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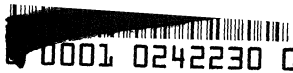
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**AUSTRALIA, NEW ZEALAND, AND  
THE PACIFIC ISLANDS**



AUSTRALIA,  
NEW ZEALAND,  
AND THE  
PACIFIC ISLANDS

*Edited by*

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SECOND EDITION



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## FOREWORD TO THE SECOND EDITION

This book has been completely revised and brought up to date, the authors having borne in mind throughout the requirements both of the general reader and of the new General Certificate Examination at all levels.

Since the first edition was published, there have been great changes in the political and economic life of the region, mainly as a result of the Second World War. In particular, the considerable development of the Australian economy has necessitated a thorough revision and, in places, rewriting, of the relevant sections. This has been carried out by Mr. R. J. Evans, with the critical assistance of Mr. Clarence Martin, Lecturer in Geography in the University of Adelaide. Recent developments in New Zealand have also been fully covered, and all statistics have been brought up to date. The political situation in the Papuan region is still fluid; and it has therefore been thought best to omit the original concluding chapter on Pacific problems.

Acknowledgments are due to Mr. Hale, Director of the South Australian Museum, and to Mr. N. Tindal, the Museum's anthropologist for their criticisms and corrections; to Mr. H. A. Bennett, who drew many new maps for this edition; and to the High Commissioner for New Zealand, the Australian News Information Bureau, London, and Messrs. Dorien Leigh Ltd., for permission to use copyright photographs.



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# AUSTRALIA

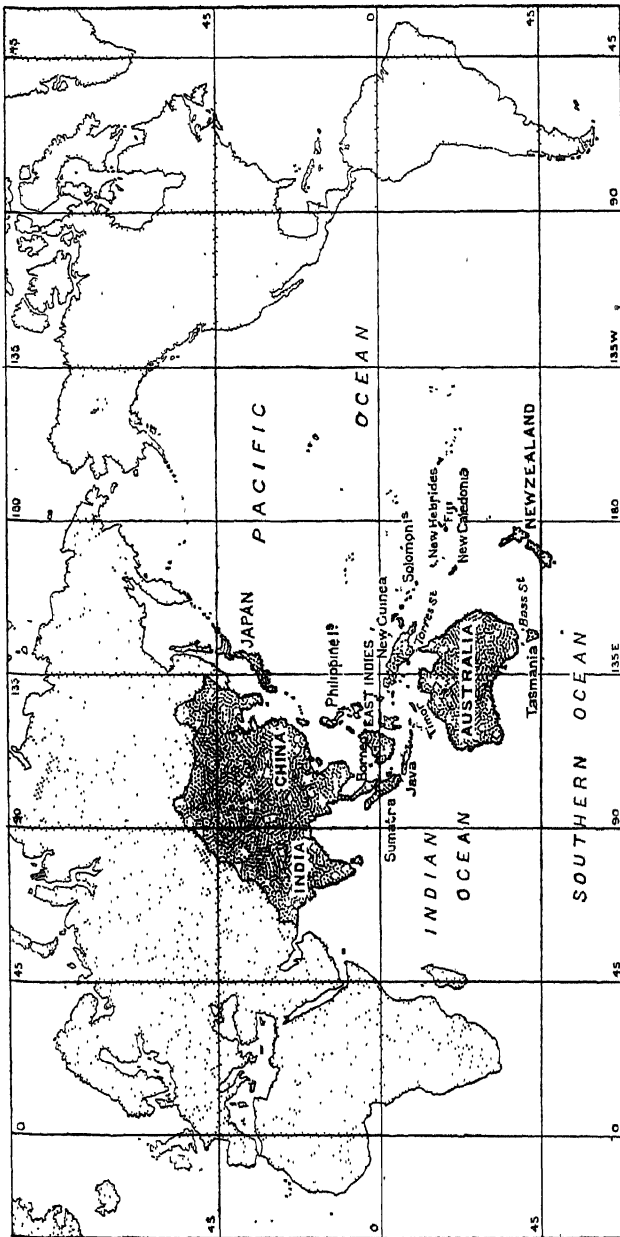
## CHAPTER I

### WORLD POSITION AND IMPORTANCE

Most people base their ideas of world position on the suggestion of atlas maps that the surface of the globe is divided into five continents and five oceans. Few suggestions are more misleading. The earth is not a flat surface, but a sphere, and study of a globe shows clearly that the fundamental fact of land and sea distribution is the existence, not of five, but of two oceans. What we call the North Atlantic forms a pool of which the South Atlantic, the Gulf of Mexico, and the Mediterranean and Arctic Seas may be considered arms, the whole being surrounded by a broken ring of land. The pool and ring make up roughly one half of the globe. Into this pool drain most of the world's greatest rivers, and its shores, dominated by the European, form a world of their own, which we conveniently summarize as "the West." The other half of the globe contains the Pacific and Indian Oceans, really one ocean which forms almost a complete water hemisphere.

An effort is required to realize the size of this waste of water. Perhaps a true idea of its vastness may best be grasped by noting that the 180th meridian passes over the ocean almost throughout its length, while the greater arc of the Equator between longitude 80° W. and longitude 45° E.—a distance of 235°—passes over land for less than 20° of its path.

But this ocean is not entirely empty. Its northwestern segment is more or less filled with disconnected units of land, including China, India, Australia, and New Zealand. The triangle formed by these countries is a separate world. It is, in part, thickly populated, but



THE EASTERN TRIANGLE.

The darkly stippled areas form a separate world—the East.

not with a population imbued with European culture. It is not the West, but the East—the world of colour.

Historically, it is the base of the triangle which counts. China and India, separated both from one another and from the civilization of the West by a long and dangerous land journey, each developed a high civilization of its own. One or both of these cultures might have been expected to spread throughout the remainder of the triangle, for at first sight the East Indies, Australia and New Zealand seem to be the natural fields for the expansion of the peoples of southwestern Asia. This expansion, however, never took place on more than a trifling scale ; a failure for which several reasons may be suggested.

The simplest explanation is that until modern times none of the Asiatic peoples ever felt economic pressure sufficiently severely to make expansion a necessity. There may be some truth in this, but in any case the task would have been extremely difficult. Although they are immensely productive, the East Indies, which form, as it were, the first step towards expansion, are not climatically suited to the development of a progressive race, so that the occupation of Sumatra, Java, and Borneo would not necessarily lead to further expansion. The next step was harder still.

Northern and western Australia for the most part offer a singularly unattractive appearance to the would-be settler and are deficient in indigenous food-stuffs. That this is true is proved by the opinion of New Holland held by the Dutch before the time of Cook. There is little incentive to settlement on these coasts, and the infinitely more attractive conditions in southeastern Australia and New Zealand could not of course have been guessed, even if the existence of these lands had been known.

Nature would also seem to have planned Australia and New Zealand deliberately as lands which could only be approached, as it were, from the wrong side, after a long and dangerous voyage. It is a most significant fact

## 6 WORLD POSITION AND IMPORTANCE

that the great civilizations of China and India left the southern lands practically untouched, and that their exploration and settlement was eventually undertaken by a maritime people from the other side of the world. A somewhat similar case can be imagined if we suppose that the Americas had been turned round so that the steep and difficult western shores had faced the Atlantic. European settlement would obviously have been a much longer and more laborious process. From the European point of view the world has been very conveniently arranged.

Neither the Chinese nor the Indians developed ship-building and the art and science of navigation to a degree which would have made the long, hazardous journey to southeastern Australia or New Zealand one of reasonable security. Consequently, the coloured peoples did no more than follow the line of least resistance, and their migrations resulted in a partial and desultory occupation of many islands and in a great deal of racial intermixture which offers complex problems of ethnology to-day.

So the East missed the opportunity which lay before it. In due time, the European perfected his ships and his methods of navigation until he was in a position to carry his ideas and culture all over the world. In America he found comparatively empty spaces, and only a relatively feeble opposition ; but the arrival of Vasco da Gama at Calicut in 1498 brought the East and West face to face, and there began that painful adjustment of different civilizations with different ideals which in our own day seems to be approaching an acute stage.

In Australia, New Zealand, and the Pacific Islands, however, the white man found an almost clear field for his energies. In New Zealand the Maori fought the inevitable with stubbornness and chivalry, and has since assimilated European civilization with remarkable success ; a racial and cultural development hardly paralleled elsewhere. In the Islands the native was too weak to resist the white man, but has yet to prove that he is strong

enough to emulate the Maori. Australia proudly boasts that her history is unstained by war within her borders. Her aboriginal people, never a danger, are to-day merely a challenge to the white man's conscience, and, one may say, a challenge which the Australian Government has not refused. It is difficult to visualize a widening horizon for these survivors of a past age, but at least they are protected from the sad consequences which have too often followed the contact of a primitive race with a civilized people.

So it has happened that the Western Pacific has become biologically as well as physically an area of arresting diversity and even contrast. Here survives the old tableland of western Australia, one of the most ancient lands in the world, while to the north and east are the tangled chains where the two great belts of world-folding finally meet one another. Here too are archæan crust-blocks and coral islands ; volcanoes and glaciers ; snow-covered mountains and tropical swamps : the world's greatest artesian basin and its finest geyser. Everywhere is contrast, and everywhere the new jostles the old. Almost every kind of climate is represented—the torrid heat of New Guinea is opposed by the glacial conditions of the Southern Alps, and the maritime, almost English, air of Tasmania contrasts with the Mediterranean conditions of "Swanland." The flora and fauna are even more diverse and full of peculiarities, and the introduction by man of exotic species has added to the diversity and offered new problems.

## CHAPTER II

### DISCOVERY

SINCE the Pacific was the last ocean to be entered by Europeans, the discovery and exploration of its lands comes late in the history of European expansion. This is not surprising in view of the world-positions of Europe and the Pacific. What is surprising is the length of time which elapsed between the first entry into the Pacific and the first serious attempt at settlement outside the East Indies.

Magellan crossed the Pacific in 1520, and the existence and to some degree the size of these lands had been known for pretty well a century and a half before the first settlement was established in Australia in 1788. The occupation of New Zealand began even later. This delay is explicable only when the history of Pacific exploration is considered.

Magellan's voyage resulted in a treaty which extended to the Pacific the famous Papal line dividing the known world between the Spanish and the Portuguese. About 1584 Spain occupied the Philippines (a discovery of Magellan's) and under the treaty, Spanish ships sailed to Manila in latitude  $15^{\circ}$  N. by a westerly route only—actually from the American port of Acapulco in latitude  $11^{\circ}$  N. This route enabled them to use the Trades on the outward voyage, while on the return they worked north and so got the Westerlies. But both routes lie far to the north of Australia, New Zealand, and the principal island groups, which accordingly were never sighted. The Portuguese worked eastwards to the Moluccas, but as their route from the Cape of Good Hope coasted along the shores of Africa as far north as Zanzibar and then crossed



the Indian Ocean to Ceylon, they too were so far north that no discovery was possible. Thus, knowledge of the southern lands was postponed until the beginning of the 17th century, when the Portuguese had given place to the Dutch.

Almost from the beginning of the Age of Discovery, the belief was widely held that there must exist a large land-mass in the Pacific. This belief was a revival of the old Greek idea of world-symmetry which appeared to require a continent in the fourth quarter of the globe to balance the other land-masses. It was known that South America was much smaller than Asia, and so, in perfect good faith the 16th century geographers placed on their maps the enormous "Terra Australis nondum cognita." Magellan's voyage was considered to support the theory, his strait being thought a continental strait, while the discovery of Drake that to the south of Cape Horn the eastern and western seas "meet in a most free scope" does not seem to have been appreciated at its true value. As late as 1595 the great geographer Hondius expressed doubt as to the insular character of Java, which might, he thought, be part of the southern continent.

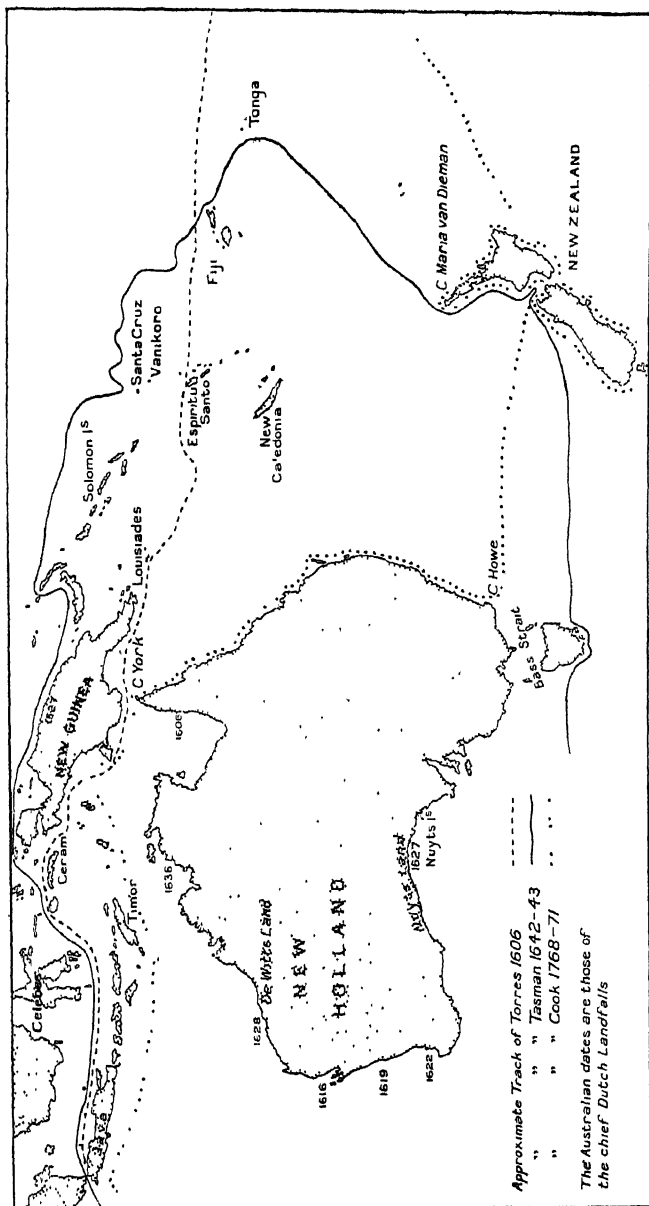
The 16th century did not itself see much addition to the knowledge brought home by Magellan. In 1527 a Spaniard called Meneses sighted the north coast of New Guinea, which later became a familiar sight to sailors, though no one seems to have been sufficiently curious to carry investigations any further. In 1595 another Spaniard, Mendana, sighted the Solomon and Santa Cruz groups, and his discovery supplied the impulse to the voyage of de Quiros, which we may fairly take as the beginning of western Pacific exploration proper.

In December, 1605, a Portuguese sailor, de Quiros, left Callao in command of a Spanish expedition to find the southern continent, and to do so took a more southerly course than any hitherto attempted. As a result he passed through the Low Archipelago and found the New Hebrides, which he called Australia del Espiritu Santo,

but losing heart, he sailed north and eventually returned to America after calling at Guam. His second-in-command, a Spaniard named Torres, lost touch with him and sailed west. His course took him through the Louisiades and so to Torres Strait, through which he passed within sight of Australia, though its continental nature does not seem to have been recognized. The voyage terminated at Manila, and neither Torres nor any one else apparently realized the magnitude of his exploit. No account of his voyage was published, and the whole affair sank into oblivion for more than 150 years. And yet Torres was not the discoverer of Australia.

In June, 1606, the Dutch authorities at Batavia sent a small vessel, the *Duifken*, under William Janszoon, to search for new spice lands to the east. The *Duifken* sailed along the south coast of New Guinea, crossed Torres Strait under the impression that it was a bay, and coasted the Gulf of Carpentaria as far as latitude  $13^{\circ} 45'$ , this feat taking place a few months before Torres' passage of the strait, and, as in his case, no particular importance seems to have been attached to the voyage. It was in fact the discovery of Australia.

A few years later the Dutch authorities ordered their captains to take a more southerly route when sailing across the Indian Ocean from the Cape of Good Hope to their eastern possessions, in the hope that by doing so they would find an easier passage. These orders, issued solely in the interests of navigation, resulted in the discovery of large parts of Australia. In 1616 Dirk Hartog sighted Australia in latitude  $26^{\circ}$  and landed on the island which now bears his name. He was only the first of many, and by 1640 Dutch skippers had seen and charted most of the coast from Cape York round to de Nuyts Archipelago, the name of which commemorates the voyage of Peter de Nuyts, who in 1627 surveyed the whole south coast from Cape Leeuwin to longitude  $133^{\circ}$  E. Nowhere, however, had they reported fertile land or possibilities of trade, nor was it clear what relation the



MAIN VOYAGES OF DISCOVERY IN THE SOUTHWESTERN PACIFIC.

various coasts had either to one another or to the so-called Southern Continent. These problems were to some extent solved by the voyage of Abel Tasman.

Acting under the orders of Van Diemen, the Dutch Governor of the East Indies, Tasman left Batavia in August, 1642, watered at Mauritius, and sailed southwards to latitude  $40^{\circ}$  S. where he turned east, and on November 4th sighted the western coast of Tasmania. The south coast was charted, the land being considered as an extension of de Nuyts land, and the voyage eastwards was resumed. On December 13th a new land was sighted in latitude  $42^{\circ} 10'$  S. This was the western coast of New Zealand, and after an unsuccessful attempt to penetrate Cook Strait, Tasman followed the coast northwards to Cape Maria van Diemen. From here he sailed northnortheast and discovered Tonga and Fiji before rounding the north of New Guinea and reaching Batavia after one of the most remarkable voyages in the history of exploration. Broadly, he showed that Australia had no connection with the Southern Continent (which was thought of as immensely bigger than Australia itself), and by his discovery of New Zealand he placed on the map the last habitable land-mass of any size in the world. Two years later, on a second voyage Tasman sailed along the Australian coast from Cape York to de Witts land in latitude  $20^{\circ}$  S., so that by 1644 two-thirds of the coast were tolerably well known, while Tasmania and New Zealand had been visited. From the Dutch point of view, however, these discoveries were all worthless. It was evident that none of the new lands provided any source of trade or wealth (as they understood it) and so the practical Dutch simply let the matter drop.

The century following Tasman's discoveries is relatively a barren period in Pacific discovery. Ship after ship visited various parts of the Pacific, and in an unsystematic fashion many islands were placed on the map, but no really big step forward was made until Cook sailed on his first voyage in 1768. Between 1688 and 1701 the English-

man Dampier continued Tasman's survey of the north-west Australian coast, and in 1722 Roggeveen made the last of the great Dutch circumnavigations and discovered Easter Island with its mysterious statues. Byron in 1765 touched at the Gilbert Islands, and in 1767 Wallis discovered Tahiti in the Society Islands. In the following year the French sailor, Bougainville, discovered the Samoa group, and gave the name *Louisiades* to the group first seen by Torres. Bougainville's voyage merits attention, less for its discoveries than for the fact that the expedition was the first to be properly equipped for its work, the personnel including several eminent French scientists. In this sense Bougainville is the forerunner of Cook. Interesting in their way, and important as these voyages are, they did nothing to solve the big problems—the relation of Australia to New Zealand; the extent of the latter; the existence of the Southern Continent. The extent and boundaries of the Pacific were little better known than in the time of Tasman. Cook's voyages settled all these questions, and in doing so practically brought to an end the exploration of the Pacific Ocean.

In 1768, as master of the *Endeavour*, a Whitby collier of 360 tons, Cook led an expedition whose declared object was to observe a transit of Venus from Tahiti, but whose real purpose we now know to have been the annexation of the greater lands in the Western Pacific. The British Admiralty, alarmed by French projects in this ocean, determined to forestall their rivals. On October 8th, 1769, Cook reached the east coast of New Zealand in latitude  $38^{\circ} 39' S.$  at the place now known as Poverty Bay. After sailing south to Hawke Bay, he turned and made a complete circuit of the North Island; so proving what Tasman had suspected, the existence of Cook Strait. A careful and admirable chart of the coast was made, and frequent landings provided the scientists with much information about the country and its inhabitants. On reaching Hawke Bay, Cook turned the *Endeavour* southwards, and circumnavigated South Island

with the same care and thoroughness, the only error of any importance being the failure to recognize the insular character of Stewart Island. After resting at an anchorage in Cook Strait, the expedition sailed westwards from Cape Farewell on March 31st, 1770, over five months having been spent on this survey of the coast of New Zealand.

On April 19th, he sighted Australia near Cape Howe in latitude  $37^{\circ}$  S., and a little later made a landing at Botany Bay. As he proceeded northwards, Cook carried out the same careful charting and examination of the coast until Cape York was reached, the *Endeavour* narrowly escaping disaster on the Barrier Reef. Passing through Torres Strait, he called at Batavia before returning to England, which he reached on May 12th, 1771. The knowledge gained was very great. In brief, he proved that there was no possibility of continental land in the southwestern Pacific north of latitude  $40^{\circ}$  S. ; he showed the position, size and shape of New Zealand by a chart, the accuracy of which excites admiration even in the 20th century, and explored with equal skill practically the whole eastern coast of Australia ; finally, he verified the track of Torres in 1606 by his passage between Australia and New Guinea.

On his second voyage, between 1772 and 1775, Cook definitely showed that the idea of a vast southern continent must be abandoned. In a series of cruises from his base in New Zealand the South Pacific was thoroughly explored. The Hervey or Cook Islands and New Caledonia were discovered ; the Antarctic Circle crossed ; and the " permanent " Antarctic ice sighted for the first time in history. But he found no big land area, and he stated that if there were a continental mass it lay in such high latitudes that it must be useless to man ; in which statement he was perfectly correct.

His third and last voyage was directed towards the practically unknown north. Hawaii was discovered, though it seems probable that the group had been sighted in the 16th century by Spaniards, and then forgotten ;

and much of the American coast and Behring Strait charted before the fatal return to Hawaii and Cook's murder there by the natives on February 14th, 1779. His second-in-command, Captain Clarke, finished the survey on the Asiatic side of Behring Strait, so that on the expedition's return in October, 1780, the unveiling of the Pacific was practically complete.

There remained one small Australian problem, which was solved a few years later by Flinders. In company with a naval surgeon, called Bass, he carried out the circumnavigation of Tasmania in 1798, so proving the existence of Bass Strait, completed the exploration of the Australian coast from de Nuyts Archipelago to Cape Howe in 1801-2 ; and finally carried out the first circumnavigation of the continent in 1803. The discovery of Australia was finished, but the exploration of the interior had scarcely begun.

## CHAPTER III

### EXPLORATION

THE opening up of Australia formed one of the major tasks of 19th century exploration, and is of great interest since the conditions under which the work was done were in many respects unique. Australia presented a combination of physiographic and climatic difficulties which largely dictated the actual lines of advance, which led incidentally to much hardship and even to loss of life, and which evoked feats of extraordinary gallantry and endurance. Australia is justly proud of the pioneers whose work fills the most glowing pages of her history.

On January 18th, 1788, acting under orders from the British Government, Governor Phillip landed in Botany Bay, and a few days later founded the first permanent settlement on the neighbouring harbour of Port Jackson. Before many years were past the growing colony realized that its expansion was narrowly limited by the line of the Blue Mountains, but when attempts were made to cross the barrier by the usual and natural method of following up the rivers, an unexpected obstacle was encountered.

The Blue Mountains form a monoclinical fold of hard sandstone capping soft shales, which has resulted in the rivers eating out broad, precipitous-sided amphitheatres on the flat above the fold, but at the fold itself have only been able to cut narrow notches, so producing the famous "bottle-necked" valleys which excited the curiosity of Darwin. The early explorers would follow up a river, struggle with difficulty through the inevitable gorge and then instead of reaching a pass through the opposing mountains, they invariably found their progress barred by a wall of cliff at the head of the amphitheatre.





of Bathurst and to the rapid exploration of the immediate hinterland by Evans, Oxley, Cunningham and others ; while Hume and Hovell in 1824 succeeded in reaching the site of Geelong after a difficult journey. Thus by 1830 knowledge had increased considerably, and had brought with it a problem which puzzled the settlers for many years.

Almost every expedition returned with particulars of rivers and streams which flowed westwards. Many of these when traced down apparently ended in marshes, but others, such as the Lachlan and Murrumbidgee, seemed much too big for such a fate. The puzzle was to find what did happen to them. Practically the whole Australian coast was well known, and no one had ever reported the existence of a large river-mouth at a point which could bear any relation to these newly discovered streams. So there sprang into existence the plausible theory of an Inland Sea, into which the rivers were supposed to drain ; and round which there was presumably an almost illimitable stretch of fertile land.

The idea touched the imagination of many men, and of no one more strongly than Captain Sturt, who, after several preliminary expeditions, carried out in 1828-29 the journey which solved the problem. Dragging a boat overland, he voyaged down the Murrumbidgee, and so on to the Murray, which led him and his five companions after a long and arduous journey to its junction with the sea at Lake Alexandrina. The return journey nearly resulted in disaster through shortness of food, hostile natives, and the difficulties of working against the stream ; but it was safely accomplished. Sturt had exploded the theory of the Inland Sea, and when in 1836 Mitchell opened up the Great Valley of Victoria, long known as Australia Felix, and Hindmarsh established a settlement at Adelaide, a chapter in the history of Australian exploration was ended. The geographical framework of the great southeastern quadrant from Brisbane to Adelaide, which is still, and probably will remain,

the centre of Australian civilization, was known, and a host of small expeditions working on the data of the great pioneers rapidly filled in the necessary detail.

By 1840 the original colony at Port Jackson had multiplied into numerous settlements of varying degrees of prosperity and scattered over a wide area, but in the main already tending to centre round three foci—the present-day cities of Adelaide, Melbourne, and Sydney—while away in the southwest was the isolated settlement of Western Australia founded in 1829 on the banks of the Swan River.

The greater part of the continent however still remained unknown, and its unveiling took the better part of forty years. The expeditions which accomplished the task can be divided into two groups. From the Adelaide and Perth districts efforts were directed which first established contact between those two areas, and later led to the opening-up of Western Australia : while from the eastern settlements another series of expeditions completed the work already begun. Practically all these efforts had the same objective—to reach the heart of Australia, and then, if possible, achieve the transcontinental journey—an idea which seems to have had the same fascination for these later explorers as the Inland Sea had had for their predecessors.

Ever since his voyage down the Murray, Sturt had been eager to penetrate to the heart of the continent, and in 1844 he started from the junction of the Murray and the Darling and pushed his way to the northwest. He made fair progress over an arid country as far as the Grey Range, but beyond this he met some of the worst conditions Australia has to offer. Stifling heat and an almost total absence of water caused incredible hardships and brought the expedition to a standstill for months ; but eventually Sturt succeeded in pushing over a naked desert beyond Cooper Creek, which he mapped for about 100 miles before returning. This is perhaps the hardest journey in

the history of Australian exploration. The party were utterly exhausted, Sturt himself became almost blind, and his second-in-command, Poole, died.

In the next year, Mitchell, who had followed up previous exploration in the south with some useful work in tracing the feeders of the Upper Darling, started on an attempt to find the watershed between the southern rivers and those flowing into the Gulf of Carpentaria. In this he failed, but he reached Cooper Creek, known above its junction with the Thompson as the Barcoo. Two years later Kennedy showed the identity of the two streams by following it down to Sturt's turning point of 1844. The success of these two expeditions was partly due to their being made in the wet season, and neither man experienced the hardships from thirst suffered by other explorers in this area.

Meanwhile a great journey had been accomplished in the north. The increasing sea traffic round the north of Australia had led to the establishment of a government post at Port Essington in Arnhem land, and it was earnestly desired to find an overland route which would link this settlement with the stations of the southeast. In 1844 Leichhardt started from Moreton Bay and in December, 1845, reached Port Essington after a journey of over 3,000 miles through a country of the most broken topography, hampered by tropical heat and rain, impeded by dense, often impenetrable vegetation, and menaced by the wild tribes of the north. It was a remarkable achievement, but unfortunately of little immediate value. Leichhardt and his men reached Port Essington in rags, at the point of starvation, and it was evident that the route was not a practicable one. Accordingly, in 1848 Kennedy attempted a new route to Cape York. His party was landed near Rockhampton, and after a terrible journey, similar in character to Leichhardt's, was ambushed by natives near Cape York. All the white members of the expedition were killed, save two, who escaped

mainly through the faithfulness and bush skill of their native interpreter Jacky. The same year saw yet another tragedy. Leichhardt started to cross the continent from east to west. He made good progress, and in a letter written from his camp on the Cogoon in April, 1848, seemed full of confidence. From that moment nothing more was ever heard of him, and his actual fate still remains a mystery, in spite of the most careful attempts to trace his movements.

Three years later the great Australian "gold rush" began, and for ten years exploration was at a standstill while the country grappled with the problems of vast immigration and mining camps ; so that it was not until 1860 that the next expedition started, this time from Melbourne, under the leadership of Burke and Wills.

The expedition was definitely planned to cross the continent. It was supported by private and public subscription, and its departure from Melbourne was the occasion of universal interest. Progress being slow, Burke and Wills with a small party pushed ahead and reached Cooper Creek without difficulty, having given the third in command, Wright, instructions to follow on as quickly as possible and establish a permanent camp on the river. After waiting in vain for Wright, Burke and Wills left part of their provisions at a depôt in charge of a small party, and with two others, Grey and King, started off northwards with a very inadequate outfit. Fortune favoured them, and their progress was fairly rapid in spite of many difficulties and privations owing to the nature of the country and their meagre equipment. They reached the Flinders River and followed its course to the Gulf of Carpentaria. The continent had been crossed.

Their return was one long drawn-out tragedy. Food ran short, Grey died from his exertions, and the three survivors struggled to the depôt, to find it empty and abandoned. In actual fact, the base party had only left that very morning and at the moment were only a few

miles away. After some consultation a fatal decision was taken to try and reach the South Australian settlements *viâ* Mount Hopeless. They soon found themselves in a foodless, waterless country, and after trying to exist for some time on the seeds of a swamp plant known as nardoo, Burke and Wills died of starvation, while King at his last gasp was found by some natives who succoured him to the best of their ability. News of their failure to return was brought to Melbourne by Wright, who visited the depôt on Cooper Creek only a few days after Burke and Wills had found it deserted, and when they were only a short distance away. He does not seem, however, to have observed any traces of their visit, nor to have realized the necessity for rapid and vigorous action, but merely returned to Melbourne by easy stages. The anxiety in Melbourne was intense, and four well-equipped expeditions set out in search of the lost explorers.

Of these expeditions, Howitt's, starting from Melbourne, succeeded in tracing the lost party's tracks, rescued King, and found the bodies of Burke and Wills, so clearing up the mystery of their disappearance. Walker skilfully led a party from the east coast to the Gulf of Carpentaria, and though, of course, failing in his main object, actually found the tracks of Burke and Wills and mapped a good deal of the Queensland tableland. McKinlay started from the Lake Torrens district and made a remarkable journey to Cooper Creek, found Grey's body, pressed on to the Gulf of Carpentaria, and finally made his way to the coastal settlements in Queensland. Finally, Landsborough, starting from the Gulf of Carpentaria, made a brilliant transcontinental journey to Melbourne.

The scope of these expeditions and the thorough and successful manner in which they were carried out, left practically no exploration on the grand scale to be done in Eastern Australia, and the unveiling of this area may be said to have ended with Landsborough's arrival in Melbourne. During these same years the centre of the continent had been revealed through the exertions of Stuart.

Between 1856-60 this skilful explorer, who had got his early experience with Sturt, had made a series of journeys into the districts west and northwest of Lake Torrens and had opened up the country as far north as the present town of Oodnadatta. In 1860 he discovered the mountains which now bear his name and succeeded in reaching the centre of the continent, but was foiled in an attempt to reach the Victoria River. A second attempt in 1861 also resulted in failure, Stuart being compelled to return not far from latitude  $17^{\circ}$  S. A third attempt in 1862 was successful. After a difficult march he reached the Adelaide River and so made his way to the north coast, his route being practically that followed later by the transcontinental telegraph line. Stuart must rank as one of the greatest of Australian explorers. Both the extent of his discoveries, and the efficiency and skill with which they were conducted over some of the most trying and difficult country in Australia, stand out in sharp contrast with many less fortunate expeditions.

The story of Western Australia begins with the foundation of Perth in 1829. Within a few years the settlers had roughly mapped most of the southwestern area, which still remains the most developed portion of the modern State. Cut off from the eastern settlements, the westerners steadily carried out the exploration of their hinterland, in spite of the grim fact that the reports of each expedition seemed only to emphasize the barren and worthless nature of the country. The story is thus one whose main interest lies in the triumph of human hardihood over the obstacles and perils of Nature, and it was not until many years later that the discovery of mineral wealth and the gradual development of stock routes showed that the work of the pioneers was, after all, well worth while.

For over thirty years exploration was mainly directed to the coastal districts. Between 1829 and 1840 George Grey (afterwards the famous Governor of New Zealand) and Stokes mapped the coast northwards from Perth; Grey in particular doing extremely valuable work in the

neighbourhood of Shark Bay. In 1841 came one of the most remarkable journeys of the century, the story of which deserves more attention than it has ever received.

Edward Eyre, who in the preceding year had done some valuable work in the Lake Torrens district, started from Port Lincoln to open up a coastal route to the western settlements. His expedition consisted of himself, a white overseer named Baxter, and three native boys. A small flock of fourteen sheep formed their main food supply and on February 23rd, 1841, they began their march westwards, and on March 3rd reached the head of the Great Australian Bight, from which point onwards the country was unexplored. The unknown country which they now entered proved worse than their gloomiest imaginings. They covered 110 miles without finding a trace of water, and Eyre was compelled to leave his companions in camp and hurry on in advance for another twenty-five miles before finding a spring. After resting for a few days they started off again, and this time had to cover 160 miles before again reaching water. How they ever survived the journey is a mystery, but even so, Eyre was only at the beginning of his troubles. Their food supply was rapidly becoming exhausted, and the natives frightened and mutinous. On the night of April 29th Eyre left the camp to recover a strayed horse, and hearing a gunshot, turned back to find Baxter lying dead and two of the three natives with most of the food and gear missing. The horror of his position can hardly be exaggerated. He was over 600 miles from King George Sound ; his clothing and boots were nearly in rags, his food reduced to a mere handful, and his only companion a native of doubtful loyalty. And yet Eyre never wavered for a moment, but continued his journey with dogged pertinacity. Fortunately, the remaining native proved faithful ; but their sufferings during the next four weeks were almost beyond endurance. By June 2nd they were on the verge of exhaustion, foodless, and in such a condition that the white man could hardly be distinguished from the native.



They approached the sea shore and suddenly caught sight of a ship at anchor below them!—a coincidence which borders on the miraculous, and without which they would certainly have perished. It was the French whaler *Mississippi*, which had put in for water and some minor repairs, and its commander, Captain Rossiter, did everything in his power to assist the explorer. Eyre rested on the ship until the 14th and then, restored to vigour and provisioned, started off again, and was able to complete his journey with no more than the hardships usual to such an undertaking, reaching Albany on July 7th after a journey which has few, if any, equals in the history of exploration.

The next chapter of western activity is mainly concerned with the brothers Gregory, who between 1846 and 1861 practically completed the exploration of the coastal areas as far north as the Victoria River, opening up new pastoral areas in doing so. The turn of the interior came in the seventies, when a series of expeditions crossed from the west coast to the line of Stuart's journey in 1862. Perhaps the most important of these was that of Giles, who in 1875-6 made the crossing in both directions. In 1883 the discovery of gold in the Kimberley district started a series of prospecting movements which led to the establishment of the numerous mining towns and settlements of the present day; and brought to a close the period of extensive exploration rather more than a century after the landing of Governor Phillip at Botany Bay.

With it there closed the "heroic" period of Australian history, a period of which the glories are now largely forgotten outside Australia; but a knowledge of which is essential to a real understanding of the Commonwealth. Few stories reveal such suffering, hardihood, and endeavour. Without the efforts of the pioneers there would be no Commonwealth of Australia to-day, and it was the qualities exhibited by the host of explorers, named and unnamed, which achieved such glory in later years on the fields of South Africa, Gallipoli, France, Libya, and the S.W. Pacific.

## CHAPTER IV

### STRUCTURE AND RELIEF

#### GENERAL CONSIDERATIONS

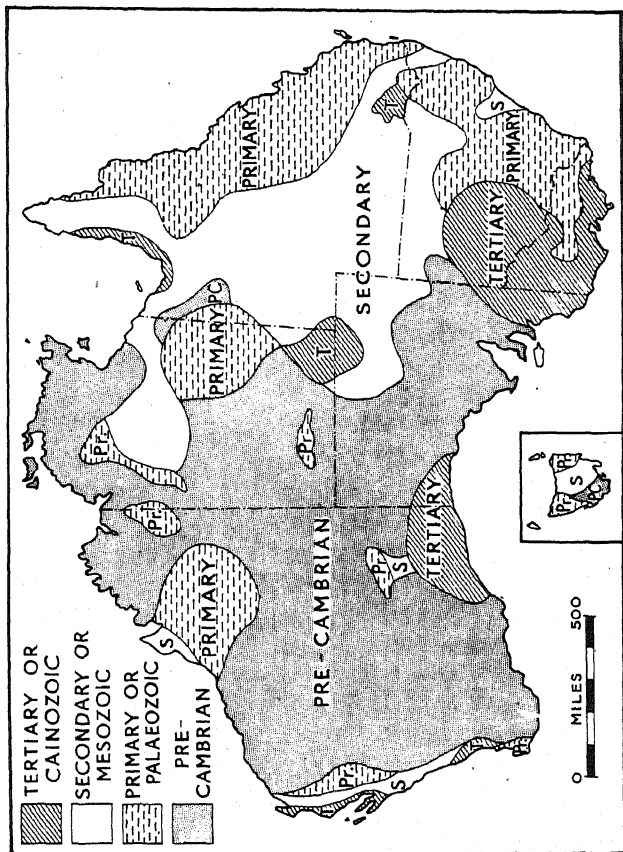
AUSTRALIA is a land of little topographic variety. Two great earth-folds curve across the globe and meet in the East Indies, after giving to Europe, Asia, and America some of their chief physiographic characteristics. Australia lies outside the area affected by these movements, and accordingly lacks the grander features of the other continents. Its main elements are four in number. The Eastern Highlands, a complex mountain system rather than a simple range, run from Cape York to the Grampians in Western Victoria. They are separated by the Central Lowlands from the Western Plateau, a single topographical area which includes just over half the area of the continent. In South Australia the Mount Lofty and Flinders Ranges, with the Spencer-Torrens Sunlands, form a separate unit due to local earth movements.

The geological history of these elements seems to be somewhat as follows. In the Primary Age Australia apparently consisted of the platform or crustal block now known as the Western Plateau, and two similar but smaller blocks to the southeast now included in the Eastern Highlands. In late Secondary and early Tertiary times there took place a series of thrusts from the Tonga Deep against the Western Plateau. The small eastern blocks with the later sediments surrounding them were uplifted with much folding and faulting to form the Eastern Highlands, which then extended much farther east than at present, and stretched south to include Tasmania. Westwards, the resulting downfold seems to have formed great gulfs, or more properly, sea, separating

## THE BUILDING OF THE CONTINENT 27

the new mountain ranges from the old Western Plateau. Australia may thus have consisted of two large islands, though possibly the two units may have been connected by a low ridge in the north.

In this central sea level-bedded sediments were laid

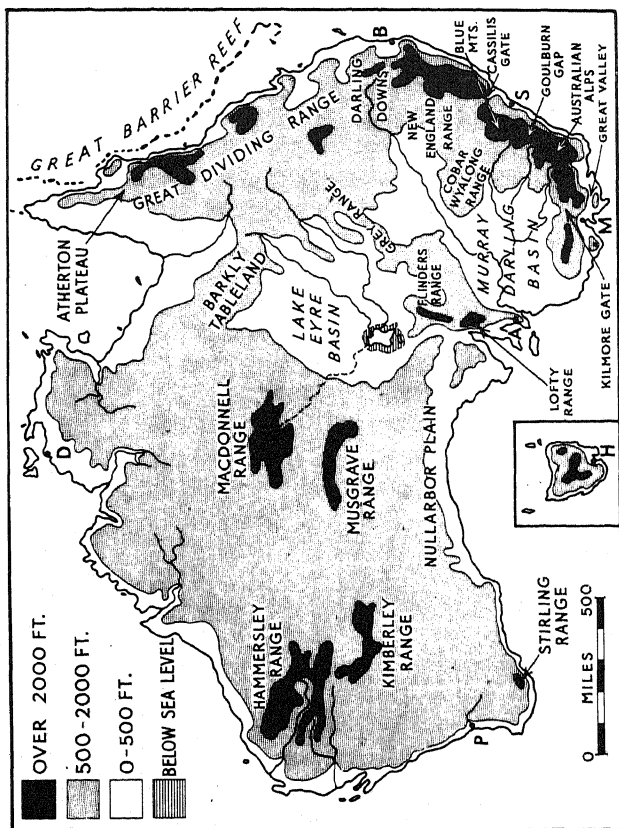


down, which a later Tertiary uplift converted into the present Central Lowlands, linking the Eastern Highlands with the Western Plateau, and draining southwards to the Southern Ocean.

At the end of the Tertiary Age more local movements followed, which produced the South Australian Gulfs and

Highlands. In this process the drainage to the south was blocked, and the present system of draining into Lake Eyre resulted.

One or other of these Tertiary movements was accompanied by a coastal subsidence which gave the Eastern



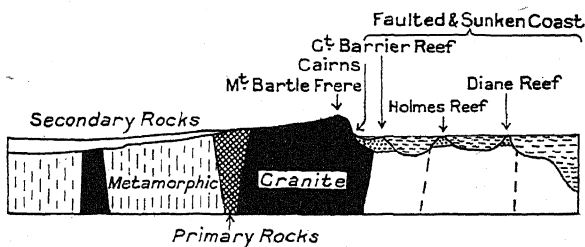
THE TOPOGRAPHICAL RELIEF OF AUSTRALIA.

Highlands their present form. The connection with Tasmania was broken, and a large area lost on the eastern side.

#### THE EASTERN HIGHLANDS

The Eastern Highlands form a belt about 150 miles wide, stretching from Cape York to the Grampians in

Western Victoria. They are separated from the sea by coastal plains, generally narrow, and in some places almost non-existent. The eastern face is markedly steeper than the western, a fact which, as we have seen, greatly hindered the exploration of the interior. They do not form a single mountain range in the true sense of the word, but rather a complex mountain system which reflects their geological history. They are divided into a series of more or less separate blocks, each probably representing an original granite nucleus and each of which has a river system of marked peculiarity. Many of the present-day eastern rivers are consequent on the original uplift only in their lower courses. Their head



SECTION EAST AND WEST THROUGH QUEENSLAND.

waters apparently consist of the upper courses of rivers originally flowing west. Some geologists attribute this unusual arrangement to structure, others, including Griffith Taylor, holding that the Tertiary uplift blocked the course of the old westerly rivers, shifted the water parting westwards, and so produced the existing easterly systems with their reversed tributaries.

Southwards from Cape York the Queensland Highlands reach their greatest height in the Bellenden-Ker group (Mount Bartle Frere, 5,438 feet) on the edge of the Atherton Plateau, which at an altitude of 2,000 feet is probably the healthiest district of tropical Australia. In Southern Queensland they have a marked plateau character, and include the fertile Darling Downs on their

western flank. The chief rivers are the Burdekin and the Fitzroy, both considerable streams, the basin of the Fitzroy in particular being comparatively wide and of great fertility. For over two-thirds of its length the coast is faced by the coral formation of the Great Barrier Reef, of which an account will be given later.

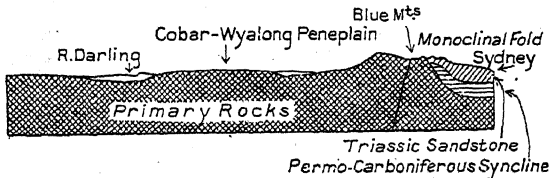
In New South Wales the plateau characteristics largely disappear. Individual hill masses, presenting difficult obstacles to travel, are well marked, which explains the familiar, but unfortunate, name of the Great Dividing Range so often employed. The New England block rises abruptly from the eastern coast to a height of over 3,000 feet, its highest point, Ben Lomond, being over 5,000 feet ; and consists mainly of very hard sedimentary rock with granite intrusions. The short rapid rivers, often rushing through narrow and remarkably beautiful gorges, offer hydro-electric power which is being developed, notably at Nymboida on a tributary of the Clarence.

The Cassilis Gate formed by the Hunter and Goulburn rivers provides an easy route into the interior, and separates the New England *massif* from the Blue Mountains, which for so long blocked the expansion of the early settlers from the Sydney district. Their general structure is similar to that of the New England block, consisting mainly of ancient slates and limestones on the western side, buttressed by granite and faced on its eastern slope with a hard Triassic sandstone. This coastal face forms a simple monoclinial fold which has had remarkable results on the drainage. On the western side of the fold the tributaries of the Hawkesbury have cut down their beds into huge amphitheatres with precipitous sides, in some places as much as 2,000 feet high. On the fold itself, however, the rivers have been able to saw only a narrow notch, so producing the famous "bottle-neck" valleys which we have already mentioned.

To the south is Goulburn Gate, a gap caused by a fault in which lies the Lake George depression. This gap

provides a good route from Sydney to the southwest and separates the Blue Mountains from the high Monaro region which lies athwart the New South Wales-Victoria boundary. The western half of this region is the most elevated portion of Australia, for it includes the Kosciusko *massif* (Mount Kosciusko, 7,328 feet). This is the only part of the continent where snow lies all the year round, and even here it is confined to one or two tiny spots. The area is drained southwards by the Snowy River which waters the fertile coastal district of Gippsland, while on the north side the Murray and Murrumbidgee have their sources.

The Monaro gives place westwards to the rather lower Bogong and Hotham groups which extend to nearly due north of Melbourne, where the Kilmore Gap provides an

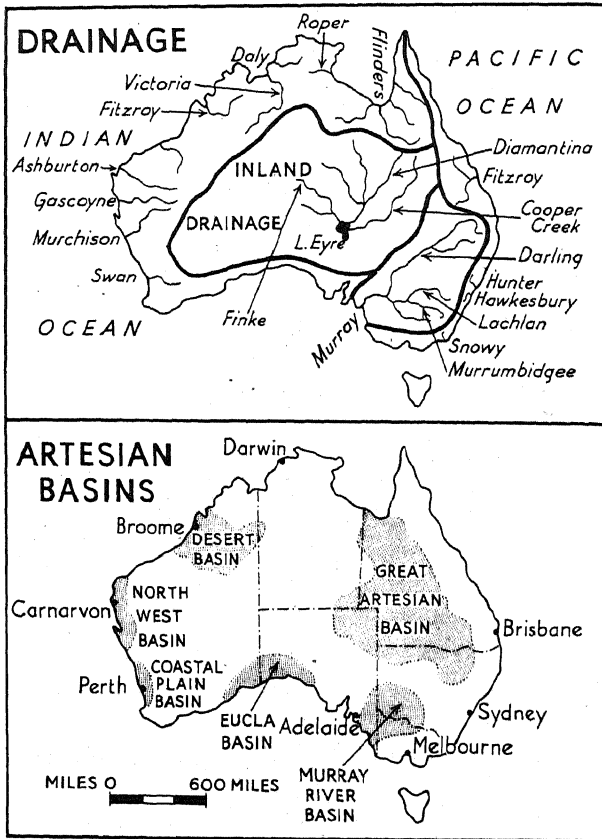


SECTION EAST AND WEST THROUGH NEW SOUTH WALES.

excellent gateway to the interior. On the other side of the Gap lie the West Victorian Highlands, including the Grampians and Pyrenees groups. These represent the worn-down remnants of an old mountain range and form low plateaux, the chief constituent of which is basalt. The fertile soil of the surrounding plain is due to disintegration of the basalt.

Geologically and structurally Tasmania forms a separate but related section of the Eastern Highlands. It has the same association of old sedimentary rock and granite masses of high mineral value, with later carboniferous strata in isolated deposits, but in addition, in Western Tasmania there are large flows of basalt. The island consists essentially of dissected plateaux, mostly over 3,000 feet, the highest point being Legge's Peak (5,160 feet), surrounded by a coastal plain.

The central plateaux contain many lakes (Great Lake, 50 square miles), and is drained by a series of rivers, the chief of which form three pairs, occupying three valleys, which cross the island from N.W. to S.E. and probably



follow old fault lines. In the north is the Tamar-Macquarie line, the Pieman-Derwent line approximately cuts the island in half, and in the south is the Gordon-Huon line.

#### THE CENTRAL LOWLANDS

The Central Lowlands extend from the Eastern High-



lands to the Western Tableland and thus in situation, but unfortunately not in character, correspond to the Middle West of the United States. The Great Artesian Basin forms the northern half of the area, and the Murray-Darling Lowlands occupy the south.

(1) *The Great Artesian Basin*

The Great Artesian Basin is roughly triangular in shape, stretching from Normanton in Queensland south-eastwards to Moree in New South Wales, and westwards to Lake Eyre in South Australia. The Barkly Tableland, which is composed of Silurian sediments, forms the main water-parting, the lower land to north and south being mainly permeable sandstones and shales, frequently covered with a blue clay. The Gulf country is thinly forested, with many rivers, the coast-line usually fringed with mangrove swamps—a type of country which extends round to Cape York. South of the water-parting there is excellent pastoral land in the down-like country of South Queensland, but west and southwest, as the land levels out, its value rapidly diminishes on account of the climate until the desert region surrounding Lake Eyre is reached. Practically all this section drains into Lake Eyre, but none of the rivers—Cooper Creek, Diamantina, etc.—ever flows for more than a short period, and Lake Eyre itself is usually a sheet of salt. Owing to the very slight gradient, and the hardness of the surface, heavy rainfall is apt to produce the vast floods of short duration which misled so many of the early explorers in their estimate of the country. This forbidding region is dealt with in Professor Gregory's book, "The Dead Heart of Australia." Far more important than its river-system is the existence of underground water on an unusual scale which has given the district its name. On the eastern side of the Basin the porous sandstones are exposed and receive a heavy rainfall which, sinking in, flows west and northwest, and is finally impounded against the "wall"

of the Western Tableland. Since 1887 more than 2,000 bores have been sunk, and in spite of the great leakage which probably exists into the Gulf of Carpentaria, a sufficient water supply has been obtained to form the basis of great pastoral activity. It seems, however, more than doubtful if the artesian water will ever be of much value for irrigation, owing to the limited supply, and its high mineral content.

