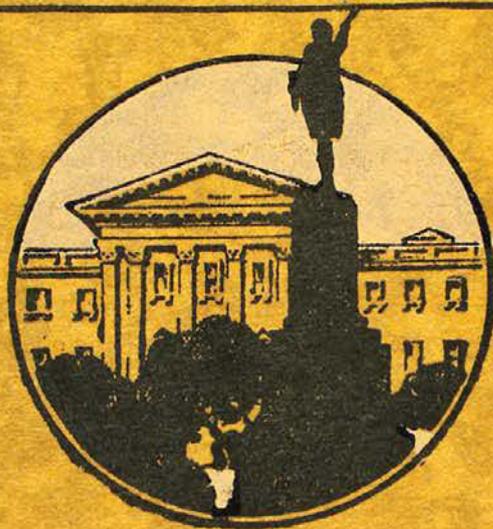


The
**AUSTRALIAN
MUSEUM
MAGAZINE**

EDITED BY C. ANDERSON, M.A., D.Sc.



A Naturalist on the Nepean River - *Anthony Musgrave*

A Museum Collector in Papua

The Story of the Oyster - - - *T. C. Roughley*

Stone Fishes and the Art of Camouflage

Allan R. McCulloch

The Fruit-Bats, or "Flying-Foxes" of Australia

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Destruction of the Whitsunday Coral Reefs, Q'land

E. H. Rainford

What I found - - - - -

A. H. Chisholm

PROFUSELY ILLUSTRATED.

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THE AUSTRALIAN MUSEUM MAGAZINE

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Mosquito Camp." Captain Frank Hurley and Mr. A. R. McCulloch encamped at the Aramia Lakes, Western Papua.
See accompanying article, page 158.

[Photo.—*Captain F. Hurley.*



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VOL. II., No. 5.

JANUARY-MARCH, 1925

Editorial.

ONE of the outstanding events of the year, so far as the Empire is concerned, has been the holding of the Wembley Exhibition. The Exhibition has been aptly described as the first Museum of Empire and it was fitting that the Museums Association should hold its annual conference there. Dr. Herbert Bolton, of the Bristol Museum, was in the chair, and his presidential address is one which should be thoughtfully read by all who are charged with the management of museums. The address is a long and many sided one, but it may not be unprofitable to touch on a few aspects which are of particular interest to us.

It is depressing to note that even now Dr. Bolton finds it necessary to insist that "years of close study and special technical skill are essential requisites for the successful working of museums." Apparently the day is not yet gone when the common opinion was that anyone could undertake to "run" a museum successfully.

MUSEUM COLLECTIONS.

Every museum has much material which is not on exhibition and Dr. Bolton discusses the best means of utilising such reserve or

reference collections. The reserve collections in our museum are substantial in comparison with the exhibited series, and one of our great problems is that of storage. But reserve collections are absolutely necessary, if a museum is to fulfil one of its most valuable functions, namely the preservation of the means for acquiring knowledge. In a general way the exhibited collections represent the results of past research, set forth so as to instruct the public, the reserve collections are in large part the raw material for research, the object of which is to increase knowledge, and to this end they must be carefully catalogued and arranged for ready reference, a work which makes large demands on the working time of those in charge of the collections.

MUSEUMS AND EDUCATION.

"The collection and safeguarding of all these things upon which human knowledge is based must ever remain the primary function of museums; secondary functions are the advancement of knowledge by continued study of museum collections, and the making of the new knowledge available to those who ought to receive it."

In recent years museums are taking a much larger part in educational work. This usually takes the form of lectures, which are of various kinds. In our Museum, where the lecturers are mainly members of our own staff, we have gallery demonstrations, free evening lectures in our own hall, and free lectures in the suburbs and in country centres, as well as regular series for school children. Our efforts in this direction have been remarkably successful, but have been attended with considerable expenditure both of time and money. Dr. Bolton points out that in America, where special attention is given to museum education of school children, special teachers do the work, while in Britain it devolves upon the Museum staff, whose normal work is usually in arrears, and he is of opinion that a museum curator is not necessarily the best teacher of the youth of elementary and secondary schools, a view strongly held also in the United States.

MUSEUMS AND RESEARCH.

"Research must be prosecuted if the museums are to fulfil their highest function, which is the advancement of science, art, and industry."

The difficulty which faces every museum worker is that of finding time for research. The mere reading of the enormous body of new scientific work which is poured forth every year is a heavy task, but it must be faced if

the research worker is to produce anything of value, and not only that, it must be card indexed. Dr. Starr Jordan, one of the leading ichthyologists of the world, has in one of his papers referred to a member of our staff as "one of the most accurate workers in systematic ichthyology now living." The officer in question attributes his success solely to the possession of a card index of literature comprising about 150,000 entries, the compilation of which has demanded years of assiduous toil, undertaken in unofficial hours.

Speaking of the British Museum, Dr. Bolton says: "Each department has a very small body of highly trained men, and the tasks with which each man has to deal are herculean, and can never be mastered by any one man. Every scientific man of note in the whole world interested in the sciences represented there visits it for study and enquiry, whilst general enquiries are legion. Collections pour in; the labours of Sisyphus were mild in comparison with those of the staff of this Museum, for his labours never increased, whilst theirs are continually mounting up. But this does not touch the question of research. These men do carry out research, but only by making the hours of life the hours of labour."

While ours is a much smaller and less ambitious institution than the British Museum, our staff is also proportionately smaller, and their duties are equally multifarious and exacting.

The untimely death of Professor John I. Hunter was a great shock to the staff of the Australian Museum, to which he was a frequent visitor. He was a man of fine personal qualities and rare ability, and his death is a signal loss to the University of Sydney, to Australia, and to medical science.

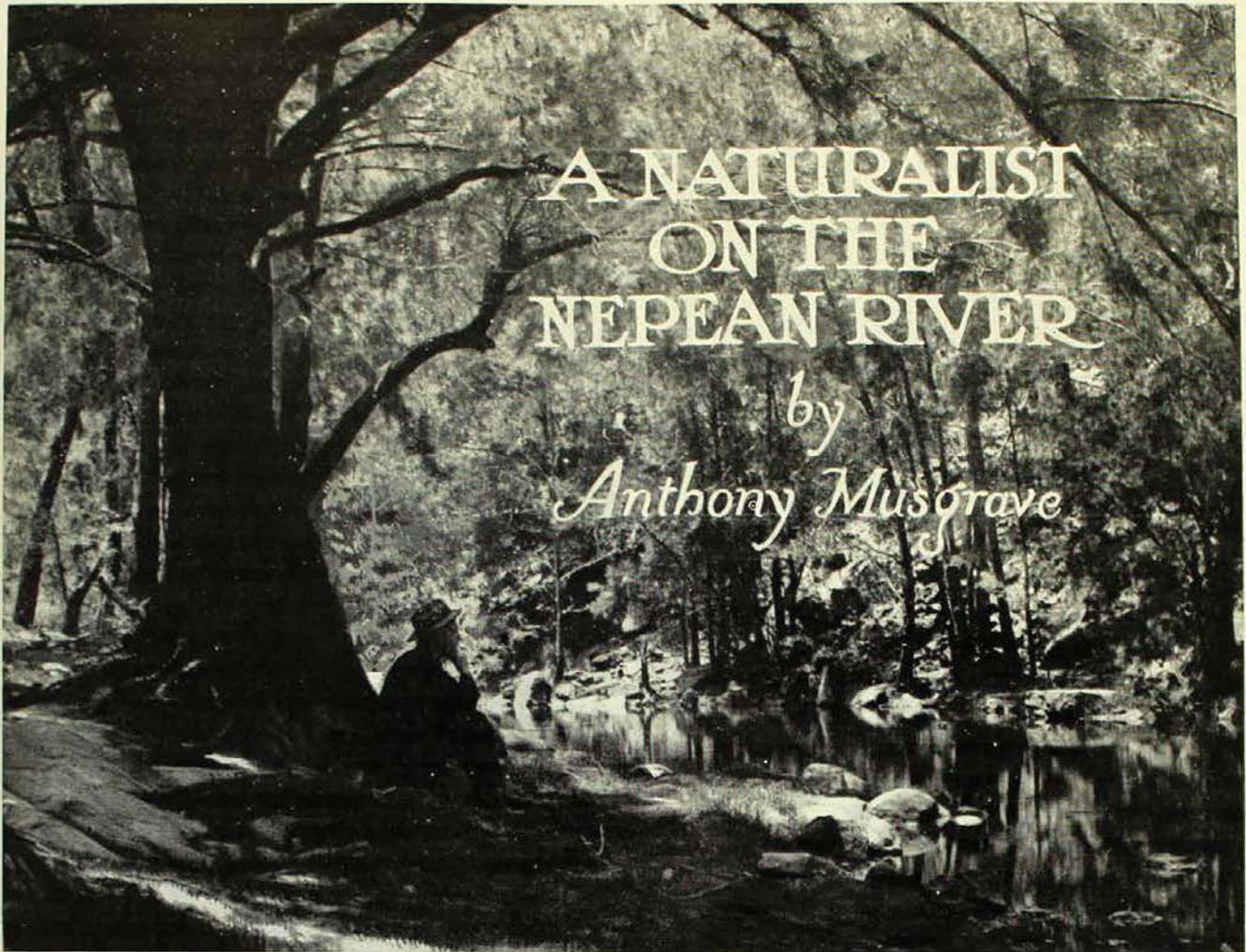
Mr. J. McKern, Crown Trustee, left recently on a visit to India. He will be absent for about four months and during that time will visit various museums in India, particularly those of Colombo, Bombay and Madras. En route he visited the museums at Adelaide and Perth.

Dr. T. Storie Dixon, President of the Medical Board of New South Wales, has

been re-elected President of the Board of Trustees of the Australian Museum for the year 1925.

Mr. Octavius C. Beale, who was recently elected to the Board of Trustees of this Museum, took his seat at the meeting of 7th November and was welcomed by Dr. T. Storie Dixon, President.

By arrangement with the Curator of the Technological Museum, Sydney, this institution has agreed to make available to the various country museums loan collections of exhibits. These will be changed at intervals, thus affording the country resident the opportunity of seeing much more than would otherwise be possible.



FOR some years past it has been the happy custom of various members of the staff of the Australian Museum to pay short holiday visits to the Nepean River near Mulgoa. Though our jaunts were never undertaken with the intention of making any serious study of the natural history of this locality, still we rarely came away without gaining some slight insight into the lives of the animals, or gathering some curiosity to enrich the collections of the Museum. In this manner we have gradually accumulated certain facts about the river which may appeal to those who, like ourselves, find peace and contentment by its reed-girt banks.

HISTORICAL.

The Nepean was discovered in June, 1789, by a party consisting of Captain-Lieutenant

Tench, Surgeons Arndell and Lawes, two marines and a convict. The result of their explorations being made known, Governor Phillip named the river after Under-Secretary Nepean of the Home Department. For the next twenty-four years the river was the western boundary of the colony, for it was not until 1813 that Blaxland, Lawson, and Wentworth stormed the barrier of the Blue Mountains and laid bare the secrets of the western plains. After the road had been constructed over the mountains, a ferry took travellers across the river about the spot where the Penrith railway bridge now stands, and here in 1836 Charles Darwin, the great naturalist, crossed the river on a trip to Bathurst. Readers of his *Voyage of the Beagle* will doubtless remember his account of the journey, and how impressed he was with the scenery of the Blue Mountains.



The gorge of the Nepean River from the peninsula of rubble at Glenbrook Creek.

[Photo.—A. Musgrave.]

THE RIVER.

The Nepean rises in the coastal escarpment of the Illawarra Mountains and flows in a westerly direction to join with the Warragamba River near Mulgoa. Below its junction with the Warragamba it is known as the Nepean until, after its meeting with the Grose River near Richmond, it becomes the Hawkesbury River and as such enters the sea.

The part of the river most frequented by us lies between the bridge at Penrith and the junction of the Warragamba and Nepean Rivers, a stretch involving a thirteen mile row from the boatshed at Penrith. So much geographical, botanical and zoological interest is compressed into this small expanse of river that we return to it time and again to find our love for it as fresh as ever.

From the Penrith bridge we row up-stream, the river here for the first three miles flowing in practically a straight line, the banks in places being lined with willows drooping their pendulous foliage into the water. Of these, there are two kinds, the basket, and the weeping willow. On either side of the river the banks rise to a height of about thirty feet, the country on the eastern side being flat and extending away to Sydney, while on the western side it is flat for a mile or so, then sloping abruptly to the escarpment of the Blue Mountains. About three miles from the

bridge Mulgoa Creek, a beautiful willow-embowered tributary, enters the river on the eastern side, its mouth being choked with a tangle of aquatic plants, chiefly nardoo. Having left Mulgoa Creek a mile behind, we enter a deep gorge with hills 700 feet high on each side. Near the place of our entry, Glenbrook Creek joins the river on the western side. This, at one time, was a pretty spot, but débris from the railway deviation works on the hills above have spoiled the valley, and a peninsula of rubble and stone juts out into the Nepean. Looking back from Glenbrook Creek towards Penrith we note how abruptly we change from the low-lying country to the sandstone ridges of the Blue Mountains. From now on for nine or ten miles the river flows through a splendid gorge, sometimes with towering cliffs of sandstone weathered into ochre-coloured caves, sometimes with steep wooded acclivities whose bases are lined with a vegetation quite distinct from that which adorns their sides and summits. This line marks the zone of the floods. The gorge is interrupted only on its western side, where it is joined by Euroka, Breakfast, and Erskine Creeks, and then the river gorge broadens out where it is joined by the Warragamba. It is here in a rock shelter known to us as Sandy Cave that we usually camp. At a short distance beyond the cave we come to the junction of the two rivers, and we find the Nepean so shallow that it is necessary for us to tie up the boat and proceed the rest of the way on foot. A short walk brings us to Norton's Basin, and as we near this pool of tranquility we are at once struck with the beauty of its surroundings. The Nepean is now only a small stream, the branches of the river oaks almost meeting overhead, though the débris in the trees above shows to what extent the river is capable of rising in times of flood.

