30,000 in a great military expedition with several thousand men in order to secure the whole of the remaining natives—less than 300 in number, the result being the capture of two only—Mr. Robinson offered to undertake their pacification and capture in his own way. Accompanied by a few of his native friends, he traversed the wildest parts of the island to visit the various remnants of tribes then existing. For two years he persevered, and finding that if he went armed they would not believe in his friendly character, he thenceforth went

among them wholly unarmed. He had many narrow escapes, and on one occasion, when just about to be speared by an excited crowd of savages, he began quietly to address them in their own language, which caused them instantly to lower their weapons, and allow him to tell them why he came among them. After five years' labour and dangerous journeys, he succeeded in persuading the whole of them, about 250 in number, to follow him to Hobart Town, and submit to the Government.

The extraordinary decrease in their numbers, from about 7000 to 250 in thirty years, was certainly not due to the direct action of Europeans, as in that period only a few hundreds at the outside could have been killed by them. It is thought that their own tribal wars were a much more efficient cause, intensified probably by the fact that the territory of some tribes being occupied by white men, the dispossessed tribes were obliged to trespass on the territory of their neighbours, leading to perpetual feuds. Infectious diseases, introduced among them by whalers and convicts, also aided in the work, as did the abduction of many of the women by these people. Another very efficient cause is to be found in the abundance of European clothing, blankets, etc., either given to them by well-meaning people or obtained by the plunder of the settlers, and which, worn for a time and then discarded, brought on colds and lung-diseases which often produced fatal results.

The languages of these people are said to have been soft and musical, and were altogether distinct from those of Australia. Although apparently so low when judged by material evidences of civilisation, there seems good reason to believe that both intellectually and morally they were superior to the Australians. When the last remnant of them were living on Flinders Island under

the intelligent guidance of Mr. Robinson, they showed not only an aptitude but a positive love for whatever teaching he was able to give them. Many even of the adults learned to read and write. They cultivated the ground and made roads. They became cleanly both in their persons and their houses, so that Mr. Robinson says : "The cleanliness, order, and regularity observed by the inmates of the new cottages in the disposition of their culinary utensils, furniture, and bedding, would do credit to many white persons." The women learned to sew their own clothes. They cooked their meat, and baked bread for themselves. The chief amusement of the men was hunting, but in the barren island to which they were banished they soon exterminated the game. They took to dancing, bathing, cricket, and swinging, and became excessively fond of marbles, in which game the women also joined. Unfortunately, when Mr. Robinson retired from his position, no fit person could be found to succeed him. They were altogether neglected. Liquor and all kinds of debauchery were allowed to be introduced among them, and the date of their final extinction was thus hastened.

Their physical no less than their mental characteristics appear to have been misrepresented. Many of the men were handsome savages, and one of the West Coast tribes, whose portrait was painted with photographic minuteness, is said to have possessed fine and thoughtful features. Those who knew them best declare that no fair judgment of them is to be formed from the few weird-looking old creatures that photography has preserved from absolute forgetfulness, who seem to have been selected from the most hideous among them. Thus has passed away an interesting race, whose affinities are a puzzle to the anthropologist. Their origin will probably ever remain an unsolved enigma.

8. Productions and Trade.

The special production of Tasmania is fruit, and for this its climate is so favourable that it could supply all Australia with preserves if it had cheap sugar and open markets, but the colonial tariffs prevent this. Notwithstanding these difficulties, the export of fruit and jam in 1885 amounted to the large sum of £164,986, and fresh apples are now largely exported to this country. Mr. A. Trollope declares that the fruits he ate in Tasmania—cherries, greengages, mulberries, etc.—were finer than any English fruits, and they abound so that they often rot on the trees, not being worth picking. Hops also are largely grown, and much beer is brewed for exportation to the adjacent colonies. Wool, however, as in all the other colonies, is the most important article, the value exported in 1889 and for some years past being over a quarter of a million. Cheese and butter, wheat, hides, horses, sheep, and wattle bark for tanning, are other articles of export.

The only metals produced to any extent are gold and tin. In 1885 tin was exported to the value of £357,587, while in the same year the gold amounted to over £150,000. Sufficient coal is worked for the use of the colony. Bismuth, copper, lead, and diamonds have also been discovered. Timber is exceedingly abundant, of great variety, and of admirable quality. The total exports of the colony for 1889 were £1,489,857.

9. Government, Religion, Education, etc.

The Government of Tasmania consists of a Governor appointed by the Crown, and two Houses of Parliament—a Legislative Council and a House of Assembly. The

Legislative Council consists of eighteen members (who must be over thirty years of age) chosen for six years by £30 freeholders, officers in the army and navy, graduates of a university, clergymen, and doctors. The House of Assembly consists of thirty-six members, who are chosen for five years by owners or occupiers of property having an income of £60 a year or upwards. All elections are conducted by ballot. The ministers must have a seat in Parliament. No religious denomination is subsidised by the Government. The Church of England predominates, having 75,000 members, and 100 places of worship; the Roman Catholics number 30,000, with 50 churches; and all other sects about an equal number, but with a larger proportion of chapels. Education is compulsory, and there is a Council of Education for the higher branches, and a Board of Education for elementary instruction. There are schools in every township giving a free education, and attendance is secured by a heavy fine on the parents. The two chief towns have several high schools and colleges, and degrees are conferred by the Council of Education on such pupils as attain the prescribed standard. There are also two scholarships of £200 a year for four years at a British university offered for competition annually. Sunday schools, also, are largely attended; there are good mechanics' institutes and libraries in all the chief towns; and, on the whole, there are probably few, if any, British colonies, where the intellectual, moral, and religious wants of the community are better supplied than in Tasmania.

10. Roads, Railways, and Telegraphs.

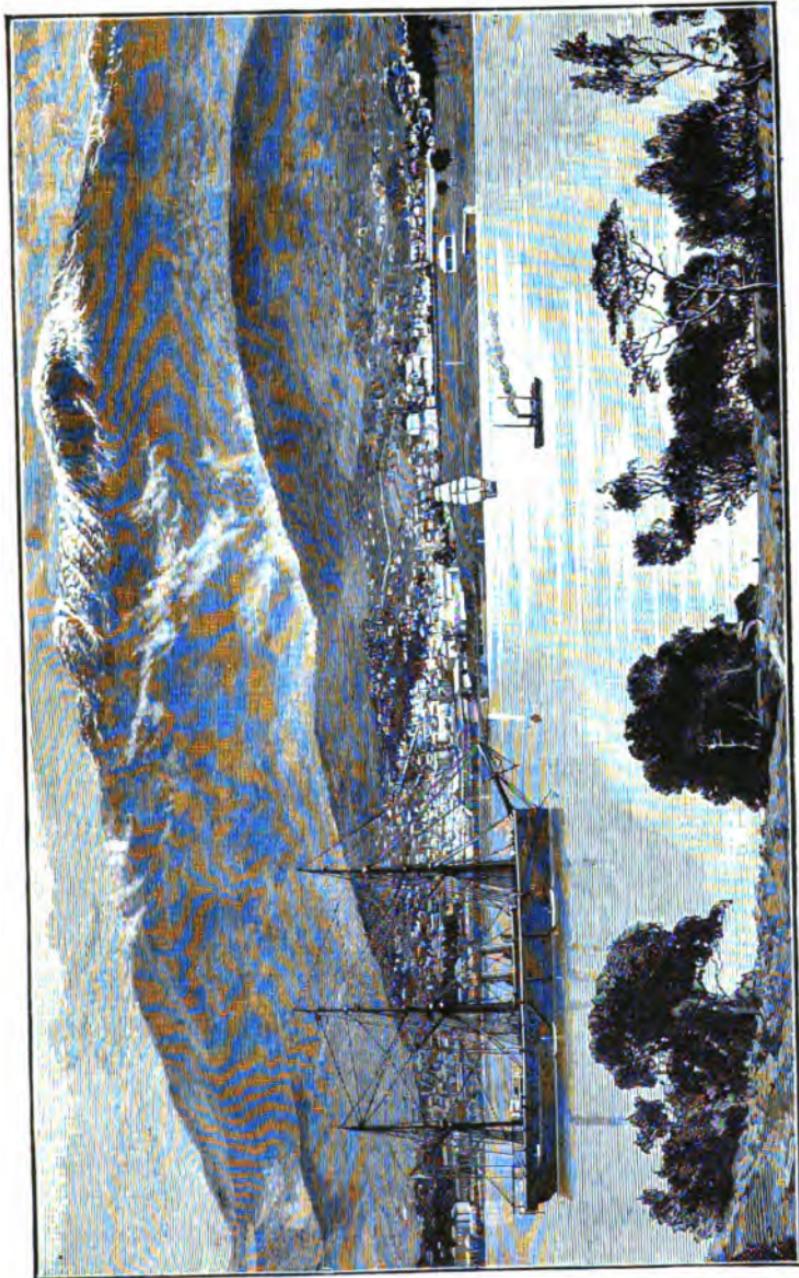
Having so long had the assistance of convict labour, many good roads have been made in Tasmania. The

main road from Launceston to Hobart Town (130 miles) is macadamised and as good as the best English coach roads; and there are several other roads to towns in the east, centre, and north of the island, in fair condition and traversed by mail coaches. There are two railways—the Main Line from Hobart Town to Launceston, 133 miles; and the Western Line from Launceston to Ulverstone, 99 miles. There are also branches to Glenora and Apsley, from Cleveland to St. Mary's, and from Parattah to Oatlands. Electric telegraphs extend along the railways and to all the other chief towns. A submarine line connects Tasmania with Victoria, and thus with the whole civilised world.

11. Political Divisions—Cities and Towns.

The colony of Tasmania is divided into eighteen counties, but many of these are almost wholly unsettled. Their positions are as follows:—On the south, KENT, ARTHUR, BUCKINGHAM, MONMOUTH, and PEMBROKE; on the west, MONTGOMERY, FRANKLIN, MONTAGU, and RUSSELL; on the north, WELLINGTON, DEVON, and DORSET; on the east, CORNWALL and GLAMORGAN; and in the centre, WESTMORELAND, LINCOLN, CUMBERLAND, and SOMERSET. More important is the division of the settled districts into rural municipalities, nineteen in number, exclusive of the towns of Hobart and Launceston.

HOBART, the capital city of Tasmania, with its suburbs, has a population of about 36,000, and is picturesquely situated near the mouth of the river Derwent, which is here 2 miles wide, and forms a good harbour, and at the foot of the fine Mount Wellington, more than 4000 feet high, and often snow-capped even in the midst of summer. The city has many handsome public buildings, an excellent public library, and many good schools. There is a park of 1000 acres, called the Queen's Domain. Mr. Anthony Trollope thus speaks of



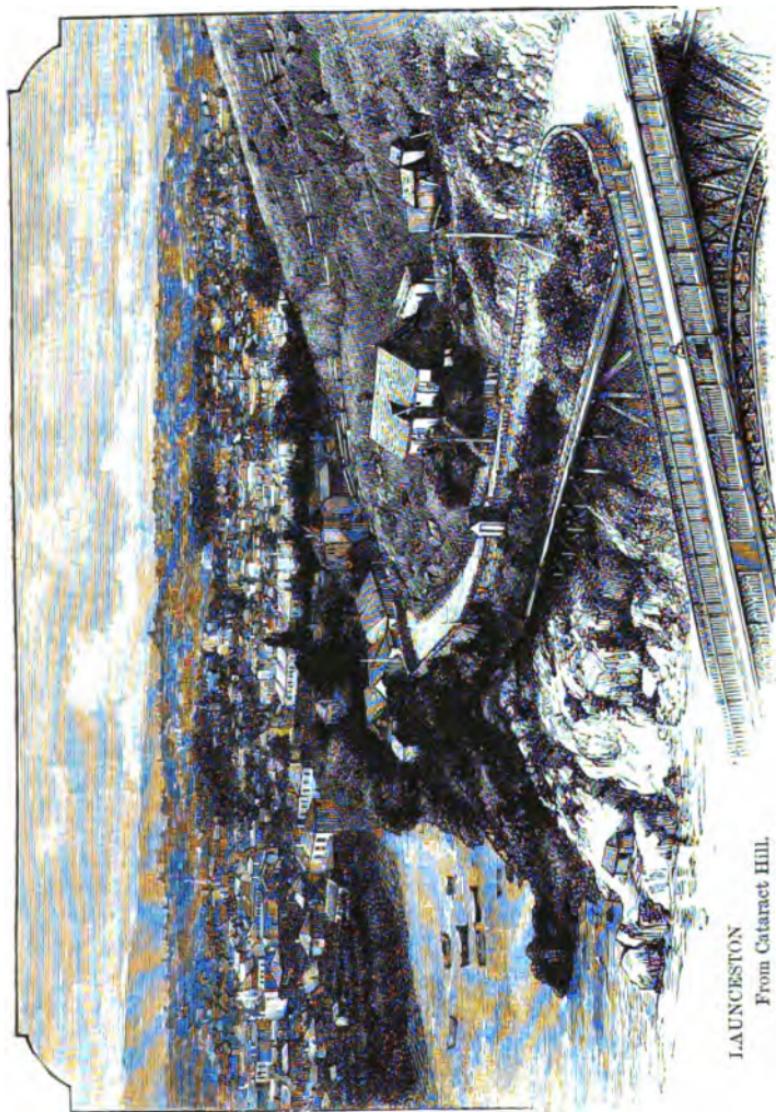
HOBART.

Hobart Town : "It is as pleasant a town of the size as any I know. Nature has done much for it, very much indeed ; and money has done much too. It is beautifully situated, just at the point where the river becomes sea. It is surrounded by hills and mountains, from which views can be had which would make the fortune of any district in Europe. And the air of Hobart Town is perfect air. I found the summer weather to be delicious. All fruits which are not tropical grow to perfection at Hobart Town and in the neighbourhood. Its cherries and mulberries are the finest I ever saw. Its strawberries, raspberries, apples, and pears are, at any rate, equal to the best that England produces. Grapes ripen in the open air. Fruit is so plentiful that in many cases it cannot be picked from the trees. It will not pay to pick it. So much in regard to the gifts bestowed by nature on the capital of Tasmania. Art — art in the hands of convicts—has made it a pretty, clean, well-constructed town, with good streets and handsome buildings. The Government House is, I believe, acknowledged to be the best belonging to any British colony. It stands about a mile from the town, on ground sloping down to the Derwent, and lacks nothing necessary for a perfect English residence."

Many beautiful excursions can be made around Hobart Town, to the mountains, the lakes, the river Huon, the fern-tree valleys ; and everywhere the scenery is lovely. The society in the town is good, and thoroughly English ; there are ample facilities for education ; living is cheap ; and on the whole there seem to be few more delightful spots for an Englishman, wishing to live out of England, to retire to.

LAUNCESTON, the second and only other populous town in Tasmania, is situated on the north side of the island on the river Tamar, about 40 miles from its mouth, and at the conflux of the North and South Esk Rivers. It lies in a valley enclosed with hills, and the lofty Mount Barrow, 4644 feet high, is only 12 miles distant to the east. The town has wide streets, excellent public buildings, an extensive public library, and public gardens 9 acres in extent. Its population with the suburbs is about 22,000 ; but though much smaller than Hobart Town, its trade and shipping are about equal to that of the capital, its nearness to Australia giving it a great advantage in this respect.

The following are the only towns which have a population of 1000 or upwards :—



LAUNCESTON
From Cataract Hill.

BEACONSFIELD, a town in the county of Devon, in the most important gold-mining district of Tasmania, about 37 miles north-west of Launceston. The town has a population of about 500, but the mining district of about 2000.

BURNIE, a seaport on the shore of Emu Bay, in the county of Wellington, 102 miles north-west of Launceston. There is a railway to Waratah, where are situated the Mount Bischoff tin-mines. Population nearly 1000.

CAMPBELLTOWN, prettily situated on the banks of the Elizabeth River, in the county of Somerset, 91 miles north of Hobart. The surrounding country is pastoral, and is well adapted for merino sheep. Population over 1000.

DELORAIN, a town on the Meander River, in the counties of Westmoreland and Devon, 156 miles north-west of Hobart. It is surrounded by good agricultural country, where both wheat and fruit are largely grown. Population about 1000.

DEVONPORT, a seaport town near the mouth of the Mersey, in the county of Devon, 192 miles from Hobart. Steamers run weekly to Melbourne, and it is a favourite resort of tourists. Population about 1500.

LATROBE, a town near the mouth of the Mersey, county of Devon, 75 miles north-west of Launceston, in a good agricultural and fruit-growing district. Population about 2000.