(2) *The Murray-Darling Lowland*

On three sides—east, south and west—this area is well-defined by the Eastern and Victorian Highlands and the Flinders Range, but to the north its limit is somewhat arbitrary, being usually taken as the southern edge of the Great Artesian Basin. Over the east and centre the old palæozoic rocks are buried beneath the *débris* and sediments brought down from the Eastern Highlands, though here and there fragments of the older series project as isolated heights ; but in the west, round the mouth of the Murray, is a large tract of Tertiary deposits.

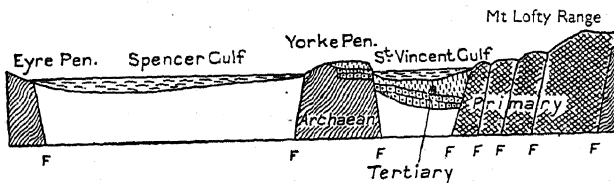
The Eastern district includes the foothills of the Highlands, and slopes down from about 1,500 feet before levelling out into the central division which is about 500 feet above sea-level. The area includes the headwaters of the Murray-Darling system and is well-watered, with much good land, as in the Liverpool Plains around the Namoi River.

The central district has the same geological characteristics, and consequently has large areas of fertile land, but westwards and northwards the rainfall decreases rapidly, the country to the northwest deteriorating into Sturt's Stony Desert. The district is traversed by the chief rivers of Australia, the Murray, the Darling, the Lachlan and the Murrumbidgee, but the Murray is the only true perennial stream, so that with the exception of the Riverina district in the south, irrigation is needed if the hopes of making this an area of close settlement are to be realized.

To the west is the area of Tertiary deposits occupying the gulf by which the chief rivers of the Murray system formerly reached the sea. This is a semi-arid district in which the Murray functions as a very inferior Nile. The Wimmera district in northwest Victoria is drained by rivers from the Grampians, which however rarely reach the Murray. There is much mallee scrub, but in the south, where the rainfall is greater, large areas are now producing wool and wheat, and towards the Murray artesian bores and an irrigation channel are making stock profitable.

### (3) *South Australian Highlands and Sunklands*

This well-defined geographical unit divides the Murray Basin from the Western Tableland, and is of great structural interest. The main feature is the series of north-south ridges, the highest being the Flinders Ranges, built up of Cambrian sediments, mostly slates and limestones (St. Mary's Peak, 3,900 feet), separated by hollows, such as the downfaulted Lake Torrens and Lake Frome. This north-south series seems to be the original structure, and it is probable that originally Lake Eyre and the central rivers drained to the Southern Ocean by way of these



SECTION ACROSS THE PENINSULAS OF SOUTH AUSTRALIA.

Spencer and St. Vincent Gulfs are clearly shown to be sunklands.

longitudinal valleys. At some later date earth movements produced a counter-series of east-west undulations; the Gawler Range, and possibly the southern end of Yorke peninsula, and Kangaroo Island being suggestive in this respect. These later movements destroyed the original drainage, and were either accompanied or followed by the faulting which produced the present gulfs and the sunkland of Lake Torrens. The relation of

Spencer Gulf to Lake Torrens is probably similar to that of the Gulf of Aqaba and the Jordan Valley. There are no rivers of importance, and the lakes which figure prominently on maps are mostly shallow sheets of salt water which increase greatly in size after heavy rain.

#### THE WESTERN PLATEAU

If size were the only criterion this would be by far the most important region of Australia, since it accounts for just over half of the land surface, but the knowledge that it contains only 6 per cent. of the population gives us a juster estimate of its value. The greater part in fact forms a vast area of semi-desert. It is a remarkably uniform geological and topographical unit, so much so that it is difficult to find any satisfactory regional divisions. For our purpose it can perhaps best be considered as consisting of (a) the interior, and (b) the coastal area.

##### (a) *The Interior*

The interior forms a rectangular area about 1,000 miles from east to west and 600 from north to south, including parts of Western Australia, South Australia and the Northern Territory. The Western Australian section consists of Archæan rocks, mostly schists and gneisses, lying at an altitude of about 1,000 feet. Little can be added to the fact that it is usually an uncompromising desert, certain parts of which have a high mineral value.

The eastern side is more interesting. The early reports of explorers from the Adelaide districts were by no means hopeful, Stuart in 1858 calling the country west of Lake Torrens "a dreary, dreadful, dismal desert." Later history has considerably modified this view. The South Australian portion consists of belts of fair pastoral land, alternating with strips of scrub or desert land. Its chief drawback (characteristic of the whole central region) is the great unreliability of the rainfall, which results in what one year appears to be good pastoral country becoming practically desert the next. Under such a handicap per-

manent settlement becomes intensely difficult. North of this region the so-called "Gibber" desert ("gibbers" = masses of indurated sandstone) leads to the Central Highlands, a series of parallel east-west ranges of palæozoic sandstones and limestones in the south passing into gneisses and schists of the Western Australian type on the north. The Macdonnell Ranges are rather more than 3,000 feet in height (Mount Zeil, 4,955 feet). The most striking feature of the region is due to the existence here of a system of antecedent drainage. The rivers, chief of which is the Finke, flow towards Lake Eyre across the ranges in which they have cut narrow but extremely deep gorges, their tributaries having worked out lateral trenches, such as the Horn Valley, in the softer outcrops. Some of these remarkable gorges contain permanent pools of water, often of considerable size, while on the exposed plain outside the rainfall is rapidly evaporated. Beyond the Central Highlands there appears to be some fair pastoral land northeastwards in the direction of the Barkly Tableland, while northwards the land falls to the peneplain for which the name 'Darwinia' has been proposed.

(b) *The Coastal Areas*

From the Gulf of Carpentaria round to Shark Bay the land seems to have much the same characteristics. A low coastal plain, perhaps 100 miles wide, with isolated areas of higher land, gradually rises 1,000 feet to the interior plateau. The rocks are largely palæozoic with patches of late sediments, but no detailed geological survey is yet available. In the tropical areas of the north are some of the finest rivers of Australia, such as the Roper and Victoria, and much of the land is good pasture; but westwards, as the rainfall diminishes, the rivers shrink in number and size, and the value of the land decreases. South of Sharks Bay the coastal strip widens into the more varied country of "Swanland." This is a triangular area rather larger than England. It is built up mainly of

Archæan granites and gneisses, but thanks to its enjoyment of the most reliable rainfall in Australia, the rivers have produced a more varied topography than the Western Plateau can show elsewhere. It seems probable that the district owes some of its character to a series of north-south faults similar to the South Australian series. The coastal strip around the Swan River has been "dissected into wide shallow valleys, in which old-looking rivers meander" (Jutson). Behind, the Darling escarpment rises to 1,500 feet and gradually gives place to a forest-covered plateau, which, in turn, passes through a district of scrub into the central desert behind. In the south the Blackwood and Stirling Ranges (Bluff Knoll, 3,640 feet) appear to be the result of a fairly recent uplift.

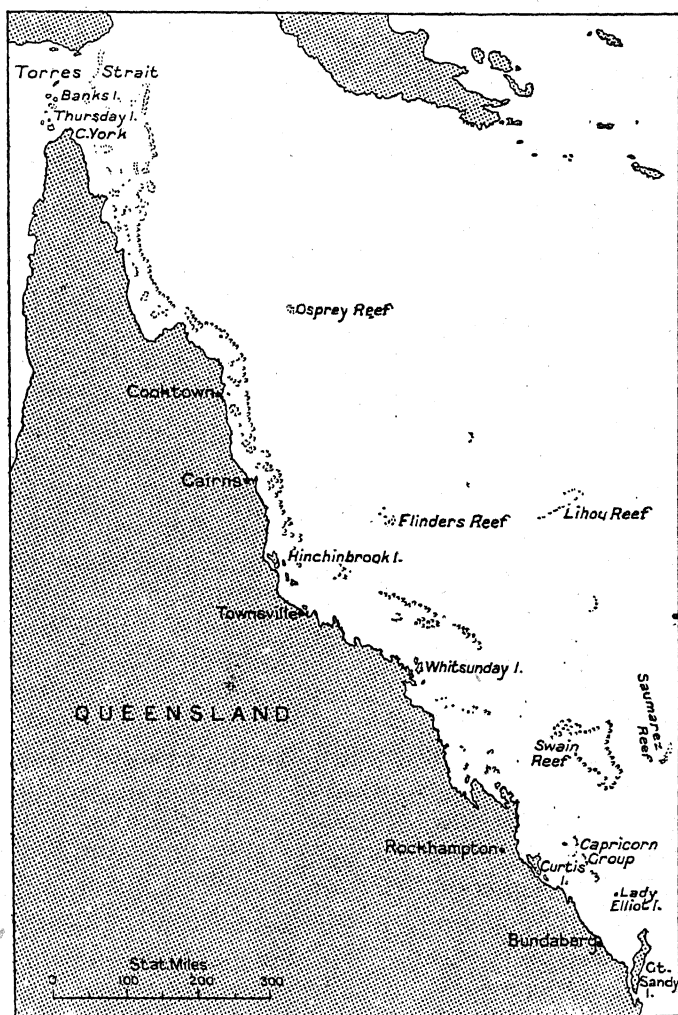
Eastwards, 'Swanland' gives place to some of the most difficult country of the continent. This is the large Tertiary area, mostly limestone, which lies behind the Great Australian Bight. Steep cliffs border the coast, behind which is an arid, riverless country gradually passing into desert. Part of the land around Eucla forms an artesian basin, but much of the water is brackish. There is no system of permanent drainage, but on occasion the district is subject to extensive but short-lived floods, such as caused much trouble to the Transcontinental Railway in the last weeks of 1950.

#### THE GREAT BARRIER REEF

The greatest single mass of coral structure in the world stretches approximately 1,500 miles from Torres Strait southwards to Lady Elliott Island off Cape Sandy. It is often thought of as a single coral reef, but in fact it is by no means entirely coral, and, far from being a single reef, includes a maze of islands, cays and reefs, intersected with lanes and channels, some of which are several miles wide, though the majority are so narrow as to make navigation dangerous.

From Torres Strait to Cairns the name Barrier Reef

has some slight justification, but southwards the so-called reef consists of widely-separated patches and groups of



THE GREAT BARRIER REEF OF AUSTRALIA.

Notice the broken nature of the Reef.

islands. The width of the "lagoon" between the coast and the Barrier varies from less than 10 to over 100 miles,

the average distance being perhaps 20 miles. It is not proposed to deal here with the construction of the reefs, a matter which is still the subject of investigation and discussion, but it may be noted that the foundation of the Reef is almost undoubtedly the old coastline of the continent. The actual area above sea level can only be estimated, since only a part has been surveyed in detail, but probably 80,000 square miles is an underestimate. What proportion of this figure is made up of islands and what of reef pure and simple it is impossible to say.

The islands fall into two classes. The "high" islands which lie close to the shore are of a rocky nature, similar to the continental land opposite, and consist frequently of a central peak from which deep valleys radiate outwards. The height may be considerable, Hinchinbrook Island, for instance; having several peaks over 3,000 feet high. They are generally heavily forested, at any rate on the windward side, and are partly or wholly surrounded by a fringing reef. The "low" islands represent every stage of coral growth from a simple mass of coral sand piled on a reef to the much more complex low wooded island whose formation is still a matter of debate. The coral reefs proper are innumerable and are usually crescent-shaped with the convex side turned towards the open sea.

The Great Barrier Reef is a striking natural phenomenon whose interest and value has only recently been recognized. Commercially, the possibilities of hauls of *bêche-de-mer*, pearls, guano, turtles, and fish are very great indeed, and efforts are being made to study the resources of the Reef. But there are drawbacks, for the dangers incurred by shipping in the surroundings is considerable. The steamship routes from Australia to Japan, China and the East Indies pass through the "lagoon." Apart from perils of reef and current to which the experiences of Captain Cook bear witness, there is the risk of hurricanes at certain times of the year, and the great tidal range caused by the funnel shape of the "lagoon," especially during a southeast gale, increases the dangers.



## CHAPTER V

### CLIMATE

AUSTRALIA, lying between latitude  $10^{\circ}$  S. and  $40^{\circ}$  S., is placed mainly in the Southeast Trades, and corresponds very closely in position to South Africa ; but, whereas in the latter the dry effect of the Trades is confined to the Kalahari, in Australia the greater part of the continent is arid, the Southeast Trade being a moisture-bearing wind on the east coast only. Most of Australia's difficulties arise from the fact that she is  $20^{\circ}$  too far north. If only the whole continent could be shifted  $20^{\circ}$  to the south it would be mainly in the belt of westerly winds, and would have climatic conditions similar to those of Western Europe.

Both in the north and in the south the land-mass projects beyond the Trade Wind belt. The northern half lies within the Tropics and comes under the influence of monsoons, while the southern edge feels the influence of the Westerlies.

The continent is extremely compact in shape, with its greatest length from east to west—bean-shaped, as Kendrew calls it. This is unfortunate, as thereby the drying effect of the Southeast Trade is increased, and little modification is secured from the relief. The Eastern Highlands act as rain-producers for their own area, but project a rain shadow over the Central Lowlands, which rapidly become arid westwards, and the Western Plateau, which covers nearly half the continent, is semi-desert until the west coast is reached.

Briefly, the main characteristics of the Australian climate are a temperature range from warm temperate to tropical : a pressure range based on its position in a sub-

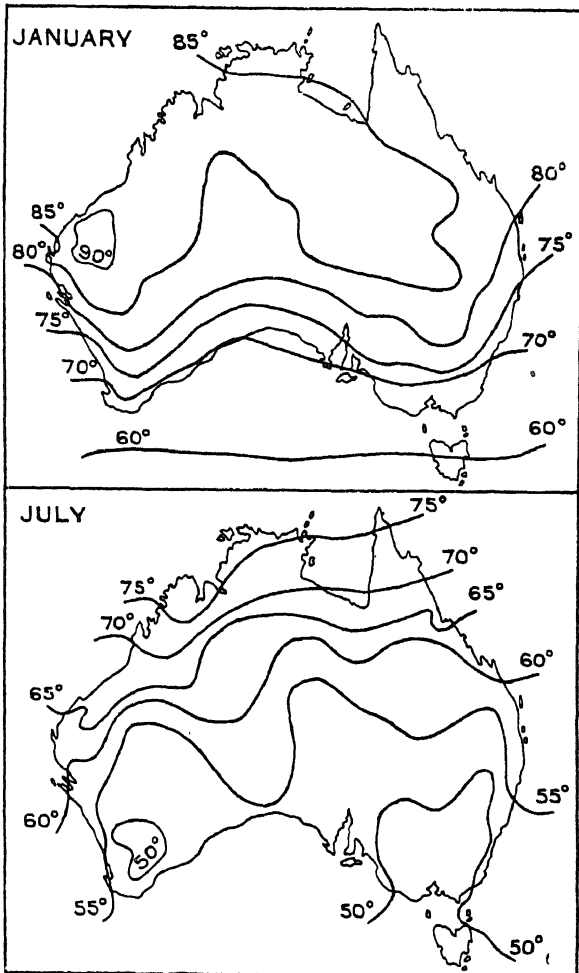
tropical high-pressure belt, with a consequent procession of anticyclones from west to east ; and a rainfall which is largely of a marked seasonal nature, and over a large part of the continent is either deficient or unreliable. From the human and economic point of view this last fact is by far the most important, being probably the chief factor in the future of Australia.

#### TEMPERATURE

During the summer months the warmest region is the northwest, where the isotherm for  $90^{\circ}$  F. encloses a large area in December, while practically the whole continent north of the Tropic has a temperature of over  $80^{\circ}$  F. The interior is uniformly warmer than the coasts, the lowest figure being returned by southern Victoria, where the isotherm for  $65^{\circ}$  F. cuts Melbourne, showing clearly the steady decrease in temperature from northwest to southeast. In winter the warmest region is still the northwest, but no longer in the interior, the isotherm for  $75^{\circ}$  F. cutting the coast of northern Australia and just touching Cape York. The temperature diminishes southwards fairly regularly, but Victoria is still the coolest part of the continent, most of the State being under  $50^{\circ}$  F. The transition from summer to winter conditions has no strongly marked feature beyond a rather sudden drop in temperature all over the continent in April.

The interior of Australia has naturally provided some very high temperature readings. Marble Bar on the Pilbarra goldfield in West Australia has recorded a maximum of  $90^{\circ}$  F. or over on 151 consecutive days, while Alice Springs, situated on the Tropic, records  $115^{\circ}$  fairly frequently. Though less persistent, equally high figures have been reached in the south, Adelaide's record being  $117.7^{\circ}$ , and Melbourne's  $114.1^{\circ}$ . It should be carefully noted that these high temperatures are not unduly oppressive owing to the extreme dryness of the air.

Wet-bulb readings are low, and conditions even at Pilbara are not unbearable.



DISTRIBUTION OF TEMPERATURE IN JANUARY (SUMMER)  
AND JULY (WINTER).

As would be expected, the range of temperature, both annual and diurnal, increases with distance from the sea. Darwin, a coast town in the Tropics, has an annual

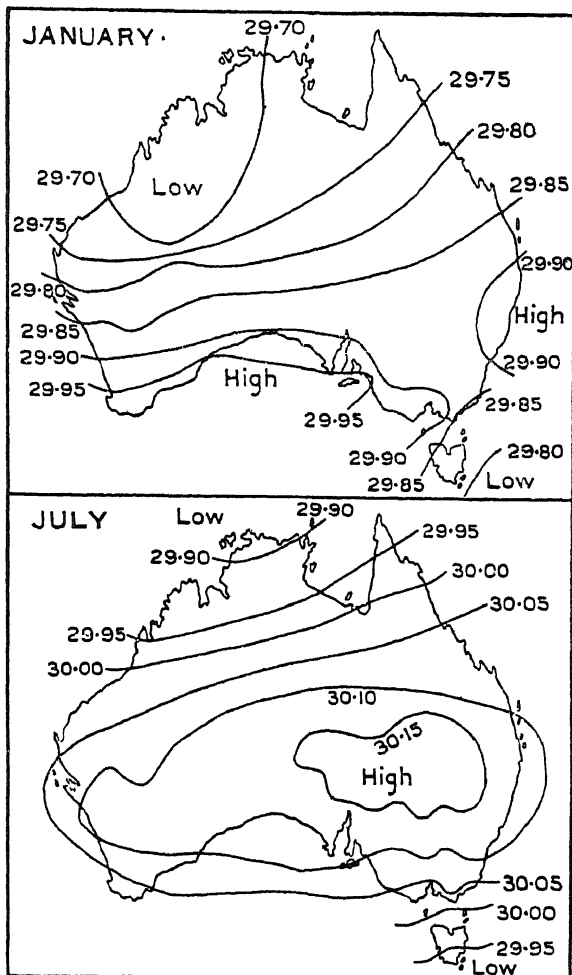
range of about  $8^{\circ}$ ; in the south, Melbourne has a range of  $19^{\circ}$  F., but Alice Springs in the interior one of  $32^{\circ}$  F. All over the continent south of the Tropic the temperature may fall below freezing point in winter. At Alice Springs the thermometer has been known to fall as low as  $25^{\circ}$  F., which is lower than any recorded temperature at Adelaide or Melbourne. Diurnal ranges show the same contrast. Much of the continent is sufficiently high for a "plateau effect" to operate, and nights in the interior are almost always cool and pleasant during the winter. Throughout the year the east coast as a whole is cooler than the west, in spite of the presence off the west coast of the cooler waters of the Antarctic Drift. This is in marked contrast to the conditions in South Africa and South America, and is probably due to the shorter extent of the West Australian coast line, and the presence to the northwest of shallow and very warm seas.

#### PRESSURE AND WINDS

An isobaric map of Australia showing air pressure at any time of the year shows a "ridge" of high pressure as its main feature. This "ridge" is really a series of anticyclones moving from west to east at rather less than 20 m.p.h. Remembering that an anticyclone consists of descending air, it follows that land under such an influence must be dry. In fact, much of Australia, including most of the interior, only gets rain when there exists a definite "trough" of low pressure between two anticyclones.

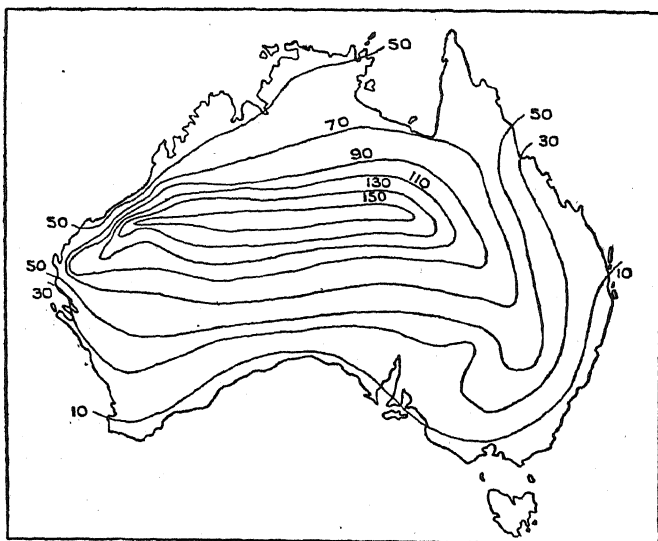
The seasonal movement of this high-pressure belt largely determines the rainfall of the continent. In winter the belt lies in its most northerly position following the swing of the wind belts, and encloses the continent as far north as the Tropic of Capricorn. North of the Tropic pressure is less, the prevailing wind being then the normal Southeast Trade. This is the dry season in North Australia. In the south conditions are entirely different. The low-pressure belt of the westerlies is now placed

immediately to the south of the continent, and a series of eastward moving cyclones controls the weather of



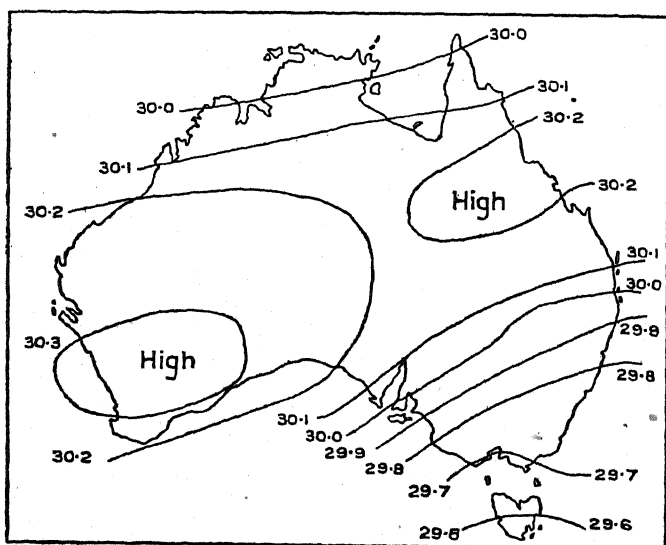
DISTRIBUTION OF PRESSURE IN JANUARY AND JULY.

southern Australia. Actually, the greater number of cyclones pass clear of the land, but with the exception of the country round the Great Australian Bight, all southern Australia gets an adequate rainfall from the



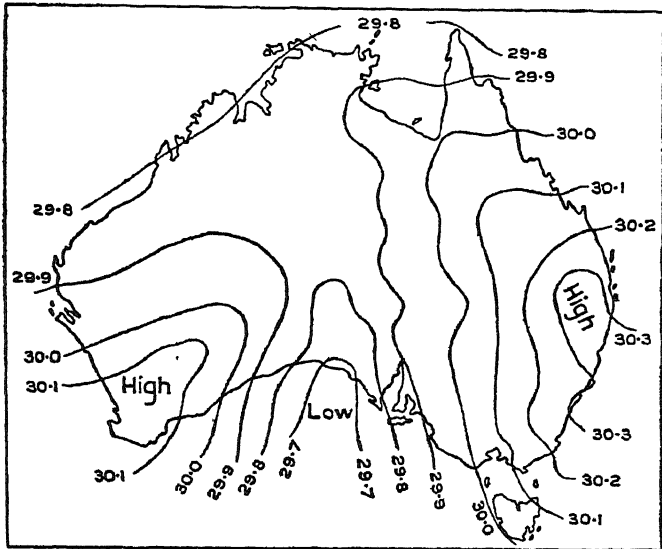
DISTRIBUTION OF MAXIMUM TEMPERATURE.

The number of consecutive days in which the maximum exceeds  $90^{\circ}$  F. is shown by isolines.



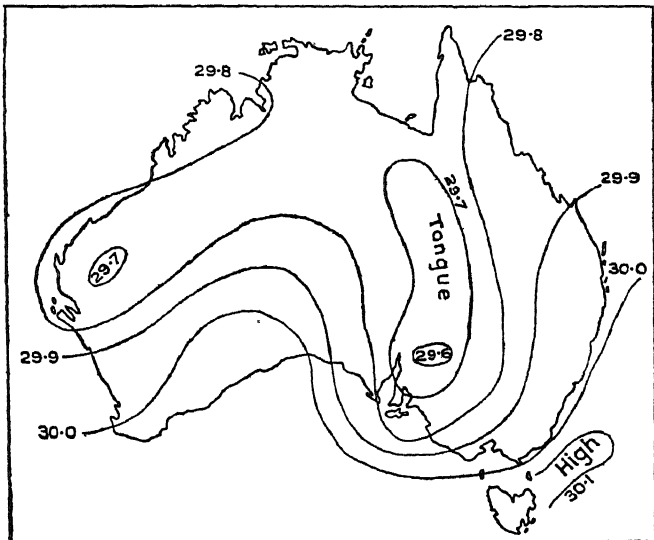
A TYPICAL PATTERN OF PRESSURE DISTRIBUTION.

Anticyclone producing dry weather over the Continent.



A TYPICAL PATTERN OF PRESSURE DISTRIBUTION.

An "Antarctic Low" between two "Highs," producing rain in southeastern Australia and dry weather elsewhere.



A TYPICAL PATTERN OF PRESSURE DISTRIBUTION.

Displacement of "High" by an extension (Tongue) of tropical low pressure producing rain in eastern Australia.

secondaries and V-shaped depressions which frequently accompany the main cyclones. Victoria occasionally experiences exceptionally rough, wet weather, owing to the cyclones taking a more northerly route than usual.

In summer the anticyclonic belt moves south, and in consequence the influence of the westerlies is hardly felt in Australia. This is the dry season in the south, except in parts of Victoria which extend farther south than the rest of the continent and are in consequence to some extent subject to cyclonic conditions at all seasons. In the north a low-pressure area is centred round about the Pilbara district, and tropical Australia has its wet season, getting a copious rainfall from a northwest monsoon.

#### RAINFALL

Four main rainfall regions can be distinguished :—

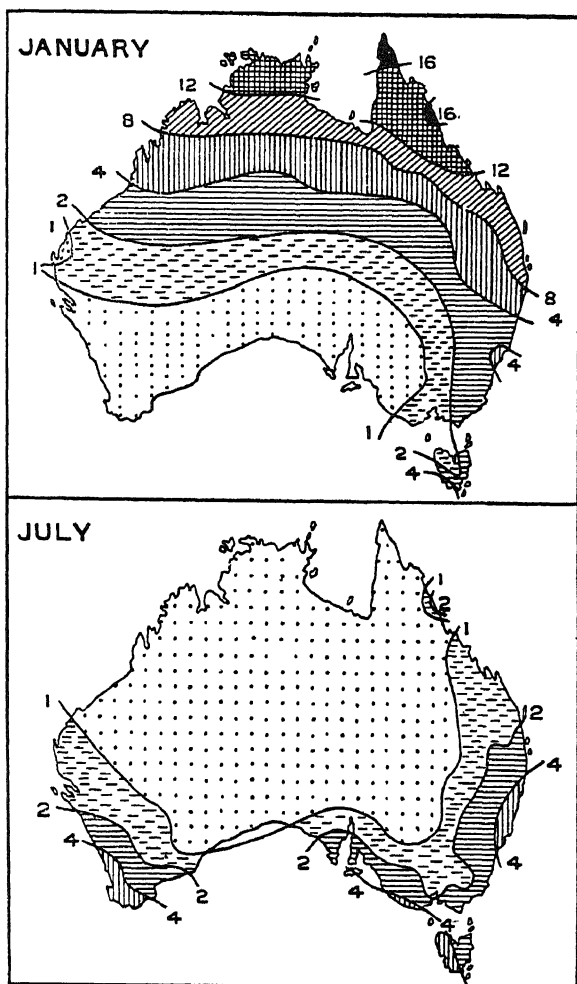
- |     |                          |  |
|-----|--------------------------|--|
| (1) | East coast and Highlands | —Rain at all seasons.                  |
| (2) | North        "        "  | —Summer rain.                          |
| (3) | South        "        "  | —Winter rain.                          |
| (4) | Centre       "        "  | —Arid (less than 10 inches) or desert. |

“The rainfall is essentially peripheral” (Kendrew), a fact brought out very clearly on a map: It is necessary to remember that both maps and figures of Australian rainfall may be very misleading, as unfortunately much of the rainfall is of an uncertain character. This applies particularly to regions lying between the isohyets for 10 and 30 inches, which include large parts of New South Wales and Victoria, and in these districts drought is a formidable enemy. In good seasons settlers establish themselves and prosper, but when a bad year comes the flourishing settlements are abandoned, and widespread ruin follows. Drought and the high degree of evaporation and consequent loss of water are the most pressing meteorological problems which the Australian people have to solve.

Although it is convenient to treat the east coast and



Highlands as one region, its rainfall is due to more than one cause. The part of Queensland included lies in the

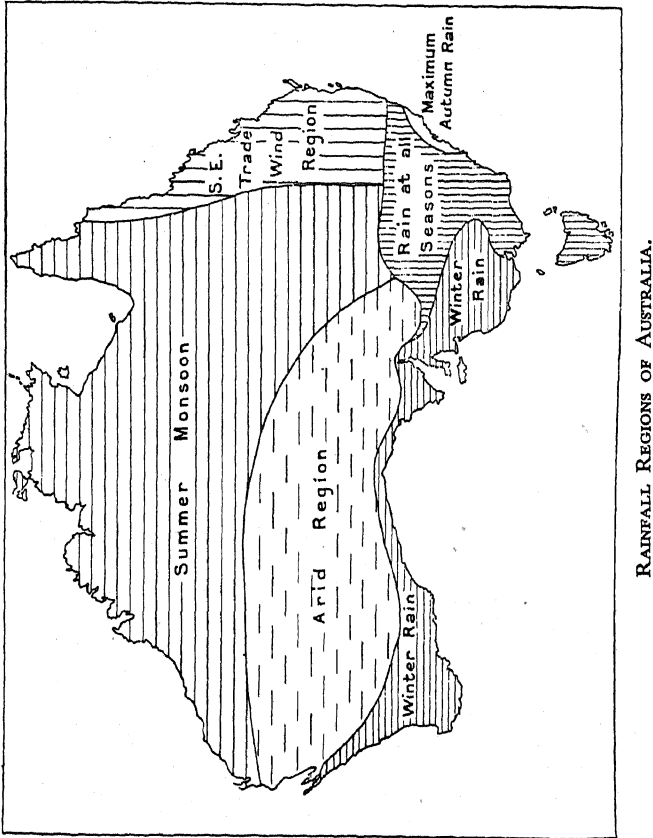


DISTRIBUTION OF RAINFALL. (The figures denote inches.)

Southeast Trades all through the year. Coming from warm seas, and rising over the Highlands, they are copious rain-bringers to the upland districts, especially

in summer and autumn. The coast averages 50 inches per annum, a figure which rises to 140 inches in the Bellenden-Ker Mountains, but falls off rapidly towards the west.

The coastal belt between Brisbane and Melbourne lies



in the path of the great anticyclonic procession, and has a less simple rainfall scheme. Precipitation is mainly due to east winds blowing out from anticyclones over the warm Tasman Sea, but much of it is also caused by southward extensions of a tropical low-pressure system which frequently appears during the summer months,

and often causes floods in New South Wales and Victoria. The passage of cyclones, especially if these take a track more to the northward than usual, is not without some effect.

In New South Wales the coastal districts receive 40 to 50 inches fairly evenly distributed through the year, the amount steadily decreasing inland. But in Victoria the Highlands are the wettest areas (50 to 60 inches) with a slight but distinct winter maximum. The whole of the eastern region is liable to exceptionally heavy downpours, usually caused by a southward extension of the tropical low-pressure system. Many places have received 20 inches in one day, and near Brisbane a fall of 150 inches in twelve days has been recorded.

The north has a well-marked seasonal division. From May to September practically no rain is received, the region being entirely under the influence of the Southeast Trades. Frequent thunderstorms mark the change to the wet season, which extends from October to April, the northwest monsoon dominating the region throughout the period. Weather conditions during this half of the year are extremely trying. The temperature is high, heavy rain falls daily, and the relative humidity of the atmosphere is very high. Precipitation is greatest in coastal districts (Darwin, 60 inches), but diminishes rapidly inland, the isohyet for 10 inches passing near Alice Springs.

In the south there is an equally well-marked seasonal division. During the summer the region is under the influence of the anticyclonic belt, and there is practically no rain, but in winter the swing of the wind-belts brings the Westerlies over the southern edge of the continent, their effect being especially felt in the districts which project southwards. The Darling Range in 'Swanland' exercises a marked influence in producing relief rain, Perth getting 34 inches, and a very considerable area over 25 inches. The mountains of South Australia function similarly, giving Adelaide 21 inches and pushing

the isohyet for 10 inches well inland. These two regions form the Mediterranean area of Australia, and it should be noticed that their growing prosperity largely results from the fact that the rainfall, though not large, is one of the most reliable in the continent. The Bight country lying between them is practically rainless.

The arid region of Central Australia receives rain at irregular and infrequent intervals, usually during the summer. The showers are as a rule accompanied by thunderstorms, the causes of which depend on local meteorological conditions.

Tasmania, lying at all seasons in the path of the Westerlies and having considerable mountain ranges, has rain throughout the year. As one would expect, the amount diminishes sharply from over 100 inches at many places on the western to less than 30 inches on the eastern side.

#### CYCLONES AND LOCAL WINDS

Both northwestern and northeastern Australia suffer from tropical cyclones known in the northwest as "Willy-willies." These originate in the warm Timor Sea during summer and autumn, travel towards the southwest, and then curve southeastwards. In the coastal districts they are very destructive, but inland they are welcomed as rain-bringers. The accompanying down-pour is very heavy, sometimes exceeding 20 inches. The northeastern cyclones are similar in character. They usually originate near Fiji, and strike the coast of Queensland between Brisbane and Cairns, sometimes causing great damage.

The southeast is subject to hot, dry, dusty winds from the interior, which occasionally produce very high temperatures in Melbourne. "In Victoria the hot winds are known as 'Brick-Fielders,' a name originally applied to the 'Southerly Bursters' in Sydney, because of the dust they raised from the brickfields to the south of the city. When the goldfields were discovered in Victoria, the miners

STATISTICS  
Mean Temperature

(Figures give mean temperature in degrees F.)

Station.	Altitude Feet.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.	Range.
Sydney .	146	71.0	69.2	64.5	58.6	54.3	52.3	54.8	58.8	63.4	67.0	70.0	63.0	63.0	19.3
Melbourne .	115	67.2	64.7	59.6	54.1	50.3	48.5	51.0	53.9	57.5	61.3	64.5	58.3	58.3	19.0
Adelaide .	140	74.2	74.0	64.0	57.7	53.4	51.5	53.8	57.0	61.9	67.0	71.1	62.9	62.9	22.7
Perth .	197	73.5	74.1	66.4	60.4	56.2	55.0	55.9	58.0	60.9	65.4	70.6	64.0	64.0	19.1
Darwin .	97	84.0	84.1	84.2	81.9	78.9	77.2	79.5	82.7	85.5	85.7	85.3	82.7	82.7	8.5
Alice Springs	2,000	82.3	76.7	68.1	59.7	54.4	52.4	58.3	65.6	73.5	79.5	82.4	69.7	69.7	31.6
Coolgardie .	1,389	77.3	71.3	65.4	57.5	52.3	50.8	53.3	58.2	63.5	71.0	76.0	64.4	64.4	26.5

Rainfall

Station.	Altitude Feet.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Sydney .	146	in. 3.7	in. 4.7	in. 5.1	in. 5.2	in. 4.9	in. 5.2	in. 4.7	in. 3.3	in. 2.9	in. 2.8	in. 2.9	in. 2.6	in. 48.0
Melbourne .	115	1.9	1.8	2.2	2.3	2.2	2.1	1.9	1.8	2.4	2.7	2.2	2.3	25.6
Adelaide .	140	0.8	0.6	1.1	1.8	2.8	3.0	2.6	2.4	1.8	1.8	1.0	0.8	20.6
Perth .	197	0.3	0.3	0.7	1.7	4.9	6.6	6.4	5.6	3.3	2.1	0.8	0.6	33.3
Darwin .	97	15.3	13.0	9.7	4.5	0.7	0.2	0.1	0.1	0.5	2.1	5.2	10.3	61.7
Alice Springs	2,000	1.8	1.7	1.3	0.9	0.6	0.6	0.4	0.4	0.4	0.7	0.9	1.3	11.1
Coolgardie .	1,389	0.4	0.7	0.6	0.6	1.3	1.2	0.9	0.9	0.6	0.7	0.5	0.6	9.2

hailing from Sydney gave the name to the dusty winds from the opposite quarter" (*Australian Year Book*).

The Southerly Burster itself is a cold wind from the south due to the passage of a V-shaped depression between two anticyclones. The front half of the depression consists of a warm northerly wind, but with the passage of the trough this is succeeded abruptly by the cold south wind, which forms the rear half. The temperature drops suddenly, usually about 20° F., and the phenomenon is accompanied by a roll of cumulus cloud and heavy rain. They are commonest in spring and summer, and are most characteristic in the coastal districts of New South Wales.

#### RIVER RÉGIME

Australian rivers fall naturally into two classes : those of the coastal plains draining to the ocean, and those of the central plains draining to Lake Eyre, the latter class providing one of the best known examples of inland drainage. Owing to the absence of high mountains in Australia, both groups depend almost entirely on rainfall for their water supply. Most of the rivers drain large areas, but the loss of water due to evaporation and seepage is so great that the discrepancy between the total amount of rainfall and the volume of water discharged by the rivers is often very considerable. It has been calculated, for instance, that only 10 per cent. of the rain which falls on the catchment area of the Darling River above Bourke actually passes the town. Elimination of this loss would be an incalculable gain to Australia.

#### RIVERS OF OCEANIC DRAINAGE

The coastal rivers have, in general, a moderate gradient, though the nearness of the Eastern Highlands to the coast gives a steeper slope to most of the eastward flowing streams in this region. As a rule they are not navigable far inland.

(1) *The Eastern Rivers*

The Queensland rivers derive their water supply from the copious rains brought by the Southeast Trades, and there are in consequence some large streams, such as the Burdekin and Fitzroy, which flow throughout the year, though towards the end of spring even these shrink to narrow streams. In New South Wales the Hunter and Hawkesbury are large, and have a perennial flow, but here also variation is very great. Extensions of the tropical low-pressure centres frequently cause disastrous flooding throughout the eastern region, while in contrast the increase of population in recent years has compelled recourse to storage schemes to tide over dry seasons. Those rivers which rise in the Kosciusko area are unique in Australia in that they alone derive their water supply in part from melting snow, and so have a degree of reliability unapproached elsewhere. Of those not forming part of the Murray-Darling system, the Snowy, which drains Eastern Gippsland, is characteristic and is being harnessed for the development of hydro-electric power.

(2) *The Murray-Darling System*

The Murray rises near Mount Kosciusko, and has a course of some 1,600 miles. It is fed by melting snow and is therefore a permanent stream, the only occasion on which it has been known to fail being during the exceptional drought of 1914. Its first important tributary, the Murrumbidgee, runs low during the summer, but rarely ceases altogether, and in winter time is a fine body of water. It is connected with the Murray by a series of creeks, or "billabongs," in which a flood on the Murray sometimes causes a reversal of the current for many miles. The Murrumbidgee receives the Lachlan, which has a less plentiful water supply, and so becomes a string of water-holes in summer. The Darling is the longest river of the system, being 1,800 miles from its source to its junction with the Murray at Wentworth, but for the last 500 miles it receives no tributaries except in flood time. Conse-

quently the Lower Darling resembles the Lachlan in dwindling to a series of water-holes during the summer, and may be blocked for several years during a series of dry seasons. Below its junction with the Darling the Murray has no real tributaries, the short streams of the Wimmera only making a connexion in time of exceptional flood. It is this lack of tributaries, coupled with great evaporation, which makes the Murray a smaller stream in its lower than in its upper reaches, and so prevented regular navigation until a system of locks and weirs was provided.

### (3) *The Western Rivers*

The rainfall of Swanland shows a marked winter maximum, but since the summer gets a regular though small amount of rain, the rivers, of which the Swan is the chief, are mostly permanent, though frequently much shrunken in January and February. Further north the rivers, such as the Murchison and Ashburton, are definitely not permanent, being dry gullies in the hot season, and at other times frequently brackish, though Willy-willies and other storms may produce temporary floods. In the Kimberley district, which feels the influence of the northwest monsoon, rivers like the Fitzroy and the Ord are flooded from December to March, but shrink to a chain of water-holes or disappear altogether in the dry season.

### (4) *The Northern Rivers*

These exhibit the same characteristics in general as those of the Kimberley district, but a few are big enough to be permanent, and form some of the finest streams on the continent. The Victoria River has a permanent course of over 100 miles from tidal water, and in the wet season is over 300 miles long. The Roper is very similar, and the Flinders, which enters the Gulf of Carpentaria, is even larger.



## RIVERS OF INLAND DRAINAGE

The Lake Eyre drainage system consists of many streams, all of which are intermittent, and in consequence have a severely limited value. All are alike in that they flow (except in their upper courses) only during the wet season and have a very slight gradient. An exceptionally heavy fall of rain thus produces floods which often cover hundreds of square miles, but last only for a short time, evaporation from the hot dry ground being very great. In the space of a month vast areas may change from an arid wilderness to an inland sea, and back again. It is only during these times of flood that streams such as Cooper Creek and the Diamantina actually enter Lake Eyre, which, like the majority of the so-called lakes shown in atlases, consists of a salty plain, containing water, inevitably salt, only in its northern arm. The Finke, which, coming from the Macdonnell Range, gathers up most of the streams from the centre of the continent, has stretches of permanent water in the deep gorges through which its upper course is cut, but like the eastern rivers of the basin is a continuous stream only in flood time.

As a result of exceptionally heavy rains in Queensland during 1949-50, water flowed down the Cooper to Lake Eyre North, filling it to a maximum depth of 13 feet over an area of 50,000 square miles. This inland sea showed well-marked capes and bays on the southern and western margins, and extensive mud-flats and deltas on the north and east. Although the water did not flow into Lake Eyre South by the narrow connecting channel, local rains produced a wide sheet of water here also.

## CHAPTER VI

### PLANTS AND ANIMALS

#### PLANTS

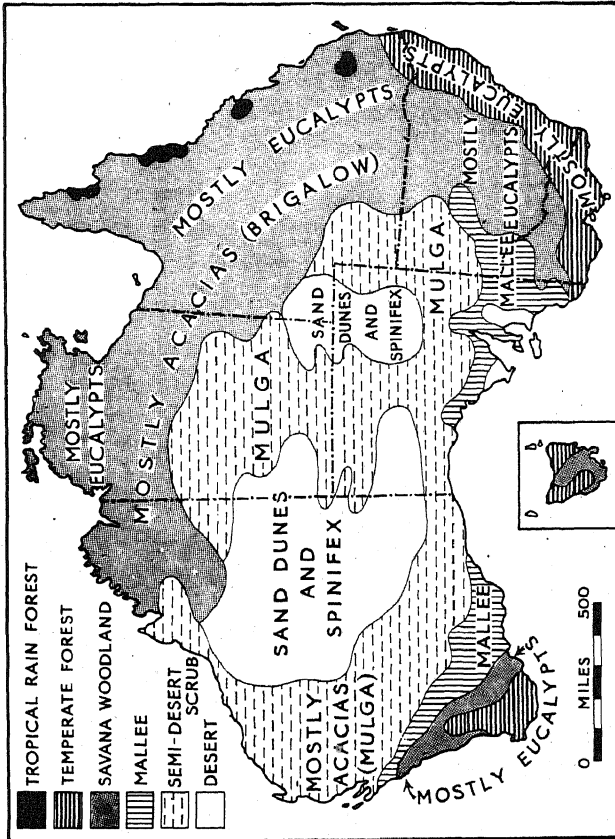
AUSTRALIA was cut off from Asia at an early date, and the vegetation consequently has a monotony unlike that of any other continent. The general layout is simple. A centre of desert sand dunes is almost surrounded by a belt of mixed woodland and grassland, and outside this in turn is a zone of forest. But in spite of the great size of Australia, and the wide variation of climate, there is comparatively little variety in the plant life. Almost all the trees belong to two genera. In the outer zone they are practically all eucalypts, while the inner ring is dominated by acacias. There are, of course, many varieties of each ; but the general effect is nevertheless monotonous. The most important eucalypts or gums are Coolabar, Ironbark, Jarrah, Karri, Stringybark and Blue Gum, and the best known acacias, found mainly in the intermediate zone, are Brigalow and Mulga.

#### (1) *Tropical Rain Forest*

The only places where tropical rain forest occurs in its typical forms are on the east coast of Queensland in a few isolated patches. It reaches its fullest development in the region of greatest heat and humidity in the neighbourhood of Cairns, where the vegetation is so densely matted with creepers, lianas, and undergrowth that it is most easily penetrated on all fours. Clematis and jasmine loop from tree to tree, numerous orchids and ferns occur in the undergrowth, and in some parts the "lawyer cane"

and climbing bamboo make the thickets almost impenetrable.

Further to the south near Brisbane is another large area, which although it does not consist of the same plants has an almost equally tropical appearance ; it is sometimes



DISTRIBUTION OF VEGETATION (after Prescott).

distinguished as tropical brush. Mrs. Dominic Daly, who visited Brisbane in 1870, describes it thus :

“On the bank within a stone’s throw of us rose clumps of feathery bamboos ; masses of scarlet poinsettias glowed bravely against the dark green background formed by broad-leaved plantains whose tattered leaves rustled

with every gust of wind which reached them. Palms towered majestically over the heads of the lower shrubs, and camellias and stephanotis and many other semi-tropical flowers were growing luxuriantly in the open air."

There are also in many places fringes of mangrove swamp. The plants rise on their stilt-like roots out of the sea water and have the peculiar habit of germinating their seeds on the parent plant itself and subsequently planting them out by dropping them like darts into the mud entangled in the roots of the tree.

### (2) *Temperate Forest*

Two areas of temperate forest occur, one in the southeastern and the other in the southwestern corner of the continent. The southeastern area includes a part of New South Wales and Victoria, and extends over portions of Tasmania. The southwestern area covers roughly the district of 'Swanland.' During his voyage on the *Beagle* Charles Darwin made an excursion by carriage from Sydney to Bathurst in which he appears to have crossed the southeastern temperate forest at its extreme northern end. He says :

"The extreme uniformity is the most remarkable feature of the landscape. . . . Everywhere we have an open woodland, the ground being covered with very thin pasture with little appearance of verdure. The trees nearly all belong to one family (Eucalypts) and have their leaves placed in a vertical instead of a horizontal position. The foliage is scanty and of a peculiar pale green without any gloss. Hence the woods appear light and shadowless ; this, although it is a loss of comfort to the traveller, is of importance to the farmer as it allows grass to grow where otherwise it would not."

Darwin also comments on the untidy and desolate appearance produced by the annual shedding of the

bark of the trees. The wooded area through which he passed, through marked as temperate forest on the map on page 59, is not of the normal type ; but farther south is found something more like the true temperate forest. In Gippsland are found some of the largest trees in the world. According to the official returns the size of the tallest measured tree here is given as : height 326 feet, girth 25 feet 7 inches measured 6 feet above the ground ; locality, Mount Baw Baw, 91 miles from Melbourne.

In this area are also found the celebrated Victorian fern gullies. These occur to the west of Gippsland and in the valley of the Yarra River. In them the eucalypts, which dominate the forest, grow near enough together for their crowns to touch, and beneath them is found a dense undergrowth of tree ferns and smaller plants of the same species. There are thickets of dogwood, native hazel (no relations of the European plants of those names), and cottonwood, which is a groundsel. Festoons of clematis loop from tree to tree, and there is even said to be a fern allied to our polypody which behaves like a liana.

The temperate forest in Swanland contains the finest eucalypts in Australia. The heavier rainfall has led to bigger trees standing closer together than elsewhere, and to the presence of an undergrowth of cyclads and grass trees, instead of the grass found in other districts. The finest tree is the jarrah, a dark grey tree with furrowed bark, 90 to 120 feet high and stems 3 to 5 feet in diameter, rising 50 or 60 feet to the first branch. Its red wood in the form of paving blocks was very familiar to Londoners before wood paving went out of favour. Another, the karri, deserves to be called a giant tree. It has yellowish white bark which flakes off like that of our plane ; it may rise to a height of 200 feet with its first branch 150 feet up. Tuart and wandoo are valuable timber trees, and further inland, as the rainfall decreases, the york, mallet and salmon gums link up with the mulga country.

(3) *Savana Woodland*

A belt of savana woodland extends all round the northern and eastern end of the continent from Kimberley through Arnhem land, the Cape York Peninsula, parts of Queensland, New South Wales and Victoria. Its general character is fairly uniform, but it is subject to considerable local variations. In general it consists of an open park-like growth of eucalypts with more or less grass between and beneath them. In early life the trees are fairly densely covered with foliage, but as time goes on they become gaunt and lanky. As the more arid central portions of the continent are approached the trees become more scattered and tend to occur only in long rows beside the water channels. In places, however, where there is water all the year round, especially in Arnhem land, the vegetation is described as taking on the character of a tropical rain forest in certain small areas. Mrs. Aeneas Gunn in "We of the Never-never" thus describes the vegetation of these denser parts:—

"Two wide-spreading limpid ponds, the Warloch lay before us veiled in a glory of golden-flecked heliotrope and purple water lilies, and floating deep green leaves with here and there little seas of water opening out among the lilies; and standing knee deep in the margin a rustling fringe of light reeds and giant bulrushes. All round the pond stood dark groves of Pandanus palms and among and beyond the palms tall grasses and forest trees with here and there a spreading coolabar festooned from summit to trunk with brilliant crimson strands of mistletoe (*i.e.*, native mistletoe) and here and there a gaunt and dead old giant of the forest. . . . Everywhere upon the floating leaves myriads and myriads of grey and pink galah parrots and sulphur-crested cockatoos preened feathers and rested sipping at the water."

Or again on the Roper: "A wide and spreading banyan tree with its propped-up branches turning and twisting in long winding passages and balconies over a

feathery grove of young palm trees that had crept into its generous shade."