Here there are outcrops of basalt, a reminder that the locality has not always been as tranquil as the scene on which we now gaze. In primordial times the Basin was the outlet of gases and molten lava and the smoke of its burning ascended to the skies. Now all that remains to suggest the convulsions and eruptions which doubtless once shook the spot, is a narrow neck of old lava near the Basin and extending as far as Sandy Cave on one side and the weir at Wallacia on the other.



Norton's Basin, Nepean River, an eroded volcanic pipe. The small cascade about the centre of the picture is the river entering the Basin.

[Photo.—A. Musgrave.]

NORTON'S BASIN.

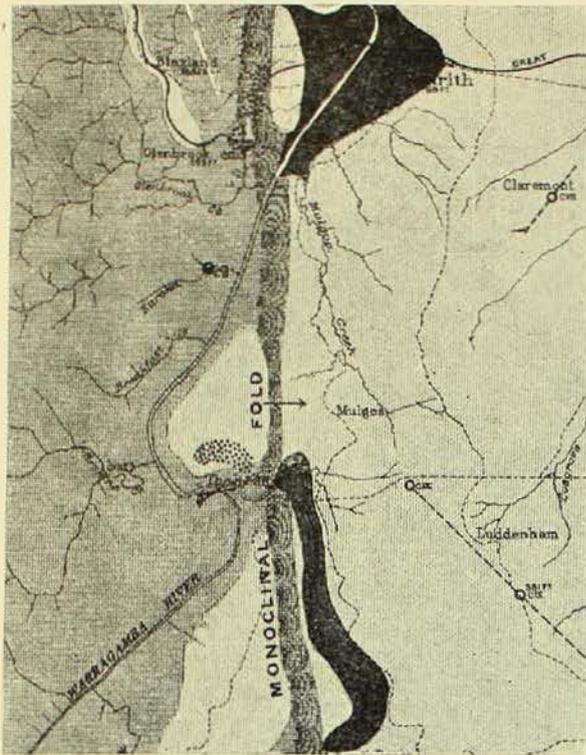
The Basin itself is a large pothole in the valley of the Nepean, girt for most of its circumference by river-oaks. It is over one hundred yards across and about fifty feet deep, though according to legend it is bottomless. As floods have swirled through it since time immemorial it is remarkable that it has not been choked with boulders and sand. Geologists find it of interest in that it provides a good example of the weathering of an old volcanic pipe causing the formation of a basin or broadening in the bed of a river.*

The Nepean flows into the Basin over a ledge of rock a few feet in height, forming a small waterfall which, during the summer, is a very insignificant trickle. As a matter of fact most of the water in the Nepean below

its junction with the Warragamba comes from the latter stream, which drains an area almost as far south as Canberra and as far west as Lithgow. Its waters have not been utilised as is the case with the Nepean, which with its tributaries higher up forms the source of Sydney's water supply.

If we proceed up the rocky gorge along which the Nepean flows before entering the Basin, we come across several other basins, and as we continue on our journey we will, after a time, come to the weir at Wallacia. It is here that we leave the gorge and suddenly emerge among the rolling hills of the Mulgoa district. The question that one would naturally ask is, why has the river cut its way through the mountains when the more low lying country offers it so little resistance? The explanation of this curious behaviour on the part of the river has been shown to be due to an earth fold.

* See T. G. Taylor, *New South Wales—Historical, Physiological, and Economic*, p. 61.



Map showing the earth fold in relation to the Nepean River.

A CURIOUS RACE.

At one time a vast plain existed where the Blue Mountains now stand and through this plain the Nepean flowed on its way to the sea. Then a fold in the earth's surface took place, the fold lying about north and south, and the river had the big task of wearing down the rising land. The movement was so slow that the river was able to keep pace with the uplift and thus approximately maintain its channel. As it had no surplus energy to devote to the widening out of its valley, we have a narrow "saw cut" gorge. If the race had been to the advantage of the uplift, the river would have been diverted and would have flowed along the foot of the slope from Mulgoa to Penrith.

Upon the top and sides of the escarpment may be seen patches of river gravel resembling those formed by the river of to-day. When the railway tunnel at Glenbrook was being constructed, the workmen cut through the bed of one of these old river channels. North



Potholes caused by floods. Their northern sides have been worn away by stones some of which may be seen.

[Photo.—A. Musgrave.]



Flood-bent trees and deposits of water-worn stones at the junction of the Nepean and Warragamba Rivers.

[Photo—A. Musgrave.]

of the Nepean gorge, the old river gravels occur on the level plain, and in a railway cutting near Emu Plains the water-worn stones of one of these ancient channels are plainly visible. The position of these old channels proves that the river once followed the course which they now occupy, and that it existed before the Blue Mountains.

SCENERY IN THE MAKING.

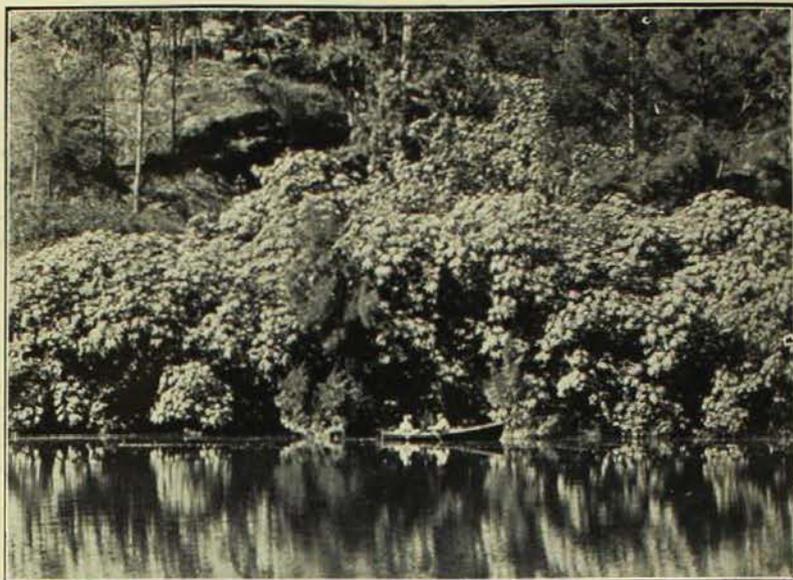
The river seems to be ever-changing and every flood washes away some old familiar land mark. At the junction of the Nepean with the Warragamba a large bank of water-worn stones has been in existence for many years, and, though the smaller heaps are constantly being washed away or replaced by other heaps, the large stones are, to all intents and purposes, permanent. Many of

the trees which have sprung up among these boulders exist despite the fact that they are frequently submerged during floods and have to withstand a strong current bearing battering rams in the shape of logs and branches down upon them. A river oak opposite our cave is gradually succumbing to the floods, and the earth has been all but dislodged from its roots. Close to the junction of the Nepean and the Warragamba are some rocks which illustrate admirably the mortar and pestle method by means of which pot-holes are formed in the beds of rivers. In a flood the force of the rushing water swirls stones round and round so that they gradually wear away the rock and thus form the pot-hole. The northern sides of most of the pot-holes here have been worn down, showing that the water has come from the south.

These examples serve to show us that the making of scenery by rivers is accomplished only in times of flood. When we approach the Basin during the summer months, when the river is at a low level, and appears calm and placid, mirroring the river oaks in every detail, we might be incredulous when a geologist friend tells us that scenery such as this is due to the action of rivers. But if we saw the river in times of flood, when the Basin boils above the river-oaks like a giant's cauldron, and observed afterwards the tremendous changes the flood had wrought, then we would view that geologist's statements with less scepticism and appreciate the fact that floods and beautiful river scenery are indissolubly linked together, the influence of the river on the scenery during times of normalcy being quite negligible.

PLANTS.

Along the banks of the river well within the flood zone grow tall thickets of the castor-

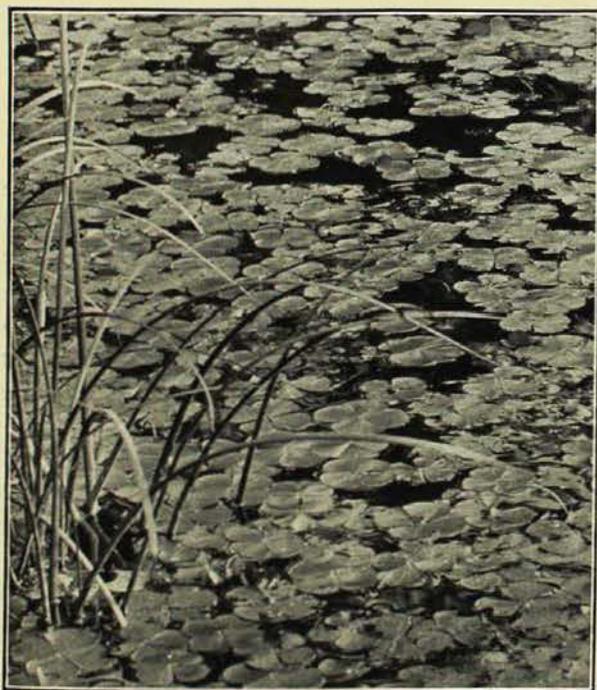


Castor-oil plants occur on the banks of the river, sometimes attaining to a height of 30 feet.

[Photo.—A. Musgrave,

oil plant (*Ricinus communis*), an introduced plant that has been declared a pest. This plant is indigenous to India and Africa, but it has been cultivated in other countries. It is extremely hardy, and in hot climates may attain the height of twenty feet in one year. The seeds of the castor-oil plant are enclosed in a thick pod, the pods growing in clusters. Mr. E. Cheel, of our Botanic Gardens, to whom I am indebted for much of my information concerning the flora of the Nepean, tells me that there are several varieties of the castor-oil plant occurring near Sydney, and the Nepean one he calls the Bulli form because it also occurs at Bulli on the South Coast. These varieties of the plant are divided into two groups, the "poppers" and the "non-poppers." The poppers disperse their seed by the bursting open of the pod, which scatters it, while in the non-popping forms as may be expected the seed-pod does not pop. The Bulli or Nepean form is a non-popper, and for this reason its seed can be easily harvested, as it is retained within the pod, whereas in the popping forms, when each pod arrives at maturity it at once sheds its contents.

At one time arrangements were made to exploit the castor-oil plants of the Nepean, as it was then estimated that ten tons of seed could be secured, the value, in Melbourne, being £17 per ton. The labour conditions however proved unsatisfactory and the ven-



The Nardoo, or Clover-Fern, whose leaves float on the surface of the water, tethered by long stems.

[Photo.—A. Musgrave.

ture fell through, and so we go on importing castor-oil to lubricate our machines and to act as a deterrent to juvenile crime, when we have, in many instances, the plant growing within our own gates.

On leaving the plains at Glenbrook Creek and entering the gorge, we encounter the Wild Magnolia, its beautiful white flowers making it a prominent feature of the landscape. We call it a magnolia probably because it is not a magnolia; it is really a species of Hibiscus (*Hibiscus heterophyllus*), and it ranges from Port Hacking to Queensland. It is also known by the misleading name of "Green Kurrajong" though it is no more like a kurrajong than a magnolia. It is a tall shrub and its branches are liberally endowed with prickles, though the beautiful white flowers with their purple centres would doubtless afford compensation for any annoyance one might sustain in gathering them.

In quiet places, away from the current of the mid-stream, aquatic plants abound, making progress in a boat extremely difficult. Of these water plants perhaps the most interesting is the Nardoo or Clover Fern (*Marsilea quadrifolia*), which occurs in all the States except Tasmania. During the summer months the swamps in which this plant occurs dry up, and it dies, leaving only the spore cases. These spore cases were formerly collected by the blacks, who ground them between two stones, making a kind of flour which they used as food. Nardoo appears to contain practically no nutriment, and it is believed to be difficult to digest. Near the banks of the Nepean the leaves float on the surface of the water tethered by long stalks, which are a source of annoyance to rowers, for, though the leaves resemble those of the lucky four-leaved shamrock, they bring anything but good luck. They have also been known to entangle swimmers, and several



The Wild Magnolia, a species of Hibiscus. Its white flowers make it one of the most conspicuous plants of the river-banks.

[Photo.—A. Musgrave.]

cases of death by drowning have been attributed to the tenacious powers of the stems of this plant. The nardoo is also interesting from the fact that it is found to-day "living in the same form as that in which the ancient rocks of Devonian age contain it in a fossilised state."

These are but three of the many interesting plants growing along the banks of this thirteen-mile expanse of river, which provides for the naturalist an inexhaustible field for study and for relaxation.

In a further contribution the animal life of the district will be described.

An opportunity to acquire a collection of valuable and rare minerals from Broken Hill recently presented itself. A vast number of the items in this collection is now unobtainable, as they were confined to the oxidized zone now worked out of the celebrated silver lode.

