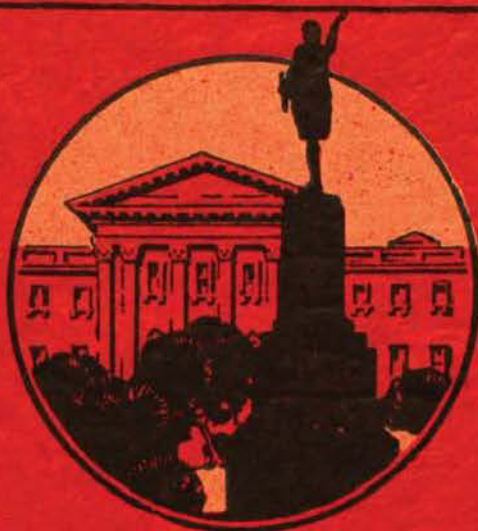


The
**AUSTRALIAN
MUSEUM
MAGAZINE**

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



- Infants that Commit Murder** - - - *A. H. Chisholm*
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An aboriginal carved tree marking the site of a native interment at Bell River, near Wellington, New South Wales. In the Australian Museum ethnological galleries there may be seen exhibits of such trees preserved from the elements for all time. This tree forms the central portion of the design for Mrs. Mary Gilmore's book-plate described in this issue.

[Photo.—*Henry Barnes.*



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Infants that Commit Murder

STORIES FROM THE REAL LIFE DRAMA OF THE CUCKOOS

By A. H. CHISHOLM.

IF there is one feature of bird behaviour that presents a deeper problem than any other, that feature is parasitism—the habit which certain birds possess of depositing their eggs in other birds' nests. It is a habit common to various birds, but chiefly cuckoos, in each of the six continents, and it is one that presents many particular problems within the main problem.

Here in Australia the challenge of the cuckoos is insistent, since we possess fourteen species of these birds and all save one are parasitic. What an opportunity is offered for Australian ingenuity to reveal some of the truths underlying this problem of parasitism, one of the strangest developments, and one of the most mysterious processes, in the whole realm of Nature!

How did parasitism originate? Did it arise on the same basis among unrelated birds? Why do most fosterers attack a cuckoo, yet accept the intruding egg? Does a cuckoo sit upon the nest to lay

or does it deposit the egg with beak or foot? Why is it that the cuckoo's egg in some cases resembles that of the fosterer and in other cases creates a striking contrast? Does a female cuckoo always, or usually, seek to lay her eggs in the type of nest in which she herself was born? What factor causes the infant cuckoo, while it is still blind and naked, to eject eggs or other young birds from the nest? Why is it that fosterers make no attempt to succour their rightful young when a baby cuckoo ejects them?

Why! why! why!—the Drama of the Cuckoo presents as many problems as a tragedy of Shakespeare. It is a drama that has engaged many nimble wits, and it will continue to do so indefinitely, not only because of its challenge to human emotions, but because it is a drama of the near-at-hand; it is being enacted, for example, in every forest, every jungle, and every heathland of Australia during spring and summer. That being so, it may seem odd that few Australians have

seen any phase of it. But the point is that you must be either very lucky or very patient to see this Nature play at its height. In all my years of bird-study I have never seen an adult cuckoo carrying an egg or actually visiting a nest. I have, it is true, discovered many cuckoos' eggs in nests, but only very rarely—such is the luck of the amateur bird-watcher—have I witnessed the most poignant episode in the drama, that is, the ejecting of eggs or young by the infant cuckoo. Curiously enough, after years of anticipation I was recently a spectator at two such episodes within a few months of each other, and it is these I propose to discuss here; other phases of the problem of parasitism having been dealt with in two chapters of my latest book, *Nature Fantasy in Australia*.

The first incident relates to a jungle area near Sydney on a bright day in mid-summer. The Governor of New South Wales (Sir Philip Game) was camped at the spot with some fifteen scout-masters, and they were much amused, and perhaps a trifle resentful, at the sight of a pair of the beautiful little red fantails dancing attendance on a young square-tailed cuckoo which already was almost twice the size of its devoted fosterers. An hour later, as we wandered beside the Port Hacking River, I recalled that a brother naturalist had told me of a square-tailed cuckoo's egg in a fantail's nest beside a certain creek in the jungle, and, leaving the party in waiting, I sought the nest. When found (and the finding was not as difficult as it seemed) the dainty cradle contained an infant cuckoo, perhaps thirty or forty-eight hours old; there was no sign of eggs or young of the fantail.

For perhaps fifteen minutes, then, the visitors watched with amazement the



"The usurper himself tumbled out on to the 'verandah'." Young Black-eared Cuckoo, where it fell from the nest after throwing out the young Speckled Warbler. (Note contrast of the "brunette" cuckoo against the "blonde" warbler.)
[Photo.—A. H. Chisholm.]

antics of this blind and naked scrap of bird-life. A small piece of fungus was placed upon its hollow back and the nest was caused to sway slightly. Immediately the young cuckoo wriggled fretfully. Then, as the swaying continued and the fungus rolled gently backwards and forwards, the blind baby became an enraged gnome; it squirmed and twisted, grasped the bottom of the little cup-shaped nest firmly with its feet, wriggled its hand-like immature wings about, put its head down for further leverage, and, moving backwards to the side of the nest, reared up and, with a sharp jerk, threw the intruding object over the rim of the nest.

Here was a curious sight—vice-royalty and a bevy of scout-masters, all of whom were more or less familiar with the countryside but had never before seen such a drama, standing in a dim jungle near a city, watching an inch-long, naked, blind atom of a bird showing how it practises murder in order to preserve its own life!

Yet it is not many years since a sober-minded British naturalist declared that narratives of infant cuckoos casting out other young birds should be classed with "the equally well-authenticated stories of ghosts and other apparitions which abound!"

The scene changes now to a forest area on the western fringe of Sydney on a day in spring. On this dry, tree-studded plain, which stretches away to the foothills of the Blue Mountains, there lives a curious little ground-bird known as the speckled warbler—*Chthonicola sagittata* of the ornithologist, and "Speckled Jack" of the schoolboy. The nest of this distinctive bird, built into a recess beneath debris or a small bush, is not often found; and it is always worth finding because of the beautiful eggs, uniform reddish-brown in colour, and because the species is the chief host of the rare black-eared cuckoo, which also lays a reddish-brown egg. Accordingly, we were a pleased trio of naturalists when, on this sunlit day of September, one of us came upon a speckled warbler's nest containing three eggs.