The same writer describes other parts of Arnhem land as grown over with long grass 10 feet high for many miles, while in the neighbourhood of the Gulf of Carpentaria the vegetation scarcely deserves the name of forest at all. This area is subject to severe floods and there are more termites' nests to the acre than trees, and such trees as do grow are stunted and small.

#### (4) *Savana and Scrub Lands*

Within the belt of the savana forest lies a fairly continuous stretch of savana proper extending along the north, east, and south of the continent. Every here and there, however, this is interrupted by extensive tracts in which the grass is interspersed with areas over which low-growing trees or bushes are scattered or even replace the grasses entirely. The most important of these scrub bushes are the brigalow, mulga, and mallee. The factor which determines the presence of one or other type is partly rainfall, but soil conditions and susceptibility to forest fires are probably more important. Brigalow is a species of acacia of gnarled and irregular habit. Mulga is also an acacia, but mallee is one of the genus *Eucalyptus* so common throughout Australia. It has several straggling stems rising from one swollen root stock and little foliage except at the ends of the branches; an untidy and melancholy looking tree. Natives occasionally dig up the roots and suck them to relieve their thirst with the small quantities of liquid they contain, and Europeans have occasionally tried to do likewise—usually with undesirable results.

In certain places the savana may entirely give place to scrub; for instance, in the interior of Queensland there is an extensive stretch of brigalow scrub; in the centre of the continent between the two main areas of desert next to be described is a stretch of mulga scrub, while

another occupies the northwest corner of Western Australia. Mallee scrub extends along the south coast of South Australia and into Western Australia, thus isolating the area of temperate forest in Swanland. Schomburgk, writing in 1875 of the scrub of South Australia, says :—

“ The general impression given by the scrub is dismal. . . . It reaches a height of 4 to 6 feet interspersed with stunted and ramified trees of *Casuarina*, *Eucalyptus*, *Banksia* and others. Smaller shrubs cover the ground and are overtopped by the higher growing ones forming sometimes impenetrable thickets. Its dominant colour is glaucous green interspersed here and there with whitish leaves of some shrubs and reddish-brown leaves of others. . . . Everyone avoids the scrub as much as possible ; many have lost their way there and perished for want of water.”

Many travellers comment on the remarkable change which comes over the face of the scrub and the savana on the fall of rain. Schomburgk describes the richly coloured carpet of flowering plants, white, blue, yellow, violet and red, which spring up especially alongside the watercourses ; Carnegie in “ *Spinifex and Sand*,” says : “ not only vegetable but also animal life is affected by it (*i.e.*, the rain) ; the bush is enlivened by the twittering of small birds which come from nobody knows where, build their nests, hatch their young and disappear. Almost every bush held a nest, usually occupied by a diamond sparrow.”

#### (5) *Deserts*

In the interior of the continent are two large but unequal areas of desert, the larger of which lies in the west. This one has been vividly described by Carnegie. Its outline is very roughly that of a molar tooth with the crown to the west and the two fangs pointing to the east. The northwestern corner very nearly reaches the sea



coast in the middle of the Ninety-Mile beach. Different parts of it have received special names, *e.g.*, Victoria Desert, the Great Sandy Desert, etc. It consists of fiercely baked arid plains where no water is to be found except in occasional "soaks," "gnamma holes" (*i.e.*, hollows in the rocks) and clay pans. These often dry up entirely, and the clay pans are usually salt and often covered with a crust with almost no moisture underneath. In spite of these terribly arid conditions the country is not entirely lifeless, but is overgrown with the "hateful spinifex" and even timbered in some places with desert gums. Of this plant Carnegie says :—

"It grows in round isolated hummocks one to three feet high ; these are a dense mass of needle-like prickles and from them tall blades of very coarse grass to a height sometimes of six feet. . . . Whatever form it takes it seems to be so arranged that it cannot be stepped over or circumvented ; one must in consequence walk through it and be pricked unpleasantly. . . . There are two varieties, 'spinifex' and 'buck spinifex.' . . . There are a few uses for this horrible plant, for example it forms a shelter and its roots make food for the kangaroo-rat or spinifex-rat ; from its spikes the natives (in the northern districts) make a very serviceable gum ; it burns freely, serves in a measure to bind the sand and protect it from being moved by the wind and it makes a good mattress when it is dug up and turned over. I should advise no one to try and sleep on the plant as it grows for 'he who sitteth on a thistle riseth up quickly.' But the thistle has one advantage, *viz.*, that it does not leave its points in the victim's flesh. In North Australia it is in seed for three weeks and when in this state forms most excellent food for horses and fattens almost as quickly as oats. For the rest of the year it is useless."

From the edge of the desert to Mount Worsnop, a distance of nearly 200 miles, there is a continual series of sand dunes, sand flats, stretches of spinifex, and gravel ridges. There are, however, a few other plants besides spinifex in some places, *e.g.*, the remarkable *parakeelia*, a

small plant with long fleshy projections in place of leaves and pretty little lilac flowers. It is eagerly devoured by the camels which learn to seek it even in the middle of the spinifex clumps. It can be eaten by human beings. There is an acacia with a flower like a golden powder puff; and the quondong or native peach, a graceful little black-stemmed tree with fresh green leaves and a bright red fruit the size of a cherry. The fruit, however, is almost all stone, and the rind is usually worm-eaten. Camels eat the fruit and reject the stones when they chew the cud. An occasional native poplar and a "black boy" or grass-tree also occur.

Around the salt lakes grows the samphire, a plant with somewhat the appearance of heather and, when green, an excellent food for camels.

The eastern deserts lie to north and northeast of the Lake Eyre basin, and in their general appearance are not very unlike those of Western Australia. From these they are separated by a belt of savana and mulga which in some places, *e.g.*, in the Musgrave and Macdonnell ranges, is fair pastoral country.

#### (6) *Alpine Flora*

The only part of Australia with a typical Alpine flora lies in the Australian Alps, on the borders of New South Wales and Victoria, for here alone the mountains rise above the tree line. Near Mount Kosciusko the upper slopes are described as producing yellow and white buttercups, forget-me-nots, the woolly daisy, the woolly lily, and woolly composites. The same plant is often found to change its form as it ascends the mountain, becoming dwarfed and spreading to support the weight of the snow in winter and covered with hairs as a protection against the clear summer sun.

#### (7) *Tasmania*

The larger eastern part of Tasmania, which is also the

drier, is covered with a eucalypt forest not unlike that seen covering the southeast part of Australia. The smaller wetter western part, however, is unlike anything in that continent, but is said to be more suggestive of Tierra del Fuego. Its main constituent is the beech, but it also has several pines, at least two tree saxifrages, and two coniferous shrubs whose only other known habitat is South America. On the summits of the mountains the vegetation assumes a sub-Alpine character.

#### ORIGIN OF THE AUSTRALIAN FLORA

It was pointed out by Wallace that there are in the Australian flora two distinct types of plants which he called the tropical and the temperate. Moreover, the difference between them is not merely that one is adapted to a tropical and the other to a temperate existence. Nearly 500 of the tropical species are identical with, or close relatives of, plants found in India and Malaya, whilst the temperate genera contain an enormous number of peculiar species. According to Wallace there are at least seven genera, each containing more than 100 species, widely distributed in Australia, but all highly characteristic of that continent. Diels refers to the sharp line of demarcation between the two. He describes the scattered denizens of the eucalyptus park as occupying the centre of the stage, while in the dark wings the tropical rain forest rises abruptly like a precipitous wall.

Wallace is inclined to explain these facts by supposing that at any rate the western half of Australia has for a very long time been completely isolated and has evolved a flora of its own ; much more recently there has been an invasion of at least the north and east by Malayan and Indian forms. The peculiar flora of the eastern half of Tasmania also lends some support to the suggestion that there has been another invasion of forms from lands now submerged lying to the south. This

hypothesis would also account for the presence in the island of forms showing an alliance with South America.

#### ANIMALS

The fauna of Australia shows signs of belonging to a phase of development which has been outgrown in the other continents. Protected by their isolation, a number of peculiar animals have survived here and have developed along lines not known elsewhere. For this reason the study of Australian animal life never fails to excite interest.

##### (1) *Fishes*

Among the most remarkable of the animals of Australia is the lung-fish, which occurs in two Queensland rivers. It is a large fresh-water fish 3 or 4 feet long with a tail which tapers to a point instead of having the almost universal fan shape. The streams in which it lives are subject to partial drying-up, and this emergency it is able to meet by the use of nostrils and a lung. Normally, it breathes by gills, taking in breath at intervals only, but when the water becomes foul it is observed to rise more and more frequently to the surface. That this mode of respiration is efficient is seen by the fact that living specimens have been observed in a pool containing the dead bodies of other fishes. It feeds on small animals adhering to vegetation and to get these takes in quantities of water-weeds, decaying sticks and the like, which it bites up with great curved crushing plates in the mouth.

It has only two near living allies, one in Africa and the other in South America. In geological times, however, its family was numerous and widespread. The explanation of these facts is probably that the group was at one time numerous and successful, but that it has succumbed in competition with modern forms, only persisting in one or two out-of-the-way corners of the earth to which competitors have not succeeded in penetrating. This case has been dealt with in detail because it is typical

of the distribution of many of the native animals of Australia. Other fishes of which much the same story might be told are : the scleropages of the Queensland rivers ; a so-called native trout ; and the Port-Jackson shark, a representative of an old and vanishing family now confined to eastern waters.

### (2) *Amphibians and Reptiles*

Among the amphibia we notice a total absence of the tailed-forms, newts, salamanders, and their kin, while there are a number of peculiar toads and tree frogs.

There are many snakes, most of which are venomous, and along the northern coasts many kinds of sea snakes are plentiful. In the deserts is found a very peculiar lizard, the moloch, whose flattened body is covered all over with blunt spines and protectively coloured. Two species of crocodiles occur, one of them in the northern rivers ; while the other, marine and estuarine, sometimes grows to 30 feet in length. It also occurs in India and Malaya. The leathery turtle is occasionally seen, while other marine turtles, green, hawksbill and logger-head, are common on the tropical coasts. There is one family of fresh-water tortoises which occurs only in Australia and South America, though widely distributed in the fossil state.

### (3) *Birds*

Among the birds primitive characteristics are also noted. Of all living birds those with an unkeeled breast-bone (the ostriches and their allies) are the simplest. At the present time this group is fairly well represented in Australia and the neighbourhood though poorly elsewhere. The emu, not so common as formerly, occurs in pastoral districts, chiefly in western New South Wales and southwest Queensland. It is a large bird very similar to the ostrich though somewhat smaller and possessing three toes instead of two. It makes a shallow apology for a nest

in which numerous eggs are incubated by the male. In northeast Queensland one species of cassowary occurs, an emu-like bird with a peculiar casque or helmet-shaped structure over the head and brilliant turquoise-blue wattles.

Opinion has swung back and forth several times concerning this group of birds. At times it has been maintained that they were an ancient group which had formerly a wide distribution, now dispossessed by the smaller flying birds from all but the most secluded corners of the earth (of which Australia is one). Others have maintained they are degenerate descendants of flying birds, each specially adapted to the region in which it lives. Recent research seems rather to confirm the former view.

Australia has also numerous flying birds ; in fact, out of about 700 species, 690 can fly. The pigeon family which is distributed over the whole world has more representatives from there than from any other region.

There are three species of a remarkable group of birds known as mound builders, the scrub fowl of the northern coasts, the brush turkey of the eastern forests, and the mallee hen of the mallee scrubs to the south and west. They are nearly allied to the curassows of South America and are peculiar for their very strange habits of nest building. In the brush turkey several females, possibly assisted by their males, raise a large mound of earth which may be 6 feet high. In a cup-shaped depression on the top of this a number of eggs are laid, covered over with decaying vegetation and more earth, and in this artificial hotbed are hatched by the heat produced by fermentation. It is said that in the case of the mallee hen each female makes a mound of its own.

Another remarkable bird is the lyre bird, so called from the peculiar structure of the tail of the cock. In this there are two large curving feathers like the framework of a classical lyre. They are used for purposes of display in courtship. The bird is remarkable for the

facility with which it can imitate the cries and song of other birds, or even humanly-produced sounds such as whetting a scythe or sharpening a saw. It lays a single purple egg in a covered nest built on the ground or on a low tree stump.

Equally peculiar are the famous bower birds, which have the habit of constructing playgrounds or "bowers" of twigs or grass stems and ornamenting them with shells, bright pebbles, flowers or even articles of human workmanship, which are collected in many cases from quite long distances. As a rule the bower is not very near the nest, with which it has nothing to do. In some cases it is a straight tunnel-shaped structure opening on a sort of yard or playground at one end. Also characteristic of the country are lorikeets or brush-tongued parakeets, cockatoos, and the little budgerigars, or grass parakeets. The former are similar to the parrots, and like them they feed mainly on succulent vegetables and fruits, but owing to the possession of a curious brush-like tongue they are able to supplement this with honey from the flowers of eucalyptus and other plants. Many of them are beautifully coloured. The cockatoos are also handsomely coloured and have a feathered crest, while the grass parakeets are well known in this country as pets. They are small birds, rather larger than a sparrow, brilliantly marked with yellow and green picked out with bright blue. They fly quickly in straight lines and often flock together on grassy spots to feed on the seeds. They keep up an incessant amorous bickering, accompanied by shrill warbling cries. Other families of birds represented are the kingfishers, of which the laughing jackass is the best known example, and the birds of paradise. This latter group is much more numerous in Papua and the neighbouring islands, but a few species occur in the eastern parts of Australia.

#### (4) *Mammals*

Striking as are the characteristics of the birds, reptiles, and fishes of Australia, those of the highest class of verte-

brates, the mammalia, are even more so. To understand how remarkable they are, it will be necessary to allude very briefly to their classification, though no details of structure will be referred to.

The whole class can be divided into three large subdivisions depending on certain peculiarities in their modes of reproduction and anatomical structure. Members of the simplest group are characterized among other things by the fact that they lay eggs and that the young are born in an extremely immature condition, and, though like all mammals they are nourished by milk secreted by the mother, they do not suck it from teats, but lick it off the hairs of the underside of the body. The teeth are only present for a short time, if at all, and when present are quite unlike those of any other living mammal. The only two members of this group still to be found are inhabitants of Australia, Tasmania, and Papua. One is the duck-billed platypus, or duck mole, of eastern Australia and Tasmania. It is rather smaller than an otter, covered with somewhat woolly fur, and provided with webbed feet and a horny bill like a duck's, but shorter and broader. The first specimens which were brought to this country were treated by naturalists with scepticism, as they were thought to be fakes made by joining parts of different animals together. The animal feeds upon insects and worms, is nocturnal and shy in its habits and lives in burrows in the river banks. In these the female lays two small oval eggs, brown in colour and about as big as a robin's.

The other member of the group is the spiny ant-eater, which ranges from Tasmania to New Guinea, where there is also a second kind. Its feet are provided with claws which it uses for burrowing. It feeds on ants and, like the duck-billed platypus, it has a beak, but this is long and narrow and not broad and flat. It also lays eggs, two at a time, and incubates them in a special pouch into which the milk-glands open.

Neither of these creatures has any close relative either



living or extinct in any part of the world. To find their nearest allies we should probably have to search among the earliest known mammalian fossils of the Triassic or Jurassic ages.

The next group of mammals is that known as the marsupials. These are distinguished by the fact that in most cases the female has a pouch on the under side of the body, in which are the teats. As in the last group, the young are born in a very undeveloped state. A new-born domestic kitten may be  $3\frac{1}{2}$  inches long. A new-born kangaroo is about an inch in length, though its parent may stand 4 feet high or more. These blind, hairless, helpless offspring crawl into the pouch, and their mouths remain attached to the mother's teats for a considerable time. They are born as a rule in January, and do not leave the pouch until October. Even when they are able to care for themselves they retreat to the pouch on the approach of danger. To this remarkable group of animals belongs the majority of the native mammalia of Australia, and with the exception of the American opossums and coelonestes they are found in the living state nowhere else. Moreover, they exhibit an amazing diversity of structure, being adapted to live the life of moles, squirrels, dormice, cats, dogs and other animals. The student will naturally wonder why, if this is the case, they should all be classed together in one group instead of being placed in the orders in which the moles, squirrels, cats, etc., of the rest of the world are placed. The answer is that though superficially they resemble the creatures named they all agree in a number of important peculiarities of which the possession of a pouch is one and the structure of the brain, the teeth and the reproductive system are others; peculiarities which are not possessed by any other living animals of the world. In fact the earliest explorers were so struck by this fact that they actually suggested that perhaps the various species interbred freely with one another.

Among the best known of the carnivorous marsupials is the Tasmanian wolf or tiger, a striped animal like a small

wolf, now confined to Tasmania and almost exterminated owing to its partiality for sheep killing. Another, equally destructive but smaller, is the Tasmanian devil, while still smaller are the native cats—about the size of a domestic cat or less and similar in their habits to the weasels, martens, and polecats of the Old World.

Among the insectivorous members of the group may be mentioned the bandicoots, which supplement a diet of insects and worms with roots and other vegetables. The largest of them is about the size of a rabbit, to which it is sufficiently similar to have acquired the name "native rabbit" in some places.

The truly vegetarian forms are very numerous. The wombats are like small bears and the largest of them attain a length of 3 feet. They live in burrows and emerge only at night. The beautiful flying opossums (which are not closely related to the American opossums) possess a broad fold of skin extending from the little finger to the ankle and use it to parachute from branch to branch of the gum trees, on the blossoms of which they feed. Finally, we have the kangaroos and wallabies. These are mostly the inhabitants of the grass lands. They stand erect on the hind feet, partly supporting themselves with the tail, and progress by a series of short hops. When alarmed, however, they can make immense leaps. A few aberrant species live in trees and among rocks.

The only living marsupials known outside Australia are the American opossums and the little creature called coelonestes, of the Argentine. In the fossil state, however, they were widely distributed.

Of the third and highest class of mammalia, which includes by far the greatest number of species of the order, only two or perhaps three groups are represented. Of the bats, which owing to their powers of flight are able to spread widely over the earth, there are several genera also common in Asia.

There are a large number of rodents, including the large aquatic beaver-rats, various kinds of jerboa-rats,

and more ordinary-looking rats and mice placed in numerous genera, many of them allied to forms known in the Old World.

There is also the native dog, "Yellow Dog Dingo" of the "Just-so Stories," which was quite possibly introduced by the aborigines. Then there are seals, whales, dolphins and a dugong, to which, of course, the sea does not act as a barrier.

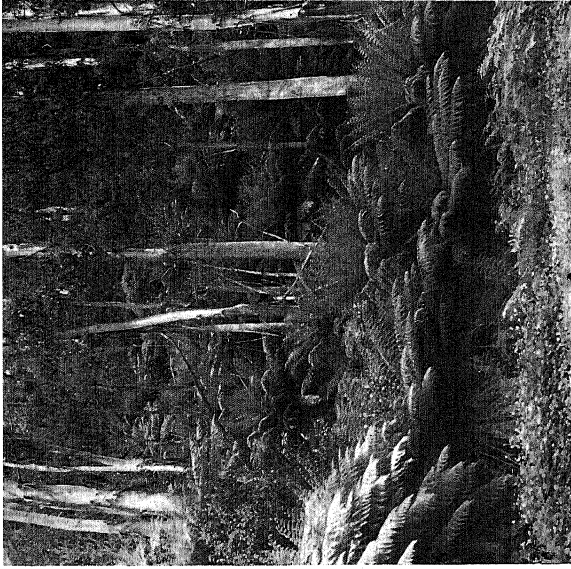
This concludes our sketch of the plants and animals native to Australia; but it would be wrong to suppose that all of these are common objects to be seen there at the present day. Since the advent of Europeans many foreign plants and animals have been introduced both from South Africa and South America as well as from the northern hemisphere, and they have in many cases found the surroundings so congenial that they are rapidly ousting the native forms and in some cases developing into pests. The prickly pear covered 60,000 to 70,000 square miles in 1922 and was then increasing at the rate of about 230 square miles per annum; it is now largely controlled by the cactoblastis caterpillar, introduced from South America. The rabbit increased so rapidly that rabbit-proof fences have been constructed right across the west end of the continent and across southern Queensland; the fox and the starling have also proved a pest on introduction into the continent.

To explain the remarkable assemblage of animals which has thus been briefly reviewed we may compare Australia with the "Maple-White land" of Conan Doyle's story, "The Lost World." Those who have read that interesting romance will recall that it describes a plateau whose precipitous sides retained and preserved samples of many bygone geological periods which had elsewhere been exterminated by the evolution of more modern forms. In Australia we do not find actual living examples of the animals of the Jurassic, Cretaceous, or any other bygone period. Probably no single fossil species of any antiquity, geologically speaking, is found living there, with the possible exception of the lung-fish and some invertebrates, but the

native fauna as a whole certainly has an ancient look, and it is difficult to resist the conclusion that the country was populated at an early date when the majority of the mammals on the earth were of the Australian type. It then lost its connection with the main land-masses of the world and its fauna continued to develop in a cloistered seclusion which is now being rudely shattered by the introduction of more progressive types from the continents of the northern hemisphere.

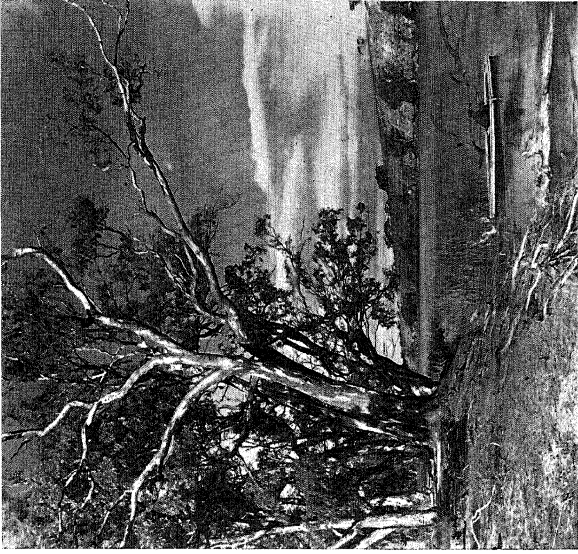
By what route it received its original fauna is doubtful. According to some the last land bridge to be severed was in the direction of the Malay Peninsula and the East Indian Islands. Others point to the similarity of the animals of South America as evidence of a connection through Tasmania with a northern extension of Antarctica. Still others find evidences of two invasions; an earlier one by way of the Malayan connection, introducing the ancestors of the duck mole and the spiny ant-eater, and a later one from South America introducing the marsupials. The discussion of these topics is, however, beyond the scope of this book.

PLATE I



[*Australian News Information Bureau*]

A. TASMANIA: TREE FERNS IN WELDBOROUGH PASS



[*Australian News Information Bureau*]

B. SOUTH AUSTRALIA: SWAN REACH ON THE RIVER MURRAY

The river, here 153 miles from the sea, has shrunk in size through evaporation and lack of tributaries. The trees are red gums.

PLATE 11



*[Australian News Information Bureau*

A. AUSTRALIAN ABORIGINES

A group singing sacred songs preparatory to blood-letting and decoration for snake corroboree.



*[Australian News Information Bureau*

## CHAPTER VII

### THE ABORIGINES

THE first European settlers found two distinct races in occupation, one in Tasmania and the other on the mainland. It is uncertain whether the Tasmanian natives migrated from the equatorial lands of southern Asia and occupied Australia and Tasmania before Bass Strait was formed, or whether they were driven southwards by the Australian natives who killed or absorbed their fore-runners on the mainland of Australia, but who were held up by the newly-formed strait. Both races seem to have remained undisturbed from these very early days until the first European settlers discovered them.

Of the Tasmanians little need be said, for they have been exterminated by the white settlers. They were a black-skinned people of medium stature: their woolly hair placed them in the negrito group of races, but unlike the negroes of the west, they possessed strong projecting eyebrow ridges which, together with the deep depression at the notch of the nose, gave them a particularly brutal appearance. Completely isolated, the Tasmanians remained an unprogressive, but mild-tempered people, until the invading white man upset the even balance of their lives. So stagnant and rude was their culture that they have been called a palæolithic people. In winter they wore kangaroo skins, but usually they dispensed with all clothing. They had no houses, but erected simple screens against the wind. Their weapons—spears and clubs—were made of wood; their implements and tools were of chipped stone. Hunters and grubbers, they levied toll on the animals, birds, reptiles, and insects of

their island, but the art of fishing they had not learnt, though they were skilful divers for the shell-fish of the shallow waters. They navigated the coastal waters in bark rafts. At the highest estimate these simple people numbered only 2,000 and after the fighting which ended in 1831, there remained only 200. A belated attempt to save the remnant failed, for kindness proved as destructive as the harsh policy which preceded it. We know very little of their social organization and religion ; indeed the study of human culture has suffered grievously from the cruelty, ignorance, and carelessness of the early settlers in the island.

Like the Tasmanians, the natives of Australia received their characteristic physical features in a hotter land than that of their adoption. They are of medium stature, their brown skin colour varying in intensity. Prominent eyebrow ridges and a flat retreating forehead give them a very primitive appearance, especially when associated with a projecting lower jaw and a very broad nose. The Southern people were stoutly built, hairy bodied, and thick-legged. The Northerners were lean, spindly legged, relatively hairless, and often very dark. The woolly or spiral hair of the negrito survives only in the Atherton Plateau of Queensland, and a few small highland areas in the southeast and southwest. The more usual wavy or curly hair places them as very primitive representatives of the great group of races to which we ourselves belong, and which stretches across the southern fringe of Eurasia and the Archipelago to Oceania. He was probably in occupation of Australia in the late Pleistocene Age, for the Talgai skull in Queensland presumed to be of that age exhibits most of the features of the existing native. If we ignore the effects of contact with the Melanesians and Papuans of New Guinea in the extreme north, the Australian has remained isolated throughout these thousands of years. He has provided students of human culture with a magnificent opportunity, and indeed our knowledge of the Australian is in marked contrast with that of the Tasmanian. Here is, or rather was, a primitive



people still in the hunting stage of culture and unspoilt by contact with other races ; surely here, students used to say, we can see fossilised a stage of evolution through which we all have passed. No longer, however, is the confident belief held that all mankind has passed through the same stages of cultural evolution, nor, indeed, is Australian culture fossilised ; but in Australia can be studied a really important example of the reaction of man to his environment in the case of an isolated hunting people.

It is the men's work to hunt the kangaroo, the emu, and the opossum, to dig out the wombat, and to bring down the duck and the pigeon. Meanwhile, the women and young children are collecting wild yams and grubbing for insects. The marsupials provide the family with meat, birds are plentiful, reptiles make good eating, and fish are caught with barbed spears and fish-hooks or trapped in cleverly constructed weirs. Even in the dry lands the native lives where the white man dies, for he has learnt to find water in the roots of trees. In his weapons as well as in his manner of hunting the Australian shows an advance on the Tasmanian. He has learnt the art of hafting and possesses cleverly chipped stone spear-heads, axes, adzes, and knives, hafted to wooden handles. He possesses, too, the spear-thrower which enables him to kill at a distance of 50 yards, and the many kinds of boomerang. The boomerangs used in hunting are big and heavy, but thin and offering little resistance to the air ; they travel far and hit—indeed they are difficult to avoid. The better-known returning boomerangs, used chiefly for sport, are small, very thin, and very strongly curved.

The Australian huts, or wurleys, are simple erections of branches often intended for but a brief stay. Except when the cold nights compel the use of kangaroo or wallaby skins, the natives go nude or wear hip girdles only. They share with the Tasmanians a love of coloured pigments for decoration, and while the women wear necklaces of kangaroo teeth, the men prefer the nose pin, a piece of

wood thrust through the nasal septum and projecting beyond the face on both sides.

In their simple social organization the family is the basic institution, though more important is the clan, a kind of extended family in which descent is counted in some cases through the male, in others through the female. Usually the clans are totemic ; their members, that is, are associated in a mystic bond of kinship with some class of animals, birds, insects or, less commonly, of inanimate objects. Clans are grouped together into tribes, often speaking a common dialect. In the days before the white invasion, the hunting and grubbing grounds of each tribe were respected by their neighbours, and within each tribe the clans had their customary territory. There was very little inter-tribal fighting, for the Australian was not a warlike savage.

It is generally true of simple societies that the duties and obligations of their members are determined by their blood relationship to each other, so that a knowledge of marriage regulations stands at the very heart of the understanding of their conduct. Amongst some Australian tribes a man marries his first cross-cousin, that is; his mother's brother's daughter, and in other tribes his second cross-cousin, a woman who is usually his mother's mother's brother's daughter's daughter. A mere mention of these relationships shows that we are moving now in a carefully regulated social system, in which such rough and ready practices as marriage by capture are almost unknown. Indeed, the savage lives in an orderly society, and so long as he remains uncontaminated by white contact, he is a model law-, or rather, custom-abiding clansman. So far is marriage a matter of regulation and not of private initiative that a woman may well be, and often is, betrothed before she is born—if an Irishism be permitted. Now, as in all Australian clans descent is reckoned through one side of the family only, male in some cases, female in others, a man in marrying his cross-cousin is marrying a woman of another clan ; marriage is in fact

exogamous. To marry within the clan is to commit the most serious and abominable crime known in savage society.

So brief a description of native marriage regulations may, through its inadequacy, be confusing. For our purpose it is necessary to remember not so much the regulations as the fact that services and duties are based on relationship. A man must deport himself in one way in the presence of his father, in another in the presence of his mother, still another towards his mother's brother and so on throughout the complex of relationships. From his day's hunting, for instance, certain gifts of food must be reserved for his father. Or again, for years before his marriage, a man's father will have made gifts to the father of his son's future wife, that is, his wife's brother in the simple system. Further—and here we touch on really difficult questions—as the clan is a quasi-familial organization, it is not difficult to see that a man may owe the same services not only to his own father, but also to all the men in the clan of the same generation. In fact, he calls them all by the same name. Carry the argument further again and we find that there is not a member of his own clan or his wife's clan to whom he does not stand in a definite relationship carrying with it a definite code of conduct, so that his whole social behaviour is regulated from birth to death. Outside the kinship system there is no code, and no obligations, so that we can understand the panic of Professor A. R. Brown's black servant who stood outside a strange camp until he had undergone the catechism beginning with the question "Who is your father?" Moreover, this social system explains the dualism of savage ethics, for whereas there is the strictest code of behaviour within the system, outside it is the uncharted world of the unknown where the savage wanders with no guide as to mine and thine, or as to right and wrong.

Clan discipline is, or rather was, maintained by the old men who lead by reason of their experience and of

the tradition of obedience. They form a natural aristocracy ; there are no appointed chiefs or kings. Amongst them a man of strong personality is accepted as leader. A medicine-man may or may not be in the circle of the elders ; his powers are specialized, his training is both vigorous and painful, and usually he maintains a high standard of professional conduct which puts the welfare of his people before his own. He is more priest than scientist, for disease comes from the unknown—that realm where primitive religion and magic consort. The savage has no comprehension of natural causes of disease, so that the savage doctor uses his prestige as a dealer in the unknown to replace fear by confidence and to cure by suggestion.

The position and services of the medicine-man lead us to the part played by religion in Australian aboriginal life. For whereas social organization shows us the mechanism of life, it is religion amongst savages which provides the power driving that mechanism. Crude in its expression and entirely dependent on concrete symbolization, the religious life of the Australian is still extraordinarily active and vigorous. It enables him to conquer the rigours of life in the hot desert, to face hunger and thirst. It is the source of his very will to live, and, in spite of his adverse environment and of his slender control thereof, the will to live well.

He worships no gods, and indeed, much of his supposed belief in spirits is the overstatement of observers. Among the Aranda of Central Australia, for example, religious rites are concerned with a sacred power or "tjurunga" which can be discovered in sacred objects. It is a power, secret, occult, and ancient, which can destroy those who approach it in a profane spirit, but which strengthens and restores those who approach it with due respect, that is, those who keep the traditional taboos. It brings not only plentiful food, but those spiritual benefits which can best be described in the simple words of one of the natives who said he became "strong, glad and good." That this

sacred quality is attached to certain stone "bull-roarers" and can be transferred to the native by the simple process of rubbing the "bull-roarer" on his stomach, though miraculous in itself, means that we are dealing with a people for whom spiritual values can be conveyed only by concrete symbol and dramatization. But the values are the reality, and their origin, in this case in the wooden "bull-roarer" which emits its unearthly moan and roar, is easily comprehensible when we remember that such an uncanny noise proceeding from an apparently ordinary piece of wood fills the savage mind with those emotions of awe and wonder which lie at the heart of religion.

Two very briefly described examples of widely different aspects of Australian religion must suffice. Firstly, let us take ceremonies connected with the provision of daily food. Among the central tribes the totemic groups perform rites which have as their object the increasing of the food supply, a vital matter in the hot desert. Each group is responsible for its own class of animal, bird or plant. The kangaroo men, for instance, assemble at the sacred rock of the kangaroos and amidst solemn chants allow their blood to flow freely over its hallowed surface. Then follows a sacrificial meal in which certain parts of a kangaroo are sparingly eaten by the old men of the totem, the younger ones continuing their already long fast. The ceremony, lasting two or three days, is set in a traditional routine: for the time being the totemites have passed out of the world of profane commonplace happenings into that of the sacred. Henceforward they eat but very little of kangaroo flesh, and of some parts they eat nothing, but they have helped to fill the larder of their fellow tribesmen of other totems, who through their own appropriate rites do a like service for the kangaroo men.

And, secondly, let us turn to the elaborate initiation ceremonies. Like other savages, the Australian parent is proud of his children and showers his affection on them. But the time comes when the boys must become men, when the care of the young passes out of the hands of the

parents into the stern control of society. The boys undergo a period of discipline and education which for ever impresses on their minds a respect for the customs of the tribe and for the elders who rule over it. For weeks they live in the bush under the strictest rule of silence. The elders teach them the tribal ceremonies and the stories of the past. Each day and night dramatic performances tell them of the doings of their ancestors in the *Altjeringa*, the golden age of the past. At customary times in this strenuous education, severe tests of physical endurance are imposed, traditional and painful mutilations are performed by those elders whose kinship gives them the honourable position of teachers of the young. At each critical stage in the initiation ceremonies the silent, fasting lads are cowed by the wild noise of the "bull-roarers," which have been hitherto preserved in complete secrecy. Finally, they are told of the source of the mysterious music and come to understand the vehicle of the sacred power. From such an ordeal they emerge into the profane world as men, social conduct and ceremonies for ever stamped into their minds. Such indeed is the complex nature of Australian religious life that throughout their early manhood they undergo a series of increasingly arduous tests until they in their turn become the guardians of tribal lore and the instructors of the young. "Thus," says Dr. Marett, "is custom exalted, and the coercive power amplified, by the suggestion of a power . . . that 'makes for righteousness,' and, whilst beneficent, is full of terrors for offenders."

## CHAPTER VIII

### THE BEGINNINGS OF SETTLEMENT

IT has been seen in previous chapters that the great island continent, isolated in a very marked way from the larger land-masses of the world, is a region of great interest to the biologist and anthropologist. In the following chapters an attempt is made to show that Australia is no less interesting as the scene in which other matters of the greatest human interest may be studied. For example, one of the outstanding facts of modern history has been the spread of the European into regions which are far removed from his last centre of dispersion in Western Europe. This development of new lands by the European may be studied most simply in Australia because, in the first place, the land was only very sparsely populated before his arrival, and, secondly, the occupation has been carried out almost entirely by people of one nationality. Again, as a self-governing Dominion within the British Empire, Australia is part of that unique development of modern history—the British Commonwealth of Nations. Still another feature of much interest to the student of politics is to be found in the constitutional and industrial laws of the country. A great group of the English-speaking people has been transplanted, has embraced wholeheartedly the democratic ideals of the British people, while it has rejected equally emphatically the aristocratic traditions and anomalies of the English constitution. In legislation on industrial questions the Australians have made bold experiments in state regulation of industry and commerce. Finally, in bringing a vast new territory into full productivity, the scientists and agriculturists of Australia have been among the first to see the part that is to

be played by the natural sciences in the solution of the world's economic problems. It may therefore be said that Australia is not only a museum for the naturalist and anthropologist, but also a laboratory for the student of economics and political science.

The real beginning of effective British settlement was in January, 1788, when Captain Phillip arrived with "The First Fleet" and his company of 700 convicts at Botany Bay. The commencement of a great experiment in colonization with such human material may at first sight seem unpromising, and no doubt many of the convicts were of bad, and even dangerous, character; but it must be borne in mind that a great many were transported for petty crimes and for political offences. Among the latter were many men of upright character, whose crime had been nothing more than the sturdy independence with which they had held certain political opinions. Men of such character played an important and valuable part in the political and economic development of the early colonies. Many of the later convicts were Chartist, who lived to see the adoption of their democratic programme in the new lands long before it came to be accepted in Britain. On the other hand, it cannot be denied that the nature of the early settlements, combined with the great distance from Europe, acted as a deterrent to the immigration of free settlers, and accounts for the slow growth of the early colonies.

It is not easy to appreciate the difficulties and dangers which confronted these early settlers. Almost from the beginning the existence of two or three classes in these settlements proved fruitful of disputes. There were the officials, the convicts, the "emancipists," *i.e.*, those convicts who had been liberated on the expiration of their sentences, and, finally, the free settlers. Moreover, quite early in the history of the colony, bands of bushrangers, *i.e.*, escaped convicts and outlaws, made themselves a serious danger to outlying settlements and to communications between them and the towns. Tasmania suffered



terribly from these men ; and in Victoria the numbers of the bushrangers were increased by the many undesirables who were attracted by the gold rush of the early fifties. An additional cause of anxiety in the first few years was a very real danger of famine through shortage of all sorts of supplies. One or two unlucky wrecks caused acute distress, and the steady stream of convicts, many of whom arrived exhausted and ill after their long voyage, tested the ingenuity and courage of Captain Phillip to the uttermost.

The great wall of mountains which looks down upon the eastern coastlands for long proved a very effective barrier to any penetration of the interior. The coastlands were given over to farming of a mixed type, although sheep rearing was prominent very early. The labour on the farms, as well as on roads and other public works, was largely carried out by convicts hired out as bond servants. There is an interesting comparison to be made between the early history of these colonies and that of the English colonies in North America. In both cases a great system of mountains confined the settlements to the coastal plain, and the crossing of the barrier was followed by rapid expansion into the interior. In both cases also it will be seen that the problem of developing the hot coastal regions nearer to the Equator raised the question of coloured labour.

There was in reality no early settlement at Botany Bay because there was discovered almost immediately the much better site of Port Jackson at Sydney Cove. Wheat, barley, and vines were planted, and merino sheep from South Africa were introduced a few years later. Very soon small settlements were established at Norfolk Island and on the Hawkesbury River. The mineral wealth of Australia was first exploited in the form of coal at Newcastle in 1796. Wool was first exported in 1803. Settlements in Tasmania were made about this time for the detention of the more dangerous types of convicts, and this was the beginning of an unhappy series of events

which marred the history of that lovely island. Throughout this early period there was continued anxiety as to supplies of the bare necessities of life, but the period of beginnings may be said to close in 1813 with the successful crossing of the Blue Mountains, and the discovery of the wonderful grasslands of the interior. It is significant of the later history of the country that this first act in the opening up of Australia was due to the fact that the sheep farmers of the coastlands had been driven by a disastrous drought to seek new pastures for their flocks.

In the early days a great deal depended on the character of individual colonists and a good idea of the early life of the colony may be gained from the biographies of some of these men. One of the most important was Captain John Macarthur. He was the son of a Scottish Jacobite, who fled abroad after 1745, but returned later to settle in Devonshire. John Macarthur became an officer in the Army and in 1789 came to Australia in the 102nd Foot, or New South Wales Corps. As was the custom with many of the officers, he took up a grant of land and engaged in farming and commerce. It was he who imported some Spanish merino sheep from South Africa in 1796, and he bred from them a very promising flock. In consequence of a quarrel with a brother officer, he was sent to England for a court-martial and took with him specimens of wool which created a very favourable impression on English manufacturers. In 1805 he settled on a large estate near Sydney and introduced into Australia the olive tree. The Governor of New South Wales was at that time engaged in an attempt to put down the liquor trade in the country, and a long struggle ensued on this point between him and Macarthur. The outcome was a peaceful revolution in which the Governor himself was arrested, and Macarthur was placed in a high position in the provisional government. The consequent legal proceedings again took him to England, and after spending some time in France in order to study viticulture, he returned to Australia to plant a vineyard.

Macarthur may be said to have founded the wool and wine industries of Australia.

The story of the Blaxland brothers is also typical of the early days. These two men went to Australia in 1805 as free settlers, having contracted with the home authorities to occupy and develop 8,000 acres and to employ 80 convicts. The fact that they were free settlers and therefore not completely under the Governor's authority led to frequent disputes with the latter. For example, they persisted in rearing cattle while the Governors wished to develop the cultivation of wheat. They took some part in the mutiny of Macarthur against Governor Bligh, but they usually kept out of politics so long as they were left to farm in their own way. It was the younger Blaxland who first crossed the Blue Mountains and found the great pasture lands lying to the west.

A good idea of the early days may be gathered from the following extracts from the journal of a traveller in 1836. In describing a journey over the Blue Mountains from Sydney he writes :

“ We set out at an early hour to Penrith on the Nepean River. Our guide was a black called Simeon. His wife was killed, about two years ago, by some of those whom he termed ‘ Wild Natives.’

“ After breakfasting at a respectable inn, we proceeded to the station of an ‘ ironed-gang,’ on Emu Plains. They have been employed in cutting a new road up Lapstone Hill, the ascent of the Blue Mountains.

“ On leaving the gang, we proceeded along dusty mountain roads, through forests of gum and stringy-bark, in some parts of which fire was raging with fury. Bullocks travelling with settlers’ drays were ill-favoured and lean-fleshed, from the scarcity of grass. Dead bullocks were numerous by the roadside.

“ As we descended the hills, Bathurst Plains opened to our view, relieving the eye after a long incarceration in thick, or in open forest, by a fine undulating expanse, watered by the Macquarie, formed here by the junction of the Campbell and Fish rivers, all running westward.

“ At a short distance from Bathurst, a man was feeding a bullock, by the roadside, which had fallen from exhaustion. Should there be no rain for a few weeks longer, it will be keenly felt. In many places the ewes are so weak as to be unable to feed their lambs ; and to the southward, the influenza, a destructive disease, is prevailing among the sheep.”

In the early part of the 19th century two great continents were at the same stage of settlement—North America and Australia. The romantic adventurers in their “ prairie schooners ” and the “ forty-niners ” of California have their counterparts in the equally bold settlers and “ diggers ” of Australia. Flood and drought, and human outcasts, whether black or white, took their toll of the indomitable men and courageous women who faced the heart-breaking tasks of the pioneer. In those early days none of them can have been ordinary people or nonentities. Only those whose careers in the home country had been unusual, or who were possessed of the roving spirit, would be found in Australia in the twenties and thirties of the last century.

It is tempting to try to imagine the varied motives of the emigrants, but it has been done for us admirably in a work of fiction, “ Geoffrey Hamlyn,” by Henry Kingsley. The following quotation from that novel gives an excellent glimpse of the settlers as they moved in to the new land :

“ We could hear the rapid detonation of the stock-whips loud above the lowing of the cattle ; so we sat and watched them debouch from the forest into the broad river meadows in the gathering gloom ; saw the scene so venerable and ancient, so seldom seen in the Old World—the patriarchs moving into the desert with all their wealth, to find a new pasture ground. A simple primitive action, the first and simplest act of colonization, yet producing such great results on the history of the world, as did the parting of Lot and Abraham in times gone by.

“ First came the cattle, lowing loudly, some trying to

stop and graze on the rich pasture after their long day's travel, some heading noisily for the river, now beginning to steam with the rising evening mist. . . . Behind the cattle come horsemen, some six or seven in number, and last, four drays, bearing the household goods, come crawling up the pass.

“ We had time to notice that there were women on the foremost dray, when it became evident that the party intended camping in a turn of the river just below. One man kicked his feet out of the stirrups, and sitting loosely in his saddle, prepared to watch the cattle for the first few hours till he was relieved. Another lit a fire against a fallen tree, and while the bullock drivers were busy unyoking their beasts, and the women were clambering from the dray, two of the horsemen separated from the others, and came forward to meet us.”

The history of a nation is something made up of the individual lives of its citizens, but the result is something more than a mere collection of biographies. The birth and growth of this young nation, only a few generations old, is a romantic and heroic story.

Life was evidently not easy in the young colony, and the difficulties were increased by the vast distance which separated the colonists from the Motherland and the length of time required for communication with “ the old country.” But the leaders had the experience of the English settlers in North America before them, and they were conscious of being the foundation builders of a mighty limb of the British Empire. We shall try to show in the next chapters what they made of their task.

## CHAPTER IX

### ECONOMIC GEOGRAPHY

#### INTRODUCTORY

THE woolsack, which serves as a seat for the Lord Chancellor in the House of Lords, is a symbol of the fact that in mediæval times England was the great source of raw wool for the textile industries of Flanders, and that the export of wool at that time laid the foundation of English wealth and commerce. The centuries have wrought great changes in the functions of different regions of the world, and now England, part of an island which was formerly on the outskirts of the civilized world and a great producer of raw wool, is one of the greatest manufacturers of woollen cloth and draws the bulk of its raw material from the island continent on the other side of the world.

As we have seen, the prosperity of Australia was early connected with sheep farming, and it is appropriate that a study of the economic geography of the country should begin with a consideration of its pastoral industries.

#### THE PASTORAL INDUSTRIES

##### (1) *Sheep*

The leading position of Australia in the production of wool is well known, and although the industry has suffered severe fluctuations in its history, mainly on account of droughts, nevertheless it is undoubtedly the basis of Australian prosperity. The importance of the industry may be realized from a study of the following figures for Australian exports in 1948-49 :

Value of total exports	.	.	£A547,000,000
Value of wool exports	.	.	£A240,000,000

Again, the importance of Australia as the leading country in the production of wool is shown in the following figures for the same year :

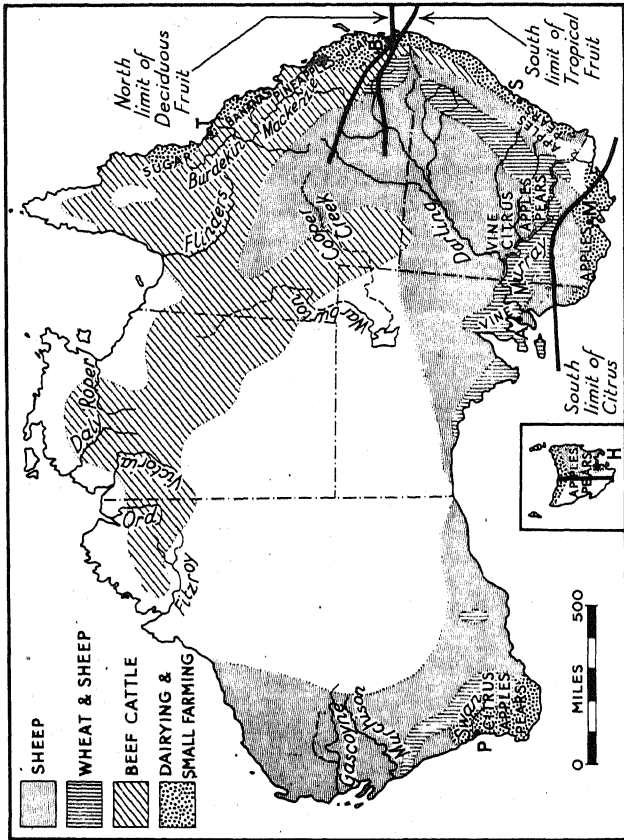
	millions of lbs.
Australia . . . . .	1,026
Argentine . . . . .	450
New Zealand . . . . .	365
U.S.A. . . . .	307
U.S.S.R. . . . .	260
South Africa . . . . .	210
Rest of the World . . . . .	1,152

The production of wool is in fact the staple industry, although in relation to other Australian industries it has decreased considerably.

The distribution of sheep in Australia is determined by climate and food supply. The sheep is an animal of the temperate zone and lambs cannot stand the high temperatures of the north. Heavy rainfall is also unfavourable, and the sheep do not generally flourish in regions with a rainfall of over 30 inches. They are therefore not found in the north or on the eastern coastal plain to any great extent. On the other hand, few sheep can be pastured in lands which have less than 10 inches of rainfall per annum. All round the great desert is the saltbush country, which provides excellent fodder for sheep. The saltbush, however, is slow to recover after it has been cropped, and this region therefore cannot support such large flocks as the natural grassland. By far the greater proportion of the flocks is to be found on the rolling grasslands between the eastern mountains and the desert. This is indeed the best sheep country in the world. Of the whole Australian flock in 1944, New South Wales had 46 per cent., Queensland 18 per cent., and Victoria 15 per cent.

Just as the predominance of the pastoral industry has become steadily less marked in the economic life of Australia with the rise of other industries, so also the predominance of wool has decreased in the sheep-rearing industry as a result of the introduction of cold storage

which made it possible to breed sheep for mutton as profitably as for wool. Up till 1880 the merino sheep were favoured for their fine wool, but since then cross-breeds have challenged them because they are larger and



DISTRIBUTION OF PASTORAL, AGRICULTURAL AND FRUIT GROWING LAND.

hardier animals. On the coastlands, and still more in the highlands, the crossbreeds for mutton and coarser wool are to be found in the majority. It is only on the western slopes of Queensland, New South Wales, and Victoria that the merino, with its fine wool, holds its own. Tasmania, with its cooler climate, plays a special part in breeding good vigorous stock



which can be drafted into the flocks on the mainland.

The huge sheep-runs of former times are gradually disappearing, and in many cases farmers are combining sheep rearing with other kinds of farming. In former, and more spacious, times the flocks ranged over great areas and a life similar to that of the American cowboy was characteristic of early Australian days. Great fortunes were made, and lost as well. The life was full of hardships, in which droughts, floods, and pests had to be contended with. There was frequent trouble with the natives, and occasionally with the bushrangers or escaped convicts. The most disastrous year was in 1902, when, with the runs overstocked, a severe drought occurred. It was estimated that it caused a loss of £127,000,000 to Australia. Now, however, the industry is more stable, if less romantic. Fenced-in paddocks, machine shearing, the sinking of artesian wells, and the growing of fodder crops, have changed the industry greatly. By careful breeding the average weight of the fleeces has been almost trebled, and it is safe to say that the industry will be the most important in Australia for many years to come.

One of the chief problems now facing the Australian farmers is the rabbit plague. Introduced into an environment in which most of their natural enemies are absent, these animals have multiplied enormously and do untold damage in destroying the natural food supply of the sheep. Great sums of money have been spent in constructing rabbit-proof fences, which have provided a considerable, but not complete measure of security. During the last ten years the export of frozen carcasses to the United Kingdom has become increasingly important, and in view of the world shortage of protein, this may develop into a permanent and valuable trade.