MOUNT BISCHOFF (or Waratah), a mining town in the county of Russell, 160 miles north-west from Hobart. It is in railway communication with Emu Bay on the north, and a road is making to Macquarie Harbour on the west coast. Population about 1000.

ULVERSTONE, on the river Leven, is a flourishing seaport in the county of Devon, 70 miles north-west of Launceston. It is in a good pastoral and agricultural district, and there is very picturesque scenery up the river. Population about 1000.

WESTBURY, an agricultural town situated on Bramby's Brook, in the county of Westmoreland, 20 miles south-west of Launceston (35 miles by rail). The district is famed for its long-wooled sheep. It is surrounded by a good agricultural district. Population about 1200.

There are in all 45 towns in Tasmania, but 15 of these have less than 300 inhabitants. There are 20 Rural Municipalities, besides Hobart and Launceston, each with its warden and police. The following list of

these, with their situation, area, and population, will be useful for reference. The Populations are given for the Electoral Districts, which apparently do not always correspond with the Rural Municipalities.

Rural Municipalities.	County in which situated.	Area in Acres.	Population of Electoral District—1886.
Bothwell . . .	Monmouth	296,065	3040
Brighton . . .	Monmouth	95,922	2954
Campbelltown . . .	Somerset	392,527	2710
Clarence . . .	Monmouth	56,000	1485
Deloraine . . .	Devon and Westmoreland	376,000	4126
Evandale . . .	Cornwall	255,000	2473
Fingal . . .	Cornwall and Glamorgan	652,000	3974
Glenorchy . . .	Buckingham	24,000	3917
Green Ponds . . .	Monmouth	100,800	2954
Hamilton . . .	Monmouth, Cumberland, and Buckingham }	...	3040
Longford . . .	Westmoreland	212,000	5182
Macquarie . . .	Russell, Montague, Franklin and Montgomery }
New Norfolk . . .	Buckingham	248,000	3644
Oatlands . . .	Monmouth and Somerset	369,000	3473
Portland . . .	Cornwall and Dorset
Richmond . . .	Monmouth	138,000	1729
Ross . . .	Somerset	178,000	2710
Sorell . . .	Pembroke	136,000	3327
Spring Bay . . .	Pembroke	330,000	3327
Swansea . . .	Glamorgan	439,000	1027
Westbury . . .	Westmoreland and Devon	272,000	5773

NEW ZEALAND

CHAPTER XIV

PHYSICAL HISTORY OF THE NEW ZEALAND GROUP

1. Position, Extent, Islands, etc.

IN the western portion of the South Pacific Ocean, and far removed from the shores of Australia, rises the island group bearing the name of New Zealand. Lying between $34^{\circ} 50'$ and $47^{\circ} 50'$ S. latitude, and consequently crossing thirteen parallels, it consists of two large and several smaller islands, with a total area estimated at 101,000 square miles,—that is, as nearly as possible, the size of Italy and Sicily together. It is also about as broad as Italy (110 to 180 miles), which country it moreover resembles in its figure, though in a reversed sense. The two great masses known as North Island, or Te Ika a Maui ("The Fish of Maui"), and South Island, or Te Wahi Panamu ("The Place of the Greenstone"), are separated by Cook Strait, which, at its narrowest point, is scarcely 16 miles wide. South Island is, again, separated by Foveaux Strait from the smaller and uninhabited Stewart Island, and these three form what is usually known as New Zealand.



ISLAND EALAND

English Miles to 1 Inch.
English Miles.

0 10 20 30 40 50 60

English Feet
inches

36



But besides these and the few islands near the coasts, there are several outlying groups and islands, which, though situated at a considerable distance in the ocean, yet, both by their natural productions and geographical position, may most conveniently be classed as forming part of the New Zealand group of islands. To the south are the Auckland, Campbell, and Macquarie Islands; to the east, Chatham Island and the small Bounty and Antipodes Islands; to the north, the Kermadec group, and Norfolk Island; and to the north-west, Lord Howe's Island.

2. Physical Features and Scenery.

The two large islands of New Zealand are marked by striking physical differences, which cannot fail to react upon their economical and social relations. North Island, with its varied outlines, consists of two sections, the district to the north of Auckland forming the north-western peninsula, abounding in fertile and well-watered valleys; and the main body of the island, characterised by gently sloping hilly ranges and low-lying table-lands, varied here and there by lofty volcanic peaks. The country is everywhere covered with a luxuriant growth of timber, except about the centre of the island, which is full of lakes, hot springs, and geysers, depositing silica and sulphur, like those of the Yellowstone Park in the United States. In the southern part of this district, and not far from the centre of North Island, is situated Lake Taupo, whose secluded and romantic waters are furrowed only by the canoes of the natives, here more numerous than elsewhere. Still farther to the south is a very wild high-land region, but little visited by Europeans. Here are Mount Ruapehu and the active volcano of Tongariro, rising to a height of

9195 and 7000 feet respectively. In this district lie the sources of the river Waikato, which flows northwards through Lake Taupo, watering one of the finest regions in the country. Here also are the sources of many other streams, flowing some eastwards to Hawke's Bay, others in a south-westerly course to Cook Strait.

Besides Mount Tongariro, New Zealand possesses two other active volcanoes. Mount Tarawera, near the celebrated hot springs and white and pink terraces, was considered to be an extinct volcano, but in 1886 it broke out with terrific violence, desolating the surrounding country, and entirely destroying the most beautiful products of volcanic action, the terraces above referred to. Tarawera must therefore now be considered to be an active volcano.

One other active volcano is Mount Wakari, in White Island, a small rocky island in the Bay of Plenty; and there are also a large number of extinct craters, tufa and lava cones, beds of slag and scoria, of which as many as sixty-three are found in the isthmus of Auckland alone. At the western entrance of Cook Strait rises in solitary grandeur the snowy Taranaki, or Mount Egmont, 8270 feet high. This beautiful mountain is almost a perfect cone, having a base 30 miles in diameter, its lower slopes clothed with forests, while its summit, an extinct crater, is covered with perpetual snow. In Europe in the same latitude we must go about 2000 feet higher on isolated peaks to reach the snow-line, a difference due no doubt to the excess of moisture in the atmosphere of the insular mountain.

The South Island (or Middle Island, as it is often called), which is both somewhat longer and more extensive than the North Island, presents a very different physical aspect. Its western side is traversed in its



HUKA FALLS, TAUPO.

entire length by the so-called Southern Alps, a massive range from 10,000 to 13,000 feet high, whose slopes up to the snow-line are densely wooded. Towards the west they contain vast snow-fields and glaciers, extensive tracts filled with stony detritus, moraines, clefts and fissures of enormous depth, whence flow icy streams to the lakes of the great southern table-land. Parallel with the upland plateau, and about the centre of the island, runs a low range, intersected by many mountain streams, which make their way over a series of terraces down to the south-east coast. The lower terraces, from the elevation of about 1500 feet, down to and inclusive of the narrow coast strip, form the so-called Canterbury Plains.

This province of Canterbury is separated from Otago, its southern neighbour, by the broad-flowing Waitaki, which is fed by three lakes lying at the foot of the central group of hills. The outlines of the coast are very remarkable. The south-western corner of the island is indented, doubtless through glacier action, by deep fiords, similar to those of Norway ; the north-eastern seaboard, on Cook Strait, is diversified by countless little inlets and bights ; while the east coast forms, with two exceptions, a low and perfectly straight shingly beach. The exceptions are Port Littleton and Port Chalmers, the two narrow channels at Christchurch and Dunedin, whose peculiar formation is due to masses of volcanic rock disposed in crescent form, and encircling small water basins.

3. Lakes and Hot Springs of the North Island.

The lakes of New Zealand deserve especial notice, as they present many interesting features. They may be generally classed as due either to volcanic or to glacial

action, the former being the case in the North, the latter in the South Island. Taupo, the largest lake in the North Island, is a veritable inland sea, 25 miles long and 20 wide, and of an enormous depth which has not yet been ascertained. It is situated 1250 feet above the level of the sea, and is surrounded by volcanic deposits forming a table-land 1000 feet above its surface. From this rise numerous volcanic cones, while the active volcano Tongariro is only a few miles to the south. On the western side the lake is bounded by vertical precipices 1000 feet high, and here the water is believed to be deepest. Its colour is a dark blue, like that of the deep ocean, and from its centre rises a single small but very beautiful island. This lake has evidently been formed by a great subsidence of the volcanic plateau. Nine miles south of Taupo, behind a group of volcanic cones, is the small lake Roto-aira, at an elevation of more than 1700 feet.

The Waikato, about 25 miles from its exit from the lake, passes through a remarkable group of hot springs, extending for more than a mile along its banks. The river here plunges through a deep valley, and its floods, whirling and foaming around rocky islets, dash with a loud uproar through the defile. Along its banks white clouds of steam ascend from hot cascades falling into the river, and from basins full of boiling water shut in by white masses of stone. Steaming fountains rise at short intervals, sometimes two or more playing simultaneously, and producing endless changes, as though experiments were being made with a grand system of waterworks. Dr. Hochstetter counted seventy-six separate clouds of steam visible from a single station, and among them were numerous intermittent geyser-like fountains, with periodical water eruptions. The accompanying illustra-

tion affords but a faint idea of the grandeur and peculiarity of the natural scenery of Orakeikorako.

About 40 miles N.N.E. from Lake Taupo, and nearly the same distance from the shores of the Bay of Plenty, is the Lake District—a cluster of more than sixteen lakes of various sizes, occupying a tract of country about 20 miles long by 12 wide, and covering about the same



GEYSERS ON THE RIVER WAIKATO.

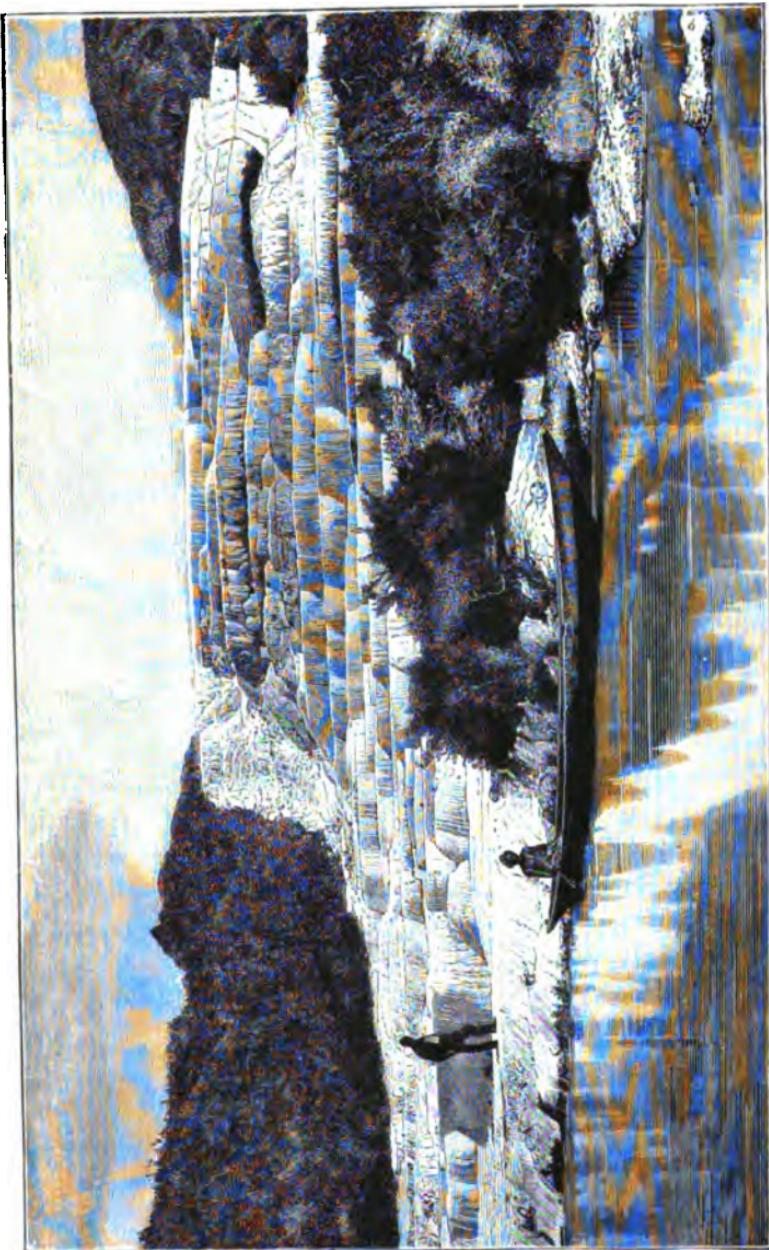
area as the large lake itself. The district around all these lakes, and extending between the volcano of Tongariro and the sea, is a zone of hot springs, solfataras, fumeroles, and mud volcanoes, more than a thousand in number, which, according to Dr. Hochstetter, far exceeds all others in the world in variety and extent. The largest as well as the most irregular and picturesque of the group of lakes is Tarawera, surrounded by rugged rocky bluffs, shaded by fine woods, and bounded on the

east by the destructive Tarawera volcano. Next in size is the Rotorua Lake, 6 miles across and nearly circular, with a conical island almost exactly in its centre. Clouds of steam ascend from the numerous hot springs about the shores of this lake, and with its circular form and the conical peak in its centre give it all the appearance of a large volcanic crater; but its depth is but small, and Dr. Hochstetter is of opinion that, like all the other lakes in this district, its origin is due to the sinking of part of the volcanic table-land in which they are situated.

But the most wonderful part of the lake region previous to the eruption of 1886, was the small Rotomahana, or Warm Lake, with its boiling springs and siliceous terraces. The first appearance of the lake itself was disappointing, as the elements of beautiful scenery possessed by the other lakes were wanting; but almost everywhere around the lake there was a seething, hissing, and boiling sound from the numerous escapes of steam, boiling water, or hot mud, while in the lake itself hot springs were so numerous that the whole body of water was kept at a temperature of 90° or upwards. The chief sight, however, was the Te Tarata, at the north-east end of the lake. At 80 feet above its surface, on the fern-clad slope of a hill, there lay an immense boiling cauldron in a crater-like excavation with steep sides, 30 or 40 feet high, and only open on the side towards the lake. The basin itself was about 80 feet long by 60 wide, full to the brim of perfectly transparent water, which in the snow-white incrusted basin appeared of a beautiful turquoise-blue. Even at the margin it had a temperature of 180° Fahr., but towards the centre, where it was in a state of constant ebullition to the height of several feet, it was probably at the

boiling-point. The surplus water flowing down the hill-side into the lake formed a pure white siliceous deposit in a series of ridges or steps covering a surface of about 3 acres. At the bottom the terraces were low, but farther up they were 2, 3, or even 4 and 6 feet high, each with a raised rim from which slender stalactites hung down, and enclosing on its platform one or more basins resplendent with the most beautiful blue water. These basins were of every size and depth, the upper ones warmer and the lower cooler; and they formed a series of exquisite baths such as the most refined luxury could not surpass. The pure white of the siliceous deposit, in contrast with the blue of the water and the green of the surrounding vegetation; the intense red of the bare earth-walls of the water-crater; the whirling clouds of steam—altogether presented a scene unequalled of its kind in any other part of the globe. But all this is now a thing of the past. In June 1886 a terrible eruption broke out in Mount Tarawera, hurling ashes, dust, and red-hot stones over a wide area of country; while another explosion occurred in Lake Rotomahana itself, destroying at once the lake, the boiling springs, and the pink and white terraces, with three native villages and every particle of vegetation, leaving in their place a scene of barrenness and hideous desolation.

But though the crowning beauty of this volcanic district has been destroyed there is still much of interest both to the tourist and the man of science; and the value of the locality as a health-resort, both on account of the climate and the great number and variety of the thermal springs, has induced the New Zealand Government to establish a sanatorium on the southern shore of Lake Rotorua, where arrangements have been made for the accommodation and treatment of invalids, by means



WHITE TERRACES, ROTOMAHANA, N. Z. (Destroyed in 1886.)

of the numerous medicinal hot springs in the immediate vicinity. Rotorua is about 1000 feet above the sea, and has a drier and more bracing climate than the towns on the sea-coast, and though there is great heat in summer the nights are always cool. Here are examples of the five classes of springs for which the Lake District of the North Island is celebrated. These are saline, alkaline, alkaline siliceous, sulphurous, and acidic. An area of 50 acres contains all these springs, at each of which commodious baths have been erected; and the whole has been planted with evergreens and ornamented with fountains and flowers. There is also a warm swimming bath 62 feet long by 24 feet wide, maintained at a temperature of 98° Fahr. All the baths can be regulated as to temperature, and there is also a vapour bath of steam impregnated with sulphur, said to be highly efficacious in cases of rheumatism. Within a mile of the sanatorium are three hotels, each of which possesses thermal baths, which are free to visitors.

