Hobart Harbour, with Mount Wellington at the back. Photograph of a drawing in the possession of Mr. Beattie.

A NATURALIST IN TASMANIA

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PREFACE

The following sketches in Tasmanian natural history are the result of a six months' stay in Tasmania during the spring and summer of 1907–8; the expedition was undertaken at the suggestion of Professor G. C. Bourne of Oxford, with the object of studying especially the fresh-water life of Tasmania, and besides the material help which he gave me I am happy to express my indebtedness to the Warden and Fellows of New College for allowing me leave of absence, and to the British Association for a substantial grant. I should also like to acknowledge the assistance which Mrs. Weldon has given me, and if anything in these pages could be thought worthy of being dedicated to the memory of Professor Weldon, to whom I owe so much, my constant aim would be in some measure achieved.

It is a delightful experience for the Englishman after travelling for about twelve thousand miles away from home to meet with his fellow countrymen at the Antipodes, and to be received with that hospitality which has become almost proverbial with us here; but a special delight is added to the naturalist from home, who can converse with kindred minds in these distant countries, and learn to appreciate the ideas which

are stimulating the work of fellow naturalists in a land of inexhaustible interest and natural riches.

I should be at a loss to say how much in these pages is due to my own observations, and how much to the suggestions which I have gleaned from the conversations and writings of such Australian naturalists as Professor Baldwin Spenser of Melbourne, Professor Haswell of Sydney, Mr. Hedley and Mr. Goddard of Sydney, Mr. Twelvetrees of Launceston, and Mr. Rodway of Hobart; but I am quite certain that I have learnt more from them than I could ever have the wit to put into a book. To Mr. Rodway is due the merit of whatever is sound in my account of the botanical features of Tasmania, and my walks and expeditions with him will always live in my memory as the most pleasant and valuable part of my Australian experiences.

Of the many books on Tasmania which I have consulted, I am perhaps most indebted to Mr. Ling Roth's *Aborigines of Tasmania*, to Mr. Backhouse Walker's historical essays entitled *Early Tasmania*, and published by the Royal Society of Tasmania, to Mr. Rodway's *Tasmanian Flora*, to numerous papers by Mr. Charles Hedley, dealing with the problem of the lost Antarctica, and to Mr. R. M. Johnston's *Geology of Tasmania*. In Launceston I received much help from Mr. Scott, Mr. Petterd, and Mr. Alan Slater; and I must not forget to thank Mr. Wertheimer, the Secretary of the

Tourist's Bureau, for his kindness in facilitating my travels, while I can only apologize to my Tasmanian friends that in return for their hospitality I have only these imperfect sketches to offer.

The illustrations in this book are partly from photographs and drawings of my own, or made under my direction, while many are borrowed from Mr. Beattie of Hobart, who has kindly permitted their reproduction here. The drawing of the Tiger is a composite drawing by Mr. Bayzand of Oxford, partly after Gould and partly from my own suggestions, while that of the Devil by Mr. Goodchild is from a living specimen in the Zoological Society's Gardens, by permission of Dr. Chalmers Mitchell.

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At the extreme south of Australia and separated at a distance of about two hundred miles from the mainland by the gradually shelving channel of Bass's Straits, lies the little island of Tasmania, mountainous, forest-clad, and watered by innumerable rivers and highland lakes, and about intermediate in size between Wales and Ireland. Although it is structurally and historically a part of Australia, the scenery and climate are both quite distinctive, and if a somewhat sombre monotony, not without its special charm, is the keynote of Australia, Tasmania, small as it is, is a land of variety and bold transition, from flat Eucalyptus-covered tablelands to fantastically rugged mountain ranges, overgrown with virgin forests of southern Pine and evergreen Beech; from the calm blue skies of a southern Italian summer to the fierce Antarctic blizzard.

And though economically, and from its small population of about 200,000 souls, one of the less important states in the Federation, the island

has played an important and picturesque part in the colonization of the southern seas, where certain rare touches of romance redeem a somewhat dark and equivocal history, and are not lightly to be forgotten.

Pope Alexander VI in 1493 issued his famous bull assigning the world west of the Azores to Spain, and east to Portugal, and so it came about that the Spaniards working west from America and the Portuguese to eastward from India met in their trading enterprises in the East Indies. The unknown south land, which had existed as a kind of myth even in classical times, became the Terra Australis Incognita, a vaguely imagined continent, dreamed of, adumbrated, and finally sighted by a succession of navigators. The Spaniards De Quiros and Torres (1594) are credited with having first seen the north coast of Australia, and Torres certainly sailed through the straits between New Guinea and the mainland, which bear his name; but his discovery was forgotten, and Tasman, in his map of fifty years later, makes New Guinea a northern projection of Australia. At the beginning of the seventeenth century the Dutch were rapidly supplanting the Spaniards in the command of the seas, and had already established an important trade in the spices and other products of the East Indies; in the pursuit of this trade the navigators of the Dutch East India Company on their way from Europe were in the habit, after rounding the

Cape of Good Hope, of drifting in an easterly direction until they sighted the western Australian coast, and then crossing northwards to the Indies. In this way they became acquainted with much of the western Australian coast, and many of the names still testify to these early Dutch discoveries.

Abel Janszoon Tasman was born of obscure parents in the village of Luytjegast, Groningen, in the year 1603, just as Holland was emerging to greatness from the struggle with Spain. At the age of thirty he took service with the Dutch East India Company, and made the voyage between Holland and the Indies several times, rising from a common sailor to posts of some responsibility, which marked him out as a navigator of promise. At this time the Governor of the Dutch East Indies was Van Diemen, a man of enterprise and shrewdness, who, from the seat of Government in Batavia, dispatched several expeditions of discovery to the Pacific and southern seas, in the hope of extending the trade and dominion of the Dutch flag. Tasman was in command of one of these expeditions, the object of which was to discover a large island of enormous wealth supposed to exist in the Pacific, east of Japan. Despite the unproductiveness of this voyage, Van Diemen chose Tasman to command an expedition which had long been germinating in the Governor's mind, the object of which was to explore the great Unknown

South Land, and to report on its natural wealth and the possibility of discovering a new trade route to South America. On the 4th August, 1642, Tasman set out from Batavia in the *Heemskerck*, a vessel of two hundred tons, with the flyboat *Zeehaan* in company, of rather less burden; they arrived at Mauritius on September 5th, though by their reckoning they should have been two hundred miles to the east; a fact which shows us how very inaccurate was the calculation of longitude in those days. The ships arrived in a rotten and leaky condition, and short of supplies, so that it was not until a month later that they set out again on their adventurous voyage. On November 24th they sighted land which can be easily identified as the mountains at the back of Macquarie Harbour on the west coast of Tasmania, and thus Van Diemen's Land, as Tasman called it, was seen for the first time. Tasman sailed round the southernmost extension of the coast, and after encountering a fierce storm in Storm Bay, named after the incident, he anchored in what is now known as Blackman's Bay on Forestier's Peninsula. Tasman tried to go ashore, but the surf prevented his landing, so that the ship's carpenter had to swim to the shore and plant a flag. Nothing was seen of the natives. Tasman now sailed eastward, and after discovering New Zealand, where he had a bloody encounter with the Maoris, he returned to Batavia through the straits north of New Guinea, arriving home

on the 15th June, 1643, with the loss of fourteen men.

Although this historic voyage had not discovered the earthly paradise which the Governor expected, it had proved Australia to be an island, and that a possible route by this way existed to South America. So inveterate, however, was the belief in the existence of an Antarctic continent, that when Tasman had proved Australia to be an island, he still believed that New Zealand was the northernmost extension of a southern continent which was probably joined on to South America.

Tasman's subsequent career was not very distinguished; he was sent to discover Torres' Straits, but failed, and on a subsequent piratical expedition against the Spaniards at Manilla, he appears to have summarily hanged one of his crew for disobedience, a proceeding which led to temporary suspension from his command. He died in 1657, one of the most prominent citizens of Batavia.

Dutch enterprise in the southern seas subsided almost completely after Tasman, and it was not until the end of the next century that Europeans revisited the southern shores of Australia and Tasmania. The reason for attention being again paid to this remote part of the world, was the rivalry of France and England for the command of the seas and the extension of their empires, and the story of the rediscovery and final coloniza-

tion of Van Diemen's Land or Tasmania, is the story of rival French and English discoverers sailing, often ostensibly in the interests of science, but always with a view to annexing territory or establishing spheres of interest, who met, fraternized, and outwitted one another by turns in Australian waters.

This epoch begins in 1770 with Captain Cook's first voyage, to observe the transit of Venus at Tahiti, which had for its most important result the exploration of the East Australian coast and the discovery of Botany Bay and New South Wales. Two years later Van Diemen's Land was visited, for the first time since Tasman, by a French Captain, Marion du Fresne; he was the first to see or hold converse with the natives, and owing to a misunderstanding the natives attacked the sailors with stones, and a few shots were fired by the Europeans.

In 1773, during Cook's second voyage Captain Furneaux was separated from Cook in a storm and made the east coast of Tasmania, where he landed, but he did not see any of the natives, only stumbling across their simple bark huts, and noticing the extensive bush fires which they had started. On his third voyage, 1777, Captain Cook, with two ships, the *Resolution* and *Discovery*, entered and landed in Adventure Bay on Bruny Island, and this is the first occasion on which we learn anything definite about the natives.

Bruny Island is a winding strip of hilly country

FIG. 1. View of Adventure Bay, Bruny Island, where Captain Cook landed.

FIG. 2. *Trigonia pectinata*, picked up on Adventure Bay. (Natural size.)

cut off from the mainland by a narrow channel, now known as the D'Entrecasteaux Channel, both the island and the straits being named after the French Admiral Bruny D'Entrecasteaux, who surveyed these coasts a few years later. It is an easy journey from Hobart, the whole of the passage being in sheltered water, and it was on Bruny Island that I had my first experience of camping in Tasmania. Our tents were pitched under some tall Gum-trees which were then in flower, and in the early morning attracted small flocks of the beautiful little Swift Parakeet to feed on their honey. A short walk through the thinly timbered bush brought us out on to the sweeping half-moon crescent of sand fringing Adventure Bay, which the rollers from the open ocean strew with every sort of curious shell; thousands of the little whelk-like *Elenchus*, of which the natives used to make necklaces, and occasionally the remarkable *Trigonia* (Fig. 2), a kind of mussel very abundant in the Jurassic Seas of Europe, but now confined to the Australian coasts. On the cliffs to the north of the bay every sort of sea-bird breeds, and among the sand hummocks are large Penguin warrens. It was here, in the southernmost corner of the bay, that Captain Cook and a party of his men landed for the purpose of cutting grass and spars, and of obtaining water. Several days were spent on shore, and several parties of the natives were interviewed.

To quote from Cook's narrative:—

In the afternoon we were agreeably surprised, at the place where we were cutting wood, by a visit from some of the natives: eight men and a boy. They approached us from the woods without betraying any marks of fear, or rather with the greatest confidence imaginable; for none of them had any weapons, except one who held in his hand a stick about two feet long and pointed at one end. They were quite naked and wore no ornaments; unless we consider as such, and as a proof of their love of finery, some large punctures or ridges raised on several parts of their bodies, some in straight and others in curved lines.

They were of the common stature but rather slender. Their skin was black, and also their hair, which was as woolly as that of any native of New Guinea; but they were not distinguished by remarkably thick lips nor flat noses. On the contrary their features were far from being disagreeable. They had pretty good eyes; and their teeth were tolerably even, but very dirty. Most of them had their hair and beards smeared with a red ointment; and some had their faces also painted with the same composition. . . . We had not been long landed, before about twenty of them, men and boys, joined us, without expressing the least sign of fear or distrust. There was one of this company conspicuously deformed; and who was not more distinguishable by the hump upon his back, than by the drollery of his gestures and the seeming humour of his speeches; which he was very fond of exhibiting, as we supposed, for our entertainment. . . .

Some of our present group wore, loose round their necks, three or four folds of small cord, made of the fur of some animal; and others of them had a narrow slip of the kangaroo skin

tied round their ankles. I gave to each of them a string of beads and a medal; which I thought they received with some satisfaction. They seemed to set no value on iron or iron tools. They were even ignorant of the use of fishhooks. . . .

We cannot, however, suppose it to be possible that a people who inhabit a sea-coast and who seem to derive no part of their sustenance from the productions of the ground, should not be acquainted with some mode of catching fish, though we did not happen to see any of them thus employed; nor observe any canoe or vessel in which they go upon the water. Though they absolutely rejected the sort of fish that we offered to them, it was evident that shell-fish at least made a part of their food, from the many heaps of mussel-shells we saw in different parts near the shore and about some deserted habitations near the head of the bay. These were little sheds or hovels built of sticks, and covered with bark. We could also perceive evident signs of their sometimes taking up their abode in the trunks of large trees, which had been hollowed out by fire, most probably for this very purpose. . . . The females wore a kangaroo skin (in the same shape as it came from the animal) tied over the shoulders and round the waist. But its only use seemed to be to support their children when carried on their backs; for it did not cover those parts which most nations conceal; being in all other respects as naked as the men, and as black, and their bodies marked with scars in the same manner.[1]

Cook's Australian discoveries resulted in the establishment of the first penal settlement at Sydney, the site of which was chosen by Governor

[1] *Cook's Voyage to the Pacific*, vol. i, chap. vi.

Phillip in 1788. On the very day that Sydney was founded the ill-fated La Pérouse sailed into Port Jackson, only to find the English already in occupation; he seems subsequently to have gone in search of a more southern port, and a bottle containing his dispatches was picked up years later in Adventure Bay; but neither he nor any of his crew were ever seen again.

The English were established in New South Wales, but the French still entertained the hope of starting a rival settlement, and their attention was especially directed to Van Diemen's Land, or the southernmost extension of the mainland, as every one then thought. Admiral Bruny D'Entrecasteaux was sent out by the National Assembly in 1791; ostensibly to look for La Pérouse; but he evidently had instructions to search diligently for a port in the southern Australian waters, and his discovery and the beautiful survey which he made of the Derwent Estuary, and the complicated coast-line in the neighbourhood, were kept strictly secret until the French had given up all hope of gaining a footing on Van Diemen's Land. For we find in 1794 Lieutenant John Hayes, in the service of the English East India Company, repeating the French Admiral's discovery and survey of the Derwent, and it was Hayes's less accurate chart that Flinders and the early English settlers used. D'Entrecasteaux's explorations were chronicled by the naturalist to the expedition, La Billardière, who

also made the first systematic observations on the natural productions of the country and its native inhabitants. It is impossible not to notice the glamour and romance which La Billardière and, later, Péron love to throw round the dubious figures of the aborigines; but it is also clear that their intense predisposition to believe in primitive man helped them a long way towards gaining the confidence and arousing the interested curiosity of the natives. It is also of importance to note that not only La Billardière and Péron, but also the less sentimental testimony of Cook, all bear witness to the mild characteristics of the Tasmanians before they had come into contact with the fatal influence of civilization. La Billardière [1] gives the following picturesque account of the native women obtaining food:—

They each took a basket, and were followed by their daughters, who did the same. Getting on the rocks that projected into the sea they plunged from them to the bottom in search of shell-fish. When they had been down some time we became very uneasy on their account; for where they had dived were sea-weeds of great length, among which we observed the *Fucus pyriferus*, and we feared they might have been entangled in these so as to be unable to regain the surface again. At length, however, they appeared, and convinced us that they were capable of remaining under water twice as long as our ablest divers. An instant was sufficient for them to take breath, and then they dived again. This they did repeatedly until their baskets were nearly

[1] Quoted from Fenton's *History of Tasmania*.

full. Most of them were provided with a little bit of wood cut in the shape of a spatula, and with these they separated from the rocks, at great depth, very large *Sea ears* (*Haliotis*). Perhaps they chose the biggest, for all they brought up were of great size. On seeing the large Lobsters (*Panulirus*) we were afraid they would have wounded these poor women terribly with their large claws, but we soon found they had taken the precaution to kill them as soon as they caught them. They quitted the water only to bring their husbands the fruits of their labour, and frequently returned almost immediately to their diving till they had procured a sufficient meal for their families. At other times they stayed a little time to warm themselves, with their faces towards the fire on which the fish were roasting, and other little fires burning behind them, that they might be warmed on all sides at once. It seemed as if they were unwilling to lose a moment's time, for while they were warming themselves they were employed roasting fish, some of which they laid on the coals with the utmost caution, though they took little care of the Lobsters, which they threw anywhere into the fire; and when they were ready they divided the claws among the men and children, reserving the body for themselves, which they sometimes eat before they returned into the water.

The English in their little settlement at Sydney were not indifferent to the competition with France, and in 1797 George Bass, a surgeon in the Royal Navy, made his adventurous voyage in an open whale-boat across what is now known as Bass's Straits, but was then supposed to be merely a deep bay in the Australian continent. From the existence of currents and other signs Bass concluded

that Van Diemen's Land was an island, cut off from the mainland by wide straits, and in the following year Governor Hunter, of New South Wales, sent Flinders and Bass in a twenty-ton sloop to settle the matter finally and report on the possibility of using Van Diemen's Land for settlement. They circumnavigated the island, and stayed for a long time exploring the Derwent River; and it was Bass's rather misplaced enthusiasm for Risdon on the north bank of the Derwent, a few miles inland of where Hobart now stands, which subsequently led to this spot being chosen for the site of the first settlement. The names of Flinders and Bass, especially the former, are now household words in Australia; and the unhappy fate that put a term to their career throws their great achievements into a strong light. Flinders, second only to Captain Cook in navigation and the exploration of the Australian coasts, was seized by the French and detained in Mauritius for nearly seven years as a close prisoner; the fate of Bass is uncertain, but he disappeared while still a young man, and it is supposed that he and his crew were seized in Valparaiso and sent to the quicksilver mines.

The last bid for Van Diemen's Land was made by the French in the First Consulate, when the *Géographe* and *Naturaliste* were sent out under Baudin, with Péron as naturalist, to follow up D'Entrecasteaux's discoveries at the Derwent. Péron's account of the natives is exceedingly

vivacious, and he does not appear to have been at all indifferent to the charms of some of the younger women, one of whom he describes as having 'spirituel eyes', while in another he praises 'the softness of her looks, their affectionate and sparkling expression, her lively air and perfect innocence'.[1] It is a little difficult to reconcile these features with what one would expect from the most primitive of all known races, and with the descriptions of the later English, but we must remember that the Frenchmen opened negotiations in a bland spirit, calculated to bring out the best side of the savages. They exchanged presents, sang the Marseillaise and some comic songs 'accompanied by lively gestures', and submitted to having their faces smeared over with grease and ochre, to the huge delight of the natives. When Péron sang the Marseillaise one of the young men 'tore his hair, scratched his head with both hands, agitated himself in a hundred different ways and repeatedly iterated his approving clamour'.

The French expedition, after spending a long time at the Derwent, were attacked with scurvy and forced to find refuge in Sydney, where they were hospitably received by the English. But the suspicions of Governor King were thoroughly aroused, and after a good deal of correspondence with Lord Hobart at home it was finally decided that Van Diemen's Land should be settled as a safeguard against further French designs. Con-

[1] Ling Roth's *Aborigines of Tasmania*.

Fig. 3. Tasmanian Aboriginal, Woureddy.
Photograph by Mr. Beattie from an oil painting in Hobart Museum.

sequently in 1803 Lieutenant Bowen was sent to the Derwent with a few soldiers and convicts, and Risdon, which had been so favourably reported on by Bass, was recommended as the site of the first settlement.

The Risdon settlement was from the first a failure, partly owing to the barren hilly ground and lack of water, but largely to the bad material with which Bowen had to deal and his own rather small capacity as a pioneer. The experiment did not, indeed, last long; for Collins, who had been sent out to found a new settlement at Port Philip, being dissatisfied with the site, sailed for Van Diemen's Land, took over Bowen's command and removed the settlement from Risdon to Hobart Town, which he founded (1804). From this date the history of Tasmania as an English colony begins; but for the first forty years, although a large number of free settlers came out from the old country, the standard of living and wealth remained low, owing to the depravity and insecurity attendant on the convict system. Although many of the convicts were transported for trivial offences, there were others of an utterly degraded type, and the brutal system of punishments, and the appointment of ex-convicts as overseers, tended to reduce the better parts of the convict population to the same low level. The wonder is that the colony flourished to the extent it did, and the greatest honour is due to those settlers who by their industry and honesty reclaimed the land

from the savagery of nature and man. The Home Government, whose officials regarded Australia merely as a dumping ground for criminals, were not interested in the imperial aspect of the colonies, despite the representations of men like Sir Joseph Banks, the botanist who accompanied Cook in his voyages, and the complaints of the colonists themselves. The insecurity of life and property, in the early part of the century, owing to the hostility of the natives and the depredations of armed bands of escaped convicts, was a serious bar to the material and moral improvement of the colony. The prisons for the punishment of the worst criminals, first at the desolate Macquarie Harbour (1821), utterly cut off from the rest of the island, and then at Port Arthur, were dens of the lowest depravity and degradation too disgusting to describe. But it was the discovery of gold in Australia in the early fifties that made politicians in England wake up to the necessity of doing something to regenerate the country, and listen seriously to the repeated complaints of the colonists ; and the transportation of convicts was definitely stopped.

At about this time (1847) out of a population of 70,164, 43,730 were free and 24,188 were convict, while the military made up the rest.

Bushranging in the early days, and even up to the fifties, was carried on in Tasmania to an equal or even greater extent than in New South Wales. The most celebrated of the Van Diemen's Land bushrangers was Martin Cash in the early forties,

whose autobiography, a work of perspicuous honesty and indifferent grammar, affords us a most trustworthy account of the condition of the penal settlements, and illustrates the adventurous career of his own genius or impudence. Cash, a young man of family, who was transported from Ireland for manslaughter, might, from his characteristics of independence, frankness, and a kind of mental and physical adaptability, have been an ideal pioneer; but a bad start and a fiery temper, which in the unsettled state of the country occasionally led him to commit more or less justifiable homicide, forced him to take to the bush, where, in a series of depredations on the settlers and armed encounters with the police, he reigned a recognized king. In many of his adventures he unaffectedly acted the part of an historic Starlight, and protected his victims from the depravity of his companions in arms, and the reality of his intervention is completely proved by the fact that, when he was taken red-handed and without a show of defence, the most influential settlers, many of whom he had robbed, signed a petition that his life might be spared. The petition was narrowly granted, and after serving a long term in the penal settlement at Norfolk Island, Cash was liberated and ended his days as the proprietor of a farm at Hobart and a most respected citizen. His most daring exploit was the escape from Port Arthur across the narrow peninsula of Eagle Hawk Neck, which was guarded not only by armed

sentinels but by a cordon of ferocious dogs; and in maintaining his liberty in the wilds as an outlaw for so long a period he proved himself to possess to an extraordinary degree the instinct or art, so much respected even in modern Australia, of the successful bushman. The picture which he draws of the life of a convict, whether as an assigned servant to one of the settlers or in the stricter durance of one of the prisons, is sufficiently lurid, but his pages are a refreshing comment on the morbid and ghastly descriptions of the novelist, Marcus Clarke, in his well-known story *For the Term of his Natural Life*; and induce the reader to suppose that even in the darkest days of the penal settlements, the convicted criminal had almost as good a chance of reclaiming his life as he has to-day in one of the great modern cities.

Despite the disturbed state of society during the early days of the colony, a place was found for the pursuit of learning, and our knowledge of the wonderful natural products of Australasia is greatly indebted to the fundamental work done in Tasmania by a succession of naturalists. Besides the French naturalists, La Billardière and Péron, who accompanied the early navigators, the distinguished English botanist, Robert Brown, whose *Prodromus Florae Novae Hollandiae et Insulae Van Diemen* (1810) laid the foundation of an Australian Flora, was with Collins when Hobart was founded; and the celebrated John Gould, whose monograph on the Australian Birds and Mammals is among

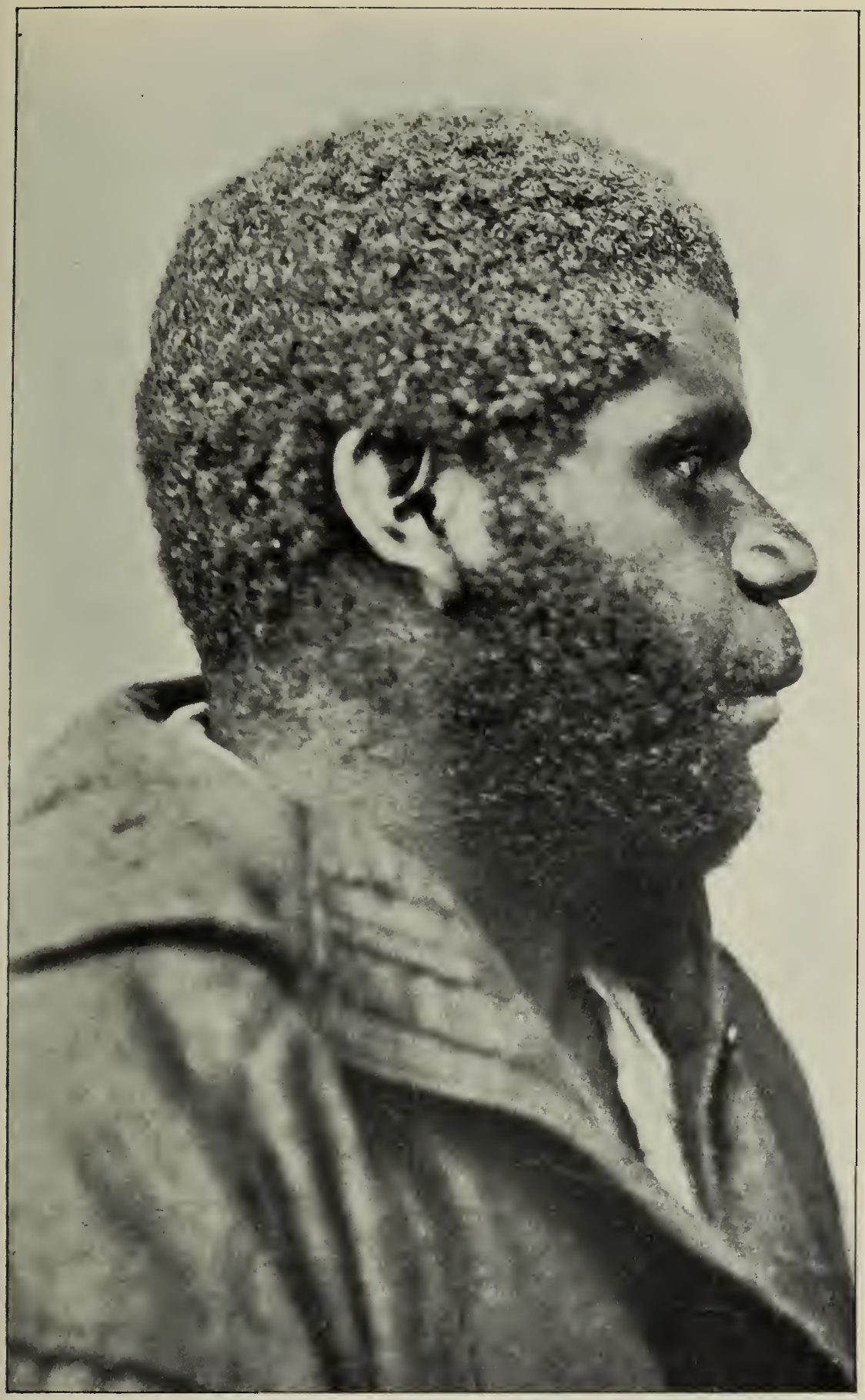

FIG. 4. Lanné, or King Billy, the last of the male Tasmanian Aboriginals. From a photograph in the possession of Mr. Beattie.

the most beautifully illustrated books on natural history, was for several years the guest of Sir John Franklin, and did most of his work in Tasmania.