The eggs could not be seen in the cosy chamber behind the side-entrance of the fibrous home, and so I took the risk of removing them. Who was to say that a black-eared cuckoo had not found this well-hidden nest before us? The entrance, it was true, had not been disturbed, and as it would only admit one finger it had certainly not been entered by the starling-sized cuckoo; but it was still possible that the parasite had placed an egg in the nest with her beak, and, in order to maintain the clutch at three, had flown off with one of the warbler's eggs. So, then, I placed a forefinger in the nest, manœuvred carefully, and lifted an egg into a companion's waiting hand. It was the charm-



"He completely filled the nest." Black-eared Cuckoo a fortnight old.

[Photo.—A. H. Chisholm.]

ing dull-red egg of the speckled warbler. So, too, was the second one. But the third egg was slightly larger and slightly darker; three pairs of eyes peered closely at it, and three men gasped with pleasure at the realization that, for the first time in the experience of any of them, they had found the rare egg of the black-eared cuckoo.

Had any of us been an egg-collector he would have esteemed that clutch as a first-rate prize. Had any of us been a sentimentalist he would perhaps have felt inclined to remove the cuckoo's egg in order to save the baby warblers. But, not being afflicted in either manner, we merely examined those eggs closely—we marvelled at the uncanny colour-resemblance in a case in which protective coloration seemed unnecessary (that is, in a domed nest, where the eggs cannot be seen); we noted also that although the cuckoo is twice the size of the warbler the eggs were approximately the same size; and we rubbed a little of the reddish

colour off the cuckoo's egg and noted that this could not be done with the warbler's eggs—and then we carefully replaced all three eggs and left them to hatch.

Two weeks later I came to the nest again. This was merely a casual visit, for it was not expected that the eggs would have then been hatched. But the first thing I saw on reaching the nest was the dead body of a newly-hatched warbler lying on the "verandah" at the entrance. It had been thrown out by its cuckoo foster-brother and had died fairly under the eyes of its parents. One can understand adult birds losing sight of a newly-hatched infant (one unable to call) that has been ejected to a point some distance from a nest, but what is to be said of these birds, which stepped over their dying infant every time they went to feed a changeling! Indeed, with a little gentle effort they could easily have pushed the stricken birdling back into the nest-chamber.

I hoped, on seeing the dead warbler, that its brother was still in the nest—that I had arrived in time to witness the most moving episode in the cuckoo drama. Sure enough, two fingers inserted in the nest withdrew both a warbler and a cuckoo, the former, like its dead relative, being pinkish in body and lightly covered on the ridge of the back and on the head and wings with greyish-white down, and the interloper being a forbidding little creature, leaden-black in colour and entirely featherless. Both birds had the eyes unopened, and both appeared to be about the same age, perhaps two days old; evidently the mother cuckoo had watched the nest carefully, and, by depositing her egg immediately the clutch was complete, had ensured her offspring being hatched at about the same time as the young warblers.

But what a transformation was this!—the eggs of the warbler and the cuckoo bore a striking resemblance, yet the products of those eggs were as unlike as baby birds well could be. Are we to assume that the warblers might have distinguished a contrasting egg, but could not distinguish, or were willing to tolerate, a contrasting babe?

When the young warbler and the young cuckoo were replaced in the nest they rested quietly for a few moments. Then, as the warbler began to fidget after the manner of most unfledged birds, the cuckoo showed strong resentment; he writhed and shrank into the floor of the nest, turning and twisting until the warbler fell across his hollow back; this accomplished, a convulsive shudder shook the cuckoo's body, and, bowing his broad head in the manner of a bucking horse, planting his powerful feet firmly in the fibre, and using his sprawling, claw-like wings as fore-feet, he shuffled backwards to the entrance, and, with a resolute jerk, threw the weaker infant over the slight entrance-ridge and out of the nest.

What an uncanny little creature that blind cuckoo looked, quivering there on the edge of the nest! His leaden-black skin, gleaming dully in the spring sunlight, suggested something reptilian, and his curious leg-like wings, with their serrated edges and thorny tips, helped the body and the legs to suggest a miniature of some grotesque monster of old. It was difficult to imagine this ugly atom growing into a shapely master of the air.

Presently the cuckoo sprawled back into the nest and I placed the young warbler beside him. Again they rested, but again, within ten minutes, the smaller bird was ejected, the cuckoo moving backwards with strange accuracy to the opening of the nest and throwing his burden out. This time, however, one of the cuckoo's wing-legs (or should it be wing-arms?) became caught around the warbler's neck, with the result that the usurper himself tumbled out on to the "verandah," upon which, greatly to my surprise, the tiny warbler wriggled free, scrambled over the top of the cuckoo, and actually dived back into the nest-chamber! A few moments later the cuckoo followed suit; he scrambled a few inches along the fibrous platform and dived inside.

Still the drama proceeded. Again the cuckoo threw the warbler out, and this time, as he rested on the edge of the chamber, I (interfering for the first time) tickled his back with a straw. This was intolerable to the nery little creature; he fidgetted and shrugged so much that

he threw himself out on to the platform again, but again, and apparently without difficulty, he scrambled back into the nest.

Now, the question that arises here is this, How did that blind young baby cuckoo, to say nothing of the blind young baby warbler, not only realize that it was desirable to return to the chamber, but actually discover its entrance? It has long been a matter for conjecture as to how, in a domed nest, a cuckoo with eyes unopened ascertains the point at which to throw its burden off; and it has been suggested, variously, that the entering current of warmer air indicates the opening, and that light from outside has some slight influence on the dawning ocular consciousness of the cuckoo. In the present case, although the position was reversed, it seems possible that the stranded babies were guided by a draught of cooler air, a suggestion of that which we feel when standing at the entrance to a cave. Aside from this theory, I can only surmise that something in the "feel" of the fibre, or perhaps the aroma of the chamber, guided those infants back.

All of this drama, as I have said, took place on a spring morning, and I watched its play from a kneeling position, peering into the chamber of that neat little nest on the ground. There were no other naturalists present, but there were several city folk, all of whom stood amazed at what they saw; and, moreover, there was a girl of six years, who became so annoyed with that "naughty cuckoo" that she

had to be forcibly restrained from killing him. Indeed, one of the men who looked on, marking the murderous determination of the cuckoo, was inclined to think it would be well to remove him and "give the little fellow a chance." Interference of this kind, however, is no part of a naturalist's function, and so, while sorry for the warbler that was destined to be killed, we left him to his fate.