4. Lakes and Glaciers of the South Island.

If now we transfer our view from the Northern to the Southern Island, we find, in the magnificent range of the southern mountains, a series of true alpine lakes, fed by huge glaciers, and dependent for their very existence on ancient glaciers of still greater extent. These glacier lakes commence about latitude $42\frac{1}{2}$ ° S., but they become larger and more numerous as we approach Mount Cook, the giant of New Zealand mountains, 12,350 feet high, where we find Lake Tekapo, 15 miles long and 3 wide, and two others, Lakes Tukaki and Oahau, forming the sources of the Waitaki River. The great Godley glacier, which extends above Lake Tekapo, is very extensive, and

the view from its middle moraine over the snow-fields of Mount Tyndall, Mount Petermann, and the Keith Johnston range, is said by Dr. Haast to form as grand scenery as he ever beheld in the European Alps. Lake Pukaki is 10 miles long and 4 wide, and is shut in by an old terminal moraine, which attains a height of 186 feet above the lake. The view from the outlet towards the Southern



A DISTANT VIEW OF MOUNT COOK.

Alps, with Mount Cook in the centre, and a wooded islet in the foreground, is described as sublime in the extreme; and, if we imagine villas and parks around its shores, the Lago di Como or Lago Maggiore would not bear comparison with it. It is supplied by the Tasman River, which has its source in the great Tasman glacier, 18 miles long, and the largest in New Zealand.

Farther south the glaciers descend lower, and the lakes increase in size. Lake Wanaka is 35 miles long,

and Lake Wakatipu 50 miles, while Lake Te Anau, still farther south, is 40 miles long, and has numerous extensive branches. The bottoms of many of these lakes are far below the sea-level, though they must have been filling up for ages by the sediment carried into them, a proof either that the entire land was once much higher, or that the lakes have been ground out by glaciers, as supposed by Professor Ramsay. The fact that the lakes increase in size and depth as we go south, while on the west side of the island it is only towards the south that the coast is indented by long and winding fiords, whose inner waters are deeper than near their mouths, is strongly in favour of the glacial theory of their origin. On the western side of the mountains there are also numerous glaciers, and one of these, descending from Mount Cook, terminates within 705 feet of the sea-level, and for a long distance is bordered by a magnificent vegetation of metrosideros, tree-ferns, and fuchsias. This is in lat. 43° 35' S., corresponding to Montpellier and Marseilles in France, and Leghorn in Italy!

Of all these lakes, Wakatipu, the largest and one of the most beautiful, is the best known, owing to there being a railway from Dunedin to Kingston at its lower end, and steamers on the lake to Queenstown at the first bend about 25 miles up, while others ply thence to the head of the lake, where there are two villages, Glenorchy and Kinloch, both with hotels for the accommodation of tourists. The lake is about 50 miles long, and from 1 to 3 miles wide, with two nearly rectangular bends forming three grand reaches, and surrounded on all sides with lofty mountains, mostly forest-clad, sometimes rising from the water's edge in grand precipices, sometimes opening out to deep ravines or retiring to form verdant meadows. It is 1060 feet above the sea, and is so deep that in

places its bottom is 500 feet below the sea-level. Owing to the great body of water its temperature hardly changes throughout the year (except a few feet of surface water), varying only from 52° to 54° Fahr. The mountains on both sides, throughout its whole extent, are from 5000 to 6000 feet high, but towards its upper end they rise



LAKE SCENERY OF THE SOUTH ISLAND.

to 7000 and 8000, and about 15 miles farther culminate in the grand double snow peaks of Mount Earnslaw, 9165 feet high. All around the upper portion of the lake are numerous alpine lakelets and tarns situated in the grandest scenery, and mostly within a day's excursion from the head of the lake. The Rev. W. S. Green, who paid a hasty visit to the lake after his memorable ascent of Mount Cook, thus speaks of the scenery : "As the sun

gained power the mists rose in long wreaths round the mountain sides; the splintered crags of the great wall of mountains known as the Remarkables showed themselves against patches of clear blue sky on the opposite side of the lake; and rounding an elbow, the head of the lake came in sight with its grand combination of forest-clad headlands and icy peaks. The white glaciers of Mount Earnslaw shone through the mists, and bright gleams of sunshine danced on the surface of the lake, giving glorious effects of sunlight and shadow. Wakatipu is amazingly beautiful; the only lake in Europe that can surpass it is Lucerne. . . . The camera has never done justice to Earnslaw as seen from Lake Wakatipu, but its pure white peaks, and the group of mountains near to it, form a combination not easily to be effaced from the memory of the artist or mountaineer."

This, it will be admitted, is high praise from a man who is thoroughly acquainted with the finest alpine scenery of Europe.

Owing to the fact that the snow-line in New Zealand is full 3000 feet lower than in the Alps, while the snow-fall is probably much greater, the high alpine scenery is fully equal, if not superior, in grandeur to that of the most celebrated mountains of Europe. The grandeur probably culminates in Mount Cook and its group of surrounding peaks, and a very good idea of it is given in Mr. Green's most interesting volume *The High Alps of New Zealand*. The Great Tasman Glacier, up which the first part of the ascent of Mount Cook was made, is considerably larger than any glacier in Europe, but so vast is the quantity of rock and debris brought down by its moraines—which are very numerous owing to the number of branches into which it divides in its upper part—that it appears to have no great terminal ice-cliff, but to be



THE GLACIER SYSTEM OF MOUNT COOK.

entirely hidden by moraine matter, formed chiefly of huge masses tumbled together in the wildest confusion. At one place there was "a perpetual fusillade of stones from the cliffs above," varied by regular stone avalanches, which shook the whole mountain and caused a roar like thunder. At another place, while climbing some steep crags an avalanche passed over them, and "some blocks whizzed over our heads with a scream like a shot from a 35-ton gun." The constant avalanches of ice and stones on these mountains give us a vivid idea of the rapidity with which denudation is still going on; and this fact is further enforced by the enormous ridges and heaps of torrential gravel brought down by the rivers, which have spread out in every direction and formed the extensive level plains between the mountains and the sea.

When Mr. Green, with two experienced Swiss guides, first ascended to the surface of the Great Tasman Glacier and obtained a good general view of the mountain peaks, he says: "No words at my command can express our feelings when we stood for the first time in the midst of that glorious panorama. I tried vainly to recall the view in Switzerland on the Great Aletsch Glacier, in front of the Concordia hut, to establish some standard of comparison. Then I tried the Görner Glacier, on the way to Monte Rosa; but the present scene so completely asserted its own grandeur that we all felt compelled to confess in that instant that it surpassed anything we had ever seen. . . . Mount Tasman was hidden by the shoulder of Mount Cook, but the great ice-fall of the Hochstetter Glacier pouring down from the hollow between these two mountains presented us with as grand a spectacle as it is possible to conceive. Rising beyond this glacier, the square-topped Mount Haidinger, robed in white glaciers, stood as the next worthy member of this giant family.

After dwelling on some smaller peaks our eyes swept round to the great mass of Mount de la Bêche, looking something like Monte Rosa, and occupying a conspicuous position between two main branches of the glacier. Farther off Mount Elie de Beaumont appeared, and then the great buttresses of the Malte Brun range, which flanked the side of the glacier opposite Mount Cook, and shut out from our view its own finest peak and Mount Darwin beyond. The glacier on which we stood having an area about twice as great as that of the Great Aletsch, the largest glacier in Switzerland, is really a union of many fine streams of ice, which, coming in on all sides in graceful curves, bear along their tale of boulders to swell the great rampart of moraine which gave us such difficulty to surmount. We counted in all thirty distinct glaciers in sight together." Having reached a height of 5000 feet on a preliminary exploration of the southern ridge of Mount Cook, Mr. Green says: "Looking down the steep cliffs on to the Ball Glacier, and across to the great ice-falls and snow-clad precipices of Mount Cook, bathed in the brightness of the morning sun, we thought we had never seen a grander exhibition of mountain glory."

Mr. Green's description of the difficulties of the ascent, which occupied more than a week of hard work, is well worth reading, while on the descent the small party had an adventure as exciting and dangerous as anything in the records of alpine adventure that did not prove fatal. Having limited time and provisions when on the mountain, the party had to choose at 3 P.M. between giving up the ascent altogether or going on and having to spend the night high on the mountain. They went on, and reached the summit at six in a storm of wind, rain, and mist. Descending, darkness soon overtook them, and it

was necessary to find some amount of shelter to pass the night. They had got off the highest slopes of snow and ice, and had reached some precipitous rocks, beyond which were other dangerous ice-slopes. The only spot they could find to pass the night was on a ledge less than two feet wide, sloping outwards, with somewhat overhanging crags above, and rocky, snow-clad precipices below. There was just room for the three to stand side by side. Sitting down or even shifting six inches from the position first occupied was impossible, and to sleep or even to relax the attention from their insecure position would have been certain death. And thus they stood during nine hours of darkness, exposed to wind and rain, which, however, they considered fortunate, as it prevented them from getting frost-bitten, which would certainly have happened if the night had been clear, since the height of their position was over 10,000 feet above the sea. A few meat lozenges were their only food. They got back safely to where they had left some food, having been twenty-two hours not only without any solid food, but without once sitting down. By the time they got off the glacier, they had been roped together for thirty-six consecutive hours.

But besides its picturesque lakes and grand snow-peaks, the South Island possesses on its west coast a number of fiords, which have a character altogether their own. As Mr. Green visited two of these, we shall allow him to describe them. On entering Milford Sound during a gale of wind, he says: "Vertical cliffs rose for thousands of feet on either hand. Waterfalls resembling the Staubbach came down the cliffs from far above the clouds, and were blown away into spray while in mid-air by the fury of the storm. Wherever vegetation could get a footing on these immense precipices, lovely tree-

ferns and darker shrubs grew in profusion, all dripping with moisture, and running up the cliffs in long strips of verdure till lost to our view aloft in the torn white mists. The vivid green of the foliage was the feature of



THE CITY, MILFORD SOUND.

all this wondrous scene which struck me most. Two or three miles up the Sound we steamed close to an immense waterfall, which, in one plunge of 300 feet, leaped into the Sound with a roar like thunder. The face of another great cliff was so draped with numberless small falls that it seemed to be covered with a veil of silver gauze about

300 yards in width. The mists now showed an inclination to clear off, the rain ceased, and as we entered the inner basin of the Sound the forests increased in beauty. The totara pines draped with festoons of gray lichen contrasted well with the soft green of the great fern-fronds, and formed a suitable background to the scarlet blossoms of the rata, which here and there lit up the upper surface



IN MILFORD SOUND.

of the forest with patches of intense colour. When about eight miles from the open sea a booming sound rose high over the voices of the numerous cascades, growing louder as we advanced, and rounding a forest-clad point we came upon the grandest of the New Zealand waterfalls—the great Bowen fall. Its upper fall is only about 50 feet into a rock-basin, but leaping from this basin upwards and outwards in a most wonderful curve, it plunges down in a deafening roar in a single leap of 300 feet. The steamer

was allowed to drift up in the eddy caused by the fall, and being caught by the stream in the midst of drenching clouds of spray, she was spun round as though she were a mere floating twig. The weather had now cleared sufficiently for us to see through an opening in the clouds the snow-clad top of Mitre Peak, which rises in one great precipice of 5000 feet from the surface of the Sound. The glacier on Pembroke Peak showed for a few minutes, and was then lost to view, but what we saw formed the grandest combination of scenery upon which my eyes had ever rested."

About 30 miles farther south is George Sound, which was also visited by Mr. Green, and which is thus described: "The expanse of water which we saw on entering reminded us somewhat of the Lake of Brienz, and on reaching its inner end we expected to turn round and come out. But this was only the vestibule, for a deep gorge opened to the right, so narrow that the steamer could barely have turned in it. And now we steamed through the most lovely corridor of rich forest-scenery rising tier above tier to the highest limits of vegetation. On and on we went, past an islet covered with fine trees draped with lichens, the whole reflected gem-like in the still water; thinking that every bend and branching arm would be the last, till, on reaching it, another charming vista opened ahead. When about twelve miles from the sea we reached the inner sanctuary, a fitting home for the nymphs. A strong rush of water here met us, while the filmy haze and dull booming of a waterfall filled the air. The screw now ceased its motion, the eddy of the fall drew us along, grazing the rocks and trees which hung their branches almost over our deck; we slipped past a point and entered a little basin in which we were quite shut in from the view of more than

half a square mile of water. Immediately before us the foaming fall plunged into the Sound, filling the air with its roar. For a moment we felt as if we were at the bottom of a deep well, so small was the patch of sky overhead, the walls of forest all around rising rapidly for 3000 or 4000 feet. The next moment the eddy swept us into the main current of the fall, and though the *Te Anau* was a vessel of some 1500 tons burden, she was instantly spun round and drifted out of the sacred spot, in which we can imagine an extraordinary meeting of oreads, dryads, and naiads was immediately convened to denounce the modern abomination of steam navigation."

Still farther south is "Dusky Sound," the most extensive, and said to be the most beautiful of all; but the descriptions now given are sufficient to show how grand in their forms and structure, and how exceptionally beautiful in their luxuriant and peculiar vegetation, are these fiords of the Southern Hemisphere. We will now only quote the general estimate of New Zealand scenery given by two travellers of considerable experience in various parts of the world. Sir Charles Dilke, in his *Problems of Greater Britain*, thus summarises his impressions of the scenery in this Britain of the South: "New Zealand scenery, with that of Japan, is the most beautiful of the temperate world. The one drawback to living in the loveliest parts of New Zealand is the drawback to Japan—the wind. The west coast of the south or middle island of New Zealand is unequalled in the combination of jungle with low glacier. It is as fine a coast in its way as the west coast of Guatemala; but it bears no resemblance to that or to any other on the globe. The glaciers come down almost as low as those of Norway, on account of the great rainfall, the constant damp, and the absence of a true winter; while

the tree-ferns of the largest size resemble palm-trees in their apparently tropical loveliness. In the central part of the north island, in a warm and less wet climate, having just enough rain to fairly moisten its rich soil, the snow-peak of Mount Egmont and the strange white mass of Tongariro rival the snow dome of Mount Cook of the southern Alps. On the coast of the middle or south island are fiords as wild as those of Norway or of Labrador, and in the extreme south rocks as rugged as those of the Saguenay." . . .

The general character of the New Zealand scenery, as contrasted with that of Australia, is well expressed by Mr. Anthony Trollope. He says: "In New Zealand everything is English. The scenery, the colour and general appearance of the waters, and the shape of the hills, are altogether un-Australian, and very like that with which we are familiar in the west of Ireland and the Highlands of Scotland. The mountains are brown, and sharp, and serrated, the rivers are bright and rapid, and the lakes are deep and blue, and bosomed among the mountains. If a long-sleeping Briton could be set down among the Otago hills, and, on awaking, be told he was travelling in Galway or the west of Scotland, he might be easily deceived, though he knew those countries well; but he would feel at once that he was being hoaxed, if he were told in any part of Australia that he was travelling among Irish or British scenery."

5. Climate.

New Zealand has of course a very varied climate, extending as it does through 14° of latitude. No part of the islands suffers from hot winds, and the temperature is generally equable, especially in the North

Island, where frost and snow are almost unknown, except on elevated plateaus, and where, towards the extreme north, the climate becomes semi-tropical. The western shores are moister and more agreeable than the eastern, and the Canterbury Plains on the east side of the South Island experience the greatest vicissitudes of temperature, the annual range of the thermometer being 62°, while at Wellington it is 45°, and at Hokitika, on the west coast of South Island, 48°. The climate of the Canterbury Plains has been said to be a mixture of the climates of the south of France and the Shetland Islands. The rainfall varies between 28 inches at Christchurch and 122 at Hokitika. The coasts of New Zealand are very windy, especially in the straits between the islands; thus Invercargill on Foveaux Straits, and Nelson and Wellington on Cook Straits, have hardly a calm day in the year. Dunedin seems the least windy place on the coast, having had 98 calm days in 1873, while Queenstown, on the Wakatipu Lake, had 142. On the whole the climate is at once mild and bracing; combining a large amount of variety with comparatively few extremes; and it is well fitted for the average English constitution, though less adapted to those in delicate health or with unsound lungs than the brighter skies of Australia.