We will conclude this sketch with some account of the characteristics of the native tribes of Tasmania, as far as they are known, and of the events which resulted in their extermination. The Tasmanians were of medium height and good physical proportions ; their colour was very dark brown or black and their hair golden brown and woolly like an African negro's. In transverse section the hair is flat, resembling that of the negritic Andamanese. This characteristic separates them sharply from the Australian natives, whose hair may be wavy, but is not woolly, and is oval in transverse section. The woolliness of the hair links them to the negritic population of New Guinea and the Pacific (Melanesians), and certain osteological characters, especially in the skull, confirm this view of the affinities of the Tasmanians. The skull has a very characteristic shape and can be easily picked out from a collection of Australian or South Sea Islander skulls by a number of distinctive properties. From the Australian type it is altogether different ; we miss in it the peculiar roof-shaped top, the massive overhanging brows, and the narrow elongated form (i.e. pronounced dolichocephaly) of the Australian (Fig. 5, No. 992), the Tasmanian skull (No. 1017) being almost globular in shape, not pronouncedly dolichocephalic, and with the brows not greatly projecting,

although the orbits are deeply sunk beneath them. The most characteristic point in the skull is the rapid broadening from before backwards, the region on each side at the back swelling out suddenly into large parietal bosses, which are entirely absent in the Australian type. This marked swelling out of the parietal region is met with to a less extent in the Papuan head (No. 1028), while it forms a transition from this latter type to the globular shape of a Melanesian race such as the Andamanese (No. 1040), which is very broad behind but, unlike the Tasmanian, does not suddenly narrow in front, the excavation in front of the parietal bosses having been apparently obliterated by the shortening of the whole skull.

The face of the Tasmanian was very short and rather sloping (prognathous), but the lower jaw took no part in this prognathism, as in the Australian or African negro. The closest resemblance is certainly to the Papuan negroes of New Guinea, but with many of the characters greatly exaggerated.

Whether the Tasmanian race ever inhabited the mainland of Australia or not, it is certain that neither in their physical characters nor in their culture have they anything to do with the Australian blacks, whose relationship lies rather with the Veddahs of Ceylon and the other straight-haired Proto-Dravidian races that still exist sparsely in India and the Malay Islands.

It has been plausibly suggested, though without

FIG. 5. No. 992, Australian. No. 1017, Tasmanian. No. 1028, New Guinea. No. 1040, Andaman.
Upper Series to show prominent parietal bosses in Tasmania; Lower Series for comparing the shape of the skull-roof and of the face. In each case note entire difference of the Australian to the other three types. (From specimens preserved in the University Museum, Oxford.)

any definite evidence, that the Tasmanians originally spread all over Australia, and were ousted by the invasion from Indo-Malaysia of the present Australian natives, who, however, did not reach Tasmania owing to the existence of Bass's Straits. In support of this theory certain common customs are advanced, such as the corroboree and the habit of knocking out some of the incisor teeth, which may have been derived by the invading Australians from the Tasmanian aboriginals.

The state of culture of the Tasmanians was extremely low; so low that, as Professor Tylor says, they must be regarded as survivals of Palaeolithic man. The only implements which they used, besides wooden spears and waddies or clubs made of the native Tea-tree (*Melaleuca*), were roughly chipped stone scrapers, true Palaeoliths, without any attempt at grinding or polishing the edges. These weapons, which were apparently chiefly used for sharpening the spears and scraping shell-fish or flesh, and in the rough surgical operations which they performed, were not made of real flint, which does not occur in the island, but of the hard cherty stone formed from the mudstones, where they have come into contact with, and been altered by, the igneous greenstone or diabase.

Dr. Noetling[1] has also recently described some peculiar rounded stones with depressions made in them by which they might be held, which he re-

[1] *The Tasmanian Naturalist*, vol. i, No. 3, 1907.

gards as having been used in religious ceremonies, probably in connexion with ancestor worship. These stones show signs of having been broken by baking in the fire. In support of his view that they were used in religious ceremonies he quotes a curious passage from Bonwick's *Daily Life and Origin of the Tasmanians*, p. 193 :

When the Quaker missionaries, Messrs. Backhouse and Walker, were visiting the remnant of the tribes carried to Flinders Island, Bass's Strait, they saw a poor old 'lubra' busy in placing together sundry flat stones marked variously with black and red lines. These, she explained to the strangers, were her country people absent from her . . . . Unwilling to refer to them as dead, she spoke of them as 'plenty far away'.

Although many of the early observers have affirmed the contrary, it is certain that the Tasmanians knew how to obtain fire by twisting a pointed stick in a hollowed-out piece of wood, some dry tinder being placed in the hollow ; and the use of fire was habitual to them for clearing the forests, in order to entice Kangaroo and other game to feed in the clearings so made, for cooking their food, and cremating their dead. Their food consisted largely of shell-fish and Crayfish, the native marsupial animals, such as Echidna, Kangaroos, and Opossums, the eggs and flesh of the Mutton Bird or Sooty Petrel (*Procellaria*), and various vegetables, such as the roots and young shoots of ferns, sea-weeds, and fungi.

We have a good deal of information as to the

burial customs used by these natives, and these customs are interesting, as they differ totally from those of the Australian natives. The latter never cremate the dead bodies, the most general custom being to build a kind of nest in a tree, and place either the whole body or part of it in the nest. The Tasmanians, on the other hand, always burnt the corpses, and generally built over the ashes a kind of tomb, formed of strips of Eucalyptus bark and interwoven reeds.

Practically nothing is known of their religious beliefs, and the early observers cannot agree whether they entertained any idea of a supreme Being, though they evidently believed in evil spirits, and probably in a future state. Nor is anything known of their tribal organization, except that at least four distinct tribes existed, all speaking distinctly different dialects. Their language, from the scanty knowledge we possess of it, seems to have differed entirely from the Australian and to show a remote connexion with the Andamanese.

The extinction of this unfortunate race took place thirty years ago without any trained observers having left a record of their customs or beliefs, so that we have to rely upon the casual observations of travellers, or residents interested in their welfare or conversion to Christianity; and the accounts they give are very meagre and uncritical. One man, George Robinson, had unique opportunities of learning something about them, as he lived with them in their natural nomadic condition for many

months; but he was not only untrained in the scientific study of man, but altogether uneducated, so that his voluminous reports contain very little of value.

The extracts which we gave from the journals of Captain Cook and the early French explorers, afford distinct evidence that the natural disposition of the Tasmanians was originally by no means fierce or vindictive; but it was not long after the final advent of the English to the Risdon settlement that hostilities broke out which only ended in the practical extermination of the race. The first occasion of strife seems to have been due to a foolish mistake on the part of the English. A large party of blacks, armed only with waddies, with their women and children with them, were seen approaching the Risdon settlement in a half-moon formation, driving a mob of Kangaroos before them. Some of the soldiers in the outlying part of the settlement seem to have taken alarm, and fired their muskets at the inoffensive blacks with fatal results. The blacks withdrew, but seem, not unnaturally, to have nourished the greatest resentment at the treatment they had received, and it was not long before they began to retaliate on the settlers by murdering them whenever they could catch them singly, and by even planning attacks on isolated houses.

When once the natives had established a reputation as murderers, there was no chance of a better feeling between white and black being arrived at,

and the only art which the savages learnt from the English was a superior cunning in planning and carrying out their murders. If the English who chiefly came into contact with them had been ordinarily humane, affairs might have taken a better turn, but they were, for the most part, escaped criminals and bushrangers, who shot down the natives as if they were mere animals, while the sealers in the islands of Bass's Straits, the utter scum of the earth, were in the habit of making regular raids upon the north coast of Tasmania, killing the men and carrying off their gins. It was small wonder that the natives came to look upon every white man as a natural enemy.

The aboriginals became so cunning and pertinacious in their conduct of the 'war' that Governor Arthur determined in 1830 to try to put a stop to it by forming a cordon across the centre of the island, and driving the natives on to Forrestier's Peninsula. About three thousand whites took part in this singular drive, which is supposed to have cost £60,000. The line converged upon the peninsula, and it was discovered that one black boy had been captured, all the rest having escaped, as it was natural they should do, in the thick scrub which they understood both to traverse and hide in so much better than their pursuers.

But in the meantime a more effective weapon for ridding the country of its aboriginals was found in the remarkable personality of George Robinson, a bricklayer of Hobart. At a time when the

native problem was at its most acute stage, and starting in the same year as the futile and absurd 'drive', it was Robinson's achievement practically single-handed and without bloodshed to bring in all the remaining natives and settle them on Flinders Island in Bass's Strait. Robinson was accompanied on his expeditions sometimes by a few white companions and always by some friendly blacks, of whom the faithful Truganini, who had lived among the settlers ever since she was a girl, and was the last of the race to survive, was always one. Robinson, although often in danger of his life, seems to have entirely won the confidence of the natives, whose dialects he could talk with ease, and although there was a touch of charlatanism in his character—which, perhaps, did not come amiss to the childish intellects of the savages—he seems to have had a genuine affection for his black protégés, who in their turn venerated him almost as a god. It is surely a complete vindication of the placable and mild disposition of the natives, that, when once they had joined Robinson's camp of their own freewill, they never attempted any treachery against one who, after all, belonged to a hated race which had treated them with the utmost brutality and callousness.

The total number of natives transported to Flinders Island was 203, truly a miserable remnant of the race, thinned by war, not only with the white settlers, but with one another, owing to the disturbance of the territorial arrangements which

originally must have kept the tribes apart. It is, however, doubtful if there were more than 2,000 natives when the island was first settled by the English.

Whilst Robinson was in charge of the Flinders Island Settlement, it seems to have prospered, and the natives showed a teachable disposition, but when Robinson was called away to act as the Protector of the Aborigines in Victoria, the settlement must have fallen into unsympathetic hands, or else the unnatural conditions in which they were forced to live began to tell on the health of the natives. In 1847 their numbers were reduced to forty-four, of whom only ten were young, and the settlement was removed to Oyster Cove on the mainland, where, instead of any improvement, things went from bad to worse, partly owing to the free access of the worst of the white population, and their pernicious liquor.

Truganini, the last of the pure-blooded Tasmanians, died in 1876. Her mother was murdered by some sailors, her sister carried off by some sealers, and she herself was originally kidnapped and her lover murdered by two sawyers in the Government employ. Her complete skeleton is preserved in the Museum at Hobart, and this has given offence to many to whom the dispassionate inquisitiveness of science is almost as disgusting as the natural inhumanity of the unsophisticated.

CHAPTER II

HOBART AND THE MIDLANDS

Hobart and the Derwent River. English appearance of the country. Eucalyptus country. Cultivation and pasturage. Birds. Mount Wellington. Vegetation. The mountain tableland. Scenery. Harz Mountains. Birds. The Mountain Shrimp.

THE little town of Hobart is situated upon the estuary of the Derwent River, a few miles from the heads where the river flows into the open ocean; the river, which is nearly two miles broad and does not narrow very much for eight or nine miles of its course inland, is very deep; and ships displacing about thirty feet of water can draw right up to the wharves at Hobart, a distinction which gives this port the pre-eminence in Australian waters. At the back of the town rises the Mount Wellington range of greenstone (diabasic dolerite) mountains, and in all directions the land is hilly, the palaeozoic sandstone strata undulating up and down among crests and dykes of the igneous greenstone. The coast-line to the east and south of Hobart is wonderfully irregular, and has been compared to the fantastic shapes formed by pouring molten lead into water; everywhere the sea makes inroads into the coast, cutting off narrow islands and peninsulas, while the broad estuaries of the Derwent and Huon

FIG. 6. View over the Derwent Estuary, from near the top of Mount Wellington. (Cutting grass and sedges in the foreground, with two small Blue Gums (*Eucalyptus globulus*).

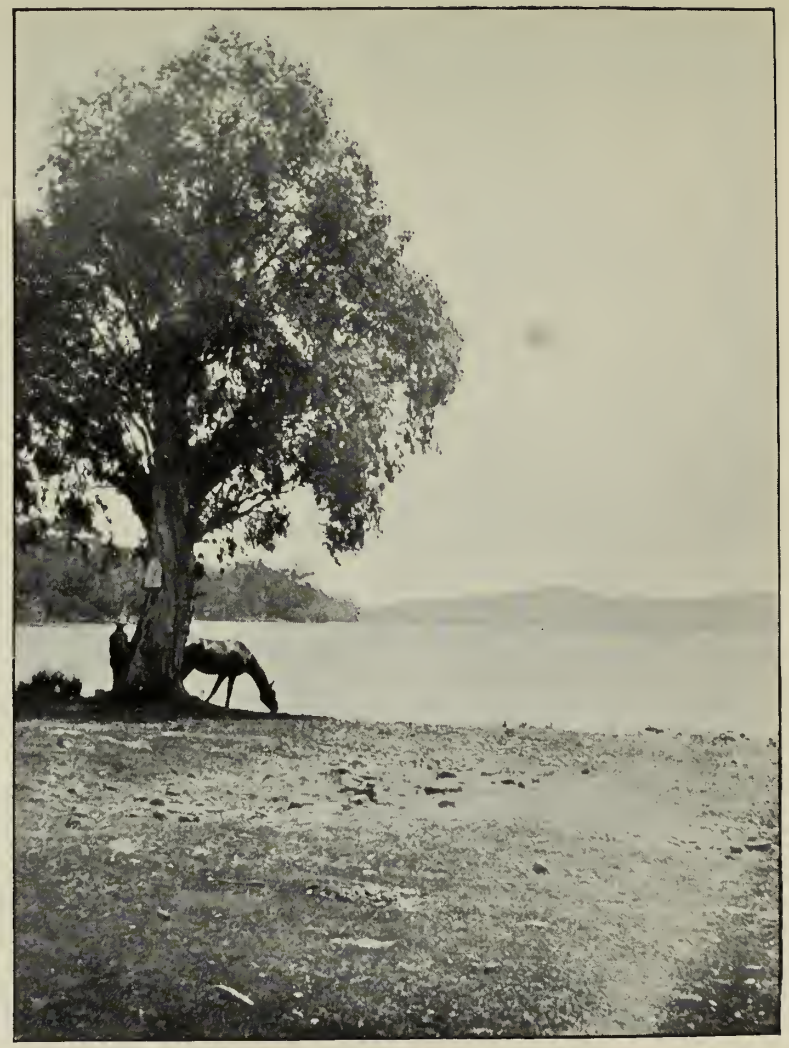

FIG. 7. Lake Sorell, with an old Peppermint Gum (*E. amygdalina*).

rivers, winding inland between low hills, have the appearance of sunken valleys; and there can be small doubt that the configuration of the coast is largely due to a gradual subsidence since the strata of sandstone were deposited and the igneous diabase thrust up beneath it.

The consequence is that there are miles and miles of protected water in the neighbourhood of Hobart, where yachting can be carried on with great convenience; before issuing from 'the Heads' at the mouth of the Derwent, a narrow opening leads south into the D'Entrecasteaux Channel, which runs between the narrow mountainous Bruny Island and the mainland, and before reaching the southern end of this channel we can enter the estuary of the Huon. Similarly to the north a series of large protected bays opens out from the Derwent estuary.

Owing to the quantity of greenstone in its composition, the soil round Hobart is stony and poor, and agricultural operations are not extensive, but the low hills support a certain amount of stock, and the light soil is favourable to fruit-growing. The latter industry has grown to great proportions, the chief orchards and hop-gardens in Tasmania being situated on the banks of the Derwent for many miles inland, and latterly also up the course of the Huon. The orchards, consisting chiefly of apples and apricots, but also containing all the European small fruits, which thrive remarkably in this temperate climate, are

planted out in bare fields, the soil of which is kept perpetually crumbly by constant ploughing; the trees are all pruned when young so as to assume a rather low cup-shaped growth, the central shoot being cut off and five or six lateral branches being encouraged. This artificial method of growth doubtless detracts from the beauty of the trees, but for commercial purposes, in saving expenses of picking and difficulties in spraying, it is undoubtedly the best. Besides the export trade in apples, the softer fruits are made into pulp for jam, and supply the material for a very large local manufacture. The fruit grown in Tasmania—and I speak from a personal experience of almost every kind—is in every way as fine as anything that Europe can show, and this is an achievement of which the Hobart fruit-growers may well be proud, since the land where their orchards now flourish was fairly thick bush only a few years ago. They have also to contend with quite the usual quantity of pests, all of them introduced from other countries; Codlin Moth, Black Spot, and the Pear Slug; but with the adequate legislative precautions and the advice of a Government entomologist which are provided, and also the scientific spirit in which the industry is conducted, the fruit-growers have every chance of success.

In driving about the suburbs of Hobart and the neighbouring villages further afield, the visitor from England, and even more so the visitor from

the Australian mainland, is struck with the English appearance of the buildings and gardens, and even of the landscape. Many of the houses are built of solid blocks of sandstone, a remnant of the old days of prison labour, and although corrugated iron has replaced the once almost universal 'shingles', a certain number of tiled roofs may still be seen. In the gardens by the roadside geraniums and every sort of English flower grow to perfection in a congenial climate; oaks, poplars, and elms, and a variety of pines are planted everywhere; and the blossom of the hawthorn hedges, which everywhere line the roads and delimit the fields, might surprise us that this is an Antipodean spring in October and not our English May. Along the banks of the rivers and streams, magnificent willows hold a usurped sway, and the sweet-briar is not only rife, but would very soon cover the whole of the open country if it were given a free hand, and is a more serious menace to the Tasmanian farmer than the rabbit of evil fame.

The illusion that I was in England was very strong one sunny afternoon as I sat outside a village inn upon the Brown's River road. Looking up and down the village street one could see nothing but English flowers and trees; sparrows pecked about on the road and a flock of starlings passed every now and again overhead, and a number of goldfinches were busy looking for seed in an adjoining field. Some swallows swept

round the eaves of the house, not genuine English swallows these, but 'Welcome Swallows' all the same, which come to Tasmania in the spring in the orthodox manner to nest and go north instead of south when winter comes; and once a whirring flight of swifts swept past, swifts which visit Tasmania for two months in the middle of the Antarctic summer, and go north to Japan to breed. A heavy rumbling of wheels, and a coach and four draws up in front of the inn, passengers and driver alight and order refreshments, ostlers bestir themselves, and a small urchin climbs on to the box and takes the reins, remarking that he could drive the team into Hobart if required, and we are back in the coaching days of the last century. For in Tasmania, largely owing to the mountainous character of the country, a great part of the travelling is done by coach; and in most of the little townships along the main roads there is an old-fashioned stone-built inn for the accommodation of travellers, and very clean and comfortable most of them are.

But one must not exaggerate the English appearance of the landscape, which really does not extend beyond the immediate neighbourhood of the villages. In the open country one soon recognizes the characteristic Australian vegetation, so utterly unlike the fresh green of Europe. Everywhere the dominant trees are Eucalypts, of which there are several hundred species, all really very similar and grading into one another, but differing

in the size of the leaves, the character of the flower and fruit and of the bark. Naturally of a graceful shape, with the leaves forming dense mops at the ends of the branches, the Eucalypts are apt, especially in dry localities, to become thin and scraggy owing to the quantity of dead wood that they carry ; it appears indeed a general adaptation of these trees to let the greater quantity of the boughs die and to carry on life economically with a few live branches. All the Tasmanian Eucalypts have white or yellowish flowers ; the leaves are of a dull bluish-green and droop vertically downwards, usually with the thin edge of the leaf turned towards the sun. The dull coloration of the foliage applies not only to the Eucalyptus, but to all Australian trees ; they are all with very few exceptions non-deciduous, and having to carry their leaves all the year round in a climate which is for the most part dry and parched, the foliage is dull and waxy and takes on all those xerophytic characters intended to prevent a too rapid transpiration of the moisture.

The flowers of the Eucalypts, which are very sweet-smelling and attract by their honey swarms of insects and honey-eating birds, form dense clusters of feathery spikes in the form of bottle-brushes. The form of the Eucalypt flower is well shown in Fig. 13, p. 55, which represents not an actual Eucalypt, but a closely related low-growing shrub (*Callistemon*), very common in the undergrowth of the gum forests.

A peculiar characteristic of the Eucalypt is its habit of shedding its bark in the autumn; the long strips of bark remain for many months loosely hanging on the trunks, and flap like sails or streamers in the wind, a well-known sound in the forest.

Despite their insistent presence and the rather sombre colour of their drooping leaves, one grows to love the Eucalypt of the Australian forests, not only for its peculiar beauty and the wealth of life which it attracts, but also for its usefulness and the associations of pleasant camp life which it calls up. For its young saplings furnish tent-poles for the encampment, and in the evening what splendid camp fires can be built up from the fallen boughs which everywhere litter the ground, and even the green branches with their leaves blaze up with a clear flame, loading the night air with the incense of their oils and the very spirit of health.

In the open country round Hobart, of which we are speaking, scattered among the Gum-trees, are various kinds of Wattles or Mimosas, spreading bushy trees growing to forty or fifty feet in height, with dark green feathery foliage, and covered in the flowering-season with beautiful masses of golden or white blooms. Clumps of *Banksia*, the native Honeysuckle, one of the Proteaceae, stand up almost black against the prevailing olivaceous greens; the flowers are in the form of large white bottle-brushes, and the fruit which seems to be

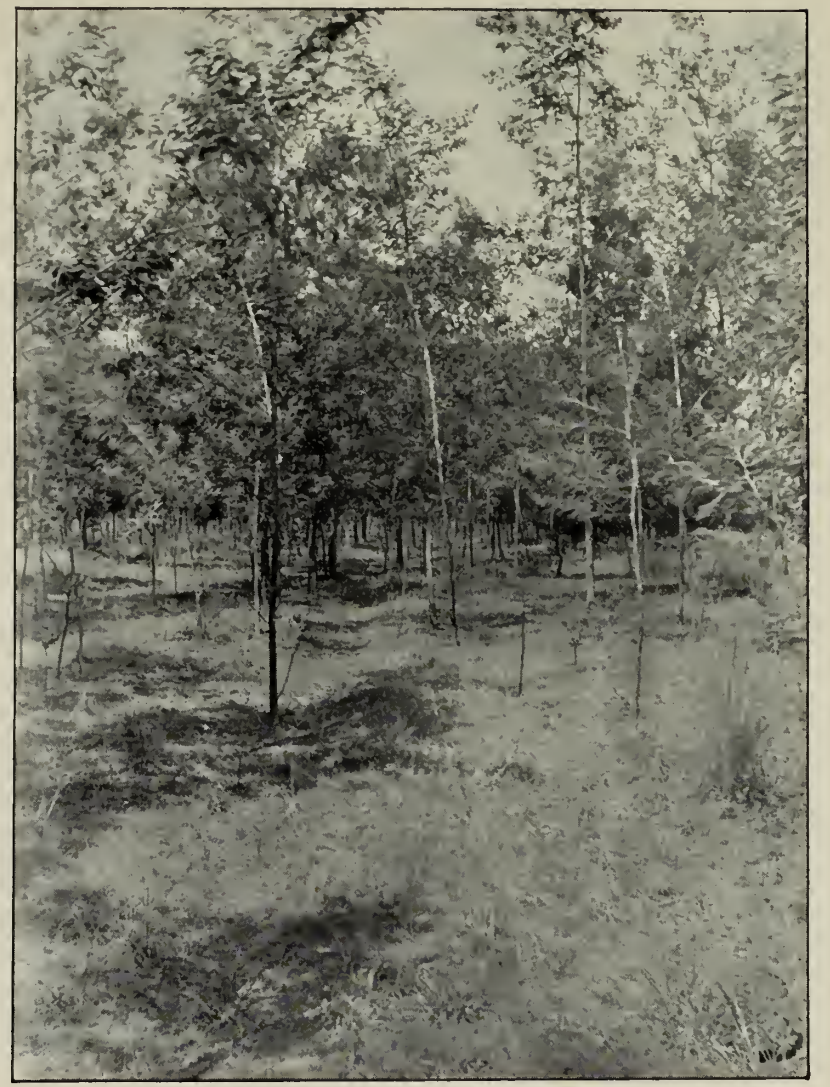

FIG. 8. A young Wattle (*Mimosa*) Plantation.

FIG. 9. Blackwood Tree (*Acacia melanoxylon*).

always on the tree is a black skeleton of the flower. Usually standing by itself is the curious She Oak (*Casuarina*), a small symetrically growing tree with narrow needle-like leaves something like those of the Broom. The native Cherry, a small pine-like tree with yellowish-green foliage (*Exocarpus*), is one of the curiosities in a country where, according to popular tradition, mammals lay eggs or are born on the teats of the mother, and where the trees shed their bark instead of their leaves; for the native Cherry bears a small red succulent berry, the stone of which is attached to the outside of the fruit. A handsome and valuable tree that can be seen growing in open fields near Hobart is the Blackwood (*Acacia melanoxylon*) (Fig. 9); this tree attains a considerable height, and carries a dense foliage of broad and very dark green leaves; the wood, which is soft, makes very fine panelling, as when it is varnished it takes on with time a rich black colour like old oak. Although this tree has been planted out a good deal in the open park-like country its native home is really in the forest, and year by year it is becoming more and more difficult to obtain, as it is nowhere present in large numbers.

In the rolling sandstone country which lies everywhere on the flanks of the central and eastern greenstone mountains, the undergrowth is rarely very dense. In many areas open grass plains appear to represent the natural condition of the country, but it must be remembered that

the aboriginals, probably from time immemorial, had been in the habit of burning out the scrub in order to make large feeding-grounds for the Kangaroo and other game on which they subsisted. In other parts, the low hills are covered with the ordinary English Bracken, which is also a native here; and this, together with small Wattles, Tea-trees, and Bottle-brushes, makes a fairly thick but by no means impenetrable scrub, which is not to be compared with the really thick bush on the southern and western mountain ranges.