Little more remains to be told of this particular cuckoo. Thirteen days later we re-visited the nest and found the young black-ear in sole possession; there was no sign of the young warbler. Now fourteen to sixteen days old, the cuckoo was a lusty and truculent fellow, snapping viciously when a finger was placed near him. Breast-feathers were still scanty, but he was well fledged on the back, a tail had taken shape, and those ugly little "arms" had become normal wings. Already bigger than his foster-parents, he completely filled the nest, a fact in itself sufficient to indicate that a growing cuckoo cannot live with other birds in a small nest, and that the early trial of strength is the only way out.

Three days later again, when the cuckoo had just left or was due to leave the nest, a further visit proved fruitless; the adult speckled warblers were twittering sweetly near by, but their changeling had gone. He was not fit to fend for himself at that stage, and had, quite certainly, followed his victims to a violent death.

Recent visitors to the Museum include Dr. Charles H. Rogers, Curator of the Museum at the University of Princeton, New Jersey, U.S.A., who was passing through Sydney on his way to Siam; Vice-Admiral Nobujiro Imamura and Lieutenant-Commander R. Namba, of the training squadron of the Imperial Japanese

Navy, recently in Sydney Harbour; Mrs. Mary Gilmore, well-known authoress, an article from whose pen appears in this issue; Mrs. E. W. P. Chinnery, Rabaul, seeking information on pottery-making in the Pacific; Mr. Charles Barrett, C.M.Z.S., of Melbourne, a frequent contributor to the MAGAZINE.

An Aboriginal Book-Plate

By MARY GILMORE.

IN the Museum section of aboriginal antiquities there is a happy hunting-ground for the designer of book-plates, and, in literature, for head and tail pieces. For a book-plate which I lately had made, I took the eagle totem, and for two reasons. One is that my father's people in Scotland had the right to wear the eagle feather, and the other because the aboriginals, where we lived when I was a child, and to whom I was sister, called me "the child with an (or the) eagle mind." On account of that I always had an eagle feather put in my hair whenever one was found. Sometimes it was stuck there by a native, sometimes by my father, and sometimes by the stockman who shot it. No matter whose bird it was, a feather was brought home for me.

Now, as with the early European races, among the natives themselves the right to wear an eagle's feather had to be earned. A man had to kill his eagle with his bare hands before he could wear the feather. The great chief of the Waradgery sept (which, I believe, extended from Scone on the coast, to Narrandera and the Murray) had five when I first saw him in a gathering of head-men and chiefs, two others had three or four, and several had two and one. A youth, the finest human creature I ever saw, and who was being trained, when of full age and experience, for election as chief, came into that gathering (which was a great tribal conference) wearing his first eagle feather. I can remember my father talking with wonder of this youth, as his feat to obtain the feather had required not only cunning to reach the bird before it could rise or turn in attack, but also swift

and ready action, and when in holts enduring strength. The eagle had to be caught from the back, as his talons would tear the uncovered body, his great beak rip, and the beat of his wings flog like



flails. The youth wore his feather high, for he had escaped without a scar.

To take his bird, and with the highest honour, the lad had chosen a king eagle. Having found his quarry he studied its location and habits for two or three weeks, daily creeping nearer the nest and standing like a stump whenever the attention of the bird seemed to be aroused. On the

last three days, without food or water, he had to stand practically motionless close to a point by his objective, and moving nearer only in the night. It was the one spot from which he could leap to the bird's back if there came a moment when it could take the position in which he could best come at it. There was actually but one angle from which he could reach his quarry, which had to alight so that it would be opposite a single narrow space between two tall rocks. In addition he had to hope that the bird would so turn that its eyes would not catch his first movement towards it. Also he had to take the sun's time, so that his shadow would be behind him, and not before or beside, as in such case his movement would be visible the moment he sprang. Then, as the sun moved toward the solstice, and so changed its own position in relation to the site, it too narrowed the space available for use.

In the last days the Kubba had to remain on watch all the time, only getting away for a short time in the night, because, if his place had been once day-vacant the nesting bird's keen eye would have noted with alarm that the place was not always the same. Besides this, as they sat in turn, he had to get both birds slowly accustomed to the human smell near the eyrie. But there came a time when he had to act whatever came or went, as the sun was working round, and his shadow would soon betray him. In addition, he was growing weak for want of sufficient food and water, and before him was a struggle that would take all his strength to carry it through—and whose whereabouts he had kept secret, as that enhanced his honour in victory. The Gods must have been good to the lad, because, for the first time in his watch, and on almost the last day possible for the capture, the eagle, flying home to relieve the female, settled down where he was wanted. The Kubba leapt, caught the bird by the back of the neck, and the struggle began. The courage of the action needs no comment, for while he fought the male he was liable to attack by the female, should she, who had already flown off, return to the aid of her mate. The prize was one of the largest in the district.

It had taken three calves that season (sheep were not common in the locality, it was all cattle then). I saw the leg-bones lying about, as my father, proud of the youth's exploit, had driven out so that we could see the place. The spot was on the Tarcutta hills, where there was a small platform of earth not much more than the size of a dining-table, on which the nest was built, with a good take-off for birds heavy in flight. Two upright rocks stood just at the back of the nest. I give the full description in case some of the old people about Oura or Tarcutta remember or recognize it. The road made later may have cut into it.

As to my book-plate, so that I could explain just what I wanted, I asked Mr. Gayfield Shaw, the etcher, to go with me to the Museum and look through the aboriginal antiquities there—for antiquities they now are, as there is almost no one left, today, who can elucidate their intricate meanings. No mark on anything was ever made by chance, nor without the sanction of tribal law and lore. Nothing was accidental, the smallest point and line had intention. In my plate, however, I have not followed tradition, but have taken as I would. The main feature in the drawing, though seeming subsidiary, is the churinga, which is repeated all round the design. The subsidiary marking, though the most obvious, is the tree with an aboriginal pattern cut into the wood. I cannot pretend to interpret this, but I recollect that my father said of similar ones that they were like escutcheons among European families, that is, were merely of heraldic and individual importance, or as distinguishing a great chief either at election or when he had done something remarkable in war, in law-giving, or in feats of strength or endurance, and the same for the tribe as a whole. These tree markings had not the deep significance of the churingas, which, besides being religious, carried right back to what, to us, were prehistoric beginnings. In my churinga (I call it mine) is shown the endless spiral of time and the eagle's flight in the heavens. In that flight the king eagle soars to the centre of the height above his own territory (his companion eagles, as every one knows,