6. Geology.

The geological formation of the two islands of New Zealand differs remarkably. The North Island is essentially volcanic, the South sedimentary. The North is full of volcanic cones, extinct and active craters, boiling springs, lava-fields, sulphur-deposits, and lakes formed by subsidence. The South has lofty ranges of slate and granite, with Silurian sandstones and limestones, and the

valuable green jade, so much prized by the natives for making their choicest weapons ; snowy ranges, enormous glaciers, deep alpine lakes, and wide glacial deposits. Of course these distinctions are not absolute ; there are some Primary rocks in the North, and some volcanic formations in the South. Gold and coal are found in both islands, but far more abundantly in the South, while deposits of Secondary age cover but a small area in both islands.

Volcanic formations occupy fully one-third of the area of the North Island. Within a dozen miles of Auckland City there are more than 60 cones and craters, from 300 to 900 feet high. For hundreds of miles volcanic conglomerates, cinder-heaps, and lava-streams spread over the country ; the thousands of hot springs, solfataras, and mud-volcanoes have already been referred to, while the three lofty volcanoes—Tongariro active, Ruapehu and Mount Egmont quiescent, vie in grandeur with those of most of the great continents.

Coal, both Palæozoic and Tertiary, occupies a wide area in the South Island. Good coal is also worked at the Bay of Islands, and near Auckland in the north. Gold has been found to occur almost as abundantly as in Victoria, and in many different localities. Till 1860 little was known, when rich fields were discovered in Otago, and subsequently in Westland, Nelson, and Marlborough, while the Thames Valley gold-field, in the North Island, surpassed all in richness. Much of the gold is found under glacial drifts, and on the west coast the sands of the sea-shore produce it in paying quantities, especially when a gale of wind brings down fresh deposits from farther north. The same wonderfully lucky finds occurred here as in Australia. At the Havelock diggings in Marlborough, three men, in felling a tree at the edge of a river, found a pocket under it from which in a few

hours they washed 30 ounces of gold. In the Tuapeka diggings in Otago one party obtained 38 ounces in a day, and it was said that any one who could stand the work could gather from 1 to 2 ounces a day. In a few months 16,000 persons were collected at these diggings among wild mountain gullies, and all the phenomena of the Australian "gold-fever" were reproduced. At one time the emigrants arriving at Dunedin from Melbourne amounted to 1000 a day.

Besides gold, other metals are worked more or less successfully. Silver is abundant at Mount Rangitoto; copper occurs at Barrier Island, and tin at the Buller. Chrome iron-ore and iron-sand are also abundant, and will no doubt one day be largely worked.

Fossil remains are rather scarce in New Zealand, and throw little light on its past history. No fossil mammals have been found, and no birds or reptiles except such as are allied to forms still living on the island. The few Tertiary shells are closely allied to living species; while the cretaceous and jurassic marine deposits contain ammonites, belemnites, and allied groups bearing a striking resemblance to European forms of the same period; and in the jurassic beds of the Waiparu species of plesiosaurus and ichthyosaurus have been discovered, showing that these ancient saurians had an almost world-wide distribution.

7. Natural History.

New Zealand is the largest oceanic group of islands in the temperate zone, and, as might be expected, presents a large amount of specialty in all its natural productions. Its flora, when compared with that of other islands of equal extent, is rather poor in species, since it possesses

fewer flowering plants than Great Britain. It is, however, wonderfully peculiar, about two-thirds of the species being entirely confined to the group, and even 26 of the genera are found nowhere else. The relations of the flora are with Australia and with the Antarctic lands, including temperate South America. A large number of species and genera are common to New Zealand and Australia, but in many cases it is the New Zealand forms which have migrated to Australia, and not *vice versa*. There is also the extraordinary fact of the total absence of some of the most common and widespread of the Australian groups of plants; for not a single species of *Eucalyptus* or *Acacia* is found in New Zealand, a fact which absolutely negatives the idea of any former union, or even any recent near approach of the two lands as the cause of the similarities of their floras. No less than 89 species and 76 genera are common to New Zealand and South America, but the larger part of these are also found on the Alps of Tasmania and Australia. There are also 50 species common to New Zealand and the Antarctic islands, and only a few of these are found on the mountains of Tasmania.

The great characteristics of New Zealand scenery, as dependent on vegetation, are the forests, the ferns, and the grassy plains. The forests chiefly clothe the mountain ranges; the lower hills are covered with fern; while extensive tracts, chiefly on the west in the North Island, and on the east in the South, are covered with grass and bushes. In the forests there are scarcely any gay flowers and few herbaceous plants,—nothing but shrubs and trees, mostly with obscure green flowers and as destitute of scent as of beauty. In the North Island there is a species of palm locally known as the Nikau Palm, but botanically as *Rhopalostylis sapida*. It is usually rather

dwarf-growing, as shown in our illustration, but is sometimes near 30 feet high, and is then very graceful. It marks the extreme southern limit of the palm tribe in the southern hemisphere. Pines also, quite unlike ours, belonging to the genera *Podocarpus*, *Dacrydium*,



NIKAU PALMS, THE HUTT, WELLINGTON.

Phyllocladus, and *Dammara*, abound; but generally the forests are much intermixed, and their chief distinctive feature is the abundance and variety of the ferns that grow beneath their shade. Here are splendid fern-trees 30 or 40 feet high, equalling those of the tropics; exquisitely beautiful filmy-ferns growing on trunks of

trees; while rocks, and shady banks, and often the whole surface of the ground, are covered with them in great variety. There are about 130 different kinds of ferns and Lycopods, while the mosses and Hepaticæ are also wonderfully luxuriant, amounting to nearly 900 different species. A few of the trees bear handsome flowers, such as the *Edwardsia microphylla*, with its magnificent yellow pea-like blossoms; the *Metrosideros robusta*, crowned with scarlet flowers; and the large crimson pea-blossoms of the shrubby *Clianthus puniceus*. But these and the few other showy plants are not enough to compensate for the general poverty of the flora, which has led one writer to remark that "there is no indigenous flower equal to England's dog-rose, no indigenous fruit equal to Scotland's cranberry,"—a statement which, though not literally exact, well serves to show the poverty in fruits and flowers of the New Zealand vegetation. Sir Joseph Hooker, in the introduction to his *New Zealand Flora*, speaks of its monotonous and uninteresting aspect in comparison with that of Tasmania, where "Orchideæ of many kinds carpet the ground in spring with their beautiful blossoms; the heaths are gay with *Epacridææ*; herbs, trees, and shrubs of *Compositeæ* meet the eye in every direction; whilst the *Myrtaceæ* and *Leguminosæ* are characteristics both of the arboreous and shrubby vegetation." And he adds: "The difference is so marked, that I retain the most vivid recollection of the physiognomy of Tasmanian mountains and valleys, but a very indifferent one of the New Zealand forest, where all is, comparatively speaking, blended into one green mass, relieved, at the Bay of Islands, by the symmetrical crown of the tree-fern, the pale green fountain of foliage of the *Dacrydium cupressinum*, and the poplar-like *Knightia* overtopping all."

In the higher regions of the snow-clad mountains

there is, however, a characteristic and beautiful alpine vegetation, consisting of an immense variety of dwarf shrubby Veronicas, of which more than 60 species have been described, white and yellow Ranunculi of large size, and many species of white and yellow mountain asters of the peculiar genus *Celmisia*. Near the snow-line grows an edelweiss (*Gnaphalium grandiceps*) not very different in appearance from that which grows on the Swiss Alps.

One of the most valuable and abundant of the forest-trees of New Zealand is the Kauri pine (*Dammara australis*), which grows to the height of 180 or 200 feet, and furnishes splendid timber. Whole towns have been built of it; it is largely exported, and has been recklessly destroyed by settlers; so that, writing in 1867, Dr. Hochstetter remarks: "The extermination of that noble tree progresses from year to year at such a rate that its final extinction is as certain as that of the natives of New Zealand. The European colonisation threatens the existence of both, and with the last of the Maoris the last of the Kauris will also disappear from the earth." Besides its timber, this tree produces a valuable gum resembling amber, which is found in large masses at the roots of the trees, and in ground from which Kauri forests have disappeared. It is used for making varnishes, and for other purposes, and several thousand tons are exported annually, of the value, in 1885, of £299,762.

The zoology of New Zealand is no less peculiar and interesting than its botany, perhaps even more so. In common with all remote oceanic islands there appear to be no truly indigenous mammalia, with one or two doubtful exceptions. When first discovered by Europeans, there were two species of mammals—a dog and a small rat. Both are now nearly or quite extinct, but the dog was almost certainly introduced by man, as it is a

favourite article of food with both Melanesians and Mahoris, and would therefore be constantly carried in their canoes. Besides, it was never wild in New Zealand. The native rat, called Kiore, has been destroyed by the imported European rat, and no specimen of it is known to exist. It is therefore uncertain whether it was a true rat or some allied animal; but it was most likely introduced originally through man's agency, and the tradition of the natives that they brought it with them in their canoes is probably true. More interesting is the otter-like animal, reported still to exist in the mountains of the South Island, and which has a native name, Waitokeke. Dr. Haast has seen its tracks, resembling those of our European otter, at a height of 3500 feet above the sea, in a region never before trodden by man; and the animal itself is said to have been seen by two gentlemen near Lake Heron, but they failed to capture it. It was described as being dark brown, and the size of a large rabbit. On being struck at with a whip, it uttered a shrill yelping sound and disappeared in the water.¹ This evidence seems to render it certain that such an animal exists, and as the only undoubtedly indigenous mammal in New Zealand, it is of immense interest to determine whether it is or is not marsupial—whether its affinities point to Australia or to some other continent. It is to be hoped that this creature will not be allowed to become extinct without a determined effort being made to secure specimens in order to study its structure and its relationship to other mammals.

The common Norway rat is now as abundant in New Zealand as it is in Europe. Cattle and pigs have run wild, the latter multiplying so enormously as to become quite a nuisance. In the province of Nelson three men

¹ Hochstetter's *New Zealand*, p. 161, note.

in twenty months killed 25,000. The other land vertebrates, reptiles, and amphibia are curiously limited. Snakes are quite unknown; frogs are represented by a solitary species, and that very local, being only found at one spot on the east side of North Island; but lizards, on the other hand, are tolerably plentiful, there being 12 species, all peculiar, and not closely allied to those of any other country. Besides these there is a lizard-like animal, *Hatteria punctata*, of so peculiar a structure as to form a distinct order of reptiles called Rhynchocephalina, intermediate between lizards and crocodiles. Two sea-snakes are found on the coasts allied to those of other parts of the Pacific.

Birds, however, form the most interesting class of animals in New Zealand, since they are tolerably numerous, and present a number of beautiful and interesting forms. The elegant black parson-bird, with its white throat-tufts, is beautiful and lively, and is an excellent mimic, imitating the notes of other birds and the cries of animals. There are several fair songsters; some of the pigeons and parrots are very handsome; and there are a good number of fine aquatic birds. In all, there are 145 different kinds of birds known, of which the larger proportion belong to the aquatic and wading groups, only 57 being true land-birds. Almost all these are peculiar to the island, and of the 34 genera in which they are classed, 16, or nearly half, are also peculiar. Among the most remarkable is the singular starling (*Heterolocha gouldi*), the "huia" of the natives. It is a glossy black bird, the size of a chough, with handsome orange-coloured wattles. The beak is quite different in the two sexes, that of the male being straight, while the female's is longer and excessively curved in a sickle shape. Such a remarkable difference in the sexes does not occur in any

other known bird. Another remarkable bird is the owl-parrot (*Stringops habroptilus*), of a greenish colour, and with a circle of feathers round the eyes as in the owl. It is nocturnal in its habits, lives in holes in the ground under tree-roots or rocks; and it climbs about the bushes after berries, eats mosses on the ground, or digs for fern-roots. It has fully-developed wings but hardly ever flies, and though formerly abundant in both islands is now becoming very scarce. Another very interesting group of birds are the large, dull-coloured parrots of the genus *Nestor*, called Kea and Kaka by the natives from their peculiar cries. Their natural food is berries, insects, and the honey of flowers, but of late years the Kea (*Nestor notabilis*), a mountain species found only in the South Island, has developed a curious liking for meat, and now attacks live sheep, settling on their backs and tearing away the skin and flesh to get at the kidney fat. About 1871 these birds, which were then scarce, began picking sheep-skins and offal about stations; they then attacked exposed carcases or joints of meat, and at last discovered their greatest delicacy in the live sheep. In consequence of the abundance of food thus provided for them they have become very numerous, and several birds will combine in their attack on a sheep. In 1884 it is said that 200 sheep were killed by them on a single run; and in consequence of the great loss occasioned by them a reward of 3s. a head was offered for their destruction, and as many as 15,000 have been killed in a year. Most remarkable of all the birds of New Zealand is the "Kiwi" or *Apteryx*, of which there are three or four species in the two larger islands. These are totally wingless and tailless birds, with feathers resembling hairs, and altogether unlike our usual idea of a bird. They are about the size of a small domestic fowl,

with long curved beak something like that of a curlew. They are entirely nocturnal, feeding on insects, worms, and seeds, and as they have no means of protecting themselves from dogs they become rapidly exterminated in all the settled districts.

But the existing Kiwis are only the last survivors of a race of wingless birds of various sizes, the largest exceeding considerably in bulk and height the living ostrich. Remains more or less complete of 12 species of these birds, called Moas by the natives, have been found. They differ much in structure, proportions, and size, the largest being $10\frac{1}{2}$ feet high and the smallest about 3 feet. Some perfect skeletons have been found, and even remains of skin and feathers. A perfect egg, 10 inches long and 7 broad, was found in a native grave, as well as moa bones in old native cooking-places; so that there is every reason to believe the traditions of the natives, that their ancestors hunted these enormous birds for food. Some remains, however, have been found in caves under thick layers of stalagmite or of lava, and others under several feet of alluvial deposits, and these no doubt indicate a period long before the present race of Maoris came to New Zealand.

The fresh waters of New Zealand do not produce many fish, the most abundant being eels, and small fishes called whitebait by the colonists (*Eleotris*), of which there are several species. One peculiar genus (*Retropinna*) is the only fish of the salmon family in the Southern Hemisphere. The most curious facts about the fishes of New Zealand are, that the eel is a species found also in China, Europe, and the West Indies, and that the *Galaxias attenuatus*, a fish somewhat resembling a trout, inhabits Tasmania, the Falkland Islands, and temperate South America, as well as New Zealand.

Insects are very scarce. Only 11 different kinds of butterflies are known, and these are not abundant. Moths are also comparatively scarce. Beetles are better represented, but even these are very few compared with their abundance in other countries with the same variety of climate and luxuriance of vegetation. Bees and wasps are few in number, and the Neuroptera and Heteroptera are also very scarce. The Orthoptera are mostly wingless, and there is one huge spiny grasshopper or cricket, whose body is $2\frac{1}{2}$ inches long while its great spiny hind-legs are 4 inches in extent. Land-shells, on the other hand, are abundant, there being nearly 120 species, of which about 100 are peculiar; and many of these are large and handsome, the green *Helix busbyi* being $2\frac{1}{2}$ inches diameter, while the fine orange-mouthed *Bulimus hongi* is 4 inches long. Most of the species are, however, small and insignificant.

8. Past History of New Zealand.

Taking into consideration the peculiarities of the flora and fauna of these islands, and the entire absence of any fossil remains indicating a former connection with other continents, we are justified in concluding that, during the whole Tertiary period at least, if not for much longer, New Zealand has maintained its isolation from all other extensive tracts of land. We know that Australia was formerly richer in mammals than it is now, and we may be sure that it possessed an abundance of species and individuals during the entire range of the Tertiary period. If, therefore, there had been any land connection between the two countries during this lapse of time, it is incredible that no mammals should be found in New Zealand, a country so well adapted to support them. The very existence and development of the huge wingless moas is

also an indirect proof that no extensive mammalian fauna ever inhabited the country; for such birds take the place of mammals, and they are never abundant in species except where the latter are absent, as in the case of the dodo and other flightless birds of the Mascarene Islands. But though New Zealand may never have been directly connected with Australia or South America, it has probably been much more extensive than it is now, and has included the Auckland and Chatham Islands, and perhaps even at some remote period the Kermadec group and Norfolk Island. At a much more recent epoch the two large islands have certainly been connected, since an elevation of only 1000 feet would change the submarine bank on which they stand into dry land, and form a single island more than double the area of the existing group. This greater extent and greater elevation would have added enormously to the area of the snow-fields of the Southern Alps, and to this was no doubt due that great extension of the glaciers, the effects of which are visible far below their present range in huge moraines and excavated lake-basins.