The earlier settlers naturally took up this comparatively open country for their sheep-runs and agricultural operations, especially in the midland and northern parts of the island, where the soil is superior. But little trouble is required for preparing the land as pasture; the Gum-trees are ring-barked, and if growing in too great numbers are grubbed up and burnt, but on many acres of grazing-land the dead trees are left standing or lying untidily about. The bush-grown country is reclaimed by ringing the Gums, which die after two years, shedding their leaves and bark, and at the same time, or more properly afterwards, the underscrub, if it is sufficiently thick, is burnt, and the refuse cleared away.

But after clearing the land and sowing with clover or grass, constant attention is necessary to keep the Bracken from invading the newly opened country; so that it takes fully four years

before the land is ready for use. At a low estimate, supposing the cost of the land is £1 an acre, it will cost £4 an acre to clear it, though of course the expense varies greatly according to the thickness of the timber and scrub.

In the open pasture lands and cultivated districts of which we are speaking, there are one or two very characteristic birds which will at once strike the eye of a visitor. The native Magpie (*Gymnorhina organicum*), really a Crow Shrike, is a fine black and white bird with a very melodious voice, but its song is more in the nature of an experiment than a finished work of art; in captivity, however, it will learn to whistle almost any tune, and I was surprised in the bush by an escaped pet whistling 'I don't want to play in your yard', regarding me the while with a knowing expression.

Another very beautiful bird which haunts the lightly timbered sandstone country and is even common in orchards, where it makes considerable depredations among the fruit, is the Rosella Parakeet with the head and breast of a brilliant scarlet. Nothing is more beautiful than to see these birds dashing about in the sunlight from tree to tree; the brilliant scarlet plumage appears to annoy some of the other birds, and I have seen small flocks of Miners, inconspicuous grey birds of about the size of a Mistle-thrush, with yellow bills, belonging to the large Australian family of the Meliphagidae or Honey-eaters,

chasing a Rosella Parakeet with the greatest anger, though of course they were incapable of doing it any hurt. Another brilliantly coloured bird, with red and blue plumage, which I met with only on Bruny Island (but it is, I believe, common elsewhere), is the small Swift Parakeet; this bird resorts in small flocks to the Gum-trees when in flower and feeds on the honey. On the rather remote sheep-runs flocks of the large Yellow-crested White Cockatoo may be seen. They are birds which always have sentinels posted to warn them of approaching danger.

The farming stations in Tasmania are generally not very extensive, if judged by Australian standards; the sheep-owners engaging especially in the raising of pure Merinos for breeding. There are also districts, such as Longford in the northern midlands, lying in rolling country between Ben Lomond and the Western Tiers, where the Palaeozoic strata are overlain by extensive freshwater deposits of Tertiary age, and where a few old English families possess properties which in the course of a few generations have been wonderfully assimilated to the country seats of England whose names they bear. At Brickendon, the property of Mr. W. Archer, where I had the pleasure of staying, the drives round the house are planted with many varieties of Pine and Fir-trees; Oaks and Elms grow co-mingled with Wattles and choice Australian shrubs; an old-fashioned English orchard with nut-walks and Mulberry-trees sup-

plies a quantity of various fruit, the willow-margined river which forms a boundary to the estate, is stocked with English Trout and Perch, and the stubbles are full of Quail. Walking in the old walled orchard one is transported back to the home counties of England, save that the blue wings of the Parrots dash in and out among the fruit-trees and the metallic song of the native Magpie falls strangely on the ear. In a congenial climate where the snow never lies in winter, and the summer heats are tempered with cool breezes blowing from the Western Tiers, the time is passed between the healthy and profitable operations of farming and the strenuous or polite exercises of tennis and croquet; nor will the Englishman wonder more than the native-born Australian at the refined care with which the smallest details of a complicated civilization have been transplanted and reproduced so many thousand miles from its place of origin. But the philosopher may observe, and the patriot will boast, a less constrained social intercourse, a spirit of freedom and independence in the very air which blows in from virgin forests and indomitable mountains never far distant; and this close proximity to nature, calling forth whether in sport or earnest all the arts of the natural man, gives to the Australian his characteristics of resourcefulness and independence.

One of the most important industries in Tasmania is the felling and exportation of the various

Eucalyptus woods which are finer in growth here than in any other part of Australia, and are sent all over the world for making bridges, wharves, and other engineering works where great durability and hardness is required. The commonest Eucalypts used for timber are the Blue Gum (*E. globulus*) and the Swamp Gum (*E. regnans*), which may grow to a hundred feet in height in about sixty years, but those of slower growth, after reaching an age of two to three hundred years, are in the best condition. The Stringybark (*E. obliqua*) is of quicker growth, but inferior as timber; the Peppermint Gums (*E. amygdalina*) (Fig. 7, p. 36) being of slow-growing and very durable timber. The felling of these gigantic spars and their transport to the saw-mills employ a large number of labourers, whose splendid physique and skill in the use of the axe distinguish them rather as the devotees of an art, than the servants of a laborious trade.

In felling one of the larger spars the timbermen insert palings or 'shoes' into the trunk above the level of the undergrowth where the bole of the tree begins its straight and equal growth upward for perhaps two hundred feet, and from these swaying platforms they ply their axes, cutting out huge wedges at each blow, until the V-shaped notches from either side meet in the middle, the last few blows determining to which side the tree shall fall. And this laborious art requires so much skill, that the 'chopping

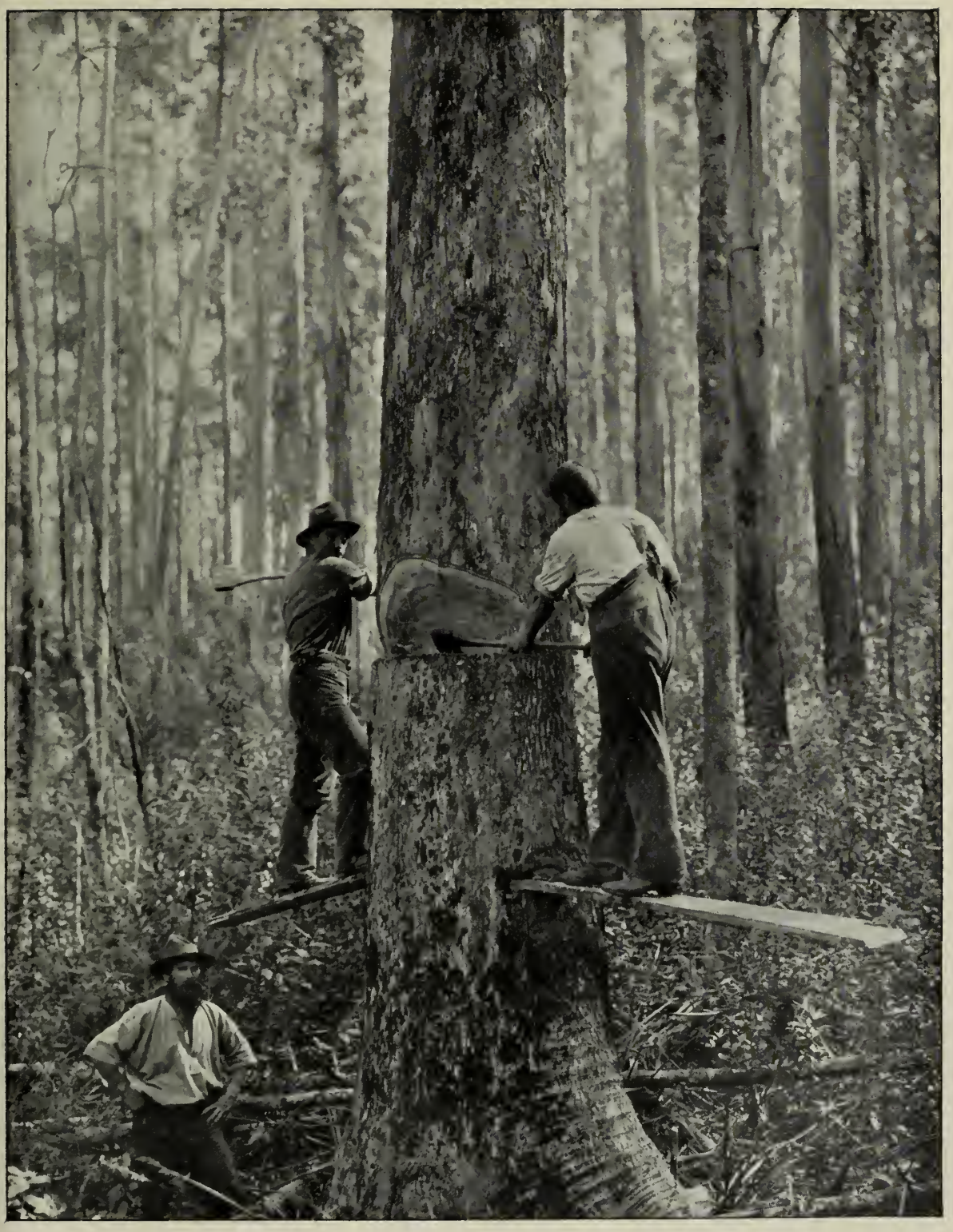

Fig. 10. Felling Eucalyptus Trees.
Photograph by Mr. Beattie.

match' has become one of the chief national sports at which the most skilled timber-men assemble from all parts of the island to compete with one another. In a 'chopping match' blocks of timber usually of about two feet diameter are fixed to stumps, and the competitors, divided into heats, have to cut through their blocks in as short time as possible.

Hobart is blessed by the possession, among other things, of a considerable mountain, situated, so to speak, in its back garden. Mount Wellington is a real mountain, properly steep and stony and intractable; the coaching road to the Huon passes over its southern shoulder, and from the highest point on this road, where the Fern Tree Hotel stands, a good road winds still further up to the 'Springs', and here, too, a small hotel, rather after the style of a Swiss Châlet, has been erected. From Hobart it is not more than two hours' drive to the 'Springs', situated about three thousand feet above sea level. Making the 'Springs' my head quarters for about a month, I rambled over the mountains in most directions, and it was here that I made my first serious acquaintance with the Tasmanian bush and some of its wild inhabitants. The bush of Mount Wellington, despite the devastations of fires and, to a much less extent, of man, is by no means contemptible; in some of the gullies the *Eucalyptus regnans* attains as great a size here as anywhere, and the undergrowth of Acacia, Cutting

grass, Tree-ferns, &c., in many places is almost impenetrable.

The mountain rises up as a dark, rather shapeless mass at the west of the town; the top is flat, but at the northern end, towards the town, falls suddenly to a precipitous cliff formed of apparently basaltic pillars arranged organ-pipe-wise. The top of the mountain can be seen to be extremely rocky and barren, and to rise well above the zone of forest which clothes the lower slopes with great luxuriance. The forest on the eastern slopes of the mountain facing the town has luckily been spared, but to the south and south-west the ruinous fire of nine summers ago has destroyed a great part of the vegetation upon the higher slopes, leaving the unsightly white spars of the Gum-trees standing by thousands, or lying prone upon a parched and rocky soil that has not yet sufficiently recovered to support even a moderate undergrowth. It is seldom that a bush fire does its work so completely; frequently the Gum-trees may burn for many hours and be completely stripped of foliage and yet speedily recover; but the undergrowth on Mount Wellington afforded too rich a fuel, and for many square miles there is hardly a living Gum-tree left of the giants that stood there once. I know of few places so desolate or dispiriting to walk through as these charred and blasted acres; one would like to hurry through them, but the way is barred at every turn by fallen trunks and jagged twisted

FIG. 11. Eucalyptus forest on Mount Wellington, after the great Bush fire.

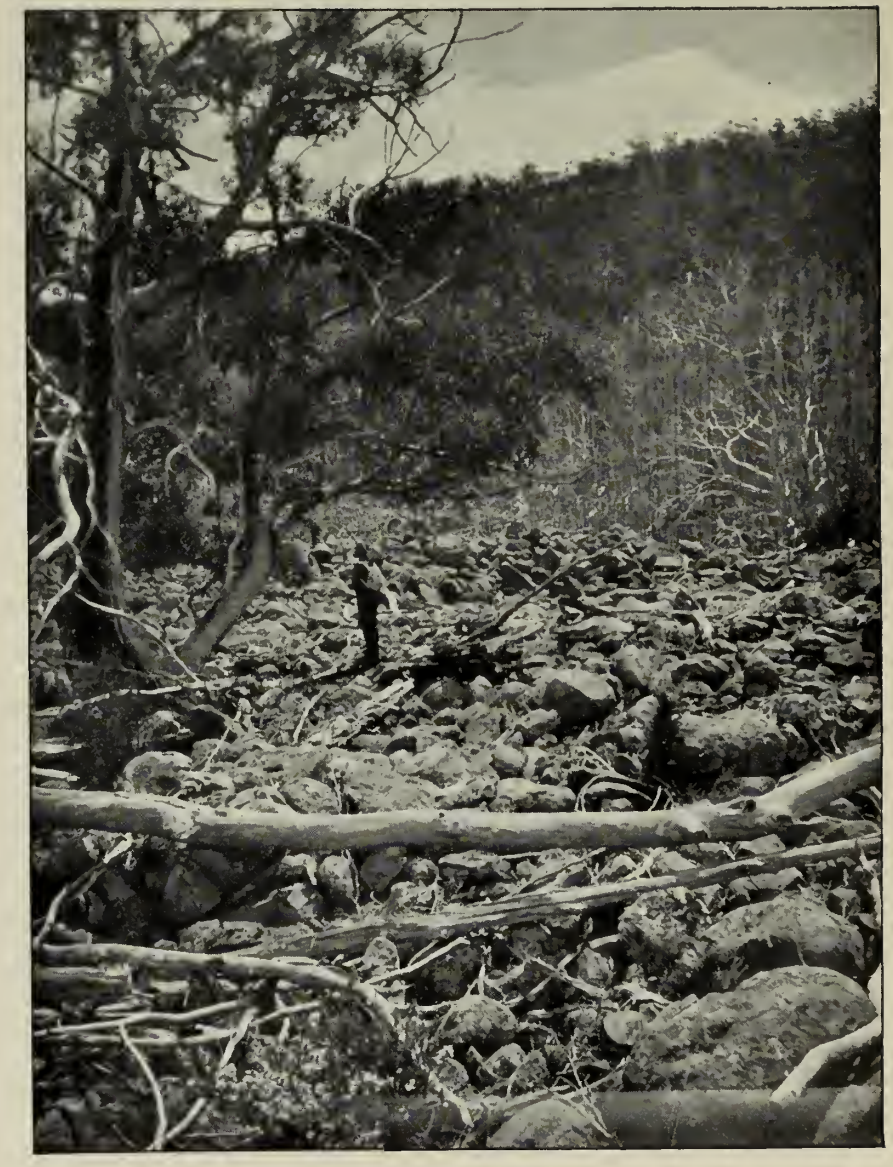

FIG. 12. The 'Potato-fields' on Mount Wellington, consisting of huge Greenstone boulders.

limbs; the surface of this fallen timber is white and polished where it is not charred, and after hours of scrambling, the traveller issues shaken and blackened from the depressing wilderness. There are, however, considerable patches of virgin forest left even on the southern and south-western slopes untouched by the fire; one little bit, through which a track passed, I liked especially. On entering it one passed from bright sunlight outside to a dim twilight within; on each side of the track a tangled mass of shrubs and small trees grew so thickly round the boles of enormous Gum-trees, which towered a hundred or two hundred feet above them, that the eye could not penetrate more than a few yards, except where a spar had recently fallen and cleared an alley. This underscrub consisted here chiefly of the native Laurel, really a large tree Saxifrage with pretty white flowers something like orange-blossom, a thornless Acacia, the so-called Sassafras (*Atherosperma moschata*), whose bark has a distinct bitter flavour and was used by the blacks medicinally, while scattered among the Gum-trees the native Myrtle (*Fagus Cunninghami*), which is really a Beech, grows to a considerable height. This last-named tree under certain conditions upon the west coast of Tasmania forms the chief element in the forest, and may attain a height of a hundred feet or more. It possesses a graceful rather slender form, and the leaves are exceedingly small, giving the branches rather

a feathery appearance. It is, like all the other native trees and shrubs of Tasmania, evergreen, but the other Tasmanian Beech (*Fagus Gunnii*), a small shrub found only upon the western mountains, has the distinction of being the only deciduous tree in Tasmania. On Mount Wellington the Myrtle only grows very sparsely, the predominant forest trees being all Eucalypts of various species.

The underscrub on Mount Wellington varies very much in different localities. In the damp gullies Tree-ferns (chiefly *Dicksonia*) grow with great luxuriance, while on the lower slopes a multitude of flowering shrubs form a tangled mass of inextricable confusion. One of the commonest elements here, as in all parts of Tasmania, is the Tea-tree of various kinds (*Leptospermum* and *Melaleuca*), a densely-growing tall shrub with small grey-green leaves, belonging to the same order as the Eucalypts, the Myrtaceae, and having rather similar fruit, but the flower is not a bottle-brush, having large pink and white petals. It was from the stem of this tree that the aboriginals used to fashion their spears and waddies. On the higher slopes, in the neighbourhood of and above the springs for instance, the underscrub assumes a sub-Alpine character, and the Gum-trees are greatly thinned and dwarfed in size. In this region an interesting tree, *Senecio centropappus*, belonging to the same genus as our common European Groundsel, is found, and occurs

elsewhere only on Mount Dromedary, also in the neighbourhood of Hobart. This little tree attains the height of about fifteen feet, and in early summer (December) is covered with brilliant yellow flowers. A related tree, *Bedfordia*, also with showy yellow flowers, and white-backed leaves, takes its place in the scrub rather lower down the mountain. The tree *Senecios* are characteristic of the southern hemisphere; many species occurring also in New Zealand and South America.

In the sub-Alpine zone we meet with a number of species of the almost exclusively Tasmanian genus *Richea* (distantly related to the Heaths), popularly known as the Grass-trees. It is remarkable that this genus should branch out into so many distinct forms within the narrow limits of a little island, while only one species, *R. Gunnii*, extends its range outside to the Australian Alps. The plants of this genus are characterized by their prickly cutting-grass-like leaves; the flowers (Fig. 14) grow in a dense spike and are in the shape of oval bells, but when mature the end portions of the petals fall off and a feathery mass of stamens is left. A very handsome decorative species which grows into a large shrub about ten feet high is *R. dracophylla*; this shrub has fine grass-like leaves and a large white flower-spike; the *R. scoparia* is a more truly Alpine species of stunted growth and forms thick prickly masses among the boulders on the top of the mountain; its dark red flower-spikes make an exceedingly

fine show at some distance, but are poor when closely inspected. Rather distantly related to the Grass-trees, and growing in great profusion in the sub-Alpine zone, are a number of species of Heaths, belonging to the genera *Epacris*, *Podocarpa*, &c. These Heaths (Epacridaceae) take the place in the southern hemisphere which is occupied by the Ericaceae in the northern, but they branch out into a much greater variety of forms, both in the manner of growing and in the structure of the flower. Some of the species grow into quite large shrubs, some have exceedingly long and graceful bells if we compare them with our own Heather, and in the middle of summer they bear the most beautiful large berries which may vary from white to magenta, red, or puce in colour.

At the risk of being tedious, one other group of shrubs found under sub-Alpine conditions on Mount Wellington must be mentioned, belonging to the natural order of the Proteaceae, which is so characteristic of the flora of Australia and the southern hemisphere. The Waratah (*Telopea truncata*) (Fig. 15) is a small tree or shrub, sometimes attaining twenty feet in height, and bearing the most beautiful scarlet flowers which are so much prized by the colonists for decoration that the tree is becoming scarce in the frequented parts of Mount Wellington. The flowers are arranged in a gracefully clustered head, and each separate flower consists of a curved style, which, before the flower is ripe, is

FIG. 13. Sprig of the Bottle-brush (*Callistemon*), with flowers and fruit.

FIG. 14. Sprigs of the Grass-tree (*Richea scoparia*).

FIG. 15. Sprigs of the Waratah (*Telopea truncata*).

inserted into a cap formed by the perianth; but on ripening the perianth splits, exposing the stamens and setting the style free. A ripe flower is shown to the right of the figure, and two unripe flowers on the left. The vivid scarlet colouring of these flowers, shining out among the sombre blue greens of the gum forests, is certainly one of the most beautiful sights that the Tasmanian bush affords. Although scarce in the frequented parts, the Waratah grows in the most splendid profusion at the source of the North-West Bay River across the top of the mountain; owing to the exposed situation it here takes on the growth of a low bush, but with a mass of bloom that is really marvellous. A related shrub is the *Hakea* or native Pear; it has needle-like leaves and small inconspicuous white flowers, but the fruit is a large pear-shaped capsule which may remain on the bush for several years, and only cracks to let out the seed when thoroughly dried or even roasted by fire. Dwarf *Hakeas* and a closely related bush *Orites*, which possesses rather bright yellow needles, form a prominent part of the stunted vegetation which grows upon the top plateau of the mountain.

On attaining to the top of Mount Wellington we stand upon an extensive undulating plateau of greenstone or diabase, stretching for many miles in a westerly and south-westerly direction. Indeed in these directions a vast army of mountains is disclosed, stretching in serried ranks across

south-western Tasmania to the coast. These mountains, except in the extreme west, are all of greenstone, and form the broken southern continuation of the great central greenstone plateau of the island. On some of the peaks, for instance Adamson's Peak and Mount Field, snow is rarely altogether absent even far into the summer, and the whole inland district, south of a line drawn from Mount Wellington to the west coast, is one of the wildest and least inhabited in Australia. Owing to the heavy rainfall the mountains are clothed with dense forest, whose impenetrable underscrub can only be traversed by painfully cutting a track with the axe; tracks so cut are completely obliterated by fallen timber and undergrowth in the course of a few months; and at all times of the year the traveller may be overtaken by the rigour of the Antarctic blizzards, which sweep over these exposed ranges with deadly suddenness. None but experienced bushmen could venture with impunity far into these inhospitable regions, and many of the most experienced have lost their lives there. On several occasions vessels have been wrecked upon the south-west coast, and the shipwrecked crew on attaining to land and the hope of safety have attempted to strike into the bush in search of succour, only to perish miserably of starvation and exposure with all the attendant horrors or suspicions of foul play. And yet the whole district is only the size of an

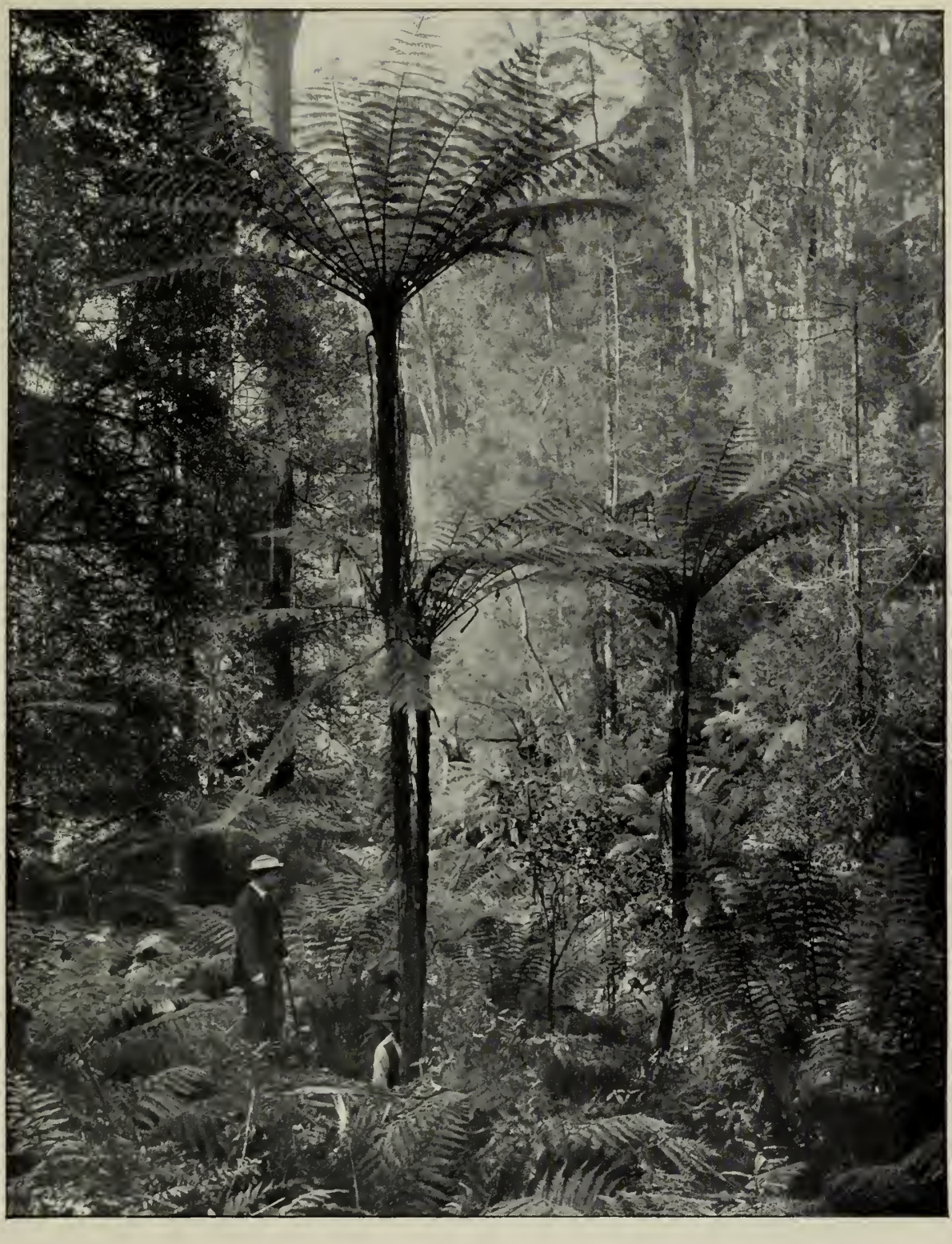

FIG. 16. Tree Ferns (*Cyathea*) in a Gully in the gum forests near Geeveston. Photograph by Mr. Beattie.

English county, and the mountains rarely as much as four thousand feet in height might appear puerile to the Alpinist who is only conversant with European conditions.

From the top of Mount Wellington, almost due south, the Harz Mountains stand out rather conspicuously; these mountains lie on the outskirts of the south-western ranges and can be easily ascended from the little township upon the Huon River called Geeveston, famous for its timber mills, and for being founded, maintained, and almost entirely populated by the family of Geeves. Mr. Richard Geeves also informed me that it was, or should be, famous for the very high intelligence of its rising generation.