circle east and west, and north and south, but farther out, than he does). In the churinga he soars toward the sun, and the sun is shown with the short rays of winter, the long ones of summer, and the intermediate (in equality of length) of the two solstitial periods. The bird's range is a spiral, but the sun moves in an arc—daily and solstitially—and this too is shown. I well remember my father's astonishment and sense of discovery at finding that the natives knew the solstices just as truly as we did. I was too young to keep in mind all that he said about how they measured for the period, except that it was done by means of certain fixed mountain-rocks known to the tribes. One of these was somewhere near the source of the Clarence River. It was a rock mass that neither earthquake nor landslide could shake out of position. When the sun's edge at setting just touched the down-line on one side of this rock, and the sun's rising at the other edge, it marked the period of the sun's turning. The solstice was either just then, or within so many days of that; I cannot now remember which. Watch was kept by those chosen for this duty, which was of the utmost importance, the year being measured by it, and tribal ceremonies dependent on it for date. When the watchers marked the time, messages were sent to all the tribes. The aboriginal ceremonial year was half the length of ours. And I well recollect my father saying that the aborigines measured the sun's course, and their year, as accurately in their way as we did in ours.

I have used the expression "king eagle"; it is a translation of the aboriginal word.

A similar expression is used by the Indians in South America. And I still say, as I so often did on my return from Patagonia (where there were still Indians who remembered their past) and as I also wrote to Sir Baldwin Spencer some time before he went there, that we will almost certainly have to go to the South American antiquities in order to unravel our own.

Before ending, I would like to say of the word *kubba* which I have used, that that word, together with *cobba*, *cooba*, and *cobbera*, were our forms of the aboriginal word *ngcobbera*, which meant a neophyte, or one newly initiated into the bora circle. I remember that my uncles always said that they looked for a *kubba* as guide or helper when out after stock, because, being young, such were biddable, and "not having the memories of injury suffered at the hands of the whites that older men had, *they were not so likely to be treacherous.*" (The italics are mine.) A *kubba* was a mate, and hence our later word *cobber*.

In conclusion let me say, with all the emphasis at my command, that the aboriginal antiquities at the Museum are worth a world's studying, and especially to Australians if only for purposes of a national art typical of this country; in part like, yet distinct from that of the rest of the world. As to my own book-plate, I think it is the first of its kind, though I have seen one somewhere with a conventional blackfellow, and an equally conventional boomerang. This is not enough for art, and it is unworthy of the people we so unmercifully displaced, yet whose work we should apply.

The attendance at evening lectures in the Museum has not diminished, the Lecture Hall being crowded at each lecture. Most of the audience are habitués, but each lecture brings newcomers. These are readily identified by their enquiries regarding the entrance to the Lecture Hall, which is cunningly concealed behind a number of exhibition cases.

Readers of the MAGAZINE will be familiar with the extraordinary forms of the deep-sea fishes trawled by the Danish *Dana* Expedition on its voyage around the world. Through the courtesy of Professor Johannes Schmidt, leader of the expedition, we have received a consignment of peculiar lantern-fishes and deep-sea Angler Fishes, a selection from which will be placed on exhibition.

Recording the Song of the Lyre Bird

BY R. T. LITTLEJOHNS, R.A.O.U.

IN June, 1931, the first permanent recording of the song of the Lyre Bird was made in the Sherbrooke Forest, near Melbourne, and was broadcast in Australia and, later, to England and America. This recording, though remarkably efficient in the main, was subject to some microphone blasting on the loud notes due to an undetected fault in the recording equipment. Because of this fact, a proposal to make a gramophone record of the song was deferred temporarily.

On the 29th May, 1932, therefore, the sound recording plant was again taken to Sherbrooke, and a quarter of a mile of wire was laid to two microphones concealed at different points in the forest. Those who have had experience of Lyre Birds in their natural state will realize that considerable investigation and organization were required to determine a position, or two positions, where the birds would not only sing within fifteen feet of the microphone, but would give there a complete and sustained song from which a representative recording could be made.

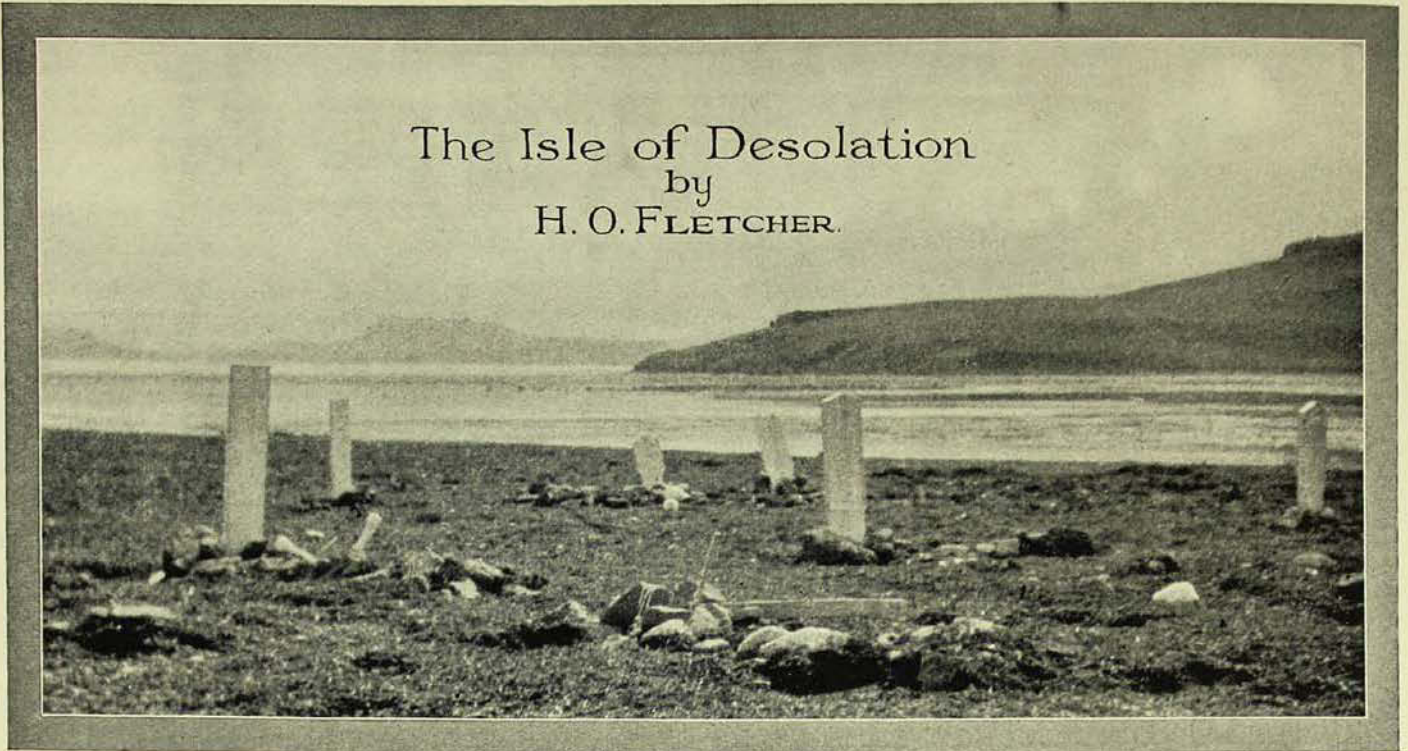
Weeks were spent in observing two males which occupied territories within reasonable distance of the edge of the forest, and which were known to be efficient songsters. One of these was the bird recorded in 1931, and the other occupied adjoining territory nearer to the edge of the forest; both are mature birds and fine songsters. As soon as the singing season commenced early in April, these two birds were shadowed day after day. At first the singing was desultory and occurred disjointedly between periods of feeding. It was impossible at this period to forecast where it would take place. As the season advanced, however,