Recent discoveries of fossil plants of the Tertiary epoch are very interesting, as showing that the flora has undergone more remarkable changes than the fauna, owing no doubt to the greater facilities for dispersal of plants than of animals. From its general aspect this fossil flora is supposed to be of considerable antiquity, and is classed by Baron von Ettingshausen, who has described it, as being Lower Tertiary and probably equivalent to the European Eocene. It consists of several distinct elements. First, there are plants which are closely allied to some still living in the islands, as species of *Fagus*, *Santalum*, *Loranthus*, etc., while there are what seem to be identical species of *Dammara*, *Podocarpus*, and *Dacrydium*. Others

are of distinct genera, but such as may have been the ancestors of existing types of New Zealand plants. But the most remarkable are those which are now quite unknown in the country, but are closely allied either to living or Tertiary species of Europe, North America, or Australia, such as *Sequoia*, *Myrica*, *Alnus*, *Quercus*, *Ulmus*, *Planera*, *Ficus*, *Cinnamomum*, *Sapindus*, *Casuarina*, and many others. As almost all these occur also in beds of similar age in Eastern Australia, and as most of them have become extinct in both countries, we must suppose either an approximation of New Zealand and Australia at that early epoch, or that both received immigrants from a common source, which was probably the high-lands of New Guinea, then perhaps more closely approaching the Asiatic continent. At a later period these northern forms appear to have given way to the more tropical forms which now prevail, due perhaps to alterations of surface and of climate which favoured the development of existing types. Perhaps too the great increase of the huge moas, which before the advent of man appear to have existed in great numbers, may have exterminated certain groups, either by feeding on their fruits—such as acorns, or more probably by feeding on the young seedlings.¹

Our conclusion is, therefore, that New Zealand is the remains of one of the most ancient, if not the most ancient, of the islands of the globe ; that it has undergone many fluctuations in area ; that the two islands have been quite recently united, and that at some remote epoch it was many times more extensive than it is now ; but that through all these changes it has never, during the Tertiary epoch at least, been united to any other extensive land.

¹ The former history of New Zealand is more fully discussed in Chapters XXI. to XXIII. of the author's *Island Life*.

9. The Maoris and the Aborigines of New Zealand.

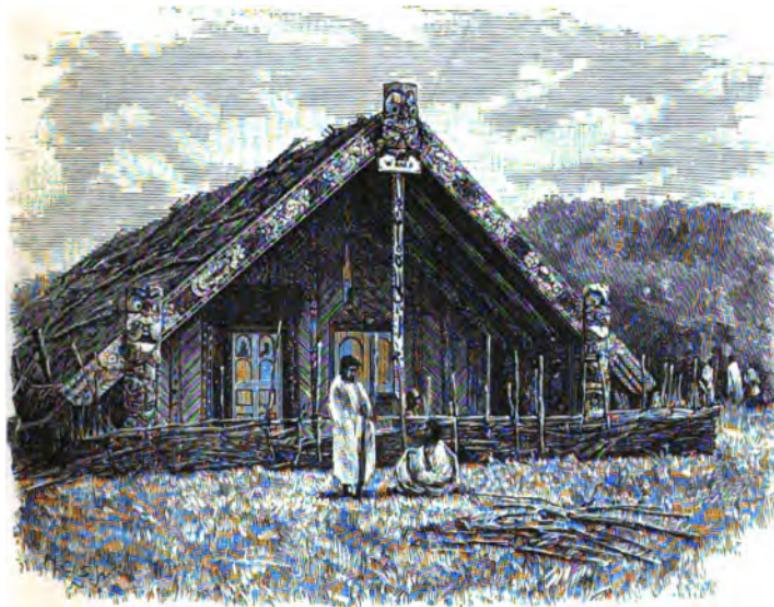
The Maoris form one of the most important families of the brown Polynesian stock, being that which has developed its peculiar mental and physical characteristics to the highest degree. This is due in part to their having to maintain themselves in a far less favourable climate than their fellows of the tropical islands. They have no breadfruits, bananas, and coco-nuts to supply food almost without labour, and they have to protect themselves against the vicissitudes of a boisterous and comparatively



CARVED NEW ZEALAND CHEST.

ungenial climate. They had not even the pig, which furnished such an unfailing supply of food in the other islands, but had probably at first to hunt the now extinct moas as their only animal food, till, when these became scarce, they were obliged to feed on their dogs, the only domestic animal they appear to have brought with them. Their only cultivated plants were the sweet potato, the taro, and the gourd; the fern and several other plants supplied edible roots; and these, with a few berries and fruits, and fish of various kinds, made up their means of subsistence. They thus became skilful hunters and fishers,

and good agriculturists; and the amount of skill and energy necessitated in these pursuits, in building houses and canoes, in making clothing, and in forming the various weapons and implements which they required from stone, wood, or shell, furnished the needful stimulus for an active and healthy existence. War too, as among all



A MAORI DWELLING.

savage tribes, occupied them greatly, and the construction of forts and defences was added to the regular labours of every community.

The earliest European settlers thus found the Maoris in a state of civilisation not often to be met with among a barbarous and savage people. They lived together in villages, in huts well constructed of wood and reeds, ornamented with ingenious and fanciful carvings, and

painted with gay-coloured arabesques. They protected their villages with ditches and palisades, and surrounded them with extensive plantations. They manufactured flax from a native plant, and from it wove mats and clothing, which they dyed with various kinds of bark and roots, and ornamented with the bright feathers of birds; and they made cloaks of great value from the dressed skins of their dogs. Their faces and some parts of their bodies were elaborately and elegantly tattooed, more largely in the men than the women; and the heads of great chiefs were skilfully embalmed and preserved, either as trophies of the fight or in affectionate remembrance of the dead. Although they had no written language, they had numerous songs and proverbs, legends and traditions, transmitted orally from generation to generation. They knew every plant and bird and insect of the country they inhabited, and designated them by distinctive names; and they distinguished the various kinds of rock with a keen talent of observation. They had words in their language for the four seasons, and they divided the year into thirteen months, all of which had appropriate names, the year commencing with the first new moon after a particular star, called Puanga, began to be visible in the morning. They had names for all the chief stars, and also for many constellations, which were called after their resemblance to canoes, houses, garments, weapons, etc. They had measures derived from the human body, as the span, the stride, and the fathom. They had no regular barter, but whatever a friend asked for was given, on the understanding that the giver might in his turn have anything he took a fancy to; but all valuable property appears to have been held by the tribe, and could only be exchanged in this way with other friendly tribes. They had numerous games of skill or chance, many of

them exactly similar to our own, as flying kites, skipping-ropes, cat's-cradle, gymnastic poles, wrestling, hide-and-seek, stilts; as well as dancing, diving, and many others. They had a firm belief in a future state, and an elaborate mythology and system of temples, priests, oracles, and sacrifices. They were great orators, and a son of every chief had to learn the traditions, laws, and rites of his tribe, and to be an orator and a poet as well as a warrior, a hunter, and a seaman.

The dark side of their character was the practice of cannibalism, which prevailed extensively at the time when Europeans first visited them. But this vile practice



WAR CLUB OF NEW ZEALAND.

seems always to have been associated with a superstitious belief in the transfer of the qualities of the victim to his devourer. This became one of the chief incentives to war, as to eat the bodies of the slain was supposed to impart courage and ferocity to those who partook of them, and likewise to make their triumph over their enemies complete. War was also carried on as a means of obtaining plunder,—valuable jade weapons and ornaments, beautiful mats, food, and wives, just as in Europe in the middle ages.

Missionaries of various denominations have been at work in New Zealand for more than sixty years, and have now converted the whole population, except a few

of the older chiefs, to Christianity. Cannibalism, tribal wars, polygamy, slavery, and most of the superstitious practices of the Maoris have been abolished; they have become to a considerable extent educated and civilised; many of them have farms and ships, or are successful traders. But with this apparently beneficial change, their old elasticity of spirit and enjoyment of life seem to have left them. They cannot as a body compete with Europeans. Our habits are not suited to them; our diseases and vices decimate them; their numbers diminish year by year; and, as in so many other cases, we seem to civilise and christianise only to destroy. When first taken possession of in 1840, New Zealand is supposed to have contained about 120,000 Maoris. In 1856 there were but 65,000; in 1874 they had decreased to 45,740, and by the census of April 1886 the native population was stated to be 41,432. This seems to show that the rate of decrease has been checked, and that there is no immediate danger of the extinction of this interesting people.

The Maoris are said to be conscious of their approaching fate, a fate in which not only the people themselves, but also the native fauna and flora seem involved. The inevitable process of extinction is vividly described by Peschel, who remarks that even the English grasses are spreading with astonishing rapidity and supplanting the indigenous vegetation. Vernal grass, sorrel, docks, the sow-thistle, and water-cresses are triumphantly invading the domain of the native growths, which are fain to yield before the younger and more vigorous conquerors. "Make room for your betters," is the watchword in all these wars between races. Swine, as already stated, have increased to an alarming extent, and commit great havoc by upturning the ground in search after roots. Yet even this contributes towards the introduction of new plants,

for the freshly-turned-up soil is quickly occupied by the hardy species intimately associated with European culture, which follow the white man in all his wanderings, and which, already victorious over so many older species, soon displace the last feeble survivors of former geological epochs. The native rat, which is said to have entered New Zealand with the Maoris, has now been extirpated by the Norway variety, which has been introduced into the island by ships arriving from England. Our house sparrow is now the most common bird in New Zealand; and will doubtless lead to the extinction of some native birds. The European house-fly, which presented itself originally as an uninvited guest, is now sent far and wide in boxes and bottles by the settlers themselves, who have observed that its company is declined and its presence carefully shunned by the far more noxious native blue blow-fly. Hence the Maoris rightly say: "As the white man's rat has extirpated our rat, so the European fly is driving out our fly. The foreign clover is killing our ferns, and so the Maori himself will disappear before the white man."

The traditions of these people lead to the conclusion that they first came to New Zealand about 600 years ago, from some of the islands between Samoa and Tahiti; but some ethnologists put the migration as far back as 3000 years. Their language is a dialect of the Polynesian, most resembling that of Rarotonga, but their physical characters vary greatly. Some are fair, with straight hair, and with the best type of Polynesian features; others are dusky-brown, with curly or almost frizzly hair, and with the long and broad arched nose of the Papuan; while others have the coarse thick features of the lower Melanesian races. Now these variations of type cannot be explained unless we suppose the Maoris to have found in the islands an indigenous Melanesian people, of whom

they exterminated the men but took the better-looking of the women for wives; and as their traditions decidedly state that they did find such a race when they first arrived at New Zealand, there seems no reason whatever for rejecting these traditions, which accord with actual physical facts, just as the tradition of a migration from "Hawaiki," a Polynesian island, accords with linguistic facts.

10. Other Islands of the New Zealand Group.

A brief notice only can be given of these, with special reference to any points of general interest in their natural history or present condition.

STEWART ISLAND (formerly called South Island) is the third island of the New Zealand group, but is of insignificant size, being only about 40 miles in extreme length, and of such an irregular form that its area is less than 500 square miles. It is mountainous, and well wooded with valuable timber-trees. It has also several good harbours, and there are many fertile valleys. It was originally uninhabited, but is now occupied by a few whalers and sealers, with some natives and their half-breed descendants. The seas around swarm with fish, and there are large oyster-beds. There are numerous quartz-reefs, some of which have been worked to a limited extent, and there are said to be large deposits of iron-sand equal to that of Taranaki.

THE AUCKLAND ISLANDS lie about 250 miles south of Stewart Island, and consist of one large and several small islands, the most important being about 25 miles long and 15 wide at the south end, where it is widest. These islands consist of basalt with greenstone and some granite and Tertiary sandstone; and there are basaltic

columns 300 feet high and highly magnetic at Peas Head in Laurie Harbour. The islands are mountainous, rising to a height of 1325 feet, and are covered with a fine vegetation of trees, shrubs, and herbage. Some of the trees are from 50 to 70 feet high. Adam's Island, on the south, separated by a long winding strait forming Carnley Harbour, is 2000 feet high. The climate is excessively wet and stormy; yet, strange to say, there are here a number of flowers equal in brilliancy to those of tropical or alpine regions. Among these are bright-coloured gentians and veronicas, large purple-flowered Compositæ, gay ranunculi, and a handsome liliaceous plant—*Chrysobactron Rossii*. This is the more remarkable as there is nothing to compare with them in the cooler parts of New Zealand.¹ Parrots, pigeons, and honey-sucking birds also inhabit these islands, which are in the same latitude as the south of England; and there is a curious flightless duck, forming a distinct genus (*Nesonetta Aucklandica*) and peculiar to these islands, as are most of the other birds.

CAMPBELL ISLAND is about 180 miles south-east of the Aucklands, in south latitude $52^{\circ} 33'$ and east longitude $169^{\circ} 9'$. It is about 36 miles in circumference, with some good harbours, and is mountainous, rising to a height of 1500 feet; but the hills are less woody than in the Auckland Isles, though the vegetation is in general very similar, the same species of plants being for the most part found in both. The cliffs all round the island are of columnar basalt, and the islands are so steep that they look like a group of pyramids, many of which are surmounted by slender rocks like druidical stones. Besides volcanic rocks, there are here chalk with

¹ For a probable explanation of the cause of this difference, see the author's *Tropical Nature*, p. 238; or Second Edition, p. 408.

flints, Secondary sandstone like that of New Zealand, and slate with quartz veins.

Both the Campbell and Auckland Islands are usually uninhabited, but depôts of provisions are kept on both groups for the use of shipwrecked crews.

MACQUARIE ISLAND is situated as far again from New Zealand as the Auckland Isles, and more to the south-west, being in south latitude $54^{\circ} 30'$ and east longitude $158^{\circ} 50'$. It is about 20 miles long, and is covered with vegetation, mostly grassy, though there must be some trees or shrubs in sheltered parts, as a peculiar species of parrot of the genus *Cyanoramphus* allied to those of the Auckland Isles is found here, and it is the species which extends farthest from the tropics of the entire order of parrots. Macquarie Island is a fine place for seals, and is only visited for the purpose of capturing them.

ANTIPODES ISLAND is really a small group of rocky islands wholly of volcanic formation, the largest more than 1000 feet high, and having lofty perpendicular cliffs all round, with an immense cave or arch at the north-west cape. It is covered with a vegetation of long grass, fern, or scrub. It lies north-east from Campbell Island, and is remarkable as being the nearest land to the antipodes of London, being in south latitude $49^{\circ} 42'$ and east longitude $178^{\circ} 43'$, so that it is really the antipodes of Cape Barfleur, a little east of Cherbourg and about 60 miles south of the Isle of Wight. Campbell Island is the antipodes of a point off the west coast of Ireland about 30 miles west of the mouth of the Shannon.

THE CHATHAM ISLANDS are situated about 450 miles east of New Zealand, and lie a little to the south of Cook's Straits. They consist of three islands, the largest about 25 miles long, but of a very irregular semicircular

and branching shape. It is hilly, but not lofty, and is mostly of volcanic rock, some schist with quartz-reefs, chalk, and Tertiary limestone. There is a luxuriant vegetation of trees and shrubs, with much boggy land, and there is a good deal of the common New Zealand fern. The plants are generally like those of New Zealand, but with many peculiar species and some handsome flowers. There are 13 species of true land-birds, 8 of which are New Zealand species, and 5 distinct but allied forms. The natives say that the Apteryx as well as the Kakapo parrot (*Stringops*) formerly inhabited the island, but have been destroyed since 1835.

The first discoverer of these islands was Captain Broughton in 1791. He found an indigenous population, and he describes them as a cheerful race, full of mirth and laughter, and dressed in sealskins or mats. In 1831 a European ship carried about 800 New Zealanders to the islands, and these rapidly exterminated the aborigines, so that ten years later, in 1840, Dr. Dieffenbach found only 90 living beings out of a former population of at least 1200. These people were Morioris. They spoke a peculiar language allied to that of New Zealand, but they exhibited considerable physical differences, and it is not improbable that they were the result of a mixture of intruding Polynesians with aborigines of a lower type.

At present the islands are used for cattle- and sheep-breeding for the supply of whalers. The small population of about 200 persons is excessively mixed, and is said to contain examples of Morioris, New Zealanders, Kanakas or Sandwich Islanders, Negroes, Chinese, Spaniards, Portuguese, Danes, Germans, English, Irish, Scotch, and Welsh.

THE KERMADEC ISLANDS are a group of small rocky or mountainous islands to the north-east of New Zealand, and distant from it about 500 miles. The largest is about 12 miles in circumference and 1600 feet high, rugged and covered with wood. They are quite uninhabited, and are chiefly interesting because, from their height and conspicuousness, they form a stepping-stone midway between New Zealand and Tongataboo, and thus render it easy to understand how successive migrations of Polynesians might have reached the former island.