I had the pleasure of ascending the Harz Mountains in company with two gentlemen from Hobart, who volunteered to put down some of the Rainbow Trout in the land-locked mountain tarns near the summit, and in this way I was enabled to gain some idea of the bush on the south-western ranges. In all essentials I imagine this bush to resemble closely that which must have clothed Mount Wellington, before that mountain was partially tamed by fires and the domesticating hand of man. The first four miles out of Geeveston we accomplished on the light trolley railway which is used by the timber-men for carrying logs from the forest to the mills, and our track struck out from this through some magnificent gum forest on to the highlands. As

we ascended, the scrub, consisting largely of Sassafras, Laurel, and Myrtle, became thicker and thicker; I saw here two remarkable Heaths, one of which (*Prionotes cerianthoides*) is a climbing creeper forming a tangled growth with pretty purple bells upon the trunks of the larger trees, and another (*Trochocarpa Gunnii*), which is itself a tree with a profusion of giant bells for flowers. I mention these two shrubs because Heather does not do these things in the northern hemisphere. The Waratah grew in great profusion and in the protected forest sprang into tall trees with the gorgeous red blooms shining high up and well out of reach. In the moist gullies the Tree-ferns shot up to a great height; besides the ordinary species (*Dicksonia*) with a stout stem, the much rarer form (*Cyathea*) grows in this neighbourhood (Fig. 16). On emerging from the luxuriant forest growth of the lower slopes we traversed an extensive marshy flat known as the Kermandie Plains, which was comparatively free from timber, but thickly overgrown with Button grass (*Mesomelaena sphaerocephala*). This sedge grows in large tussocks upon marshy plains at a high elevation, and often attains a height of about six feet; the leaves are very slender, and the flowers are borne as buttons on an upstanding slender stalk, the plants, when growing close together, forming a kind of jungle which is not easy to walk through.

After crossing the plains we soon began to ascend into the upper regions of the range; the

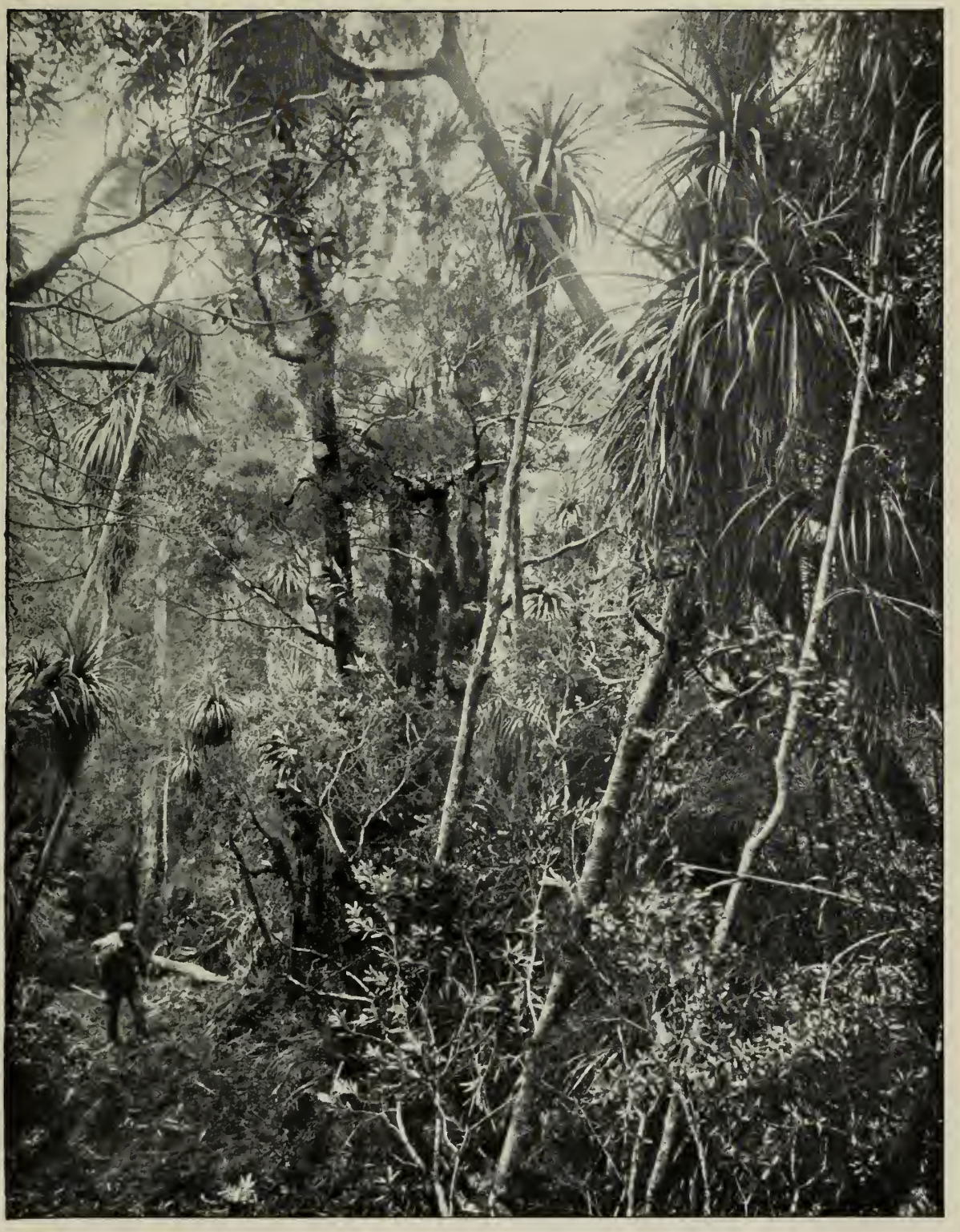

FIG. 17. Giant Grass-trees (*Richea pandanifolia*) on the Harz Mountains. Photograph by Mr. Beattie.

large Gum-trees and Sassafras gave place to stunted Myrtle-trees covered with grey lichens, which in some ways reminded me more of the European forests than anything I have seen at the Antipodes. To correct this impression, however, we came here upon the wonderful Grass-tree (*Richea pandanifolia*), which is confined to Tasmania and is only found on the southern and western ranges. This curious tree resembles a palm; the stem shoots up twenty or thirty feet and frequently branches at the top, while from the ends of the branches a fine cluster of broad palm-like leaves spreads out. An unbranching tree is shown in the foreground of Fig. 25 (p. 98), while some fine full-grown specimens are presented in Fig. 17.

The exposed plateau upon the top of the Harz range resembles in its vegetation the plateau of Mount Wellington; indeed it seems that these elevated and exposed greenstone tablelands support a typical vegetation, since much the same kind of growth is met with again upon the summits of the tiers in the lake district, and on the isolated greenstone massive of Ben Lomond in the north-east of the island.

To return to the summit of Mount Wellington, from which our view of the Harz Mountains led us to digress, we may mention some of the plants which grow upon the extensive plateau. The vegetation is extremely stunted and one can walk over it much in the same way as one walks over a grouse moor at home. Dwarf Tea-trees, *Hakea*

and *Orites*, grow scramblingly over the rocks, while everywhere the common Grass-tree (*Richea scoparia*) forms dense and forbiddingly prickly masses. Wherever the ground is at all marshy the native Artichoke, which is really a Lily (*Astelia alpina*), forms prickly dense tufts, so dense that one treads on the top of them without sinking in at all. The whitish-green leaves, forming the tuft, are broad and sedge-like, terminating in a sharp spike ; the flower is very small and inconspicuous. The native Artichoke is an entirely Alpine plant, only occurring in the marshy mountain tops in Tasmania, Victoria, and New South Wales. Growing in the same situations side by side with the Artichokes on Mount Wellington are some peculiar rounded cushions, of a vivid green colour, and often several yards in circumference. The vivid green shows up wonderfully among the preponderating dull greens of the Artichokes and low-growing Ferns, and the cushions look at first as if they would be very spongy and treacherous, like moss, but as a matter of fact they are quite hard and firm, and one can jump from cushion to cushion without sinking in at all. These cushions are composed of a mass of very small star-like plants belonging to the Compositae, known as *Abrotanella*, a genus confined to the Alps in the southern hemisphere. Curiously enough a plant of an exactly similar method of cushion-like growth occurs on the Harz Mountains and in the Alps of New Zealand, but this plant belongs to the genus

Donatia, which is not a Composite at all, but one of the Stylidiaceae.

The top of Mount Wellington presents some physical features of interest, especially in relation to the weathering of the diabasic rock of which it is composed. This rock whenever it forms the face of an exposed cliff takes on the structure of upright prismatic columns, which split longitudinally ; the organ pipes on the face of Mount Wellington turned towards Hobart are a fine instance of this, but better still are the cliffs on the southern face of Ben Lomond, and the wonderful fluted columns of Cape Raoul on the east coast. Another feature is the presence upon the plateau of Wellington and Ben Lomond of extensive level fields of large rounded boulders of diabase (Fig. 12), known locally as 'potato' or 'ploughed' fields, which do not support any soil or vegetation owing to the gaps between the rocks, through which the rain washes all the detritus away. These boulders apparently represent the talus blocks which have rolled off the once precipitous peaks of the mountain, and as they themselves now lie nearly upon the top of the mountain, with nothing but gently sloping ridges above them, it is apparent what an immense amount of denudation has gone on since first the diabase was exposed.

During my rambles about the mountain I met with many of the Tasmanian birds, and some of the more characteristic of these may now be mentioned. In wandering through the Aus-

tralian bush it will at once strike the traveller from the home country how comparatively tame the birds are, probably owing to their less acquaintance with civilized man and his exterminating propensities. Many of the birds which I will now mention are, of course, not confined to Mount Wellington, but may be found all over the country wherever suitable conditions prevail.

A great many of the Tasmanian species also occur on the mainland of Australia, but a considerable proportion are distinct species, with very closely related forms upon the other side of Bass's Straits. The most characteristic family of birds which haunt the Tasmanian and Australian forests is that of the Meliphagidae, or Honey-eaters, a family of Passerine birds, which take the place in Australasia which is filled by the Humming-birds of tropical South America. The Meliphagidae include a great number of genera of very various size and appearance, the majority being small, but a few, such as the peculiar Wattle-bird, being as large as a pigeon and of a very anomalous appearance. They are all characterized, however, by the possession of a remarkably long tongue, ending in a fine pencil of stiff bristles, with which the birds extract the honey from the Eucalypts and other flowering shrubs that grow in such profusion in these regions. Although essentially honey-eaters, practically all the species are insectivorous as well, catching the insects which are attracted to the flowering shrubs, and I have frequently

seen the common Tasmanian Yellow-throated Honey-eater (*Ptilotis flavigula*) searching the bark of the Gum-trees for spiders and beetles, and hawking for flies on the wing exactly after the manner of a true Flycatcher. The Yellow-throated Honey-eater of Tasmania is one of the commonest birds in the forests on Mount Wellington, and its rather mellow little song is not to be despised in a country where the birds are notoriously unmusical. It is rather a large bird, about the size of a thrush, but more slender in build and with a long tail ; the colour is olivaceous green, and there is a patch of saffron under the chin. Two much smaller Honey-eaters with rather long curved bills, almost as common as the above, are the Black-headed (*Meliphaga novae-hollandiae*) and the Tasmanian Honey-eater (*M. Australasiana*), the latter confined to Tasmania and distinguished by its black collar. Both have black and white plumage with yellow on the wings ; the Tasmanian Honey-eater is very common quite on the top of Mount Wellington, and I have often watched them there gathering the Honey from the Waratah. Another peculiar Honey-eater, characterized by its exceedingly long curved bill and its chocolate breast, is the Spine Bill (*Acanthorhynchus*). This bird occurs on Mount Wellington, but is much commoner in the open lowland country.

Next to the Honey-eaters, the true Flycatchers or Muscicapidae are the best represented of the small Passerines in Australia and Tasmania, and

some of these are among the most beautiful small birds in the world. The little Blue Wren of the colonists, *Malurus longicaudatus* (Gould), has a wonderfully long tail, which is held erect perpendicularly above the body; the male has the shoulders and head of a vivid electric blue, with a black collar, while the female is dull brown, with a greyish breast; but in the autumn the male loses his beautiful colouring and resembles the female, reacquiring his blue cape and hood in the spring. It builds a dome-shaped nest in low shrubs, with the opening at the side, and in this nest the Bronze Cuckoo frequently lays its eggs. The Wren haunts clearings in the forest, and is indeed very common everywhere, especially in gardens. A very closely related species, *M. cyaneus*, occurs in Southern Australia and New South Wales. Another long-tailed Flycatcher, but of a larger size and dull colouring, is the Fan-tailed Flycatcher (*Rhipidura albiscapa*), which has the habit of flirting its tail and spreading it out like a fan. This is a very common bird and is widely distributed on the Australian mainland.

A very common short-tailed Flycatcher of great beauty is the Flame-breasted Robin (*Petroica phoenicea*), so called from its vermilion breast, though of course it has nothing to do with our European Robin. This bird is about the size of a Bullfinch, the back and wings are black with white markings, and the whole of the chin, breast, and belly is of a brilliant vermilion in the male sex.

The electric blue of the male Wren and the scarlet of the Robin are among the most vivid colours in nature, and the birds are very common and by no means shy, seeming, indeed, rather anxious to show off their plumage to a stranger.

Closely related to the Flame-breasted Robin is the Dusky Robin (*P. fusca*), a most insignificant brown bird without any gay coloration at all in either sex. Seeing these two common species of bird living together under exactly similar conditions leads one to reflect upon the powerful operations which the mere caprice and love of beauty has effected in nature, for, look at it how we may, some dusky forbears of the Scarlet-breasted Robin have thrown their corner of nature into a convulsion, and made themselves into a new species, simply for some whim of a red stomacher. And so far from this giddy ambition leading them to destruction, it is even at the present time a protection, for the colonists think the bird pretty and are reminded by it of the Robin living in the country which is still referred to vaguely as home, and so it is believed that if you kill a 'Robin' you will never have good luck again. In another of the Tasmanian Robins, known as the Pink-breasted Robin, the male has the breast of a most beautiful claret colour; this species is much rarer than the foregoing, and I only saw it on a few occasions, once in a thick part of the gum forest on Mount Wellington, and once in the myrtle forests on the west coast.

One of the few mellow-voiced birds in Tasmania is the Thrush or Whistling Dick (*Colluricincla selbii*), a slaty-grey bird about the size of our Song Thrush, and with a rather similar voice and habit. It is peculiar to Tasmania, and very common ; the bill is long and powerful and it feeds upon grubs and insects.

An interesting Ground Thrush (*Oreocincla lunulata*) occurs in the thickest part of the scrub on Mount Wellington, and, since it practically never flies but hops about the dense bushes, it is difficult to get a sight of one. The note, however, which is a low mournful whistle, is a most characteristic sound on the mountain, and often one can hear it in the thick bush a few yards off without ever finding the bird. This peculiar note, the only sound the bird ever emits, has given rise to the name of Moper Thrush. Occasionally the bird, when suddenly startled, will hop off the ground on to a fallen log, and it can then be seen to be a very large brown Thrush beautifully barred with crescentic black markings.

Most attractive of all to the stranger are the birds of the Parrot tribe ; in the forests on Mount Wellington two kinds are met with, one of which, the Yellow-bellied Parakeet (*Platycercus flaviventris*), a fine green and yellow bird with blue wings and a very long tail, which feeds almost entirely on seeds, and when startled emits a curious cry, *cussek, cussek,* in rapid succession. It builds its nest in holes of the Gum-trees.

The other much rarer species met with on the mountain is the Black Cockatoo (*Calyptorhynchus xanthonotus*), a very large jet-black bird with saffron-coloured ears, and some brilliant saffron feathers in the tail. This is one of the handsomest Cockatoos, but it is practically never seen in captivity owing to the extreme difficulty of getting the young from the nest, and the old birds are far too wild to catch or to tame. Indeed, until recently a nest had never been found, but in felling a gigantic gum spar a nest was discovered in a hollow near the top. This Cockatoo feeds on grubs which it extracts from under the bark of Gum-trees and from rotten timber ; it is a powerful flier and rarely lets one approach within gunshot. The cry is a long-drawn screech, *whooeeyia*, uttered when on the wing or at rest. I well remember my first view at close quarters of this magnificent bird ; I had taken a little 20-bore collecting-gun into a thick bit of bush on Mount Wellington in the hope of shooting a Bandicoot which I knew to lodge there, when I was astonished to hear the screech of a Black Cockatoo quite close to me. I stopped perfectly still and, after a great deal of rustling, the bird burst out of the thickest part of the under-scrub and settled on an old rotten gum stump about twenty yards away, which it began to attack with its beak, displaying to the full its saffron ears and tail feathers, and its jet-black plumage shining in the sunlight. As I lifted my gun it saw me and made off, my shot only disturbing a few

feathers, but as I did not know how badly the bird might be wounded I followed it up. There then followed a most exhausting chase, clambering over fallen trees and pushing among Tree-ferns and undergrowth, till the Cockatoo's screeches were lost in the mist that was descending over the top of the mountain. He never let me get within shot of him again, and the only other time I was within gunshot range of the bird was when I was driving to Lake St. Clair: my gun and ammunition were packed at the bottom of the buggy, when suddenly in a clearing I came upon five beautiful Cockatoos sitting quite fearlessly on the lower branches of some small Gum-trees and preening their feathers in the sunlight.[1]

A number of streams rise in the plateau of Mount Wellington, some of them attaining a considerable size before joining the estuary of the Derwent, and all of them are characterized by the beautiful clearness of their water, owing to their beds being formed entirely of hard greenstone boulders. In the pools of the upper reaches of these streams near the top of the mountain, a very peculiar shrimp-like animal is found, which has been known for some time to the settlers, but it

[1] An unpleasant experience which I had with a pair of Wattle-birds made me unwilling to shoot at the wild birds in the bush. I had shot one of a pair with great difficulty, owing to their shyness, but on going to pick up the fallen bird I was astonished to find that the other refused to fly away, but continued to regard its fallen mate, although I was only within a few feet of it.

was not until Mr. Rodway pointed it out to a New Zealand naturalist, Mr. Thomson, in 1893, that anything was known of it in the scientific world. It is now recognized as one of those survivals of a bygone age of which the Australian continent has furnished so many and such interesting examples. The nearest allies of this animal appear to be some marine shrimps which have come down to us as fairly common fossils in the sand deposited round the Permian and Carboniferous seas of Europe and North America; subsequent to this very remote period they do not seem to have existed in the seas, at any rate of the northern hemisphere, so that an enormous passage of the earth's history has occurred between their peopling the northern seas and their survival solely on the mountain tops of Tasmania. And yet to judge by external appearance there is very little difference in organization between the primitive forms of the Carboniferous period and the present-day *Anaspides tasmaniae* (Fig. 18).

The Tasmanian Mountain Shrimp is sometimes as much as two inches in length, of a dark brown colour, and walks about on the stones and among the weeds at the bottom of the pools, in the position shown in the figure, browsing on the mosses and Liver-worts and any small creatures it can catch; it very rarely swims, but when frightened it darts forwards by flicking its tail and takes cover under a stone. It differs from the ordinary Sea-shrimp or Prawn in having all the segments of the front

part of the body free, instead of being fused to form a shell or carapace, and the way that the body is held quite flat without any bend in it is very different from a shrimp or any of the other higher Crustacea. Moreover, all the legs are forked and consist of two branches, a character which usually occurs in the young stages of many of the Crustacea, but is lost to a great extent in adult life. Indeed, in all the chief points of its structure it shows a remarkable combination of characters, some of them being quite peculiar to itself, while others are taken, as it were, at random from all the chief groups of the higher Crustacea; and this is what we should expect, on the principle of divergent evolution, a very ancient and primitive animal to do. One of its most interesting features is the double series of delicate leaf-like gills attached to the bases of the front limbs, which are kept in a continual gentle motion by the waving of the outer branches of the front legs, even when the animal itself is standing still.

Curiously enough this creature resembles many other of the Australian animals, e.g. the Platypus and the Marsupials, in differing totally from all the other members of its class in its method of reproduction. In practically all Crustacea, and certainly in the higher Crustacea generally, the female carries about her eggs for a long period after fertilization, until they are ready to hatch out, and for this purpose she employs either an elaborate brood-pouch formed of imbricating plates which

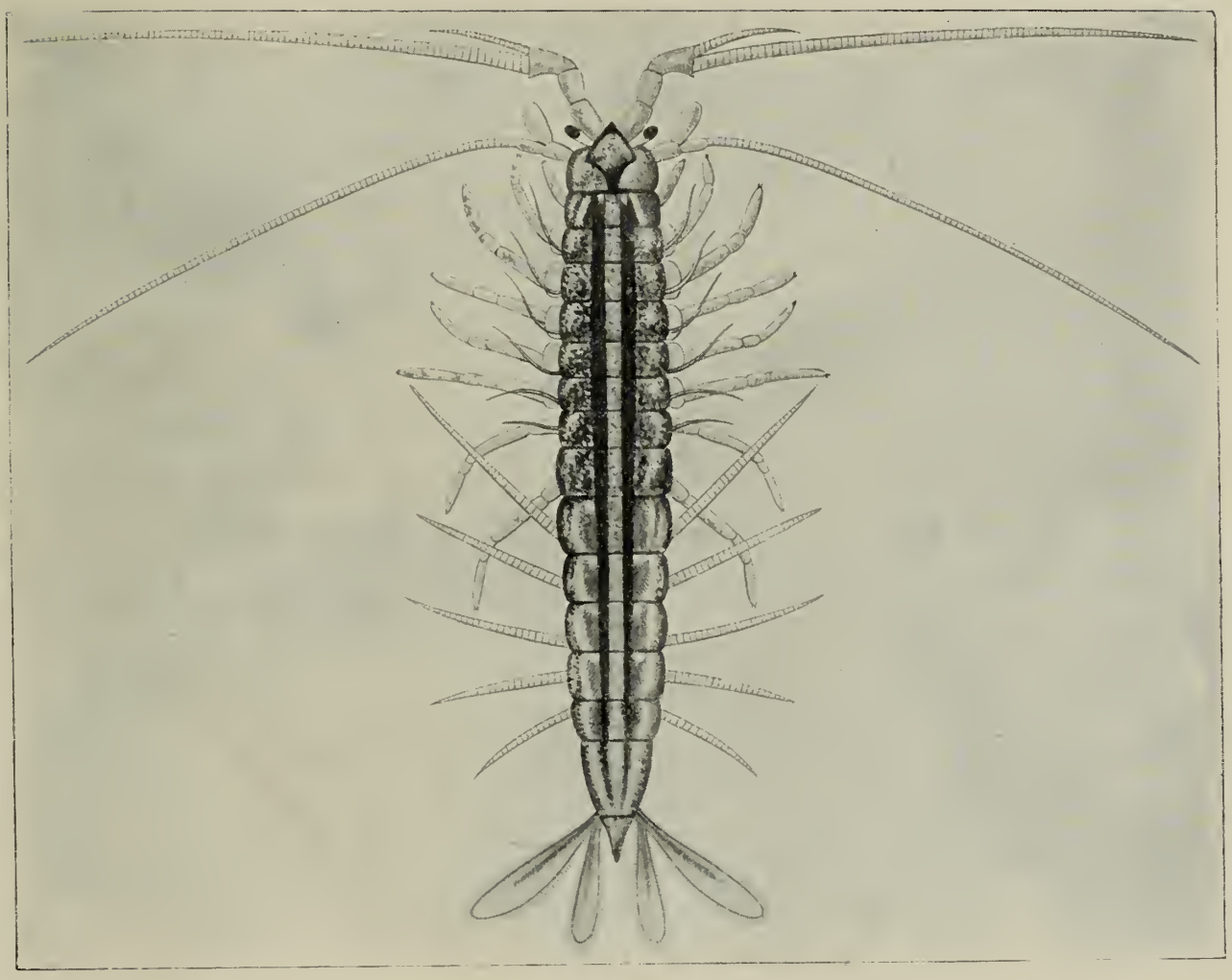

FIG. 18. *Anaspides tasmaniae*, the Mountain Shrimp, from the dorsal aspect, in the natural position in which it runs about on the rocks and water weeds. About natural size.

meet underneath her body, or else she glues the eggs on to the swimming appendages underneath the tail. The *Anaspides* deposits about twenty or thirty rather large purplish eggs, immediately after fertilization, among the water weeds or under stones, where they undergo development, hatching out into young which possess at the outset all the essential features of the parent's organization.

Besides the species which occurs on the top of Mount Wellington and on certain other mountain tops in Tasmania, there is a distinct kind which I found in the Great Lake of Tasmania, and another has been found in a stream not far from Melbourne ; but in other parts of the world no trace of the animal's survival has been discovered.

Goethe somewhere remarks that the most insignificant natural object is, as it were, a window through which we can look into infinity. And certainly when I first saw the Mountain Shrimp walking quietly about in its crystal-clear habitations, as if nothing of any great consequence had happened since its ancestors walked in a sea peopled with strange reptiles, by a shore on which none but cold-blooded creatures plashed among the rank forests of fern-like trees, before ever bird flew or youngling was suckled with milk, time for me was annihilated and the imposing kingdom of man shrunk indeed to a little measure.

CHAPTER III

THE LAKE DISTRICT

Travelling to the Great Lake. Scenery and life of the shepherds. The Great Lake. Account of its fauna. The wild animals of the bush. Poisonous snakes. Journey to Lake St. Clair. A shepherd's home. The Tiger and Devil. Lake St. Clair. Lake Sorell.

THE Lake District of Tasmania, situated on the central greenstone plateau of the island at an elevation of about 3,000 feet above sea level, may be approached from various points; the easiest approaches are from the east and south-east, as here the so-called tiers or mountain ridges rise gradually to the plateau with broad plains in between them, while to the north and north-west the Western Tier presents an almost sheer precipitous face up which the track ascends at an exceedingly steep grade.

Travelling in the Lake District is not easy; there are a few metalled roads on the outskirts, such as the road from Bothwell to the Great Lake, and from Oatlands to Lake Sorell, but once upon the plateau there are only the merest tracks, used for bullock wagons and stock, but hardly accessible to any ordinary vehicle. For hundreds of square miles the only habitations are shepherds' huts, separated from one another by many miles of bleak and barren country produc-

tive chiefly of boulders, and the life of the shepherds in these regions must be as lonely as anywhere in the world. Although bleak and barren and utterly useless for agriculture, the Lake District is used by the stock-owners for sheep and cattle-runs in the summer, what little grass there is remaining fresh and green in those cold and damp altitudes, when on the lowlands all the feed is parched and dried up. During December and January one meets with many flocks of sheep being driven up to the highlands to be turned out on the huge runs, and gathered in again at the approach of winter in April. Even in summer the weather may be intensely severe up here, and the day before I arrived at the Great Lake at midsummer, several hundred sheep had died of exposure in the snow, having been on the road for some days previously, and then being unable to find food or to withstand the cold, when the storm came on. During the few weeks I spent in the Lake District the most perfect summer weather prevailed, but from the accounts given me by shepherds the winter must be terribly severe and bleak; nevertheless in parts where the grass is more luxuriant stock is kept up there all the year round.