Sir Hugh Dixon, with characteristic generosity, made available the amount of £50

towards the purchase of the collection. Subsequently Mr. T. Hodge Smith, mineralogist, proceeded to Broken Hill to take delivery, supervise packing, and dispatch of this valuable acquisition. Whilst there Mr. Smith delivered a series of popular lectures, under the auspices of the local Field Naturalists' Club, and also went into the matter of loan of exhibits to the Broken Hill Technological Museum.

A Museum Collector in Papua.

MANY readers of our Magazine would suppose that the camping scene portrayed on the front page of this issue, could be nothing less than an idyllic holiday. The picture conveys no suggestion of the troubles of a collector in the field which are so many and varied as to affect not only the procuring and preservation of his specimens, but often his comfort and even health also. Insect pests are perhaps his worst enemies, they being able to destroy in a few hours, skins of birds and mammals which have cost him several days of patient labour in preparation. Hide beetles (*Dermestes*) and ants of all kinds miss no opportunity of destroying all animal matter coming their way, and birds intended for preservation must be kept out of their reach until skinned and packed away safely with quantities of naphthaline to ward off their unwelcome attention. When cockroaches are abundant, a collector however weary after his day's work, must take precautionary measures against their voracity ere permitting himself to drift in restful sleep.

Mosquitoes often cause intense discomfort, and if they be of the *Anopheles* breed and carriers of the dread malaria parasite, will almost certainly infect any unfortunate collector they chance to light upon.

A small party led by Captain Frank Hurley into the heart of western Papua a few years ago, suffered considerably from the bites and stings of insect pests. Even his native crew, though well accustomed to an abundance of mosquitoes in their own district, were unable to bear the torture inflicted upon them by dense swarms which were encountered along the Fly River and at Lake Murray. The frontispiece shows Captain Hurley and Mr. McCulloch of the Australian Museum staff encamped at the village of Totani in the Aramia Lakes district. The hot and moist atmosphere of that region was so agreeable to insect life, and to mosquitoes in particular, that the visitors were unable to withstand their onslaught for more than a couple of days, and had to cut their visit short after a brief period of Culicine persecution. By day as well as by night the pests maintained their vicious attack, and the vibrations of their myriad wings produced a high-pitched humming sound which was an incessant reminder

of their hateful presence. Sanctuary was to be found only beneath the mosquito proof nets of the camp beds, which were sewn closely to the mattresses, only a small opening being left for entry and exit. At sundown, each member of the party crept into his bed, and, after closing the hole securely, set about entering up diary notes, skinning small animals or preserving them in jars, and any other tasks possible in the confined space. Notwithstanding all precautions, however, a dozen or so of the pests would find their way in before the entrance could be blocked up and had to be chased round the nets with lighted matches until the last one was sufficiently singed to put it out of action. A sporting interlude was provided when lots were drawn during the evening to determine who should leave his bed and brave the myriad pests in order to turn out the benzine lamp.

When the picture was made Mr. McCulloch was engaged in skinning some small mammals and his task was rendered well nigh unendurable by the sustained attack of mosquitoes upon his face and hands. The natives sitting around were less troubled, partly because they had become more or less immune to the poison of the insects, and partly also because constant exposure to the burning sun, wind and rain had rendered their skin too tough to be penetrated by the frail lancets of the mosquitoes' boring outfit. A dry and scaly condition of the native's skin, due to the ravages of a prevalent disease commonly known as Sipooma likewise deterred the insects' ardour, as did a thin coating of mud which is affected by many natives of the Fly River district in lieu of other clothing. Such few mosquitoes as succeeded in penetrating the dusky skins without detection, took their fill and left unharmed, unless indeed, the native victim's blood was infected with the prevalent malaria germs, which would in turn infect the mosquito and render it a danger as well as a pest. For then it became a carrier of the dread disease with every likelihood of conveying the parasites to some fresh host. Adult natives become more or less immune to malaria fever, even in districts where it flourishes, but the children are its natural victims, and provide an abundant supply of germs for distribution by the *Anopheles*.

Stone Fishes and the Art of Camouflage.

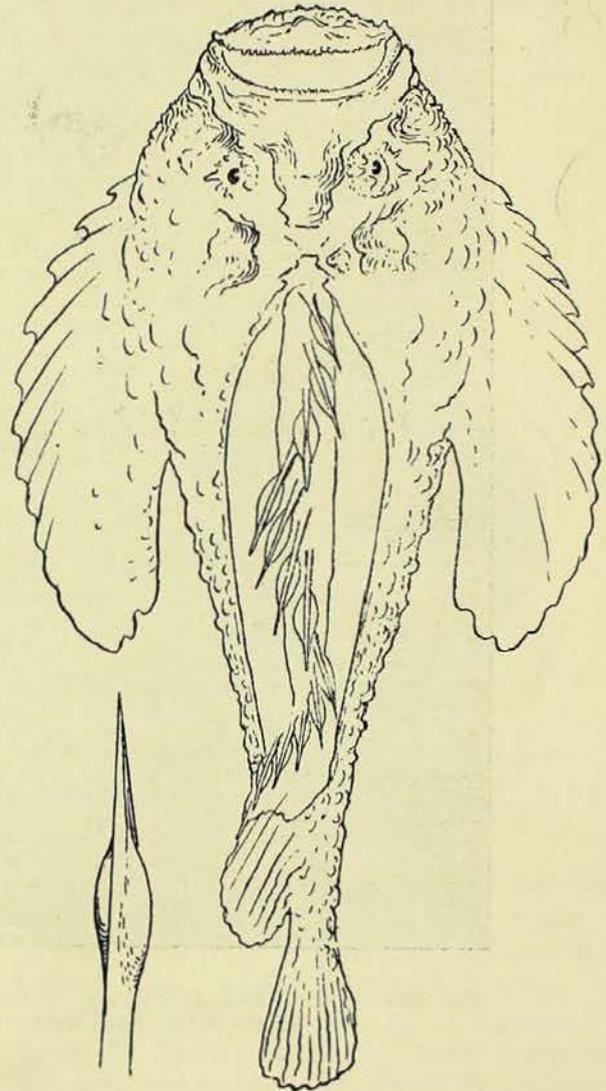
BY ALLAN R. McCULLOCH.

CAMOUFLAGE is a word made famous during the great war and is found only in the most modern of English dictionaries. To camouflage an object is to disguise it by covering it with other things, changing its shape, or painting it with strange colours to make it look like what it is not. Guns were painted in such a way that they became invisible to the enemy planes, and their emplacements were so disguised as to appear like the less dangerous areas surrounding them.

Though the term is but a recent addition to the English vocabulary, Nature has utilised the art for aeons in her operations of attack and defence among animals. Stone Fishes, for example, so closely resemble a rough stone or piece of eroded coral that they can be detected in their native environment only by those with keenest sight and trained to be ever watchful for just such frauds. Further, they are endowed with sharp spines on the head and the unlucky number of thirteen more in a row along the back which have hidden poison glands secreting a venom as virulent as that of a snake. Therefore, lying motionless at the bottom of a coral pool among surroundings it resembles so strangely, a Stone Fish is a menace to everything approaching it. In parts of the South Seas it is known by the Polynesian name "Nofu" or The Waiting One, while my late friend Mr. E. J. Banfield records several others in this delightful book *The Confessions of a Beachcomber*. Warty Ghouls were one of his choice, likewise Sea Devil, and Scorpion Fish, but it is perhaps best known as the Stone Fish to laymen, and as *Synanceja horrida* to ichthyologists. But call it what you will, it is a very dangerous impostor, and is rendered safe only when impaled upon something akin to the four-pronged fish spear of our aboriginal brethren.

Genealogically speaking, the Stone Fish and all its relations are not far removed from our common Gurnet or Red Rock Cod, but evolution has changed their form so greatly that they no longer resemble their forebears. Even their skulls have been so

modified that some of the essential parts are difficult to recognise, and such important organs as the eyes, for example, are hidden away in crevices so that they may not be seen by, and scare away the small crabs and fishes for which these masterly products of



In this diagram the back and dorsal fin is represented as denuded of the thick skin which hides thirteen needle-pointed spines. Each of these is provided with two venom-secreting glands, and grooves on each side convey the poison from them to the tip of the spines.

[A. R. McCulloch, del.]

the art of camouflage lie in wait. Pony outgrowths are pitted and grooved so as to exactly resemble fractured surfaces and edges of stones, while the skin covering their bodies is soft and flabby and provided with many



The Stone-fish (*Synanceja horrida*) so closely resembles a piece of eroded rock that the symmetrical outlines of its fins alone betray its identity.

[Photo.—A. R. McCulloch.]

wart-like tubercles. That covering some of the fins is very thick, and effectively hides the needle-like spines which arm the back.

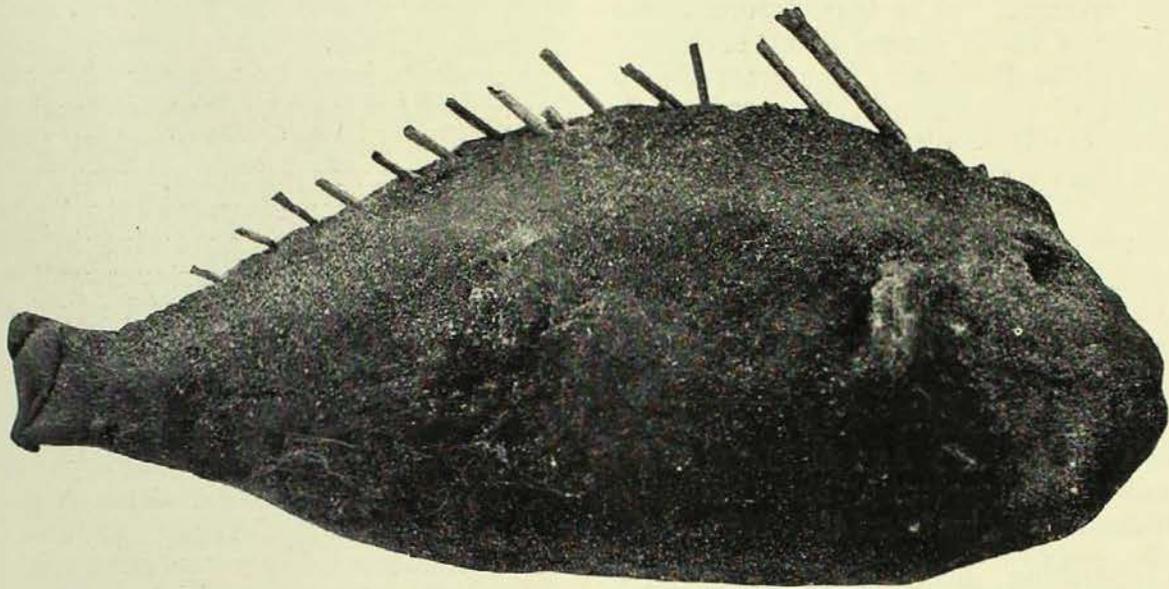
The colouration of Stone Fishes varies considerably, but is always more or less similar to that of other objects on the reefs among which they are usually found. In a specimen just received by the Australian Museum, the dominant colour is scarlet,

variegated with grey marblings and irregular white streaks across the fins. Viewing it in a dish, one might well find difficulty in appreciating how it could effectively resemble its environment on a coral reef. Seen alive however, and perhaps with a chameleon-like power of changing its hues to tally with those of everything around it, the camouflage becomes so perfect that only trained eyes can detect it.

Some years ago, when collecting in Torres Strait, some native children drew my attention to a Stone Fish which lay perfectly still in a shallow pool, but though familiar with specimens preserved in the Museum collection, for the Stone Fish is not uncommon on parts of the Queensland coast, I quite failed to recognize its identity. It lay upon clear sand barely covered by water, and was only about eighteen inches from my eyes, but its resemblance to a chunk of coral rock was so perfect in both form and colour that I actually believed it to be an inanimate stone, and searched for some small crab or other animal upon it which I supposed to be the object of my native friends' interest. Only when I

among the many edible products of a coral reef, a large Stone Fish is a welcome find, for our dusky brother has discovered its flesh to be of excellent quality when the external poison glands have been removed. But if he be unfortunate enough to kick against the fish unawares, or to tread on its upstanding spines, he will surely suffer intense pain and may even die as a result of his injuries.

The Australian aboriginals of the Cape Bedford district, Queensland, prepare a model of the "Dornon," as they call the Stone Fish, for production at some of their initiation ceremonies whereat the youths receive instructions upon many things. The model is exhibited and the poisonous



Beeswax model of the "Dornon" or Stone Fish (*Synanceja horrida*) used in the "Dornon" dance amongst the blacks of the McIvor River, Queensland.

[Photo.—W. E. Roth.]

attempted to pick it up did its identity become clear, and the children hurriedly withdrew my arm, while warning me by signs of its dangerous nature. So I scooped it into a small hand net, and realised for the first time how extraordinarily well the fish is disguised in order that it may escape observation, both from its enemies and its prey. Lying quietly in wait for the latter, it would be approached by small crabs and fish which believed it to be no more than the rock it resembled, and with its capacious mouth partly opened and directed upwards, the engulfing of the unfortunate visitor would be a matter of but a few moments.

To a bare-footed native, searching for tucker

nature of the fish is described by the elders who pretend to search for and spear it. Finally, one treads upon it, and acting as though he were poisoned, utters an unearthly yell, and falls to the ground in agony.* Notwithstanding such demonstrative education, however, Stone Fishes are so easily overlooked that the keenest sighted natives occasionally pay the penalty of their failure to recognize the hidden danger.