The sheep are shorn before the beginning of the hot weather. Shearing is a very heavy job, even with machinery, and it is also highly skilled work, for the wool must be clipped close to the skin without wounding the sheep. A good man will deal with more than a hundred

animals in the day. It is usual to employ vocational shearers, who are engaged in advance and go round from station to station. The operation of shearing takes place in a great shed, where the wool is not only removed from the sheep, but also sorted. (The best wool comes from the shoulders and the poorest from the legs and tail.) It is then pressed and baled and sent off for sale in the Australian ports, where great markets are attended by buyers from Europe, America, and Japan. Some of the wool is exported for sale in London or in other European markets. Although the export figures mount year by year, there is a growing industry of woollen manufacture in Australia itself, and every year more and more wool is consumed in Australia. The spectacular rise in wool prices is disliked by thoughtful Australians. It has led to a general rise in prices, considerable inflation, and by encouraging farmers to sacrifice everything to wool production has resulted in neglect of mutton and lamb, just when world meat requirements are greater than ever before.

Tallow and stearine, for the manufacture of soap and candles, are obtained as by-products from the treatment of the wool. The horns and hoofs are not of great importance, but are used for the manufacture of combs, handles and glue. Paradoxically, catgut is made from the intestines of sheep.

## (2) *Cattle*

The farming of cattle definitely ranks below that of sheep as a great pastoral industry of Australia, but it is undoubtedly an increasingly important industry and capable of great expansion. The great beasts pastured in the north are splendid beef animals, and the suitable regions have not been by any means fully occupied. In the extreme north, on the coastlands and islands, the Asiatic buffalo was introduced early in the 19th century. A large number of them escaped and there are now many herds of them in a wild state. They reach enormous weights and are hunted for the sake of their hides.

Fortunately, the interests of the owners of sheep and cattle do not clash, as the land which is suitable for cattle is much less so for sheep. For beef purposes the best land is in the north, where the cattle find good pasture, and where the heat does not affect them adversely as would be the case with sheep. Here great herds of magnificent cattle are ranched. Queensland is the foremost cattle state in the Commonwealth.

The history of the two great pastoral industries is very similar. In both cases the pasturing of great flocks and herds over wide areas continues, but tends to give way to more restricted and less wasteful methods. The practice of refrigeration and cold storage has resulted in a great increase in dairy farming, and this of course has been encouraged by the growth of large cities. For dairy purposes the eastern coastlands, with the milder climate demanded by dairy cattle, are admirably suited. As in almost all dairying countries, co-operative methods have been adopted with great success. In Queensland all butter factories are co-operatively owned, as are the majority in New South Wales and about 50 per cent. of those in other States.

#### AGRICULTURE

In the following account of agriculture in Australia no attempt is made to give a description of every crop cultivated. Only those crops will be dealt with which are of special interest or importance in Australian agriculture.

##### (1) *Wheat*

Among the cultivated crops of Australia, wheat is much the most important, and Queensland and Tasmania are the only states in which it does not occupy first place. It is, however, only recently that wheat has gained an important place in the exports of the country. Until the second half of last century Australia depended for much of her wheat upon foreign countries, especially South

America, and wheat did not figure as an Australian export until 1897. To-day Australia is among the first ten wheat-producing countries.

The best conditions for wheat cultivation are found in the interior lowlands of New South Wales and Victoria, in South Australia round Spencer Gulf, and in the southern parts of Western Australia. Here the climatic conditions are excellent so long as there is at least 10 inches of rainfall in winter. The average yield per acre is poor, but is being improved; and the quality of Australian wheat is so good as to fetch very high prices. The area under wheat has been considerably extended by practising "dry farming." Australian wheat exports go chiefly to Great Britain; but Italy, France, and Japan are important customers. The trade with Japan is likely to increase as there is a steadily growing demand for wheat in that country.

A great deal of splendid work has been done by scientists in breeding and selecting varieties of the wheat plant which are specially suited to Australian conditions. In this connection it is impossible to pass over the work of William James Farrer (1845-1906). In spite of obstacles of every kind, and the ridicule and contempt of so-called experts, he spent many years of devoted and patient research in the cross-breeding of varieties of wheat, so that Australian farmers might be able to make the most of their particular soils and climate. His discoveries entirely changed agricultural conditions in the wheat lands of Australia; the average yield was raised by two bushels per acre, and the world price of Australian wheat by 2s. a quarter.

## (2) *Maize, Sugarcane, and Cotton*

These crops are grown almost entirely in Queensland and New South Wales. Successful cultivation of sugarcane and cotton is complicated by political problems and fluctuations in the world markets. The political problem

involved is that of coloured labour. It may be said that conditions of soil and climate are excellent, but that the conditions of labour are very difficult for Europeans. Australians would prefer to leave the land undeveloped rather than see the establishment of a large population of coloured labour.

Much has been done, however, in the invention of machinery which can take the place of human labour. In various ways, also, sugar-cane and cotton growing have been encouraged by government aid. Maize and sugar-cane are well established, while cotton still depends on a continuance of the present vigorous Government support.

### (3) *Wine and Fruits*

The vine was cultivated in the original settlements round Sydney in the very early days, but it has not been developed in New South Wales so much as in Victoria and South Australia. In those parts of these two States where the climate approximates to that of the Mediterranean lands, the vine is grown very successfully for wine, for table grapes, and for raisins and currants. The ravages of the phylloxera caused a temporary set-back, and Australian wines have still to win the reputation of wines from countries where wine-making has flourished for centuries, but there has been a steady increase in production and export.

Of other fruits produced there is a very wide range, although, of course, certain types of fruit predominate in the different States according to climatic conditions. Thus, Tasmania is pre-eminently an apple-growing country and produces more apples than all other States combined. On the other hand, the cultivation of bananas and pineapples is extensive in Queensland and negligible elsewhere. Citrus fruits are grown in all the States except Tasmania, but chiefly in New South Wales. Stone fruits are most successful in Victoria, and the chief fruits of Western Australia are apples, oranges and pears.

#### (4) *Water Supply*

The area of Australia is roughly equal to that of the United States of America, yet in all this vast territory, the total population is only seven-tenths as great as that of the city of New York. The chief reason for this state of affairs is that a great part of the country consists of desert which can never be occupied because of the lack of water supply. Estimates as to the future growth of population and as to the maximum population possible for the whole continent differ very widely ; but the water supply is the controlling factor in all these calculations.

Drought figures repeatedly in the tragic story of Australian exploration. In Carnegie's fascinating book, "Spinifex and Sand," a vivid account is given of the trials of a gold prospector in Western Australia, and in the whole book there is hardly a page without reference to the difficulties of finding water. More concrete proof of the supreme importance of this question can be shown in the statistics at the time of the Great Drought at the beginning of the present century. Between 1895 and 1902 the number of sheep in Australia fell from 106 millions to 53 millions. In 1901, 25 million bushels of wheat were exported, while in 1903, 11 million bushels had to be imported. It is obvious that the future of the country is closely bound up with the increase in the water supply.

#### (5) *Artesian Water*

The largest and most important of the artesian basins covers more than half of Queensland, and much of the interior of New South Wales and South Australia. Other basins are the Murray River Basin, the Eucla Basin on the Bight, and three basins on the west and northwest coasts of Western Australia.

Geologists are sharply divided in their opinions as to the origin of the water obtained from these basins.

Professor J. W. Gregory believes in what is known as the plutonic origin of the water, *i.e.*, that it is derived from the rocks which lie deep below the earth's crust. The more generally accepted view is that the water is derived from the rain which falls on the Jurassic sandstones of eastern Queensland and collects underground in porous beds with impermeable rock beneath.

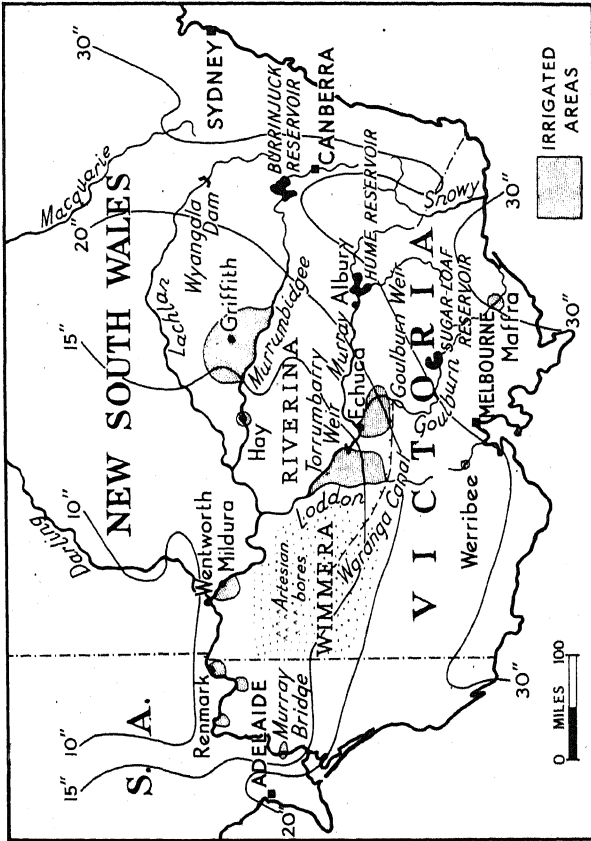
This scientific problem is of great practical importance, because it is at present impossible to know whether this water supply can be relied upon indefinitely. It is certain, at any rate, that the flow tends to diminish if too many bores are sunk in any particular district. The chemical quality of the water is also important. It is certainly invaluable to pastoralists, especially in keeping open the great stock routes ; but for agricultural purposes the artesian water in some districts is much less useful than in others. Soil which is irrigated by artesian water usually becomes impregnated with salts.

#### (6) *Irrigation*

Artesian water is primarily of benefit to the pastoralists, but irrigation on a big scale is only profitable when used, if possible intensively, for agriculture. Naturally enough, the greatest developments have taken place round the great river system of the Murray and its tributaries. Since 1917 the R. Murray Commission has had control of all navigation and irrigation schemes in the area, the Federal and State Governments sharing the costs. Several large scale schemes are in vigorous operation, and others are projected.

The Burrinjuck reservoir on the Murrumbidgee has a capacity of 771,000 acre feet, and supplies a flourishing fruit and dairying area round Griffith. The Hume Reservoir at the junction of the Mitta Mitta and the Murray is even bigger (1,250,000 acre feet), and with the Goulburn Dam provides the water utilized by a series of projects in the Murray area, notably at Echuca and Cohuna. Near the confluence of the Murray and the

Darling, Mildura and Renmark are important fruit-growing areas. Other projects and extensions are planned, the most spectacular being the Snowy River Scheme, by which water from this east-flowing river will



WATER SUPPLY AND IRRIGATION IN SOUTH EAST AUSTRALIA (after Griffith Taylor)

be taken in a tunnel under the Australian Alps to augment the supply in the Murray basin.

The chief crops in these areas are lucerne, vines, fruit and cereals including both wheat and rice. In northwest Victoria a large stock area benefits greatly from artesian bores, and from water supplied from the Goulburn by the 150-mile Waranga Channel. There are other schemes



for the improvement of stock rearing and domestic uses, notably in the "billabong" country between the Murray and the Murrumbidgee.

Outside the R. Murray area proper, a 235-mile pipeline from Morgan supplies water for the shipbuilding and steel industry at Whyalla, a branch running north from Port Augusta to the new rocket range at Woomera. In West Australia a reservoir at Mundaring, near Perth, is used by another pipe-line to supply the Coolgardie and Kalgoorlie districts nearly 400 miles away, and the Canning and Stirling Dams irrigate about 13,000 acres near Bunbury in Swanland. Queensland has about 50,000 acres of irrigated land, made up of numerous small schemes, the largest of which is the sugar-growing district of Ayr.

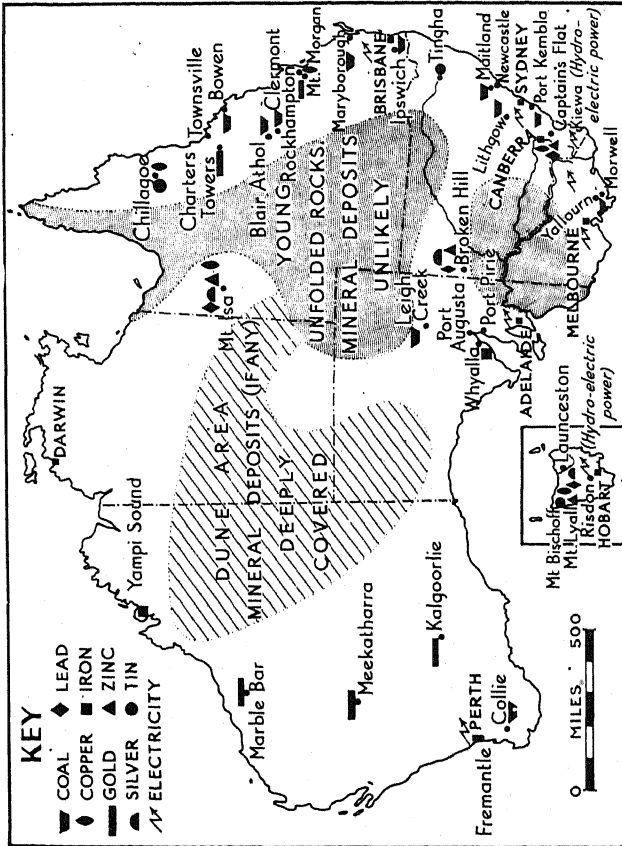
#### MINERAL WEALTH

It is very interesting to compare the influence of the pastoral and mining industries upon the development of Australia. The influence of the former has been steady, continuous and progressive. The influence of mining has been spectacular and erratic, but almost as important, in the long run, as the pastoral industry. The gold rushes introduced a very disturbing element into the economic history of the country and were responsible for a very rapid increase of population between 1850 and 1860, when the population rose from 405,000 to 1,146,000. The production of gold resulted in a great advance in public and private wealth, but the really important result was the stimulus given to agriculture by a greatly increased population.

#### (1) *Gold*

The existence of gold in Australia had been proved for some years before any sensational development took place, and the real genesis of the gold mining industry of Australia is to be found in the Californian rush of 1849.

Edward Hargraves, a small squatter near Bathurst, went to try his fortune in California, and was struck by the similarity of the geology of California and the Bathurst



region. When he returned to New South Wales in 1851 he at once set out to prospect for gold, and was almost immediately successful in discovering the precious metal in the land round the headwaters of the Macquarie River.

Much more sensational, however, were the events which followed in Victoria in the same year. Rich fields were discovered at various points in the mountains

to the northwest of Melbourne, and a stampede to the diggings at Bendigo, Ballarat and Mount Alexander, threw the economic life of the country into the utmost confusion. The problem of maintaining order was extremely difficult, and there were many ugly incidents. In one month after the discovery of gold at Ballarat, 2,500 people arrived, and the stream continued at the rate of 100 a day. Very soon to these were added shiploads of adventurers from every part of the world. A great strain was thrown upon the Government of the newly-formed colony of Victoria, and attempts to collect licence fees from the diggers led to the outbreak of wild disorder which could only be quelled by the use of troops.

After 1856 there was a steady decline in the production of gold until the last decade of the 19th century, when the discovery of rich fields in Western Australia caused another rapid expansion. The discovery of gold at Coolgardie in 1892, when two prospectors collected 500 ozs. in one afternoon, was followed by several other finds in the same region. The year 1903 saw the peak of production reached when Australia produced over £16,000,000 worth of gold. Since then there has been a rapid and continuous decline, the 1948 output being worth £9,500,000. The devaluation of sterling and the Australian pound will encourage the industry, but no spectacular expansion is expected.

The methods by which gold is obtained vary according to the resources of those engaged and the conditions in which the gold is discovered. The individual miner and prospector is usually concerned with alluvial gold, *i.e.*, gold in the form of nuggets and dust which is to be found in sands and gravels. In these cases the gold is separated by comparatively simple methods which involve the use of currents of air and water. A gold-mining company, on the other hand, usually treats gold which is to be found in reefs of quartz and other rocks. The rock is crushed in great batteries and the gold separated by

chemical and mechanical processes. The dredging of river beds for gold is also usually carried out by gold-mining companies.

In general, it may be said of gold mining in Australia that the indirect effects of the industry have been more important than the actual value of the gold produced. Much of the exploration of the great continent was carried out by prospectors, especially in Western Australia. The attraction of a great number of immigrants to the gold diggings accelerated the rather slow growth of population and greatly encouraged the development of agriculture.

### (2) *Other Minerals*

*Coal* was discovered at Newcastle in New South Wales as early as 1797, and was first exported in 1799. Since then the production has steadily increased, and it is now the most valuable mineral mined in Australia. The chief fields lie on the seaward side of the Eastern Highlands, the most important being the great Newcastle-Lithgow-Bulli field over the centre of which lies Sydney. The Ipswich field in south Queensland has good coking coal, and further north the undeveloped Dawson field is credited with the largest reserves on the continent. The brown coal at Morwell, in Victoria, is obtained by open-cast mining at Yallourn, and is used to generate electricity for Melbourne. No coal is at present mined in South Australia, but the small Collie field about 125 miles south of Perth is important locally, and there may be large reserves in the Kimberley region near the Fitzroy River.

Extensive searches have been made for *oil*, but so far no field of any real importance has been found, possibly because Australia lies outside the great world systems of young folded mountains, on whose margins lie most of the world's important oil reserves. There are, however, considerable deposits of oil shale in Tasmania and New South Wales, which may become commercially profitable with the development of modern methods of extraction.

*Iron* is fairly abundant, though there is nothing comparable with the huge reserves of North America. By far the most important area is that of Iron Knob and Iron Monarch, about 32 miles from Whyalla on Spencer Gulf. The ore, a high-grade hematite, is quarried from the benched hillsides, railed to Whyalla, and shipped to steel works at Newcastle and Port Kembla (N.S.W.), which are now producing annually 200,000 tons of commercial iron and steel. Other deposits at Yampa Sound (W.A.) are being exploited, and in 1947 a blast furnace was blown in at Wundowie which now supplies most of the needs of the state. With the post-war growth of the shipbuilding, motor-car and aircraft industries, arising from the Australian need for self-defence, iron and steel production will show a steady expansion in the future.

In the southwest corner of New South Wales is the famous mineral region of Broken Hill, one of the most remarkable mineral agglomerations in the known world, which, since its inauguration by Charles Rasp in 1883, has produced metals worth nearly £200 millions. The outcrop of the lode is  $3\frac{1}{2}$  miles long, and varies in width from a few feet to 200 or so. Tin, lead, zinc and silver are all present in the form either of oxides or sulphides, and in spite of the output to date, large reserves of ore remain. Nearly all the traffic to and from the mines passes through Port Pirie on Spencer Gulf.

Other silver-lead mines are at Captain's Flat in N.S.W., at Mount Isa in Queensland, which has been described as a second Broken Hill, and at Mount Zeehan in Tasmania. Tin, which was the first mineral mined at Broken Hill, now comes mainly from Mount Bischoff in Tasmania. Copper is present at Mount Isa, and is mined in Queensland also at Mount Morgan and Cloncurry, but the chief field is again in Tasmania at Mount Lyell. Zinc is perhaps the most important item of Broken Hill's present-day output, and gives Australia fourth place in world production. There is also a small production at Mount Zeehan.

Minerals of less commercial value include salt from small lakes in the Yorke and Eyre peninsulas, tungsten from one of the world's biggest deposits on King Island, Tasmania, and the newly discovered uranium deposits in the Flinders Range. Queensland has long been famous for opals; and sapphires, a few diamonds, platinum, molybdenum and osmiridium have been found.

#### FORESTRY

Although only a very small proportion of Australia is under forest, and although the imports of timber considerably exceed the exports, nevertheless there are points of importance to be noted in connection with the Australian timber industry. The forests of economic importance are situated either in the southwest, the east, or in northern Queensland.

In Western Australia, in the region lying between Perth and Albany, are great forests of jarrah and karri, both of which are very valuable timber trees. Jarra is particularly useful for road paving, railway sleepers, wharves and telegraph poles, because it is very hard and resists the attacks of insects. Karri is very strong and tough, and is specially valuable for heavy constructional work. The trees may grow to the height of 300 feet.

In New South Wales there are many varieties of hardwoods, of which ironbark and blue gum are the best known, and there are some beautiful soft woods for furniture and cabinet work, such as cypress pine, red cedar, rosewood, tulipwood, and sandalwood. Eucalyptus oil, obtained from the leaves of many varieties of eucalypts, is an important article of commerce. A sample of the oil was sent to England as early as 1789 by Governor Phillip, and it was probably the first natural product to be exported from Australia.

The care of forests is vested in the individual states, and a great deal is being done to check unwise destruction of forests, and to train a body of skilled foresters.

## FISHERIES

Although the consumption of fish in Australia is comparatively small, the fishing industry is capable of expansion. This is shown by the fact that there are considerable imports of dried and canned fish and that there are many excellent food fishes to be obtained in Australian waters. The industry in general is, however, unimportant, although there are one or two interesting features. There was a considerable export of trepang or *bêche de mer*, a sea slug, to China, where it is considered a delicacy. The industry centres on the Great Barrier Reef. To the north of this region, in Torres Strait, as well as along the northern coasts of Western Australia, there is a very flourishing industry in pearls and pearl shell. A large number of schooners are engaged on this trade. The divers are generally Japanese, Malays, and Torres Strait Islanders, and sometimes Papuans and Australian aborigines form the crews. In the Shark Bay district of Western Australia, pearls are obtained more usually by dredging.

## MANUFACTURES

Australia aims at the achievement of economic independence, and her young manufacturing industries are being assiduously encouraged. The day has long gone by when Australia could be regarded simply as an exporter of raw materials and an importer of manufactured goods. In actual fact, the total annual value of all manufactures even surpasses that of all raw materials produced. But manufactured articles only take a very small place among Australian exports, while on the other hand they bulk largely in the imports, particularly under the headings of textiles and metal manufactures. Statistics as to the numbers and size of factories, and the power used in them, show that there is a steady expansion. Many European firms are establishing factories in Australia.

The chief manufacturing states are New South Wales and Victoria, and it seems reasonable to predict the growth of great industrial centres on the coalfields round Newcastle (N.S.W.) and Morwell (Victoria). The chief features are, as might be expected, the treatment of the raw materials of the agricultural, pastoral and mining industries, as well as the manufacture of machinery for agriculture and mining. In the invention of agricultural machines Australia has been a pioneer.

The development of hydro-electric power is not great compared with some other countries. Five stations are planned in the Snowy River Scheme. Plants are in operation at Barron River (Q.), Nymboida (N.S.W.), and Eildon Weir (Vic.), but the output of each is small. At present, Burrinjuck has the biggest output of the mainland stations. Thanks to a mountainous terrain, and ample rainfall, Tasmania has been able to make considerable progress. Waddamana and Tarraleah are the biggest plants, and their capacity is being increased.

#### TRADE AND COMMERCE

The war completely disrupted the pattern of Australian trade, and it is not yet possible to see what form it will ultimately take. In the present abnormal state of affairs, as a member of the sterling area she holds a key position as a supplier of foodstuffs, and so long as the "dollar problem" persists it is likely that she will continue to be one of Great Britain's main sources of supply. She is in fact largely increasing her production, with the direct intention of helping Great Britain, but it is difficult to imagine that she either should or could remain purely a primary producer. The war greatly accelerated the development of industry in Australia, and when conditions once again permit anything like world trade, she will undoubtedly figure as an exporter of manufactured goods, though, as in America, agriculture will always form the basis of the country's prosperity.



## TARIFF POLICY

In colonial days, customs and excise provided the main source of revenue. Subsequently the individual colonies adopted tariffs for purposes of both revenue and protection of local industries. It was obvious that this had a detrimental effect in placing obstacles in the way of full economic development. As soon as the Federation took place, free trade between the states greatly stimulated Australian industry by providing one large home market for Australian manufacture. The adoption of tariffs by the Commonwealth was done with the object of establishing economic independence.

## COMMUNICATIONS

Prior to the construction of railways in the second half of the 19th century, inland transport was dependent on the horse and camel and on a few navigable rivers. The camel was introduced about 1840, and it has been invaluable for transport in the dry parts of the interior, especially to those engaged in work connected with surveys, police and the overland telegraph line. The Murray, the Darling, and the Murrumbidgee were of considerable service to transport in the agricultural region through which they flow, but seasonal fluctuations in the volume of the rivers rendered this service intermittent.

To-day as a mode of transport the camel has disappeared, and it is unlikely that the rivers will ever again carry anything but small passenger and pleasure craft. This is due to the internal combustion engine, which both on land and in the air has revolutionized transport in Australia. Twenty years ago it was assumed that while road and river transport might develop slowly, there would unquestionably be a comprehensive system of continental railways sooner or later. Even that is now doubtful.

Railways have played a great part in opening up Australia, though not so strikingly as in North America.

The pastoral and mining industries were well established before the coming of the railways, and although to-day much of their output travels by road, the railways still maintain their superiority for heavy long-distance transport, in spite of great drawbacks.

Owing to the independent growth of the original colonies, railway development was haphazard, stemming from the great ports, without any particular system or overall plan. The physical difficulties were great, partly because of the awkward layout of the country, with its dissected plateaux near the coasts, partly because of the absence of great river systems to provide easy natural routes. In the early days, therefore, communication was largely by sea, and no one seriously envisaged a national continental railway system, such as the United States naturally developed, since she was a continental unity before the railway age.

This unplanned growth has resulted in one great misfortune; the existence in Australia of three different railway gauges. Victoria adopted a 5 ft. 3 in. gauge, New South Wales the standard 4 ft. 8½ in., and Queensland and the north generally the cheaper 3 ft. 6 in. South Australia followed the example of Victoria, but the Federal trans-continental line from Port Pirie to Kalgoorlie, built in 1917, is standard gauge, while from Kalgoorlie onwards West Australia uses the narrow gauge. There is thus a vast amount of exasperating expense, delay, and handling of goods, which can only be ended satisfactorily by making the standard gauge universal. This might by now have been accomplished but for two factors.

The two world wars inevitably delayed work on such schemes, and now the conquering advance of motor-cars and aircraft has led many Australians to think more of road and air transport and less of a complicated and expensive railway reconstruction. It is recognized that there must be a continental trunk line of standard gauge, and before long it should be possible to travel from Brisbane



country, but more, perhaps, from the success with which the aircraft has met *present* needs.

Flying in Australia has developed very rapidly. The dry sunny climate ensures freedom from all the problems and dangers created by cloud and mist. The absence of great mountain ranges means that over most of Australia an aircraft is perfectly safe at a height which in other continents would often spell disaster. The marked individualism of the Australian finds flying a congenial occupation, and the relative backwardness of the railway system has operated strongly in its favour.

The first long-distance air service was set up from Geraldton to Daly in West Australia as early as 1922. Within the next ten years routes were established by which it was possible to fly, in stages, from Brisbane *via* Sydney, Melbourne, Adelaide, and Perth to Darwin, with numerous radiants inland. To-day there are regular services connecting all the state capitals, in addition to transcontinental routes from Darwin to Sydney and Adelaide, which are really the last links in the regular routes from Europe. Australians are thus markedly air-minded, and flying is a commonplace so far as passenger traffic over long distances is concerned.

For short distances and the transport of goods, cars and lorries have come into general use, and, as in other countries, have taken away from the railways much of their most profitable traffic. This development is bound to continue, since so much of the country, apart from the difficult Eastern Highlands, is such that usable tracks and routes can be made readily and cheaply. It is significant that when the war necessitated a land route from the south to Darwin the Government did not complete the railway from Alice Springs to Daly Waters, but constructed a motor road instead. In the fullness of time Alice Springs, which is more or less the geographical centre of Australia, may become a great crossways city, with airports and coach stations, but it is unlikely to become the centre of a busy continental railway network.

## CHAPTER X

### THE REGIONS

AUSTRALIA is divided by the physical aspects which we have considered above into seven geographical regions. These do not coincide exactly with the political divisions, but correspond closely enough to them to demonstrate the control of geography over man-made boundaries. These regions we shall now consider in detail.

#### THE EASTERN AND SOUTHEASTERN COASTLANDS

From Cape York in the north to Wilson's Promontory in the southeast, the coastlands consist of a series of lowlands frequently interrupted by spurs from the Eastern Mountains. The range of latitude is from  $10^{\circ}$  S. to  $38^{\circ}$  S., and it is natural, therefore, to look for considerable differences of climate and a wide variety of agricultural products as we go from the north southwards.

In Queensland the coastal region is dominated by the Great Barrier Reef, which runs from Cape York southwards nearly to the latitude of Rockhampton. It acts as a natural breakwater for the ships which ply from Sydney or Brisbane to Asiatic ports, but the innumerable reefs constitute a serious danger to shipping. It may fairly be said that the sea plays a more important part in the economic life of Queensland than in that of any other Australian state. Here is the flourishing trepang fishery, and further north the valuable pearl and pearl shell fishery with its headquarters at Thursday Island in Torres Strait.

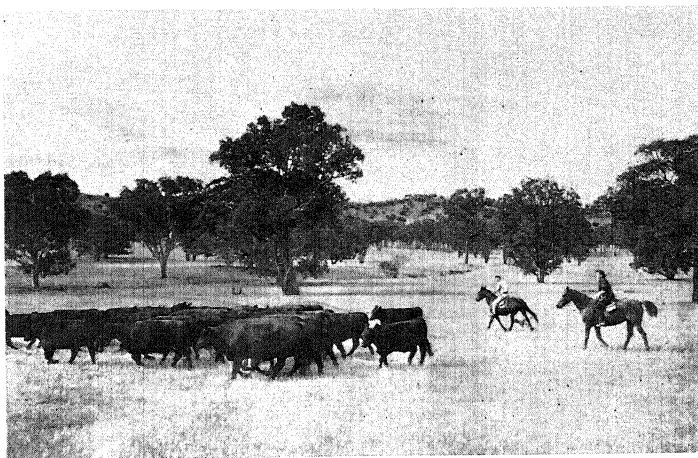
The lowlands are extremely fertile, rich with alluvium and soil formed by decayed forest vegetation. In many

parts the tropical forest may be seen with all its wonderful plants, giant trees, tree ferns, creepers, and orchids. Many valuable timber trees are exploited. The heat and rainfall make it possible to cultivate maize and sugar-cane at several points along the coast, notably near Mackay, Cairns and Bundaberg. Cotton is still grown, but is still aided by a Government bounty. In the neighbourhood of the towns dairying flourishes and continues to make progress. Tropical fruits of all kinds are grown, the most important being pineapples and bananas. Finally, it should be noted that much interest as to the future of Australia centres round this region, since it is here that one may see in operation the experiment of tropical colonization by Europeans.

There are many good harbours, usually formed by subsidence of the coast. Brisbane (pop. 402,000 in 1947) is situated about twelve miles up the river of the same name. The river enters the sheltered waters of Moreton Bay, where an early convict settlement was established. Situated in the extreme southeast of the state, Brisbane is less central as a state capital city than Melbourne or Sydney, but it is the centre of the most closely settled part of Queensland, having the Darling Downs as its hinterland and the important Ipswich coalfield nearby. Northwards there are several other ports in similar situations. Such towns are Rockhampton, near Mount Morgan, with an important railway to Longreach; Townsville, the port for Charters Towers and Cloncurry; and Cairns, the port for Herberton. These ports are all linked by a line which runs along the coast, but Cooktown, in the Cape York Peninsula, with a short railway running inland, is still unconnected with the main system.

The boundary between Queensland and New South Wales follows the bold Macpherson Range, which closely approaches the sea and cuts off the Brisbane valley from the lowlands of the Richmond and Clarence Rivers. Nevertheless, the fine climate and the fertility of the soil make it possible to cultivate many of the tropical crops

PLATE III



[Australian News Information Bureau

A. ROUNDING UP CATTLE IN NEW SOUTH WALES



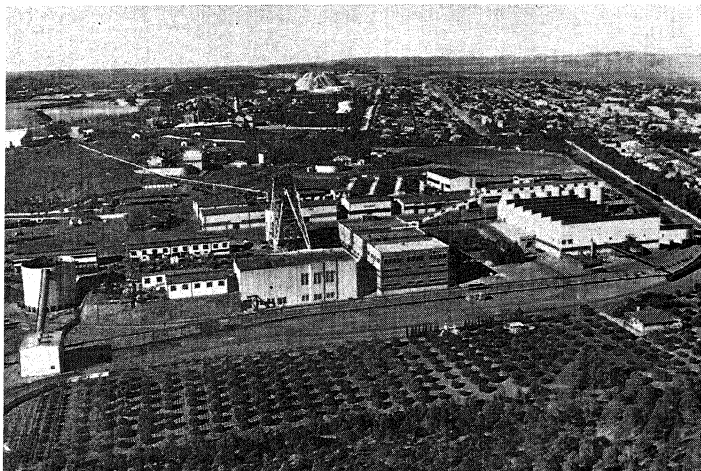
[Australian News Information Bureau

B. CUTTING SUGARCANE IN QUEENSLAND

Australia is the only country to cultivate sugarcane entirely by white labour.

[To face page 116

PLATE IV



[Australian News Information Bureau

A. BROKEN HILL

The surface works of the Zinc Corporation are backed by the citrus orchard, trees and lake of Albert Morris Park—barren land until 1936.



[Australian News Information Bureau

B. SYDNEY

Behind the Harbour Bridge lies the city's business area. Left centre is a large area of parkland, behind which are the southern suburbs.

[To face page 117



of Queensland in this northern part of New South Wales. Maize, sugarcane, and dairying are the chief features of this rich region which is centred on Lismore and Grafton. Further south the Hunter River valley is very fertile and, in addition, has a splendid coalfield. It leads to one of the most important gaps in the eastern mountains, and all these considerations indicate that the Maitland-Newcastle region is destined to be a very prosperous part of Australia. Newcastle is the second city in New South Wales and has a considerable export trade in coal.

While Queensland and northern New South Wales have a marked maximum of rainfall in the summer months, the coastlands south of the Hunter River enjoy a good rainfall at all seasons. This, together with lower temperatures, produces a change in the agriculture. Dairying becomes more and more important, while sugar-cane and cotton are no longer to be found. The Nepean valley is a fertile farming country.

Sydney, the fourth city of the Commonwealth, with a population of a million and a half, is situated on Port Jackson harbour, a drowned river valley with a shoreline of 183 miles. The main inlet is perfectly sheltered, accessible from the ocean by a passage a mile wide between the North and South Heads, from which it immediately bends southwards behind a high ridge, before turning westwards for some 14 miles. Both this main channel and the numerous smaller ones which branch from it are almost entirely free from silt, owing to the absence of any large streams flowing into the harbour. The city itself is typically modern in its build and layout, with fine broad streets, massive public buildings and extensive parks. The scene is dominated by the great Sydney Harbour Bridge, opened in March 1932. It carries a 60-foot roadway, four railway tracks, and two 10-foot footpaths at a height of 170 feet above the water. To the south of Sydney the mountains approach very near to the coast, and there is very little lowland. The deep harbour of Jervis Bay is a station of the Royal Australian Navy.

From Cape Howe to Wilson's Promontory there is a much broader lowland than any in New South Wales. This is the rich region known as Gippsland in the state of Victoria. It is a very beautiful part of Australia, splendid forests of eucalypts alternating with fine farm lands. In addition to dairy farming, lumbering and coal mining are important industries. Indeed, to the south-east of Melbourne lie great deposits of brown coal which are being used for electric power. The chief town in this district is Morwell. The dairy farms and sheep-runs of the western coastal district of Victoria centre on Geelong on the west shore of Port Phillip.

Melbourne, the second city of Australia, is well placed to be the state capital of Victoria. It is on the river Yarra where it flows into Port Phillip. There is easy communication along the coastlands in either direction and across the mountains to the interior by way of the Kilmore Gap. The largest steamers use Port Melbourne, but the city's harbour has been greatly enlarged and improved in recent years, and now accommodates ships of 30-foot draught. The city itself is planned on spacious lines with splendid broad thoroughfares, notably Collins Street, over 6,000 acres of parks, a famous cricket ground, and Flemington racecourse. For many years after the gold rush of 1851 Melbourne was the largest Australian city. The population in 1947 was a million-and-a-quarter.

#### THE EASTERN HIGHLANDS

The splendid system of mountains which stretches from Cape York to the Australian Alps in Victoria is a very important feature of Australian geography in its effect on climatic conditions, on lines of communication, as a barrier to early exploration and as a region of great mineral wealth. In the north, the broad Atherton Plateau is very important in that it provides an upland in the tropics where white men can live in comparative comfort. Here there is already a large dairying industry and this is likely to grow steadily. Important mining

towns in the Queensland Highlands have grown up at Charters Towers (gold), Chillagoe (tin and copper), Mount Morgan (gold and copper), Herberton (tin), and Clermont (coal). In Queensland the highlands do not usually present serious obstacles to railway construction, but further south they rise to considerable heights, and by reason of their geological structure and the complicated river system they form a region of wild impressive scenery which is very difficult to cross. As a consequence certain gaps are of great importance, notably the Cassilis Gate, the Goulburn Gate, and the Kilmore Gap north of Melbourne. Throughout this upland region there is an alternation of woodland and pasture for sheep and cattle, with many mining centres.

## TASMANIA

Tasmania is the only Australian state where there is no region which suffers from drought. Indeed, in the west rainfall is too heavy for successful agriculture and population is confined to a few mining towns. The island, consisting of Palæozoic rocks, granites and basalt flows, is rugged, mountainous, and well forested. Population centres in the valleys of the Tamar, around Launceston, and of the Derwent, around Hobart, and in the mineral region already mentioned. The climate is ideal for Europeans, and the island comes next to Victoria in density of population.

The economic products show in general the same features as those of the mainland. For example, there is the fluctuating prosperity of the mining population and the comparatively steady prosperity of pastoral and agricultural industries. In early days whaling and sealing were important:

The climate is too rainy for wheat farming to be very successful and the most important agricultural products are potatoes in the north and apples in the south. Sheep have lost some of their former importance. For some

decades the Tasmanian flocks were the chief source of supply of rams for some of the mainland areas, such as the western districts of Victoria and the southern Riverina. These districts have now largely developed their own pedigree flocks, and the Tasmanian trade in stud animals has diminished, though a few relics still remain. The quality of Tasmanian wool is still considered the finest in the Commonwealth.

In the west and northwest are the famous mining centres of Mount Lyell (copper), Mount Bischoff (tin), and Mount Zeehan (silver lead). These are connected. The small coalfields have been little developed, owing to the superior attractions of hydro-electric power, of which Tasmania possesses about 75 per cent. of the Commonwealth's potential resources. The water of the Great Lake is utilized nearly 1,000 feet lower in the Ouse valley at Waddamana. Lake St. Clair feeds a station at Tarra-leah, and there are smaller plants at Duck Reach on the South Esk River, and at Lake Margaret. Approximately 100,000 h.p. is now utilized, and the small size of the island enables the energy to be distributed everywhere.

The population of Tasmania is about 275,000. The capital, Hobart (77,000), has a good harbour on the R. Derwent, in the centre of a great fruit and hop growing district. Launceston (38,000), on the Tamar, is the largest town in the north, and has most of the Victorian trade.

#### THE CENTRAL LOWLANDS

From the east coast the mountains of Eastern Australia appear like a great range or series of ranges, but once this rampart has been scaled it is found that the Highlands slope very gradually to the west until they merge imperceptibly into the Central Lowlands. The northern parts of these lowlands form a great artesian basin. Here vast herds of cattle are pastured, and further south, *e.g.*, round Longreach, the importance of sheep becomes evident. In the west of Queensland the mineral deposits

of Mount Isa have been increasingly exploited in the last ten years, and now supply large quantities of silver, lead and copper. The Gulf of Carpentaria is shallow and its coasts, formed of flat alluvial land, are usually masked by mangrove forests. This region, as well as the Cape York Peninsula, is very thinly populated.

The boundary between the great artesian basin and the lowlands of the Murray-Darling basin is not very definite, but the region drained by the one great river system of Australia is a very distinct unit. In the east of the basin and among the slopes of the Eastern Mountains, wheat farming is practised successfully and in the irrigated lands of the southwestern parts of the basin fruit farming has become increasingly important. Rain-fall decreases steadily from east to west, and the woodlands of the foothills give place to splendid rolling grasslands, with lines of trees following the watercourses. Finally, this grass gives way to scrub and desert. The great proportion of the basin, however, is given over to sheep farming, and this region claims to be the finest sheep country in the world.

Developments of recent years have somewhat blurred the old distinction between the wheat and sheep lands, though it is still true that the sheep thrive on the drier slopes to the west of the 20-inch isohyet which marks the limit of the grain westwards. The chief town is Albury, situated where the Murray breaks through the mountains. Upstream is the great Hume Dam; downstream are numerous irrigation settlements. To the northwest are the wheat and wool lands; to the southwest excellent mixed farming country. It is a busy road and rail centre, where the standard 4 foot 8½ inch gauge changes to the Victorian 5 foot 3 inch. Albury has a bright future. The plains bordering the Murray on the Victorian side are the most important of the irrigated areas of Australia. Echuca, Swan Hill and Kerang, are thriving settlements, while further west Mildura in Victoria and Renmark in South Australia produce much wine and fruit. North-

wards, between the Murray and the Murrumbidgee, is the famous Riverina whose already large production of wheat and wool is increasing with the development of irrigation.

The uniform relief of these lowlands is broken by the metalliferous rocks of the Cobar and Broken Hill districts, the latter of which is very important. Broken Hill is the third town in New South Wales and is the centre of a populous and wealthy area. Although within the borders of New South Wales, its natural outlet is through South Australia.

#### SOUTH AUSTRALIAN HIGHLANDS AND SUNKLANDS

The life of this important region centres on Adelaide. It is characteristic of all Australian states that the population tends to concentrate on one or two centres, and this is specially true of South Australia. The long inhospitable coast of the Bight is practically uninhabited, and the great desert and semi-desert plains to the north and northwest, with a few stations and some railway and telegraph outposts, are also very sparsely inhabited. Where, however, the monotony of these regions is broken by the great inlets of Spencer and St. Vincent Gulfs, the hills of the Flinders and Mount Lofty Ranges and Yorke Peninsula, or by the winding course of the Murray, one of the most steadily prosperous parts of Australia

The rainfall of this region is not large, but it has two great merits. It comes in the winter, and it is one of the most reliable in Australia. The slopes of the Mount Lofty Range attract a sufficiently heavier fall to be well forested with red gums and stringybarks. Where the forest has been cleared on the western slopes, fruit, especially the olive and the vine, do well. Over 70 per cent. of Australia's wine production comes from this district. In the valleys mixed farming, with an emphasis on dairying, is important. On the plains of the sunklands to the west the rainfall is smaller but generally reliable, and so Yorke Peninsula and the coastal plain from Adelaide to Lake

Torrens is a most prosperous agricultural region. The chief crop is wheat, the quality of which is among the best in the world, but there are numbers of vineyards especially in the sheltered Barossa valley, and it is the chief sheep area of the state. The southern part of Eyre Peninsula lies within the area of reliable rainfall, and is now developing along the same lines. The chief town is Port Lincoln on a splendid harbour.

Minerals are now less important in South Australia than formerly, except for the mines of Iron Knob and Iron Monarch whose iron is exported through Whyalla on Spencer Gulf. Opposite Whyalla is Port Pirie (12,000), which grew up as the outlet for Broken Hill, but is now also exporting quantities of wheat and wool.

The capital, Adelaide (383,000), stands on the plains between the Mount Lofty Ranges and the sea, and is a beautiful and well-planned city. The small river Torrens has been dammed, forming a long and beautiful lake, after the manner of the Alster at Hamburg. The broad streets cross at right angles, and are lined with ornamental trees. The city is plentifully supplied with public buildings, and is the meeting place of many routes. The city's port is at Port Adelaide, seven miles away, on a tidal reach of the Torrens.

#### THE NORTHERN REGIONS

That part of the continent which borders on the Gulf of Carpentaria and the Timor Sea together with the uplands lying to the south form a fairly well-defined unit in the geography of Australia. It is certainly a region of difficulty and is developing very slowly, although there are certain districts which may prove to have a prosperous future. It is at present very sparsely inhabited, the census of 1947 giving a population of 10,868 whites. The region is generally thinly forested, but there is good pasture, especially for cattle on the Barkly Tableland, in the Victoria Valley, on the uplands of the Northern Terri-

tory and in the Kimberley Division of Western Australia. In these uplands there are also several important mining centres such as Cloncurry (gold and copper), Pine Creek (gold and tin), and Hall's Creek. Isolation, however, makes the whole region suffer from scarcity of labour, and transport is costly: A railway from the Barkly Tableland to the Gulf coast or into Queensland would undoubtedly prove very helpful.

The coasts have a few towns scattered at wide intervals. On the Gulf there are few settlements apart from occasional mission stations. The Arnhem Peninsula is similarly undeveloped, but at Darwin there is a small port. As the natural landfall for aircraft from Europe it is rapidly becoming one of the key airports of the continent. At certain points along the coasts there are small settlements connected with pearl and pearl shell fishing. This industry extends westwards as far as Shark Bay in Western Australia and an allied industry is the collection of guano from the islands of the north and west coasts. It is interesting to compare the location of this latter industry on islands off the desert coast of Australia with that on islands in similar positions off the desert coasts of South-west Africa and the Pacific coast of South America. Broome is the chief centre of the pearl and pearl shell fishery. At Hamersley Range blue asbestos is being produced, and an up-to-date township, Hamersley Range, has been established.

#### THE WESTERN TABLELAND

The vast peneplain of Western Australia is of a fairly simple relief, but the area is so large that there must obviously be a considerable variety of conditions within the region. Only in the southwest is it in any sense closely settled, and this part is so clearly marked off by climatic conditions from the rest of the tableland that it will be dealt with in a separate section. The rest of the tableland is marked by arid or desert conditions



generally, but differences of soil and slight differences of rainfall make it possible to discriminate between various parts of the region.

In the centre of the continent rise the Musgrave and Macdonnell Ranges. In the deep gorges of these hills water is usually obtainable in considerable quantities, and the pastoral possibilities of the country are by no means negligible. Considerable mineral wealth of gold and mica exists. The railway from Port Augusta has made Alice Springs into a small tourist centre for the scenery of the Macdonnells, and it is also a Flying Doctor base with an up-to-date hospital.

To the west and south of these Highlands stretches part of the region which has been called the 'Dead Heart of Australia. In some places it consists of sandy desert with the sand piled in long high ridges which proved heartbreaking obstacles to early pioneers. Elsewhere the surface is marked by plains of clay or pebbles, sheets of salt marsh and stretches of poor grass and thickets of stunted trees and bushes. Near to the western coast sheep and cattle can be pastured. The boundaries of the region are the Indian Ocean on the west and the great Australian Bight on the south.

Apart from pastoral activities, however, there is one very important occupation, namely, gold mining. Until the discovery of gold at Coolgardie in the later years of last century, the development of Western Australia lagged far behind that of the other states, and although the output is at present decreasing, gold is still the most valuable of the products of this state. Apart from the Kimberley district already mentioned in the far north, there are the northwest group of goldfields, of which Pilbara is a centre, with an isolated railway to Port Hedland; the Murchison and Yalgoo fields with a port at Geraldton, and the famous fields of Coolgardie, Kalgoorlie, and Southern Cross, served by the great transcontinental line and its branches. The railways are supplemented by motor transport.

## SWANLAND

There are three main belts. The southwest coastal strip has fine orchards, vineyards and dairy farms, with a growing citrus production. Behind this the land rises to the plateau, where there are splendid forests of karri and jarrah. Where the trees have been cleared the land is as good as the plain for dairy farming and apple and pear orchards. Bridgetown is an important centre, and Albany on King George Sound is the port, exporting both timber and wheat. Behind the jarrah region lies the wheat belt, a strip of the plateau having a reliable rainfall of between 10 and 25 inches. The chief towns here are York and Northam. Eastwards as the rain fails, wheat gives place to sheep.

Perth, the capital of West Australia (273,000), is beautifully situated on the north bank of the Swan River, 12 miles from its port of Fremantle, at the mouth of the river. It is a prosperous, rapidly growing city with numerous modern public buildings, and is the centre of a railway network covering all Swanland, and connecting with the transcontinental line to Port Augusta.

## CHAPTER XI

### THE STATES AND TERRITORIES

#### (1) *New South Wales*

The name of New South Wales was originally applied to the whole group of British colonies in eastern Australia, but with the growth of widely separated communities, it became clear that subdivision was necessary and the State of New South Wales is now bounded on the east by the sea, and on the west by longitude  $141^{\circ}$  W. The northern border follows latitude  $29^{\circ}$  S. from the western border to a tributary of the Darling ; from here it follows this tributary to its source and then continues along a secondary watershed to the sea. The southern border follows the Murray to its source and then cuts across in a straight line to the sea at Cape Howe. It will be seen, therefore, that Australians have had to follow the usual custom in new countries of adopting lines of latitude and longitude for frontiers. It is apparently the best that can be done, but inevitably anomalies arise later when the regions thus partitioned come to be developed and it is found that the frontiers bear no relation to the natural features.

#### (2) *Tasmania*

Tasmania is the only Australian state whose boundaries follow natural geographical lines throughout. The early settlements on the rivers Derwent and Tamar were made to anticipate a possible occupation of the island by the French. The occupation of the island has developed from these points where Hobart and Launceston are the chief towns. In the early days the settlements suffered terribly from the activities of escaped convicts and from the hostility of the Tasmanian aborigines. The latter were provoked by the ill-treatment which they received

at the hands of the bushrangers. They were nearly exterminated in a fierce struggle and the few survivors have since died out. In 1853 transportation of convicts to the island ceased, and the present name of Tasmania was adopted instead of that of Van Diemen's Land. The first Tasmanian parliament under responsible government met in 1856.

(3) *Victoria*

The landward boundaries of Victoria are, in the west, longitude  $141^{\circ}$  E., and on the north the River Murray to its source. From that point a straight line is taken to Cape Howe. This is the smallest and most closely settled of the states on the mainland. It developed from early settlements round Port Phillip and leapt into importance with the gold rush of 1851. Almost at the same time it was recognised as a colony separate from New South Wales, and its early days as a colony were stormy. Responsible government was inaugurated in 1855.

(4) *Queensland*

The first settlement was a convict station at Moreton Bay where the capital, Brisbane, now stands. The coastlands to the north and the interior were steadily opened up and developed, and with this growth came the demand for separation from New South Wales. The colony of Queensland came into separate existence in 1859, and the first parliament met in the following year. Queensland has special problems which marked the state off from its neighbours. The successful development of tropical lands with the allied problem of labour are of special importance here. It is a very large state, and if these problems are solved its future prosperity is assured by the great diversity of its agricultural and mineral resources.