I travelled to the Great Lake from Bothwell; the railway goes within about fifty miles of the lake, and the rest of the journey may be taken in the mail cart, which goes through once a week to the south end of the lake, where the trooper

for the district looks after a small accommodation hut for travellers, a few enthusiastic fishermen, and shepherds. All round the flanks of the tiers, which gradually ascend to the plateau, lie the Palaeozoic sandstone strata intersected by dykes of greenstone; the sandstones become rarer and rarer as we ascend, until on the tops of the tiers, and on the topmost plateau, it is all greenstone, except for a few small patches of sandstone, which show that at one time the whole region was covered by these deposits, but has been subsequently denuded. The greenstone or diabase, which composes so much of the central and eastern part of Tasmania and forms the characteristic flat tablelands on the tops of all the mountains, is an igneous but not a true eruptive rock; that is to say, it was thrust upwards or possibly thrust in sidewards as a sill, without attaining to the surface, and solidified under the pressure of the overlaying strata. This volcanic disturbance took place after the Palaeozoic marine sandstones had been deposited, as is witnessed by the alteration of these latter strata, where they come into contact with the greenstone, and it was probably to a great extent the agency by which the centre and east of Tasmania was raised permanently above the sea in late Palaeozoic times. The age of the sand- and mud-stone strata is roughly correlated with the Permian and Carboniferous of Europe, the characteristic fossils being such forms as the large Brachiopod shell,

Spirifera, the fern *Glossopteris*, &c. A certain amount of coal of moderate quality has been found associated with these strata, especially round Mount Wellington (Sandfly Colliery) and Ben Lomond. (For geological features see map.)

Wherever the sandstone prevails among the lowland hills the country is open, and thinly timbered with Gums, Wattles, and Honeysuckles, with rich grazing pastures spread out under them; but on ascending the lower tiers the bush becomes thicker, and the unprofitable nature of the greenstone is shown by the vast tracts of unreclaimed forest country, stretching for miles in all directions. The undergrowth in these gum forests is never very dense, and there are large upland plains between the tiers covered with coarse sedges; one is at once struck with the quantity of Crows and Crow-shrikes that haunt these regions, the jet-black Crow (*Corvus coronoides*), whose cry is a raucous caw; the Black Magpie (*Strepera fuliginosa*), a large black bird with some white tail feathers, which is very common here and nowhere else, though it is found rarely in south-eastern Australia; and the White Magpie with its curious bell-like call. In the forest country, too, large flocks of noisy, inquisitive Miners are met with, and the Wattle-bird (*Anthochaera inauris*), another of the Meliphagidae or Honey-eaters, is very common in summer time. This extraordinary bird, the largest of the Honey-eaters, being about the size of a pigeon, slaty-grey in

colour, and with a very long tail, is confined to Tasmania, and receives its name from the yellow fleshy pendants which hang down from the ears; it emits the most extraordinary cry of any bird, being comparable to a man drawing a cork out of a bottle and then being violently sick. In winter time these birds descend in large numbers to the lowlands and become very fat, when they are much sought after by the settlers as food, but in the breeding season they are thin and poor, and in any case protected by the Games Act. After driving all day through these deserted regions, and hearing nothing but the strange cries of the Crow-shrikes and Wattle-birds, it was a relief to overtake a flock of several thousand sheep with a couple of mounted shepherds and their dogs; the road had by this time deteriorated into a mere mountain track studded with large greenstone boulders over which the cart jolted mercilessly; then, as we crossed over the last tier and seemed to have arrived on the very backbone of the world, the enormous sheet of the Great Lake was spread out before us in the evening sun. The Great Lake, even when seen at its best by the mellowing light of the rising or setting sun, is more curious than beautiful, more eerie than romantic. The vast expanse of water, ninety miles in circumference, is held in a shallow basin nowhere deeper than twenty feet, and upon its sides low and insignificant greenstone knolls, utterly barren or else supporting

a rather stunted growth of Eucalyptus, stretch away into the distance, alternating with marshy plains, and nowhere rising into significant peaks or salient ridges to give boldness and distinction to the scene. For here we are actually on the roof of the island, and it is a matter of some difficulty to understand the source from which the waters of this vast lake are derived ; certainly the drainage from the low surrounding hills is hardly sufficient, and one must suppose that there are considerable springs supplying the lake from below. Moreover, two large rivers flow out of the lake at the southern end, the Shannon and the Ouse, which further south become tributaries of the Derwent.

I spent a fortnight at the south of the Great Lake, making dredging expeditions from a boat and along the shore, and, occasionally, accompanied by a shepherd and his dogs, making incursions into the bush after what native animals we could find. The Great Lake has earned a considerable reputation among fishermen for the size and number of the Trout which it contains ; the largest Trout which has been caught in these waters scaling twenty-five pounds. All kinds of theories are held to account for these gigantic fish, but there can be no doubt that they are the ordinary English Brown Trout, which live and grow to their great size in the lake, favoured by the absence of predatory fish such as Pike, and by the superabundance of ground food of which

more will be said later. The fish can only be caught with a spinning bait, such as an eel-skin or artificial minnow, and seldom show any very great fight; indeed the large fish which I saw near the bank of the Shannon were so sluggish that one could poke them with a stick before they would make off. The introduction of English Trout into Tasmania in 1864 is of some historic interest, since this was the first place in the southern hemisphere for these fish to be put down, and the first consignment of Trout to New Zealand, which has recently surpassed Tasmania as a fishing resort, came from here. Now practically all the rivers and creeks and most of the lakes in Tasmania are plentifully supplied with Trout, chiefly the Brown and Salmon-trout, though the Lock Leven and Rainbow are hatched in considerable quantities in the Government fish-hatcheries at Plenty on the Derwent and at Launceston, and the Rainbow Trout in Lake Leak on the north-east coast, where they cannot get access to the sea, afford excellent fishing. The fishing in the smaller rivers and creeks, either with the fly or grasshopper bait, is really more interesting than spinning for large fish in the lakes; by far the greater number of the fish in these rivers are Salmon-trout. Although a large quantity of true Salmon have been put down as fry, there is no record of a true Salmon being caught in any waters of the southern hemisphere.

The abnormal size of the Brown Trout in the

Great Lake would naturally arouse the curiosity of a naturalist to inquire into any peculiar conditions of the lake which might favour their growth, and I am certainly disposed to find an answer to this problem in the extraordinary richness of the invertebrate fauna of the lake, which is quite unlike anything we are accustomed to find in the lakes of northern Europe. The only native fish in the Great Lake are, I believe, two species of *Galaxias*, or native Trout, a genus remotely connected with our northern Pike and characteristic of the southern hemisphere, being found in the temperate fresh and brackish waters of Tasmania, New Zealand, South Africa, and South America. Besides the common spotted *Galaxias truttaceus* (Fig. 26, p. 106), which is also common in almost all the creeks[1] throughout Tasmania, there is, in the Lake District only, an unspotted species, *G. auratus*, with golden blotches on its silvery rather transparent body, which may grow to about ten inches in length. Large shoals of these little *Galaxias* may be seen in the shallow waters of the Great Lake, and there can be little doubt that they form an important article of diet for the large English Trout. Besides the purely freshwater *G. truttaceus* and *auratus*, there is an unspotted brackish-water form (*G. attenuatus*) (Fig. 27, p. 106), which is found at the mouths of the rivers, and ascends some way into pure fresh

[1] The term 'creek' in Australian parlance is applied to any small freshwater stream, and not to an inlet of the sea.

water, and this identical species is found in similar situations at the extreme south of South America.

It is, however, in the invertebrate fauna that the Great Lake is particularly rich, and especially so in the Crustacea. Mention has already been made of the remarkable Mountain Shrimp of Tasmania (*Anaspides tasmaniae*), which is found at a high elevation on Mount Wellington and in the clear tarns upon Mount Field, the Harz Mountains, and on some of the mountains on the west coast. I was fortunate to find in the coastal waters of the Great Lake, especially in weedy localities, an entirely new form of this shrimp, which I have named *Paranaspides lacustris*; this shrimp, although it agrees rather closely with *Anaspides* in its anatomy, is totally different to look at, being of a transparent yellowish-green colour, and with the body very much humped in the middle: from its structure and observed habits it evidently pursues more of a free swimming, and less of a creeping habit than *Anaspides*. This shrimp, which is apparently confined to the Great Lake, is very abundant there.

On the stones and among the weeds near the shore of the lake I found great quantities of a peculiar Crustacean genus called *Phreatoicus* (Fig. 19), a genus confined to the Alpine regions of southern Australia and New Zealand, and belonging to a peculiar group of its own, agreeing in its essential anatomy with the Isopoda, but resembling in its external characters the other

great group of sessile-eyed Crustacea, the Amphipoda. The *Phreatoicus* of the Great Lake belong to several distinct species and are exceedingly abundant; one species is very large, sometimes attaining to an inch in length, and is adorned with spines, while the antennae and extremities are of a brilliant orange colour (Fig. 19). These animals, which are without any closely related forms in any other part of the world, are very sluggish

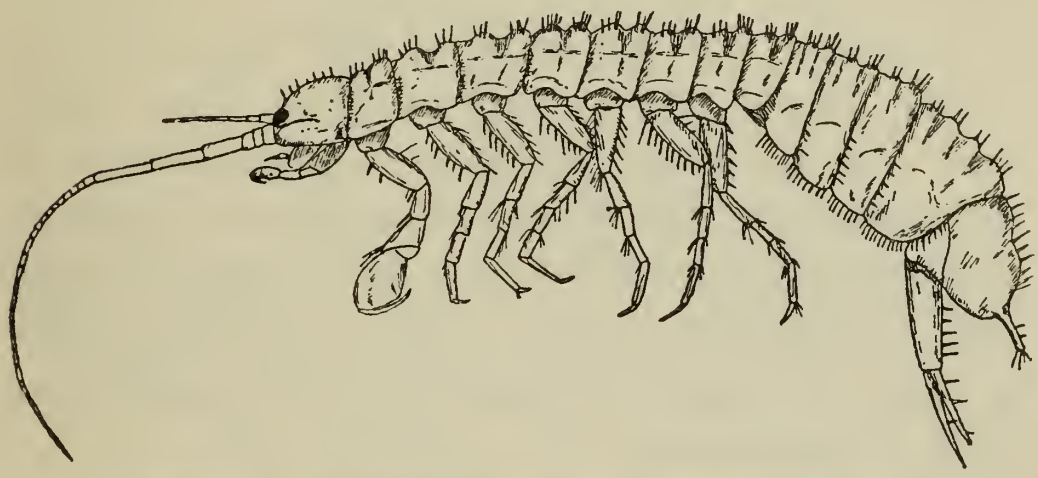

FIG. 19. *Phreatoicus spinosus*, from the Great Lake. (Three times natural size.)

in their habits, and they appear to live rather after the manner of Earthworms, passing a great quantity of vegetable mud through the intestine, which is thrown into elaborate folds to increase its absorptive area, just as in the Earthworm.

It is thus seen that the two most abundant Crustaceans of the Great Lake, *Paranaspides* and *Phreatoicus*, are highly peculiar forms standing in somewhat the same relation to the other Crustacea as the Platypus does to ordinary mammals. Besides these, living with them in the same littoral

zone, are a great quantity of Amphipods of two or three species, some of which (e.g. *Neoniphargus*, Fig. 20) are closely related to freshwater European species, while others (*Chiltonia*) are confined to the southern hemisphere (see pp. 135, 136). I believe that the above-mentioned Crustacea, so richly developed both in point of variety of species and in number of individuals, afford the chief food for the Trout and account for the great size to which these fish grow; in several instances I examined the contents of the stomachs of freshly caught Trout, and in most cases they were full of these Crustacea: moreover, it is noticeable that the flesh of these Brown Trout is almost always of a fine pink colour, and it is held with considerable reason that this colour is due to the decomposition products of the chitinous shells of Crustacea.

Of other invertebrata inhabiting the Great Lake, perhaps the most conspicuous is a large freshwater Limpet [1] (*Ancylus*) sometimes measuring an inch or more across, which is found sticking to rocks below the water mark, while under the stones a great quantity of dark olive Flat-worms and a brown Leech (*Glossophonia*), which from its affinities is probably a fish parasite, are found. Very little is at present known about the freshwater worms of Tasmania, but a Sydney naturalist, Mr. Goddard, with whom I made several expedi-

[1] This so-called Limpet is not related to the marine Limpets but to the Land Pulmonates, e.g. the Snail (*Helix*).

tions, is studying this subject, which is of great importance in connexion with the probable derivation of the fauna in the southern hemisphere.

The shallowness of the Great Lake has already been mentioned, the average depth being about fifteen to twenty feet, and there are not known to be any deep holes; in consequence, when the weather is rough the mud on the bottoms is very

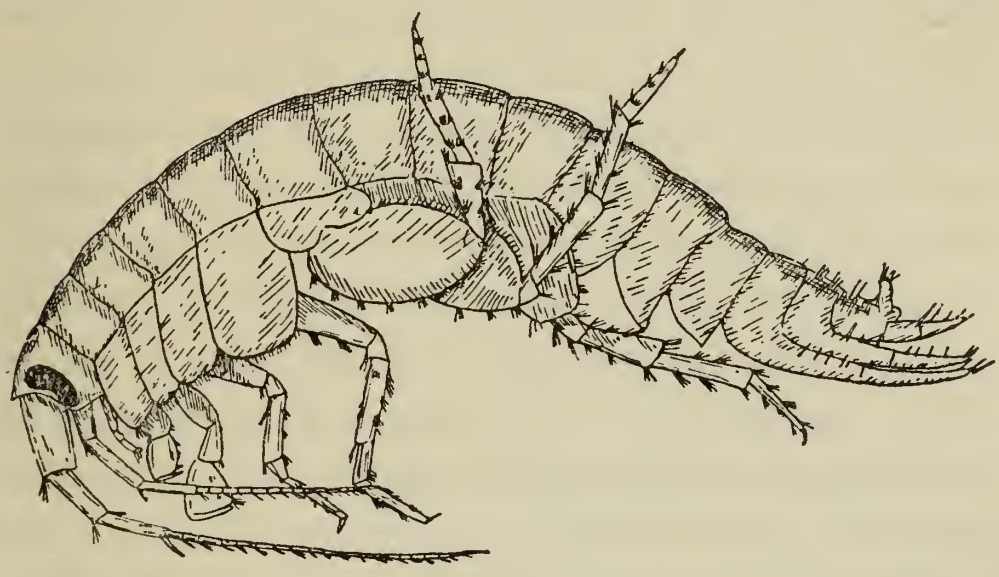

FIG. 20. *Neoniphargus ripensis*, from the Great Lake. (Four times natural size).

easily stirred up, and the waters are always more or less cloudy and discoloured. It is probably due to this fact that the amount of floating life in the water, technically known as *plankton*, and consisting chiefly of small Crustaceans, Rotifers, Algae, and Protozoa, &c., is very small. The shallowness of the lake also leads me to discredit the stories which are told of a gigantic and mythic monster, the Bunyip, which is said occasionally to rear an almost human face above the waters and utter strange sounds, although the presence of such a being is attested

by local evidence and has been supported by the testimony of an Anglican bishop. Perhaps an unusually large Platypus, numbers of which haunt the banks of the lake in the evening, or a Musk-duck or Black Swan, striking in upon the pastoral reflections of shepherd or ecclesiastic, have given rise to the legend.

Although the greater part of my time was occupied in investigating the waters of the lake, I spent several afternoons and evenings hunting Kangaroo or Opossum in the bush, accompanied by a shepherd and dogs. The Lake District, owing to its few inhabitants and the vast stretches of virgin country, is very full of game. Among the low hills covered with somewhat thin scrub, which surround the lake, are a great number of the Tasmanian Kangaroo (*Macropus Bennettii*), really a large Wallaby, with greyish fur, and standing about four feet in height. This Wallaby is a variety of the species found in Victoria, and haunts the open plains and thin scrub, but its numbers are being greatly thinned owing to the value of its skin, and it will probably soon suffer the fate of the large Forrestier Kangaroo, which is now practically extinct in Tasmania. It is exciting work hunting these animals with dogs among the Gum-trees and undergrowth, as they spring past with lightning bounds, and it is difficult to be ready for them as one stumbles and trips over dead logs, or pushes a way through Bracken, Wattle, and Tea-tree. The only other

Wallaby found in Tasmania is the much smaller *Macropus Billardieri* with rufous fur, which haunts the thickest parts of the bush and never comes out into the open unless hunted with dogs. Round the margins of Lake St. Clair, wherever I walked in the dense bush I could hear the thud, thud, of this Wallaby, often only a few yards from me, but I only once caught sight of the animal for a second. Besides the Wallabies, there are two similarly shaped animals known as Kangaroo and Wallaby Rats (*Bettongia cuniculus* and *tridactylus*), small black creatures about the size of a Hare, which spring in the manner of a Kangaroo; the dogs frequently started them out of bushes and soon ran them down.

All these animals are active during the daytime and are grass feeders; the Opossums, on the other hand, are strictly nocturnal in habit, and feed chiefly on the leaves of the Eucalypts in which they make their nests. The so-called Australian Opossums, more strictly termed Phalangers, have nothing to do with the American Opossums or Didelphyidae. The great order of the Marsupials, which at the present day only exists in Australasia and Papua and South America, falls into two separate sub-orders, the Diprotodontia, in which the incisor teeth are reduced in number, leaving a broad gap or diastema between the incisors and molars behind, and the Polyprotodontia, in which the incisors are numerous and no such gap exists. To the Diprotodontia

belong the Kangaroos and Wallabies, Kangaroo Rats, Wombat, the Opossum Mice, &c., and the Australian Opossums, while to the Polyprotodontia belong all the carnivorous Marsupials such as the Tasmanian Tiger and Devil, and the Native Cats (Dasyuridae), the Bandicoots, and also the American Opossums; so that the American Opossums are more closely allied to the Australian Native Cats or Dasyures, than to the Australian Opossums.

There are two species of Opossums in Tasmania; the Ring-tailed Opossum (*Pseudochirus Cooki*), is a small creature with dark grey fur and a white ring round the end of its tail, which makes its nest almost always in a hole of the trunk of a Peppermint Gum, and in this nest frequently three or four adult Opossums will live together. The Brush Opossum (*Trichosurus vulpecula*) is a good deal larger, and occurs under two varieties, the one with iron-grey fur, the other of a rich reddish-brown or black colour, the latter being highly prized for its skin. These two varieties apparently may be bred from the same parents, of whatever colour these parents may be. The dark variety is confined to Tasmania, this fuliginous colour being frequently found in the Tasmanian Marsupials, which are also generally possessed of finer fur than those on the mainland. The practice of 'Possuming' is pursued by the shepherds and trappers as a trade during moonlight nights in the winter; a bushman with whom I went out one night had a small terrier which

was trained to pick up the scent upon the ground, and follow it till it led to a tree up which an Opossum had recently climbed; the dog then stood barking at the foot of the tree until we came up to it, when a search would be made among the branches, and the Opossum, generally hanging motionless on one of the topmost branches, would be brought down with a gun. The sport does not sound exhilarating, but the chief excitement for me was the reckless floundering in the dark, and the extraordinary skill with which my guide found his way about the forest without any apparent landmarks to go by. It frequently struck me that the shepherds and men familiar with the bush were able to recognize individual trees and logs in an apparently chaotic forest, much in the same way that a Londoner learns to know shops and houses in the street, and they certainly pick up the tracks of a Kangaroo or any native animal with unerring certainty.

Besides the above-mentioned vegetable-feeding Diprotodonts, I came across the two species of Dasyure or Native Cat at the Great Lake, small carnivorous Marsupials of nocturnal habit, which prey upon birds and small mammals, and frequently commit depredations among the poultry of the settlers. The two Tasmanian species known respectively as Native Cat (*Dasyurus viverrimus*) and Tiger Cat (*D. maculatus*) are distributed over the island and are quite commonly met with; they occur also on the Australian mainland, but

it appears that they are being rapidly exterminated there, and are by no means as common as in Tasmania. The Native Cat is a small grey civet-like animal, spotted with white; the Tiger Cat is much larger, of a reddish colour, with more numerous and more clearly defined white spots. We used to capture these animals by laying rabbit traps at night along a deadwood fence at the back of the hut, a small boy of the neighbourhood showing me how to distinguish between a rabbit's pad and cat's pad, one of those fine bush distinctions that must be seen to be appreciated.

The unwonted heat while I was at the Great Lake brought the snakes out in great quantities, and there were very few days that we did not come across one or two, either close to the hut or on the marshy flats by the river. They sometimes turned up in the most unexpected places; once when I went to get some water from the spring and lifted up the board that covered the water-hole, a Black Snake jumped out of the water and made off over the grass. Another time a man was fishing on the river and drawing his spinner slowly through the water near the bank, when a Black Snake about three feet long sprang out from the bank and took his spinner fairly in its mouth; the man brought the snake, safely hooked, to shore, and dispatched it with his gaff, but he did not attempt to recover the spinner out of the snake's mouth.

It seemed to me that snakes were very abundant in Tasmania; as the summer drew on I hardly made an expedition into the bush without coming across one or other of the three species. Despite the innumerable names given by people in the Tasmanian bush to snakes, there are only three true species, all of them being highly venomous, and two of them deadly in effect, unless

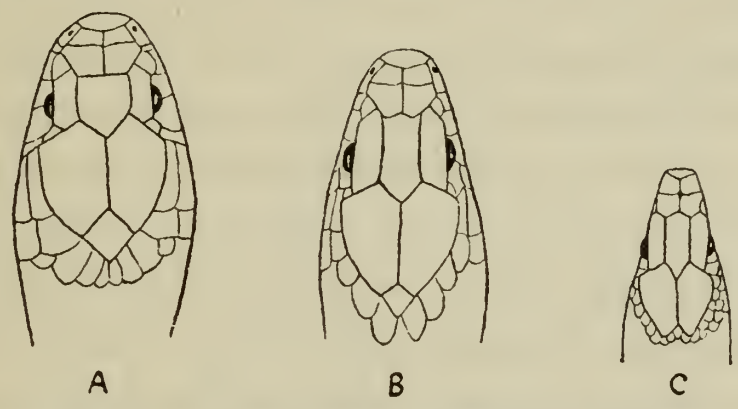

FIG. 21. Head-scales of Tasmanian Snakes.

A. Black Snake (*Hoplocephalus curtus*).
B. Diamond Snake (*Denisonia superba*).
C. Whip Snake (*Denisonia coronoides*).

stringent remedies are immediately applied. The two deadly kinds are firstly the Black, Tiger, or Carpet Snake (for it goes under all these names according to whether it is black, banded with yellow, or more irregularly blotched), *Hoplocephalus curtus*; this snake is by far the commonest, and may be distinguished by the central scale on the head being of a blunt truncated shape with straight sides (Fig. 21, A), and by the shortness of the tail behind the vent: secondly, the Diamond Snake (*Denisonia superba*), which may vary from black to sandy colour, but is sharply dis-

tinguished from the foregoing by the central scale of the head being elongated and narrow, and having its sides concave (Fig. 21, B); also by the greater length of the tail behind the vent. Both the Black and the Diamond Snake may attain a very large size, as much as six feet in length, and as thick round as a man's forearm.

The third species is the little Whip Snake (*Denisonia coronoides*), a little thin greyish snake with the scales on the head very similar to those of the Diamond Snake (Fig. 21, C); this little snake, which is generally found in dry localities away from water, never attains any size, and its bite, although serious, is rarely, if ever, fatal.

These are the only dangerous reptiles in Tasmania, though a little lizard (*Lygosoma*), which, owing to the reduction of its legs, is snake-like in appearance, has earned the altogether unmerited title of the Death Adder, and is held by almost every one in the bush to be highly venomous; in fact I was informed on more than one occasion that it meant certain death to touch one.

Although the snakes in Tasmania are all exceedingly poisonous and abundant, the number of deaths due to snake bite are very rare. This is due to a number of causes; in the first place the horror in which these reptiles are held leads to a certain amount of caution, and several men who had always lived in the bush told me that the idea of snakes was very seldom from their minds, especially if they were shifting logs, or in

any way exposing themselves to a sudden attack ; secondly, owing to the small size of the mouth in even the largest Black Snake, they are unable to get the grip necessary for injecting the poison unless they can strike on to the bare skin or through very thin cloth. The most common way of getting badly bitten is on the finger, as here the snake can get a firm grip. Of course in the vast majority of cases the snake will make off at the approach of a human being, but they also have an unpleasant habit of lying out in the sun along a road or track, and when one comes upon them in this situation they frequently lie perfectly still, and the danger of treading on them is very great, as they will strike either forwards or backwards with amazing rapidity. The biggest Black Snake is, however, easily killed by striking it with a supple stick or sapling anywhere behind the head or along the back, and it is always advisable to go to work sideways at the animal, as they cannot strike sideways, and are slow at turning. It is astonishing how a fairly hard blow on the back will entirely disable a snake and rob it of its spring, though of course the muscular activity will continue for a long time afterwards, even though the snake is fatally injured, a fact which has given rise to the superstition that a snake killed in the day never dies till sundown.

From the Great Lake I had determined to push out westwards to Lake St. Clair, a large and exceedingly deep lake lying about fifty miles away,

on the extreme western edge of the greenstone plateau, and bordering on the mountain ranges of the west coast. I had considerable difficulty in securing a guide and conveyance for this journey, as for the first twenty miles or so there is no road at all, but only a very rough stock track passing over swampy plains and boulder-strewn hills; indeed, if it had not been for the dryness of the weather during the two preceding weeks it would have been practically impossible to get through. We made the journey in a light two-horse buggy, and took a tent with us and provisions for about a week, so that with my dredging apparatus, about six hundred feet of rope, and two large bags of chaff for the horses, not to mention guns, opossum-skin rugs, and changes of clothes, the buggy presented a rather business-like appearance. I was very fortunate in securing the driver I did, Walter Davie, as he managed the horses admirably under peculiarly difficult conditions, and enlivened the succession of long days' driving by apposite quotations from the 'Man from Snowy River', the whole of which spirited ballad he appeared to have by heart. It was also fortunate that neither he nor his employer had ever made the trip before, as both of them emphatically declared on our return that they would never undertake to do it again. We expected the first twenty miles to be rough going, and it was; but when we got on to the Linda track, which we expected to be good, we found

FIG. 22. On the Linda track to Lake St. Clair. The Mount Charles Plains, with Mount Olympus in the distance. Photograph by Mr. Beattie.

that we were only at the beginning of our difficulties, since this track had been allowed to go to ruin for six years ; the culverts were frequently broken in, the ' corderoy ' logs were mostly rotten and full of holes, and in more than a dozen places huge Gum-trees had fallen across the track, so that we either had to cut them out of the way with axes or else make wide deviations into the scrub to circumvent them. But these were merely enlivening incidents varying the ceaseless jolting and jarring over the greenstone boulders, of which this wonderful track is chiefly composed.