it became apparent that one point, or, more correctly, one small area within its territory, was resorted to by each bird when internal satisfaction or other circumstance provoked that varied and sustained song for which the species is so justly famous. The favourite singing area of the bird recorded in 1931 contained four closely grouped mounds, whilst the other bird shows a preference for logs and fallen branches, and seldom sings for any lengthy period from a mound. One microphone was hidden in the undergrowth centrally between the four grouped mounds, and the other was hidden in the centre of the group of logs preferred by the second bird. This preference of the male Lyre Bird for a singing place is a well-defined habit of all the individuals which I have studied closely.

This year's recording features the bird which prefers to sing from logs. The subject of last year's attempt did not visit the mounds chosen until a very complete recording had been supplied by his neighbour. For upwards of half an hour he sang from a position which could not have been more than a few feet from the hidden microphone, and twelve minutes of faultless melody was recorded. The reproduction of this year's song is entirely free from the defects which were present in the previous effort and, after years spent amongst the birds, I am satisfied that the recorded song is not noticeably inferior to the original.

The gramophone record is to be issued shortly by Herschell's Pty., Ltd., of Melbourne, who have already done much to bring the interest and the capabilities of the species before the public. One side of the disc will be devoted to the song and the other to a description of the bird and its habits.

The Isle of Desolation
by
H. O. FLETCHER.



A not uncommon sight on sub-antarctic islands. Grave Island at the entrance to Royal Sound, Kerguelen Island.

[Photo.—H. O. Fletcher

THE philosophers and astronomers of the fifteenth century considered that a great continent must exist in the far south, and in 1515 the globes of Leonardo da Vinci and Schoner definitely show a vast land mass lying in the southernmost portion of the sphere. This continent, based solely on man's credulity, was, strange to say, not grossly inaccurate in position, shape, and size.

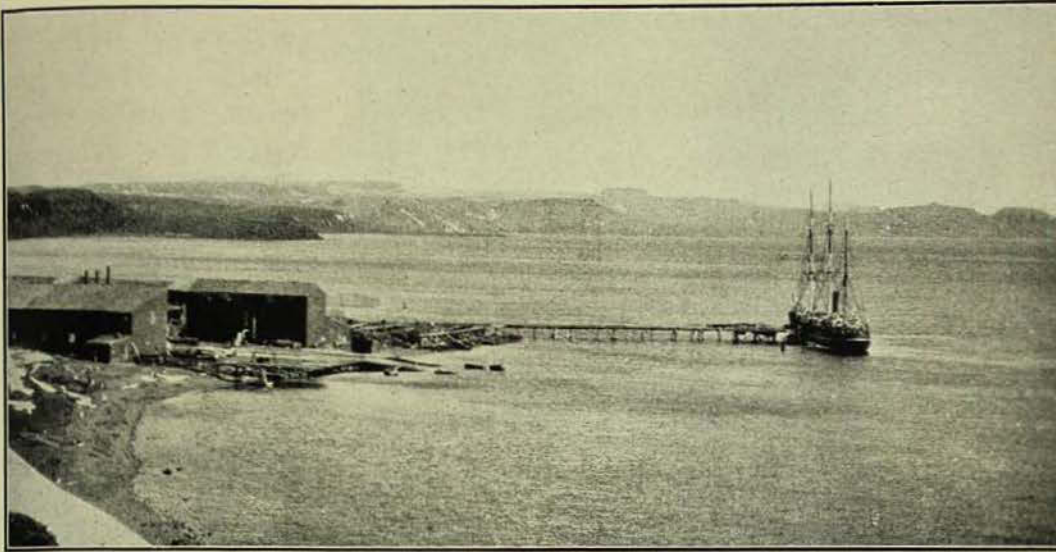
EARLY VOYAGES OF DISCOVERY.

Vasco da Gama in 1497 rounded Africa and thereby confounded the view of Ptolemy that a great continent bound Africa to Asia, and together with other early voyagers proved that the age-long dread of the tropics was unjustified. The gateways to the south were now open and many nations sent their best navigators to investigate this great southern ocean which passed into the unknown.

It was during these voyages of discovery that various island groups were first placed on the map, each in turn supposed to belong to the great southern continent until this was disproved by later seafarers. Early reports appear to show that many navigators on sighting a strange land mass would return in all haste to the homeland,

carrying the great news without further investigation, and in many instances the reports were very inaccurate. The French navigator Marion du Fresne in 1772 found the islands now called Marion and Crozet, and his name, Terra d'Esperance, was symbolic of the hope of all the early navigators, that at last they had reached the threshold of this great nameless and unknown territory, which, according to their learned men, was as large as the habitable world at that time.