(5) *South Australia*

Historically, South Australia differs from the other states in that there was never any settlement of convicts in any part of the state. Colonization in this region

began in the twenties and thirties of last century as the result of the agitation of Edward Gibbon Wakefield for a scientific system of colonization. Briefly, the principle of Wakefield's scheme was that Crown land should be sold at a sufficiently high price to oblige immigrants to work for a landowner for some time before holding farms of their own. The money realized from these sales was to be used to provide free transport for emigrants from England. It undoubtedly led to an increase in emigration from England to Australia, but the plan was not very successful. One of the misfortunes in the early history of South Australia was a feverish speculation in land values. The landward boundaries of the state are longitudes  $129^{\circ}$  E. and  $141^{\circ}$  E. and latitude  $26^{\circ}$  S. Responsible government was accorded to the colony in 1856.

#### (6) *Western Australia*

As in the case of Tasmania, a settlement was made on the western coast of Australia in order to establish a claim for Great Britain before a settlement should be made by the French. The colony developed from the Swan River Settlement and the State of Western Australia is the largest in area of all the Australian states. Progress at first was very slow, and the transportation of convicts was essential for the supply of labour. The system therefore continued to a much later date than was the case in the other colonies. Transportation ceased in 1868, and responsible government was granted in 1890. Population increased rapidly in the last decade of the 19th century after the discovery of the Coolgardie and Kalgoorlie goldfield.

### THE TERRITORIES

#### (1) *Northern Territory*

The establishment of a small settlement on Melville Island in 1824 was carried out in order to forestall the occupation of the north coast by a foreign power. For some time the settlement was under the administration of the New South Wales Government. Later all the region

lying to the north of latitude  $26^{\circ}$  S. and between longitudes  $129^{\circ}$  E. and  $138^{\circ}$  E. was named Northern Territory and placed under the control of South Australia. In 1911, however, the territory was taken over by the Commonwealth Government; in 1926 it was divided into two sections, North Australia and Central Australia, but in 1931 this arrangement was abandoned, and the area is now administered from Darwin as the Northern Territory. In 1947 it was granted a measure of self-government.

### (2) *Federal Capital Territory*

After much discussion, a site for the capital city of the Commonwealth was selected in 1908 at Canberra, and in the next year the territory, 900 square miles in area, was handed over to the Federal Government. After some years of preliminary work and survey, a design by Walter Burley Griffin of Chicago was selected for the new city. The site is on a plain, at a height of 1,900 feet, on both sides of a tributary of the Murrumbidgee, the Molonglo, which here flows below hills rising to 2,800 feet. The plain is on the western side of the Eastern Highlands, where there is a fairly easy crossing to the coastlands. The territory is entirely in New South Wales, about 170 miles from Sydney, near the Victorian border, and is on the railway line from Melbourne to Sydney, and about 80 miles from the coast at Jervis Bay. The climate is good, the summer heat being tempered by the height, and the rainfall is about 19 inches. The Cotter Dam, across the river of the same name, provides an ample water supply.

The inauguration of the city took place in 1927 when the King, then Duke of York, opened the first sitting of the Commonwealth Parliament. Since then great progress has been made, and to-day Canberra is a unique combination of political capital and garden city, remarkable for the beauty of its trees, shrubs and flowers. The population is about 17,000, and will grow as rapidly as is permitted by the controlled planning of the Government.

## CHAPTER XII

### CONSTITUTIONAL DEVELOPMENT

THE Commonwealth is a Federal State and a self-governing Dominion within the British Empire. It has reached this status by a steady growth through more than a century of experiment in the adaptation of British constitutional theory and practice to the special conditions of Australia. It is unnecessary to trace in detail the process by which the present constitution has been evolved, but the broad outline is significant and typical of much that took place in other continents where Anglo-Saxons have established themselves. In general, it may be said that the constitutions of the individual states and of the Commonwealth are very closely modelled upon that of the home country. The Crown is represented by a Governor-General for the Commonwealth, and by governors in the different states. These men perform the functions which the King performs in Great Britain. With the exception of Queensland, which has only one legislative house, there are two houses of legislature roughly corresponding in function to the Houses of Parliament at Westminster. The most obvious difference is the fact that in the Australian upper houses membership is not hereditary. The executive and legislative bodies are linked, as in Britain, by the Cabinet system.

As might be expected, the younger country has been less conservative in its constitutional development, its parliamentary life is more purely democratic, and there are few anomalies to recall the early stages of constitutional history. There is no plural voting, and usually no property qualification for electors or members of parliament in Australia ; while in adopting manhood suffrage,

the vote by ballot, payment of members and women's suffrage, Australia anticipated events in England by many years. In some elections voting is compulsory.

The form of the federal constitution bears a close resemblance to that of the United States. The constituencies for the House of Representatives are arranged on a basis of population, though a minimum of representation is guaranteed to each state. In the Senate each state is equally represented. All federations are unions of separate political groups which surrender certain functions of government to the federal power. In Canada the powers of the provincial governments are enumerated, and all other matters are considered to be under the jurisdiction of the Dominion Government. In Australia and the United States, on the other hand, the opposite is the case, for there it is the sphere of the federal authority which is defined, and all other matters are in the control of the different states. The difference is important and is probably to be explained by historical and geographical circumstances. When federal unions are formed, the contracting states are naturally unwilling to surrender more authority than is necessary. The extent of the powers of the federal government will probably depend upon the extent to which a strong central power is needed. When the Commonwealth of Australia was founded external dangers were not very much in evidence. Federation was a convenience rather than a necessity, and consequently a minimum of authority was delegated to the Federal Government.

The future relationship of the Commonwealth Government with the individual states is difficult to forecast, and it will probably be a long time before any condition approaching permanence is attained. But there is now a large body of practical experience to draw upon, and many of the earlier problems have been solved. The difficulties arising from the lack of co-ordination in railway construction are practically over. There are very



efficient methods of industrial arbitration in operation covering workers under both Federal and State awards, and there is usually close, harmonious liaison between the two authorities. Federal and State Arbitration Acts, codes and regulations, follow similar lines in fixing wages, hours, working conditions, and so on.

A typical example of co-operation is provided by the R. Murray Commission, which controls the utilization of the Murray-Darling system, a matter directly involving three states. The Commission is charged with the duty of giving effect to the agreement of 1914 between the Commonwealth and the states of New South Wales, Victoria and South Australia for the "economical use of the waters of the R. Murray and its tributaries for irrigation and navigation"; and, therefore, controls the construction and maintenance of all riparian works and allocation of water. Other special organs of Commonwealth and State co-operation are the Loan Council, which deals with matters of common finance, and the Premier's Conference for general affairs.

The war of 1939-45 naturally increased the power of the Federal Government, and it seems unlikely to lose its gains in the future. In a world dominated by problems of political danger and economic control, of which the recent (1950-51) spectacular rise in the price of wool is an excellent example, the central government must be strong, and capable of rapid and decisive action. On the other hand this very growth of power at the centre has produced a strong reaction at the periphery, and there is now a strong demand for the establishment of new states. This most interesting development is powerfully supported in New South Wales and Queensland, and if successful would lead to the creation of two new states in eastern Australia. This demand for a smaller state unit arises directly from the characteristic Australian determination to retain local and personal rights, in spite of the greatly increased cost of maintaining their own individual administration. Considered historically it is a

healthy and desirable phenomenon likely to maintain a just balance between State and Commonwealth.

#### THE LABOUR MOVEMENT

A description of Australian politics would be incomplete without an account of the Labour Movement. There has always been a strong radical element in the country ever since many Chartists and Irish went out as political exiles. These were reinforced by political refugees from European countries after the turmoil of 1848—the year of revolutions. All these newcomers brought with them a well-founded hatred of political autocracy and of the economic theory of *laissez-faire*. The doctrine that the Government should not interfere in industrial affairs had led to its logical consequence in the horrible conditions of the English working classes before the passing of the Factory Acts. The gold-rush of 1851 brought great numbers to Australia who, disappointed on the gold-fields, swelled the urban populations.

The artisans and labourers in Australia had from the beginning been provided with an inducement to unite against the use of convicts and Chinese, and gradually the trade union movement developed along familiar lines. Largely by means of strikes a high standard in wages, hours and conditions of labour was achieved, but this culminated in the disastrous strikes of 1890, when the trade unions suffered very heavy defeat.

After 1890 a change came over the movement. Strikes unfortunately did not cease, but labour began to concentrate on political action. Harking back to the Chartist demands, the labour leaders agitated for the adoption of vote by ballot, of payment of members, and the abolition of plural voting. When success had been achieved in this direction the Labour Party rapidly rose to power. It has held office in the Federal Parliament and in every state. The ideal of the party may perhaps be fairly described as the maintenance in Australia of a high standard of living

for white men, even if this involves economic sacrifices and a retardation in the full development of the resources of the continent.

#### LAND POLICY

“ And Abel was a keeper of sheep, but Cain was a tiller of the ground.”

It is a profound truth that the oldest quarrel in the history of man is the undying feud between the pastoralist and the agriculturist. On the fringes of the great deserts bordering on the Mediterranean, or where the practice of transhumance brings flocks of sheep and goats through the vineyards and farmlands of Italy and Spain, or on the grasslands of Australia, the conflict of interests still persists. As Joseph warned his famine-stricken brethren, when they came to him in Egypt, “ every shepherd is an abomination to the Egyptians.”

Among all the questions which have agitated Australian politics, the question of the land, and its utilization and tenure, has been predominant. Even to-day the problem is far from being solved. The subject is of great interest to the British people, because the questions arising out of the occupation of vast new regions are of vital importance to the Empire, and are very unfamiliar to the inhabitants of the British Isles.

In this connection Australia has certainly been spared one problem which has to be solved in our African territories, the question of the rights of the aborigines. The Australian and Tasmanian aborigines were in the early days treated with much cruelty. Their numbers are now so small that it is not difficult to make provision for them in the vast territories of the north. With the above exception, however, it may fairly be said that the land question in Australia has bristled with difficulties.

From the beginning it has been assumed that all land is Crown property until it has been transferred to some other owner. Throughout the first half of the 19th cen-

ture the interests of the "squatters," or great sheep owners, were paramount. No other interest had anything more than local importance. The welfare of the whole country was bound up in that of one industry. A change, however, came with the great gold rush of 1851, when other activities developed ; and in recent times the interests of squatters have come more and more into line with those of the mining and agricultural communities.

Until 1831 land was granted freely to any who desired to occupy it, and sometimes very large areas were transferred to one man, or to a company for the grazing of sheep. The fact that some parts of such a district might be more suitable for other and more profitable use was the root cause of all later trouble. Moreover, occupation of the interior by the squatters proceeded so rapidly that in many cases they were occupying land to which they had no right and which had not yet been surveyed. To secure themselves in undisturbed possession, they frequently bought from the Crown strategic points, such as water holes, fords, etc.

To meet the difficulties caused by this concentration of land in the hands of a few men engaged in one industry, various experiments were tried without much success. Sales by auction only resulted in a fever of land speculation. The system of selection proved even more disastrous. By this system, a settler might select some land for his farm even if it were in the middle of a sheep run. If he resided on the land and developed it satisfactorily he was allowed to purchase it outright. The squatters countered this by buying up the strategic points, or by paying others to make bogus purchases for them. On the other hand, some men bought land in the territories of the squatters, without intending to develop it, but so as to force the latter to buy them out at exorbitant prices.

This system of selection before survey, in fact, not only failed to attain its object, for gradually the land drifted back into the hands of the squatters, but it also lowered

the standard of honesty in business relations and greatly aggravated the bad feelings between different classes of the community.

The claims of the farmers of fruit, wheat and cattle, however, were not to be denied, and the great period of squatter supremacy has passed away. The greater part of the inhabitable land has now been surveyed and classified according to its suitability for different kinds of occupation. Queensland, developing late, has avoided many of the mistakes of the other states, and only about one-eighth of her land has passed permanently out of State ownership. Here the system of perpetual lease is very promising. In the other states, the break-up of large estates into smaller farms may be achieved by the compulsory powers of purchase by the State. The institution of a land tax has also succeeded in inducing owners of large tracts to make the most economical use of their fertile land. Finally, an interesting experiment has been made in the adoption by some land-owners of the "metayer" system of Mediterranean lands. By this system the landlord supplies the capital, the stock, the implements, and the land, while the tenant farmer works the land. The income from the farm is divided between landlord and tenant in agreed proportions. In the opinion of some, this system has done more to develop a body of small farmers than all effort by the states.

#### POPULATION

##### (1) *Composition*

Australian statesmen are faced to-day with a great dilemma. If they are to justify their claim to exclude other races from the continent, they must develop and settle the land as fully as possible. The natural rate of increase in population is very small and without a large increase through immigration the day when the continent will be properly settled lies in a very distant future. The wholesale admission of immigrants, however, would

undoubtedly disturb the social and economic life of the country and would lower the high standard of living which Australians cherish so greatly. The problems of the White Australian policy, of the closer settlement of the country and of immigration policy, are thus connected in a very intricate manner. What does the future hold for this great continent which has roughly the same area as the United States but only a small fraction of the population of that country?

The first point to be noted is that the great majority of Australians are determined to preserve the existing population against the introduction of a lower standard of living. They have been called "more British than the British," and it is true that 97 per cent. of the population is of British descent. This state of affairs is surprising when the Australian population is compared with that of almost all other new countries. It must be remembered that when the country was first occupied, English colonists elsewhere were not alive to the problems which were later to emerge as a result of the employment of coloured labour. But for the fact that convict labour was available, the early Australian settlers would undoubtedly have employed great gangs of Indian or Chinese coolies. Australia is not only fortunate in having no problem of the aboriginal races, but also in being free from the legacy of slavery.

After the cessation of transportation the question of a labour supply became serious. The owners of great sheep runs were inclined to experiment with indentured coolies from India, Japan, China and the Pacific Islands. Later on they were joined in this policy by the sugar-cane planters of Queensland. At one time in the latter part of the 19th century there were many thousands of Kanakas in Queensland. The recruiting of these in the islands led to grave scandals, and some British schooner captains gained a notorious reputation for kidnapping. In 1843 the working men of Sydney had begun to organize opposition to the introduction of labourers whose standards of

living were so low that it was impossible for white men to compete with them. Finally, in the first year of the Commonwealth, the Federal Government abolished the indenture system.

Apart from the question of indentured labour, public opinion in Australia steadily grew more hostile to Asiatic immigration in general. The gold discoveries attracted many Chinese, and there were frequent riots in the mining centres in consequence. Attempts at exclusion were made by the enforcement of large fees to be paid by Asiatics on entering the country, but this frequently placed the Imperial Government in an embarrassing position with regard to friendly countries such as China and Japan. Since the federation a language test has been applied, and this has virtually excluded Asiatics from settling in Australia. The Asiatic population has fallen from 47,000 in 1901 to less than 13,000 in 1947, and the majority are Chinese.

Thus has emerged the White Australia policy. It seeks "to prevent the free influx of labourers and artisans whose traditions, and whose political, social and religious ideas differ so much from ours, that it would be very difficult to assimilate them." The policy is not really directed against the coloured races as such, nor is it simply inspired by selfish motives on the part of Australian labour. It aims at the preservation of opportunities for human welfare which are far greater than those existing in most of the other parts of the world.

At the census of 1947 the population numbered 7,579,358, of which 99·5 per cent. were of British extraction, and 90·2 per cent. were born in Australia. Since the war, immigration has gone on at a high rate, and for the first time Australia has been taking relatively large numbers of Continental Europeans. In order of preference Australia is taking European immigrants from :—

1. British Isles.
2. Northern and Western Europe.
3. Central Europe.
4. Southern Europe.

Thus in the future the racial basis of the Australian stock will widen, almost certainly to the nation's benefit, though the marked dominance of the British element will continue for a long time.

In November 1949, the Australian Government announced that the population had passed the eight million mark.

With regard to the distribution of population, it is at first surprising to find that in a new country such a large proportion of the people are concentrated in a few great cities. This is mainly due to the fact that the pastoral industries require comparatively few workers on the stations, but give employment to a great many factory hands, clerical and transport workers in the towns.

### (2) *The Future Growth of Population*

Assuming that the population of Australia will remain of the same character as at present, it remains to be seen what total population may be expected in the future. This is a subject which has been widely discussed and very different estimates have been made, ranging from a maximum of 10 millions to one of 200 millions. The question is of very great importance because the military strength and economic stability of the country depend upon the size of the population, which in turn raises the question of emigration from Great Britain, through which alone any appreciable increase in the adult population can be secured in a short time. The two great causes which place limits on population are (1) insufficiency of rainfall, and (2) the difficult conditions of life in a hot climate such as that of tropical Australia.

Professor Ellsworth Huntington, of the United States, estimates the highest possible population for Australia to be 15 millions, and says: "The more I study this matter, the more I am filled with amazement that the Australians so constantly talk about the desirability of a



large population. Australia must decide how dense a population it wants, and then should take every feasible measure to keep its population at about that density." This estimate may be contrasted with that of Professor Geisler, of Germany, who thinks that Australia could maintain a population of from 150 to 200 millions. He divides the continent into forty-three divisions and estimates the possible density of each. Some of his calculations seem to be optimistic, but they are based on careful study of local conditions. He gives a possible density of 65 per square mile to the Barkly Tableland, of 78 to the Atherton Plateau in Queensland, and to the Sharks Bay region in Western Australia, and of 130 to a large tract in the south and west of Western Australia.

The chief protagonists in the discussion have been, however, Professor Gregory, of Glasgow, and Professor Griffith Taylor, of Toronto. Professor Gregory maintained that Australia could easily support a population of 100 millions, while Professor Taylor held that an estimate of 50 millions was very optimistic. The latter pointed out that no continent has so great a proportion of its area subjected to dry conditions. Possibly three-quarters of the continent is condemned by lack of moisture to be devoted solely to grazing, which can only support a very small human population. Mining by its very nature cannot give rise to permanent close settlement of the country, except possibly on the coalfields. A large population may be expected to develop in the areas which receive more than 20 inches of rainfall per annum, but Professor Taylor pointed out that in the United States the 20-inch isohyet bounds the country which supports a density of six or more persons to the square mile. With regard to the tropics, Professor Taylor was emphatic that a large white population would never be established there. It is true that Australia is less afflicted by tropical diseases than is the case with other hot countries, possibly because there is such a small native population. But the conditions of life are still very hard, especially for women.

In this connection the following figures are of interest.

State	Square Miles	% of Aust. Total	Persons 1947	% of Aust. Total	Density	Masculinity
N.S.W.	309,433	10.40	2,984,838	39.38	9.65	99.97
Vic.	87,884	2.96	2,054,701	27.11	23.38	97.41
Que.	670,500	22.54	1,106,415	14.60	1.65	105.29
S.A.	380,070	12.78	646,073	8.53	1.70	98.16
W.A.	975,920	32.81	502,480	6.63	0.51	105.59
Tas.	26,215	0.88	257,078	3.39	9.81	101.10
N.T.	523,620	17.60	10,868	0.14	0.02	211.40
A.C.T.	939	0.03	16,905	0.22	18.00	116.37
Aust.	2,974,581	100.00	7,579,358	100.00	2.55	100.41

Professor Taylor pointed out that a clear idea may be gained of the climatic conditions to be faced in tropical Australia by a comparison of the following pairs of towns which have very similar climatic data: Townsville (Queensland) and Calcutta; Darwin (Northern Territory) and Cuttack (Bay of Bengal); Wyndham (Western Australia) and Tinnevely (South of Madras).

In an article in the *Contemporary Review* (October, 1929), Professor Gregory vigorously attacked those who adopted what seemed to him unduly conservative figures. In particular he selected Professor Taylor's figures for Victoria as being quite inadequate. Professor Taylor estimated that the population capacity of Victoria was 1,613,000, but Professor Gregory pointed out that that figure had already been passed (1,670,852 in 1925), that there were still very large tracts capable of agriculture waiting to be occupied, and that Victoria, in proportion to area, receives more immigrants than the other States. If the population of Victoria were to be multiplied by five the state would still only have a density of population, equal to that of Spain. He concluded:

“The table that assigns to Victoria a lower potential population than it already has, assigns to the whole of Australia a population of 29,600,000. If that table underrates the capacity of the rest of Australia as much

as it does that of Victoria, my former estimate of the future population as 100 millions appears moderate.”

Where so many eminent authorities fall out, it is difficult for others to come to a definite conclusion. It does, however, seem to be the case that those who adopt conservative estimates tend to ignore the possibilities of scientific discoveries which may greatly alter the conditions. Moreover, it must be borne in mind that Australia in her coalfields has a very important asset, especially in view of the fact that all over this part of the world, in the East Indies and the Southern Pacific, large populations will be growing up. Of recent years instructed opinion has tended to agree more with Professor Taylor's conservative estimate of the possibilities, and it is considered that at the present stage of scientific development the maximum population which Australia could maintain at a reasonable standard of living is somewhere about thirty millions—three times the present count—of European or similar stock; but it must be emphasized that, if science can advance as fast during the next fifty years as it has during the last fifty, the whole situation may be transformed.

## CHAPTER XIII

### AUSTRALIAN LIFE

The narrow ways of English folk  
Are not for such as we ;  
They bear the long accustomed yoke  
Of staid conservancy :  
But all our ways are new and strange,  
And through our blood there runs  
The vagabonding love of change  
That drove us westward of the range  
And westward of the sun.

. . . . .  
Our fathers came of roving stock  
That could not fixed abide :  
And we have followed field and flock  
Since e'er we learnt to ride ;  
By miner's camp and shearing shed,  
In land of heat and drought,  
We followed where our fortunes led,  
With fortune always on ahead  
And always further out.

IT might be supposed from the above lines that in the course of more than 150 years the British people in Australia would have entirely changed their ways of life in the new surroundings. It is therefore of interest to note how deeply rooted are the cultural traditions of a people who look back on hundreds of years of unbroken history. To an English visitor there is obviously much in Australian life which appears new and strange, but a foreigner like Professor Demangeon is impressed not so much by the differences as by the similarities between English life at home and overseas. He notes the persistence of English ways in spite of potent geographical

and historical influences. He observes in the Dominions the English passion for "unremunerated physical activity," cricket, horse racing, and football; the ubiquity of the English Sunday; the large and frequent meals; the habits of diet, clothing and daily routine, which seem to defy climatic considerations. The common language, similar religious, legal, and political institutions all tend to draw the British communities together all over the world. In the case of Australia this is very marked in the sports of the people. Horse racing is extremely popular in a country where many of the people spend their lives in the saddle. Above all, cricket is played with an enthusiasm unparalleled even in England.

It is, indeed, perhaps a misfortune that the Australians have not more readily broken away from the traditions of European culture. In a young country there is no leisured class and so the development of æsthetic and intellectual interests is delayed. There is a tendency to follow the conventional taste and the artistic fashions of the home country, even when in political and social life the old traditions are ruthlessly abandoned. It cannot yet be said that Australia has found her place in the world of Art, Music, and Literature, although there are many promising signs.

The development of Australian architecture exemplifies what has just been said. In church architecture it was perhaps to be expected that the buildings should be reminiscent of worship in England. In domestic architecture, after the raw days of wooden huts and corrugated iron, domestic architecture was modelled almost exactly on that of the home country. It is, however, interesting to note that such modification as has taken place has been similar to that which occurred in America. Verandahs, balconies, and porticoes recall the beautiful American "colonial" style of Arlington and Mount Vernon in Virginia. Most middle-class houses are single-storey buildings designed to meet the

difficulties of housekeeping in a land where there is a shortage of domestic labour. The straight streets and tall buildings of the business quarters in the cities also show American influence.

The development of any distinctively Australian school of artists was long delayed. There were many early painters of views and portraits, but little of merit was achieved until the later decades of the 19th century. Australian scenery for long seemed to be uncongenial and strange. In the 'eighties, however, a group of Australian artists came under the influence of the Impressionists in Europe. Arthur Streeton, born in 1867, was the leader of this group, and under his influence there has grown up a definitely Australian school of landscape painters, who saw Australian scenery with the eyes of the native born. Hans Heysen is a notable modern painter who shows a true appreciation of the beauties of the Australian bush.

The *Sydney Bulletin*, founded in 1881, has done a great deal to help Australian poets and artists, and the association with this paper of Phil May, the English artist in black and white, led to the appearance of Australian cartoonists noted for their vigorous and racy work. The recent inauguration of a society of painter-etchers indicates another branch of Australian art.

It may now be said that Australian artists have come into their own. Sir Bertram Mackennal, the sculptor, was a Royal Academician, and many Australian artists have had their work "hung on the line" at the Royal Academy. Among these such men as William Dobell, Will Dyson, and Sir Lionel Lindsay have a world-wide reputation.

Of all the arts, Music has found the readiest welcome in Australia. A piano was one of the first articles to be landed from "The First Fleet" in 1788, and musical societies were established in the leading cities in the early part of last century. Music has an important place in the general education of the country, and its value is certainly appreciated very widely. Among Australians who have

played a leading part in the world of Music are Dame Nellie Melba, Ada Crossley, and Percy Grainger.

In Literature the best work has been done by writers of ballads and lyrical verse. Australian writers have generally failed when they have modelled themselves upon European standards, and they are at their best when writing about themselves and about Australian bush life. There is a racy humour about much of the best work.

“ True patriots all, for be it understood,  
We left our country for our country's good.”

The language is usually terse, direct, and forcible. In many of the poems there is a melancholy note reflecting the hardships of life in the early days, while in others a vigorous pride of achievement is reminiscent of much of Kipling's poetry.

Henry Kendall (1841-1882) was the first poet of mark, and much of his work has real lyrical beauty inspired by life in the bush. The tragic Adam Lindsay Gordon in his ballads tells of life on the sheep stations, in a free reckless verse which seems to gallop with the horses which figure so largely in Australian life. His is the famous quatrain :

“ Life is mostly froth and bubble,  
Two things stand like stone ;  
Kindness in another's trouble,  
Courage in your own.”

A. B. Paterson, some of whose lines are quoted at the beginning of the chapter, must be accounted a great ballad writer by any standard. “The Man from Snowy River” is a pocket Australian epic, and “Waltzing Matilda” has become the unofficial National Anthem.

During the last twenty-five years the mass and variety of Australian literature has greatly increased. It still bears the mark of youth, and in all forms is largely descriptive and closely related to the social history and life of the people. There has not yet been time for the development of individual intellectual work on a high and reflective level, though there is an increasing promise for

the future, and it is unfortunate that many of Australia's best brains have emigrated to countries of more mature culture instead of remaining at home to build up their own.

In several directions Australia has been a pioneer as regards the application of science to practical economic problems. Farrer's work on the wheat plant has already been noted, and much similar work has been done in the application of Mendelism to plant and animal breeding. Australian inventors were specially successful in designing agricultural machinery for thrashing and harvesting wheat in the special conditions which confronted Australian farmers. One of the finest examples of a true scientist was Lawrence Hargrave, whose early experiments in aviation, for the results of which he refused to take out patents, were of great importance to early inventors in this branch of engineering. His work was not properly recognized in Australia, although it was used and acknowledged by the Wright brothers in America.

Perhaps the most obvious expansion of economic activity resulting from scientific work has been in connection with the refrigeration of meat. For twenty years Thomas Sutcliffe Mort, a prominent business man in New South Wales, conducted experiments in this direction. He died just before the result of his work was realized, when in 1880 a cargo of 48 tons of frozen meat was successfully brought to London from Australia. In the next fifty years exports grew steadily, but soon after the first world war the development of chilling processes in South America threatened the Australian industry with ruin, for the appearance, flavour and quality of the chilled meat was far superior to that of the frozen. The Australian Government therefore set up the Council for Scientific and Industrial Research to investigate the problem. Experiments began in 1931, and in 1934 the first small shipment of chilled beef was made. In 1939 about 40 per cent. of the beef export was chilled, but the outbreak of the second world war then halted developments. Great Britain was obliged to revert to frozen



meat, which could be kept longer in store: and this consideration will probably prevent any change until such time as she can abandon the rationing of meat.

The C.S.I.R.O. has also spent much time and effort in improving the conditions of the industry; and pastures, herds, transport and station management generally have greatly improved in consequence.

The future of the cattle raising and meat exporting industry seems bright, but progress will require big capital expenditure and the constant adoption of new and better methods as they become available. When Great Britain can once more take regular and large supplies of chilled meat, Australia should be a big supplier, to the advantage of both countries.

#### CONCLUSION

The colonization of Australia by the people of the British Isles has been a great experiment. A vast area has been seized upon by the Anglo-Saxon race and is in process of occupation. A social and political way of life, formed by centuries of history in a small group of islands on the other side of the world, has been transplanted to an entirely new environment and is there being altered and adjusted to meet the new conditions. From the colonial stage, the Australians, in a little more than 100 years, have advanced to full nationhood and now take their place among the great peoples of the world. Coming from the cool temperate climate of Western Europe, they have tried to occupy regions to which they were not at all acclimatized. Hence, it is difficult to say whether they will be entirely successful. Since their appearance in these regions, new great nations have developed and are peopling the adjacent lands, and the whole problem of international relations in the Pacific awaits solution.

In the economic life of the country, no less than in politics, the near future may bring great changes. The world has in the last few decades become one vast market

and almost every considerable industry suffers great fluctuations between depression and prosperity, arising from economic developments in distant parts of the world. It almost seems as though the time were coming when vast international organizations of certain industries will be necessary to stabilize conditions throughout the world. It seems strange and wasteful, for example, that the apple growers of Tasmania should depend on the English market to such an extent that they suffer the greatest uncertainty as to the future owing to the competition of English and Canadian producers. The whole world of production awaits organization.

Geography and History are the study of Man in his environments of Space and Time. In early history and prehistory he was almost entirely at the mercy of an apparently blind and indifferent Nature. He was decimated by famine, plague, and disease, terrified by startling phenomena, overawed by manifestations of unseen and incomprehensible powers. Through thousands of years the indomitable animal has advanced, his audacity growing with his knowledge. Nature is no longer his implacable enemy ; rather he has come to understand something of her. While he can never hope to be independent of geographical circumstance, still he does steadily increase his power to adapt himself to it. With increasing skill he is eliminating the dangers of drought and flood and pestilence, is more and more stabilizing his conditions, and transforming the raw material of his environment to his own advantage. By a fascinating accident of historical and geographical circumstance the first and last stages of this old story may be seen together in Australia.

# NEW ZEALAND

## CHAPTER XIV

### PHYSICAL CONDITIONS

NEW ZEALAND lies 1,200 miles to the south-east of Australia from which it is separated by the turbulent Tasman Sea ; 1,200 miles from Antarctica ; and 5,000 miles from South America. The Panama Canal is 6,500 miles, the Malay Peninsula 5,350 miles, and South Africa 7,500 miles distant from New Zealand. The Dominion proper consists of a group of islands and islets, of which the chief are the North Island (43,131 square miles), the South Island (58,120 square miles), Stewart Island (662 square miles), and the Chatham Islands lying some 500 miles to eastward. The area of New Zealand is rather less than that of the British Isles, though the South Island is about the same size as England and Wales. The estimated population in 1949 was 1,873,000, including 112,000 Maoris.

Annexed to New Zealand are the Cook Islands and certain neighbouring islands in the Western Pacific ; while the western islands in the Samoa group are administered by New Zealand under a trusteeship agreement of the United Nations, this having replaced a mandate granted by the former League of Nations. The Ross Dependency in Antarctica is also under the jurisdiction of New Zealand.

The main group extends from latitude  $34^{\circ}$  S. to latitude  $48^{\circ}$  S. and has a length of about 1,000 miles, whilst its greatest breadth is about 280 miles. Its coastline is approximately 3,000 miles long, and no portion of the country is more than 75 miles from the sea.

The rocky coasts of New Zealand are generally straight and contain, for the most part, few good harbours. They are often bordered by extensive beds of sand and shingle. The mouths of many of the rivers are blocked by sand and shingle bars which form a great hindrance

to navigation. In the North Island there are good harbours in the northeast, such as the ria opening on which Auckland stands, whilst that of Wellington, on Cook Strait, is one of the finest in the world. The western side of this island has, however, few good openings.

In the South Island the rather poor natural harbours of Lyttelton and Otago have been improved by dredging and the construction of breakwaters. In the southwest of the South Island the mountainous coast is cut up by numerous fjords known as *sounds*. These rival in grandeur the fjords of Norway and British Columbia. Above their rocky sides rise snow-clad peaks, whilst over their steep bounding walls the waters from countless falls continually pour. Farther north the coastal strip of Westland is broken by few inlets.

#### STRUCTURE

Since the earliest times the portion of the earth's crust which we now know as New Zealand has undergone many changes. At one time it has been raised far above the level of the ocean and at another time it has sunk beneath its surface. Throughout the different geological periods constant changes, in most cases gradual, have been taking place.

During the Primary period New Zealand probably formed part of a great land mass which extended far to the west. This finally disappeared, but in the early part of the Tertiary period New Zealand was probably connected, or nearly connected, by land with Australia and New Guinea. In the middle of the Tertiary period the land subsided, but, later, portions were again elevated and a land-mass arose which included New Zealand and the Chathams, and which stretched southwards to the Antarctic continent. A vast snow-field covered the mountain ranges of New Zealand, which were far higher than the present Southern Alps. The sides of these mountains were seamed with glaciers.

Later, the climate underwent a change and became milder ; the glaciers receded and rock waste from the melting ice and snows was carried down by rushing torrents, thus helping to build up the plains of Canterbury and Southland. These deposits formed a very fertile soil, and the plains formed by them are to-day amongst the richest grazing areas in New Zealand.

Though the present-day glaciers of New Zealand are small when compared with these mighty giants of the Ice Age, yet there are many evidences which testify to the recent presence of vast glaciated areas : U-shaped valleys, cirques, erratics, as well as vast quantities of morainic material, occur over large areas.

Volcanic action, though now confined to the North Island, was probably continuous throughout the group during the Tertiary period, for many igneous rocks also occur in the South Island. The coal measures of New Zealand were probably laid down during the latter part of the Secondary and the earlier part of the Tertiary period.

#### RELIEF

In the extreme southwest of the South Island there is a block of ancient mountains whose grain runs north-west and southeast. Further north parallel ranges run in a northeasterly direction through the island and, except for the break of Cook Strait, are continued across the North Island to East Cape. From the main chains branching spurs run out towards the east and the west coasts. North of the Southern Alps, as the main chains of mountains are called in the South Island, are the Tasman Range on the west, and the Kaikoura Range on the east. The latter rise steeply from the coast, culminating in long rows of notched peaks.

In the North Island the mountains have a lesser elevation than in the more southerly island, and with the exception of four volcanic cones none exceed 6,000 feet in height. It is in the South Island that the mountains

reach their greatest breadth and their maximum height, and here Mount Cook attains a height of 12,349 feet, whilst there are also some sixteen peaks of over 10,000 feet in altitude. There are large glaciers in the higher parts of the Southern Alps: the Tasman Glacier is over eighteen miles long and one and a half miles broad; such glaciers as the Murchison, the Godley, and Franz Joseph are all over eight miles in length. On the western side of the Southern Alps some glaciers descend to within 700 feet of sea level. Of the countless waterfalls the three leaps of the Sutherland Falls total 1904 feet. Arthur's Pass is the main route over the mountains. It leads to the Otira Gorge through which wind the road and railway that connect the eastern and western sides of the island.

The western portion of the South Island is extremely mountainous. North of latitude  $44^{\circ}$  S. a narrow strip of country, called Westland, runs for about 250 miles between the Alps and the coast. It is, however, a rather hilly region and is of little use for agriculture, except in one or two more favoured areas. In the east of this island the Canterbury Plains extend for nearly 200 miles parallel to the east coast, but though they have in parts a breadth of about 40 miles, the richer lands do not extend for more than from 10 to 15 miles from the coast.

In the North Island the higher mountains occupy about one-tenth of the surface and there are lowlands of varying extent. The chief are the Waikato-Thames Plain extending inland from the head of Hauraki Gulf, and the Manawatu-Horowhenua Coastal Plain in the southwest, watered by the Manawatu and other rivers. Plains of more limited extent include the Taranaki Plain, an upland plain stretching from the west coast to the slopes of the extinct volcanic cone of Mount Egmont; the Wairarapa Lowland, running inland from Cook Strait between the mountains to the west and the downland country to the east; and the Heretaunga Plain opening to the south of Hawke Bay.

In portions of both the North and the South Islands are

regions of low, undulating, hilly country lying between the mountains and the coast. These hills, which are usually between 1,000 and 2,000 feet in height, are known as Downs. They consist of rocks which, because they are somewhat harder than the surrounding ones, have been able to withstand the forces of prolonged erosion. The most extensive area of Down country is in the Taranaki and Hawke's Bay districts of the North Island, and in the northern part of Canterbury in the South Island. Once covered with forests, these regions have now been converted into pastures.

To the west of the main chains there is in the North Island a volcanic region where the cones of Tongariro (6,458 feet), Ngauruhoe (7,515 feet), Ruapehu (9,175 feet) rise high above the surrounding plateau. This line of volcanoes is continued northeast through Tarawera to White Island in the Bay of Plenty. Unlike the solitary cone of Mount Egmont in the west, these volcanoes are not extinct : Ruapehu was particularly active in 1945.

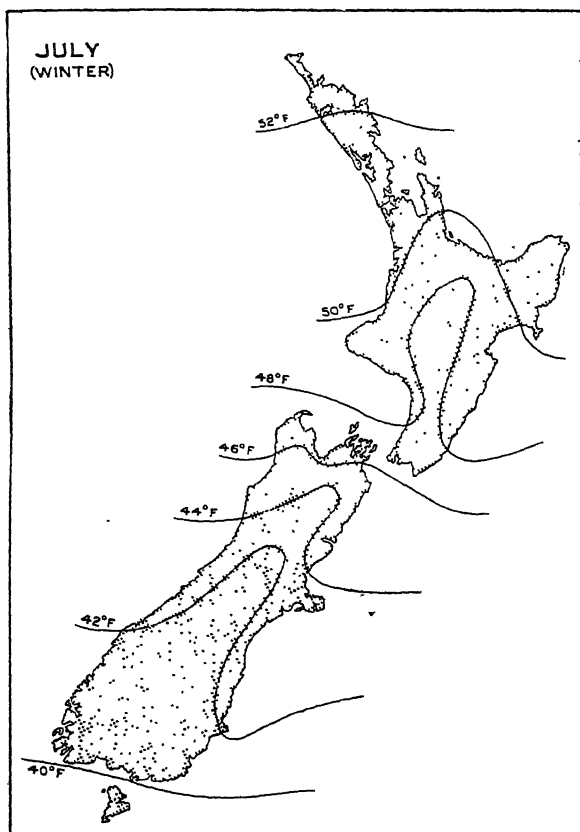
A remarkable system of hot springs and geysers lies on either side of the line of volcanoes with whose formation they are closely connected. The springs vary in temperature from boiling point to tepid. In some pools steam and sulphurous fumes rise from seething, black water ; but in others bright bubbles shoot to the surface from clear, green depths. Some of the geysers eject columns of boiling water and mud at regular intervals.

The principal thermal centres are round Lake Rotorua, formed by the damming up of the normal outflow of a river by a stream of lava. The famous Pink and White terraces which were situated in this district were destroyed by the eruption of Tarawera in 1886. Apart from the general interest of such a region, its importance lies in the fact that the mineral waters of the springs have a great medicinal value, which the New Zealand Government has not been slow to recognize. Lake Taupo, the largest lake in this area and also in New Zealand, is about 25 miles long and 17 miles broad. Its formation

was possibly due to the subsidence of the land after a volcanic eruption. There are, in addition, a number of smaller crater lakes.

## CLIMATE

Though New Zealand is the antipodes of Spain and Portugal, its climate resembles that of the British Isles.

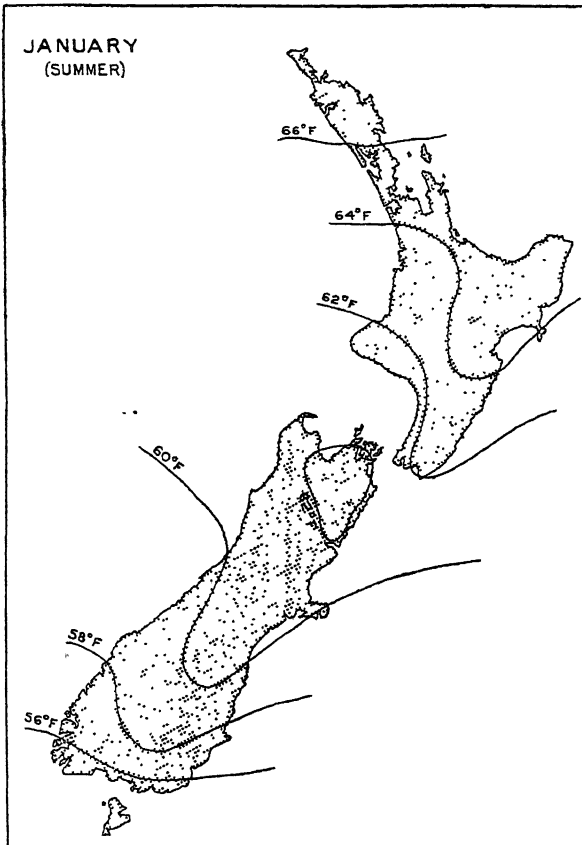


DISTRIBUTION OF TEMPERATURE IN JULY.

This is largely due to the fact that the extensive ocean of the southern hemisphere causes a reduction in



temperature latitude for latitude. At Auckland the temperature graph is strikingly similar to that of Plymouth, while Dunedin corresponds closely to Dublin. The bleakness of Stewart Island is reminiscent of the northwest



DISTRIBUTION OF TEMPERATURE IN JANUARY.

of Scotland. The resemblances are only in general, however, and there are many differences in detail.

Owing to the fact that New Zealand extends for about a thousand miles from latitude  $34^{\circ}$  S. to latitude  $48^{\circ}$  S. there are, of necessity, many climatic variations. Speak-

ing broadly, the temperature decreases from north to south, the difference between the means at Auckland and Invercargill being about  $10^{\circ}$  F. On the low lying coastal lands of North Island frosts seldom occur during the winter months, though they are sometimes severe on the higher lands of the interior, but on the South Island they are more frequent.

In winter the west coast of New Zealand is somewhat warmer than the east on account of (1) the warm waters of the East Australian current which increases the temperature of the air that blows over them ; (2) the greater dampness of the atmosphere consequent upon the prevailing Westerlies. In summer, however, the land tends to heat up more quickly than the sea and, therefore, the westerly winds have a cooling effect on the west coast. Their cooling influence is little felt in the east, for this part of the South Island lies on the leeward side of the Southern Alps. The west winds deposit most of their moisture on the windward slopes and summits of the mountains. When the pressure is low on the leeward side the air descends with great rapidity and becomes contracted and warmed. This dry, warm wind of the foehn type, during its occasional occurrences, greatly increases the temperature on the east side of the Southern Alps.

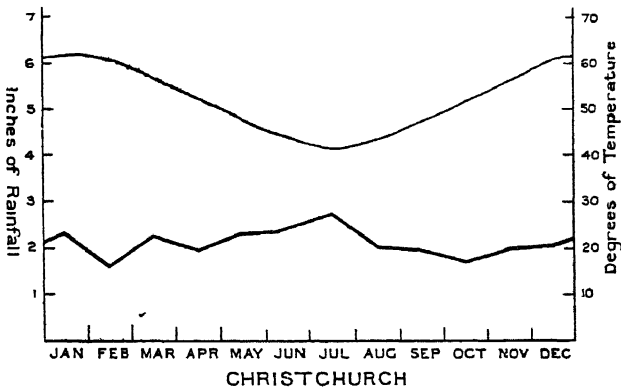
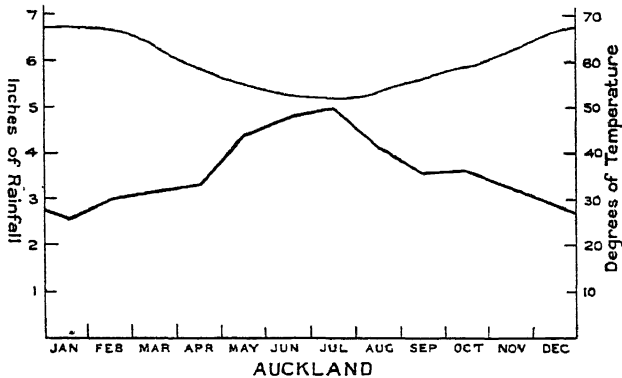
The winter temperature at Christchurch is  $42^{\circ}$  F., whilst that of Hokitika, on the west coast, is some  $3^{\circ}$  higher. In summer, however, Christchurch, with an average temperature of  $62^{\circ}$  F. is  $2^{\circ}$  warmer than Hokitika.

	January.	July.	Annual Range.	Rainfall.
Auckland . . .	$67^{\circ}$ F.	$52^{\circ}$ F.	$15^{\circ}$ F.	44 in.
Christchurch . . .	$62^{\circ}$ F.	$42^{\circ}$ F.	$20^{\circ}$ F.	26 in.
Hokitika . . .	$60^{\circ}$ F.	$45^{\circ}$ F.	$15^{\circ}$ F.	116 in.
Dunedin . . .	$58^{\circ}$ F.	$42^{\circ}$ F.	$16^{\circ}$ F.	37 in.

During the summer months when the wind belts shift

southwards, most of the North Island lies within the southeast trade-wind area. This has the important effect of reversing the position of the windward slope of this island according to the season.

In many respects the rainfall of New Zealand resembles



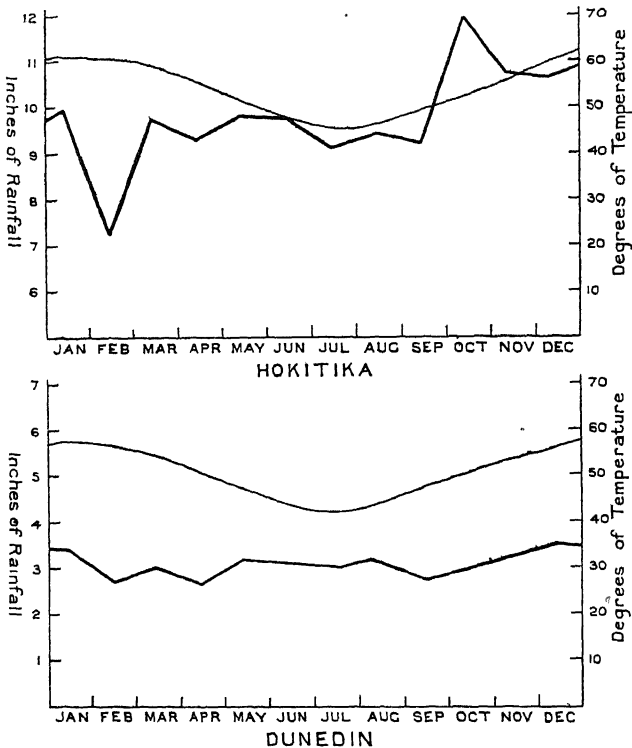
TEMPERATURE AND RAINFALL AT AUCKLAND AND CHRISTCHURCH.

Note the greater range of temperature and the lower rainfall at Christchurch.

that of the British Isles. Both regions lie in a westerly wind belt and have their highest land in the west. The Southern Alps, in the South Island, are, however, much higher and more continuous than the Western Uplands of

Britain. The west coast of both groups receives a much heavier rainfall than most of the eastern portions.

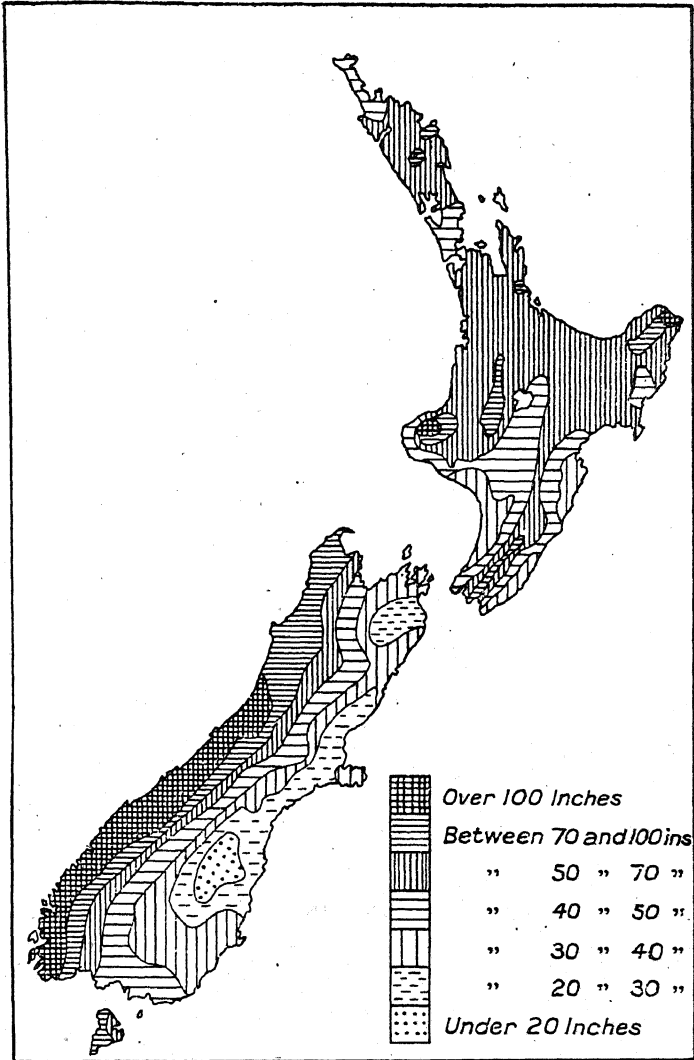
In New Zealand the amount of rain which falls on this western side increases from north to south. At Auckland



TEMPERATURE AND RAINFALL AT HOKITIKA AND DUNEDIN.

Contrast the rainfall at Hokitika and Christchurch, and the temperature at Dunedin and Auckland.

the mean annual rainfall is 44 inches ; at Hokitika it is 116 inches ; in the southwest it is well over 200 inches. The eastern side is considerably drier. The annual rainfall at Christchurch is only 26 inches—an amount somewhat similar to the annual amount of rain which falls over much of eastern England each year. One of the driest



ANNUAL DISTRIBUTION OF RAINFALL.

Note the decrease in amount from west to east in the South Island.

parts of New Zealand is in central and northern Otago, where the annual rainfall is between 13 inches and 20 inches only.

Owing to the fact that the mountain barrier is neither so continuous nor so high in the North Island as it is in the South the annual rainfall is much more evenly distributed. The region around Mount Egmont receives about 100 inches per year and the higher slopes of the mountain itself receive even more. This is, however, exceptional, and the average rainfall for the whole of North Island is 50 inches : a somewhat greater amount than that of South Island, where the average rainfall is a little over 45 inches.