The flora is very closely allied to that of New Zealand. Out of 115 species which have been collected no less than 85 are New Zealand species. Five are peculiar, and of the remainder most are wide-ranging tropical or Polynesian plants. The small proportion of peculiar species and the large number of New Zealand plants in so remote an island are unusual, and seem to imply some special facilities for the introduction of plants from the latter islands. This may be probably due to ocean currents bringing seeds, and the fact that considerable numbers of Kauri logs from New Zealand, branded with the dates of cutting, are found on the shores of the Kermadec Islands, proves that such a current exists. It is also suggestive that the whole of the land-dwelling birds, eleven in number, are common New Zealand species, and as birds are known to convey seeds either attached to their feathers, or in mud sticking to their feet, or in the soft fruits they eat, the seeds of which pass through their bodies in a condition very favourable to germination, the prevalence of New Zealand plants in these islands is very well accounted for.¹

¹ See an article "On the Flora of the Kermadec Islands," by F. T. Cheeseman, F.L.S., in *Transactions of the New Zealand Institute*, vol. xx. 1887, p. 151.

NORFOLK ISLAND is situated nearly midway between New Zealand and New Caledonia, and about 900 miles east of Brisbane, in Australia. It is not quite 5 miles long, with an average width of $2\frac{1}{2}$ miles. Mount Pitt, at the north-west corner, is 1050 feet high. There are precipitous cliffs round the greater part of the coast, and many small streams fall in cascades into the sea. There are no harbours, but tolerable landing-places in fine weather. The surface is generally a table-land with numerous gullies, and is covered with grass, sprinkled in beautiful park-like fashion with white oaks and the handsome Norfolk Island pine (*Araucaria excelsa*) which often exceeds 200 feet high. The gullies and slopes of Mount Pitt are covered with a thick scrub, with tree-ferns and guavas. Phillip Island, $1\frac{1}{2}$ mile long, lies $3\frac{1}{2}$ miles south of the main island, is nearly as high, very precipitous, and densely wooded; and there are two or three other small rocky islets. Norfolk Island was discovered by Captain Cook in 1770, and now forms part of the colony of New South Wales. It is a beautiful island, and its climate is mild and uniform when compared with the excessive vicissitudes of temperature experienced in Australia. It was long used as a penal settlement, and has been brought into a high state of cultivation by convict labour. The convict establishment was, however, broken up in 1855, and in the following year the Pitcairn Island community of 194 persons were landed here. The island, with its buildings, 2000 sheep, as well as horses, pigs, and poultry, was given to them by the British Government. They inhabit the old convict town, occupying themselves with agriculture and with whale-fishing. Forty of them returned to Pitcairn Island, and the remainder have increased to about 300, and it is to be hoped they will be

no more interfered with, and as far as possible kept from the intrusion of other colonists.

Norfolk Island is interesting to naturalists for its peculiar birds. It has 15 species of land-birds, 8 of which are Australian, while 3 are peculiar species of Australian genera; but there are 3 others which connect the island unmistakably with New Zealand. These are the *Nestor productus*, which formerly inhabited Phillip Island but is now said to be extinct; a fine parroquet, *Cyanoramphus rayneri*; and a remarkable white rail, *Notornis alba*. All these are peculiar New Zealand forms, and two of them would be quite unable to pass over any great width of ocean, while the Australian birds are mostly such as fly well, and might easily have migrated to the island. This sufficiently explains why, although the great majority of its birds are Australian, yet naturalists consider this group of islands to belong really to the New Zealand zoological district.

The flora also supports this view, being most allied to that of New Zealand, and possessing the well-known *Phormium tenax* or New Zealand flax. About one-fourth of the species are peculiar to the island; but it has many which are found in tropical Australia or New Caledonia.

LORD HOWE'S ISLAND is situated S.S.W. of Norfolk Island, and nearly midway between it and Australia, yet this too should be classed in the New Zealand group. The island is mountainous and well wooded, Mount Gower, at its southern end, rising to an elevation of 2830 feet. It is about $5\frac{1}{2}$ miles long, and from one-third of a mile to a mile and a half wide. It is of volcanic formation, and the low land is said to be very fertile. The inhabitants are Europeans or Americans,

mostly connected with whaling. They vary greatly in numbers, so that while in 1859 there were 300, in 1869 there were only 35. They supply whaling ships with pigs, goats, poultry, and vegetables. Most of the birds of this island are Australian; but there is a peculiar wood-hen of the New Zealand genus *Ocydromus*, and a white ground bird has been seen, which is supposed to be the *Notornis alba* or an allied species. The submerged bank on which New Zealand stands extends almost to this island, whereas a deep sea divides it from Australia. This has influenced the animal more than the plant life, the latter being related more to North-Eastern Australia and to New Caledonia than to New Zealand. Out of a total of 202 species of plants 51 are peculiar to it, and it possesses three species of palms, none of which are found anywhere else in the world.

CHAPTER XV

THE COLONY OF NEW ZEALAND

1. Colonisation and Population.

NEW ZEALAND was discovered by the celebrated Dutch navigator Tasman in December 1642, but the first person who carefully examined it and explored its coast was Captain Cook. The earliest white settlers were sailors from whaling ships and runaway convicts from New South Wales. Missions were first established among the natives in 1814, and from this time traders from New South Wales began to frequent the islands and to establish agencies among the Maoris. The country had been formally taken possession of by England as early as 1787, but no systematic attempt at colonisation was made for fifty years, when, under the auspices of Lord Durham, the New Zealand Land Company was formed, and in 1839 the first batch of emigrants arrived under Colonel William Wakefield, who had authority to purchase land and select the site of the first settlement. He fixed upon Port Nicholson, on the northern shores of Cook Strait, and founded the settlement of Wellington; and 1200 emigrants arrived from Great Britain before the end of the year. Other settlements were soon made at Auckland, New Plymouth, Nelson, Otago, and Canterbury,



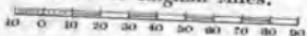
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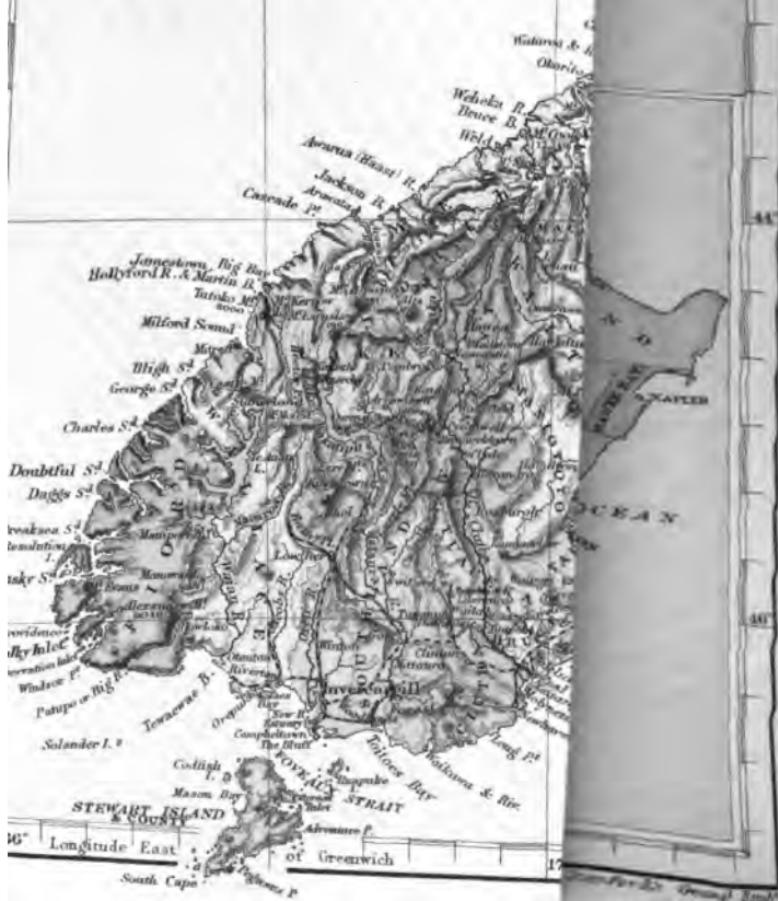
SOUTH ISLAND
NEW ZEALAND

Scale, 1: 4688,640. 74 English Miles to 1 Inch.

Scales of English Miles.



*Heights in English Feet
Railways shewn thus —*



D the land being bought by various associations—as the Free Church of Scotland in Otago and the Church of England in Canterbury; but in both cases financial difficulties obliged the parties to give up their grants of land to the Crown.

The story of the various attempts at colonisation, of the disputes with the natives about land, and of the various native wars, is far too complex and involved to be entered upon here. Suffice it to say that, after a succession of treaties, massacres, skirmishes, and wars, the country is now at peace; and the rapidly increasing white population renders it impossible for the yearly diminishing Maoris to resist the wave of European civilisation, to which, indeed, many of them are now adapting themselves. The growth of the population, at first chiefly by immigration, has been continuous and steady. In 1843 it was 13,000; in 1854, 32,500; in 1860 nearly 80,000; in 1865, 190,000; in 1871 nearly 267,000; and in 1886 about 578,283. The gold discoveries have led to the rapid increase of the last fifteen years, and this reacts upon agriculture and industry, so that we may be sure the progress of the colony will be permanently advanced by it. Immigration still goes on, and we have every reason to believe that the present large population will continue to grow rapidly for many years to come. At the end of 1889 the white population was estimated at more than 620,000.

2. Agricultural and Industrial Pursuits.

The climate of New Zealand is throughout favourable to agriculture, and there is everywhere a fair proportion of rich land, though this is more abundant in the North

Island, owing to the greater extent of decomposed volcanic rocks. About one-third of the surface is still covered with forests, and one-third of the remainder is estimated to be fitted for agriculture, the rest being more or less suitable for pasture. Over 4,500,000 acres are already under cultivation, of which about 800,000 acres are in grain crops. Wheat yields on an average 24 bushels an acre; oats and barley each 30 bushels. Large quantities of potatoes are grown; while butter and cheese are made in sufficient quantities to supply the wants of the colony, and a surplus of butter is annually exported. Though not very favourable for wool, a large quantity is produced, chiefly in the South Island, and its value in 1889 was nearly 4 millions sterling.

New Zealand is most favourably situated for the growth of all the fruits and vegetables of the temperate zone. In the North Island oranges, lemons, peaches, grapes, figs, and melons thrive luxuriantly; while in the South Island some of these, as well as every out-of-door English fruit, arrive at perfection.

Meat-preserving is one of the important industries, the other exports being mostly raw products of the country. Thus, in 1889, the chief exports were—gum (a resin of the Kauri pine), £330,000; tallow, £160,000; timber, £176,000; rabbit-skins, valued at £96,000; preserved meats, £106,000; frozen meat, £783,000; and phormium (or New Zealand flax), £361,000.

In minerals New Zealand, though late in the field, now almost rivals the richest colonies of Australia. In 1866 the greatest quantity of gold was produced—735,376 ounces, of the value of £2,787,520, since which time there have been great fluctuations. In 1873 its value was £2,013,410; in 1880, £1,220,263; and in 1889, £808,549. The greatest quantity is found in

Dunedin, in the extreme south, and in Auckland, at the opposite extremity of the islands.

No other metals have been extensively worked, but there is much mineral riches at present undeveloped. Silver occurs in the Auckland gold-fields, and has been exported to the value of £54,000 ; and at Mount Rangitoto a rich silver-mine has been opened. Copper exists, but is not yet worked successfully ; and the same may be said of tin. The iron-sand which abounds on some of the coasts smelts into a fine quality of iron. Coal is being extensively worked at several places, both in the North and South Islands, and some of it is of as good quality as that of New South Wales. In the year 1889 nearly 6 million tons were obtained, some portion of which was exported. Petroleum or rock-oil is also found, equal to that obtained from the United States and Canada ; while sulphur abounds in some of the volcanic districts of the North Island.

3. Railroads and Communications.

The railway system of New Zealand is exceedingly well developed, no less than 1813 miles being open for traffic in 1889, while several extensions are in progress. The lines and branches are very numerous, but it will suffice here to state generally the direction and length of the more important.

The greatest of all the connected lines of New Zealand is that which runs along the eastern coast of the South Island for more than 300 miles, connecting Christchurch and Lyttelton with Dunedin, Invercargill, and Campbelltown in the extreme south. From Invercargill a northern branch about 85 miles long connects the town with Kingstown on the beautiful Wakatipu Lake ; and there

are branches to the west. Another important line connects Nelson with Hokitika on the west coast, and there are several branches and short lines. In the North Island are lines from Auckland northward 38 miles, and southward 100 miles, with several branches; in the southern part of the island, from New Plymouth to Wellington, from Wellington to Mauriceville, and from Woodville to Napier. Besides the railways, several thousand miles of roads of various kinds have been made, especially in North Island, along which there is an extensive coaching system connecting the railways with all the chief towns. Monthly mail-steamer pass round the islands, calling at all the chief ports, while ocean steamers sail regularly to Melbourne and Sydney, to California, and to Europe. A small steamer plies from Kingstown to Queenstown, and to the head of Lake Wakatipu, and there are also steamers on Lake Wanaka.

4. Government, Education, Religion, etc.

New Zealand possesses a constitutional government similar to that of some of the Australian colonies. It consists of a Governor appointed by the Crown, an Executive Ministry, and a Parliament of two Chambers. The Legislative Council consists of 47 members appointed by the Crown for life. The House of Representatives consists of 91 members—34 for the North Island, 57 for the South Island, and 4 Maori members—the term of office being five years, and the members being paid £210 each session for expenses. The qualification, both for voters and candidates, is residence one year in the colony or the possession of property worth £25, so that it amounts practically to manhood suffrage.

Education is admirably provided for in this colony.

By an Education Bill passed in 1877, public schools are provided, a capitation fee of ten shillings per child being paid, or £2 for a family. State aid is also given to national and denominational schools. The higher education is of a superior kind, and most liberally endowed. There is a university, with a royal charter, whose degrees rank as equal to those of English universities. The Canterbury College has an endowment of 350,000 acres of land, judiciously selected in various districts, and producing a rental of several thousands per annum. In addition there are other landed endowments for education, including elementary and science schools, a museum and library, a college of agriculture, and a normal school for the instruction of teachers. At Dunedin there is a university, or more properly a college, on which 200,000 acres of land have been settled, while the buildings have already cost £30,000. There are also a school of art, a boys' and girls' high school, and district grammar schools, besides athenæums and public libraries in almost all the country towns and villages. In the provinces of Wellington, Nelson, and Auckland there are also colleges affiliated to the University of New Zealand, with ample provision for elementary instruction. This general dissemination of knowledge will assuredly produce good fruits in a people able to conduct their own affairs with skill and discretion, and gives promise of a bright future for what has well been termed the Great Britain of the south.

Religion in New Zealand is altogether free and independent of State control, except that all ministers are registered, so that they may legally perform the marriage-ceremony. The Church of England is the most numerous in adherents. It has six bishops, residing at Auckland, Napier, Wellington, Nelson, Christchurch, and Dunedin.

The Presbyterians rank next in order. Then follow Roman Catholics, Wesleyans, and in very much smaller numbers almost all the other sects and religions professed by civilised people. Dividing the population into Protestants and Roman Catholics, which together include the great majority of the inhabitants, the former may be said to be about ten times as numerous as the latter; while the Chinese and other pagans are only a few thousands.

5. Political Divisions.

New Zealand is divided into nine provinces—four in the North, and five in the South Island. These are of very unequal size, and correspond, to some extent, with the original settlement of different parts of the islands. They long maintained a local independence analogous to that of the separate States of the American Union; but since 1875 the local governments have been abolished, and the whole country is administered as one undivided colony. The nine provinces are now termed Provincial Districts, and are divided into 63 counties for purposes of local government.¹ As the provinces differ considerably in their physical features, and will long be referred to as designating the best known and most easily remembered

¹ The names of the counties are as follows:—In North Island 32, namely—Bay of Islands, Coromandel, Cook, Eden, East Taupo, Hokianga, Hobson, Hawke's Bay, Hutt, Kawhia, Mongonui, Manukau, Manuwatu, Patea, Piatu, Raglan, Rodney, Rangitikei, Thames, Taranaki, Tauranga, Whangarei, Waitemata, Waikato, Waipa, Whakatane, Wairoa, Wanganui, West Taupo, Waipawa, Wairarapa East, Wairarapa West. In the South Island 30, namely—Amuri, Ashley, Akaroa, Ashburton, Buller, Bruce, Collingwood, Cheviot, Clutha, Fiord, Grey, Geraldine, Kairoura, Lake, Mamatoto, Marlborough, Mangahua, Peninsula, Sounds, Selwyn, Southland, Taieri, Tuapeka, Vincent, Wainea, Waimate, Westland, Waitaki, Waikonaiti, Wallace. Stewart's Island forms one county of the same name.