To Lieutenant Kerguelen-Trémarec, a French sailor, we owe the discovery of the largest of the sub-antarctic islands. This romantically minded sailor, no doubt inspired with the same hope as his fellow voyagers, on the 13th January, 1772, sighted a large land mass through the fog and rain. The treacherous coast and the tempestuous state of the weather forbade a landing, but from his cursory glance Kerguelen returned to France with a most highly coloured account of his discovery. He reported it to promise "all the crops of the Mother Country" and to "furnish marvellous physical and moral spectacles." He was hailed as a national hero and the following year was granted leave to return to his new land



The deserted whaling station at Port Jeanne D'Arc, Royal Sound.
[Photo.—H. O. Fletcher.]

for a further investigation. It was from the results of this cruise that most of the early knowledge of Kerguelen Island was secured. The French did not accept Kerguelen-Trémarec's second report with the same enthusiasm as the first, and, feeling they had been imposed upon, threw the navigator into prison. He remained imprisoned until his death, but before his last moments, it is recorded, he expressed a wish that the island should be known as the Island of Desolation.

LATER VISITORS.

Several years after the discovery of the island, Capt. James Cook, during a voyage of discovery in the South Seas, came across Kerguelen on Christmas Day, 1777, and anchored his two vessels, the *Endurance* and the *Discovery*, in a bay which he called Christmas Harbour.

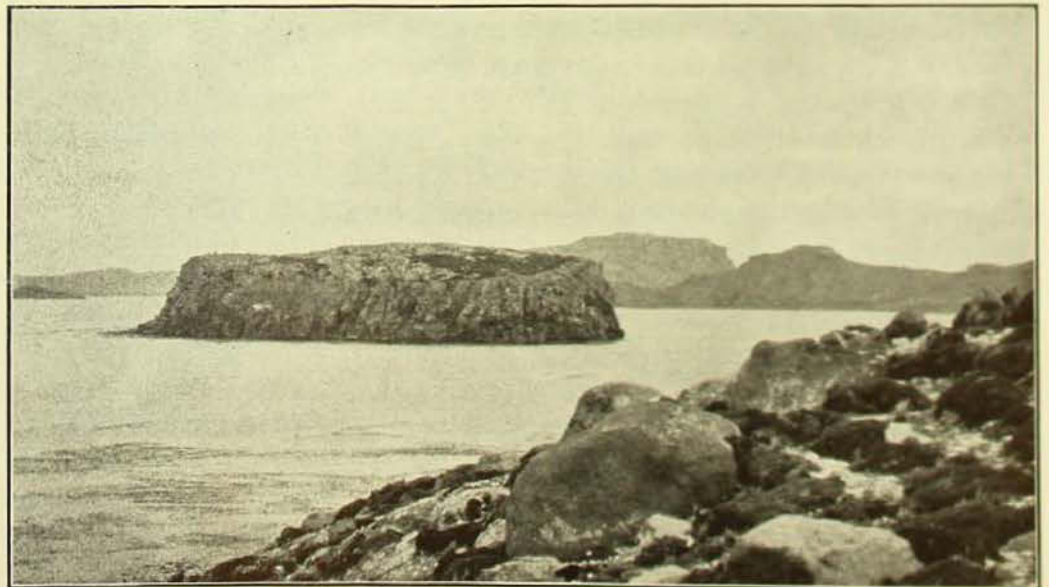
Some of the most fascinating chapters in the history of the sub-antarctic islands are furnished by the commercial voyages made south by the sealing and whaling sloops, and there is

little doubt that many of the islands were known years before the discoveries were reported; the existence of these islands was kept secret as long as possible, as the ships belonged to rival companies.

Kerguelen Island not only attracted the sealing vessels, but the lure of this unknown island and the scientific know-

ledge it might impart as a faunal link between the Antarctic continent and the three great continents of the southern hemisphere drew many ships towards its shores.

The *Erebus* and *Terror*, under the command of Capt. Sir James Clark Ross, spent the winter of 1840 on the island, making a complete zoological and geological survey. The *Challenger*, during her three and a half years world cruise, devoted a good deal of time to Kerguelen, and in her scientific reports many pages deal with the fauna of the shores and the adjacent waters. A touch of romance is also lent to the island when one realizes that it was



One of the many steep-sided, glacier-formed islands in Royal Sound on which vegetation is still luxuriant.

[Photo.—H. O. Fletcher.]



Anchored in the calm waters of Island Harbour. At left an abandoned sealing vessel.

At left an abandoned

[Photo.—H. O. Fletcher.]

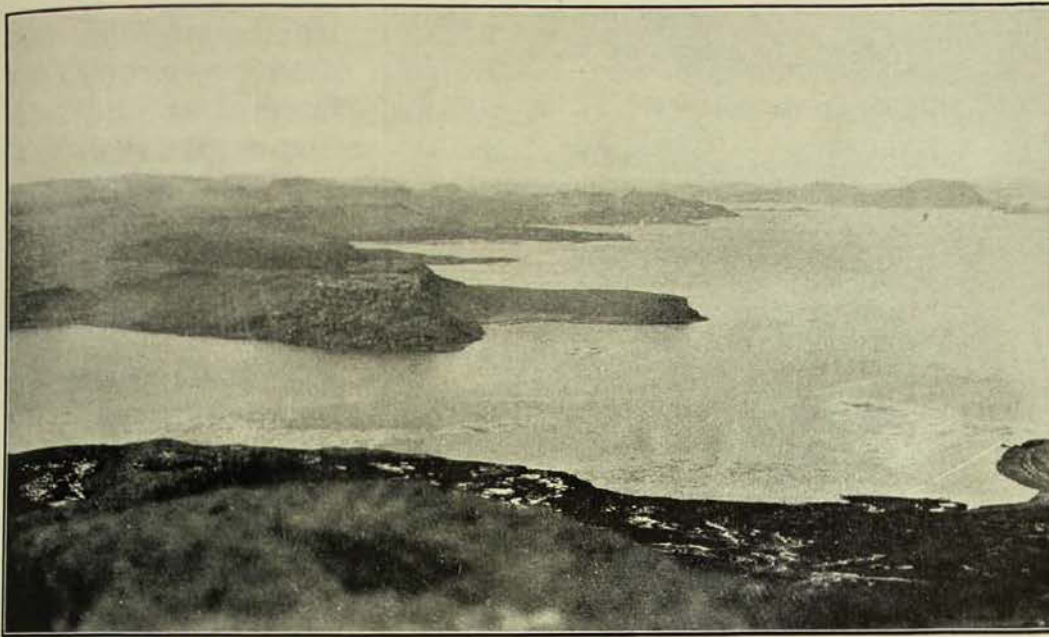
the very early reports of the navigators telling of the remarkable antics and human-like mannerisms of the penguin life which gave the island the name of the "Land of Little Men," and lent inspiration to Anatole France for the foundation of his great work of satire, "Penguin Island." The island was again visited 70 years later, when another Frenchman, an adventurous surveyor, named du Batty, hearing such glowing reports from this isolated outpost of his country, decided at all cost to make further acquaintance with it. A small ketch was purchased and in this he set out with several comrades on a remarkable voyage to Kerguelen Island, which was reached without sighting any other land. Here he stayed for several years, charting and surveying the numerous waterways and harbours, finally presenting his chart to the French government. To assist in paying the expenses of the trip they secured as many barrels of sea elephant oil as the small ketch would hold, but, unfortunately, on their trip to Australia the majority of it had to be jettisoned in the stormy seas of the "Roaring Forties."