The average amount of sunshine in New Zealand is a little over 2,000 hours per year. There is more sunshine on the drier eastern side than on the wetter west. Napier, on Hawke's Bay, has an annual average of 2,550 hours. This is considerably greater than that of the British Isles, which have an average of about 1,400 hours, whilst Italy has between 2,000 and 2,400 hours. The high average of New Zealand is somewhat remarkable when one considers the fairly heavy rainfall and the consequent cloudiness. The large amount of sunshine tends to show that when rain falls it is heavy and that there are a large number of days when there is little or no rain and when the sky is clear. Statistics show that in the North Island the average number of rainy days in a year is 163 and in the South Island 155.

#### RIVERS

Owing to its plentiful rainfall and to the hilly and mountainous nature of the country New Zealand is well supplied with rivers. But the limited area of both the North and the South Islands, and their relative lack of breadth, have precluded the development of long rivers.

Few of the New Zealand rivers are of sufficient length or volume to be navigable, apart from the fact that most of them are liable to sudden floods and are also obstructed by bars at their mouths (see p. 151). On the other hand,

because of their speed and the reliability of their flow, they are of great value as sources of hydro-electric power. Among the chief rivers used for this purpose are the Waitaki and the Waipori in the South Island, and the Waikato in the North Island.

The Waikato, rising on the snow-clad slopes of Ruapehu, flows northwards in its torrent track to Lake Taupo. Issuing from this lake the river dashes over falls formed by a hard bed of resistant volcanic rock. After flowing through wild gorges and over numerous rapids, it reaches the plain, where it winds through small lakes and marshes until it enters the sea by a broad estuary, the entrance to which is blocked, as in the case of so many other New Zealand rivers, by a bar.

The Wanganui rises on the north side of Tongariro and, after running in a northerly direction, turns south. It flows between high perpendicular cliffs in a gorge which is cut below the level of the surrounding plain. This gorge, whose steep sides are clad with luxuriant vegetation, is somewhat more than 80 miles long. In its lower course the Wanganui crosses the coastal plain and enters the sea through a deep estuary. The river flows over numerous rapids, but these do not affect navigation except when the water in the stream is low, and they can be negotiated by river steamers, which thus provide transport into the interior where other transport is not available.

Owing to the proximity of the Southern Alps to the west coast of the South Island the rivers on that side are comparatively short and extremely rapid. The streams on either side of the Southern Alps are fed by the melting snows of spring and early summer, and several of the larger rivers are glacier-fed. A good example of this is the Waitaki, which receives affluents from the Tasman Glacier. The extremely heavy rainfall of the western side of New Zealand increases the volume of water which is carried down by the streams in this region.

Many of the rivers, especially in the southern half of the South Island, have their headwaters in glacial cirques.

They then often flow through narrow gorges and over boulder-strewn beds until their valleys widen out into typically U-shaped valleys, whose steep sides rise up sharply to the gently sloping alpine pastures above. On reaching the plains the streams flow in deep channels which they have cut through the *débris* once brought down by glaciers and streams from the upland regions. In this part of their course terraces often occur which serve to mark the successive levels of the streams. The mouths of many rivers are blocked by bars of sand and shingle. In time of flood the current may sweep the bar away but soon the drift of the waves closes it once again.

The Clutha is not only the largest river in the South Island, but it has also a greater volume than any other New Zealand river. The main stream is formed by two rivers which flow respectively out of Lake Wanaka and Lake Hawea. Later the Kawarau, draining Lake Wakatipu, pours its waters into the Cluthá. Such lakes tend to prevent floods and also to reduce the amount of sediment that the rivers carry to their middle and lower courses. Some 10 miles from its mouth the Clutha divides into two portions, but it unites again and thus forms the island of Inch-Clutha. West of the Clutha is the Waiau, which drains Te Anau and a number of other lakes.

Such lakes as Te Anau, and those drained by the Clutha, are mountain ribbon lakes whose formation is at least partly due to the grooving action of ice ; and like most lakes of the type they are of considerable depth. There are also in the Southern Alps numbers of small rock tarns, perched high up in the mountains, as well as numerous morainic dammed lakes.

#### VEGETATION

A damp climate such as that of New Zealand is specially suited to the growth of trees. At one time most of this country was covered with dense evergreen forests and masses of tangled fern scrub. At present,



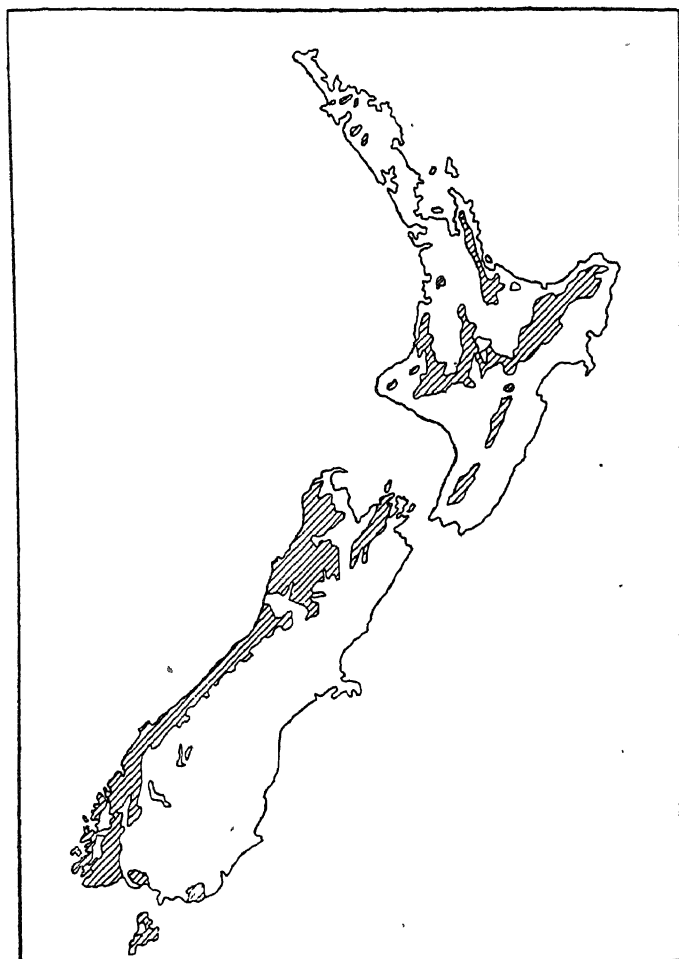
owing to felling, or to the burning of forests to clear land for pasture, only 18 per cent. of New Zealand is still forested. In some areas the clearance of forests in past decades has bequeathed to the present generation a legacy of soil erosion. To-day the most extensive forests are found on the windward slopes of the Southern Alps, notably in the fjordland region, and in the less accessible parts of the Kaimanawa and Raukumara Ranges in the North Island. Elsewhere, stands of forest are found scattered throughout the wetter parts of the country.

Most of the forests may be classed as belonging to the subtropical rain-forest type. Some develop buttress-like supports, whilst round their trunks twine vines and creepers; bushes and shrubs crowd together under the higher trees, and flowering trees and shrubs lend a touch of colour to the more sombre greens and browns of the foliage. In the less elevated forests giant tree ferns spread their graceful fronds as much as 40 feet in the air, whilst in the month of February miles of forest are bright with the crimson flowers of the feathery rata—a creeper that twines around the trees and in time kills them. And yet these luxuriant forests are not hot and steamy like those of the tropics, but their atmosphere resembles rather that of some English woodland.

The North Auckland Peninsula is the home of the kauri pine, which yields valuable hardwood. Unfortunately, the trees were felled by settlers for timber, and burnt by prospective pastoralists, and by seekers of kauri gum who also devastated many acres no longer bearing forests to obtain fossilized gum. However, a sufficient number of stands of kauri remain to give more than a hint of their once much greater extent.

“Where the undergrowth is scanty the stately kauris appear in all their grandeur, their huge shining columnar trunks rising sixty feet, and may-be eighty feet, without a branch, and dwarfing altogether the other trees. High above the general forest tower the great spreading branches, themselves equalling forest trees in size. . . .

In some instances these trees have a circumference of nearly fifty feet when measured six feet from the ground,



FORESTED AREAS OF NEW ZEALAND.

Forested areas are shaded.

and reach one hundred and fifty feet in height. The kauri is a slow grower and it is estimated that the giant tree referred to took root over 2,000 years ago.”<sup>1</sup>

<sup>1</sup> Dr. L. Cockayne: *New Zealand Plants*.

Forests of beech are found both on the mountain slopes and also on the lowlands. Various kinds of pines are common ; timber from the red and the black pines is used for building houses and that obtained from the white pine for making cheese and butter boxes. Introduced pines include the American *insignis* pine, a tree that thrives on the Canterbury Plains where long lines, planted as shelter belts, are a feature of the landscape. Other introduced trees, such as English oaks and Australian eucalypts, do well and frequently attain a height and girth unknown in their original habitats. New Zealand imports much hardwood timber, such as jarra, from Australia, and exports softwoods to that country.

Native grasses once covered much of the slopes of the hills and mountains. The tussock grass grows in clumps which are interspersed with stretches of shorter grass. Much of this native grass has now been resown with English pasture varieties.

There are over a thousand plants in New Zealand that are peculiar to the country. It is interesting to note that the Chathams and the Kermadec Islands both have species that are common alone to them and to the rest of the New Zealand group. A number of plants are found in both Australia and New Zealand, whilst about a hundred are common to the latter country and the South American continent. An important native plant is the New Zealand flax, yielding a fibre from which rope, twine, and coarse cloth can be made. There is a remarkable wealth of Alpine flora and among these plants may be numbered the most beautiful of the flowers in New Zealand.

#### FAUNA

The native animals are few in species and number. Apart from the seal, the only mammals are two kinds of bats. The long-tailed variety is also found in parts of Australia, but the short-tailed bat is peculiar to New Zealand. The Maoris introduced the Maori dog and

the rat, and, though the former is now extinct, the rat still lives in the depths of the forests. There is a great variety amongst the native birds, many of which, such as the kiwi, are quite unable to fly, and the remainder can only rise for short distances. New Zealand is probably the home of the penguin, for there is only one variety which is not found within the country. Starlings, sparrows, and rabbits introduced by early settlers have become so common that they prove pests to farmers.

#### THE MAORIS

When New Zealand was first discovered by Europeans it was found to be inhabited by the Maoris, a people who seem akin to the Polynesians and, like them, to have originated in the Malay Archipelago. The main migration of these people took place about 500 years ago, but smaller bands had visited New Zealand before that date. Their name for the new country was *Ao-Tea-Rua*, the Land of the Long White Cloud. The Maoris were not, however, the first Polynesian race to settle in New Zealand, for before their time a primitive folk, the Morioris, had made their home there. These people were, however, driven out by the Maoris, and at the present time they have entirely disappeared from New Zealand, though a few still survive in the Chatham Islands, some 500 miles to the east.

It is not improbable that the migration of comparatively large numbers of Maoris was due to quarrels at home, as a result of which the vanquished tribes determined to find a new land in which to live. Most of the Polynesians were skilful and daring sailors and thus they were able to undertake a voyage of such magnitude as one from Tonga to New Zealand. They had, for a primitive people, an extensive knowledge of the stars, the winds, and the ocean currents. Their long double-decked canoes were between 100 and 200 feet long and were most seaworthy craft. In boats of this size it was pos-

sible to carry supplies of provisions and to supplement them *en route* by fish. Stoppages were made at various islands for revictualling. On arrival in New Zealand the main tribes beached their canoes at different points along the coasts and established settlements at these places.

Land was held as the communal property of the whole tribe and did not belong to individuals ; the humbler folk had a vested interest in the land belonging to the clan just as much as the chiefs. But whilst the land was in this way common property, yet individual members of the community could own personal property such as houses, tools, food, and clothes.

The villages were usually built on an elevation near the coast or on a bluff overlooking the winding bank of some stream, and thus they were easily defended. As the Maoris depended largely on fish as an article of food, it was necessary that their settlements should be near the water. Around each village, or *pa*, was a stout stockade, whilst large wooden towers some 40 feet in height provided additional protection in time of war.

The houses themselves were built on a wooden framework of totara wood. The thatched roof was high pitched and the walls which were constructed of reeds were low. The floor of the hut was usually sunk somewhat beneath the ground. At one end was a small door and a window. However large the hut might be, there was never more than one door and one window, and thus the ventilation was extremely bad. These huts had no fireplaces or chimneys, for the cooking was done in outdoor ovens.

In addition to fish, they ate the flesh of birds, dogs, and rats, whilst practically their only vegetable was the fern. They were fond of dried shark's flesh, which was cut into strips and dried. Their fishing nets were woven from the fibre of the native flax, whilst the fish hooks were of bone. The Maoris did not understand the use of the bow and arrow, but killed birds by means of spears some 30 feet in length. After battles they used to feast on the flesh of

their dead foes, but it must not be imagined that cannibalism was an everyday practice.

The life of each clan was more or less self-contained : they caught their fish, speared their birds, collected their ferns, tilled little plots of land near the villages, and made their own stone tools and weapons. They had no flocks, and the only animals they knew, apart from wild birds, were the dog and the Maori rat, which the first arrivals had brought with them. Of trade there was none, though there was sometimes an exchange of gifts between the different tribes.

The fibre of the flax provided materials from which kilts and cloaks could be woven, but both the preparation of the fibre and the weaving took a considerable amount of time. The dresses of the chiefs were most elaborate and their mantles of feathers extremely beautiful, and in their gala dress they presented a very striking appearance.

The Maoris vary from light to dark brown in colour, and their black hair is either wavy or straight, but not woolly like that of the negro. Their noses are broad and flat and their lips are thick. The men are sturdy and thick set, with somewhat long bodies and short legs.

Though the practice is rare to-day, *moko* or tattooing was originally carried on as a fine art. The designs took the form of graceful curves and spirals, and in these one may trace the influence of their surroundings : the delicate spirals of the sea-shells or of Nature's own tracery on some tree trunk. The design was first of all drawn upon the client's face and then it was pricked out by needles and a blue pigment was inserted. The process often took months to complete ; but the more elaborate the design, the more was the owner looked up to by his fellows.

During the whole of the time that the tattoo was being done both the patient and the craftsman were sacred or *tapu* ; it was necessary for them to dwell apart from their fellows, and they were not even allowed to feed themselves. This principle of *tapu* was often most inconvenient, for things or people under *tapu* might never be

touched. Public opinion allowed no breaking of tapu, and if this was done the subject would probably be left to perish. Another custom of the Maoris was that of *murū* : if a man suffered disaster his friends would immediately descend upon him and rob him of all his possessions in order to ensure that the disaster was complete.

The Maoris had no written language and their stories, traditions, and songs were handed down by word of mouth. They had, however, a sense of beauty and poetry which they expressed in these stories, songs, and dances. Many told of their origin, and their dances usually depicted some event in their history, and in most of them, as one would expect from their traditions, the sea figured largely. As a rule the performers simply swayed from side to side and changed their position very little ; but they were extremely graceful and intelligent.

It is improbable that the Maori population of New Zealand ever numbered more than 200,000 people. Since the beginning of the present century their number has more than doubled and is now 112,000. Their principal settlements are in the Hot Springs district of the North Island.

The decrease in number was partly due to the physical and moral deterioration which so often sets in when races come in contact with White civilization, for, unfortunately, these peoples seem often to acquire the vices of the white man without assimilating his better qualities. An additional factor in the decline in numbers of the Maoris was their neglect of the most elementary rules of hygiene and sanitation. Their badly ventilated houses, their putrid food, and their lack of washing told on a race whose natural home was in the tropics rather than in a region where the climate was for them somewhat extreme.

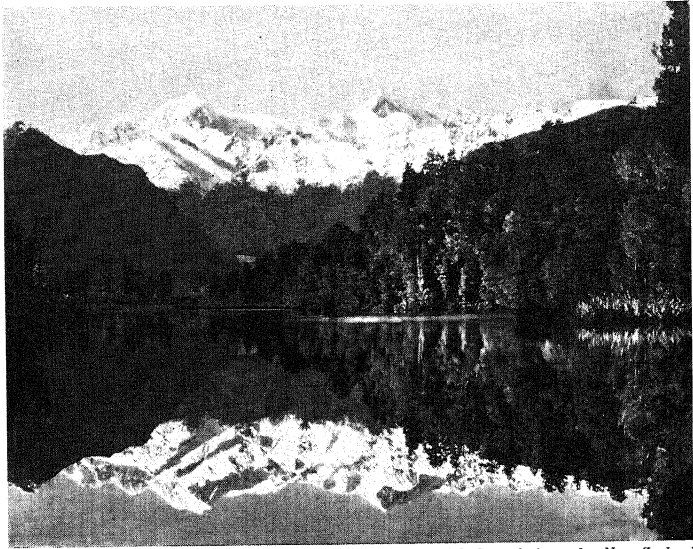
In recent times much has been done to improve the lot of the Maoris. There is a Maori Land Board to administer Native lands and to assist the people to farm their holdings. There is also a Board of Native Affairs, and a Native Land Court, as well as a Native Trustee. In

passing it may be noted that in New Zealand the term *Native* is applied both to full-blooded Maoris and to half-castes. The Maoris elect four Members of Parliament of their own race to the House of Representatives.

There is no colour bar in New Zealand. Maori children are free to attend either the usual schools or special Native village schools. In the latter, emphasis is laid on the teaching of Maori arts and crafts, songs, legends, and history, and on hygiene and elementary agriculture. This training of the younger generation of Maoris should enable this remarkably fine race to play an increasingly important part in the life of the country.

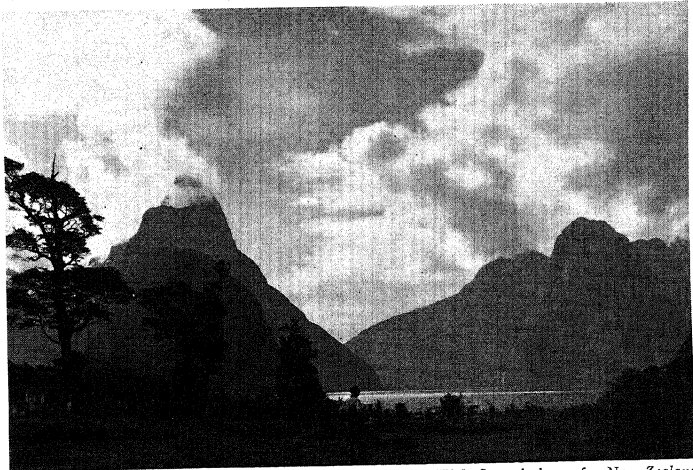


PLATE V



*[High Commissioner for New Zealand]*

A. LAKE MATHESON REFLECTING MTS. TASMAN AND COOK, SOUTH ISLAND



*[High Commissioner for New Zealand]*

B. MILFORD SOUND AND MITRE PEAK, SOUTH ISLAND

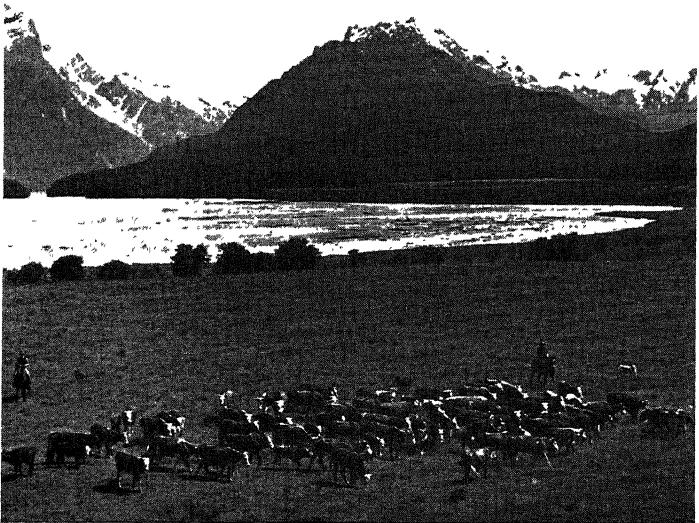
*[To face page 172]*

PLATE VI



*[High Commissioner for New Zealand]*

A SHEEP PASTURES, GISBORNE, NORTH ISLAND



*[High Commissioner for New Zealand]*

B. CATTLE MUSTER, OTAGO, SOUTH ISLAND

*[To face page 173]*

## CHAPTER XV

### ECONOMIC DEVELOPMENT

#### PASTORAL AND AGRICULTURAL ACTIVITIES

THE temperate climate and the fertile soil, coupled with freedom from drought, make New Zealand an ideal pasture country, and it is from the products of the land that the chief wealth of the Dominion lies to-day. In addition to the regions which were originally covered with native grasses, extensive stretches of sometime forest land have been cleared for pasture. In the latter case the bush, as the New Zealand forest is called, is usually burnt and the ground then sown with grass. Over  $17\frac{3}{4}$  million acres have been sown in this way, while the average still covered with native tussock grass is about 14 millions. Farmers are constantly improving their pastures by sowing free grasses. The Government Agricultural Department includes amongst its many activities the improvement of the pasture lands, and farmers can not only obtain information as to the best grasses to sow with a view to improving present pasture lands, but they can also get advice as to the best seed for newly-broken bush or scrub land. Fertilizers, such as lime and super-phosphates, are used in order to improve the soil.

Farming not only provides the basis of New Zealand's prosperity, but is also responsible for the main features of the country's contrasting cultural landscapes. The type of farming naturally varies with the altitude, the climate, and the fertility of the soil. Broadly speaking, sheep farming is carried on in the higher and drier areas, dairy farming in the moister lowland districts. But most dairy farms carry some lambs and sheep, and many sheep stations support a certain number of beef-cattle, partly to eat off the fern and coarse grass left by the sheep.

The introduction of the refrigerator revolutionized agriculture in New Zealand. Before this event the market for such commodities as meat, butter, and cheese was of necessity limited, whereas for cereals it was not. When, however, the farmers were able to secure a market for meat and dairy produce in the United Kingdom they found it more profitable to concentrate on these products than to grow cereals ; and nowadays wheat is imported from Australia to supplement home-grown supplies. Arable farming is confined mainly to the South Island, and more especially to the east of the Canterbury Plains and to certain parts of Otago, where the low rainfall, the sunny summers, and the level nature of the land provide favourable conditions. Wheat is grown chiefly on mixed farms on which lambs, sheep, and beef-cattle are fattened. A typical mixed farm of (say) 400 acres is usually divided into about a dozen paddocks, half of these being under grass or green fodder crops, and the remainder being devoted to wheat though some oats, potatoes, and peas are also grown. The whole routine of the farm is geared to a rotation cropping plan : paddocks are rarely left under permanent pasture but are ploughed up every two or three years and then sown with grain, which is followed in rotation by green fodder crops, more grain, grass, and possibly roots.

Fruit is produced chiefly for the home market, the kind depending largely on climatic conditions. There are many apple orchards in the coastal districts fronting Tasman Bay and Hawke Bay. Citrus fruits, such as oranges and lemons, do well in Auckland, and subtropical fruits such as passion fruit, are cultivated in the northern coastal region of this province.

The table on p. 175 gives the approximate number of sheep and cattle in Australia and New Zealand for the year 1948-49, and also the export of wool and meat, and butter and cheese for the same period. New Zealand has little more than one-third as many sheep as Australia, but exports nearly one-fifth as much wool. And although she

## AUSTRALIA AND NEW ZEALAND COMPARED 175

—	Australia.	New Zealand.
Number of sheep . . .	102,500,000	32,483,000
Number of cattle . . .	13,785,000	4,700,000
Exports :		
Frozen meat . . .	£A22,000,000	£NZ29,000,000
Butter } Dairy . . .	£A20,600,000	£NZ28,800,000
Cheese } produce . . .	£A3,263,000	£NZ11,600,000
Wool . . . . .	£A148,000,000	£NZ31,900,000

has roughly one-third the number of cattle that there are in Australia, yet she exports nearly double the amount of frozen meat. Again, though New Zealand has only 3.7 million cattle against 13.7 million in the larger country, yet her exports of butter and cheese greatly exceed those of Australia. On a post-war average wool accounts for rather more than 30 per cent. of the total annual value of Australia's exports, and nearly 25 per cent. of those of New Zealand. On the other hand, dairy produce (butter and cheese) only amounts to about 5 per cent. of the total value of Australia's exports compared with 32 per cent. in the case of New Zealand.

The chief reason for the greater importance of dairying in New Zealand is that this country has a damper climate than Australia. Dairy cattle, which require rich pasture, thrive in New Zealand, but in Australia, with its drier climate, the rearing of beef-cattle is relatively more important than dairy farming. For a similar reason many Australian farmers breed sheep for their wool rather than for their mutton ; but those of New Zealand rear a higher proportion of sheep capable of producing both mutton and wool.

The increase of scientific and intensive methods is leading to a reduction in the size of the New Zealand farms. The sheep farmer improves his land and is then able to devote a portion to the feeding of milch cows. This greatly increases the value of the land and also

creates a demand for labour : it is generally estimated that one man is required to look after 1,000 sheep, 100 cattle, or ten milch cows. Thus, this sub-division of the farms is leading to increased production and settlement.

#### SHEEP FARMING

In 1949 New Zealand, with about 32,483,000 sheep, was the seventh country in order of world production, and Australia, with over 102,500,000, was first. Great Britain, with some 18,000,000, ranked behind New Zealand. Australia has, however, an area of over 3,000,000 square miles, but that of New Zealand is only just over 103,000 square miles—less than that of Great Britain.

Nearly half the entire land surface of New Zealand is devoted to grazing sheep and, as so much of the land so used is quite unsuitable for any other type of farming, their importance in the economy of the country is obvious.

Their distribution is largely conditioned by relief and rainfall. As sheep do not thrive in regions of excessive rainfall few are found on the wet western slopes of the Southern Alps. In the North Island, apart from the volcanic plateau where flocks are lacking, sheep are fairly evenly distributed, though there is a greater concentration in the hill country than the lowlands. The North Island, with 56 per cent. of the total, carries rather more sheep than the South Island. The chief sheep rearing areas in order of importance are the Wellington and Canterbury Provincial Districts, the downs around Hawke's Bay and Poverty Bay, Otago, Southland, and Auckland. The carrying capacity of the land varies from one sheep to ten acres on the tussock grasslands of the South Island hill country to six or more animals per acre on the sown pastures of the plains. One of the earliest breeds of sheep to be introduced into New Zealand was the Merino, which thrives on upland pastures. But the most important sheep to-day is the Romney, and this constitutes 18 per cent. of the flocks as a distinctive breed, and is the predominating strain in 70 per cent. of New Zealand's crossbred sheep.

In New Zealand the shearing season starts in October in the North Island. Shearing is specialized work, and the shearers travel from one farm to another. Expert shearers may commence in October in the North Island and work southwards through the country until March. The shearing is carried out by machinery, and a skilled machine shearer can shear over 350 sheep in eight hours.

After the sheep have been sheared, the wool is carefully sorted and graded and is then packed into bales and sent to the market. During the last war Britain purchased the whole of New Zealand's wool clip and she still buys the bulk of her output. Much is sent to the *entrepôt* port of London from which it is re-exported. The wool destined to supply the Yorkshire mills is forwarded either to London or to Hull, Liverpool, or Manchester.

The slaughtering of sheep, for the meat market, begins in November and lasts until mid-winter (June). As a rule the companies either buy the stock alive on the farm or by weight after the carcasses of the animals have been frozen. The meat has to satisfy the Government standards before it can be exported, and thus the deservedly high reputation of New Zealand lamb and mutton is maintained.

The refrigerator ships can usually carry from 70,000 to 100,000 carcasses. These steamers generally call at a number of ports before starting on their 12,000 miles journey to the British Isles or to other countries.

An important fact which contributes to the success of sheep farming is the utilization of by-products. The skins of the sheep are tanned for leather, the horns and hoofs can be used for buttons, etc., the fat can be turned into tallow for making soap and candles, the trimmings of the skins can be sent to the glue factories, from the intestines sausage casings are manufactured, and even the blood has a market value as manure. In a recent year the total value of these by-products somewhat exceeded £12,000,000.

The profits made by modern industry often depend on

the adoption of similar methods to those employed by these sheep farmers, and it is by employing up-to-date methods that the high standard of living demanded by the New Zealand worker is maintained.

#### DAIRY FARMING

Of New Zealand's 4,700,000 cattle, about  $1\frac{3}{4}$  million are dairy cows of which 80 per cent. are grazed in the North Island, where the chief dairying districts are the lowland areas of Taranaki, the Waikato, and those around the Bay of Plenty. The rainfall is ample, and the mild winters make it unnecessary to house the animals, or to supplement the pastures with other fodder since even in the coolest months the growth of grass is seldom arrested.

The milking is done by machinery. The machines are worked by electricity or by oil engines, and in this way two or three men can milk about 100 cows twice a day in some three hours. On the majority of the farms the milk is separated by hand-separators and the skimmed milk thus obtained is used for feeding calves, pigs, etc., whilst the cream is taken to a central factory. This method not only reduces the cost of transport by decreasing the bulk to be carried, but it is found that the cream arrives at the factory in a much better condition than does unseparated milk. Nearly three-quarters of the factories are run on co-operative principles and they are owned by the farmers who supply them. This co-operative method, which is largely practised throughout New Zealand, does much to reduce overhead charges.

After the butter has been made, it is packed in boxes, each of which contains some 56 lbs. It is kept in freezing chambers at the factory and at the port of shipment. At the latter place both the butter and cheese are graded and are stamped with the "New Zealand Produce" Government mark. They are then sent in ships fitted with cold storage rooms to their destination which is, in most cases, the British Isles. In addition to butter and cheese, dried



and condensed milk and casein are also manufactured. Of the total amount of butter and cheese produced in New Zealand about one-fifth is used for home consumption.

#### FISHERIES

The fisheries of New Zealand are as yet little developed. The total number of persons engaged in the industry is less than 1,500 and the total annual value of the catch is only about three-quarters of a million pounds. There is, however, an abundance of edible fish around the coasts, and with proper organization the future of the industry should be a profitable one. The east coast grounds are the only ones that have as yet been tapped, whilst deep-sea fishing has been entirely neglected.

The principal edible fishes are bottom species, such as flounders, and line fish, such as blue cod and gropers. The river fisheries are developed chiefly as a means of sport rather than for purely commercial motives. There are important oyster beds in Foveaux Strait as well as on the east and west coasts of the Auckland Peninsula. For a considerable period attempts were made to introduce Atlantic salmon into New Zealand waters, but it was not until comparatively recently that these efforts met with success. In 1908 the Government made a determined effort to establish salmon in New Zealand, and in that and subsequent years large numbers of eggs were introduced from Canada and England. A hatchery was started on the Waiau. As a result of prolonged and careful experiment the fish have been established and are increasing rapidly.

Whaling, at one time an important industry, has greatly declined and there is now only one shore station, this being situated in Queen Charlotte Sound.

#### THE TOURIST TRADE

Those tourists and sportsmen who visit New Zealand are more than rewarded, since few other countries in the

world can show, in so comparatively small an area, such a wide range of attractions as does this Dominion for those in search of pleasure, health, or sport. Its varied scenery ranges from the snow-clad peaks and glaciers of the Southern Alps, from deep-set lakes, swiftly flowing streams, and winding fjords, and from the dignity and luxuriance of its forests to those wonderful hot springs and geysers of the volcanic district of the North Island. These springs are remarkable not only for their thermal activity, but also for their curative powers.

The Southern Alps, though not reaching the height of their Swiss namesakes, are yet far higher than any mountains in the British Isles, and they provide a field of adventure worthy of the hardiest mountaineer. The sounds of the southwest are perhaps some of the most beautiful in the world, and here the lover of Nature may feast both eye and mind amidst winding inlets, whose lower slopes are clothed with tangled forest and whose sides are seamed with foaming torrents and dashing waterfalls.

Many of the rivers and lakes are well stocked with fish, of which trout, originally introduced from the British Isles and North America, are the most common. The trout fishing of Lake Taupo is probably among the best in the world.

To those sportsmen who prefer a gun the country offers plenty of shooting ; pheasants and quail abound, and in such districts as Wanganui in the North Island, or in Westland in the South Island, it is possible to get excellent deer stalking.

The people of New Zealand are, like those of Australia, extremely fond of horse racing ; the meetings are usually attended by large crowds and the Government derives a considerable revenue from the totalisator. Of other forms of sport Rugby football is probably the first in public favour, but, as one would expect in a land with so genial a climate, all kinds of outdoor activities—camping, motoring, boating—are extremely popular.

## MINERAL PRODUCTION

The number of mineral deposits in New Zealand is considerable, but, except for coal, gold, and some iron ore, the economic value is not great. Coal—ranging from anthracite to brown coal—occurs in a number of regions. The coal mined in this area is of a remarkably high quality and ranks amongst the best in the world. Westport, at the mouth of the Buller River, is the principal coal-exporting port in the Dominion, and Greymouth, farther south, has also a considerable coal trade. 2,775,886 tons of coal were mined in New Zealand in 1948, and about nine-tenths of this amount was consumed in the Dominion itself.

Since the first discovery of gold in 1853, New Zealand has produced over £100,000,000 worth of this metal. The output has, however, shown a great decline since 1940, and the average annual yield is less than £1,500,000. To-day the bulk of New Zealand's gold is won by dredging, costs being reduced by cheap hydro-power. The principal scene of operations is the west coast of the South Island. Some alluvial mining is also carried on in this area and in Otago and Southland, but the total yield is small. Gold is obtained by quartz mining at such places as Waihi in the Coromandel Peninsula, and from the Hauraki Goldfield. In the latter field it is found alloyed with silver.

There are extensive deposits of iron ore and of iron sand in New Zealand, but at present production is very limited, and it has not yet been found possible to obtain iron from iron sand at an economic rate.

For decades many acres in the Auckland Peninsula have been pitted by kauri-gum diggers. This product, obtained from the ground in a fossilized state, is classed as a mineral. The gum is chiefly used in the production of varnish and linoleum. The best grades are used for making the former, whilst the lower are used in the manufacture of the latter. The output of this commodity

is now small, and the average value of the gum does not exceed £100,000 a year.

#### HYDRO-ELECTRIC POWER

Probably no other country of similar area in the world has such great reserves of hydro-electric power as New Zealand. The mountain streams and the vast amount of water stored in the upland lakes represent stores of potential energy whose value it is difficult to estimate. These great natural resources are being gradually developed under Government control, and wide and far-reaching schemes have been planned, and are being taken in hand, in order to cope with the demands of the future. The right to develop hydro-electric power is vested in the Crown, but the latter has power to grant a licence to local authorities, private companies, and individuals. Electric power boards, with wide authority over the general development of the industry, have been set up throughout the Dominion.

There are numerous plants in all parts of the country and both urban and rural areas are supplied with electricity. There are to be, however, three main hydro-electric plants in each island. In the North Island the principal power stations are those at Arapuni and Karapiro, both on the Waikato River, whose total output is somewhat more than 200,000 kilowatts; and on Lake Waikaremoana, where there are three stations with a combined output of 92,000 kilowatts.

In the South Island the main plants are at Lake Coleridge; Highbank, on the middle Rakaia River; and on the Waitaki River, near Kurow. These three stations have an installed capacity of 120,000 kilowatts; and there is another at the Waipori Falls, which supplies Dunedin with electricity.

The cost of these schemes has proved considerable, but the advantages obtained thereby in the development of the Dominion have more than compensated for the initial

outlay, and the ultimate saving has been very great. It is now possible to provide electricity at a very cheap rate, and town dwellers, factory owners, and transport companies benefit, as well as rural industries. The extension to rural areas is of great importance, since anything that tends to increase the amenities of country life is of great benefit to the State in general. There is no doubt that hydro-electric power is one of New Zealand's greatest assets, especially as the country is not particularly well endowed with coal.

#### MANUFACTURES

In a young country such as New Zealand manufactures, apart from those connected with the preparation of primary products, are not of first class importance. Most of the population is engaged in primary production, based mainly on pastoral activities connected with sheep farming and dairying. Owing to the comparatively small population, there is a great demand for labour, and consequently wages are high. Therefore, unless the other costs of production are extremely low, an improbable supposition, manufactured goods will be unable to compete in the world markets. Capital, too, is put into the primary industries, where it is more certain of a substantial return. There is, however, a noticeable tendency to produce goods wherever possible in the country itself and secondary industries have grown considerably ; but manufacture, as it is known in the large, populous towns of older countries and in the United States and Eastern Canada, has not yet placed its impress upon any New Zealand city. The Dominion manufactures clothing, boots and shoes, textiles, motor-car bodies, and electrical equipment, as well as agricultural machinery and chemical fertilizers. These industries have been greatly stimulated by the development of the country's hydro-electric power resources.

## TRADE

In 1947 the total exports of New Zealand were about £127,000,000 and her imports were £128,000,000, thus showing a fairly even balance of trade. The exports per head were nearly £70, ranking as the highest in the world. In considering the import and export trade one must, however, remember the invisible imports in the shape of the capital so needed to develop the country, interest on investments outside and money brought in by immigrants, tourists, etc. Owing to geographical isolation there is little *entrepôt* trade.

Practically the whole of the exports consist of primary produce dependent on the pastoral industries, the chief being wool, butter and cheese, frozen lamb and mutton, hides, skins, and tallow. These have already been discussed, but, in this respect, it is interesting to note the seasonal variation of the export trade, which shows a great increase in the summer months. The peak is reached in January-February, whilst the lowest months are the winter ones of August-September.

In 1948 over 75 per cent. of the export trade of the country was with the British Isles, and New Zealand's next best customers were the United States of America, France, Australia, and Canada.

In the same year manufactured, or mainly manufactured, articles accounted for nearly 60 per cent. of the total value of the imports. Of all imported goods, those from the United Kingdom were about 43 per cent. of the total. In 1947 New Zealand imported goods to the value of £23,000,000 from the United States and these included tractors and other machinery as well as petroleum; nearly £15,500,000 worth from Australia, wheat and cane-sugar ranking high on the list; and over £11,500,000 from Canada. India and Pakistan supplied produce valued at £4,600,000, the chief items being bags and sacks, floor coverings, and tea; Ceylon goods to the value of £1,950,000

including tea, rubber, and cane-sugar ; and much cane-sugar was also imported from Fiji, whose total exports to New Zealand were valued at £2,250,000. Imports from Persia were valued at £1,800,000, petroleum being the leading product.

There is a tariff on imports, and the Government grants a preference to British goods and, in some cases, admits them free of duty.

#### TRANSPORT, TOWNS, AND POPULATION

The importance of adequate transport in the development of a country can scarcely be over-estimated, for transport is the life blood of modern industry. It is largely through her excellent overseas transport system that New Zealand has attained her present position in the world trade of today. Though one is sometimes apt to regard one of the chief duties of transport as the carrying of people from one place to another, yet most of the great steamship and railway lines depend for their trade on the goods they convey rather than on their passenger traffic. It was the introduction of up-to-date steamers with refrigerators that revolutionized the trade of New Zealand and made it possible for her to send her otherwise perishable goods all over the world.

In the early days of settlement such local trade as there was between the towns was mostly carried on by small coastal steamers, for railways were non-existent, and it was not until 1860 that the first line was constructed. Little further progress was made until the Railway Act of 1870, which laid down a well-thought-out policy. After this date development was comparatively rapid, and by the year 1876 over 700 miles of railway line had been built. At the present time there are over 3,000 miles of railways in New Zealand : in Great Britain there are over 20,000 miles. The New Zealand railways are State-owned.

There are local steamer services between various ports, of which that between Wellington and Lyttelton is the

chief. Boats run every night in the week, except on Sundays, and the time occupied over the journey is about ten hours.

Steamers link New Zealand with the British Isles, Australia, North America, and other parts of the world. Owing, however, to the great loss of tonnage during the last war, services are much more restricted than in pre-war years, and it will undoubtedly be some time before sailings are normal.

The regular steamer service between Vancouver, Honolulu, Suva (Fiji), Auckland, and Sydney was resumed in September 1947. There are other services between New Zealand and Australia, but at present they are rather infrequent and it is much easier to obtain a passage by air.

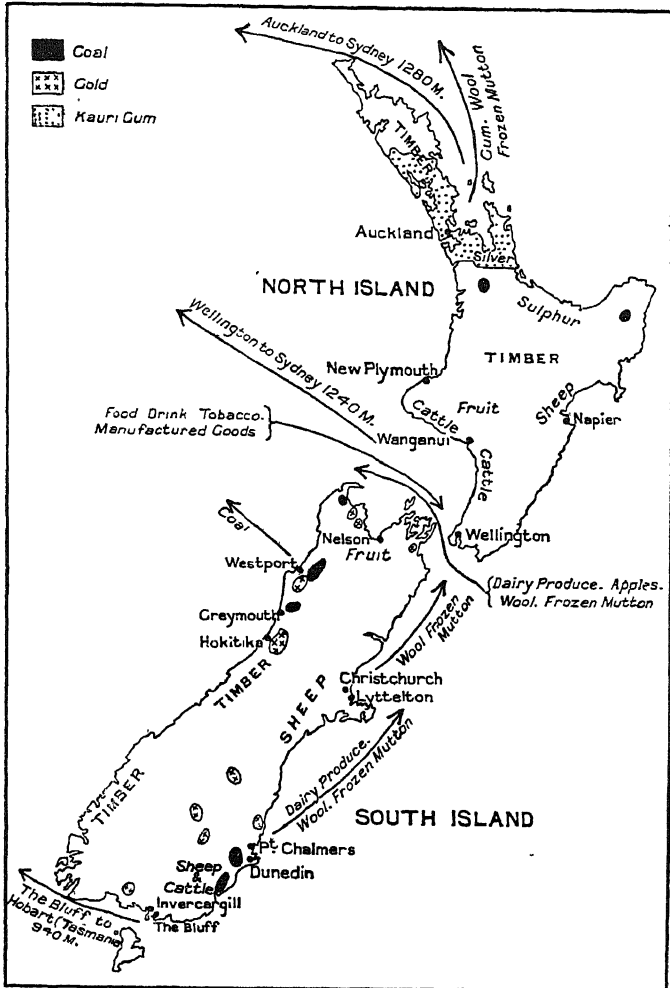
All the chief New Zealand towns are linked by air, and there are also overseas services. By air Auckland is 9½ hours from Sydney, whence it is another 4 days to London. From Auckland to San Francisco and Vancouver the time taken is about 2 days.

The two chief ports of the country are Wellington and Auckland. The former is the premier port as regards total tonnage of shipping, but Auckland handles a somewhat greater volume of the export trade. Standing on the peninsula that links the northern and southern portions of the North Island, Auckland has an excellent position for trade. It collects much of the produce of the northern part of the Island, and to it are sent wool, dairy produce, fruit, and frozen meat. In addition to its harbour on the east side of the Island the town is connected by rail with Onehunga, some eight miles away, standing at the head of the Manukau Harbour on the west coast. The railway to the south links Auckland with Wellington.

Wellington stands on a magnificent hill-girt harbour in the south of the North Island. Its central position makes it well placed to be the capital and leading commercial centre of New Zealand. Apart from steamer and air connections with other parts of the country, it is the southern terminus of the North Island railway system. A



line serving the west coast area passes through the inland town of Palmerston North (30,100), a pastoral centre and



ECONOMIC PRODUCTS AND CHIEF TOWNS.

the port of Wanganui (28,200), to New Plymouth (22,000), the principal town and port of the Taranaki lowlands.

Another railway striking northeast runs through Hastings (22,200), with large sale-yards and a canning factory, and Napier (22,300), a port and commercial centre on Hawke's Bay, to Gisborne (18,500), the outlet for the pastoral district around Poverty Bay.

The chief towns in the north of the South Island are Nelson (18,200), an apple-collecting centre on Tasman Bay, and Blenheim, the capital of Marlborough. A railway connects Lyttelton, on a sheltered harbour, with nearby Christchurch, the largest town in the South Island. Founded as a Church of England settlement, Christchurch still presents many of the features of an English county town. It is a well-planned city, with broad streets, squares, and gardens, and it is, at the same time, the chief industrial centre of New Zealand. Here are situated works for the manufacture of railway rolling stock, agricultural implements, woollen and leather goods, and many other articles.

Since the opening in 1923 of the Otira tunnel, Christchurch has been connected by rail with the Westland district. This trans-montane line passes through some of the finest scenery in the Dominion. The tunnel through which the railway runs is the seventh longest in the world and the longest in the British Empire, and this section of the line has been electrified. Greymouth, where the railway reaches the west coast, is a small coal and timber exporting port, and Westport, farther north, is the chief coal port of the country, the mineral obtained from this region being of a remarkably high quality.

South of Christchurch the railway runs across the Canterbury Plains through Timaru (22,100) to Dunedin. Founded as a Scottish settlement, Dunedin is picturesquely placed on hills at the head of Otago Harbour, a sinuous inlet that requires dredging to keep it open for shipping. On it stands the outport of Port Chalmers.

Invercargill (30,000), the chief town of Southland, still bears the impress of the early settlers who laid it out in square blocks, with exceptionally broad streets to facili-

tate the housing of their wagons and bullock drays. Its recent history, marked by steady development, reflects the growing prosperity of a countryside concerned partly with dairying and growing oats, but mainly with the production of wool, lamb, and mutton. It is 17 miles from its port of The Bluff, on Foveaux Strait, on the south side of which lies the thickly forested Stewart Island.

In the early days of settlement the number of inhabitants in the North Island exceeded that in the South Island. Gradually, however, the number of people in the former island grew somewhat less and the greatest population was found in the South Island. The Maori Wars of 1860-1870 had much to do with retarding the development in the North Island. In 1901 it was found, however, that this latter area had once more the greater population, and since this date it has retained its lead. Today about 67 per cent. of the 1,834,000 people in the Dominion live in the North Island.

Somewhat more than 40 per cent. of the people are found in the four chief centres of Auckland, Wellington, Christchurch, and Dunedin, and 55 per cent. of the inhabitants live in urban areas. It must not, however, be forgotten that in many of the smaller urban areas the people are largely engaged in agricultural pursuits. In the decade preceding the war of 1939-45 there was a marked decrease in the drift to the urban areas, but since the war there has been an increase in the urban population.

There are no really large towns in New Zealand like Sydney or Melbourne in Australia, but like those in the latter country most of the larger New Zealand towns are ports or are situated close to the sea. Auckland has a population of 290,000, Wellington of 186,000, Christchurch one of 164,000, Dunedin of 88,000. Of the remainder four—Invercargill, Palmerston North, Hamilton and Wanganui—are around the 30,000 mark, four more—New Plymouth, Hastings, Napier, and Timaru—are in the neighbourhood of 22,000, and two—Gisborne and Nelson—have a population of somewhat more than

18,000. There are five towns with about 10,000 inhabitants, and nine with between 10,000 and 5,000. The secondary towns are widely distributed, and though most towns have increased in size since the beginning of the present century, there does not appear to be any likelihood of an undue concentration of the population in some particular district, such as there is, for example, in the industrial regions of the British Isles.

## CHAPTER XVI

### POLITICAL AND SOCIAL DEVELOPMENT

#### DISCOVERY AND SETTLEMENT

TASMAN'S discovery of New Zealand was merely nominal. On sighting the Southern Alps, he had cruised northwards and anchored in Golden Bay at the eastern end of Cook Strait. After an encounter with the natives, he had set sail with the intention of exploring the Strait, but adverse winds had driven him back. He had therefore continued his way northwards and at the North Cape had taken leave of his latest discovery, to which he had given the name of Staten Land. The Dutch Government had not followed up his exploration, and for over a hundred years New Zealand remained forgotten.

Cook's arrival at Poverty Bay in 1769 was the second and practical discovery of the group. But for a long time little attention was paid to New Zealand by the British Government. However, with the settlement of Australia, British seamen increasingly visited the waters around New Zealand for the purposes of whaling and sealing. Many of these seafarers founded settlements, especially on the North Island. The natives, though warlike, were quite willing to trade, and such things as axes were in especial demand, for until this time iron was unknown to the Maoris, who had lived in a Stone Age, but they were very quick to perceive the advantage of an axe over a weapon made from stone. The seamen found that such things as kauri pine masts fetched a very high price in Sydney. A trade, too, rose up in tattooed heads, but this gruesome traffic was ultimately suppressed.

In 1814 the Rev. Samuel Marsden, a missionary, came to New Zealand and landed at Whangaroa—a spot at

which there had been a massacre some five years previously. Though for a space of nearly ten years no converts were made, yet the example of the missionaries had such an effect on the Maoris that slavery and cannibalism were almost abolished. The missionaries also introduced a system of writing for the Maori language. For a considerable time they were opposed to the annexation of the country and thereby caused much feeling at times between themselves and the early settlers.

Meanwhile the musket had been introduced, and in the tribal wars which persisted from 1818 to 1835 it caused a large reduction in the native population.

In 1833 New Zealand was nominally joined to New South Wales, and a resident officer was appointed ; and some six years later the New Zealand Company was founded. The chief personality in the company was Colonel Edward Gibbon Wakefield. He had been unfortunate in his private life, but he was one of the few people who had the vision to see the great future that lay before New Zealand and in the British Empire in general. The officials of the Colonial Office and the authorities of the Church Missionary Society opposed Wakefield and his plans. Unable to obtain help or even encouragement from the Government, the New Zealand Company, with Wakefield's advice, resolved to send a pioneer party to New Zealand under the leadership of Wakefield's brother. Large tracts of land were secured in the neighbourhood of Cook Strait and soon, even before a report was received from the pioneer party of the Company, fresh settlers were dispatched to the country. This first band of real settlers arrived in their new home in January 1840 and took up their abode round Port Nicholson on Cook Strait.

At last the Home Government decided to annex New Zealand, and Captain Hobson was detailed to carry out the work. By the Treaty of Waitangi, which was signed in May 1840, the Maori chiefs of North Island acknowledged British sovereignty and a few months later the South Island also passed under British rule. On the

signing of the Treaty the Governor issued a proclamation stating that no land purchases from the Maoris would be recognized unless they had been carried out under Government sanction. This proclamation was really aimed at land speculators, many of whom had obtained grants of land from the natives by very questionable methods. But the result was great confusion. Many of the colonists who had purchased the land from the New Zealand Company, in perfect good faith and at high rates, were now deprived of it. After much delay the New Zealand Government cut down the amount of land which Wakefield had bought on behalf of the Company from 20,000,000 acres to something under 300,000.

Hobson established the capital of the new state at Auckland in the North Island. The town was situated in an excellent strategic position on the peninsula joining the two portions of North Island. This was not, however, the reason for Hobson's selection, for owing to his dislike of the New Zealand Company the Governor did not wish to make Wellington, the town which the company's colonists had founded, the chief town. Later the capital was moved to the latter town which, on account of its central position, proved the most suitable place for government.