But the interest of the country through which we passed certainly repaid any discomfort we suffered. Every mile we made westward the further we went from civilization, and the further into the heart of the virgin country. At long intervals we passed a shepherd's cottage, perhaps with a little bit of cultivation round it, but there were only three or four such ' settlements ' in the whole fifty miles, and they were marked on the map in large and imposing capitals as ' townships already settled or partially so '. And here it may be remarked that the traveller in Tasmania should not trust implicitly to the Government maps without further inquiries, since in the greater number of the places marked as ' township reserves ' nobody has ever started to build even a hut, and very likely never will.

Starting from the Great Lake westward we are on the topmost ridges of the plateau, where vast plains

of coarse grass and sedge, liberally strewn with boulders, stretch indefinitely into the distance, with patches of rather thin gum forest here and there. But after passing over the largest of these plains, known as the Skittleballs,—where we were lucky in noticing the tracks of a cart that had recently gone through as otherwise the track was non-existent in many places—the plateau begins to fall away and to be broken up by irregular ridges or tiers, much more abrupt and rugged than the rolling tiers which flank the plateau on the eastern approach to the Great Lake. On the slopes and gullies of these steep tiers the gum forests are very thick, and when we reached the top of a tier known as Pine Tier, a magnificent panorama was displayed in front of us utterly different from the vast rolling plateau over which we had passed. We looked across the deep gully of the Pine River, at the rugged forest-clad mountain ranges which fringe the westernmost border of the greenstone plateau, and still beyond them rose up the sharp peaks of the west coast mountains, mountains composed of shales and schists and flung into the bold fantastic shapes which we associate with the European Alps. There can be no doubt that this western district of Tasmania, whether we regard the bold outlines of the mountain ranges or the magnificence of the virgin forests which clothe their slopes, is superior to anything else in the island, and perhaps in all Australia. It was not till some months later that

Fig. 23. The Native Tiger or Thylacine (*Thylacinus cynocephalus*). $\frac{1}{8}$ natural size.
From a drawing by Mr. Bayzand.

I actually visited the west coast and made myself more familiar with its splendid scenery and unique vegetation, but that first glimpse from the top of Pine Tier impressed me with all the grandeur of untouched nature. We could not reach Lake St. Clair that evening, so we stopped the night with a shepherd, named David Temple, who made us very comfortable in his wooden cottage. This little cottage, with currant bushes and a few English flowers in the garden, nestling in an Alpine valley and surrounded by the silent gum forests, appeared to me an idyllic place, but the shepherd, who had lived there with his wife for about thirty years, complained of its loneliness, the nearest small township being more than twenty miles away along that fearful Linda track. He told me many stories of the Thylacine or Native Tiger, which is more abundant here than in any other part of the island, and takes a considerable yearly toll from the flocks of sheep. Since this carnivorous Marsupial is regularly hunted and trapped by the shepherds, and since it occurs only in the little island of Tasmania, it will not be very long before it becomes extinct, so that I was careful to gain any information I could with regard to its habits.

The animal, which has something the appearance of a wolf (Fig. 23), though much thinner in the body, has a rather poor fur of a yellowish-brown colour with a number of transverse black stripes on the back and flanks, from which it gets

the rather inappropriate name of Tiger. The pouch in the female, as in all the Marsupials which progress through the scrub on all fours, opens backwards and not forwards as in the Kangaroos. The muzzle and dentition are very dog-like, in fact the skull can only be distinguished from that of a large dog by certain important details of structure, e.g. the number of the incisor teeth, and the inflection of the angle of the lower jaw. It hunts by night, and generally singly, but occasionally a family of three or four will form a kind of pack. The lair is in the forest, either in an old stump or cave, but the Tiger's favourite hunting grounds are the open plains between the forests and especially on the large sheep runs in the Lake District. The destructiveness of these animals is greatly enhanced by the fact that a Tiger will only make one meal of a sheep, merely sucking the blood from the jugular vein or perhaps devouring the fat round the kidneys, but it never returns to the same carcass. It is a cowardly animal and will not attack a man unless cornered or in a trap, though it will turn on the large Kangaroo-dogs when it is hunted. The shepherds wage incessant war on the creature, in the summer laying traps and hunting it with dogs, in the winter following up its tracks through the snow. A reward of a pound is given for the head by the Government, but the shepherd generally rides round with the head to several sheep-owners in the district, and takes toll from them all before depositing it at the police station. In consequence

FIG. 24. The Tasmanian Devil (*Sarcophilus ursinus*). About $\frac{1}{6}$ natural size.
From a drawing by Mr. Goodchild.

a large reward must be offered for the carcass of a Tiger, and an offer of £10 during a year for a live Tiger to be delivered in Launceston was unsuccessful. It pays the shepherd very much better just to hack off its head and take it round on his rides. Although the Tiger is by no means confined to the Lake District, it is more abundant here than anywhere else, though a stray individual may turn up on nearly all the big sheep stations throughout the island. The only cry uttered when hunting is described as resembling the whine of a puppy.

The other large carnivorous Marsupial which, like the Tiger, is also confined to Tasmania is the Devil (*Sarcophilus ursinus*) (Fig. 24). The Devil is far commoner than the Tiger and more widely distributed through the island; it is a very clumsily built creature about the size of a bull-pup, with coarse black fur and white markings, the face and snout being of an unhealthy whitish-pink. Like the Tiger it destroys sheep, making a single meal off each capture; being slow and clumsy in its movements it lies in wait for a sheep and then springs at its neck, fastening its hold with bull-dog tenacity. This animal is really far fiercer than the Tiger and exceedingly difficult to kill; it generally lairs in a hollow stump and only goes out hunting at night; it can only be caught in a trap baited with raw meat. A curious fact with regard to the Devil and the Tiger is that both of them are helpless if grasped firmly by the tail, being unable to bend the body sideways below the neck.

I witnessed a Devil being treated in this undignified way, the animal trying to turn its neck round to get at its captor, and uttering a furious hissing noise with wide open mouth, displaying its powerful teeth.

It is remarkable that these two carnivorous Marsupials should be confined to Tasmania: their bones in a recent fossil condition have been found in New South Wales and Victoria, so that its range was formerly much wider than now. It is supposed that the advent of the Dingo in Australia, which probably came over with the conquering Australian blacks from Malaysia, exterminated the reign of the Tiger and Devil on the mainland, but owing to the existence of Bass's Straits neither the Dingo nor the Australian blacks ever got into Tasmania, so that the Tiger and Devil on the one hand and the Tasmanian aboriginals on the other were able to survive.

We reached Lake St. Clair at noon the following day, after experiencing even greater difficulties with the track, which became worse and worse and more encumbered with fallen timber as we approached the lake. About three miles from the lake we crossed over the Derwent River, which rises in Lake St. Clair and is even here a fine broad stream of absolutely limpid ice-cold water. In our progress from the Great Lake we crossed over five rivers, rising on the plateau and all draining south into the Derwent River, namely, the Ouse, the Little Pine River, the Nive, Clarence, and finally the Derwent at its source. All these are rivers of considerable size running in beds of greenstone

FIG. 25. Lake St. Clair. Mount Ida (with gum forests) in the distance. On the right, in the foreground, a Grass-tree (*Richea pandanifolia*) ; on the left a King William Pine (*Athrotaxis laxifolia*). Photograph by Mr. Beattie.

boulders, and all characterized by their absolutely clear water. Further to the south and south-east, where the rivers draining off the plateau pass over the Mesozoic sandstone flanking the plateau, the waters are rather thick and turbid. Lake St. Clair, about ten miles in length and two miles broad, differs totally in its scenery from the other large lakes on the central plateau of Tasmania. All these lakes, such as Lake Echo, Sorell and Crescent and Arthur's Lakes agree with the Great Lake in being shallow basins enclosed by low insignificant ridges, and their waters are always more or less discoloured. Lake St. Clair is exceedingly deep, in most places from forty to seventy fathoms and in some parts as much as ninety fathoms; the water is absolutely pure, and, owing to the depth, very dark blue or black, and of an icy coldness even in the height of summer. The greenstone mountains surrounding it, especially Mount Olympus and Mount Ida at the north end, descend sheer into the water, and rise above it in precipitous cliffs and crags of magnificent boldness, while their slopes are clothed with dense forests right down to the water's edge. Any one who has seen the Königsee in the Austrian Tyrol might be tempted to make comparisons, substituting for the Pines of Austria the Gums of Australia. But another element enters into the vegetation of Lake St. Clair, namely the wonderful myrtle forests of the west coast, consisting of the fine Evergreen Beech or Myrtle interspersed with the various Tasmanian Pines, King William and Celery Topped Pines, and the tangled undergrowth

of the 'Horizontal Scrub'. I intend describing this forest later, when considering the west coast, so that we need not dwell longer upon it here, except to mention that the west bank of Lake St. Clair lies just on the eastern fringe of this west coast region, where the myrtle and pine forests begin to replace the Gums, and entirely change the character of the vegetation and scenery, so that one seems to pass right out of Australasia into, shall we say, Terra del Fuego or a lost Antarctic continent.

I was anxious to start dredging operations in the lake, so after unloading the buggy at the hut and seeing the horses accommodated in a shed, we went in search of the boat, which had been put here by the Government some nine or ten years ago. We found the boat in a fine boat-house with runners and a winch for launching it, and the boat itself proved fairly seaworthy though badly fitted with rowlocks and oars, which gave us some trouble, as we encountered one or two fierce storms of wind during our expeditions. In the course of the afternoon we dredged in a number of places varying in depth from twenty to seventy fathoms, and on the following day we covered more ground, but in all cases with very disappointing results. The dredge brought up a quantity of fine reddish mud, absolutely destitute of life [1];

[1] Forel, who investigated the Lake of Geneva, believed that the deep-water fauna was derived from the subterranean channels entering the lake. Lake St. Clair, being situated on a solid igneous rock, probably does not receive any subterranean channels, and this may account for the absence of a deep-water population.

only in the shallow water round the shore, where the bottom consisted of a beautiful white crystalline sand, we obtained the small green Amphipod (*Chiltonia*), but nowhere was there a trace of the *Anaspides* or *Phreatoicus* so characteristic of the Great Lake. By using the tow-net, however, at a considerable depth a large quantity of floating *plankton* was obtained, consisting of small Cladocera and Copepoda, and since these belong to groups entirely confined to large and deep bodies of water, and so not easily distributed, they are of great interest to the student of geographical distribution.[1] The great wealth of the *plankton*, especially if we compare it with the poorness of that in the Great Lake, is no doubt due, firstly, to the depth of the water allowing these organisms to migrate upwards and downwards, in the manner characteristic of them, according to the conditions of illumination, and, secondly, to its absolute pureness and clarity. On the other hand, I can only account for the poverty of the ground fauna by the intense coldness of the lake water, situated as it is at so high an elevation, sheltered from the sun by the steep enclosing mountains, while its immense depth naturally keeps the temperature down to a constant and low level.

After battling for some hours with the waves which were whipped up to a storm by a steady north wind, we returned to shore, and found to our consternation that the horse 'Comet' had slipped his halter and disappeared; luckily 'Doll',

[1] See chap. v, pp. 136, 137.

a splendid steady mare with a most dainty way of picking her steps over boulders and logs, had remained behind, so Davie jumped on her, and galloped her barebacked down the track in search of the runaway. I returned to the lake, meditating as philosophically as I could on the uncertainty of human affairs, had a rapid bathe in the icy cold water, and then went back to the hut and cooked some tea. It became rapidly dark, and after waiting for more than two hours I began to be anxious at the possibility of our being stranded with only one horse so far away from any possible assistance, so that it was with a feeling of considerable relief that I heard the sound of horses coming down the track. Davie had headed off the horse just in front of the bridge over the Derwent, but had experienced a good deal of difficulty in recapturing him, and if once he had got over the bridge it would have been hopeless to pursue him that night at any rate, so that we doubtless had a lucky escape. We led the horses right through the hut, and stabled them in a little yard at the back, where we kept them safe for the rest of our stay. The drive back along the Linda track to Bothwell occupied two and a half days, the last day's drive, after we had descended the tiers, taking us through open sandstone country where, in the neighbourhood of the Ouse and Hamilton, the soil is enriched by freshwater Tertiary deposits, affording some of the finest pastures in Tasmania.

A few weeks later I visited Lake Sorell (see p. 36), the most accessible of all the lakes. It was here that the exiled leaders of the Young Ireland movement in 1846 used to meet, and the most eloquent and not the least fanatical of them, John Mitchel, has celebrated the lake with the fervour of rhetoric or inspiration.[1]

Why should not Lake Sorell also be famous? Where gleams and ripples purer, glassier water, mirroring a brighter sky? Where does the wild duck find a securer nest than under thy tea-tree fringe, O Lake of the South! And the snow-white swan that 'on St. Mary's Lake floats double, swan and shadow'—does he float more placidly or fling on the waters a more stately reflection from his stately neck, than thou, jet black, proud-crested swan of the Antarctic forest waters? Some sweet singer shall berhyme thee yet, beautiful Lake of the Woods. *Tu quoque fontium eris nobilium.* Haunted art thou now by native devils only; and pass-holding shepherds whistle nigger melodies in thy balmy air. But spirits of the great and good, who are yet to be born in this southern hemisphere, shall hover over thy wooded promontories in the years to come; every bay will have its romance (for the blood of man is still red, and pride and passion will yet make it burn and tingle until Time shall be no more), and the glancing of thy sunlit moon-beloved ripples shall flash through the dreams of poets yet unborn.

[1] See Fenton's *History of Tasmania*. Smith O'Brien, Meagher, and Mitchel, with other leaders of the movement, were transported to Tasmania. The two latter, after seven years, effected their escape to America, while the former received a pardon and returned to Ireland. Mitchel has left us an account of his wanderings in his *Jail Journal*.

CHAPTER IV

THE NORTH AND THE WEST COAST

North and South. Characteristic freshwater fish of the north. Bridport. Burning the forest. Black-fish fishing. Huge Crayfish. The seashore. The West Coast. Physical characters. Myrtle and Pine forests. Characteristic animals. The Land Crab. The Mountain tops. Peculiar vegetation. Mountain tarns. The Platypus and Echidna.

A GLANCE at the geological chart will at once show that the northern half of Tasmania is much more varied in the character of its country than the southern, and certainly, as far as the natural advantage of soil is concerned, the north is far better off than the south. Besides the extensive freshwater deposits, lying between Ben Lomond and the Western Tiers, which afford an excellent red soil, there are patches of basalt, yielding soil of a rich chocolate colour where agricultural operations, such as potato-growing, are carried on at a great profit. On the north-west coast there is still a very large area of altogether uncleared land where the soil is exceptionally good, and there can be little doubt that this district in the future will be among the most prosperous in the island. Another rather extensive agricultural district lies round Scotsdale to the north-east, and in this neighbourhood, where there are large outcrops of granite and porphyry, a certain

amount of tin mining, and of gold mining on a small scale is carried on. The mining industries on the west coast are more closely connected with the north than with the south, owing to the railway which runs from Burnie on the north coast down to Strahan, while the only connexion with the south is by a small line of coastal steamers, which ply between Hobart and Macquarie Harbour. A direct railway from Hobart to the west coast has long been projected, and the carrying into effect of this plan might have far-reaching results in opening out possible mining areas in the south-west, which hitherto has remained practically unexplored.

The advantages which the south has to set off against those of the north are chiefly the vastly superior harbour of Hobart, where the largest vessels can draw right up to the wharf, compared to the tortuous and shallow estuary of the Tamar at Launceston, and the facts that the seat of Government is established there, and that the historic interest of Hobart and Port Arthur, and the natural beauties of the country, attract a large number of tourists.

The division of the island into a north and south half, with interests to a certain extent opposed to one another, leads to some jealousy; and though this may appear rather petty to a stranger, the same is true all over Australia, and indeed must always be the case in a new country where no common danger or crisis has

threatened to overwhelm the whole community, and so served to draw its different parts together for mutual defence and in a common interest.

The distinction between north and south does not only concern the soil and other economic features; it is also noticeable to the naturalist in the distribution of the river fish, certain species being confined to the rivers which flow out on the north into Bass's Straits, and being entirely absent from the rivers running in a southerly direction. Since the introduction of the English Trout these native fish are becoming rarer and rarer every year, and the time is probably not far distant when they will be in danger of extinction. The freshwater fish characteristic of the northern rivers are three in number. The Freshwater or Cucumber Herring (*Prototroctes maraena*) (Fig. 28) belongs to the family Haplochitonidae, which is confined in its distribution to temperate South America, Victoria, Tasmania, and New Zealand. This fish, which is rather closely related to the Salmonidae, used to afford the most admirable fishing, as it rises to a fly and shows fight, and is excellent to eat, but it is now extremely rare, being only caught in any quantities in the rather inaccessible rivers of the north-west coast. It is silvery in colour, rather similar in shape to a Salmon Trout, and often scales several pounds. The breeding habits of the fish are not clearly understood, but it seems certain that they descend

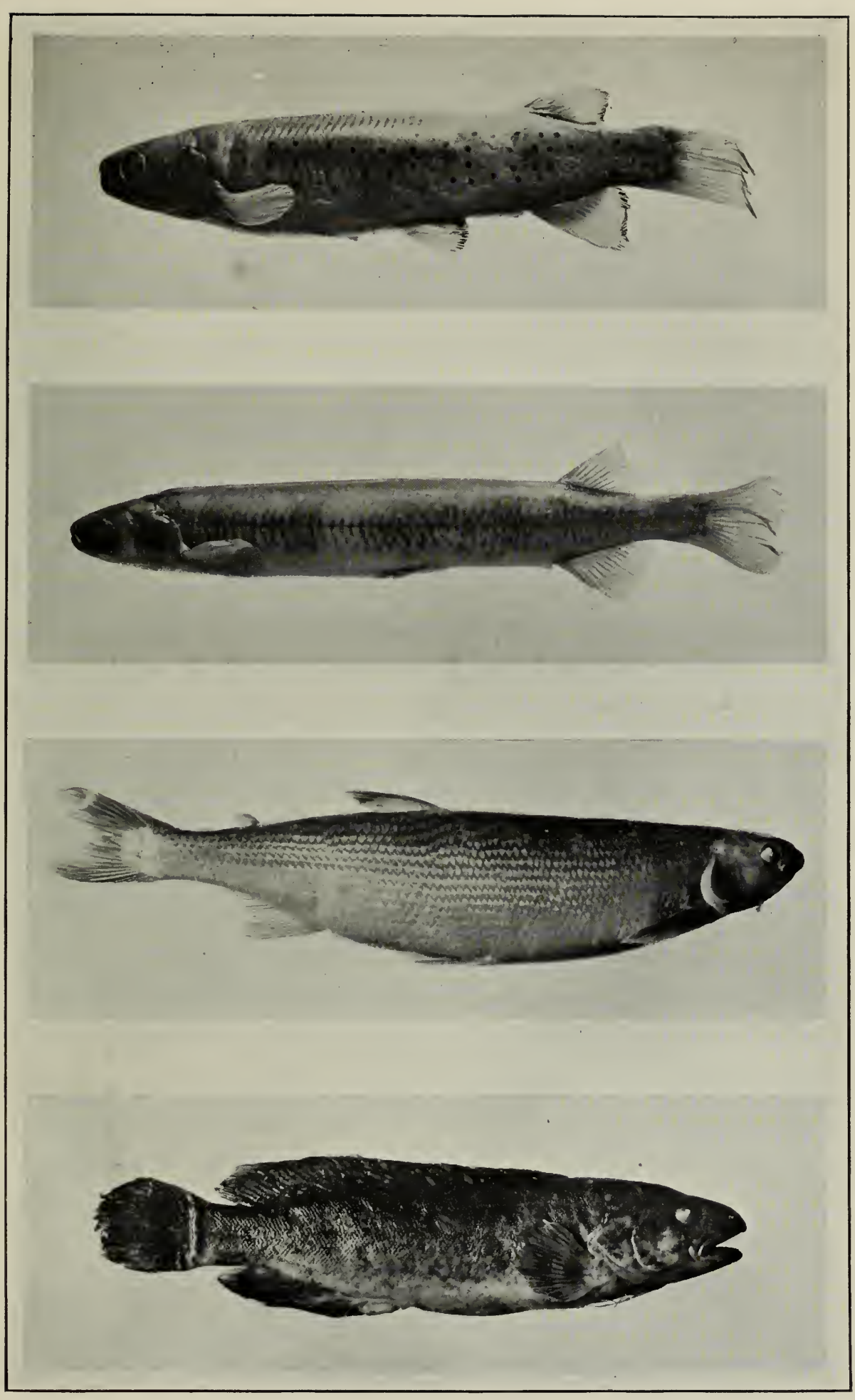

Fig. 26. The Mountain 'Trout' (*Galaxias truttaceus*) from streams and lakes. (Nat. size.)
Fig. 27. *Galaxias attenuatus*, the brackish and freshwater 'Trout'. (Nat. size.)
Fig. 28. The Cucumber Herring (*Prototroctes maraena*). ($\frac{1}{3}$ nat. size.)
Fig. 29. The Black-fish (*Gadopsis marmoratus*). ($\frac{1}{4}$ nat. size.)

into brackish water at the mouths of the rivers to spawn.

The Black-fish (*Gadopsis marmoratus*) (Fig. 29), is still fairly abundant in certain localities along the north coast of Tasmania, and also in the rivers of Australia which flow into Bass's Straits. Elsewhere it is not found at all, nor has it any closely related species, though it is held to be remotely connected with the Blennies. It is a sluggish fish frequenting the deep pools in cloudy streams; the back and sides are of a deep black colour marbled with grey, the belly being lighter in colour, while the jaws are furnished with barbels. It may grow to a very large size, scaling as much as seven or eight pounds.

The Freshwater Flathead of Tasmania belongs to the genus *Aphritis*, which has other representatives in Victoria and in Patagonia, so that this fish agrees with all the other freshwater fish in Tasmania in being confined to the temperate southern hemisphere. It does not grow to any size; the head is very broad and depressed, and the colour is mottled-grey or brown. Both it and the Black-fish are the most delicious eating, the Black-fish especially being one of the finest freshwater fish in this respect.

I spent some days on the north-east coast, at a little place called Bridport some twelve miles or so from Scotsdale, where an old Scotch settler and his wife put me up at their farm-house. The house is situated just behind the sand dunes

and is surrounded inland with gum forests and open sedgy plains; a fine jetty and a boat-house remain on the beach as a remnant of the days when the tin ore used to be shipped here from the mining districts eastward, before the railway from Scotsdale into Launceston was built. Besides a fisherman's cottage and one or two small farms in the neighbourhood, the country along the coast is pretty well unoccupied. There are two little creeks in the near neighbourhood; the Brid, which flowed quite near the settler's house into the bay, and Muddy Creek a tiny little rivulet about two miles to the east. In these two creeks we used to fish for Black-fish and for Crayfish, or Freshwater Lobsters [1] as the settlers call them. The Black-fish does not begin biting till close on sundown, so that we generally set out through the forest late in the afternoon and walked a mile or so down the river. As we went along we dropped lighted matches among dry patches of Bracken and scrub in the hope of starting fires, a practice which the inhabitants of this district always perform in the dry weather, as there is nothing to damage, the fire does not spread dangerously owing to the comparative thinness of the bush, and on the charred clearing caused by these fires a certain amount of coarse grass springs up which serves

[1] In Tasmania the term Crayfish is applied to the marine Rock Lobster (*Panulirus*), the term Lobster to the Freshwater Crayfish (*Astacopsis*).

as food for cattle. Besides putting up a few wire or deadwood fences, burning is the only kind of improvement attempted on this 'third-class' land which is sold at five shillings an acre.

On arriving at the fishing grounds each man takes his stand at some deep pool and lights a fire at his back to keep off the flies and mosquitoes which would otherwise render fishing impossible; the best rod to use is a long Tea-tree branch and a sinking line baited with worms, as any more elaborate rod is too difficult to manipulate among the densely overhanging branches of native Honeysuckle, Wattle, Tea-tree, and Gum saplings. At sundown and far into the night the Black-fish go on biting, and the heavier fish afford some amusement in landing; meantime it has grown pitch dark in the forest, but the fires that have been lit during the day, and all along the river as we pass from pool to pool, begin to blaze fiercely and to spread, illuminating the forest with a fierce glare and throwing the huge towering spars of the Gum-trees into relief. Nothing can be more beautiful than the forest when lit up by bush fires in this manner. No sound is heard beyond the crackling of the fires, the occasional thumping of a Kangaroo, the hissing laughter of an Opossum, or the raucous call of the More-pork.

Besides fishing with a line for Black-fish we used to lower lobster-pots, baited with raw meat, for the large freshwater Crayfishes (*Astacopsis*

Franklinii) (Fig. 30), which inhabit the creeks and rivers of northern Tasmania. This Crayfish is the largest in the world, and is quite a distinct species from the small Crayfish which is found in the creeks of the southern part of the island, and which never grows to more than five or six inches in length. The northern Crayfish grows to nearly two feet in length, and may scale eight or nine pounds, competing in size with our marine Lobster; it is dark-green in colour, and studded on the claws and gill-covers with blunt tubercles; the claws of the larger specimens are formidable weapons about the size of a man's hand. We obtained the largest specimens from Muddy Creek, a small rivulet that one could easily step across, and it seemed extraordinary to fish these huge monsters out of little pools in which one would expect to find nothing larger than a minnow. All these Crayfishes were smothered with a parasitic Flat-worm (*Temnocephala*), about a quarter of an inch long, which were present in such numbers, as to appear like a green foam covering the animal. The freshwater Crayfish or Lobster is excellent to eat, being less coarse than the marine Crayfish (*Panulirus*), which is the chief commercial Crustacean of Australia; but owing to the difficulties of catching it, it never appears in the fish markets, and the only people who eat it, or know anything about it, are a few prospectors and bushmen.