KERGUELEN TODAY.

Du Batty writes of large white animals, with long flowing hair, which ran with the

swiftness of the wind, but these were later found to be North American sledging dogs which had escaped from the German Antarctic Expedition that had called in at the island; a party was left at Observatory Bay to watch the Transit of Venus, and it was during the transshipment of the stores and the landing of the sheep that the dogs escaped. These have bred and multiplied, the climate and conditions apparently

agreeing with them, until now there are a good number scattered all over the island. When seen they creep under cover and will not approach, being satisfied to follow at some distance, but never taking their unwavering eyes from man, an object which appears to awaken some tender chord of memory within their minds. As the island became more known, and the sounds and fjords were charted, a Norwegian company chose the island to build a factory, and on the upper reaches of Royal Sound a large boiling-down works was built. It was not a success. In the first place the twenty-mile tow inland to the factory was a great handicap, and, secondly, the difficulty of getting flensers and workmen to remain for any length of time also hastened the end of this venture. The walls of the living quarters are scrawled with messages in the languages of many countries, but all with the same desire, the craving to return to civilization. A nearby graveyard reveals the sad story of many young men, and bears mute testimony to the hardships these men must have endured. A large bronze crucifix that had survived the battering of many a stormy year still stood high on one of the headlands, facing the setting sun, and attached to it in a small bottle was a



A typical view of Kerguelen with its mountainous scenery and innumerable waterways. A view from Red Dome, 1,000 feet above Royal Sound.

[Photo.—H. O. Fletcher.]

message of thanks to the Almighty for allowing the ship which had carried it to cross the troubled waters and make a safe anchorage at Kerguelen with all on board well. The Island of Desolation! How the name comes back to one's memory after seeing scenes such as these. What an apt name in view of the broken down sheds and huge boiling-down vats and steam digesters that must have cost thousands of pounds to carry there and build. Now the woodwork only requires the slightest touch to cause a collapse, and in charge of the whole, are thousands of the large grey Norwegian rats. Playing in the squares which once thrived with industry are hundreds of small miserable looking rabbits, liberated as a means of livelihood for shipwrecked mariners, and which have now overrun the island. On the main island the vegetation is kept low by the depredations of the rabbits, even though in the winter months and many summer months they have to burrow through snow to get at the vegetation. The many small islets situated in the Sound still bear their virgin vegetation, rising to a height of five and six feet.

Passing down the sound into Boat Harbour, which lies at the southern extremity of the Prince of Wales Foreland, one sees further evidence of the inhospitable nature of this island. A series of some eighteen or twenty small whitened boards

mark the resting places of the victims of that dread disease "beri beri," the curse of early sailing voyages. These sailors and passengers were from the full-rigged ship *Isaac Hicks* on a voyage from New London to Rio, which had arrived at the island too late for many to obtain relief from the plentiful supply of cabbage and seal meat on the beaches and foreshores. Anchored in a protected part of

the sound is a steel sealing vessel, abandoned because of damage done to the rudder and stern post, and destined to lie there till her plates rust through.

Kerguelen Island is about 85 miles long and in extreme width about 79 miles, but the coast is so much indented with sounds and fjords, which form a veritable network of waterways, that the area of the island is not more than, roughly, 2,050 square miles. Its position extends from Lat. 48° 39' S. to Lat. 49° 44' S. in the Southern Indian Ocean, and its longitude is practically the same as that of Bombay. The island is mountainous, but in the valleys there are found level tracts of boggy marsh or peat bog. The raising of sheep has been attempted many times at Kerguelen but always without success. In 1913 about a thousand sheep were landed and left in the care of three shepherds, but the results were not encouraging. In 1909 a flock of twenty was landed and of these only thirteen survived five years later and none had been born. Of another flock of twenty landed in 1911, five died in three years, so that these results clearly show that Kerguelen is unfitted for sheep raising. Reindeer have not yet been tried, and the climate is not cold enough for successful Arctic fox breeding.

The island lies within the belt of rain at all seasons of the year, and, as the temperature rarely rises above 45° F.



The twin peaks of Mount Ross in the distance and one of the many marshy valleys in which Teal abound.

[Photo.—H. O. Fletcher.]

in the summer, the soil and vegetable covering is always permanently saturated with water. These conditions, although unfavourable for sheep, are ideal for waterfowl or duck, and on the flat marshy areas of Kerguelen thousands of teal are found.

THE TEAL DUCK OF KERGUELEN.

The Teal duck of Kerguelen Island (*Querquedula eatoni*) is somewhat larger than our common teal, and is of a brown colour with a metallic blue streak and some little white on the wing. The male bird has more metallic colour on the wing than the female and is slightly larger and heavier in build. The teal are very good eating and have been a blessing to all ships which have put into Kerguelen for water and meat.

The teal are found mostly in flocks when feeding, but when travelling on the wing for considerable distances will fly in threes of invariably two females and one male. They are exceptionally tame, and require to be kicked up to afford a shot. It is very disconcerting to go out duck shooting and find that the duck has to be hit with the barrel of the gun before it will take to the wing. Needless to say the bags were large, and for days after-

wards at our hut, duck was on the menu in all the forms in which it could be prepared.

Imagine the consternation of a duck shooter if on his approach a flock of ducks numbering about 150 rose in the air, and, instead of flying away in alarm, flew towards him, pitching about forty yards off and running in his direction in a row like farm-yard fowl. The teal breed early in the season and build excellently constructed nests, placed under

tufts of grass and lined with down torn from the breast of the parent bird. The teal, on being startled near its nest, will



A roaring cascade of water terminating in a 40 foot fall. Thaw water from the towering ice-capped Mount Ross.