In the year 1915, the quarantine and health officer at Thursday Island, Dr. J. L. Wassell, was fishing upon a coral reef, and

* Roth—Records of the Australian Museum, vol. VII., No. 3, 1909, p. 174.

while wading about in sand-shoes, trod upon a large example. Although its spines had to penetrate his shoe, so much poison was injected into his foot that he died within a few days.

The glands which secrete the venom are excellently shown in an exhibit in the fish gallery of the Australian Museum. The fleshy skin covering its needle-pointed dorsal spines has been removed so as to expose a row of pear-shaped sacs, one of which is attached to the middle of each side of every spine. Though the skin may readily be slipped back so as to leave the tip of the spine protruding, the glands are more firmly secured, and their position is such that their contained venom is squeezed out by the slightest pressure. It is then forced along deep grooves which extend along each side to the tips of the spines and is so conveyed into the depths of any wound they may inflict. A skeleton exhibited alongside this dissected specimen clearly shows these grooved spines as well as the extraordinary modifications of the bones of the skull.

Stone Fishes as a group, *Synancejinae*, differ considerably among themselves, and include in their ranks some of the most

venomous fishes known. The characters distinguishing the several genera and species which are recognised under various scientific names, are ordinarily known to ichthyologists only, and the one vernacular name usually satisfies the more casual observer collectively for them all. At least three are known from the tropical waters of Australia, and of these two are very widely distributed throughout the Indo-Pacific region, where their remarkable form and venomous properties have rendered them objects of both interest and respect.

Through the interest of Dr. J. S. C. Elkington, Director of the Division of Tropical Hygiene, the Australian Museum has recently received a fine specimen of the common Stone Fish, *Synanceja horrida*, which was secured at Thursday Island. It has been cast in plaster and replicas have been made and coloured for exhibition in the Museum and at the Townsville Institute of Tropical Medicine. The specimen was put in ice immediately after capture, and was forwarded to Sydney in a frozen state so as to arrive in the best condition and with its colours well enough preserved to be sketched and noted for use in colouring the casts.

A Bush Calendar. BY AMY E. MACK (MRS. LAUNCELOT HARRISON). Fourth Edition (Angus and Robertson Ltd.), 1924. 3/6.

This charming little work was first published in 1909 and at once established itself as a favourite with nature-lovers. The book consists of a series of sketches describing flowers and the birds which may be observed in the neighbourhood of Sydney during the various months, starting with August when the bush and its denizens are beginning to feel that spring is coming. Mrs. Harrison has chosen the very best way of describing nature in recounting her experiences and observations while leisurely strolling through the bush, or along the gullies with open eye and ear quick to catch the significance and appreciate the beauty of little things which would escape one whose mind was not attuned to the right note. For each month there is a useful list of the flowers blooming and birds breeding and the book contains a number of delightful photographs of flowers, nests, young birds and bush scenes.

The World of Little Lives. By GLADYS H. FROGGAT. Second Edition (Angus and Robertson Ltd.), 1924. 5/.

The life-stories of many of our common Australian insects are here revealed in a manner which could not fail to appeal to those who delight in the study of nature. The simple words and the lack of technicalities should make it particularly desirable in that other "world of little lives," the school world. With the advance of nature study, and the fostering and inculcation in the younger generation of a love for the smaller and lowlier creatures, such a book should do much to assist those engaged in this campaign. The authoress has been fortunate in having as a sponsor her father, Mr. W. W. Froggatt, whose well known work *Australian Insects* was the first general work on Australian entomology. The book is lavishly illustrated with drawings and photographs which further extend the utility of the work.

The Story of the Oyster.

BY T. C. ROUGHLEY.

THE oyster has an ancient and illustrious pedigree. Ancient no doubt it is, for it dates from a very old geological period; illustrious we must also concede it to be, for it has provided the most palatable diet for man from the earliest records of his existence. Mounds of oyster shells or kitchen middens accumulated by man in the stone age, are still to be seen in many parts of the world, and embedded in them are often found the primitive stone implements which were employed by these ancestors of ours to force open the shell.

There are no legible records of this remote age, and therefore the name of the first person who ate oysters is unknown. This is unfortunate. He is worthy of a monument "more lasting than brass."

The earliest account of the oyster we have in literature dates probably from the time of Aristotle, the Greek philosopher and naturalist, who lived from 384 to 322 B.C. Not satisfied with a superficial view of nature, Aristotle endeavoured to find out something about the internal structure of such animals as he was familiar with, and how they propagated their young. He concluded that oysters grew from mud by spontaneous generation. Now, the oyster has been blamed for many things in its time, but this reflection on its ancestry was sufficient to make it turn in its shell.

It is to the ancient Romans, however, that we owe most of our knowledge of the important part played by the oyster as an article of diet in these early times. Roman literature abounds with references to the oyster. Pliny the Elder (23-78 A.D.), for instance, gives us quite a lot of information about its virtues and the veneration in which it was held in the first century of the Christian era. Evidently following the lead of Aristotle, Pliny also informs us that it developed from mud, but added that the mud must be in a putrid state. He went even further, and stated that it also developed from foam that has collected round ships which have been lying for a long time in the same position, about posts driven into the earth, and more

especially round logs of wood. A later and more careful observation convinced him that the oyster "discharges an impregnating liquid which has the appearance of milk." This, of course, is quite correct, and is the first accurate account in literature of any of the oyster's vital functions.

Oysters have at many times been credited with some remarkable virtues, not the least important being their rejuvenating effect on the human system, but in Pliny's eyes it was a regular panacea. "We will take the present opportunity," he says, "of stating all the medical properties that are attributed to oysters. They are singularly refreshing to the stomach, and tend to restore the appetite. Luxury, too, has imparted to them an additional coolness by burying them in snow, thus making a medley of the produce of the tops of the mountains and the bottom of the sea. Oysters are slightly laxative to the bowels; and boiled in honied wine, they relieve tenesmus, in cases where it is unattended with ulceration. They act detergently also upon ulcerations of the bladder. Boiled in their shells, unopened just as they come to hand, oysters are marvellously efficacious for rheumatic defluxions. Calcined oyster shells, mixed with honey, allay affections of the uvula and of the tonsillary glands: they are similarly used for imposthumes of the parotid glands, inflamed tumours, and indurations of the mamillae. Applied with water, these ashes are good for ulcerations of the head, and impart plumpness to the skin in females. They are sprinkled, too, upon burns, and are highly esteemed as a dentifrice. Applied with vinegar, they are good for the removal of prurigo and pitted eruptions. Eaten up in a raw state, they are curative of scrofula and of chilblains upon the feet."

A formidable array, indeed. What a fortune Pliny would have made if he had but lived at the present time!

The first century A.D. and a century or two previously, have been referred to as the gastronomic age of ancient Rome. During this era the Romans were renowned for their



Mound of oyster shells, commonly termed a kitchen midden, accumulated by the aborigines on the banks of the Richmond River, New South Wales.

[Photo.—T. C. Roughley.]

sumptuous banquets, and enormous numbers of oysters were consumed, Pliny stating that the palm was awarded to them as a most exquisite dish. The consumption of immense numbers of oysters appears to have been regarded as an indication of refinement, as an accomplishment to be emulated at all costs, and the names of several persons who rather excelled in the noble art have been handed down to us. One, Aulus Vitellius, a Roman emperor (15-16 A.D.), whose feats of gluttony have probably never been surpassed before or since, is credited with having eaten one hundred dozen oysters at one sitting. Vitellius should be the patron saint of all oyster growers.

Cicero himself admitted that he had a special predilection for them, but tells us confidentially that he could renounce them without difficulty. Needless to say, posterity has not believed him.

The first person to form artificial oyster beds was Sergius Orata, who, about 195 B.C. established them at Baiæ, on

Lake Lucrinus, near Rome. Here he transplanted oysters which were collected from other parts of Italy and the Mediterranean, for in their new environment they were found to develop to a larger size and to acquire a flavour far surpassing that of the oysters grown in their original habitat, Orata's enterprise was rewarded by the accumulation of a large fortune.

In mediæval times and up till about the 'sixties or 'seventies of last century, the oyster was held almost in reverence, and its virtues were extolled in the most extravagant language. Poems were written about it and odes were written to it. Listen to this: "The Oyster! The mere writing of the word creates sensations of succulence—gastronomical pleasures, nutritive food, easy digestion, palatable indulgence—then go sleep in peace! . . . True, true, oh oyster! Thou art the best beloved of the loved!"*

*"The Oyster: Where, how and when to find, breed, cook and eat it." Anon 1861.



Stone knives used by the Australian aborigines to cut the muscles of the oyster so that it may be removed from the shell.

[Photo.—T. C. Roughley.]

In Australia, the history of the oyster dates back a long way before the advent of Europeans, for it formed one of the principal articles of diet of the aborigines who inhabited these shores, and to this day are to be seen the huge mounds of shells left by them on the banks of many of the coastal streams. Probably the largest of these is to be seen on the north arm of the Richmond River. This mound extends for hundreds of yards, and is several feet in width and depth. Thousands of tons of shells have been used by the oyster cultivators to top-dress the mud flats which in their original condition were too soft to support the oysters it was desired to mature there. Large quantities have also been used to form the footpaths of Ballina. And still many thousands of tons remain. Fossicking amongst such heaps one frequently comes upon the stone implements used by the aborigines for cutting the muscles of the oysters when removing them from the shells. These primitive knives vary from three quarters of an inch to two inches in length, and are fairly constant in shape. They were obtained by knocking smaller pieces of water-worn stones in such a way that at least one edge would be reasonably sharp.

When our first colonists began to settle in the coastal districts, oysters were found in most of the estuaries in extreme abundance. The supply appeared to be inexhaustible. But the shells, which are rich in lime, were requisitioned for use in the mortar required in the government offices, churches and private residences alike. Little damage would have resulted if use had been made only of the dead shells which everywhere abounded, but it was found that lime made from live

oysters was a superior product to that manufactured from dead shells, for there appeared to be more life in it. Unfortunately there was more body in it also. It was customary to stipulate in contracts that the lime to be used must be the product of live oysters. As settlement progressed the demand for oyster shell lime grew apace, and it requires little effort of imagination to conjure up the enormous havoc played on the natural beds by the lime burners. As the population increased, so, in proportion, did the demand for oysters for edible purposes, until at last the inevitable happened—the supply was insufficient to meet the requirements, and legislative action was rendered necessary in prohibiting, under a heavy penalty, the burning of live oysters for lime:

Having depleted the natural supply, the men engaged in the trade were forced to devise artificial means of culture. In a new project such as this, it was but natural that the first attempts at cultivation should closely follow the lines of those methods which had proved successful in other countries.

The Hon. Thomas Holt, a member of the New South Wales legislature had, about this time, visited France, the home of oyster culture, and had studied the various systems adopted there. Consequently, on his return about 1870, he constructed channels, or "claires" as they were termed in France, on the banks of Gwawley Bay, George's River, after the most approved French fashion. These channels when completed, aggregated some thirty miles in length, were twenty-two feet wide, and of sufficient depth to retain from two to four feet of water at low tide. The inlet and outflow of water were regulated by means of flood-gates and dams

exactly as had proved so eminently successful in France. Upwards of two hundred men were employed and many thousands of pounds expended in their construction. They were stocked with oysters obtained from Port Hacking, Cowan, Brisbane Water, and Pittwater. For a number of reasons they were a failure. Holt had reckoned without the heat of the Australian sun, which raised the temperature of the still water to a degree which the oysters could not withstand, and large quantities were also smothered by

cultivation may be said to have begun. Oyster farmers now began to lay out sticks, stones, and shells to catch spat and support it till it developed to maturity. The areas under cultivation were increased yearly, new methods were evolved and a higher degree of efficiency attained as the lessees began to acquire a better knowledge of the peculiarities of their product, until gradually the industry developed into the extensive one it is to-day. The various methods of cultivation in vogue on the coast of New



Present day view of channels, or "claires," constructed on the shores of Gwawley Bay, George's River, to mature oysters obtained from Port Hacking, Cowan and elsewhere. Great hopes of these were entertained but, unfortunately, were not justified.