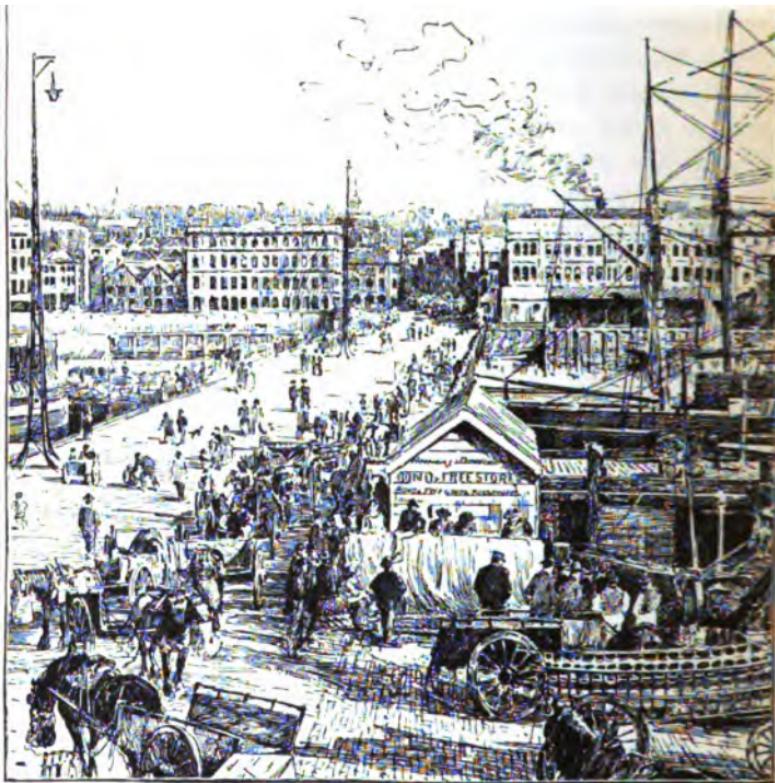
divisions of the country, we proceed to give a short sketch of each.

6. Provincial District of Auckland.

The province of Auckland includes the northern half of North Island, and is about half as large as England. Its northern portion is greatly indented, so that it has an extensive coast-line; and it has also many navigable rivers, which serve to bring produce from the interior. There are three natural divisions of the province—the northern peninsula, the east coast, and the Waikato country, the two latter being principally occupied by natives. The land is either a red volcanic loam or a stiff yellow clay. The climate is very mild, corresponding to that of Greece or Sicily. The celebrated Kauri pine is found only in this province and is largely exported for shipbuilding, the trees being sometimes 15 feet in diameter and 150 feet high. The Kauri gum, already referred to, is also a valuable article of commerce. One of the richest gold-mines in New Zealand is in the Thames Valley in this province. It is a remarkable feature of Auckland that throughout the whole of its great extent the settler can scarcely go 20 miles from navigable water either salt or fresh. The surface is for the most part broken land, with low hills and broad valleys, generally covered with dense forest; and there are numbers of volcanic hills and craters, as well as magnificent hot springs, which have already been described. Ferns are more abundant and varied here than in any other part of New Zealand.

The chief towns are: Auckland the capital, Tauranga, Havelock, Ngaruawahia, and Grahamstown. Auckland is the largest city in New Zealand, and was for some time the seat of government. It is situated on the southern

shores of Waitemata Harbour, while on the opposite coast Manukau Harbour penetrates so far inland that the island is here only .6 miles wide, and in one place only a mile. The city is picturesquely situated, the landscape



THE WHARF, AUCKLAND, N. Z.

being dotted over with volcanic cones, while it possesses a blending of land and water, of hill and dale, of woody heights and cultivated lowlands, that contributes much of the charm to natural scenery. An extinct volcano, Mount Eden, is only a mile from the city, and its summit affords

the best view of the numerous beauties of the surrounding country. The population of the town and suburbs by the census of 1886 is 65,000.

7. Provincial District of Taranaki.

Taranaki, formerly called New Plymouth, is situated on the western side of North Island, and is comparatively small, having a seaboard of 130 miles, and an area of a little over 2 million acres. Three-fourths of this is dense forest, the remainder, except where cultivated, being covered with fern or New Zealand flax. The titaniferous iron-sand, which lies from 2 to 5 feet deep along the sea-beach, is the only ascertained mineral production of the province. The climate is moist, and there are abundant streams, so that the rich volcanic soil thus watered is extremely fertile. The great natural feature of the district is the volcanic cone of Mount Egmont, which rises to a height of 8270 feet, terminating in an acute snow-covered summit. Its slopes are finely timbered, but are mostly held by native tribes.

The town of New Plymouth is small, but picturesquely situated on the sea-shore, almost at the foot of the noble mountain of Taranaki (or Mount Egmont), the summit of which is about 18 miles distant. Its population is 3100, and that of the whole province about 20,000. In 1878 the population was only 9463, so that considerable immigration into this district must recently have taken place.

8. Provincial District of Hawke's Bay.

This province is about the same size as Taranaki, and is situated exactly opposite to it on the east coast. It

consists of rich alluvial plains and undulating hills, rising gradually from the sea towards the Ruahine Mountains, which form its western boundary. There are extensive forests with valuable timber; and the Ahurri Plains to the south of Napier, 80,000 acres in extent, form an agricultural district of unsurpassed productiveness, where crops of all kinds can be grown in the highest perfection without manure. The northern part of the province is considered the best in New Zealand for sheep, which are fed on lands sown with English grasses. On the coast vines are grown. The capital town, Napier, has a population of 7680, and the province about 25,000. It is situated on a peninsula in the estuary of the rivers Esk and Tutaekuri, and has a fair harbour. Wool is the chief product of the district.

9. Provincial District of Wellington.

The province of Wellington occupies the southern part of the North Island, and is nearly half as large as Auckland, containing about 7,200,000 acres, with a population of 77,536. It is mostly undulating and hilly, with two parallel ranges of mountains in the south, and in the north the lofty Mount Ruapehu, 9195 feet high, and the active volcano of Tongariro. There are many fertile valleys, with abundance of good agricultural and grazing land, while the hills are covered with splendid forests. Wheat and oats are largely grown, and sheep-farming is also pretty extensively practised, the principal exports being wool, timber, gum, and tallow. Wellington, the chief town, is now the capital of the whole of New Zealand, a dignity it owes to its central position at the narrowest part of Cook's Strait. It is situated on the western side of Port Nicholson, which forms a spacious

TONGARIRO AND RUAPHU.



harbour, with docks capable of accommodating vessels of 2000 tons burden. The city has about 27,800 inhabitants, having much increased in the last five years. It is built wholly of wood, and must continue to be so built owing to the prevalence of earthquakes in the district. In 1848 the town was almost destroyed, and there was such a panic that the place was near being deserted. The only other town of importance is Wanganui, situated 134 miles north of Wellington, at the mouth of the river of the same name. It is the outlet for the products of a considerable agricultural and pastoral district.

10. Provincial District of Nelson.

Nelson is the most northern province of the South Island, and extends 160 miles along the north-west coast. The country is generally more rugged and mountainous than in any other province of equal area. The scenery is grand, with forest, lake, and valley, and the mountains are very lofty, that called Mount Franklin being estimated at 10,000 feet elevation. The climate is delightful, and agriculture is very successful in many of the valleys, which are exceedingly rich and fertile; but the great wealth of Nelson lies in its minerals, which are abundant and varied, and not surpassed in any other part of New Zealand. There are extensive beds of fine iron ore, coal, limestone, chrome ore, lead and copper ores, with gold both alluvial and quartz. Near Collingwood, in Massacre Bay, a tunnel has been made more than 1000 feet long, which has cut nine seams of coal of a total thickness of 16 feet. Four of these will be worked, some of them in conjunction with layers of ironstone. The quality of the coal is excellent.

Nelson, the capital, is a city of about 7500 inhabi-

ants (with the suburbs about 11,000), pleasantly situated on the shores of a small harbour at the bottom of Blind Bay. Mr. Anthony Trollope says of it: "The site is, I think, as lovely as that of any town I ever saw. Merely to breathe there, and to dream, and to look around, was a delight. Every house was neat and pretty. The summer heats are not great, and all English fruits and grass and shrubs grow at Nelson with more than English profusion."

11. Provincial District of Marlborough

This province is situated in the north-east corner of South Island, and is scarcely larger than Taranaki or Hawke's Bay. It consists of a succession of parallel valleys and mountain ranges, the latter heavily timbered, and the former well suited either for agriculture or pasturage. The soil is often very fertile, the valley of the Wairau being an extensive plain of rich loamy land. The scenery is beautiful and often grand. Pelorus Sound in the north presents an aspect perhaps unequalled for varied and romantic grandeur, resembling in some respects the lochs of Scotland; while the finely-wooded slopes and clear running streams of the interior recall the picturesque seclusion of some Devonshire valleys. The population of the province is something over 11,000. There is some gold in the Wakamarina Valley, but wool and the timber trade are the most important industries.

Picton, the chief port of Marlborough, and formerly the capital, is a small place of about 800 inhabitants, situated at the head of Queen Charlotte Sound in one of the best and safest harbours in the colony. It is a pretty, picturesque, straggling town, lying pressed in between the mountains and the sea. It is surrounded with bright green fields, and has for immediate background some of



WATERSPLASH AT WAINAU.

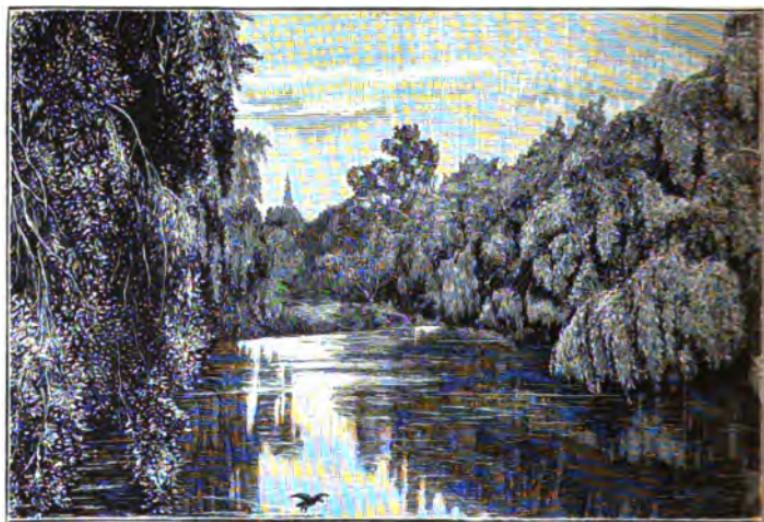
the finest scenery in New Zealand; and it enjoys a delightful climate, producing all English fruits and flowers in rich abundance.

Blenheim, the capital, 18 miles south of Picton, is a somewhat more important town, having a population of about 3100. It is situated on the Wairau River not far from the coast, and is connected with Picton by a railway.

12. Provincial District of Canterbury.

The province of Canterbury occupies the central portion of the South Island, from the east coast up to the Southern Alps, its coast-line being about 200 miles long. About one-third of its area is a vast plain, sloping gently down from the mountain ranges to the sea, forming the celebrated Canterbury Plains. This province is most favourably circumstanced for wheat-growing and stock-breeding; in a word, for the production of cereals, meat, and wool, the chief conditions for the prosperity of a young country. Here the climate, while less mild and uniform than in the more sheltered province of Nelson, is exceptionally favourable to cattle-farming, as well as to the growth of European plants and to the health of the settlers. It resembles, in this respect, the best English climate, though drier, free from fogs, and far less exposed to winter frosts. This region enjoys the cool and healthy breezes from the snowy ranges of the interior and from the polar icebergs. Winds are very prevalent and often violent, the phenomenon of a perfect calm being here unknown, yet the effect, so far from being injurious, is actually beneficial in strengthening the nervous system. European domestic animals and vegetable products flourish and increase with extraordinary rapidity, while the fertile soil rewards the labourer's care to a

really wonderful extent. Owing to the goodness of the natural pastures, here is the great sheep district of the colony, and this gave a considerable amount of prosperity to the island before any gold discoveries had been thought of. The chief industrial products are wool and grain; but besides these there is a large export trade in flax, provisions, skins, leather, and dairy produce. Silk is also produced in some parts which are suited to the growth of the mulberry tree.



THE AVON AT CHRISTCHURCH.

Christchurch, the capital town, is situated on the river Avon, about eight miles from the port of Lyttelton, with which it is connected by a railway tunnelled through a hill for a distance of nearly two miles, at a cost of £200,000. The city is situated in a level country of an especially English aspect, the land being divided into small English-looking fields, with English grasses and

English hedges. It has many fine houses and elegant villas, and the Government buildings, built of stone in the Gothic style, resemble some of our university colleges. The Museum contains a wonderful collection of skeletons of the extinct moas, the gigantic wingless birds which once inhabited New Zealand. The population of Christchurch, with its suburbs, is about 37,000.

13. Provincial District of Westland.

This once formed part of Canterbury, from which it is divided by the almost impassable chain of the Southern Alps. It is a narrow strip of country, about 200 miles long by 30 wide, rising steeply towards the mountainous interior. It is well wooded, and all the rivers abound in fish; but it is chiefly celebrated for its rich gold-fields, which have drawn to it a great influx of population. The diggings are principally alluvial, and are often of great depth; but quartz lodes have also been found, and give the prospect of a permanent gold-field. It is here that the sands on the sea-shore are impregnated with gold, often to such an extent as to pay for washing them. Besides gold, there are coal, lead, and silver ores, copper, iron, and tin; but none of these have yet been systematically worked. The population of the province in 1877 was 17,000, but in 1886 it was only 15,931, showing a decrease of the mining population. In 1889 it was estimated at 16,670. Hokitika, the capital, has about 2700 inhabitants. Having no harbour, it is sometimes difficult of access.

14. Provincial District of Otago.

Otago occupies the whole southern extremity of New

Zealand, and though one of the youngest of the settlements, bids fair to become the most important. It has grand mountains with glaciers and alpine lakes, noble forests, lofty downs suitable for sheep-grazing, and fertile lowlands well adapted for agriculture. On the west coast are a series of deep inlets resembling the fiords of Norway, while its mountains rise to more than 9000 feet above the sea. Gold was discovered in 1861, and numerous gold-fields have since been opened over a large area, including both alluvial deposits and quartz veins. Up to 1886 gold to the value of more than 17 millions sterling had been exported.

Dunedin, the capital of the province, and the most important commercial city in the colony, is picturesquely situated on a bay running nine miles inland from Port Chalmers. Mr. Anthony Trollope says that "Dunedin is a remarkably handsome town, and, when its age is considered, a town which may be said to be remarkable in every way. The main street has no look of newness about it. The houses are well built; and the public buildings, banks, and churches are large, commodious, and ornamental." It has Botanical and Acclimatisation Society's Gardens, with cricket-grounds and a racecourse, and is encircled by a reserve called the Town Belt, through which there is a carriage-drive. The population of the town is about 25,000; but with the suburbs 46,000, and that of the whole province about 160,000.

The following is an enumeration of the towns in New Zealand with 1000 inhabitants and upwards, exclusive of the capitals of the several provinces already described:—

ASHBURTON, a town in the province of Canterbury, on the Christchurch and Timaru Railway, 53 miles south of Christchurch. It is situated in the fine agricultural district of the Canterbury

Plaina. It has several flour-mills and manufactories, and a population of about 2000.

BALCLUTHA, a town in the province of Otago, 52 miles south-west of Dunedin, on the Clutha River, which is navigable for many miles inland. It is surrounded by much fertile country, and there are coal-mines a few miles distant. Population about 1000.

BRUNNERTON, a town in the province of Westland, on the Grey River, 7 miles from Greymouth, and about 30 miles north of Hokitika. There are numerous coal-mines in the vicinity. Population about 3000.

CAMBRIDGE, a town in the province of Auckland, on the Waikato River, at the head of its navigation, and 101 miles south-east of the city of Auckland. It is in a fine agricultural district, especially for butter and fruit-farming. The population is about 1100.

CARTERTON, a town in the province of Wellington, 62 miles north-west of the capital. There is much timber cut and exported in the vicinity, and also much good agricultural land. The population is about 2000.

FIELDING, a town in the province of Wellington, on the New Plymouth and Wellington Railway, 51 miles south-east from Wanganui, and 100 miles from the capital. It is in a good farming and grazing district. Population about 1400.

FOXTON, a town in the province of Wellington on the Manawatu River, with communication by rail and steamer with the capital, which is 75 miles to the south-west. The river is navigable for 20 miles above the town. There is much flax grown and manufactured in the neighbourhood. Population about 1000.