The weak policy of Governor Fitzroy, who succeeded Hobson, led to native risings and in 1844 there was a serious outbreak of fighting between the colonists and the natives. This was settled by Sir George Grey, who was sent to replace Fitzroy. After peace had been restored Grey saw that if the natives were to remain contented they must be occupied, and he employed many of them at good wages on works of road construction. Grey also bought large tracts of land from the Maoris and did much to settle outstanding land questions. He made a study of the native tongue and traditions and gained a very considerable insight into their character. He was much helped by Bishop Selwyn, who also did a remarkable work in carrying out the organization of the Episcopal Church in New Zealand.

Meanwhile, Scottish Presbyterians established a settlement at Dunedin in 1848, and in 1850 English Churchmen founded Christchurch. In the early days there was, owing to lack of roads and difficulties of transport by sea, little communication between the various settlements, though with the advent of steam and the making of roads these difficulties gradually disappeared.

In 1850 the New Zealand Company surrendered its charter. It had had to face discouragement and opposition throughout its career, and though it did not appear at the time to have been a great success, yet it was the early colonists sent out by the Company who laid the foundations upon which the young State grew and prospered.

During his term of office, from 1845 to 1853, Sir George Grey did much to establish the young colony on a firm basis and to prepare the way for self-government, which was granted in 1852 and which became effective in 1854, a year after Grey had retired.

In 1860 land troubles again broke out. The immediate cause was a dispute between the Government and one of the native tribes over a matter of land purchase in the Waitara district in the west of the North Island. The real reason which underlay the dispute was, however, the fear of the Maoris that the white settlers would soon acquire all their lands. War broke out and intermittent fighting continued until 1870, when the struggle at last ceased, and peace was finally restored between the white and the native races.

#### GOVERNMENT AND ADMINISTRATION

As one of the Dominions which compose the commonwealth of nations known as the British Empire, New Zealand forms a self-governing unit. In 1907 the designation of the country was changed from the Colony of New Zealand to that of the Dominion of New Zealand.

By the Constitution of 1852 the government was vested



in a Governor, representing the British Sovereign, and the General Assembly. The latter consisted of two chambers—an upper one known as the Legislative Council and a lower one termed the House of Representatives. There were also to be six Provincial Councils.

The Legislative Council is a nominated body and consists of thirty-four members. Before 1891 they were appointed for life, but since that date the period of office has been limited to seven years, though members are eligible for re-appointment. The Governor is also empowered to appoint not more than three Maori members. In 1914 an act was passed which made provision for an elective Legislative Council to be set up at some future date, but this act has not yet been implemented.

The House of Representatives is a popularly elected body. It has eighty members including four Maoris. The whole adult population is entitled to vote. The country is divided into single-member constituencies, which are adjusted after each five-yearly census. There are four electoral districts for the Maori population, who are not allowed to be registered on the ordinary electoral roll. The term of Parliament is fixed for three years.

Each House is presided over by a Speaker, and members receive a salary and free railway passes. As in Britain, the power of the purse is vested in the popularly elected House.

The Provincial Councils were necessary in the early days, when difficulties of communication made it impossible for a central government to function properly. But when settlement increased and it became obvious that development ought to proceed on national rather than on provincial lines, they were swept away, being formally abolished in 1875. The Local Government of New Zealand is now carried out through counties, boroughs, and independent town districts. There are also a number of Boards which manage the roads, water supply, land drainage, hydro-electric power, etc.

New Zealand is one of the most advanced democracies in the British Commonwealth, and yet, at the same time, it prizes the connexion with Britain more than most. There are no other countries in the Commonwealth, except the United Kingdom, where the State itself directly controls so many activities.

Of these the railways are one of the most important, and as in other countries, especially in those which are not yet fully developed, they form a vital factor in promoting settlement and trade and in increasing land values. As in the British Isles, the posts and telegraphs are worked by the State as well as such services as education and public health. There is a State Hydro-electric Department and a State Life and Fire Insurance Company. The Government has a special department for advancing loans to settlers and to local authorities. New Zealand was the first country to introduce old age pensions, whilst at a later date widows' pensions were also given. There is, in addition, a system of family allowances : grants are made to parents whose means are limited and who through this reason would otherwise be prevented from providing a proper up-bringing for their children.

Both primary and secondary education are free, secular, and compulsory; and pupils who qualify for a university course receive a grant for tuition fees. Every effort is made to provide education for children in isolated districts. Free passes are given on the railways, and Local Education Boards are empowered to provide free transport, where necessary, by school buses. Grants are also given to pay for the board of children who are obliged to live away from home in order that they may attend school. Since 1922 a system of correspondence lessons for children living in particularly isolated areas has been organized by the Education Department: This system has proved quite successful.

The University of New Zealand was formerly an examining and controlling body only, to which were affiliated four colleges situated respectively at Dunedin,

Christchurch, Wellington, and Auckland. By the Act of 1926 its constitution was altered and these colleges became university colleges. Each of the four in addition to providing the ordinary university education, specializes in some particular branch. There is, for instance, a School of Mines at Auckland and an engineering school at Canterbury. There are also a number of agricultural colleges. All the institutions receive an annual grant from the Government, which helps to meet their expenses. And the clever child, otherwise handicapped by lack of means, is able to climb the educational ladder from the bottom to the topmost rung.

The educational system of New Zealand may be regarded as typical of a country where there is, so far as is humanly possible, equal opportunity for all; where there are no leisured classes and few class distinctions; and where there is no hereditary aristocracy, and few cases of excessive wealth.

#### THE PEOPLE OF NEW ZEALAND

New Zealanders often call their country "The Britain of the South," and of all the Dominions this outpost of our Commonwealth is certainly the most British, for 98 per cent. of her population is of British descent.

Like the Mother Country, New Zealand is an island group, but, whereas the former lies in the centre of world trade routes, the latter is situated on the outskirts; the Mother Country is a highly-developed land with a large surplus population, whilst the daughter is a youthful state with empty spaces that need peopling.

And it is probably because of her isolation that New Zealand fully realizes the advantage, one might say the necessity, of Commonwealth tie. She is fully conscious of her own individuality and refuses to be regarded as an outlying portion of Australia, stressing in this respect her position as a completely independent and self-governing dominion of the British Commonwealth. In this she is right, for she lies some 1,200 miles eastward of the larger

country, and, though many of her problems may resemble those of Australia, yet she feels that she must settle them in her own way.

Never was New Zealand's attachment to the Mother Country more in evidence than during the wars of 1914-18 and 1939-45. In each of these about 10 per cent. of the total population served in the Armed Forces, and distinguished themselves on many fronts.

To New Zealand have come settlers from all parts of England, Scotland, and Ireland. There is, it is true, a Scottish element around Dunedin in the south, an English around Christchurch, and various Irish elements in many of the mining centres ; but all these stocks have blended together in a greater degree in New Zealand than in the British Isles. The relative isolation of their country has helped to develop in the New Zealanders an independent spirit, and their close contact with the land has stimulated in them a love of freedom.

New Zealand owes much to the early colonists of the New Zealand Company who established themselves around Port Nicholson in 1840 and to the Scottish and English settlers who made their headquarters in the South Island, for nearly all these early pioneers were men and women of sterling character, foresight, and vision, and their descendants have played no small part in the building up of this new land beyond the seas.

Unlike Australia, the Dominion of New Zealand lies outside the tropics, and therefore the whole of her lands are climatically suited to white settlement. Thus, the difficult problem of the development of extensive tropical areas, such as are found in the more northern portion of Australia, fortunately does not arise.

The people of New Zealand, like the Australians, are determined that their country shall be a white man's land, and they do not allow non-Europeans (*i.e.*, those who are not of white descent) to settle within their boundaries. Since 1861 somewhat more than half a million people, mainly of British extraction, have migrated to New

Zealand. In the early pioneer days the colony relied largely on immigration to augment the population. Since the 'seventies, however, the increase in population has been chiefly due to natural causes, namely the excess of births over deaths. In recent decades immigration has contributed little towards increments in population. In 1926 the excess of immigrants over emigrants was 11,800, but during the world trade depression of 1931-35 there was actually a net exodus from New Zealand of nearly 10,000 people. In 1936, when economic conditions began to improve, a small inward flow was again resumed, but chiefly owing to war conditions scarcely more than 14,000 settlers entered New Zealand between 1936 and 1945. Since the end of the war the total number of immigrants has been small, and has not exceeded 5,000 persons in any one year. Thus as regards immigration in post-war years, New Zealand presents a marked contrast to Australia, where, largely owing to the determination of the Government to increase the population of their country, there has been a steady flow of settlers, the majority coming from the British Isles.

The question of the native Maori race is not a serious problem when one compares New Zealand with such countries as South Africa or even with the United States of America. The Maoris are comparatively few in number (109,000) and they have been, in recent years, a peaceful race. At one time it appeared that they were rapidly dying out, but fortunately this is no longer the case. There is no real colour question in New Zealand in the sense in which the phrase is usually understood.

As compared with the British Isles, the climate is on the whole milder, and there is much more sunshine. Thus, the people live more of their life in the open air than do the average British folk. These facts help to make the New Zealanders a healthy stock, and a visitor from England is at once struck by their tanned appearance. Few live far from the sea. Many have their homes beside it and the crash of the Pacific breakers upon the

shore is ever in their ears. They are great swimmers. They are also great sportsmen : cricket, Rugby football, and horse-racing are among their main pastimes. But most of them work hard, and the output per head of the farming community is one of the highest of any country in the world.

The main business of the New Zealanders is the development of the land, and they are, as a nation, in the primary stage of production. The comradeship of the land produces a sense of equality, and in New Zealand the democratic way of life is seen to the best advantage. The social services are among the most advanced of any nation in the British Commonwealth. In short, New Zealand is outstanding as a "welfare state", and no other country provides a better example of Government "of the people, by the people, for the people".

PLATE VII



[High Commissioner for New Zealand

A. A MAORI STUDY AT ROTORUA, NORTH ISLAND



[High Commissioner for New Zealand

B. AUCKLAND, WITH DEVONPORT AND RANGITOTO ISLAND IN BACKGROUND

[To face page 200

PLATE VIII



[Dorrien Leigh

A. THE INTERIOR OF NEW GUINEA

One of the countless bywaters which run into the Fly River, and which are the only means of penetrating the dense jungle.



[Dorrien Leigh

B. HAWAII: COAST OF KAUAI



# THE PACIFIC ISLANDS

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## CHAPTER XVII

### THE PAPUAN REGION: PHYSICAL CONDITIONS

THE region here named Papuan is taken to include a large number of islands, some of which show an affinity with the Australian continent, while others are more closely related to Asia. Geologically and biologically, it is difficult, if not impossible, to mark a definite line of division between the two continents. The structural movements which first separated them have left so narrow a gap between, that the animal and vegetable life from each side has mingled to form a broad transition belt. The migrations of men have been equally facilitated, and settlement has led to a widespread mixture of race and culture. Structurally, it is an area of unrest, and the surface of the earth's crust above and below sea level is far from being settled to permanent stability.

#### STRUCTURE

Till near the end of the Mesozoic epoch Asia and Australia were united in one land mass; but during the Cretaceous period (to which the chalk of the English Downs belongs), and in the Eocene period, volcanic activity was widespread in Africa, India, Australia, and America. Then, after an interval of rest, volcanic eruptions and earth movements on a large scale recommenced during the Miocene period.

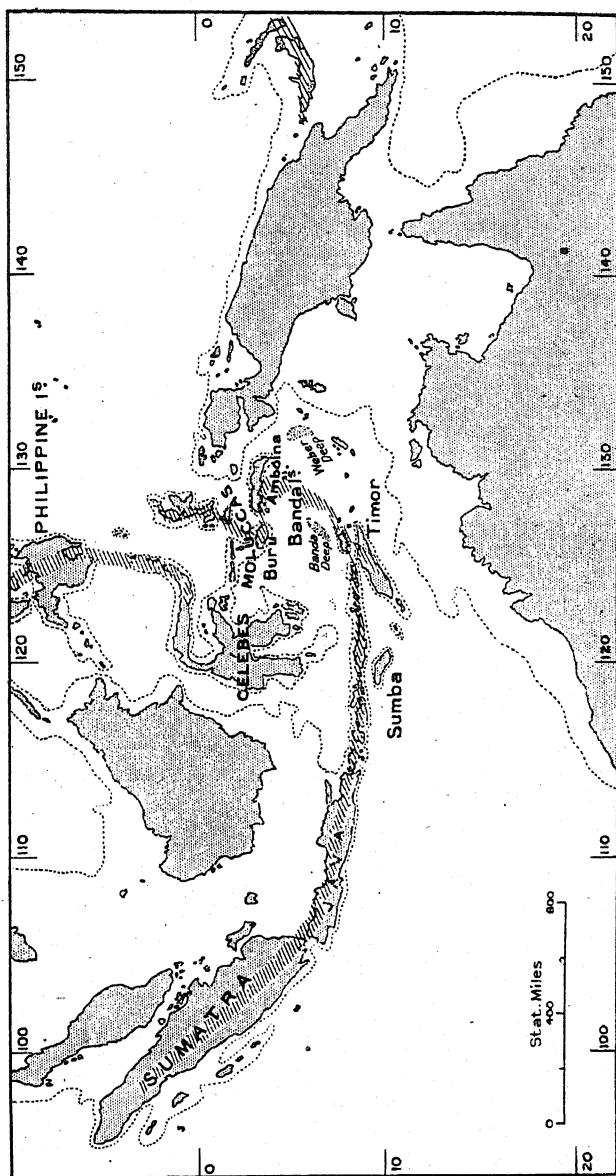
The upheavals and depressions which at the end of the Mesozoic epoch divided the two continents were more extensive to the east than the west, and Australia was the first to be broken up. This is shown by the deep

seas dividing the Moluccas from each other ; while the proximity of the 50-fathom line to Java, Sumatra, and Borneo indicates subsidence of much more recent origin. The deep channels dividing the islands of Bali and Lombok and passing through the Macassar Strait to the Celébes Sea mark the structural division of the two continents and the limit of the Asiatic undersea plateau.

The tectonic movements of the Cainozoic period left the folded systems, known as the Alp-Himalayan and the Circum-Pacific. These, though approximately contemporaneous, differ in that the direction of the former was influenced by pressure from northern blocks, while that of the latter was ordered by the subsidence to which the Pacific ocean owes its origin. The folds of the crust, forming the Alp-Himalayan cordilleras, have extended eastwards in two lines, the southern one passing through the Malay Peninsula, Sumatra, Java, and Flores, the northern one passing through Buru and Ceram to the mountains of New Guinea.

Later fractures occurred in the area between these two lines round the island group of Banda : subsidences formed the Banda and Weber Deeps (3,560 fathoms), and cross fractures broke up the land into islands and separated the Moluccas from New Guinea. These last earth movements are apparently still in progress. The sedimentary rocks of the Kei Islands were laid down in the middle of this subsidence from the materials deposited in the same basin as the lowlands in southern New Guinea.

The present instability of the earth's crust in this part of the Pacific is further proved by the almost continuous chain of volcanoes that extends along the western side of Sumatra, through Java and the Lesser Sunda Islands as far as Timor. It then turns north to the Southwest Islands, makes an eastward loop through the Banda group, then westward by Amboina to Buru, where it turns north to the Moluccas. The range is here broken, but another starts in the extreme north of Celébes and passes to the Philippines. A high proportion of



LINES OF VOLCANOES IN THE EAST INDIES.

These are shown by oblique shading. Note the 100-fathom contours outlining the continental shelves of Asia and Australia.

these volcanoes are active, and the natives of these islands are said to reckon time by the recurrence of their eruptions.

On the other hand, the islands of Celébes (with the one exception mentioned), Sumba, Timor-Laut, Ceram, Misol, and New Guinea, lying on either side of the volcanic belt, which averages 50 miles in width, are entirely free from volcanoes. This suggests that the volcanic belt marks the boundary of ancient continents of which the other islands formed part and affords some explanation of the distribution of flora and fauna in the archipelago to-day. The volcanic soils have added largely to the fertility of the ground, as it has been found to do on the sides of Mount Vesuvius.

The coasts of most of the islands, notably on the west and east of Timor, the strings of islands east of Java, portions of the Moluccas, and the Kei and Aru islands, are raised from coral formations, and this gives the characteristic whiteness to their shores.

#### CLIMATE AND NATURAL VEGETATION

All the islands here under survey lie within  $12^{\circ}$  of the Equator, and are therefore in the equatorial belt of climate, similar to that found in the basins of the Amazon and the Congo. The temperature is oppressively hot all the year round, with an average of about  $80^{\circ}$  F., and this uniformity is further enhanced by the maritime position of the islands. The uniformly high temperature is caused by the vertical angle at which the sun strikes the earth in these latitudes : the noon position of the sun is never more than  $35^{\circ}$  from the zenith, and the diurnal period ranges only between eleven and thirteen hours. Within  $4^{\circ}$  of the Equator, the range of temperature never exceeds  $5^{\circ}$  F., and the temperature reaches its highest point twice in the year, each time shortly after the equinoxes. This illustrates the greater force of the sun-ray, the more vertically it meets the earth. The mean monthly temperatures at Port Moresby

in New Guinea (lat.  $9^{\circ}$  S.) will serve as an example of the type :—

Jan.	Feb.	Mar.	Apr.	May	Jun.
$77^{\circ}$ F.	$76^{\circ}$ F.	$77^{\circ}$ F.	$77^{\circ}$ F.	$77^{\circ}$ F.	$76^{\circ}$ F.
Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
$75^{\circ}$ F.	$74^{\circ}$ F.	$75^{\circ}$ F.	$76^{\circ}$ F.	$76^{\circ}$ F.	$78^{\circ}$ F.

The rainfall of this region is also of the equatorial type, and is largely controlled by the convectional currents of air in the belt over the Equator. The general uniformity of temperature in the upper and lower layers of atmosphere results in constant precipitation throughout the year, but these islands are further moistened during the southern summer by the monsoon wind blowing off the sea between November and March. The migration of the sun to the southern Tropic causes a shifting of the wind systems of the world some 10 degrees to the south, and thus the Northeast Trade, which prevails normally between the Equator and lat.  $30^{\circ}$  N., is drawn south of the Equator and, being deflected in the southern hemisphere to the left according to Ferrel's Law, becomes a northwest wind. This hot air draws from the sea moisture which condenses as the air is forced upwards to cool.

The land mass of the Australian continent heats up under the rays of the summer sun, and this results in the formation of a low pressure system which attracts the air towards it, thus gradually strengthening the force of the monsoon as the depression deepens. The effect of the moisture-bearing monsoon from the northwest is apparent from the vegetation, and its diminishing effect as it passes east is exposed by a similarly diminishing verdure. Thus Java may be cited as receiving the fullest benefits of the monsoon, as is seen by the luxuriant vegetation of its equatorial forest, but the east end of the island is drier, and the islands of Bali, Lombok, Sumbawa, and Flores become increasingly less fertile, until Timor is found to be an arid waste. Timor and the group of islands around it

prove their affinity with the Australian desert by this climatic distinction.

It is the rising air over the continental desert that diverts the monsoon, and the heat of the air prevents the condensation of the water-vapour that it bears, and this is the cause of the diminishing benefits of the monsoon. At Kupang, on the west coast of Timor, the days with rain in each month between May and October average less than four, and the mean monthly rainfall is less than 2 inches.

Where the monsoon brings rain, luxuriant forest covers the islands from sea level almost to the mountain tops, and New Guinea, the Moluccas, and Célebes are all so covered, except for occasional tracts due perhaps to ancient clearing and cultivation or to fires. In Lombok, Sumbawa, and Flores the trees gradually change towards the east into the thorny and prickly type, and the forest degenerates to scrub. In the sparse vegetation of Timor the Australian type only is found, the eucalyptus, acacia, and sandalwood; but mostly coarse and scanty grass prevails. Where more moisture exists locally a more luxuriant verdure is seen. The islands Wetter, Kambing, and Roma are completely desolate. The Moluccas are the home of the spices, nutmeg and clove; palms, Kanary trees, and dammar pines predominate in the forest; and ferns, creepers, and flowering shrubs form the undergrowth.

From March to November the Southeast Trade wind prevails and generally produces a parching effect upon the lands that it crosses; but the mountain barrier of New Guinea forces it through the Torres Strait, where it picks up moisture from the sea. This it abundantly deposits upon the island groups of Timor-Laut and Kei, with the result that every rocky islet is clothed with verdure.

The abundance of the rainfall is everywhere controlled by altitude, and thus local differences are marked. Again, the main structure lines affect local rainfall conditions. The southern coast of New Guinea, as well as its



northeast coast, has a dry belt, stretching for about 100 miles and caused by the direction of the mountain ranges. Where the prevailing southeast wind blows parallel to the main mountain system little moisture is dropped, but wherever spurs run in a westerly or easterly direction the wind rises and causes precipitation. Port Moresby, with an annual mean of 39 inches, is the centre of one of the dry coastal belts. But practically the whole rainfall occurs in the months of January, February, and March, causing a greenness in the vegetation at that time, while for the other nine months of the year nothing but brown, bare waste is visible. A similar irregularity of rainfall is noticed in other districts. Thus, the three wettest months of the year at Samarai are March, April, May; at Kikori (annual average, 239 inches), May, June, September; at Woodlark Island, January, March, September; at Daru, January, March, and April.

The European's ability to live in the Hot Belt depends very largely upon the humidity of the air. If the atmosphere contains more than a certain percentage of moisture, the evaporation from the skin is checked, causing an unhealthy perspiration, which leads to a feeling of indolence. The capacity of a cubic foot of dry air heated to 100° F. is 19·77 grains of water, whereas if the air be cooled to 32° F. it can only hold 2·11 grains of water. The capacity of air is therefore dependent on temperature. For the purpose of considering the capability of a European to live in the tropics, the readings of the wet bulb give a more exact indication of the temperature to which he can adapt himself and, if a relative humidity of 75 per cent. at a temperature of 80° F. be taken roughly as the point where life becomes generally uncomfortable, the following figures for towns, occupied on the coast of New Guinea, may be studied :—

*Port Moresby*

Wet bulb average temperature, 76·1° F.; relative humidity, 76 per cent.

*Samarai*

Wet bulb average temperature, 76·5° F. ; relative humidity, 80 per cent.

The constancy of the sea breezes, which are comparatively cool, makes the heat in these islands more tolerable.

## NATIVE PLANTS

The natural vegetation is controlled principally by the rainfall, but largely, too, by differences of soil and altitude. The equatorial forest, with its teak, ebony, iron-wood, palms, and bamboos, with its undergrowth of lianas, epiphytes, ferns, and flowering shrubs, predominates on the mountains and far up the mountain sides, but towards the mountain tops the character of the forest changes to the temperate type with oaks, laurels, conifers, and even heaths, and the mass of rattans and other climbers gives way to a more penetrable undergrowth.

As we pass east we find the species of plant gradually changing from the Asiatic type, with its fig-trees and ferns, its parasite orchids and pitcher plants, to the eucalypts and acacias of Australia. Thus, Célebes is without the spices of the Moluccas or the camphor and benzoin of Borneo, but has eucalypts and cycads. In the northern part of Papua there is a predominance of gigantic trees which are covered with lianas, are essentially of the Malayan type, and show little diversity of species, while the southern plains are covered with Australian eucalypts.

The northern forests, where there is a greater rainfall, are of the equatorial type on the lowlands and often degenerate into densely wooded bogs ; but the mountain ridges are clad in temperate forests. The southern lowlands have a mixture of the Australian rain forest, though more luxuriant, and every variety of the monsoon forest. The spices, for which the East Indies first became famous, are indigenous to the Moluccas, viz., the clove, nutmegs, kardamoms, pepper ; the Kanary nut and cajaput tree

produce oil, the massorinde cinnamon. Flores is remarkable for its sandalwood and sapan wood (which are both dyewoods), and teak is indigenous in Sumbawa. Volcanic soils, as in the Moluccas, have added enormously to the fertility of the islands.

#### ANIMALS

The division between Asia and Australia is further marked by the distribution of the fauna on both sides. The characteristic Australian species exist in the islands which have been described as "Australian, but are not found on the western side of what is known as the Wallace Line. This faunistic frontier was first pointed out by A. R. Wallace, the co-discoverer of the theory of natural selection, and it is therefore named after him. Wallabies abound in New Guinea, and a species of cuscus is found in all these islands as far west as Bali. The cuscus is a woolly opossum, usually of a white colour; it climbs trees and for this purpose is endowed with a long prehensile tail; its meat is much sought after by the natives, but its thick woolly coat protects it against their darts, and they have considerable difficulty in killing it. Bats are numerous, and wild pigs are found everywhere.

The birds present endless varieties, all of Australian origin, and add gorgeous colouring to the forests. Parrots, kingfishers, pigeons, and the strange mound builders are among the commonest and most typical. The last named is a peculiar kind of fowl which builds a mound of leaves over its eggs and so causes them to hatch by the fermentation of the decaying vegetation. Wingless birds are represented by the cassowaries, while the gorgeous colouring of some varieties of the birds of paradise is a feature of New Guinea and the surrounding islands of the Australian continental shelf. It should be noticed that structure accounts for the distribution of the fauna: among these islands we have differences of vegetation, ranging from the rich luxuriance of the

Moluccas to the desert aridity of Timor, but the birds and insects are alike in species, suggesting that the distribution of animal life is not wholly controlled by climate and vegetation.

The island of Celébes is geologically a portion of an ancient block and represents the point of contact between the two continents. Its natural history suggests that upheavals on either flank have at one time connected it with Asia, at another with Australia. Thus, the island differs from Java and Borneo in having no tailed monkeys, no insectivora, no felines or canines, no elephants, no rhinoceroses or tapirs. It has five large quadrupeds : a large tailless ape, a small buffalo, a wild pig, the horned pig, or babirusa, and a deer. The last is similar to that of Borneo and, like the tarsier (one of the lemurs) and the civet cat among the smaller quadrupeds, was probably introduced in a domesticated condition from Malaya, for the Malays often keep them as pets. Among the smaller animals are five kinds of squirrel, two of rat, and two of cuscus of the New Guinea type. The ape, the buffalo, or anoa, and the babirusa are peculiar to this island and appear to have belonged to it before it had been connected with either Asia or Australia.

The seas abound in fish, the commonest being huge rays and gropers of brilliant hues, mullets, oysters, and sharks. Dugongs, which live in the sea, but have stomachs like the ox and eat grass, wallow among the rocks of the New Guinea coast.

#### NATIVES

The distribution of races throughout the Pacific shows a variety of mixtures ; but the migrations, though largely hypothetical, can be based upon the more certain geological history. Melanesia was first peopled by an eastward drift across southern Asia, when the present islands were united by land passages. These people all had woolly hair and were of pygmy stature : isolation in the Nassau Mountains of New Guinea has preserved

remnants in the Tapiro, who are obviously of negrito origin, with short black hair, abundant on face and body, and yellowish-brown pigmentation. They are characterised by a deep and convex upper lip. Similar traces are to be found in other tribes in New Guinea, and they are represented in the Andamanese, the Semangs of Malaya, the Toalas of Célebes, and the Aetas in the Philippines.

The pygmies are supposed to be a variety of the primitive eastern round-headed, crinkly-haired race, one branch of which drifted south into central Africa. But it may be inferred that all members of this race were not of exceptionally small stature. Hence, other less extreme forms may be found in New Guinea, which marks the eastern limit of the drift across land. A taller variety than the Tapiro are the "Goliath" pygmies, who are also found in the Nassau range. In the upper reaches of the Mamberamo is a mountain tribe, the Timorini, who are very short, but not pygmy, and have rather longer heads than usual among these peoples. The Ipi tribes of the Gulf Papuans are the tallest of this variety, while the Maipua, inhabiting the Purari Delta, are short, but definitely long-headed.

The peoples of the northern and southeastern coasts of New Guinea are later immigrants, as is proved by their language and general culture; they are mesocephalic and have a lighter skin-colour, and a considerable variety of hair is to be seen. As in central Africa, so in New Guinea, the pygmies have been gradually pressed into the dense equatorial forests.

Another early drift from Asia of a very long-headed people has left traces in the population of the East Indies, notably in the Kubus of Sumatra. They are akin to the Veddas of Ceylon and the Sakai of the Malay Peninsula, but they are taller and have rounder heads and broad, flat noses. In skin colour they are dark brown or black.

The typical Papuan has woolly hair, is dark in colour, short of stature and long-headed, but there is evidence of



a round-headed folk migrating overland to the south of New Guinea. These people have spread widely over Melanesia.

They represent the most primitive inhabitants of the islands, and their earliest members did not advance beyond savagery ; but very much later in time a series of migrations spread in a southeasterly direction from Asia. The newcomers were of much higher culture : they were tillers of the soil, not mere hunters and collectors : they came by sea, after the mainland was separated from the islands, and presumably in outrigger canoes : they introduced a new type of language, Austronesian. These men were lighter of skin than their forerunners, and their hair was wavy or straight. They soon mixed with the Papuan stock and formed what are usually called the Melanesians. There have been later sporadic movements from Polynesia into Melanesia, but only of local influence. The variations on the north coast of New Guinea, on its southeastern peninsula, and in the archipelagoes beyond, are explained by the migration of Melanesians into those parts.

Language is of little or no assistance in determining the origin of the people, and nearly every tribe has a form of speech peculiar to itself. Generally in the Moluccas and in the islands west of New Guinea some variety of Malay prevails : in New Guinea the dialects are mostly of Papuan origin, and differ from the Melanesian and Austronesian languages, but have an affinity with Australian. On the eastern coast and in the smaller islands to the east and southeast Melanesian is spoken, but the same speech does not extend far beyond the coast. The small island of Rossel uses Papuan. The islands of Woodlark, Misima, and Sud-Est use a hybrid of Melanesian, known as Melano-Papuan.

The population throughout the islands is mainly confined to the coasts because of the inaccessibility of the interiors, owing to either their mountainous nature or their dense forests.

## CHAPTER XVIII

### LARGE ISLANDS AND GROUPS

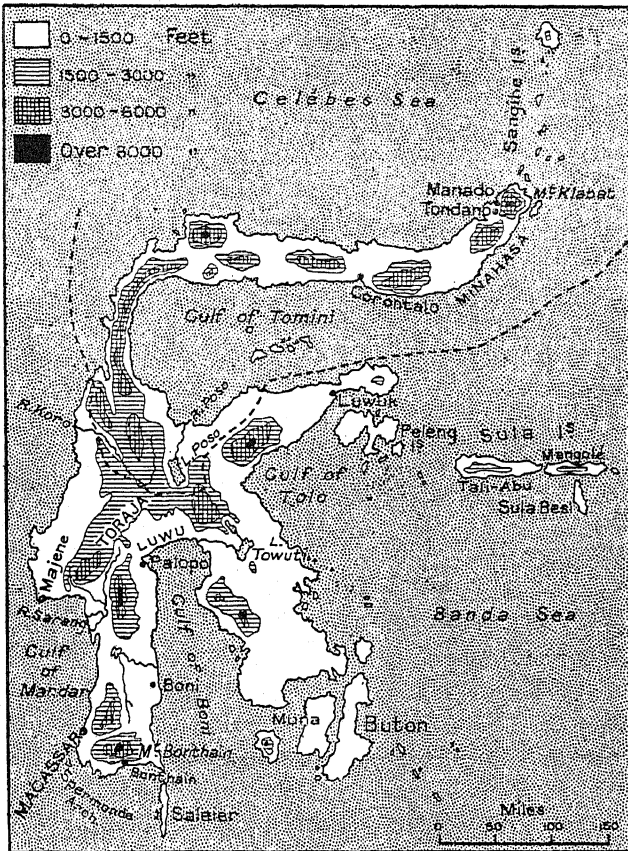
THIS region is divided politically between the Dutch, Portuguese, Australians, and the Republic of Indonesia. The Portuguese hold the northeastern half of Timor and a small coastal area west of the port of Atagupu in the same island. The Dutch hold the western half of New Guinea and the small islands connected with it. The rest now forms part of the Republic of Indonesia, an independent sovereign state in union with the Netherlands. This part of Indonesia is divided into three provinces : (1) Celébes, (2) Moluccas, and (3) the lesser Sunda islands.

#### CELÉBES

The island of Celébes, which covers an area of 48,061 square miles, is of a peculiar spider-like shape, spreading in four long and narrow peninsulas to the south and east. In the widest part is a mountainous tableland, from which high ridges run along each of the peninsulas. On either side the ridges fall steeply to the sea, and nowhere is there a broad coastal plain. Mount Klabat rises as a peak of 6,621 feet at the northern extremity and Mount Bonthain over 10,000 feet at the southern end of the westernmost peninsula. The surface is broken by rifts, and in Minahasa solfataras and hot springs point to a volcanic formation. The northern peninsula is extended in the Sangihe Islands, the southwestern in Saleier, the southeastern in Muna and Buton, while that between the Gulfs of Tomini and Tolo passes under water to the Peleng and Sula Islands. The Spermonde



Archipelago off the coast of Macassar is also structurally a remnant of Celébes. Numerous lakes are to be found on the plateau, of which Poso and Towuti are the largest. Owing to the configuration of the island the rivers are



CELÉBES.

short, the Sadang, which rises in the central massif, and runs in a southerly direction to the west coast, being the largest. The course of the streams is necessarily over constant rapids, and their heavy loads tend to block their mouths, so that they are not navigable, though the Poso

and Sadang are open to boats some part of the way upstream.

The population, which has now reached 5 millions, is confined chiefly to the narrow coastal plain, and is most dense in Minahasa, with 105 people to the square mile. At least six native peoples are included among the inhabitants, the Toalas, Torajas, Buginese, Macassarese, Minahasese, and Gorontalese. The Toalas are the most primitive, living in the forests and being partly nomadic. They are found in communities among other tribes, showing that at one time they were enslaved. The Torajas represent a more highly-developed people, but are only gradually emerging from savagery, since they occupy fortified villages and practice head-hunting. They live in isolated groups on the highlands and the lowlands, but the mountain life has preserved a greater vigour among the former, while the latter have become weak and lazy. They are primitive agriculturists and display the elements of culture in the arts of plaiting, pottery, wood-carving, and iron-work. Society is based on the family and the tribe is merely an extension of the family, without social distinctions or tribal chiefs.

The Buginese and Macassarese, both probably of Toraja descent, show a still higher standard of development, and as shipbuilders they are unsurpassed in the archipelago. Their *prahus* are to be found sailing in every sea, which they traverse with keen trading instinct. At home they are employed in collecting the forest products and keeping buffaloes, cattle, and horses on the grass lands, while their industries, if not highly developed, are various. Weaving is the chief, especially for making *sarongs*, the skirts of the native dress. Plaited goods are made in Watampone (Boni); gold and silver work in Macassar, Majene, and Watampone; and iron-work in Palopo and Majene. For amusement they are devoted to feasting, gambling, and cock-fighting.

The Minahasese are quite distinct from all the others and have spread to the Sangihe Islands. These people

were entirely savage until the introduction of the coffee plant by the Dutch in 1822 brought the islanders to an agricultural and settled way of farming. Rice is grown in the swamps, and maize on the drier ground, and these, with sugarcane, tobacco, and vegetables, compose the main food crops. Coffee, as well as rubber, kapok,<sup>1</sup> and nutmegs, is grown for export. Copal,<sup>2</sup> dammar,<sup>3</sup> and rattans are collected from the forests and are exported, together with hides and horns of cattle. There is, besides, a considerable trade in ebony, sandalwood, and other timbers. Three gold mines are working near Manado, and the seas are fished for turtle and mother-of-pearl.

In the villages the women are mostly occupied in pounding and cleaning rice for daily use; in fetching wood and water; and in cleaning, dyeing, spinning, and weaving cotton for making *sarongs*. The men do the ploughing with the help of buffaloes as soon as the rainy season begins, and plant rice, which can then be left till harvest. They grow a few vegetables and occupy the rest of their time in occasional mending of their houses or basket-making, but much time is given to idleness.

As the normal means of communication is by the sea the only towns of any size are on the coast. Only in Minahasa are centres of a considerable population to be found inland, as at Tondano, standing 2,000 feet above sea level. Manado is the chief port and centre of administration of this part. Macassar, which is situated on the most extensive part of the coastal plain, is the capital of Celébes and is the largest port. Numerous small ports, like Bonthain, receive regular visits from the Dutch Royal

<sup>1</sup> *Kapok*—a tall forest tree, whose seed-pods produce silky fibres like cotton. The fibre is remarkable for its lightness, buoyancy, and impermeability, and is therefore most used for stuffing lifebuoys, cushions, etc. Oil expressed from the seeds is used to make oil-cake, margarine, soap.

<sup>2</sup> *Copal*—a resin, used in the manufacture of varnishes and enamels.

<sup>3</sup> *Dammar*—the resin of a conifer, used for varnish manufacture, produced either by natural exudation from the tree-stem or by tapping.

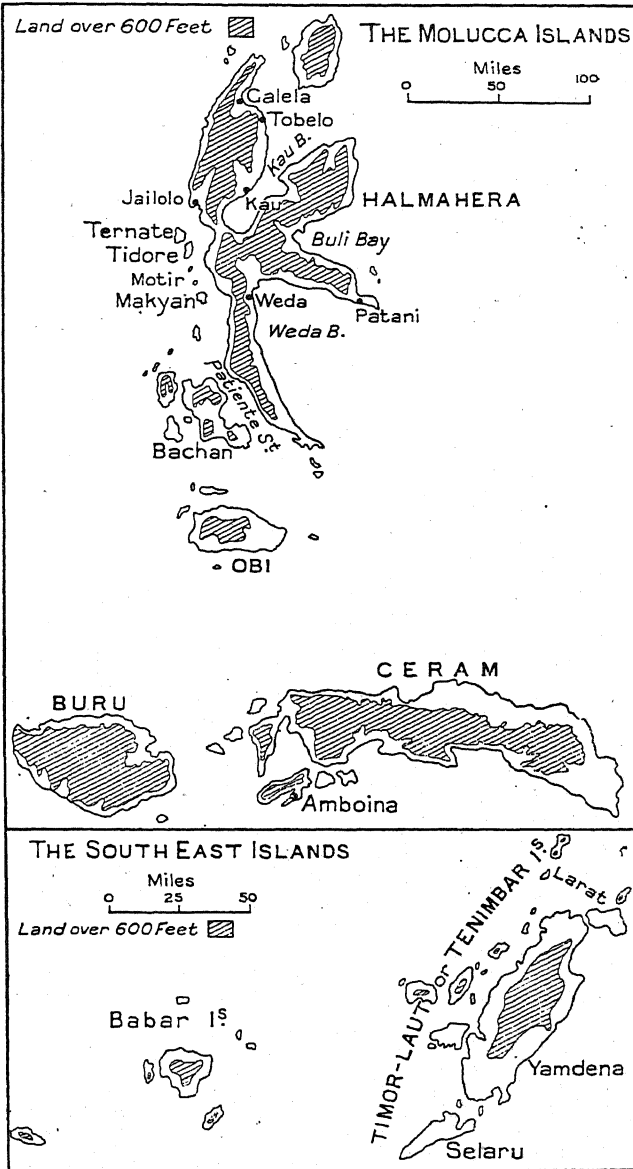
Mail Packet Company. Gorontalo has an excellent harbour, and, like Manado, is in direct touch with Java and Singapore.

#### THE MOLUCCAS

The name Moluccas was originally confined to the group of islands off the west coast of Halmahera (Ternatë, Tidore, Makyan, and Motir), from which the nutmeg came. Various island groups have been added to them politically, Bachan, Obi, Ceram, Buru, Amboina, and the Banda Islands. Halmahera is the largest, and its composition of gabbro and other eruptive rocks points to its volcanic origin. The island consists of four long and comparatively narrow peninsulas; mountain chains of an average height of 3,000-4,000 feet run along these peninsulas, and where they sink to the sea on the east are the three bays of Kau, Buli and Weda. On the western side is the smaller bay of Dodinga. Coral is found around the coast, and in the interior, high up on the mountains, coral formations are visible, pointing to the upheavals that the land has undergone. Limestone occurs in the southeast, and there are stalactite grottoes at Sagea. The mountain sides are covered with forests, which yield dammar and iron-wood and in which the nutmeg grows wild. Rice is grown in the swamps, but the sago palm is the mainstay of the native diet. The Dutch Royal Mail Packet Company's boats call at Patani, the chief port, and at Galela, Tobelo, Kau, and Weda. Fishing for *trepang* and pearl shells offers further occupation.

Here is to be found a true forest people, partly nomadic, living only in shelters. They are clothed in nothing but a loin-cloth and head-dress, and they live by fishing, hunting, and collecting, and by the simplest cultivation of the ground.

Separated by the Patiente Strait, Bachan lies off the southwest corner of Halmahera. In the south the



THE MOLUCCAS AND THE SOUTHEAST ISLANDS.

The town of Jailolo is on Dodinga Bay.

mountains rise to 6,000 feet. Sulphurous springs are still active, and small quantities of gold and copper have been noted. The surface and soil present considerable variety, and small streams wash the mountain slopes. The forest contains particularly fine trees, as well as screw pines. The chief products, sago, coconuts, cloves, nutmegs, and dammar, are exported from Bachan, the chief port and capital.

The islands of Tidore and Ternatë are volcanoes rising out of the sea. When first visited by Europeans, each of these islands contained a powerful sultan, and Ternatë was until recently the residence of the Dutch governor.

Another Dutch governor resided in Amboina, a small island consisting of two peninsulas, joined by a sandy isthmus about a mile wide. The western inlet thus formed provides a magnificent harbour, rich in corals. On its north side the swamp is cleared; coral rocks are visible, protruding through deep red earth, while the forests are a mass of palms, ferns, and rattans. Ceram, a larger island to the north of Amboina, specializes in the production of sago. The staple food of all these islands is sago. The ease with which a palm can be peeled and the pith extracted and cleaned makes living simple, and a tendency to indolence in the people is the natural result. It has been reckoned that ten days' work will provide a man with a year's food, ready cooked. The tree, too, which is a species of nipa palm, provides the material for houses, and the long spinnate leaves are used for thatching.

#### LESSER SUNDA ISLANDS

The string of islands from Lombok to Flores together form a minor natural region, in possessing a unity of volcanic and mountainous structure and of rice as the staple food. The natural vegetation tends to become more thorny as the drier climate prevails. Water has to be conserved and irrigation is practised for the cultivation of tobacco, cucumbers, yams, beans, maize, and

sweet potatoes. Lombok is the most highly developed in this way ; Sumbawa has no natural reservoirs and the streams, dashing down precipitous mountains, often dry up in the summer. The coasts are broken—Sumbawa is cut nearly in two by a long and deep gulf—and the seas are made more dangerous to shipping by the surf. The interior of Lombok is a mass of abrupt rocky hills and steep ravines, covered with clumps of bamboos and palms. A higher region is much drier, and cultivation here is only possible on the borders of the streams ; in the centre of the island are expanses of short turf, dotted with clumps of trees. The forests produce sandalwood, sapan, and beeswax, and teak is indigenous to Sumbawa. Sumbawa and Flores export ponies.

Mataram is the capital of Lombok, and Amparan, which carries on a trade mainly in rice and coffee, is the chief port.

#### TIMOR GROUP

Timor—roughly 300 miles long by 60 miles broad—has no volcanoes, except Timor Peak, which has been quiescent since 1638. The adjoining islands of Kambing, Wetter, and Roma are, however, volcanoes, and now desolate masses of rock. The drought and poor soil produce little natural vegetation but scrub, though on the higher parts coarse grass prevails. Here sheep and ponies are raised. Cultivation is practised, but only of a primitive kind ; wheat is grown at 3,000 feet. Gold, copper, gypsum, and petroleum are present, but are not being exploited.

Civilization has hardly penetrated into the island beyond the coast. The native Timorese mostly live inland in the mountains and have not yet risen above barbarism ; the various tribes are frequently at war with each other, and most of the villages are consequently stockaded. Their houses, round in shape, are built on piles, with a roof of grass or palm leaf thatch. The men

are armed with bow and arrow, spear and sword, and use a blow-pipe for hunting. Taboo and polygamy are customary, and each village usually has a special taboo house called *Uma Luli*. The men dress in a two-piece garment of patterned cotton, tied by a decorated belt, and often wear a kind of shawl and a sort of turban. The women wear the *sarong* and numerous ornaments, while tattooing on both sexes is usual. They engage themselves in weaving and plaiting and in the manufacture of weapons and ornaments. Along the coasts fishing and copra growing are the chief occupations.

The lack of inland communications retards development, but sandalwood, copra, ponies, cattle, and hides are exported, chiefly from Kupang, the main port, though landing is difficult here during the Northwest Monsoon, and from Atagupu. The Portuguese capital, Dilli, exports coffee, copra, hides, cocoa, shells, and wax, and imports cotton goods, petroleum, and wine.

The islands off the southwest coast, Semau, Rotti, and Savu, also belong to this group.

#### TIMOR-LAUT GROUP

This group (see map, p. 221) consists of Yamdena, Selaru, Larat, and several smaller islands, mainly of coral formation. A mountainous ridge runs along the east coast of Yamdena, and from there it sinks towards the west until only the higher parts appear as islands above the water. The mountain sides are thickly wooded, and the lower west coast is fringed with coconut and sago palms and mangroves along its narrow foreshore. Many of the other islands have extensive swamps. In these islands, owing to a drier climate, maize becomes the staple crop and food, though rice is grown in small stretches, where the conditions are favourable. Yams and fruits, like mangoes and plantains, grow well, but owing to the small depth of soil the trees do not grow to normal height. The low rainfall causes a lack of fresh



water and an absence of rivers. The inhabitants are primitive savages of a virile type, many of them standing over 6 feet high. They hunt and fish and practise a primitive agriculture ; but the men are in the main indolent, and most of the work is done by the women. They are remarkable for a high artistic sense, which is shown in the carving on the pillars of their houses and their work in iron and copper and gold. Though the tribe has a headman, the people live a communal and independent life.

## NEW GUINEA

New Guinea, with an area of 312,329 square miles, contains two mountain chains, separated by McCluer Gulf. One, contained in the northwest peninsula of Berau, is the end of an upraised arc, which extends westwards through Misol, Obi, and the Sula islands. The other chain extends the length of the island under various names. At the western extremity are the Charles Louis Mountains, then the Nassau Mountains, rising to 16,000 feet. The snow-line is at about 14,600 feet, and Mounts Idenburg (15,150 feet) and the Carstensz peaks (16,400 feet) have glaciers. The next section to the east is called the Orange Mountains and contains Mount Wilhelmina (15,312 feet). Passing again eastward through the Bismarck Mountains, of an average height of about 13,700 feet, which apparently form the main watershed, we come to the southeastern part of the chain, the Owen Stanley, in which Mount Albert Edward (13,220 feet) is the highest point.

The southeastern peninsula extends into the d'Entrecasteaux and Louisiade Archipelagoes, where volcanic activity is easily discernible, while the northern part of the system is continued in the Bismarck Archipelago and Solomon Islands. The hills in the south between the rivers Digul and Fly are structurally an extension of Australia. The northern coast falls steeply to the shore,



and the steepness of angle is continued into the floor of the ocean. On the southern side the mountains overlook a wide lowland, which sinks into the sea to reappear in the Aru and Frederick Henry Islands. The mountain ridges, which strike generally in a southwesterly direction, are divided by deep furrows, so narrow that vocal communication is easy from mountain to mountain though they may be a three days' journey apart to the traveller. This structure of the country impedes communication, especially as the valleys and mountain sides are covered with dense forest; and exploration of the interior is still only beginning. The tree limit may be set at over 10,500 feet.

The rugged mountains and deep chasms, together with numerous streams and cascades, falling over frequent rapids, provide a scenery of remarkable beauty. The Mamberamo River rises in the Nassau Mountains and flows into the Pacific Ocean near Cape d'Urville on the north coast: the mouth is in the only wide lowland plain on the north coast and is easily the largest opening into the central plateau from this side. Further to the east the Sepik enters the sea, draining the mandated territory of Northeast New Guinea. Sea-going vessels penetrate this river for 180 miles.

The largest river in the south is the Fly, which rises in the Victor Emmanuel Range. It is joined by the Strickland in the middle of the lowlands and emerges from a region of flats and swamps into the Gulf of Papua. It is navigable to whaleboats for 600 miles. The Digul also, with its headwaters in the Star Range, meanders across the plain in a southerly and then more westerly direction to discharge its waters by a long estuary into the Arafura Sea, just north of Frederick Henry Island.

These rivers and the smaller ones are the only means of intercommunication, and travelling is naturally done everywhere by boat. Exploration of the upper waters is still being carried out gradually by Government patrols. When it is remembered that the mouths of most of these

rivers are liable to be blocked by sandbanks or their channels overgrown with the dense equatorial foliage, it will be realized how difficult of penetration the country is. Moreover, the whole island is thickly covered with jungle and, even now, practically no roads exist.

This difficulty of penetration, coupled with the isolation caused by a world position off the track of commerce, at the extremity of the land hemisphere and on the edge of the ocean hemisphere, has caused the island to be little affected by external influences, and thus we find here men still living in savagery and barbarism, such as man passed through in other parts of the world in the Stone Age.

The native population is confined chiefly to the coasts and to the river banks, and, as these areas have been the first to feel outside contacts, their inhabitants have been the first to make progress. But the few tribes spread over the interior have been more averse to accepting enlightenment owing to their greater isolation. Though most of the tribes have now reached the state of a settled village life, based on horticulture, there are still many, especially in Netherlands New Guinea, which are nomadic or semi-nomadic. They live largely by hunting and collecting. Where sago is the staple food, there is little incentive to work; coconuts are usually abundant, and the sweet potato, sugarcane, plantain, papaw, and tobacco can be cultivated with a minimum of energy. Fishing by hook or spear affords easy food for those living on the coast or rivers.

The houses are usually built on piles for protection against wild beasts or, in the deltas, to prevent their being flooded. In most of the villages along the Sepik River and along the Papuan Gulf there is a large house built for the habitation of the unmarried males, who are initiated at an early age and pass through a series of mysteries as they grow up, each stage presenting a new revelation of life.

The chief pleasures of the people are feasting and head-hunting; the latter, less common since more enlighten-

ment has been brought by the European, is often connected with a theory of winning new names, because the conqueror assumes the name of the man whose head he captures, and so, no doubt, in theory the strength of the victim. Cannibalism still exists in many parts and is probably a relic of human sacrifice, but the cannibals see nothing indecent in eating their fellow men, and, as a rule, they are quite easily persuaded to substitute a pig where it is required for ritualistic purposes. The drum is the characteristic musical instrument. Every native is addicted to chewing the betel nut, though now tobacco is becoming almost universal as an alternative.