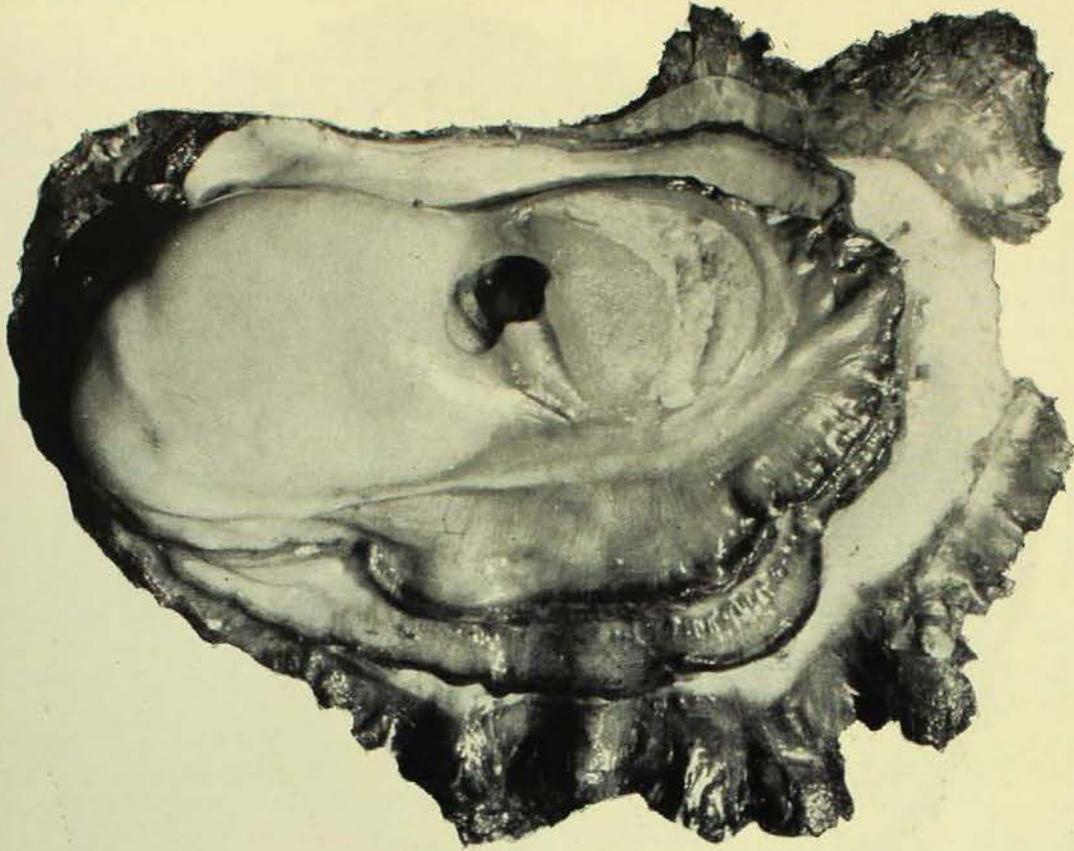
[Photo.—T. C. Roughley.]

depositions of silt. After a trial extending over a period of two or three years the whole project was abandoned.

For a considerable time after this experiment, oyster growers exhibited an entire lack of enterprise, little more being done than the transplanting of oysters from localities where growth was slow to more favourable situations where development was more rapid, until 1896, when organised systematic

South Wales at the present time will be described in a later issue of this MAGAZINE.

There are several species of oysters found on the Australian coast, but only two are of commercial value, the rock oyster (*Ostrea cucullata*), and the so-called mud oyster (*Ostrea angasi*). Of these, the rock oyster is far and away the most important, not only on account of its greater abundance and wider distribution, but also because of



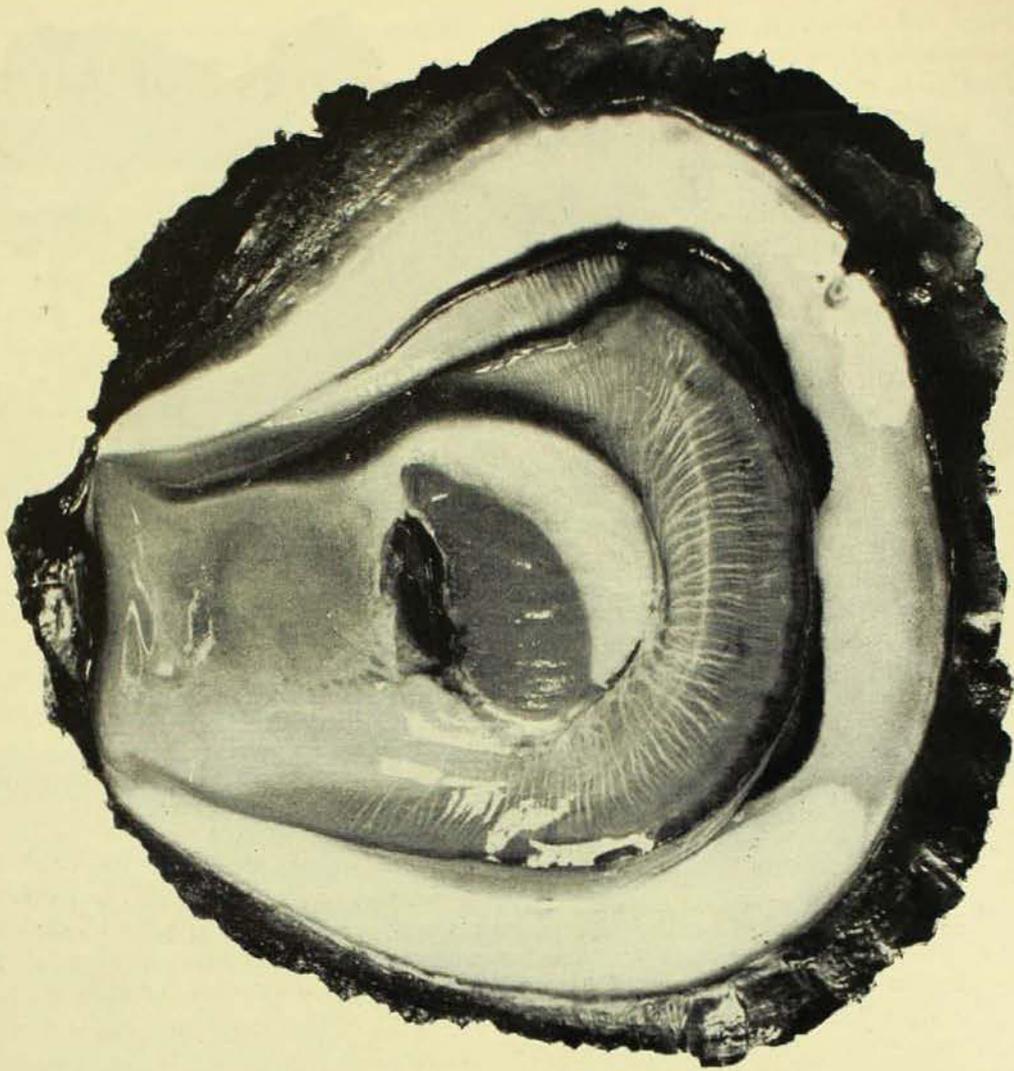
The Rock Oyster (*Ostrea cucullata*). This, the principal Australian oyster of commerce, although smaller than the Mud Oyster, is far superior in delicacy of flavour. The average weight is about two ounces, but one example weighed half a pound and measured 6 x 4 x 2 inches. The illustration is slightly above the natural size.

[Photo.—T. C. Roughley.]

its superior edible and keeping qualities. On the west coast of Australia it is found as far south as the 30th parallel of south latitude (about 150 north of Perth), and extends right round the northern, eastern, and south-eastern seaboard as far as Gippsland Lakes in Victoria, where, however, it is not common. On the south coast of Australia it does not occur at all. It thrives best between the Tropic of Capricorn (Rockhampton) on the north and the border between New South Wales and Victoria on the south. North of Rockhampton it is quite prolific, but, owing to the great rise and fall of the tide, and the heat of the tropical sun, the shell remains stunted and crinkled and therefore the oyster is of little commercial value. The main fishery for the rock oyster is carried on in New South Wales and to a less extent in Queensland. It has a wide range outside Australian waters, being found in India and also in Japan, where it has been cultivated

by means of bamboos for a very long time. It occurs also on the North Island of New Zealand but in much smaller quantities than on the Australian coast.

The habitat of the mud oyster extends from the Leeuwin along the whole of the south coast, and on the east coast as far north as the Clyde River in New South Wales, where it is now scarce. In the early days of the colony the mud oyster was found on all the rivers south of and including the Clarence, but at the present time it is extinct north of the Clyde, although large quantities of shells are still to be found. It thrives best at Port Lincoln near Adelaide, and for this reason is sometimes known as the Port Lincoln oyster. No mud oysters are marketed in New South Wales, but considerable quantities find their way to the Melbourne and Adelaide markets, where it brings only from one-third to one-half the price of the rock oyster, which is imported in large quantities from New South Wales and Queensland. From here, also,



The Mud Oyster (*Ostrea angasi*). Although of no commercial value in New South Wales, considerable quantities are marketed in Victoria and South Australia. The illustration is a little less than natural size, but one specimen measured $9 \times 5\frac{1}{2} \times 2\frac{1}{2}$ inches and weighed two pounds.

[Photo.—T. C. Roughley.]

considerable numbers are exported to Western Australia, particularly during the winter months.

The term "mud oyster" is really a misnomer, for it cannot live when submerged in mud. No true oyster can. When it has completed its development as a free-swimming larva, it must fasten its shell to some object in the water or perish, but, whereas the rock oyster will continue to grow along the surface for a very considerable time afterwards, forming a large and secure area of attachment, the mud oyster soon grows out from its base, which is therefore relatively small. Owing to its large size, it usually becomes detached and falls to the bottom. Should

the bottom happen to be firm the oyster will continue to live and thrive, but if it should drop into soft mud it soon becomes smothered.

Another characteristic difference between the two species is that the rock oyster lives and flourishes both between tide marks and below low tide to very considerable depths, while the mud oyster is rarely, if ever, found above low tide level. Then, too, as regards their keeping qualities, the rock oyster will live out of water for upwards of two weeks in summer and three weeks in winter. The mud oyster, however, usually succumbs in a few days after removal. Moreover, for delicacy of flavour the Australian rock oyster is probably unsurpassed by any oyster found elsewhere in the world.

The Fruit-Bats, or "Flying-Foxes," of Australia

BY ELLIS LE G. TROUGHTON.

THOUGH the marsupials greatly preponderate in numbers, and doubtless in interest too, yet a knowledge of the non-marsupials is essential to a full appreciation of our fascinating pouched animals. In fact we become so used to thinking of Australia as the continent of marsupials that we are apt to forget that apart from a few introduced rodents and the domestic animals there are a great many more non-marsupial furred animals native to Australia than were ever brought here by man's agency.

For instance there are about fifty native species of bats but their flying habit and almost nocturnal mode of life render them most difficult to observe or collect; rarely appearing before sunset they slip stealthily into the dusk from sombre gullies, caves, hollow trees, or even, as with small insect-eating species, from under the curled up bark of dead trees. Very little is known, therefore, of the habits of bats, and they are often regarded with superstitious awe and as omens of ill-luck, few people realising the high place these flying mammals occupy in the classification of the animal kingdom, next the order Primates containing man and the creatures nearest allied to him.

THE LARGE AND SMALL BATS.

The group of bats falls naturally into two sections, the large fruit-eating and the small insect-eating kinds, the two sections together forming the order of bats which have aptly been named Chiroptera, or hand-winged mammals, because the four fingers form slender rods which support the wing membranes; the thumb only is free and ends in a hooked claw which is used for climbing and suspension. The largest fruit bat known is the Kalong, or Malay Fox-bat, which may have a wing-spread of five feet, while the smallest insect-eating species found in Australia has a tiny mouse-like body no wider than a penny.

In New South Wales but few persons trouble themselves about any save the large fruit-bat, familiarly known as the "flying-fox," which

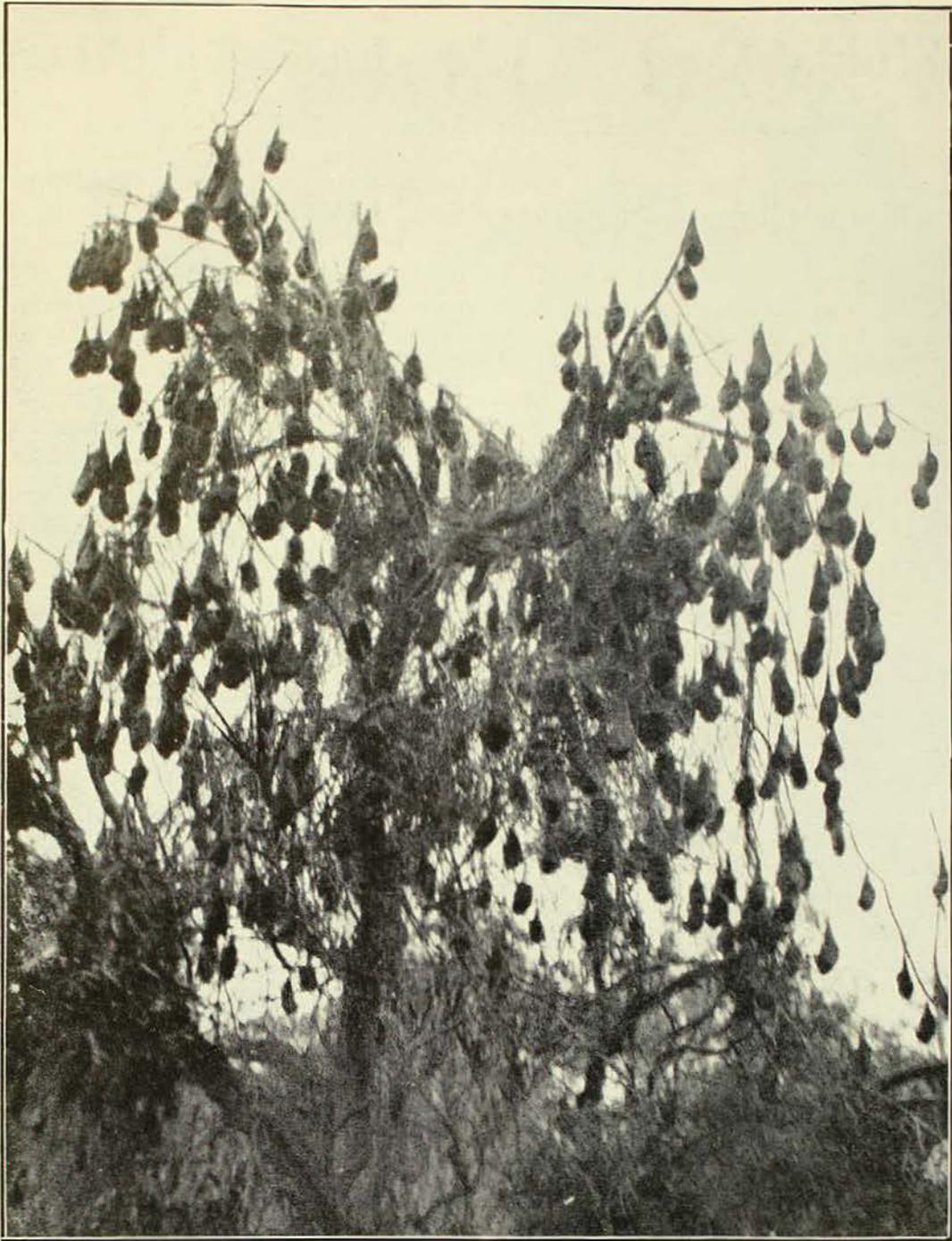
feeds almost exclusively upon fruits and causes vast economic damage in the orchards. However, there may be some measure of comfort to orchardists in the fact that of the ten large bats occurring in Australia only six are destructive to fruit, while nature's balance happily "tilts the loss with gain" by providing Australia with forty species of smaller bats, all of which eat myriads of harmful insects. These sensitive winged mammals are therefore friends of man, taking up the night watch in the birds' battle against our insect pests.