GERALDINE, a small town in the province of Canterbury, 86 miles south-west of Christchurch, on the Waihi River. It is in a good agricultural and dairy-farming district. The population is about 1000.

GISBORNE (or POVERTY BAY), a town in the province of Auckland, on the river Turanganui, 250 miles south-east of the city of Auckland, and 80 north-east of Napier. It is the centre of a fine agricultural and pastoral district, and is the port for Poverty Bay. The country around is good for dairy- and fruit-farming, and there is a mineral-oil spring in the vicinity. Population about 3000.

GRAHAMSTOWN, a mining town in the province of Auckland, on the Firth of Thames, about 40 miles south-east of the city of Auckland. It is the chief emporium of the Thames gold-fields, which have been worked since 1867. One of the quartz mines alone has yielded as much as 10 tons of gold in a single year. It is also a

good fruit-producing district, and there is abundance of fish, much of which is sent daily to Auckland. The population of the borough is about 4500.

GREYMOUTH, a seaport and mining town in the province of Westland, 20 miles north of Hokitika, on the south bank of the Grey River. There is abundance of good coal here, so that Greymouth is considered to be the Newcastle of New Zealand. Gold is obtained on the 17-mile beach north of Greymouth, and there is also a large trade in timber. The population is about 3500.

GREYTOWN (North), a small town in the province of Wellington, 53 miles N.N.E. of the capital, on the Waiohine River, by which the town is sometimes flooded. The country is good for dairy produce, and there are several saw-mills and factories. Population about 1200.

HAMILTON, a small town in the province of Auckland, on the Waikato River, 86 miles south of Auckland city. It is in a picturesque situation, and in a good agricultural district. The population is over 1200.

HASTINGS, a town in the province of Hawke's Bay, 12 miles from Napier by railway. It is the centre of a rich agricultural and pastoral district. The population is about 1900.

HAWERA, an agricultural town on the west coast of the North Island, in the province of Taranaki, 48 miles from New Plymouth by railroad. It is surrounded by a very fine pastoral country. Population about 1300.

INVERCARGILL, the principal town on the south coast of the South Island, 150 miles south-west of Dunedin, is situated on an estuary called the New River Harbour. It is said to have the lowest death-rate of any town in the colony. There are many manufactories and saw-mills in the town and neighbourhood, and it has a large export trade in wool, frozen meat, grain, cheese, and timber. It is connected by railway with Dunedin, and with the beautiful lake district of Otago. The population is about 6000, or with the suburbs, 10,000.

KAIAPORI, a town in the district of Canterbury, 14 miles north of Christchurch, on the banks of the Waimakariri River, which is navigable for small vessels to the town. There is a large woollen factory here, as well as many other industrial establishments. Population about 1800.

LAWRENCE, a town in the district of Otago, 60 miles south-west of Dunedin, on the Tuapeka River. There are gold-mines near, and other minerals have been discovered, including copper, antimony,

and cinnabar. It is also a good agricultural district. Population about 1200.

LYTTELTON, a seaport town in the province of Canterbury, 8 miles west of Christchurch, of which it is the port. It is picturesquely situated in a land-locked basin surrounded by rugged mountains, those of Banks Peninsula on the south of the harbour being volcanic, and much broken into valleys and inlets, whose verdure contrasts with the black rocks which surmount them. Breakwaters have been constructed at great cost to improve the harbour, which has cost altogether nearly half a million sterling ; the result being that the largest vessels can now load at the wharves and jetties in perfect safety. The population of Lyttelton is about 4500.

MASTERTON, a town in the district of Wellington, 71 miles north-east from the capital. It is situated in an extensive plain of good agricultural land, and is surrounded by fine hilly scenery. Population about 3500.

MILTON, a town in the province of Otago, 36 miles south-west from Dunedin. There are brick-yards, pottery works, and cheese factories here. The population is about 1300.

OAMARU, the most northern town in the province of Otago, 78 miles from Dunedin and 152 from Christchurch. It is surrounded by an extensive grain-producing district, and abounds in fine building stone. An artificial harbour has been formed to facilitate the export of agricultural produce, which is very large. Population nearly 6000.

ONEHUNGA, a seaport town in the province of Auckland, 7 miles south-east of Auckland city. There are large ironworks here, and the district around is good for agriculture and dairy-farming. The population is nearly 3000.

PALMERSTON NORTH, a town in the province of Wellington, 101 miles north-east of the capital. It is situated in a clearing surrounded by forest. It is an important railway junction, and has several saw-mills and flour-mills, as well as other factories. The population is about 2700.

PORT CHALMERS, a town at the entrance of the harbour of Otago, and about 8 miles north-east of Dunedin, of which it is the port. There are large fish-curing establishments here, and valuable stone quarries. The population is about 2300.

RANGIORA, a town in the province of Canterbury, 21 miles north-west from Christchurch. It is the centre of the large corn-growing district of North Canterbury, and has extensive flour-mills and flax-mills. The population is about 1600.

REEFTON, a mining town in the province of Nelson, 48 miles north-east from Greymouth and 77 miles from Hokitika. There are numerous quartz-mining companies in the district, which have produced large quantities of gold, and are among the most prosperous in the colony. Population about 1200.

RIVERTON, a town in the province of Otago, 26 miles west of Invercargill, situated at the junction of the Aparima and Paurakino Rivers, which together form a fine land-locked estuary surrounded by fine scenery. There is some gold-mining and much dairy-farming in the vicinity. The population is about 1000.

Ross, a town in the province of Westland, 20 miles south from Hokitika, and about 100 miles west from Christchurch. There is some gold-mining in the vicinity, and the flats near Cedar Creek are heavily timbered with wood of excellent quality. The population is about 1100.

RUSSELL (native name, Kororareka), the chief town and port of Bay of Islands county, 130 miles north of Auckland. Steamers to Sydney and Fiji coal here, and there is a considerable export trade in coal and Kauri gum. The European population is small, being only 256 in 1886, but there are many natives, and it is surrounded by a populous district. The mining town of Kawakawa, 14 miles up the river, is connected with Russell by a short railway, and has 700 inhabitants. Russell is the chief whaling station in the South Pacific.

TAKAKA, a town in the province of Nelson, 68 miles from Nelson city, situated on the Takaka River. The chief products of the surrounding district are timber, hops, wool, and dairy produce; but there is much limestone and coal, while gold, silver, platinum, and asbestos are known to exist. The population is about 1500.

TAURANGA, a town in the province of Auckland, 130 miles south-east from Auckland city, situated on the shores of an inlet of the Bay of Plenty, which forms an excellent harbour for the largest vessels. It is the principal port for the Hot Lakes district. There is much fine agricultural land in the vicinity, and there are many manufactories, among which are chemical works for utilising the sulphur with which the district abounds. The population consists of about 1200 Europeans and 1000 Maoria.

TEMUKA, a town in the province of Canterbury, on the Temuka River, 89 miles south-west from Canterbury. It is in an agricultural district, and has several flour-mills, fellmongerries, and a dairy factory. It is said to be one of the best localities in New Zealand for trout-fishing. The population is about 1300.

TIMARU, a town in the province of Canterbury, 100 miles south-west from Christchurch, and 131 from Dunedin. A breakwater has been constructed nearly half a mile long at a cost of a quarter of a million, forming a safe harbour for very large vessels. There are many factories here, including a woollen factory and refrigerating works for the trade in frozen meat. The population is about 4000.

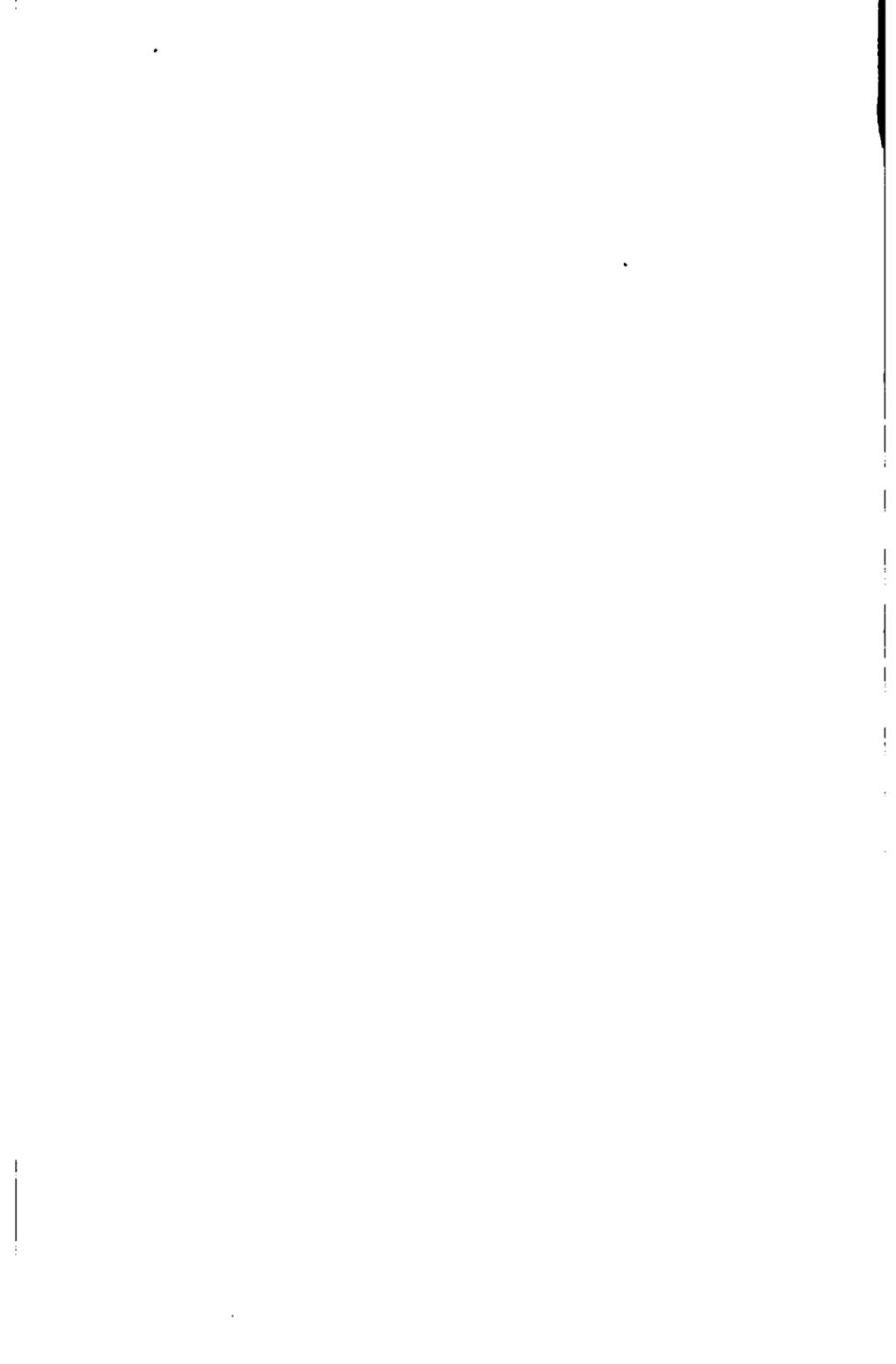
WAIMATE, a town in the province of Canterbury, 130 miles south-west of Christchurch, and an equal distance from Dunedin. It is situated in a good agricultural district. The population is about 1400.

WANGANUI, a considerable town in the province of Wellington, 134 miles north of the capital, about 4 miles from the mouth of the river Wanganui. It is the chief seaport on the west coast, and it is the outlet for a prosperous agricultural district. There is a large export of cattle, sheep, grain, wool, and dairy produce. The Maori College, built and endowed for the education of Maori youth, is in the vicinity. There are many manufactories, including iron-foundries and sash and door factories. The population is about 5000.

WANGAREI, a town in the province of Auckland, 80 miles north of Auckland city, situated on the Hotea River about 20 miles from its mouth. There is steamer communication with Auckland. The district is agricultural, but coal and many other minerals abound, though not yet extensively worked. Population about 2000.

WESTPORT, a town in the province of Nelson, on the Buller River, near its mouth, and is the best port on the south coast of the South Island. It is the outlet for numerous coal-mines and of several gold-mining districts. The coal-mines are situated 2000 feet above the sea-level, and the coal is lowered by self-acting inclined tramways. The population is about 2500.

WOODVILLE, a town in the province of Hawke's Bay, 95 miles south-west from Napier and 100 north-east from Wellington. It is situated on the Manuwatu River in a fine forest district, giving work to many saw-mills. Hops and tobacco are grown here, and there are factories of cheese and bacon. Population nearly 2000.



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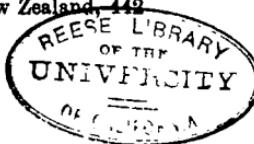
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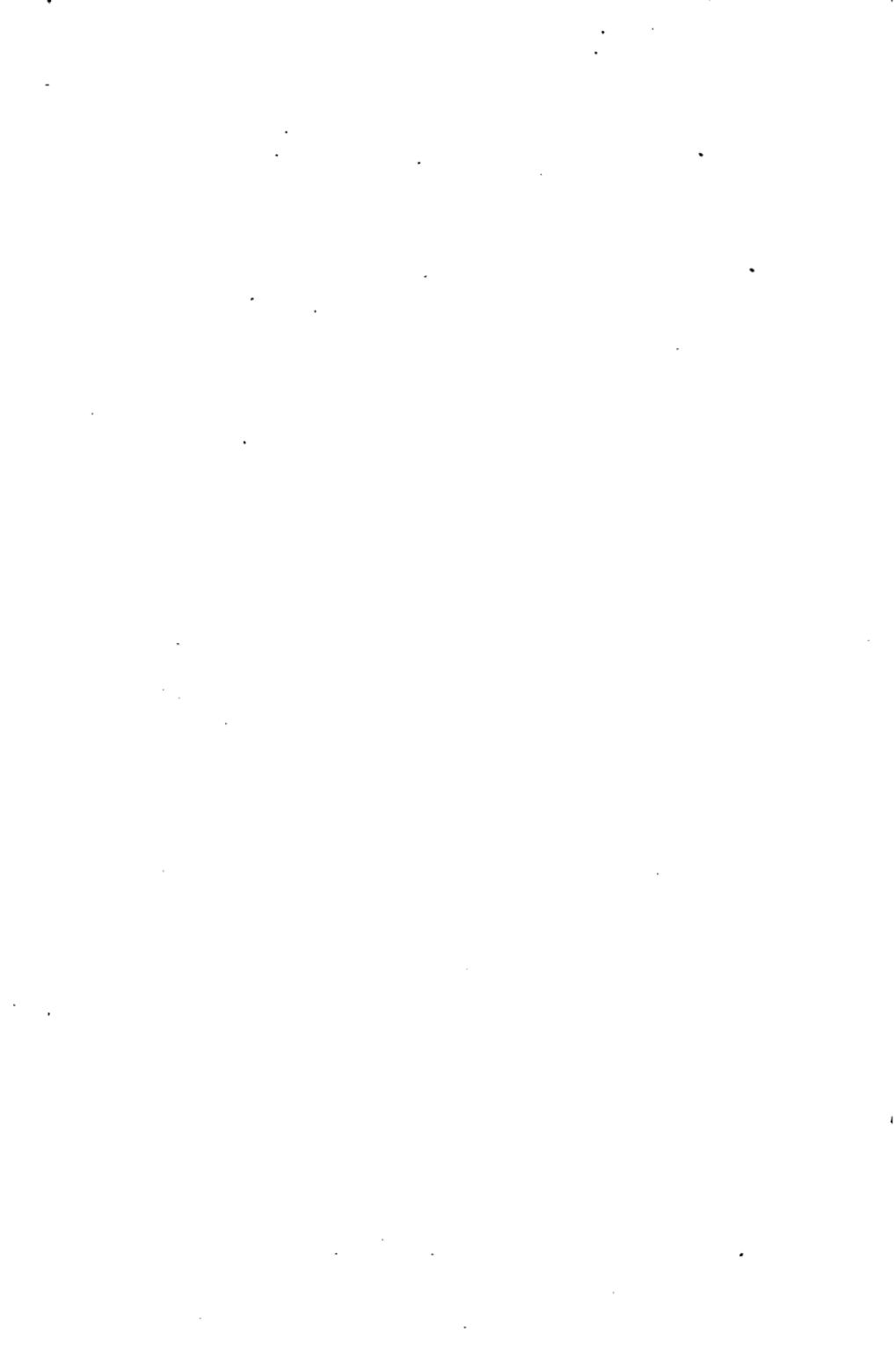
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