The men have little clothing beyond a loin cloth, but the women wear the *sarong*. In some localities their bodies are tattooed, in others covered with cicatrices, and the wearing of jewellery is common. Their weapons are usually the bow and arrow, spears, and occasionally daggers, mostly made of stone. In the Dutch territory some tribes use daggers made of the jawbone of the crocodile or the thigh bone of the cassowary. This illustrates how these folk have not yet reached the "iron" age.

The social organization is fundamentally based upon the clan, which is a far wider order than the family. Theoretically, all its members have a blood relationship to each other, but their kinship has often become remote according to our Western ideas. Kinship is normally traced through the mother, and family names are unknown. Usually no two persons of the same clan may marry, though in a few cases a man may not marry outside the clan. With the clan organization is connected totemism, which is based on a theory that the souls of the clan were once a certain species of animal or bird, and apparently the modern representatives of the species are therefore sacrosanct, as containing the life of the clan. In many cases the totem is a linked one and contains a species of bird, snake, plant, and fish. No one will on any account kill his totem; but, on the other hand, their

consciences are apparently not offended if they see others destroy it. In fact, one tribe will encourage the spread of its totem in order to provide food for a friendly tribe which is not under the same obligation.

A cult of the dead exists among some tribes, but it is not connected with the gods. Occasionally a god-cult is to be found, and with it a priesthood. Mohammedanism has spread in some form or other from the west into many districts. Sorcery and witchcraft play a large part in the daily life, and a death by natural causes is always attributed to such arts. A universal belief in ghosts adds to the sense of fear that prevails.

Netherlands New Guinea has been very little developed, except on the extreme western coastal plain facing Ceram, and parts of the northern coast. Geelvink Bay is blocked with islands, including the Schouten Islands, and trade is developing among them. The Royal Mail Packet Company calls at Seruei, on the south coast of Japen Island. The natives ply a lucrative trade by collecting the natural products of the forest—copra and nutmeg; and they hunt the cassowary for its valuable feathers. Merauke is the chief port of the south and here is the only considerable white settlement, the residence of the Dutch Gezaghebber or Governor.

British settlement in Papua began with the arrival of prospectors in search of gold. But, though a fair amount has been exported, the winning of it has not always been worth the expense; yet there are fair prospects of dredging the northern rivers with more lucrative results in the near future. Copper is being mined with good hopes near Port Moresby, and petroleum was discovered in 1911 round the Gulf of Papua, though the conditions make the sinking of wells difficult. But, as has since been discovered in both Australia and South Africa, though it was not realized by the Spaniards in Peru during the sixteenth century, the real and lasting prosperity of a country depends upon the products of the soil, acquired by agriculture; and it is in the fertility of the soil, together with

a constant supply of rain and warmth, that the future wealth of Papua rests. Such is the richness of this land that, where a road has been cleared, in three weeks' time the whole of the ground is covered with creeping plants of some size.

The genial conditions have odd effects upon plants addicted to more temperate conditions, tending to provide a luxuriance of quantity rather than quality : thus the English apple-tree will grow to the size of an oak, but the fruit is small, if prolific, and of no value ; a single cob of maize will triplicate, but very little flour can be produced ; wheat has hundreds of heads, containing seed the size of pin-heads ; the common couch-grass grows to a height of 19 feet.

The crops which are most suited to the climate and have done best are coconuts and rubber, and these, with sisal-hemp, now of little consequence, were doing well until the conditions of the 1914-18 war spoilt the market. The Australian Navigation Act, too, which has the force of allowing cargoes between Australia and Papua to be carried in none but ships manned by Europeans, has had a deleterious effect upon the exports, especially when constant strikes in Australian ports have limited the number of ships plying to Papua.

The mentality of the native, who has grown up for so many generations to regard a minimum of labour in the fields as all that is necessary to provide him with a sufficient food supply, proves a difficulty for the European planter in search of labourers, and the lack of an agricultural tradition makes it hard to teach the native the rudiments of the art. Consequently, it has been almost impossible to try skilled planting on a wide scale. Tea would flourish on the hillsides, but its commercial exploitation depends upon a sufficiency of cheap labour. In Papua labour is cheap, but sufficient numbers of men cannot be persuaded to enrol. The cultivation of rice is more suited to the native temperament, as it does not require such constant attention, and the numerous

swamps and river beds provide ground fitted for the planting. Though good crops are being obtained, however, the transport difficulty arises before they can be put upon the market.

The forests provide numerous and valuable commodities, especially tannin from the mangroves and the many and varied products of the sago palm. The pith of the latter is dried for export as the commercial sago, and the heads of the fruit are stripped for the vegetable ivory they contain, while the timber is useful for matches, veneers, and three-ply wood. Resins, gutta-percha, and dye-plants are also collected, together with oil and medicinal plants, and are brought down to the ports for shipment. Ebony and cacao may be added as two other sources of wealth.

Agricultural development and exploitation of the forest are alike seriously handicapped by lack of roads. The native instinct to move by water limits the use that would be put upon these costly symbols of civilization, and the expense of making them and repairing the constant damage caused by the monsoons is prohibitive. Before a new road can be sanctioned by the Government, a definite objective must be found, such as a region bound to be developed, and in the present condition of native life such a demand is hard to prove. Roads do not encourage settlement, and until they do it is hard to find an excuse for making them.

The settlements are all on the coast and serve as *entrepôts* for trade. The chief are Port Moresby, Daru, and Samarai. The last is on an island off the eastern end of Papua and is set in beautiful surroundings. Daru, on the western side of the Gulf of Papua, is also on an island in order to avoid the swamps of the mainland. Port Moresby is the headquarter station of Government, but is not a pretentious town. The money spent on it has been applied principally to hygiene, and this scheme has been highly successful; for the settlement has a fine record of health.



An interesting contrast in the customs of two colonising powers may be seen by comparing the Government buildings in Port Moresby with those at Rabaul. The former are marked by simplicity because they have been erected at small cost, while far more has been expended in opening up the interior of the country ; but the late German headquarters at Rabaul have a pretentious edifice, calculated no doubt to impress the native mind with the power of Government ; yet, in spite of the expense incurred in this way, little attempt had been made to press far into the interior of the land under their administration.

#### EXPLORATION BY EUROPEANS

The Spice Islands, though long known by reputation, were ultimately placed on the map by two of Albuquerque's officers, d'Abreu and Serrano, in 1511, soon after his occupation of Malacca as the key to a Portuguese Empire in the Indies. Their expeditions gained some knowledge of Java and Sumbawa, and finally reached Amboina and Ternaté. The voyage of Magellan, too, under Spanish auspices, which culminated in the first circumnavigation of the world, had the Moluccas as an objective, and these were reached in 1520. The rivalry for empire and commerce between Spain and Portugal was brought to an end in 1529 by a treaty by which Spain withdrew her claims for a sum of money, and Portuguese forts and factories were established in Amboina, Banda, Celébes, and Halmahera. Drake visited the East Indies in 1579, but English seamen confined their interests in these parts to trade and exploration.

Before the end of the sixteenth century the Dutch had arrived on the scene to avenge their wrongs at the hands of Spain. This took the form of an attempt to monopolise the spice trade, and in 1602 the Dutch East India Company was incorporated. By a treaty of Westminster in 1674, the English East India Company agreed to leave the East Indies to the Dutch and to confine to India its

activities in this sphere. For the next 100 years the Dutch were in the ascendant, until their power gradually declined towards the end of the eighteenth century.

In 1810 Amboina, Banda, and Ternatë were captured by the British, who regarded them as part of the Napoleonic Empire, but the islands were handed back to the Dutch at the Treaty of Vienna in 1814. During the remainder of the nineteenth century the Dutch extended their territories, thereby involving themselves in a succession of wars with native princes, but reform of government accompanied their successes in all the islands, including Java, Celébes, the Moluccas, the Sunda Islands, and New Guinea.

Towards the end of the nineteenth century the Chinese and Japanese began migrating to the East Indies in increasing numbers, and anxiety from this cause led the European Powers mutually to define their claims. Thus, in 1895, New Guinea was divided between the Dutch, Germans, and British. The Germans, however, lost their territory after the Great War, when it was mandated to the Commonwealth of Australia. In 1898, as a result of the Spanish-American War, the Philippines, Sula Islands, and Guam in the Ladrones, were ceded to the United States, while the Carolines were sold to Germany. The latter were occupied by the Japanese during the 1914-18 war and were administered by them under a mandate until 1945, when they were conquered by the Americans.

The war of 1941-45, during which all the Papuan islands except part of New Guinea were occupied by the Japanese, produced a social and political upheaval in the islands held by the Dutch. The Dutch still hold their portion of New Guinea, but the remaining parts of the Netherlands East Indies now form the unitary Republic of Indonesia.

## CHAPTER XIX

### THE ISLANDS OF THE PACIFIC

#### STRUCTURE AND ORIGIN

THE vast surface of the Pacific Ocean is dotted with myriads of islands, large and small. Some lie on the shelves of the marginal continents, while others stand isolated in mid-ocean. It is with the latter only that we have to do here, and our attention will be concentrated more particularly on those situated in the southwestern Pacific and known by the romantic name of the South Sea Islands.

Though purely oceanic in climate, flora, and fauna, the islands appear for the most part to lie along well-marked lines which are often continued under the sea by submarine ridges. The map on the next page will make this clear. Whether these lines are remnants of former continental highlands is unknown, though the Solomons, Santa Cruz, New Hebrides, and New Caledonia look very like continuations of the lofty mountains of New Guinea, and the submarine ridge on which they stand points to some possible connection with New Zealand. Eastwards of this arc is another containing thousands of small islands, but the structural rock seldom comes to the surface. The festoon arrangement of the peninsulas and island groups of Eastern Asia is well known. Perhaps the Pacific arcs are a similar, though feebler manifestation, their relation being to the mountains of eastern Australia. The Bonin-Ladrones festoon meets and joins the outer arc of the Pacific in the Marshall Islands. The only true oceanic islands therefore are those which lie outside these arcs.

Many of the islands are volcanic in origin. The inner arc is a portion of the "fiery girdle of the Pacific" and

contains an almost continuous chain of cones. Recent volcanoes occur in the Solomons and New Hebrides, while



ARCS OF THE WESTERN PACIFIC.

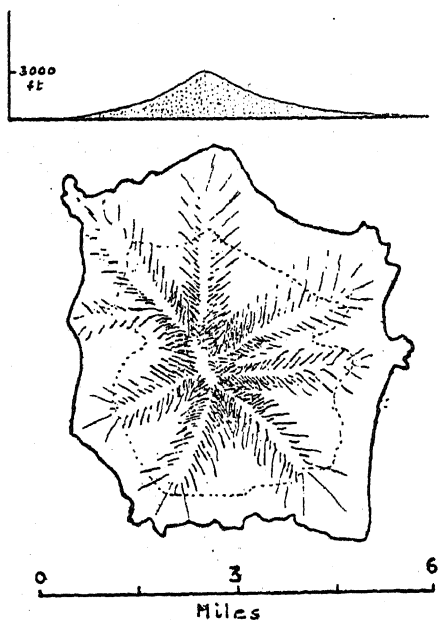
It would seem that the arcs are ridges caused by pressure from the central Pacific against the ancient land mass of Australia. Just outside the Outer Arc are some of the profoundest ocean deeps.

Tinakoru in the Santa Cruz group and Tanna in the New Hebrides are still active. Earthquakes are not uncommon along this line. In the outer arc volcanic activity has almost died out, the cones being extinct. Tonga and

Samoa alone have recent volcanoes. Dead cones occur sporadically beyond the arcs, and many of the isolated islands, like Easter Island, are ancient volcanoes. Hawaii deserves special mention. Its main island rises like a huge boil 26,000 feet from the ocean floor and is topped by the giant crater of Mauna Loa, which, with its adventitious crater, Kilauea, is one of the world's most peculiar volcanoes. Constantly active, its vast crater forms a wide cauldron in which molten rock of unusually high fluidity is for ever boiling. At times the lava overflows, scarring the hillside with its glassy rock. Often it cools into a treacherous crust at the crater lip, forming terraces and making approach dangerous for the unguided tourist. When seen at night, the dark red of the boiling rock is very impressive and recalls the image of the Miltonic hell. Farther eastwards, the Galápagos Islands also owe their existence to volcanic action and contain at least one recent cone. In Fiji the volcanoes have been eroded almost into stumps, but Mount Washington in Kandavu still preserves the characteristic form.

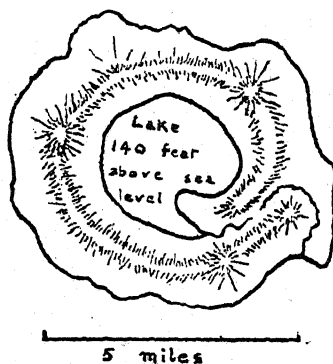
### *Physical Types*

Physically, the islands are of two kinds : the high and the low. The former occur sporadically everywhere, but are found especially in the west, where whole groups fall under this head. Most of them are volcanic in structure and rise abruptly from the sea to a height of 3,000 or, in the case of the larger islands, 4,000 feet. All the more extensive islands belong to this kind, the most important being the bigger individuals of the Fiji group, New Caledonia, and the Solomon Islands in the southern hemisphere and Hawaii in the northern. Steep gradients, combined with a heavy rainfall, have caused a high rate of denudation, and the surface relief is much broken and the topography extremely irregular. The diagrams on the next page show two sub-types of high islands. The first is typical of the single peak which raises its top above the ocean ; the second is a volcanic cone, complete with



THE ISLAND OF TAU IN THE SAMOA GROUP.

It is just the top of a single-peaked mountain, with gradients varying between 1 in  $3\frac{1}{2}$  and 1 in 5. The cross-section, which is drawn on a true scale, gives an idea of its appearance.



THE ISLAND OF TOFUA IN THE TONGA GROUP.

It is a typical volcanic cone, complete with crater lake, and rises starkly from the sea.

crater lake. A third sub-type, which is not illustrated here, is the whale-backed island caused by the protrusion of a ridge above the surface of the sea.

### *Coral Formation*

Some of the intertropical high islands are surrounded by a fringing reef of coral. This variety of coral formation is not so common in the Pacific as it is in the West Indies, but the diagram below shows a perfect specimen. The

majority of the islands are ringed about by barrier reefs which lie at distances ranging from a few hundred yards to 10 or 12 miles. Into the calm water enclosed by them innumerable streams, fed by a heavy rainfall, pour a mass of sediment, flooring the area within the reef with a thick layer of mud. Hence, in spite of their steep sub-aerial gradients, the high islands have wide, low foreshores sloping gently into a shallow sea. Almost everywhere the ebb tide uncovers a



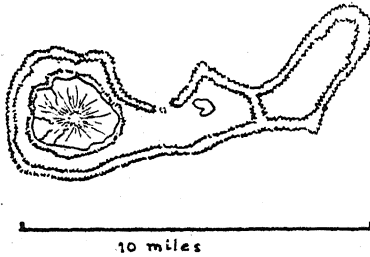
5 miles

THITHIA, FIJI.

A high island bordered by a fringing reef.

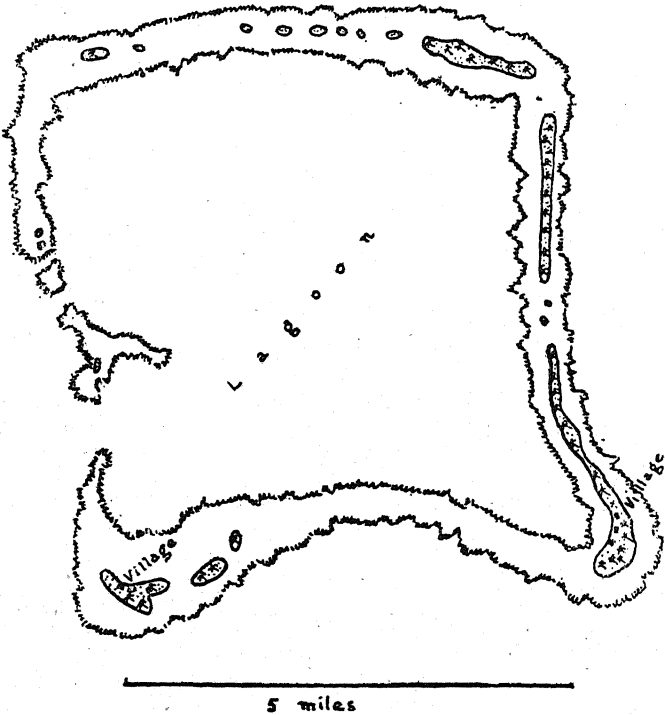
strip several hundred yards wide, though the tidal range does not exceed 3 or 4 feet. This tide-washed mud is favourable to the mangrove, which in course of time adds a strip of alluvial lowland to the majority of islands.

The diagram at the top of p. 240 shows a small island with a fringing reef and also a curiously arranged barrier reef. In many cases the barrier reef occurs without an enclosed island. These are the *thakau*, or atolls, concerning whose mode of formation Darwin and Murray have put forward rival theories. Their shape is determined by the relief of the peak on which they are built and is by no means as symmetrical as book diagrams often suggest. The figure on p. 240 shows a good specimen. In this case the reef is roughly square and contains a lagoon whose water reaches a depth of 20 fathoms in places. The habitable areas are narrow strips of soil formed by accumula-



MOTHI, FIJI.

A high island bordered by a fringing reef and enclosed in a barrier reef.



NUKUFETAU, IN THE ELLICE ISLANDS.

A *thakau* or atoll. The shaded areas on the reef are covered with soil and contain bushes and coconut trees. Note the passage into the lagoon.



tions of coral sand and jetsam of various kinds in the first instance, and later added to and enriched by decaying vegetable matter and the droppings of sea birds. Coconut palms and other trees grow in profusion, together with an undergrowth of shrubs. Such islands are "low" and exist in many thousands in the Pacific. For instance, Tonga, the Gilbert and Ellice Islands, and Paumotu, consist almost entirely of them. In them alone exist the clear lagoons which are so often wrongly attributed to the high islands.

A further manifestation of coral reef formation is the sea reef, of which the Great Barrier Reef of Australia is the largest specimen. It occurs when a submarine ridge approaches sufficiently near the surface in tropical waters for the coral polyps to build upon it. Its form is a long line of reef stretching for miles, but containing no definite islands. A typical example is found in the Great Sea Reef stretching westward from over 50 miles from the island of Vanua Levu in Fiji (see p. 253).

### *Climate*

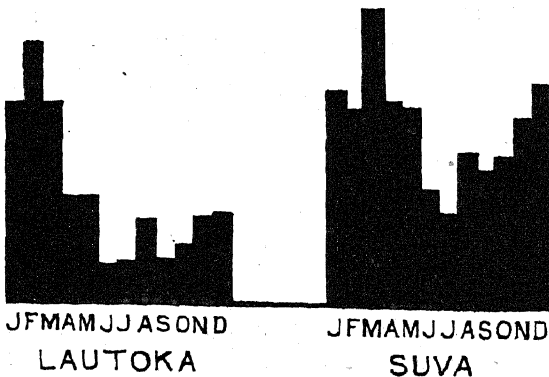
A few of the islands lie just outside the tropics and enjoy a delightful subtropical climate. Unfortunately, their fewness and smallness make them unimportant. Southwards from the Tropic of Capricorn the islands rapidly become bleak and wind-blown. The intertropical islands have an equatorial climate of a maritime type. In the low islands the control of the sea reaches its maximum. The midday temperature seldom rises above 80° F., nor does it fall below 78° F. Towards the Tropics groups like Fiji and Hawaii have a noticeable cool season and a slightly greater range. The great humidity of the air makes the heat oppressive and almost unbearable in summer to the European. Temperatures of 78° F. in Fiji make even indoor work nearly impossible for English officials between noon and 3 p.m., while in Queensland in the same latitude life is tolerable with the thermometer at 120° F. Great seasonal displacement of the thermal

equator takes place in the southwest. In January this line passes well to the south of the main Fiji group, causing the N.E. Trades to visit those islands in February and March. The influence of the rotation of the Earth, however, makes these winds change their direction and blow from the northwest soon after they enter the southern hemisphere. From May to December the S.E. Trades prevail, the thermal equator having moved north again.

The passage of the Doldrum belt over the intertropical islands causes great disturbances in the weather. Terrifying thunderstorms are frequent, and incredible torrents of rain, accompanied at rare intervals by destructive, slaty hail, descend on the land. Downpours of 10 inches in a few hours are not infrequent. The greatest on record was 33 inches in a single night at Suva in March, 1903. About this time, too, the islands are liable to be swept by severe cyclonic storms. In Fiji the "hurricane season" lasts from December to May. The damage caused by the passage of these storms is extreme. Houses are blown down, ships wrecked, and trees uprooted wholesale by the violent winds, while destructive floods are caused by the accompanying rain. Whole plantations of banana trees are sometimes blown over.

Except for a few weeks when the midday sun is at its lowest, the sky is covered with a pall of clouds which blanket the heat and often make the nights sleeplessly hot. During the short period of clear skies radiation is intense after sunset, and the thermometer may fall 15° or 20° F. within an hour. It seldom goes below 50° F. at night, however, except at high altitudes, and frost is unknown. This season is pleasant in the islands close under the tropics; June in Fiji, Tonga, and Tahiti, and January in Hawaii being mild and not too damp. To the European who has spent several successive hot seasons in the tropics the air is distinctly chilly at this time, while the native feels it necessary to warm himself at night by lighting a fire in his windowless hut.

The rainfall is more or less evenly distributed throughout the year, with one or two maxima at the time of the overhead passage of the midday sun. In low islands the rain is convectional, and therefore the fall is less abundant than in the high islands, where relief is a potent factor in condensation. Windward slopes show a markedly higher precipitation than lee slopes, as the accompanying graph, drawn from official statistics in Fiji, will illustrate clearly. When a reversal of the Trade Wind occurs, owing to the



VITI LEVU : RAINFALL PILLARS.

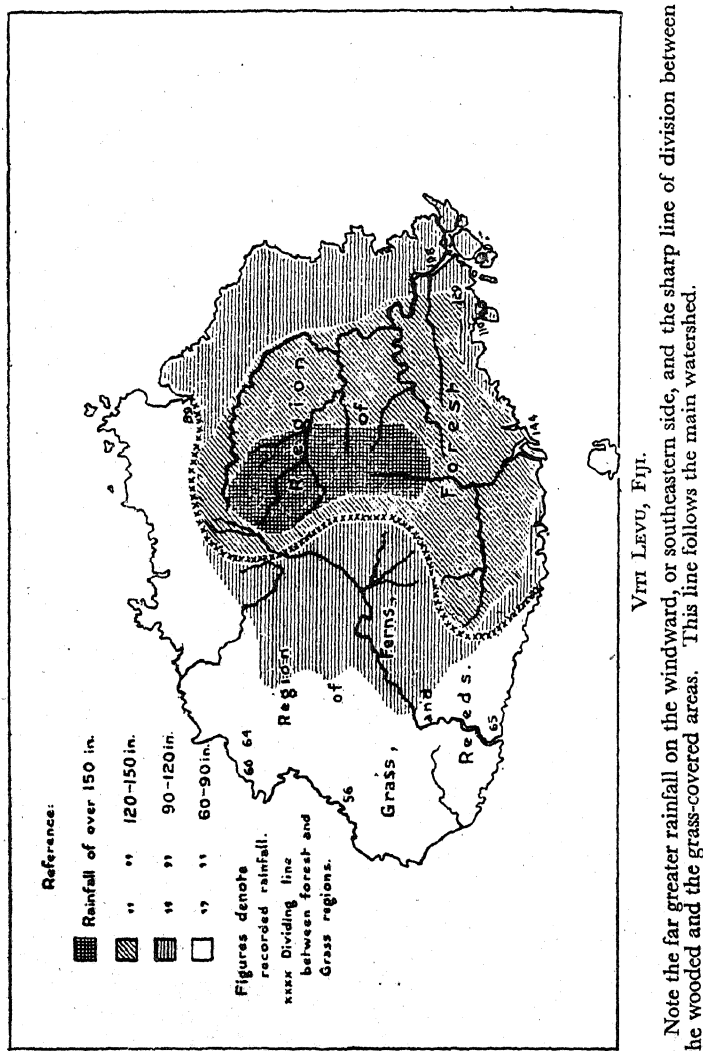
Suva, on the southeast (windward) coast, has a far higher rainfall than Lautoka on the west (leeward) coast. The latter place gets its heaviest rain during the short period of the Northern Trades. Scale of diagram :  $\frac{1}{16}$  inch of height = 1 inch of rainfall.

displacement of the thermal equator, the normal lee slope may become the windward slope for a short time and get a maximum rainfall then.

*Vegetation*

The vegetation is comparatively poor in species. The coconut tree grows everywhere on the coast. Solitary, wind-bedraggled palms may be seen struggling for existence on small portions of reef which have just escaped the reach of the tide. On the low islands they form the principal tree and grow to a height of 60 or 80 feet. Where the soil is sufficient, they are accompanied

by varieties of tropical evergreens, and bushes and coarse grass form a dense undergrowth. The high islands have



a luxuriant vegetation. Their low foreshores are fringed with mangrove, while behind this belt or on sandy stretches of shore stand groves of coconut palms, and the hillsides are

covered with dense bush or forest. The latter is tropical in nature and lacks the tangled, creeper-bound character of the continental equatorial forest. The trees are sometimes soft and sappy, at other times they are hardwood. Many of the latter are peculiar to the Pacific. The *yaka*, which gives a finely feathered board, the *dakua* or Fijian kauri, and the richly red *damanu*, yield excellent cabinet woods. Sandalwood occurs in most of the high islands, but wasteful felling of the trees in days gone by has ruined the trade in it. Forest usually covers the sheltered valleys and the slopes of hills, while exposed ridges and spurs are as a rule clad in bush. In those islands which are sufficiently far from the equator to have a decidedly prevailing wind, the lee slopes are covered with tall reeds. The accompanying map of Viti Levu, the largest island in Fiji, illustrates this fact. A noticeable feature about the native flora is its apparent inability to hold its own against introduced species. Thus, the vigorous guava tree, which was brought as a fruit tree from the West Indies, has become a pest in some islands owing to the rapidity with which it ousts the native bush and covers the hill slopes with its tough, wiry stems.

### *Animals*

Native animals are almost absent. A small brown rat is the only indigenous quadruped in many of the islands, while some do not have even this. The huge fruit-eating bat known as the flying-fox is found in all the western high island groups, and birds, of course, are plentiful in number, though relatively few in species. The most striking is a gaudy little parrakeet which is much prized by the natives for its feathers. The early navigators made a habit of leaving pairs of domestic animals on the inhabited islands,<sup>1</sup> and in many high islands there are now

<sup>1</sup> Captain Cook gave a *bull* and a *cow* to the chief of Tonga. As the natives convey no idea of sex in their language, they failed to grasp the gender distinction between "bull" and "cow," and mistook the phrase for the species of animal. Hence, the corruption *bulumakau* is the Pacific term for any bovine creature and even for beef.

wild pigs which have reverted to their ancient fierceness. The tusks of the boars form a cherished native ornament for the neck. In the New Hebrides hermaphrodite pigs are very common and are regarded with a kind of religious respect by the natives. The streams are full of prawns which are good eating and form one of the delicacies of the native diet, while the sea abounds in fish, which is much eaten by the coast folk. Mussels and oysters are also collected in large quantities from off the roots of the mangroves.

*Race, Customs, etc.*

Apart from recent immigrants, the islands are peopled by three distinct races : Malays, Polynesians, and negroes. The Malays have drifted in comparatively recent times from the East Indian Archipelago into the swarms of tiny low islands forming the Pelew, Marshall, Caroline, and Ladrões groups. As they have been described in a previous chapter, it is unnecessary to say more about them here. The groups in which they live are known collectively as Micronesia (see map, p. 248) on account of the smallness of their component individuals. Many of the islets are uninhabited.

The origin of the Polynesian is obscure. Some scholars think him an Asiatic who has worked his way along the outer arc of islands, but, though this seems to be the only alternative to regarding him as a separate racial type, there are objections to this theory. The Polynesian is very tall ; in fact, according to Ripley he is one of the tallest people in the world. Moreover, he has a well-built, somewhat European figure. His hair is black and straight, but his face is not flat, nor are his eyes of the Mongolian cast. His skin is of the rich olive-brown complexion seen in Southern Europeans, and it is without the yellow tone of the Asiatic. If Asia was his original home, his new environment has modified him considerably. He is a fine specimen of human physique, strong and athletic, yet not coarse of limb. The men are often handsome of

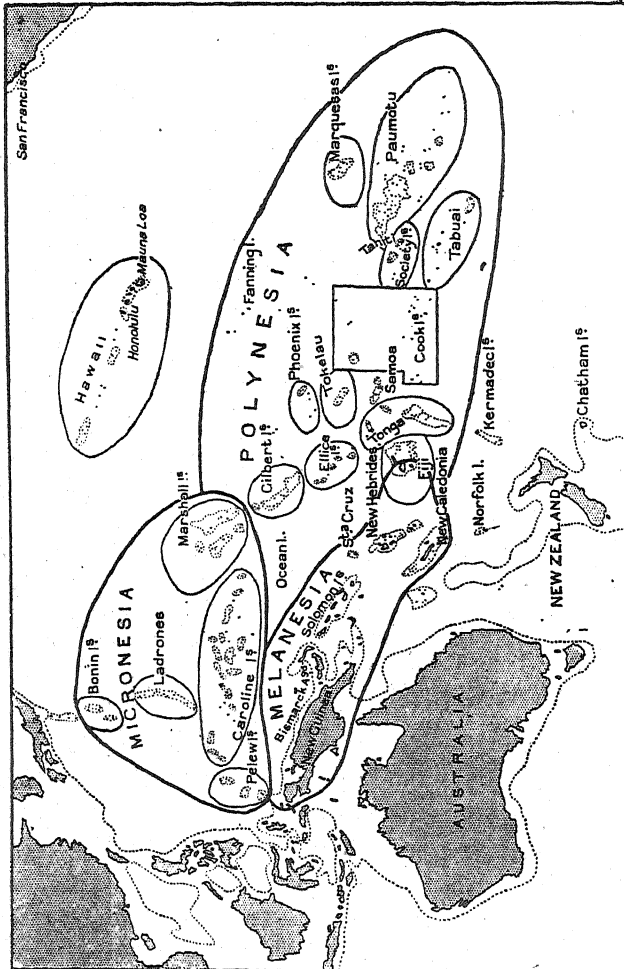
face, but the women are usually ugly. This reversal of what is commonly found among other peoples of the world is a noticeable peculiarity among the races of the Pacific.

The Polynesians are brave, though not warlike, and they are excellent sailors and navigators. Up to fifty or sixty years ago the Tongans used to make frequent voyages to and from Fiji in their frail outrigger canoes, finding their way without compass or sextant. Their only navigational instrument was a curious map made of cross-laid sticks which represented winds and currents, while shells tied on in appropriate places marked the positions of islands. Nowadays, they sail in five- or ten-ton cutters of European model, but they still substitute innate skill for scientific navigation.

Their costume in days gone by consisted of an apron of grass or *tapa*, a kind of paper-cloth made by beating together strips of the bark of various plants. But, except in remote islands, they have discarded this for a sort of kilt, or *sulu*, of cotton cloth, and they now frequently wear a shirt. The women, whose dress was formerly the same as the men's, now wear the *sulu* together with an upper garment resembling a European dressing-gown of cotton cloth. Their diet consists largely of native vegetables, chiefly *taro*, a spherical root 3 or 4 inches in diameter. To these they add fish, shell-fish, and crabs. Their cooking is done in a hole lined with stones. A fire is lighted in the hole and withdrawn as soon as the stones are hot. The food is then wrapped in banana leaves and buried in the hole. At the end of an hour or so the baking is complete.

They live in villages, each family having a neatly built, one-roomed house whose fabric consists largely of the trunks and fronds of the coconut tree. The floor of trodden earth is covered with skilfully woven mats of grass gaily fringed with parrakeet's feathers or, in modern times, dyed wool. Boys and unmarried men live in a special house. The clan is the social unit, but powerful

chiefs have brought whole islands or even groups under their sway. Thus, Tonga has a recognized king. The club was their chief weapon, though spears were also



GROUPING OF THE PACIFIC ISLANDS.

used. Their wars were usually undertaken for the extension of a chief's rule, and prisoners were eaten. European influence, both administrative and religious, has put a stop to these wars and the concomitant cannibalism.



The Polynesians are a polite, gentle-mannered people, fond of music and ceremonial oratory. The islands inhabited by them are the great majority, as the accompanying map shows. The Hawaiians undoubtedly belong to the Polynesian race, though they often have a very Malayan cast of countenance. However, this group is usually excluded from Polynesia.

The negroes belong to a previous wave of drift from southern Asia. They contain a strong pygmy strain which is probably very ancient. Small, long-headed, and kinky-haired, they are probably related to the Veddas of Ceylon, the Andaman islanders, and other backward peoples who have survived in the backwaters of the stream of race drift. Until influenced by European civilization, they were in the stone age. Their weapons consisted of the bow and arrow, the latter tipped with fish bone or flint chips, and the spear, whose head was just the sharpened end of a pole hardened by charring. Nowadays the coast tribes, at any rate, have iron spear-heads, steel knives, and other important tools. Their huts are light constructions with wattled sides and thatched roofs. On marshy coasts the foundation consists of tall piles, and farther inland the huts are sometimes perched like nests in the fork of a tree. The type of house improves with distance from New Guinea, probably owing to Polynesian influence. In the Solomons, villages which recall the Maori *pa* sometimes occupy hill-tops and are fortified with moat and palisade.

Costume is of the simplest and consists of a fringe of grass suspended by a string tied round the waist. A necklet of boar's tusks or wooden beads is worn by way of ornament. The long, crinkled hair, which stands erect 6 or 9 inches on the head and has the appearance of a busby, is often dyed red or bleached to a sickly cream. Their diet is chiefly vegetable, eked out with fish and any insects or shell-fish which can be collected. They have disorderly plots of *taro*, *kumala*—a kind of sweet potato—and yams. Their mode of tillage consists of

clearing the bush from a selected spot, digging the required number of holes with a stick, and planting the slips. No further attention is paid to the crop until it is ripe for the harvest. An amazing want of foresight is shown in connexion with the amount planted and with the using up of the roots when fit for eating.

Their social organization is that of the clan. Each clan occupies a separate village and lives at feud with its neighbours. Cannibalism is the regular sequel to their raids and skirmishes. They are very treacherous and prefer ambushes and the stalking of individuals to open warfare. The head of the clan is a hereditary chief, who rules according to established tribal law. The life of the people is strictly regulated by traditional custom. The Englishman's submission to good form is complete liberty of action compared with the restriction under which these negroes live. Their religion is animistic, though totemism is also observed in some degree. In Fiji the principal god, though represented by a shark, is an ancestral hero in traditional legend.

Civilization has scarcely touched many of the groups inhabited by this race, but its mere imminence seems to have an influence in decreasing the population. This falling off was actively helped in days past by the practice of "blackbirding," which aimed at providing labour for the plantations of Queensland. The extension of the negro race is limited to certain western groups, namely, New Britain, the Solomons, Santa Cruz, New Hebrides, New Caledonia, and the Loyalty Islands, which together with New Guinea are accordingly known collectively as Melanesia.

The Fijians form an interesting transitional people between the Polynesians and the Melanesians. The western islands of the group and the remote highlands of the two larger islands are peopled with pure negroes who are Melanesian in all but stature. The eastern islands of the group are inhabited by almost pure Polynesians, whose forbears came from Tonga within historic

times. The rest of the group contains a mixture of the two races. Fijian legend relates the arrival of the first inhabitants from the west in consequence of a large canoe having been blown eastwards by a storm, and the village of Vunda (= our beginning) is pointed to as the first settlement. The language is a dialect of the tongue spoken by the Polynesians of Tonga and Samoa, and the culture is a mixture of that of the two component races.

Some of their customs are widespread in the Pacific, and have an interest for Europeans from their strangeness. Thus, the practice of *kerekere* enables persons within a certain degree of intimacy to borrow each other's goods permanently. In modern times it is a great obstacle to progress, since it checks acquisitiveness. The young Fijian has no inducement to thrift, for the visit of a friend may deprive him at one blow of the savings of months. Better known in Europe is the custom of *tambu*,<sup>1</sup> or veto, which chiefs may lay on objects or places, forbidding their use. Its observance was enforced in former times by "club law," but even to-day a rod with the bark stripped in a certain way and fixed upright in a well-used path will close that route more effectually to natives than an iron gate. One of the chief features of a native village is the *lali*, or drum, made of a hollow, boat-shaped log. Besides its use for summoning the villagers to communal labour and for other similar purposes, it acts as a wireless set for broadcasting news. Europeans are astonished at the distance its sound carries, but they are amazed at the speed with which it can spread accurate and detailed information by means of relays for hundreds of miles. It is a curious fact that the natives are not conscious of any recognized system of signals.

<sup>1</sup> The sound represented by the letter *b* in English is not found in some Pacific dialects without a preceding *m*. Hence the missionaries in reducing the native language to writing tried to economise by giving *b* the sound of *mb*. The word *tabu*, pronounced *tambu*, reached England in the spelling of the missionaries, was pronounced with a wrong accent, and has finally become a loan-word whose form is *taboo*.

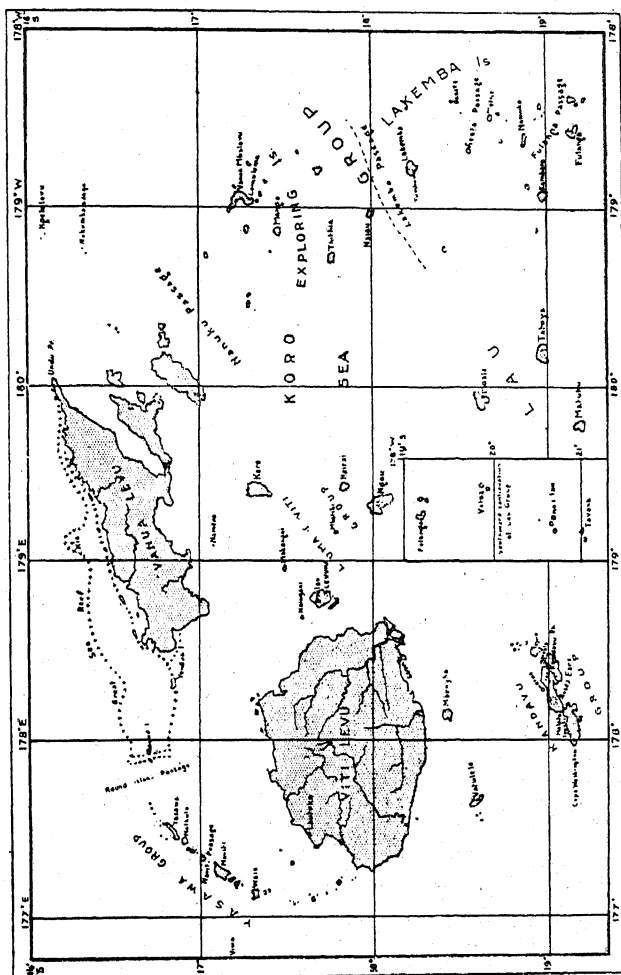
*European Settlement*

Within the last eighty or ninety years immigration has brought people of many races to the Pacific Islands. The chief are of British, American, or French origin, and these nations have divided the islands among themselves. Permanent settlement is difficult, if not impossible, for the European in most parts ; hence, the few thousand immigrants of this race are administrators, traders, or plantation managers. Hawaii has an American garrison, which increases its white population. Excluding these troops, the total number of persons of European descent in the Pacific Islands cannot exceed fifteen or twenty thousand. Japanese and Chinese immigration is numerically greater. Large numbers of these Asiatics have settled in Hawaii and in the Micronesian groups. In the former they are mostly domestic servants or labourers who work on the plantations. Laundry work and market gardening are almost entirely in Chinese hands, not merely in Hawaii, but also in Fiji and wherever a European settlement provides an opening. The Japanese owned the Micronesian islands until 1944-45.

The admission of Asiatics into the European or American possessions is unwillingly allowed, but is forced by labour problems. Since neither the Polynesian nor the Melanesian will work continuously, steadier labour must be imported for the economic development of the land. The government of Fiji tried to solve the difficulty by importing coolies from India. . After five years' work on a plantation these Indians could elect to be sent home or to be granted a plot of land on certain easy terms. As the latter choice was nearly always taken, the population of the colony includes 126,000 Indians to 128,000 natives, a fact which raises a problem.

The table below shows the chief groups of islands and their political connexions. The islands near South America have been omitted, since they are wholly undeveloped and mostly uninhabited. They belong to Ecuador

or Chile. The New Hebrides are governed jointly by Britain and France on an unworkable system known as condominium. Until it is abolished, progress will be



#### THE FIJI GROUP.

Suva, the capital, is placed in Viti Levu a few miles southwest of the delta of the Rewa River. Taveuni is the large island to the southeast of Vanua Levu. Note the sub-groups.

impossible. Norfolk Island is politically a part of Australia, and the Chathams and other southern groups belong to New Zealand. The western islands of Savaii and Upolu in Samoa, which were formerly held by Ger-

many, are now administered by New Zealand under a mandate from the League of Nations, and New Britain and Nauru have been acquired by Australia in the same way. The Cook Islands were taken over by New Zealand in 1901. The occupation of a large number of the islands by European powers is merely nominal.

TABLE OF CHIEF GROUPS AND POLITICAL DISTRIBUTION

Group	British.	French.	United States.
Melanesia	Solomon Is. New Britain ( <i>cap.</i> Rabaul) Santa Cruz New Hebrides ( <i>with French</i> ) Fiji ( <i>cap.</i> Suva)	New Caledonia ( <i>cap.</i> Numea) Loyalty Is. New Hebrides ( <i>with British</i> ) Bougainville (Solomon Is.)	
Polynesia	Gilbert and Ellice Is. Phoenix Is. Tokelau Tonga Samoa (Savaii, Upolu ; <i>cap.</i> Apia) Cook Is. <i>Scattered islands</i>	Tahiti Paumotu Marquesas Tabuai	Tutuila and Manua (Samoa) Hawaii ( <i>cap.</i> Honolulu)
Micronesia			Guam (Ladrones) Bonin Is. Pelew Is. Caroline Is. Marshall Is. Ladrones Is.

### *Importance of the Islands*

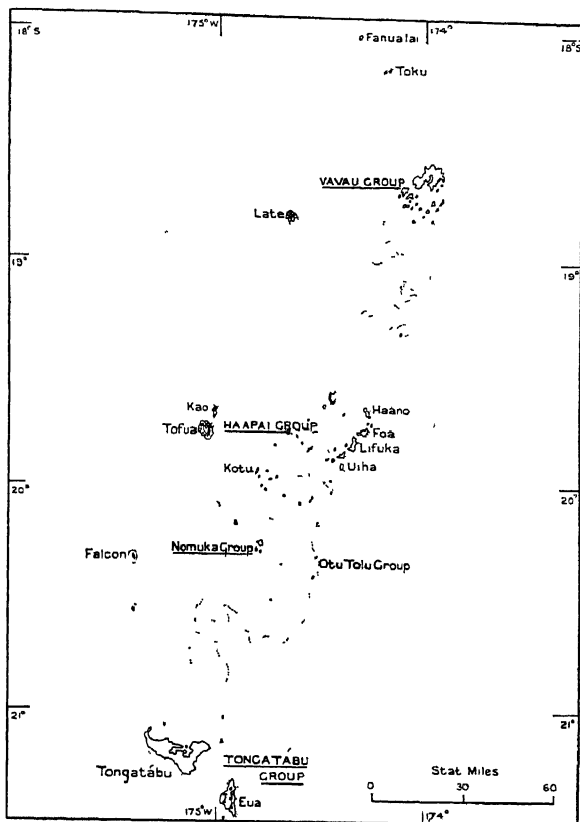
Apart from the interest arising from their inhabitants, the Pacific Islands have definite economic values. Chief among these at the moment is the use of certain islands as ports of call and refuelling stations along the trans-Pacific sea and air routes. Fiji and Hawaii are nodal points, and are thus of outstanding importance. Great steamship routes run from Vancouver and San Francisco







at Fanning Island, Fiji, and Norfolk Island. The advent of wireless telegraphy has increased the centralization of British administration in Suva. A powerful station has



TONGA.

The group contains a few small high islands and four clusters of low islands. The dotted lines are 100 fathom contours.

been installed at that town and is used for the purposes of relaying messages and for broadcasting news.

Many of the islands are of great strategic value. Australia's interest in the Pacific groups is largely derived from her anxiety lest a foreign nation should establish a naval base near her shores. Suva is the British naval head-

quarters in the South Pacific, but there are no fortifications, and the naval force usually consists of a gunboat. The positions of Hawaii as an American naval base for operations against Japan led to the attack on Pearl Harbour. It also forms with Guam and Midway Island a link between the United States and the Philippines.

The islands are capable of important economic production. The sandalwood, which attracted the early traders, has been used up by "robber economy," but scientific forestry might restore the industry and extend it to the local cabinet woods. Efforts have been made to establish rubber plantations in Fiji, but so far production has been on a small scale. The most universal product is copra. The coconut palm grows readily even in places where other trees cannot establish themselves and, except in certain islands like Viti Levu, where insect pests nip the fruit in the bud, it produces abundantly. The easy cultivation makes copra planting suitable for Polynesian labour. After the land has been cleared and the nut planted, weeding is only necessary at intervals and only so long as the tree is quite young. As soon as the plantation is established, cattle are turned in to keep down the bush, and the collection of the nuts and the extraction of the kernel is the only further labour required. The cattle are used locally as meat, though hides and bone manure are exported as by-products. It is possible that in the future copra will be grown in the low islands, smaller high islands, and in the less fertile parts of the larger high islands, the more fertile parts of the latter being used for other crops.

Sugar now ranks above copra in importance. The damp valleys of the high islands are ideal for the sugarcane, and plantations are gradually being established. Unfortunately, the fluctuations of the market and the competition of beet sugar make the crop a paying one only when grown on a large scale. This limits its extension to the larger valleys of big islands like Viti Levu. At present Fiji leads in sugar production, though the Solomons may

be developed later on. The Colonial Sugar Refining Company of Queensland is the largest sugar planter and has developed the industry especially in the valleys of the Rewa and Mba Rivers in Viti Levu. Where the high islands are too dry or where for some other reason sugar is not a suitable crop, various kinds of tropical fruit are grown. Bananas are cultivated extensively in Fiji and Samoa, whence they are shipped to New Zealand and Canada. In Hawaii the pineapple industry has attained great importance under the encouragement of the United States administration. Selected fruit are exported to San Francisco, but large canneries have been established in the islands in order to supply the United States with tinned and preserved fruit.

There are other products, though of less importance. In some groups, *e.g.*, Fiji, sea-slugs (*trepang*) are gathered in shallow water by the natives, cleaned, smoked, and exported to China, where they are used for making soup. The animals are about 9 inches long. They have a semi-circular section and look from above like brown, over-ripe cucumbers. Various kinds of shell are gathered in the shallow water about the reefs and exported to Japan and elsewhere to be made into "pearl" buttons. The chief kinds are the trochus and the nautilus shells. Shell is also got from sea turtles and becomes the tortoise-shell which is used for making combs and other small articles. Minerals are of little importance on the whole, but the nickel mines of New Caledonia were formerly one of the chief sources of the supply of that metal. The mines used to be worked by convicts transported from France, but the protests of Australia, who objected to having a penal settlement at her doors, cut off this source of labour in 1898. Nauru and Ocean Island have large deposits of phosphates, and some of the islands adjacent to the South American coast also yield guano. Gold is mined in Fiji.

Many of the islands are moderately large. Viti Levu is 87 miles long by 54 broad, and contains 4,112 square miles of surface. It is therefore slightly less than half the

size of Wales. Several of the Solomons are about the same size, while New Caledonia is even bigger. The development of the British islands is chiefly in the hands of Australian organizers, but, as Australia has her own tropical north, it is probable that New Zealand will be the real economic godmother in the future. Her interest in the islands was clearly shown by her attachment of the Cook Islands and by her eagerness to take over Samoa from the Germans in 1914. Under her control they may become the source of her supplies of tropical products.

The islands are also health and pleasure resorts for the adjacent temperate lands. Suva is a winter station for New Zealand, and the equivalent to the Englishman's cruise in the Mediterranean is for the New Zealander a month's round trip through Fiji, Tonga, and Samoa. The tourist trade is by no means well organized or developed as yet, however, though Suva has an excellent up-to-date hotel. Hawaii, on the other hand, under American advertisement, has become the playground for the millionaires of California and British Columbia. Great hotels which line the Waikiki beach, and an efficient tourist organization which provides visits to Mauna Loa and the huge geological fault of the Pali, attract thousands of wealthy visitors every year.

Among the interesting features of the islands is the fact that the 180th meridian passes through them, actually cutting some. The inconvenient, if sometimes comic, effects of this may best be illustrated by a couple of anecdotes. In the early days of European settlement in Fiji a very religious Scotchman is said to have proposed to open a store in Taviuni, an island cut by the 180th meridian. With the help of a ship's navigator he drew the meridian on the ground and built his store half on one side and half on the other. In time the store was opened. When the week-end came, one morning the sun rose on the shop, bringing Sunday to the west side, which consequently remained religiously shut. As, however, it was Saturday on the east side business went on as usual.

Next morning was Sunday on the east side, but Monday on the west, so that the Sabbath never wholly closed down the canny Scotchman's business. Unsympathetic Governments have made such ingenuity of no avail nowadays by devising an artificial international date line which does not touch land anywhere. But the device does not free ships from date troubles, and the writer can remember crossing the meridian on one occasion in company with a number of American passengers. The meridian was approached on July 4th, on which day many Americans were laid low by the celebration of their national independence. As the meridian was crossed that night the survivors duly celebrated July 4th on the following day for the second time.

A word must be said in conclusion about the romance of the South Sea Islands. The writer who will enshrine the glamour of the islands in a great work has yet to be found. R. L. Stevenson, who lived for some time in Samoa and was buried near Apia, might have done it perhaps, but his novels about the Pacific have not caught the atmosphere. It will be a matter for regret if the writer does not turn up soon, for the economic development of the islands must in a few years destroy their romance. There is a charm which pervades the islands and grips the imagination of visitors. Europeans who spend several years in them are often unwilling to leave. They get *malua*, the native term for the spirit of lotus-eating. Hardly anyone who has spent some years in them escapes afterwards from the echo of the waves beating on the coral reefs during still evenings. The savage wildness of the Melanesian, the suave and aristocratic manner of the Polynesian, and a hundred and one quaint native customs make a profound impression on the traveller and leave an indelible mark on his mind.



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