However, to commence our brief account of the Australian fruit-bats, it seems appropriate to begin with the local species.

THE GREY-HEADED FRUIT-BAT OR FLYING-FOX.

One of the larger of its kind, this species (*Pteropus poliocephalus*) is known only too well in the coastal regions of eastern Australia, which it inhabits from Cape Howe, and occasionally as far as Melbourne in the south, to Cape York in the north. As the name suggests, the grey head is a notable feature, as is the reddish yellow mantle of longer hair on the neck and shoulders, the colour being continued round onto the breast, while the rest of the body is of a sombre blackish-grey.

These bats, in common with their kind, usually associate in large numbers, forming camps or colonies during the day in dense scrub or shaded gullies. The camps often cover several acres and include thousands of individuals, which hang head downward by their strongly clawed feet, being so crowded at times that they even cling to each other. Mr. J. S. P. Ramsay observed a colony of bats covering about eleven acres, while Mr. Sid W. Jackson describes an immense camp in a gully between high hills near Scone, N. S. Wales, where the creatures were hanging all over the trees in masses of black pear-shaped objects, the noise and stench arising from the camp being amazing. As an indication of the numbers present, Mr. Jackson stated that forty of them were



A tree-top in a gully near Scone, N.S.W. loaded with Grey-headed Fruit-bats (*Pteropus poliocephalus*), giving some idea of the vast numbers present in a camp covering several acres. Seen in silhouette the bats, wrapped in their wing-membranes, seem like pear-shaped objects or gigantic cocoons, but in the thicker forests they merge with the indistinct blotches of shadow cast by the surrounding foliage.

[Photo.— J. S. P. Ramsay.]

shot in one small tree by one person, and altogether during the afternoon over two hundred were shot by five guns. The camp sites are usually near water, as the heavy-bodied fruit bats must drink at times like other furred animals, the sweet juices obtained from their natural food of fruit, berries,

and blossoms being insufficient to slake their thirst. During the hot summer days the bats may be seen dropping from the branches to skim over the surface of the water, dipping into it slightly at intervals, which appears to be their way of drinking while on the wing, as do spine-tailed swifts.



All Fruit-bats hang head downward when sleeping. This is the local grey-headed species wrapped in its wings which act as umbrellas against the rain and as blinds to shade the eyes from the sun's glare.

[Photo.—G. C. Clutton.]

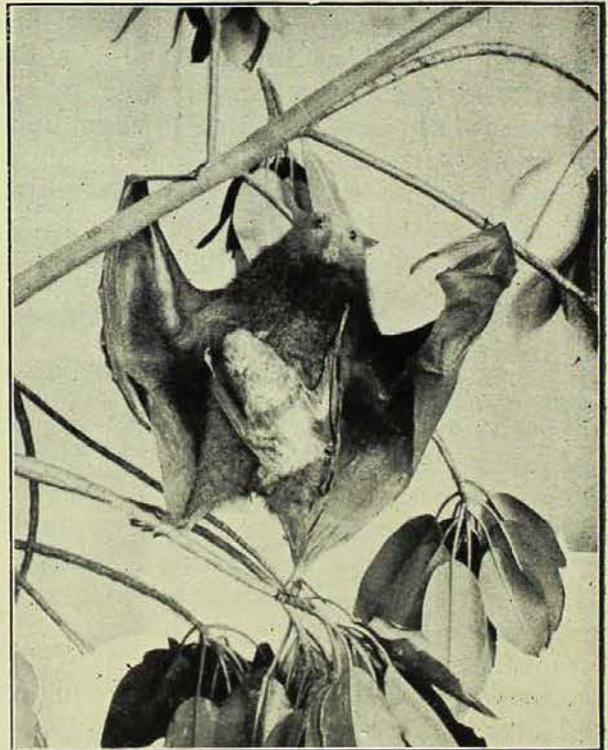
THE WINGS AND THEIR SEVERAL USES.

Bats possess all the features typical of the class of furred animals or mammals, which includes man, producing their young alive and suckling them with milk. They are, however, clearly distinguished from all other furred animals in possessing the power of true flight, for which their fore limbs are specially adapted. Untrained observers easily mistake small marsupials for rats, but the great velvety-brown or black wings of the bats render them recognisable at once. There is a kind of spurious flight such as our "Flying Opossums" possess, which is merely the prolongation of a downward leap by the aid of a well developed skin-fold stretched along the sides of the body between

the fore and hind limbs. Bats, on the contrary, can fly as strongly as birds, the flight being effected by continuous upward and downward strokes of the wings, carried on as long as muscular power permits.

The wings of our fruit-bats are distinguished by having the index or fore-finger clawed as well as the thumb, and as these larger bats live mostly in the open the wings have many uses. While the bat is feeding, one foot only, or the hooked thumb and the foot of one side are used to grip the branches while the same members of the other side are used to grasp the food. Then, too, the velvety wing membranes are wrapped around the body during sleep, and serve as coverlets for the fruit-bat babies. Again in the tropical forests of northern Queensland the membranes function as umbrellas during the heavy rainstorms of those localities. At other times they act as useful blinds against the sun's glare, and even as fans in the tropical heat.

When travelling up the Fly River in Papua with Captain Hurley's recent expedition,



A Grey-headed Fruit-bat with her young. Fruit-bats produce only one young one at a birth, which clings closely to the mother's breast during flight and in repose. The parent's wings function as coverlets for her baby during sleep, or as fans in the noon-day heat.

[Photo.—G. C. Clutton.]

Mr. A. R. McCulloch made some interesting notes of which the following is an extract. "We met with several flying-fox camps along the river banks, and were amazed at the wonderful sight as they rose into the air at our approach. They were clustered together on all the trees in a selected area and many of the females were carrying babies, which clung closely to their breasts. When hanging quietly their feet were either side by side, or on opposite sides of the branches according to the thickness, and their wings were either folded loosely around them or moved to and fro as fans. They crawled about when disturbed, reaching out for branches with their long fore limbs, and moving freely and safely by means of their hooked thumbs and strongly clawed feet. I noticed that when settling in trees, each grasped the branch with its feet while the body was in an obliquely upright position, thence swinging over immediately to the head downward position, the weight causing the branch to bend considerably.

"A hawk settling on a tree near a large number of bats caused a great disturbance, occasionally swooping among them, apparently trying to secure a young one. However, it avoided the sharp tusks and powerful molars of the adults, which appear to be expert at biting, wounded ones snapping savagely at anything near them, and chewing sticks to fragments. There is much fighting and noisy squabbling in the camps, and there is a quieter calling note which is, perhaps, the mother's call to its young."

THE FOOD OF OUR LOCAL SPECIES.

At that restless hour when the setting sun casts a glow, against which the moon struggles to make its rays effective, the quarrelsome creatures awake to scream and squabble before flying off in long files in search of "fruits in season." Though able to fly quite well in the sunlight the bats are mainly nocturnal, returning to camp in the early dawn to wrangle and contend for the highest and best branches.

Their chief natural food is the fruit of the Moreton Bay, and other native figs, but the fragrant blossoms of the eucalypts, as well as the lillipilli and other berries are also favoured. Unfortunately, too, as with some marsupials, the fruit-bats have acquired

a taste for the widely cultivated fruits which have been introduced into Australia. They devour most kinds of fruit, eating apricots, peaches, pears, and even loquats and apples with equal gusto. The grey-headed fruit-bat is undoubtedly one of the greatest pests with which our orchardists have to contend, the amount of injury done by a flock in a single night being enormous. They quarrel and gorge in the fruit trees, knocking down quantities and wasting far more than they eat, in their all-night banquet at some luckless orchardist's expense. They occur in vast numbers in southern Queensland, and the necessity for drastic treatment of the pests is confirmed by a press report that the "Queensland South Coast Crows and Flying-foxes Board" in 1923 destroyed 3,173 fruit-bats in eight months.

METHODS FOR DESTRUCTION.

At Gloucester recently, according to another press report, it was decided to attack the flying-foxes in a secluded haunt which experienced bushmen had known them to occupy for some time. An advertisement was inserted in the local newspaper announcing the time and place for a "shoot." A well-equipped party turned out but the bats had vanished like a dream, seeking fresh and safer quarters. Under the heading "Saw the advertisement," it is stated that the next time a camp is discovered it is not intended to advertise the "shoot."

With the exception of organised drives by shooting parties and the use of the gun by owners of orchards, no very feasible proposal has been mooted for the destruction of bats or protection of the orchards. Many methods have been tried with varying success, including a kind of flame-thrower which, as seems to be the way of these gentle implements, merely succeeded in burning the operators very thoroughly. Attempts made to destroy the flying-foxes wholesale at their camps by the use of poison mixed with honey resulted in failure, the animals being such greedy feeders that the poisoned food was devoured by a few bats before the main body could claim their share. The fumes of cyanide released beneath clusters of bats is said to have destroyed large numbers, though I do not know of the definite use of this method, which would involve considerable risk to its users.

THE USE OF THE NAME "FLYING-FOX."

Though known the world over as flying-foxes, it will hardly be necessary to emphasise that these large bats have no near relationship with the fox either in classification or origin, beyond their inclusion together in the class of furred animals or mammals. The name has no doubt been derived from the generally reddish, finely-chiselled, fox-like head, with its erect ears and a somewhat crafty expression typical of Reynard.

All the large fruit-bats of Australia have much the same form and habits, but one variety, the Spectacled Bat, is perhaps worthy of mention. It is our largest species,



The Spectacled Fruit Bat derives its name from the pale brown ring of colour around each eye. The largest species occurring in Australia, it has a head and body length of 12 inches. It is found in northern Australia and southern New Guinea.

[After Gould.]

having a body-length of twelve inches; occurring in northern Australia and New Guinea, it derives its name from the pale brown ring of colour around each eye. As early as 1848, John MacGillivray found this species in "prodigious numbers" on the wooded slope of a hill on Fitzroy Island, N.E. Queensland, many branches bending

under the load of bats. On close approach a strong musky odour became apparent, and a loud incessant chattering was heard. MacGillivray stated that apart from man, the Wedge-tailed Eagle was this fruit-bat's chief enemy. If this report be a fact, it supplies another argument for those who maintain that the huge eagles have their definite uses as scavengers and exterminators of certain pests.

Like the largest fruit-bat, our smallest variety, known as the "Little Fruit-bat," occurs in Queensland, about Mackay and Rockhampton. The head and body combined measure only two and a third inches, the snout is very long and narrow, and the fur is unusually long and reddish-brown in colour. Though of so small a size, this bat is said to be very destructive to fruit. The tongue affords a striking feature, as it is highly extensible and covered with long fleshy bristles, which in association with the long pointed snout, suggests that the tongue may be used for brushing up the soft pulp of fruits, and even insects, as do the honey-eating birds, and the Honey Mouse described in the last number of this MAGAZINE.

Quite the weirdest of our fruit-bats, however, have apparently forsaken a fruit diet, the stomach of a specimen having been found to contain nothing but fragments of beetles and flies. They are known as the tube-nosed bats because the nostrils are elongated into a pair of long diverging tubes which distinguish them from all other bats. Apparently no suggestion has ever been made as to the uses of these tubular nostrils, though they doubtless serve some special purpose. When one glances at the picture of the tube-nosed bat shown here, it seems hard to credit that it came from the Monaro tablelands in N. S. Wales, as these creatures are very rarely seen, though they occur throughout Queensland and New Guinea. Apart from the nostrils, they are noted for the small yellow spots which are invariably scattered over the wings and the leathery ears, and the fringe of fleshy lobes around the insides of the lips, which apparently assist in holding wriggling insect captives. The habits of these extraordinary ape-faced bats are practically unknown, and specimens are very much desired for the Museum collection. The very monkey-like face strik-



A tube-nosed bat from the Monaro District, New South Wales. Though of the fruit-bat order, it has adopted an insect diet; it may be readily distinguished from all other bats by the nostrils being elongated into tubes, the function of which has never been discovered. The monkey-like face strikingly illustrates the close relationship of bats to monkeys in animal classification.

[Photo.—G. C. Clutton.]

ingly illustrates the close relationship of the bats to the monkey group in animal classification.