I cannot leave my reminiscences of Bridport without mentioning the extraordinary quantity

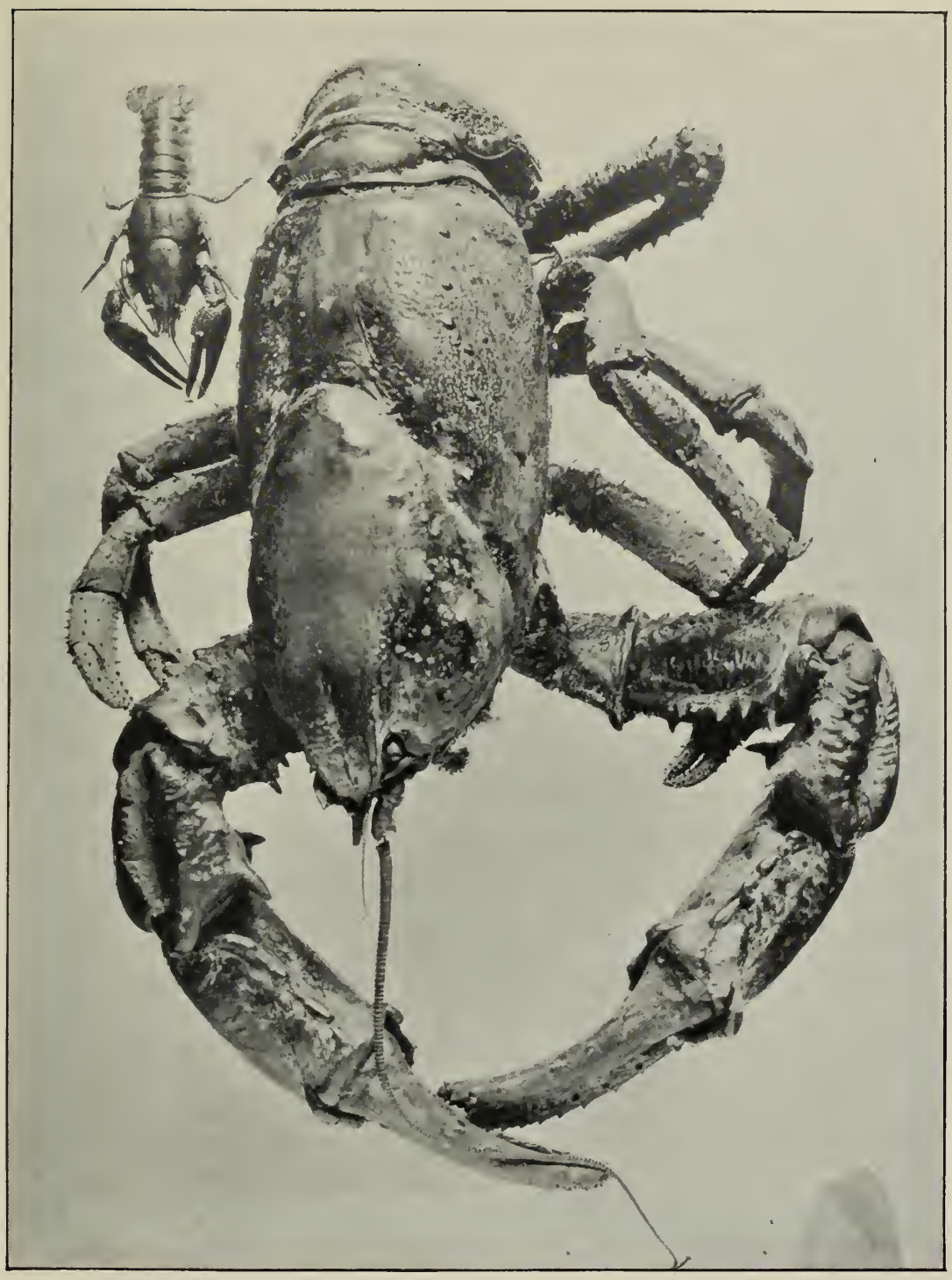

FIG. 30. The Giant Crayfish or Freshwater Lobster of Tasmania (*Astacopsis Franklinii*).
On the left an English Crayfish (*Astacus fluviatilis*), photographed to scale to compare the size.

and variety of Crabs that were to be seen at low tide on the sandy beach and along the mud-flats of the river. All of them were burrowing species and made off into their holes on one's approach; there were swarms of Ocypods, swift-running Crabs with enormously elongated eye-stalks, and even greater numbers of a little round bluish Crab (*Hymenosoma*), present in such swarms that the sand was absolutely riddled with their little round burrows, and they themselves as they ran about had the appearance of, and made almost as much noise as, a swarm of bees. I was surprised to find at this latitude a littoral fauna so much resembling that of a tropical beach; but in the southern hemisphere the tropical fauna extends as a whole much further into the temperate zones than in the northern.

Some account must now be given of the characteristics of the west coast country, a part of Tasmania that exhibits the finest scenery and some of the most interesting natural products of the island. The mountainous character of the district and the density of the forests have hitherto prevented much development or even active exploration, and were it not for the numerous mines scattered about, there probably would not be any inhabitants at all; at any rate all the settlements at present owe their existence to the mining industries. The mining towns are entirely dependent for their food on the north, and every day when I was on the west coast railway there

were consignments of sheep and cattle going down the line, to be killed in Zeehan or one of the other mining towns.

The easiest way of reaching the west coast is by a series of light railways, which run up into the mountain from Burnie on the north coast, and extend as far as Strahan on Macquarie Harbour. As shown on the rough geological chart the west coast mountains form a broad strip stretching the whole length of the island; these mountains are composed mainly of metamorphosed schists and slates of probably Archaean and Cambrian age, so that we are dealing here with a very ancient block of land that has not been submerged to any extent since it was first elevated. The detailed mineralogy of this district is exceedingly complicated, and it is doubtful if so many different kinds of mineral ores can be found within so confined a space in any other country in the world. The two most important mines are the Mount Bischoff tin mine near Waratah, and the Mount Lyell copper mine at Queenstown, but between these two, which are only about fifty miles apart, are scattered a multitude of little mines where silver, lead, copper, tin, and gold in small quantities, are worked.

Over the whole of the west coast district we meet with totally different conditions from the rest of Tasmania, and indeed from those in Australia in general; first and foremost the rainfall here is about

FIG. 31. A Path through the Myrtle (*Fagus Cunninghami*) forest, near the Magnet Mine, West Coast.

FIG. 32. In the Horizontal Scrub; climbing on the Platform.

100 inches in the year, whereas on the east coast it averages at most about twenty to thirty inches, and the winters are usually intensely cold. There is also evidence that this state of affairs has lasted for long periods, since on the west coast mountains there are distinct signs of glaciation right down to sea level, whereas on the drier east coast the only doubtful signs of a glacial period are confined to the summits of some of the mountains, such as Mount Wellington and Ben Lomond in the north. The very great rainfall has a distinct influence upon the vegetation; the xerophytic Gums are almost everywhere replaced by the Evergreen Myrtles or Beeches, and the undergrowth attains a rankness and density which have to be seen to be believed. If it were not for occasional patches of gum forest with its undergrowth of Wattle, Honeysuckle, and Tea-scrub, it would be difficult to believe that one was in Australasia at all. The Myrtle or Evergreen Beech (*Fagus Cunninghami*), which forms the main constituent of the west coast forests, grows into a tall spar, sometimes attaining 150 feet, and, from the crowded manner in which the trees grow, the branches do not spread much. The leaves are very small, stiff, and waxy, and the foliage has a feathery appearance (Fig 35, E, p. 121). The tree is closely allied to a species which forms the main constituent of the temperate South American forests, and to make the resemblance more complete a large orange fungus is parasitic

upon both of them; (this, in South America, is largely eaten by the inhabitants of Terra del Fuego). Intermingled with the Myrtles are found, singly or in patches, a number of peculiar forest Conifers belonging to genera either confined to Tasmania or else extending through the Australasian region to the East Indies and New Zealand. The finest of these trees is the Celery-topped Pine (*Phyllocladus rhomboidalis*), a large Conifer belonging to the Yews or Taxineae, and not resembling a Pine at all, attaining fifty or sixty feet in height. It is shaped rather like a celery plant, with the lateral twigs of the branches expanded into flat leaf-like organs, while the true leaves are represented by small scales closely applied to the branches (Fig. 33, A.) This Pine is of very slow growth, and affords extremely hard and durable timber, which is very much prized by the miners on the west coast for making supports for their galleries. The tree is, however, not common, and the miners are obliged to use the Myrtle for this purpose, which decays very rapidly underground; the Myrtle is used as far as possible in temporary galleries which are afterwards filled in with rubbish, while the Celery Tops are employed in the permanent woodwork of the mills, and in permanent galleries.

Another fine Conifer somewhat closely related to the American Cypresses and the gigantic Sequoia of California (Taxodineae) is the King William Pine, the three closely allied species of

which form the genus *Athrotaxis*, quite peculiar

FIG. 33.
A. Celery-topped Pine (*Phyllocladus rhomboidalis*).
B. King William Pine (*Athrotaxis laxifolia*).
C. *Pherosphaera Hookeriana*.

to the west coast of Tasmania. This tree grows to forty or fifty feet in height, and furnishes the

most beautiful pink timber of a fairly workable soft wood. The form of this tree is most graceful, as shown in the foreground of the photograph on p. 98. A small bit of the foliage is shown in Fig. 33, B.

Besides the Pines, another exceedingly fine forest tree, which furnishes a most valuable hard wood to the miners, is the Leatherwood (*Eucryphia Billardieri*), belonging to a small sub-order of the Saxifrageae with its nearest allies in Australia and South America. The Leatherwood grows into a fine spreading forest tree of sixty feet, with rather large pale-green leaves, and its magnificent wealth of white blossom in the summer months constitutes one of the great beauties of the west coast forest. The tree when in full bloom is a mass of white, and has something the appearance of a pear-tree in blossom, and round the flowers the honey-eating birds, such as Parakeets, Honey-eaters, Zosterops, collect in the same way as round the gum-flowers.

Of the smaller trees the commonest is the Sassafras, with its slender stem and shining green foliage, while here and there swamp Tea-trees shoot up to an astonishing height.

I have already mentioned the marvellous density of the undergrowth which everywhere surrounds the forest trees, affording one of the chief obstacles to the exploration and opening up of the country, as every yard of progress has to be literally hacked out with an axe.

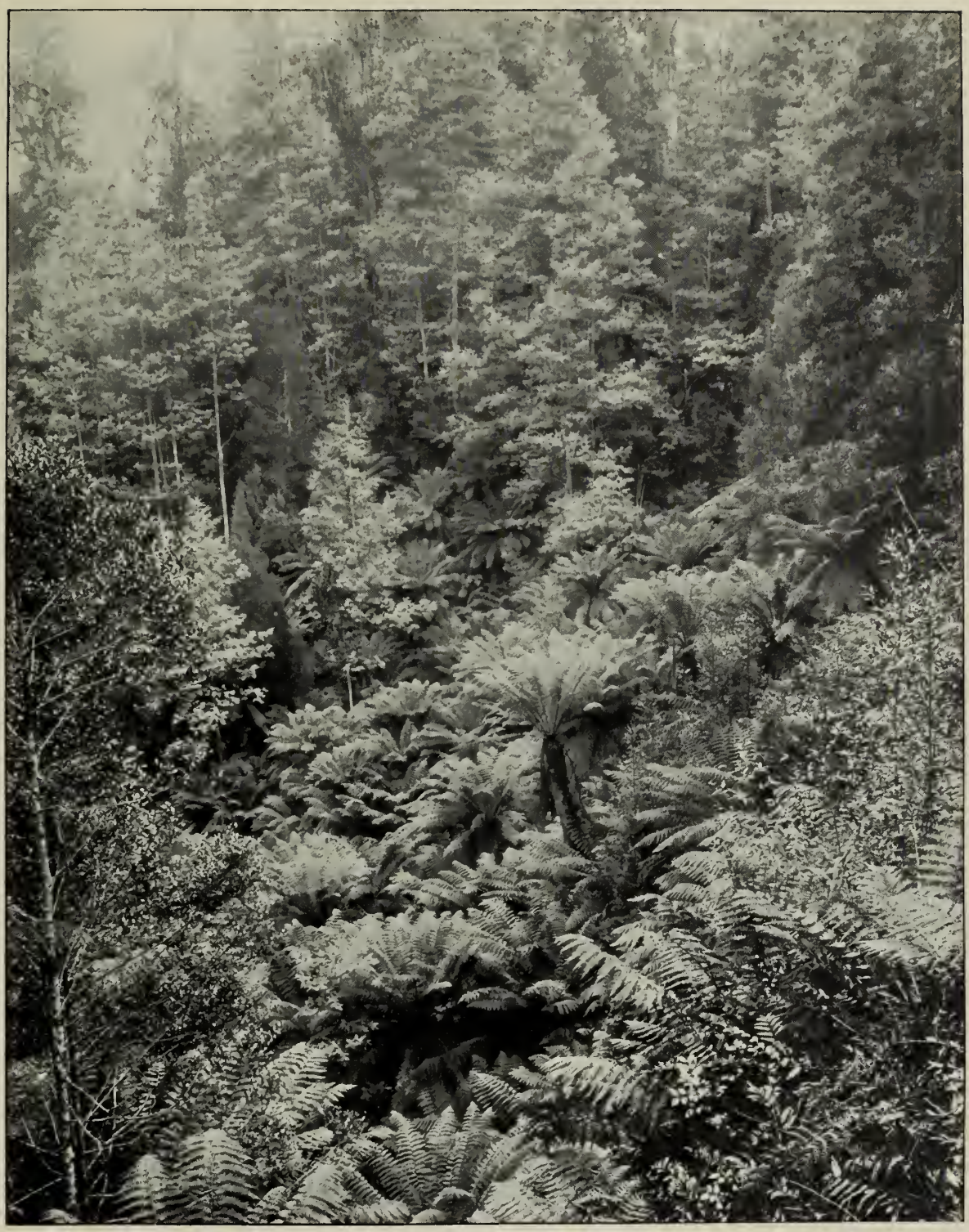

FIG. 34. Tree Ferns (*Dicksonia*) and Sassafras forest of the West Coast type. Photograph by Mr. Beattie.

The most formidable constituent of this undergrowth is the interesting Horizontal Scrub (*Anodopetalum biglandulosum*) (Fig. 32, p. 112), a species and genus of the Saxifrageae, confined to the west coast of Tasmania. The method of growth of this scrub is very remarkable. It starts as a slender sapling and shoots up to fifteen or twenty feet in height; it then falls over either by its own weight or in a storm, and from the prone trunk new saplings spring up, which, on attaining a certain height, themselves fall over and give rise to new shoots. By the constant repetition of this process, a tangled mass of boughs is formed, ever growing upward and upward, until a kind of platform is produced perhaps thirty or forty feet from the ground, surrounding the trunks of the Myrtles and spanning the gullies in all directions. It is quite impossible to push one's way through the Horizontal Scrub, as the matted boughs are far too thick and strong; the only way is to walk on the top of the platform, and to beware of treading on a rotten piece, as frequently bad accidents have occurred from a man falling right through a hole in the Horizontal Scrub on to the ground some thirty or forty feet below.

Besides the Horizontal Scrub, very beautiful Heath bushes (*Epacris*, *Gualteria*, &c.), adorned with coloured or white berries, relieve the prevailing green, and in the gullies the Tree-ferns grow in the greatest luxuriance. The boles of

the Myrtles, unlike the smooth stems of the Gums, are covered with lichens and mosses and fungi, and this combined with the brighter green of the prevailing foliage, makes an entire contrast to the usual Australian scenery.

I stayed for some days at the Magnet Silver-Lead mine in the neighbourhood of Waratah, which is surrounded by dense forests on all sides, and here I made the acquaintance of Mr. Adams, a keen bush naturalist, who showed me many points of interest during our walk through the bush. As he pointed out to me the life, and especially the bird-life, of the myrtle forests is not nearly so rich as in the gum forests, largely due no doubt to the absence of the gum-flowers which attract so many insects and insectivorous birds. The native 'Robins' of various species are very abundant, and I saw here several Pink-breasted Robins, the male of which has the breast of a beautiful claret colour. Marsupials are not very abundant, but I was interested to hear that the Ring-tailed Opossum, which usually nests in a Peppermint Gum, frequents here the Sassafras and Myrtles, while the little Opossum Mice of the genus *Dromicia* are often found nesting in holes in the Myrtles. These, with the Kangaroo Rat and the Tiger Cat, make up nearly the sum total of the Marsupial fauna, which is characterized by the absence of the Thylacine and Devil, the Kangaroo and Wallaby, and the scarcity of the Bush Opossums.

The fallen beech leaves and decaying timber form a thick carpet over the ground, and by scraping about, a wonderful variety of invertebrate life is discovered, comprising Centipedes, Spiders, land Planarians, and land Crustaceans of the Amphipodan genus *Talitrus*, resembling the Sand-Hoppers of our shores. There are thousands of these Hoppers under every log, ranging from half an inch in length downwards, and of every conceivable colour from red through bluish to white.

Another very interesting land Crustacean is the so-called Land Crab (*Engaeus*), which is really a kind of Crayfish related to the freshwater *Astacopsis* already described. The Land Crab is confined in Tasmania to the north and west, but several species are found in Victoria, and there are also species found in Tasmania and Victoria which are intermediate, both in structure and habits, between the true Land Crabs and the *Astacopsis* which live in the streams. The true Land Crab is distinguished from the *Astacopsis* or River Crayfish by the small size of the tail and the great depth of the body from front to back, the back being acutely arched. The adult reaches about four to five inches in length and varies from red to pale blue or white in colour. The animal makes a very deep burrow in the ground, of a tubular shape, which may branch several times, and at the end of each tube is a round chamber, filled with liquid mud, where the animal

is usually to be found, often with several young ones. The eggs and young before hatching are carried under the tail of the female as in the ordinary Crayfishes. They generally choose damp button-grass plains or damp gullies for their burrows, but almost everywhere through the myrtle forests their holes can be found in apparently dry situations, though on digging down some way the extreme moisture of the soil can be detected. The burrows often extend two feet into the ground. The Land Crabs in the west are well known to the miners, as they interfere very considerably with the dams and sluices by riddling the banks with their burrows; considering what small animals they are, this may give some idea of their great abundance. Although these animals are independent of the actual presence of water, their burrows are always exceedingly moist and contain a kind of liquid mud in the chambers at the end; it is untrue, however, that a prolonged immersion in water kills the Land Crab, as I have myself kept them alive for several days in pure fresh water, and Mr. Adams has kept them alive in this way for weeks.

Whereas the slopes and gullies of the west coast mountains are clothed with a peculiar vegetation of great luxuriance, the rugged exposed tops of the mountains at an elevation of about 4,000 feet support a no less characteristic and interesting scrub, utterly unlike the scrub found in the gum country on the elevated greenstone

plateaux of the centre and east. My observations on this scrub were made upon the summit of Mount Read, one of a series of peaks running north and south from the township of Roseberry down to Mount Lyell and Macquarie Harbour. The scrub on the top of Mount Read, which is typical of all the west coast summits, is charac-

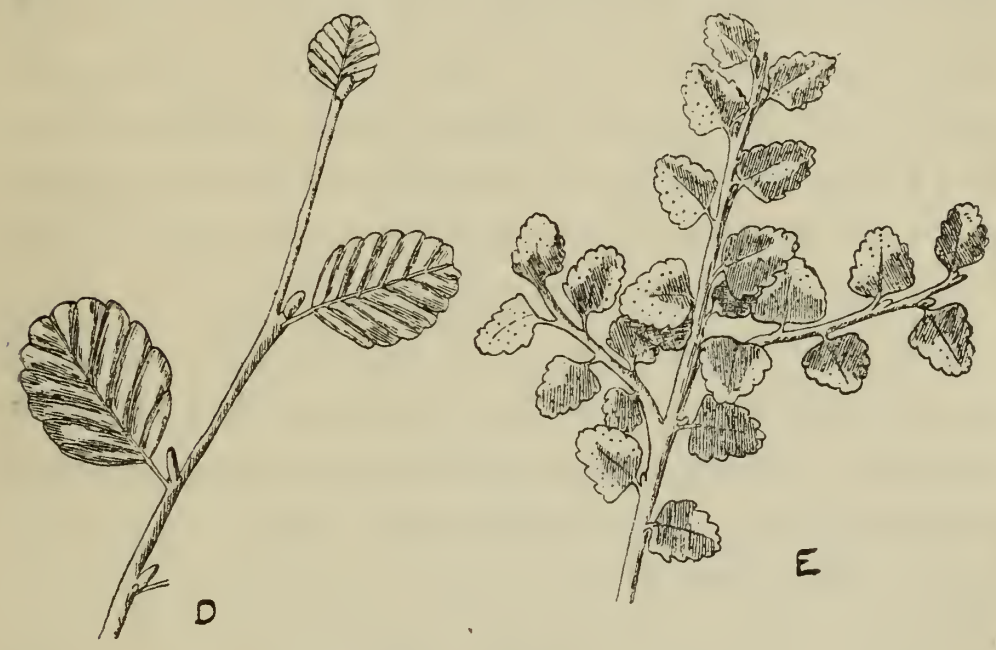

FIG. 35.
D. The Deciduous Beech (*Fagus Gunnii*).
E. The Myrtle or Evergreen Beech (*Fagus Cunninghami*).

terized by the quantity of stunted tree-shrubs, many of which are quite peculiar to this region. Foremost in interest and quite peculiar to the west coast of Tasmania is the deciduous Beech (*Fagus Gunnii*) (Fig. 35, D), the only native tree in Australia which regularly casts its leaves in winter. It is a pretty shrub, and its fresh green and rather large succulent leaves at once mark it out as a quite peculiar element in the flora.

I was amused to find that the miners call this shrub by its proper name of 'Fagus', whereas the other Beech of Tasmania is everywhere called quite erroneously 'Myrtle'. I can only put this down to the fact that whereas the 'Myrtle' is found all over Tasmania and received its name early from the ordinary settlers, the 'Fagus' is only met with by prospectors and men of some scientific interests, who frequent the mining districts in the west; indeed their influence has had a similar effect in the naming of the mountains, in which the memories of Darwin, Huxley, Owen, Tyndall, and Sedgwick are preserved.

Just as the Evergreen Beech of Tasmania has its counterpart in the temperate forests of South America, so the deciduous form is represented by a close ally in that continent. This is only one more instance of the close connexion existing between the characteristically temperate fauna and flora of Tasmania and South America, a subject which will be considered more fully in the next chapter.

Scarcely less interesting than the deciduous Beech, an important element in the scrub on the top of Mount Read is supplied by two coniferous shrubs, one of which (*Pherosphaera hookeriana*) is the sole representative of its genus and is confined to this and similar situations in Tasmania. This thickly growing shrub attains a height of eight or nine feet; its leaves are rather large and prickly for the Yew tribe (Taxineae), to

which it belongs (Fig. 33, C). The other Conifer is a lower-growing, more bushy shrub than the foregoing, and its leaves are smaller and more closely pressed on to the stem; this is the *Fitzroya* (*Diselma*) *Archeri*, belonging to a genus which has this one representative in Tasmania and another in temperate South America, thus agreeing in its distribution with the Tasmanian Beeches.

From the top of Mount Read a magnificent view of the surrounding mountains and of the sea coast was obtained; to the southward the smoke of the smelting furnaces at Queenstown darkened the air, and dotted at intervals between many of the peaks the waters of a series of small lakes could be seen shining in the sun. I walked across the mountain to the nearest of these tarns, a distance of about three miles, and found a small raft in good repair which had been built by some miners several years previously. The tarn proved exceedingly deep, the water being clear and cold, and by working with a hand-net from the boat I was able to capture some specimens of the Mountain Shrimp *Anaspides tasmaniae*, thus establishing a new locality for this peculiar animal. The waters of this tarn teemed with great quantities of a little red Crustacean (*Boeckella rubra*), belonging to the order Copepoda; this genus is confined to the temperate regions of the southern hemisphere, occurring also in New Zealand and Patagonia (see p. 137). As

I rowed about on this beautiful little tarn round whose edge the peculiar scrub which has been described grew very thickly, as well as a number of the giant Grass-trees (*Richea pandanifolia*), I was surprised at the extraordinary tameness of the Platypus, several of which swam quite near the boat with the whole of their body exposed above the water and shining with a curious grey appearance in the sunlight. No doubt in this remote spot, which perhaps had not been visited for years, these Platypus had never seen a human being before, for in the other parts of the island, where I met with them, they were always very shy, and scarcely let me get a sight of them, certainly not in broad daylight. The Platypus is now protected in Tasmania and is in some parts greatly on the increase, so that there does not appear to be any immediate prospect of its becoming extinct. So much has been written about it and the other egg-laying mammal of Australia, the Echidna or native Porcupine, that only a few remarks need be made here, especially as I did not make any extended observations myself. The Tasmanian Platypus belongs to the same species as that on the mainland, though it usually grows to a larger size and has a finer fur owing to the colder climate of the island. The native Porcupine, on the other hand, is quite distinct in appearance from the *Echidna aculeata* of the mainland, having much fewer quills and more abundant fur, whence its name *E. setosa*.

The native Porcupine, which is an ant-eater and excavates a burrow in the dry land, is very common in Tasmania, and I frequently saw it, while I was walking through the gum forests in different parts of the island, lumbering awkwardly along in the evening. When approached it makes no effort to escape, but rolls itself up into a prickly ball; it can be easily killed by hitting it a smart blow just above the beak. It makes excellent eating, tasting like young sucking-pig.

The peculiar anatomical and physiological facts connected with the breeding habits of these animals have been now established beyond doubt. Stated succinctly they are as follows. The female of the Echidna lays a small egg invested with a leathery shell, and this she transfers into a small pouch which only develops during the breeding season, being entirely absent during the rest of the year. The young hatches out in this pouch in a very rudimentary condition, and sucks the milk of the mother from mammary glands which are scattered irregularly over the skin, and not collected together to form definite teats.

The Echidna is a fossorial animal, and excavates a burrow in the ground something after the manner of a mole. The Platypus also makes a burrow in the ground, but unlike the Echidna this is always on the banks of a river or lake, one opening of the burrow being above the level of the water, and the other below. In the inner-

most chamber of the burrow the female makes a rough nest in which she deposits one or two eggs; there is no marsupium developed, as is the case in the Echidna, the young hatching out and being suckled in the nest. Besides their method of reproduction, the Echidna and Platypus have many structural characteristics resembling those of reptiles, so that their claim to rank as the most primitive of mammals, and among the most interesting of all animals, is amply established.

Unfortunately very little is known of their history in former epochs. All the fossils that can with certainty be placed in the same sub-order, belong to the existing genera, and do not go back beyond Pleistocene times, or range outside the limits of the Australian continent.

As my time was limited I had to be contented with this cursory view of some of the more typical scenes of the west coast and to forgo a visit to Macquarie Harbour and the magnificent Gordon River, but I saw enough to perceive the intense interest attaching to this little-known corner of the world as well as the wild grandeur of its scenery. In every department of science Australia still offers a wide field for many generations of students, and I doubt if so great a number of interesting problems are elsewhere contained within so narrow an area as are to be found on the west coast of Tasmania.