As to the origin of bats, it is a remarkable fact that amongst the host of extinct animals which are known, none have been discovered in any way connecting bats with other mammals. Remains of bats very closely resembling existing kinds are traceable from very early geological times, showing that the bat order is a very ancient one, and that we

will have to go back still earlier before meeting with creatures intermediate between bats and other furred animals.

THE ABORIGINES AND FLYING-FOXES.

Being blossom and fruit-eaters the flesh of the fruit-bats should be sweet, but their rather repulsive appearance and offensive odour is such that one would not relish the experiment of tasting it. The aboriginals, however, have quite a *penchant* for the bats, eating them with gusto and apparently regarding the odour as a filippic to flatter the palate. The blacks capture them by lighting fires under the sleeping creatures, which are soon stupefied by the smoke and easily knocked down with boomerangs and sticks; they also secure them by waiting in the trees and knocking down the approaching bats with long sticks.

Amongst the many legends of the aboriginals is one concerning the lizard and the flying-fox, which supplies an ingenious, if somewhat ingenuous, explanation as to why bats hang upside down. Briefly it runs that the lizard, in revenge for some wrong, placed prickly caterpillar nests outside the flying-fox's house. By and bye the flying-fox's gin came along and the baby cried because it was covered with sores from sitting on the prickles. In the general excitement the parents sat on the prickles too, and the soreness became so intense that they could not sit down, having to hang by their legs ever afterwards. And the lizard said "serves you right."

Though fruit-bats would appear singular in that they have no redeeming feature as far as man is concerned, orchardists may find comfort in remembering their many helpful little insect-eating cousins with which I hope to deal in a future article.

The preparation of an aboriginal group is being proceeded with. Mr. Ernest Wunderlich, F.R.A.S., Trustee, has generously presented the necessary funds and made arrangements with Mr. Rayner Hoff, the well known sculptor to carry out the work. It is proposed that the group should consist of three figures, a man throwing a boomerang, with a woman and child in the back-ground. Suitable

models will be obtained through the kind co-operation of the Aborigines Protection Board, and it is hoped that a striking exhibit will result, worthy of the subject and the donor.

Early in January Mr. Wunderlich will depart on an extended tour of northern Africa and the South of Spain where he will investigate the ancient Roman cities.

Destruction of the Whitsunday Group Fringing Reefs:

BY E. H. RAINFORD.

PRIOR to 1918 a visit at low tide to the fringing reef of any island of the Whitsunday Group would have been something to remember to the end of life. Everywhere the eye would have rested upon masses of beautiful live corals, many tipped with the loveliest shades of colour. Alcyonarians of the most varied shapes and hues; giant clams with their brilliantly coloured mantles; sponge growths of all shapes and shades growing so closely together that it would be necessary to walk on the corals in order to progress, for not an inch of bare rock or coral boulder was unoccupied. Fish of all descriptions and colours swam about in the pools, myriads of mollusca, crustacea and other animals found the means to support life. Were a visit paid to the same island now a scene of the utmost desolation would meet the gaze; the corals dead, broken to pieces and blackened by decay; the clam shells gaping wide and empty; the alcyonarians and sponges disappeared; fish and crustacea conspicuous by their absence; a scene with hardly any life in it given over to a scattered growth of weed and sea moss. What could be the reason for this destruction? What brought about this desolation? It was a riddle the writer set himself to solve.

There are four principal reasons for the death of coral.

1. Lowering of water temperature.
2. Raising of land level and consequently of the reef level.
3. Contamination of the water with silt.
4. Toxic effect of fresh water.

1. We may dismiss at once any idea of a lowering of the ocean temperature; it would affect the coastal climate, which has not been observed, and it would cause an immense mortality in other marine creatures which has not taken place.

2. It is true that at a comparatively recent period, geologically speaking, there has been an upheaval in the coastal area of North Queensland, for ledges of pudding stone and conglomerate of recent origin, above high

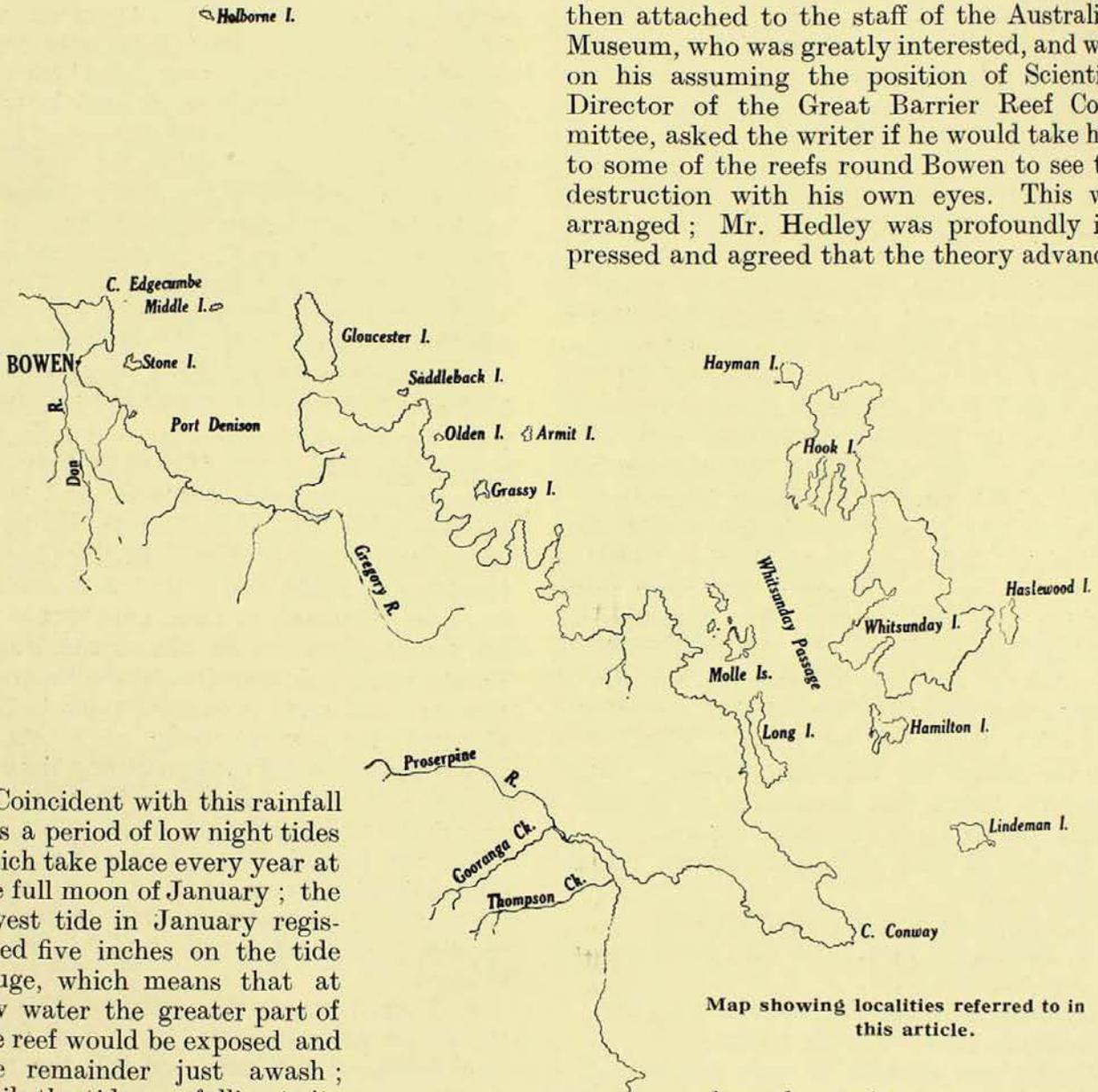
water mark, are to be found on all the islands of the Whitsunday Group. But these were in existence long before the destruction of the reefs in question and are now in the same position relative to high water mark as before 1918. And also, if a sudden rise of the reef occurred, the exposed portion with the corals would be swept by the waves into the lagoon at the back of the reef; this has not taken place, the dead coral in many places being still in situ. Lastly, no alteration in the land level has been observed and no alteration has taken place in the level of the tide gauges.

3. If contamination of the water by silt had any hand in the death of the corals it must have been, in the writer's opinion, to a very slight extent. It is obvious that every rainy season large amounts of mud in suspension must be carried out to sea by the rivers and must contaminate the water on the fringing reefs, and if that were sufficient to cause the death of coral none would ever be found alive inside the Great Barrier. To the writer's knowledge, in the harbour of Bowen coral reefs flourished prior to 1918, although for several weeks at a time the water would be discoloured during the rainy season. It may be taken therefore that occasional contamination with silt does not affect the growth of coral except when the contamination is constant. Of course some corals are more susceptible than others, and require permanently pure water to be able to exist.

4. There remains then only the theory of the access of fresh water to account for the destruction of the reefs and this the writer considers proved for the following reasons. In the first half of January, 1918, two severe cyclones struck the North Queensland coast, the first having its centre at Babinda and the second at Mackay. The rainfall during that period was enormous. For example, the fall in Bowen was twenty-six inches in five days, and Bowen is a dry locality; further north the fall was probably double. Such an immense body of water passed down the

rivers Johnston, Burdekin, Elliott, Don and others that, it was stated at the time, a coastal steamer, eight miles from land, drew fresh water in a bucket alongside. This of course may be hearsay, but, whether a fact or not, it cannot be doubted that an enormous body of fresh water found its way down the coast.

small crustacea; there was also a great decrease in the numbers of the *Pentaceros* variety of starfish. These facts appear to the writer to be a reasonable explanation of the destruction of the fringing reef corals, a destruction that was carried upwards of twenty miles from the mainland towards the Barrier. When recently in Sydney the writer related these circumstances to Mr. C. Hedley, then attached to the staff of the Australian Museum, who was greatly interested, and who on his assuming the position of Scientific Director of the Great Barrier Reef Committee, asked the writer if he would take him to some of the reefs round Bowen to see the destruction with his own eyes. This was arranged; Mr. Hedley was profoundly impressed and agreed that the theory advanced



Coincident with this rainfall was a period of low night tides which take place every year at the full moon of January; the lowest tide in January registered five inches on the tide gauge, which means that at low water the greater part of the reef would be exposed and the remainder just awash; while the tide was falling to its lowest and again rising, the reef would be exposed for at least two hours to the influence of any fresh or brackish water on the surface; time enough to destroy any organisms susceptible to its toxic effect. In proof of the great amount of fresh water in the sea at the time referred to, the writer observed dead on the beach, numbers of sand crabs, *Gephyrea* and other worms and some

by the writer to account for the destruction of the reefs was a reasonable one. One fact remains to be accounted for; how is it that this destruction of coral does not happen more frequently, seeing that cyclones are of frequent occurrence on the Queensland coast?

It may interest some to know whether the reefs show any sign of recovery, and if so to what extent. From the writer's notes

Map showing localities referred to in this article.

made during the past winter when visiting some of the reefs the following description will give an idea of their progress towards recovery.

In Port Denison the Stone Island and Middle Island reefs were such splendid examples of luxuriant coral growth that Saville Kent in his work on the Barrier Reef devoted several photogravures to these islands; to-day not a sign of surface coral is to be seen on either, nor any alcyonarians, clams, sponges, or other reef dwellers—a decaying blackened mass of coral detritus is all that exists. The same may be said of Saddleback, Olden, Grassy, and Molle Islands, all close to the mainland, but in the last two a few *Porites* are beginning to show. Armit Island, about five miles from the mainland, shows a beginning of reconstruction, *Porites* are showing more plentifully, averaging about six inches across. In the lagoon are to be found at wide intervals small stools of carmine-tipped *Pocillopora* and *Madrepora frondosa* tipped with heliotrope, some *Stylophora* and very occasionally a growth of *Seriatopora histrix*. On the South East reef are a fair number of *Tridacna* from three to six inches across, but it is very bare of life and weeds are plentiful. On the north west side of the island, in deep water, a mass of boulders formerly bound together with *Porites* is now alive with massive *Porites* and *Diplaria*, forming platforms upon which exists a close growth of *Pocillopora*, *Madrepora* and very elegant *Seriatopora*.

Whitsunday and Hook Islands have very little fringing reef and what there is remains lifeless. Hamilton Island has a fine reef and its present condition very much resembles that of Armit as regards new growth of corals. *Porites* and *Tridacna*, the scouts of reconstruction, are beginning to show up, with here and there stools of *Pocillopora* and *Madrepora* in the lagoon and on the deep water edge of the reef.

Hayman Island, 15 miles from the mainland, is more advanced than any other reef in the group. *Sacrophytum* and other soft corals are abundant; in one spot on the reef sponge growth has taken complete possession, one variety having a marvellous resemblance to fucus sea-weed. *Tridacna* about six inches across are fairly abundant on the deep water edge of reef. In the lagoon and on reef edge are found in moderate quantities,

Madrepora kenti (apricot colour), *Stylopora palmata*, *Madrepora convexa*, *Pocillopora damicornis*, in lesser quantities *Madrepora laxa*, *Millepora*, *Madrepora muricata*, *Pachyseris speciosa*, *Madrepora frondosa*; many very fine stools of *Seriatopora* were observed and the beautiful rose-tipped *Madrepora longipes* was fairly abundant, and an occasional *Fungia lacera* was met with. Most of the corals were at the north end of the lagoon and were decidedly scattered and for the most part adherent to broken pieces of old coral or vagrant stones. Holborne Island, twenty-two miles from the mainland, should be more advanced in reconstruction than any other, being so much nearer the Barrier, but curiously enough this is not the case. The description of the Armit Island reef will about fit Holborne Island, and the reasons for its backwardness are not easy to determine. For one thing the Holborne reef is in a very exposed position and strong currents prevail at all times, which may have something to do with it. The writer did not visit Long, Lindeman, and Haslewood Islands, but from reliable information received it may be accepted as a fact that their reef reconstruction is not further advanced than on Armit Island reef.