CHAPTER V

A GLIMPSE INTO THE PAST

The geographical distribution of animals and plants. Survival of ancient types in Australia and Tasmania. The derivation of the Australian fauna. Temperate and Alpine forms. Connexion with South America and New Zealand through an Antarctic continent. Separation of Tasmania from Australia. Special Tasmanian problems.

THE study of the geographical distribution of animals and plants over the face of the globe, by which an attempt is made to trace out their place of origin and the migrations they have performed in the past, constitutes not only one of the most fascinating chapters in the historical treatment of the theory of evolution, but also throws an interesting light on the geographical and physical changes which have taken place in various parts of the world. But this study, involving as it must an extended knowledge of living creatures of all sorts, in many cases inhabiting the most distant and inaccessible countries, and also some acquaintance with their past history, as revealed by fossil remains, is necessarily a modern study which still suffers from a lack of exhaustive data on which to base any far-reaching generalization. And before any certain conclusions can be arrived at, we should have at our disposal as valid criteria as possible for deter-

mining the mutual relationships of the creatures dealt with, and the probable line of their descent from one another or from some common ancestor, and furthermore we should know sufficient facts about their habits and economy to be able to judge of their capacity for dispersion and for surmounting barriers, whether of temperature, seas, or mountains. In fact, a complete theory accounting for the geographical distribution of animals and plants would include so many of the essential facts with which Biology deals, as to imply a fairly comprehensive statement of the historical process of evolution.

The settling and opening up of Australia at the beginning of the nineteenth century revealed a new world of surpassing interest to the naturalist, a world where unknown and unimagined forms of life constituted the commonest and most dominant part of the inhabitants, where every living thing, including man, seemed to have been cut off and isolated from the rest of the world at some remote period.

Our present knowledge of Australian natural history substantiates the view that the animals, and to some extent the plants, of this part of the world represent remnants of a population which once ranged all over the northern hemisphere, and which, being cut off in early times from the rest of the world, has branched out and diverged in all directions, free from competition or intermixture with the newer and more highly

developed forms of life which originated in other and more northern lands after Australia had become isolated. The wonderful Marsupial fauna of Australia, including the most diverse creatures adapted for every sort of terrestrial existence, are represented in the late Mesozoic and early Tertiary periods of Europe and North America by closely related though more generalized types, which are amongst the most ancient mammals known, and they probably gave rise on the one hand to the modern Marsupials, which now only survive in Southern America and Australia, and to the Placental Mammals, which now range over the whole world but are so poorly represented in Australia. Other forms of life which were once world-wide in their distribution seem to have survived in Australia without development or divergence into new types; such are the *Ceratodus* or Lung fish of a few Queensland streams, which lived practically in its present form in the Devonian Seas of the northern hemisphere; the Mussel *Trigonia* (Fig. 2, p. 14), a scarcely modified descendant of the common Jurassic and Cretaceous fossils that are found not only in the northern hemisphere, but in Patagonia and at the Cape; the *Anaspides* or Mountain Shrimp of Tasmania, whose effigy is stamped upon the Permian and Carboniferous sandstones of Europe and North America. These few instances of very ancient types that were once widely distributed in the northern hemisphere and now only survive

in Australia are sufficient to indicate the importance of knowing something of the fossil history of animals for the interpretation of their present geographical distribution, and to suggest that in very early times a fauna with many common elements was continuously spread over the whole of the habitable globe.

The region where Australia at the present epoch comes into closest contact with the other great land-masses of the world, is to the north in the tropical East Indies, where an archipelago of islands stretches continuously from New Guinea and the north Australian coast to the Malay Peninsula. In the middle of this region a certain admixture of Oriental and Australian forms takes place, but, as Dr. Wallace has shown, the Malay Islands can be divided geographically by a line passing between Bali and Lombok to the south and through Celebes, which is a sort of no man's land and apparently has been isolated for a very long time, to the north. To the east of this line the islands belong, from the character of their living inhabitants, to Australia, to the west the large islands of Borneo, Java, and Sumatra, with a number of smaller islands belong to the Malay Peninsula and the Oriental Region. Thus in Borneo and Sumatra there are no Marsupials, but a host of Placental Mammals, including monkeys and the Orang-Utan, and the birds belong to the typical Oriental groups, such as Woodpeckers and Pheasants; the Australian

groups of Honey-eaters, Cockatoos, and Mound-birds being entirely absent. On crossing over Wallace's line, even across the fifteen-mile straits between Bali and Lombok, we are at once in a different world, the Australian world of Eucalypts, Cockatoos, Honey-eaters and Marsupial Mammals. The small amount of intermixture that has taken place in these and neighbouring islands concerns species which have evidently only recently migrated across the line, as is shown by the fact that very few of them have yet had time to become specifically different in the two regions.

It is plain, therefore, that a direct land connexion of Australia and New Guinea with Asia, if it ever existed, belonged to a very ancient epoch when the natural products of the two countries were totally unlike those of the present day. The southern islands of the archipelago, stretching from Java towards New Guinea, are volcanic in origin, and many of the volcanoes are still active, thus very likely representing a fairly modern upheaval, so that the connexion of the Australian Region with Asia is probably closer now than it has been for a long time in the past.

Whence, then, did Australia receive its living inhabitants, or with the inhabitants of what part of the world, and at what epoch, were they connected and in common derived? To discuss this question it is necessary first of all to note that the Australian Region itself falls naturally

into three distinct sub-regions differing from one another both in physical characters and in their living inhabitants. There is, first of all, the damp tropical and sub-tropical region, including New Guinea and the North Queensland coast, characterized by the luxuriance and tropical character of its vegetation, by the wonderful development of the Birds of Paradise which are confined to this region alone, by the presence of the Cassowary, which here replaces the Emu of the south, and by the comparative poverty and specialized nature of its Marsupial fauna, of which the curious Tree-climbing Kangaroo (*Dendrolagus*) may be mentioned.

Sharply distinguished from this region is the Desert Region of central, northern, and western Australia, characterized by its dry climate, and by the very peculiar nature of its animals and plants, of which we need only mention the peculiar Marsupials, viz. the Ant-eater (*Myrmecobius*) and the extraordinary Marsupial Mole (*Notoryctes*).

Bounded on the north and west from the desert by the Dividing Range of mountains, we have a strip of country including Victoria and the coastal parts of New South Wales and Tasmania which is characterized by its temperate climate, a moderate and, in parts, even excessive rainfall, and a number of animals and plants which are able to withstand a very considerable range of temperature. Certain features in this region, though few actual species, are of course shared in common

with the rest of Australia: the prevalent Eucalypti, the Honey-eaters and Parrots, and some of the Marsupials, such as the Dasyures and Bandicoots, are simply typically Australian. But in certain characters, especially marked in the colder Alpine districts of Tasmania, a new element enters that is entirely wanting in the more arid and northern regions, or in the tropical Queensland bush. The vegetation of the Tasmanian mountains, especially on the west coast, and to a much less extent of the Victorian mountains, is characterized by a number of genera, such as the Grass Trees and Bushes (*Richea*), the tree *Senecios*, the evergreen and deciduous Beeches (*Fagus Cunninghami* and *Gunnii*), and various coniferous trees and shrubs (*Athrotaxis*, &c.), which are absolutely unknown in the warmer parts of the southern hemisphere and in the tropics, but in most cases have closely allied representatives in New Zealand and temperate South America. The resemblance of the west coast Tasmanian mountain bush to that of Terra del Fuego and the southern part of the Andes has been referred to in the last chapter. It is difficult to see how this essentially temperate and Alpine flora can have ever been derived from or continuous with a flora northwards through the Australian tropics and Asia, as there is no range of mountains, nor is there any evidence of a range having existed in the past, which would serve as a bridge from the northern to the southern temperate hemisphere in this part of the world.

It was suggested long ago that a part at least of the Australian flora and fauna has been derived from an Antarctic continent that sent projecting rays of land to join with the southernmost extension of Tasmania, South America and New Zealand. This explanation of the many elements possessed in common by these countries was rejected by Wallace, and has never entered very much into favour with naturalists, as it has been supported by very dubious evidence,—for instance, the occurrence in the now widely separated land masses of the southern hemisphere of such birds as the Parrots, and the various members of the Ostrich tribe, viz. the Ostrich in South Africa, the Rhea in South America, the Cassowary and Emu in Australia, and the Moa in New Zealand. Whatever may be the true history of the routes of migration of these and similar forms, the fact that the tropics are no barrier to their distribution makes the assumption of an Antarctic continent or any more direct connexion between the southern land masses unnecessary. But the case of the Alpine and typically temperate forms of the southern hemisphere which are not known, either themselves or their allies, to be capable of living or of ever having lived in the tropics, is altogether different. In South America the lofty chain of the Andes has permitted a migration of temperate forms from north to south through the tropics, but in the Australian region there is no such highland bridge over which the northern forms could have

passed through the tropics to reach the temperate countries in the far south. For the origin of these temperate forms in southern Australia we are forced to look for a land connexion elsewhere, and the close affinity which so many of these forms show to the inhabitants of temperate South America points strongly to a connexion through a sunken Antarctic continent. We may now examine a few of the groups of animals which especially point to this connexion. Although the fresh-water Crustacea are not very commonly employed to illustrate an argument on geographical distribution, it so happens that they are very instructive in regard to this particular problem. The Crayfishes of the southern hemisphere form a family (Parastacidae) quite distinct from those of the northern hemisphere (Astacidae), differing in several points, the most striking perhaps being the entire absence of appendages on the first abdominal segment of the male in the southern forms. These southern Crayfishes inhabit temperate Australia, New Zealand, Madagascar and South America. Although a few species, especially in South America, range northwards into the tropics, the group as a whole is characteristic of the temperate regions of the southern hemisphere.

In southern Australia and Tasmania the streams, especially the mountain streams and tarns at a great elevation, swarm with numerous species of Amphipods, closely allied to the English fresh-

water shrimp; in fact many of them belong actually to the same genus (*Gammarus*), while the majority approach rather more closely to the blind Well-shrimp (*Niphargus*), which is frequently found in wells, artesian springs, and the other subterranean waters of the northern hemisphere. Now although these and closely related forms swarm in the rivers and lakes of the northern hemisphere, and again in the temperate and Alpine regions of southern Australia, there is no single instance of a true freshwater *Gammarus* or of any closely related genus occurring in the tropics. Although we know of no records of *Gammarus* from high elevations in tropical South America nor in the temperate regions of that continent, there can be small doubt that they have reached southern Australia from the northern hemisphere by the route across Antarctica and not through the tropics of the old world.

In Lake Titicaca, situated, it is true, in the tropics but at an elevation of many thousand feet on the Andes, freshwater Amphipods of the genus *Hyalella* occur; and this again has its only closely allied representatives in the extremely abundant *Chiltonia* of Victoria, Tasmania, and New Zealand.

Another interesting piece of evidence is afforded by some of the minute Entomostracous Crustacea which form so important a part of the *plankton*, or floating organisms, of freshwater lakes and ponds. Of course many of these little creatures, especially those which inhabit small pieces of

water liable to dry up, have special facilities for distribution, such as resting eggs, which can be transported by birds or wind in a dry state without harm, but others, which habitually live in large sheets of water, are not so easily dispersed. One of the commonest elements in the *plankton* of the Tasmanian lakes is the little *Bosmina*, which is very abundant in the northern hemisphere and in South America, but appears to be entirely absent from the lakes of the tropical old world. Another of the commonest *plankton* organisms in the Alpine lakes and tarns of Tasmania is the Copepod *Boeckella*, which displaces the northern genus *Diaptomus*, and this genus is again represented in temperate South America and New Zealand, nowhere spreading into the tropics.

These are the most striking instances among the freshwater Crustacea of creatures confined to temperate or Alpine stations which are widely dispersed over the southern hemisphere, and certainly cannot have reached southern Australia through the tropics from the north.

The freshwater fishes of the southern hemisphere, about whose distribution something was said in the last chapter, are another group confined to the temperate regions of the southern hemisphere which appear to have reached their present stations in southern Australia and New Zealand from an Antarctic connexion with South America. The little pike-like fishes of the genus *Galaxias* occur in southern Australia, Tasmania, New

Zealand, South Africa and South America, nowhere reaching the tropics. One species, *G. attenuatus* (Fig. 27, p. 106), is actually common to Tasmania and Terra del Fuego. It has been held to be an explanation of the distribution of this fish that it is known to descend into the brackish water of estuaries, but the enormous stretches of deep ocean now separating Tasmania and Terra del Fuego are really as insurmountable a barrier to the distribution of an estuarine fish as of a truly freshwater one. From the greater community existing between the inhabitants of South America and Tasmania than between any other parts of the southern hemisphere, it is probable that these two countries were the latest connected with Antarctica, so that we may suppose that *G. attenuatus* was distributed along the shelf of the Antarctic continent, and preserved a continuity of distribution for a long time after the actual southern land mass had begun to be split up and submerged. The true freshwater *Galaxias*, on the other hand, being more completely isolated at an earlier date, have become differentiated into several distinct species in the various southern continents and islands. The other freshwater fishes of Tasmania, the Cucumber Herring (*Prototroctes*) and the Flathead (*Aphritis*) also have near relatives in New Zealand and South America, but do not touch South Africa, and none of them extend into the tropics or the northern hemisphere, so that they clearly belong to the remnants of the Antarctic fauna.

The last group of animals which we may consider in this connexion is that of the Marsupial Mammals. These animals occur at the present day in the Australian region and in Central and South America. In America we find the Opossums (*Didelphys*), closely related to the Australian Dasyures, and in the Andes of Ecuador a peculiar Bush-rat occurs (*Coenolestes*), which combines some of the characters of the two great Marsupial sub-orders, the Polyprotodontia and Diprotodontia, and is in a sense intermediate between them. The discovery of Marsupials in the Eocene beds of Paris closely related to the American Opossums, and the existence of still more primitive Marsupials in some of the yet earlier deposits of England (for instance the Stonesfield Slate of Oxford), led naturalists to seek a northern origin for the Marsupials, whence it was supposed they spread south-westward into America and south-eastwards into Australia through Asia. There are, however, some difficulties in the way of this simple interpretation. The primitive Diprotodont group, of which *Coenolestes* is the only living form, is represented in the Miocene deposits of Patagonia by a number of genera, but it is altogether absent from the northern hemisphere. The typical Diprotodonts are confined to Australia, so that unless there was some land connexion between South America and Australia in the past, we must suppose that the development of the Coenolestidae in South America and of the true Diprotodonts in

Australia is due to an independent and convergent process of evolution.

Again, if we examine the extinct Marsupial fauna of Patagonia, preserved for us in the Miocene beds of Santa Cruz, we find a number of types closely similar to those which exist in southern Australia at the present day. There is the *Prothylacinus*, which is in all essentials identical with the Tasmanian Tiger (*Thylacinus*), and a number of small Marsupials (the Microbiotheriidae), which form a connecting-link between the American Opossums and the Australian Dasyures. Thus the further south we go in the western hemisphere, the more types we find in common with the Australian Marsupials, while in Europe we have nothing but the Opossum (*Didelphys*) and a number of very ancient types which show no close affinity to existing forms. This is, of course, the exact converse of what we should expect to find on the hypothesis that the Marsupials spread eastwards from Europe to populate Australia.

There is also another way of testing this hypothesis. If the Marsupials entered Australia through Asia and the Malay Region, it is natural to suppose that the most numerous and the most generalized types would be found in the north of Australia and the most highly specialized in the south, being the latest point reached. But what are the facts? The tropical regions of Queensland and the Austro-Malay Islands are poorly stocked with Marsupials, and among them are some of the most highly

specialized, e.g. the Tree Kangaroo, which is plainly a very modern product. Tasmania and the south are, on the contrary, stocked with every variety of Marsupial, while the primitive Dasyures are represented in Tasmania by two forms, the Devil and Tiger, which probably never ranged further north than Victoria on the mainland.

Finally we have the record of fossil history. In Asia and the whole Oriental Region, though it is true we know very few fossiliferous deposits of the requisite age, no Marsupials have ever been discovered. In Australia very little is known of the fossil history of its Marsupial fauna, but the one salient fact which strikes a hard blow at the Asiatic route of the Marsupial migration is that the most ancient Marsupial in Australasia (*Wynyardia*), probably a contemporary with the Opossum in Europe, comes from Table Cape in Tasmania, and is said to show characters intermediate between the Poly- and Diprotodontia.

These are the chief points in the evidence to support the theory that the Marsupial fauna of Australia has travelled from its place of origin in the northern hemisphere through South America and the arms of a lost Antarctic continent into southern Australia.

If this route of migration be granted and with it the existence of a habitable Antarctic continent with rays stretching up to meet with what are now Tasmania, South America, New Zealand, and South Africa, we can settle the relative dates at

which these countries became severed from the southern continent. The elements which South Africa has in common with the other countries are very few indeed, and it is clear that this was the earliest to lose connexion. New Zealand, though possessing many features of the Antarctic flora and fauna, must have been cut off before the Marsupials reached Antarctica, that is to say, considerably prior to Tertiary time. South America and Tasmania were therefore the latest in connexion with one another, and possess the greatest community in their inhabitants, and judging by the standard of the Marsupials we are perhaps justified in placing their final separation somewhere about the beginning of the Tertiary epoch.

A great deal of evidence bearing on the existence of Antarctica could be drawn from the study of other groups, e.g. the Mollusca, which have formed the special study of Mr. Charles Hedley, of Sydney, himself a convinced believer and advocate of the theory. I have chiefly wished to emphasize certain typically temperate and Alpine groups of the southern hemisphere, because from them it seems to me that the strongest evidence is to be obtained, and perhaps the most interesting development of the future will be the working out of the invertebrate animals of the Andes from this point of view.

Antarctic exploration in the strict sense will doubtless bring many facts to light bearing on the question, and the discovery of sedimentary rocks on the Antarctic shelf is already evidence in

favour of a continental area having once existed here.

Turning to the geographical problems which specially concern Tasmania, we are led to inquire how recently the island was in direct land connexion with the mainland of Australia. Bass's Straits are two hundred miles broad, and a line can be drawn through Flinders Island connecting Wilson's Promontory in Victoria with Cape Portland in Tasmania, on which the depth is nowhere greater than thirty-two fathoms, so that a very small elevation would raise an isthmus of dry land connecting Tasmania with southern Victoria. Mr. Hedley brings together some important evidence derived from a study of the marine shell-fish of the southern Australian coast, which tends to show that this Bassian Isthmus existed in comparatively recent times. He shows that the shores east and west of the reconstructed Bassian Isthmus are characterized by quite distinct species and even genera of Molluscs, and that very little admixture has taken place between them since the isthmus has been broken down. To account more satisfactorily for this marked distinction he supposes that at the same time as the isthmus existed, Tasmania was produced southwards as dry land along what is now a rather shallow submarine bank, so that the marine inhabitants of the east and west coasts would have had to travel further south in order to intermingle, and in doing so would have been subjected to greater changes of temperature than

is at present the case. Although the connexion of Tasmania with the mainland was thus recent, probably in late Tertiary time, the island is faunistically not a mere apanage of the mainland, as England, for instance, is of the continent, differing only from the mainland in the comparative poverty of its life. It is true that the birds and mammals are mostly represented by identical or closely related species in southern Australia, and this is no doubt due to the recent land connexion which has enabled them to range to and fro. We are therefore led to suppose that certain marked differences which exist between Tasmania and the mainland are not caused by the recent separation, but existed prior to this, and were conditioned long ago by other factors. It may be suggested that the essential condition which has left its stamp on Tasmania in certain respects is its direct connexion to the south with the submerged Antarctic continent, which supplied it with certain forms that have never spread very widely on to the mainland. Most prominent among the plants which belong to this category are the eight very distinct species of *Richea* or Grass-trees, of which only one (*R. Gunnii*) occurs on the Australian Alps, and the various Conifers which are poorly represented on the mainland. Although the Common Myrtle or European Beech (*F. Cunninghami*) occurs in Victoria, the west coast mountains of Tasmania support a really peculiar vegetation with elements such as the Horizontal Scrub (*Anodopetalum big-*

landulosum) and the deciduous Beech (*F. Gunnii*), which are unknown on the mainland. Many characters of the invertebrate fauna are also noteworthy. The freshwater Crustacea, for instance, are represented by numerous peculiar forms such as the two Mountain Shrimps, *Anaspides* and *Paranaspides*, the species of *Phreatoicus* and *Neoniphargus*, which certainly cannot be looked upon as the impoverished remnants of the Australian continental types. All these facts are, of course, quite consistent with the view that Tasmania was on the high road of migration from the Antarctic country whence these forms finally reached the mainland.

Tasmania itself, regarded from the zoogeographical point of view, is not a single homogeneous unit. Although a very extended research into the distributional limits of the various animals and plants would be necessary before a definite scheme could be worked out, it seems that there are three chief areas characterized by special forms. There is, first of all, the central greenstone plateau with its outliers on Ben Lomond and the broken and greatly sunken south-eastern coast. This area is characterized by the Eucalpyts and the common Alpine forms of plants, which again crop out in the highlands of southern Gippsland and western Victoria, themselves perhaps geologically continuations of the diabasic plateau. To this region belong the Mountain Shrimps and the members of the genus *Phreatoicus*, while it is also sharply

characterized by the absence of all the freshwater fish except Eels and the genus *Galaxias*, and by the absence of the Land Crab (*Engaeus*). The second region is the low-lying strip of the north coast composed of various geological formations with eruptive basalts and granites, and a large Tertiary Estuarine deposit; this area is characterized by the absence of *Anaspides* and *Phreatoicus*, and by the presence of the large freshwater Crayfish *Astacopsis franklinii* and of the freshwater fishes *Aphritis*, *Prototroctes*, and *Gadopsis* (Black-fish).

Finally we have the West Coast Region with its mountains of Archaean and Palaeozoic rocks especially characterized by their peculiar vegetation, by the entire absence of the Black-fish and the Flathead (*Aphritis*), and of the Cucumber Herring (*Prototroctes*) except in the north-western corner. The West Coast Region, both in its physical and faunistic characters is more closely allied to the northern area than to the greenstone plateau. Thus the large *Astacopsis* is found in many of the west coast rivers, and so is the Cucumber Herring, while there are bits of beech forest on the north-east coast, e.g. on the road from Evandale to St. Helen's, which vie in luxuriance with the true west coast forests. However, the botanical characters of the west coast are sufficiently distinct to warrant the separation of this area from the others, and doubtless a better acquaintance with its fauna would bring to light other differences.

The distribution of the Black-fish, which is absolutely confined to the rivers flowing into Bass's Straits on the Tasmanian and Victorian coasts, is very remarkable, especially as it has recently been introduced into the Derwent where it is said to flourish, so that it is evidently not the existence of particularly favourable conditions which accounts for its previous presence solely in the northern streams. The fact is all the more remarkable in that this curious fish would not appear to be one that has recently taken to a freshwater habit, as it constitutes a family by itself without any very closely related marine forms. But this and kindred problems must be left to the future to solve, and if the few and imperfect suggestions brought forward in this book may haply further stimulate the inquiries of local naturalists into the natural history of their beautiful and interesting country my object will be fully attained.

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ERRATA

MAP. *For* Plateau 1,500 ft. to 2,000 ft., *read* Plateau 1,500 ft. to 3,000 ft.

The patch on the West Coast between Malanna and Mt. Dundas should be coloured yellow, not green.

TASMANIA. Geological Features.

From a Map issued by Lands & Surveys Department, Tasmania

BASS STRAIT

BANKS STRAIT

Great Western Plateau 1,500 ft. to 2,000 ft. above Sea Level

Great Lake

Arthur Lakes

Chudleigh Lakes

Western Range

King Wm. Range

Frankland Range

Arthur Range

Denison Range

Hartz Mts

Mt Olympus

Mt Ida

Mt Lyell

Mt Dundas

Mt Read

Mt Field W.

Mt Field E.

Mt Mueller

Mt Wedge

Frenchman's Cap

Adamsons Peak

Table Mt.

Eldon Range

Hunters Islands

Robbins Id.

Clarke Id

Swan Id

Eddystone Pt

Bay of Fires

George's Bay

Schouten Id.

Maria Id.

Tasman's Pen.

C. Pillar

C. Raoul

Pt Hibbs

C. Sorell

S.W. Cape

S.E. Cape

Maatsuyker Is.

Arthur River

Duck R.

Pieman R.

Henty R.

R. Cam

Leven R.

Wilmot R.

R. Mersey

R. Forth

Lake R.

R. Derwent

R. Shannon

River Ouse

R. Dee

R. Clyde

R. Jordan

Macquarie R.

South Esk R.

Ben Lomond

Little Swanport R.

Arve River

Huon River

Davey R.

Franklin R.

Gordon River

Macquarie Harb.

Storm Bay

Adventure Bay

Frederick Henry Bay

Spring Bay

Oyster Bay

Port Dalrymple

Port Frederick

Port Davey

Circular Hd.

Table C.

Ringarooma Bay

Denison Gorge

Tooms L.

L. Sorell

L. Crescent

L. Echo

L. St Clair

L. Tiberias

Russell Falls R.

Conarchy Ck.

Ellendale

Mt Field E.

Mt Field W.

Glenora

Chudleigh

Deloraine

Exton

Westbury

Longford

Cressy

Evandale

Nth Esk R.

Mowbray

Leonard

Mathinna

Fingal

St Mary's

Falmouth

Bicheno

Swansea

Orford

Triabunna

Buckland

Campania

Brighton

Bagdad

Kempton

Colebrook

Rhyndaston

Parattah

Oatlands

Tunbridge

Ross

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Lovett

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N. Bruni

S. Bruni

Carnarvon

Port Arthur

Taranna

Lake Sorell

Lake Crescent

Lake Echo

Lake St Clair

Lake Tiberias

Lake Arthur

Lake Great Lake

Gold

Tin

Silver & Lead

Bismuth

Antimony

Copper

Iron

Coal

Igneous Rocks

- Basalt
- Greenstone (Diabase)
- Granite and Porphyry

Stratified Rocks

- Crystalline, and metamorphic schists, clayslates, quartzites, and sandstones of Archæn, Cambrian, and Silurian Age
- Silurian Limestone
- Upper & Lower Coal Measures, with associated greywackes, fossiliferous mudstones, sandstones, & limestones of Palæozoic & Mesozoic Age.
- Marine, and Freshwater deposits
  - A. Post Tertiary
  - B. Miocene, freshwater deposits
  - C. Eocene, Marine bed

ENGLISH MILES

10 5 0 10 20 30

145° 146° 147° 148°

41° 42° 43°

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