It must be borne in mind that when coral destruction is alluded to this refers only to surface corals under a depth of eight or ten feet; at that depth and beyond they were not injured, and are as flourishing to-day as before 1918. The question naturally presents itself, how long will it take for the reefs to be restored to their former luxuriant growth? And it is one difficult to answer. There are so many factors in play which we are unable to see or interpret, the amount of shelter, strength of currents, presence or absence of sandbanks and other conditions, but at a rough guess the writer estimates that not less than ten years are required for Hayman Island to be reconstructed, more favourable conditions obtaining there, apparently, than elsewhere. It is doubtful if some will ever be reconstructed. A fact worthy of remark is the almost total absence of echinoderms on some of the islands, though they are abundant on the mainland. Hayman offered one or two specimens of *Holothuria atra*, Hook a solitary *Linckia*, Grassy and Armit being equally niggardly. Specimens of *Actinia* are also rare on the same places.

What I Found.

By A. H. CHISHOLM, C.F.A.O.U.

Chairman, N. S. Wales Section, Royal Australasian Ornithologists' Union.

IN the days when I was searching throughout Queensland for the lost paradise parrot,* not so long ago, I strolled into a Brisbane newspaper office at 9 o'clock on a Friday night, loaded with camera and sundries, and attired as one for whom the cost of clothes has no terrors.

"A bit north of Bundaberg—250 miles—back in three days."

"What's up there?"

"Going to see a parrot."

"What are you going to do with it?"

"Just look at it."

What more could be said? What use to



Naturalists in a Queensland jungle, about 5,000 feet above sea level. This is typical of the dense forest growth near the coast.

[Photo.—A. H. Chisholm.]

A quizzical journalist gazed judiciously. "Been out in the bush?" he asked.

"No," I told him. "Just going."

Journalistic eyebrows lifted. "At this time!" said their owner. "Where are you off?"

*The story attaching to the Paradise parrot has been told by Mr. Chisholm in *Mateship with Birds*, pp. 171-188.—EDITOR.

reason with an individual who would go 250 miles to "just look" at a bird. But the judicial one was interested enough to resume the dialogue on the Tuesday. "Hullo!" "How did you get on?"

I rolled up a trouser leg and showed a forest of blotches where sandflies had been ferociously busy.

"Put," pursued the questioner, amid chuckles, "didn't you get anything else?"

"Anything else?" You remember, reader, what the old American naturalist said: "Whichever way I go I am glad I came." Well——

RENEWING OLD ACQUAINTANCES.

We (botanist and bird seeker) dropped out of the Rockhampton mail somewhere about 9 a.m. on the Saturday, yarned briefly with the lengthsmen in charge of the little wayside station and started off on a walk of nearly ten miles towards the coast. It was a dry tramp in more ways than one. The country was semi-barren forest, the odd pools beside the way were cattle-tramped, and not one house showed up in the whole journey. But the very nature of the landscape made for compensation. It was curiously like a well-remembered district in central Victoria. I realised this subconsciously at first, and presently the idea became a pleasant conviction through the sight and sound of merry groups of fuscous honey-eaters chattering in the tree-tops. Fuscous means dusky, and dusky plumage indicates a plainly dressed bird. But lack of colour counted not at all in this case; here was the "linnet" of boyhood days, not seen before in Queensland; and as a certain back-street song says: "Gee, ain't it nice to meet a friend from your old town!"

In southern Australia it is usual to find in "fuscous" country a prettier honey-eater, the yellow-tuft, a playful sprite about the size of a sparrow, and just as assertive. The bird is stated to have been plentiful about the Brisbane district before its favourite eucalypts were destroyed, but for many years it has been sought in vain. And now, when least expected, here it was showing up and showing off in a remote part of the central district. In sooth, I felt like joining in one of the animated corroborees which half a dozen of the self-satisfied little creatures were holding up aloft. We could have exchanged some rare reminiscences.

After that I would not have been surprised to see the purple-crowned lorikeet, the only one of Australia's honey-eating parrots not recorded in Queensland; but it seemed that the screeching battalions of 'keets about the locality nearly all belonged to the tiny red-

headed species, known as the "gizzie" or little lorikeet, with just a sprinkling of the larger "bluies" (blue mountains), and "greenies" (scaly breasts). There were other honey-eaters, or course,—notably the insistent soldier-bird (miner)—but the only additional avine factors which emphasised the southern nature of the district were black-backed magpies, grey thrushes, babblers (chatterers), a solitary brown tree-creeper, numerous grey butcher-birds, and a note which sounded very like the monotone of the pretty shrike-tit.

For the rest, our companions of the wayside were either birds which are common to several States (the wagtail for instance) or species which, like the white-throated warbler ("bush canary"), and scarlet honey-eater ("blood-bird"), may reasonably be looked for in almost any part of Eastern Queensland. It was of more than passing interest to find rainbow-birds (bee-eaters) still common in the district, but even they did not challenge attention so much as the grey butcher-birds and their handsome black and white relatives. I know no other district in which these rich-voiced birds are so numerous.

THE ETHICS OF SNARING.

Speaking of butchers leads to a consideration of an individual whose pursuits are much more bloody and much less justifiable than those of any bird. Central Queensland coastal areas are favourite resorts of the 'possum snarer. All along the way we saw evidence of his pernicious activities. Snares were set against every likely eucalypt and tea tree, to the former of which Brer 'Possum goes for a gum leaf diet, while the flowers of the tea-tree provide the 'possum equivalent for human "sweets." The snare scheme is simple. A stout prop leaned against the tree is fitted with a noose of thin, pliable wire held in place by string slipped into a cleft of bark. The noose is just wide enough to admit the body of a 'possum, and just flexible enough to arouse the curiosity of the little animal as he meets it on his nocturnal pilgrimage, either up or down the fatally convenient prop. Curiosity killed more than a cat. The 'possum plays with the siren wire, which gradually tightens its noose, and when he tries to get away he is left

swinging below the prop, with the deadly strand binding tighter and tighter either round his (or her) body or neck. In the latter case death is mercifully quick in coming; but when the wire embraces the body the hapless animal must hang in agony until released by the snarer in his morning rounds. It is a ghastly ending for a likeable animal, more so when the mother instinct aroused by a suckling babe in its pouch impels a captured female to cling to life as long as possible.

And yet the snarers seem, on the whole,

'possum skins, and knowing that if you did not snare the animals someone else would; and then say whether or not you would embark on the business, inhuman as it is. It is just a question whether snaring, which has none of the fairness of our old game of 'possum shooting by moonlight, should not be prohibited as definitely as is the more dangerous, but less cruel, practice of cyaniding. Certainly at all events snarers should be compelled to observe a smaller noose; this would be less effective in captures, but



Ring-tail Opossums. These pretty animals, about three parts grown, were obtained from a nest in the hollow of a tree.

[Photo.—H. Burrell.]

a decent lot of men. "I hated the business at first" one of them told me, "but it is wonderful how callous a man gets after a while. The season should never have been opened this year, much less at breeding time; but when every other fellow is snaring, and skins are high-priced, why should I be out of it?" It is a nice problem in ethics. Sensitive noses may wrinkle at that question, but—what would you? Imagine yourself, reader, a hard-working selector, knowing that much cash was easily to be made out of

it would at least give the animal a quick death. The genuine hunter would readily do this; and for the other element—men who have given up steady jobs to seek big cheques as 'possum snarers, and those case-hardened individuals who allow their catches to swing from biting wires all day long—no consideration at all is needed.

A PATCH OF JUNGLE.

Well, to get on. Seven or eight miles from the railway and close to our farmhouse desti-

nation we strode gratefully into the shade of a considerable area of scrub (rain forest) that had sprung up somewhat irrelevantly in the sandy soil of the nearing coast. That patch of thick vegetation interested us both quite a lot, promising as it did to be a meeting-place of many northern and southern (Queensland) birds and plants. Subsequently, in fact, we spent the greater part of two days in and about the area. It was the first Queensland jungle area in which I have been unable to find either the rifle-bird, (there were no pine trees, beloved of this beauty bird) cat-birds,

hermit thrush of America has in no greater degree the quality of holy serenity that is contained in the melody of this jungle thrush of Australia. One of these shy birds lilted persuasively alongside a flying-fox camp, in which some thousands of animals screamed aimlessly as they scratched vigorously at the "scrub itch" on their breasts. There was never such a contrast in bush voices.

Odd pigeons called from the depths, occasionally hawks floated over the flying-fox camp, and now and again the jungle-loving varied caterpillar-eater (*Lalage leucomela*)



Nest and eggs of the Whip-bird (*Psophodes olivaceus*) which ranges from north-eastern Queensland to Victoria. The nest is generally about six inches in diameter by two and a half deep, and is always well concealed. The eggs are usually two in number and the ground colour varies from pale blue to a delicate bluish-white.

regent-birds, whip-birds, bower-birds, or dragoon-birds (pittas).

Nature must have a fine sense for adjustment, however, and in this instance the place of the pitta among the land-snails was taken by the rufous shrike-thrush (*Colluricincla megarrhyncha*), a brown-backed, fawn-breasted denizen of the brushes of north-eastern New South Wales and south-eastern Queensland, having the bright eye of the thrushes, and a more than usually beautiful voice. Surely the famed

uttered its reflective "Kar-r-r." But by far the greater portion of the avine population of the area belonged to the delightful family which ornithologists know as Muscicapidae, that is, fly-catchers and robins. The restless, rufous, and white-shafted fantails were to be expected; so, in a tentative manner, were the yellow-rumped robin (which, I had doubts of finding so far north), the leaden and black-faced fly-catchers, and the golden-breasted and rufous whistlers. But the pleasure

of again seeing these pretty birds was eclipsed by the renewal of acquaintance with the dear little rose-breasted and red-capped robins, and by the initial meeting with a charming northern bird known as the white-eared flycatcher (*Monarcha leucotis*). I certainly did not anticipate seeing either of the robins mentioned. Red-cap has a weakness for the dry spaces of the interior; accordingly, it was unusual to find more than one of the brilliantly coloured male birds flitting about the edge of a jungle near the coast of Central Queensland. In the case of the delicate rose-breast we had (in the absence of any record of the bird nesting in Queensland) been inclined to favour a theory regarding migration south; but the sight of a female drooping her tremulous little wings in a Central jungle area on April 18 (the date about which the species customarily reappears in Brisbane gullies) is solid evidence that the rose robins breed not only in South Queensland, but in the Central district coastal areas.

DOMESTIC FELICITY.

What interested most of all, however, was the lordly little white-eared flycatcher. This brilliant study in black and white (not the black and white of the familiar wag-tail, but a much more striking "patchwork" arrangement) was named by John Gould from a single specimen sent from Dunk Island in the early days of Queensland. Gould could say nothing general about the bird, and even fifty years later that veteran birdman, Mr. A. J. Campbell, had to admit to being unable to write anything relating to its nest and eggs. So, then, I gazed with the intensity of a picture show devotee at a pair of the pretty birds, which danced attendance on a single young one in the small bushes springing up in an abandoned sugar-cane field at the edge of the jungle. The juvenile, clad in modest black and white about the back and head, with a suggestion of buff on the breast, was able to snap up an occasional leaf insect on its own account, but nevertheless kept its fond parents going hard in its interests. Once, a parent bird grasped a large flying insect, at sight of which the young flycatcher flew up and appealed for practical sympathy. The adult promptly flitted to the next bush. The avenuous youngster followed, but not until

the insect was well and truly "bashed" would the wise parent allow the child to take it. And even then the parental gaze was very keen until the big mouthful was safely swallowed. Throughout all this the pair kept up a pretty, creaking chatter, which took an imperious tone on one occasion when the male bird became startled. He stood erect on slender little legs, quivered the dainty ruffle at the back of his neck, and plainly intimated that he was ready for any disturber of his domestic felicity.

Incidentally, it was a pretty coincidence that another pair of black and white birds, varied caterpillar-eaters, were tending a young one of about the same age at the same spot. This second juvenile (a replica of its mother but for the addition of adolescent markings on the wings and back) was also big enough to forage for itself, but it, too, maintained the parental interest by a babyish plaint. Between them these two families must have cleaned a lot of insects from the young trees.

WHAT'S IN A NAME?

"But"—here my journalist friend returns to the charge—"what about your parrot?"

Well, as I said, we trained 250 miles and walked nearly ten. Then, after a spell, we took the track again, crossed a tidal creek in a leaky boat, what time myriads of ravaging sandflies assaulted our defenceless legs, walked again, and finally came to a lone farmhouse where the rare bird was alleged to dwell. Our best German was all that the lady of the house could understand, and eventually we were pointed to a cage. Hope rose high—and fell again very soon. In short, there had been a misunderstanding through the irritating use of the same name for different birds in various districts; and the parrot we saw was one of a species which could be looked at in a dozen different cages in Brisbane!

And yet, as observed previously, which ever way I go I am glad I came. On this note it would be fitting enough to end, but there is a small sequel to be added.

A day or so later my interlocutor returned to the subject. "I told my boy," he said, "how you got on in hunting for a bird up north, and he wanted to know what you did it for. I told him you were an ornithologist.

"The boy looked puzzled. Then he shook his head. 'Huh,' he said, pityingly, 'I reckon he *must* be!'"