[Photo.—H. O. Fletcher.]

flutter a few yards as if maimed, dragging a wing or leg limply, until the intruder is well away from its nest, when it will take flight. It is a remarkable thing that

these birds should have retained this instinct when there are no four-footed or human enemies to arouse the cunning of their kind.

The Australian Museum *Mystriosaur*

BY C. ANDERSON, M.A., D.Sc., C.M.Z.S.

VISITORS to the palæontological room of the Australian Museum will observe a number of large specimens displayed on the railing of the gallery. Most of these are plaster replicas of famous reptilian fossils, contained in various museums, but two are original specimens, and one, labelled "*Original Mystriosaurus*," is a particularly fine example of its kind. It was found in the famous slate quarries of Holzmaden, Württemberg, Germany, which have yielded so many beautifully preserved examples of extinct reptiles. How did this specimen reach Sydney?

HISTORY.

In 1879-1880 a great International Exhibition was held in Sydney in the Garden Palace, a building erected in a commanding position in the Botanic Gardens. To this exhibition the well-known firm of Krantz, Bonn, dealers in minerals, fossils, and other natural history specimens, sent a number of exhibits, among which was our *Mystriosaurus*. The Trustees of the Museum, who had previously made purchases from Krantz, seized the opportunity of acquiring this fine specimen for the collection.

ITS RELATIVES.

The *Mystriosaurs* belonged to the family Teleosauridæ, marine crocodiles which externally somewhat resembled the existing gavials, or long-snouted crocodiles of India, though this external resemblance does not indicate close relationship, *Mystriosaurus* and its allies differ-

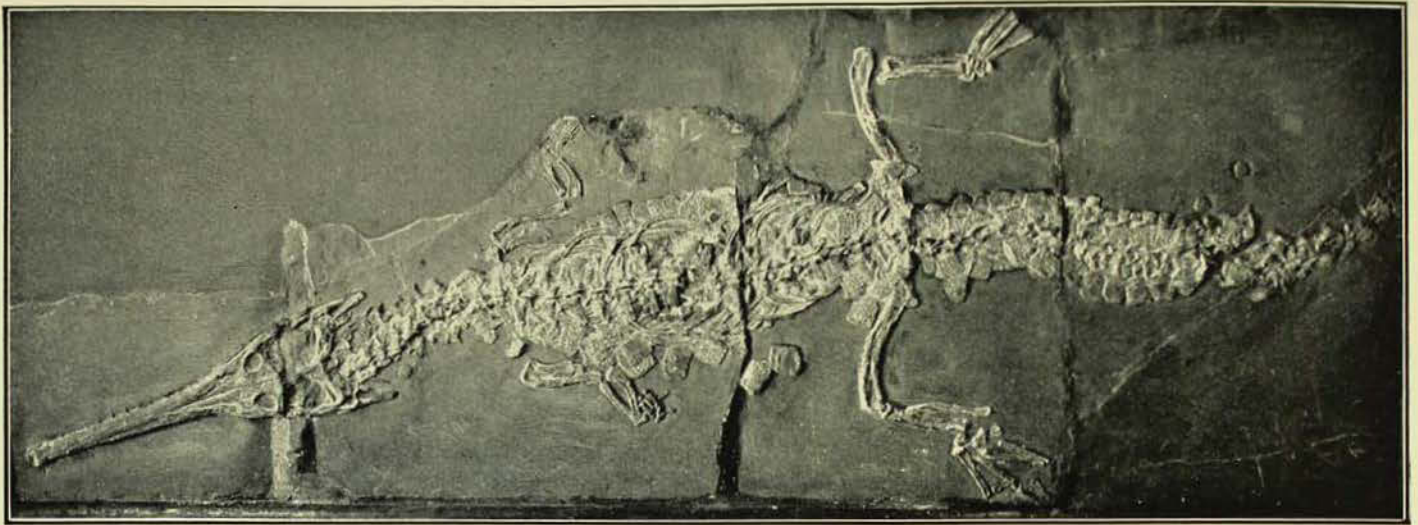
ing considerably from all recent crocodiles. In the Teleosauridæ the eye openings were situated practically on the top of the head and the forelimbs were much reduced and probably of little use, the animals swimming by lateral strokes of the powerful tail, assisted by the hind limbs. The body was protected by bony plates, which in life were probably covered by horn. The teeth were numerous, slender, and sharp, well fitted for the capture and retention of fishes, which formed a large part of the diet of these ancient crocodiles.

Our specimen has the scientific name *Mystriosaurus mandelslöhi*, but by some it is regarded as identical with the animal previously named *Steneosaurus bollensis*. The two genera, *Mystriosaurus* and *Steneosaurus*, if not identical, are closely related; some authorities are of opinion that *Mystriosaurus* is descended from *Steneosaurus*.

OCCURRENCE AND AGE.

These animals lived in Upper Jurassic times, some hundred million years ago, according to the calculations of physicists; they have, therefore, a very respectable antiquity. At that time, according to Professor Othenio Abel, of Vienna,¹ the Württemberg basin was an arm of the sea, separated from the open ocean by a bar over which the flood tide poured, carrying with it the carcasses of various animals which had met their end in the ocean outside. A number of living

¹ *Lebensbilder aus der Tierwelt der Vorzeit*, Jena, 1922, pp. 525-562.



The skeleton of *Mystriosaurus mandelslöhi*, an extinct crocodile from the Jurassic of Holzmaden, Germany. The skeleton is over seven feet in length. Specimen in the Australian Museum.

[Photo.—G. C. Clutton.

animals, too, would be able to enter at high water and would be imprisoned by the fall of the tide; an analogy may be found in the frequent stranding of whales in shallow bays at the present time. Abel considers it improbable that the animals all lived and died where their remains are now found, but that this locality is the cemetery to which their dead bodies were floated.

However it is to be explained, this Jurassic basin became the burial ground for a vast assemblage of animals, ichthyosaurs, plesiosaurs, teleosaurs, and others, and on account of the fine-grained matrix provided by the muds which now form the slate rocks of the area, the fossils are remarkably well preserved, even the outline of the soft parts of the body being sometimes indicated.

WINNING AND MARKETING.

The slates in the neighbourhood of Boll and Holzmaden, Württemberg, have long been exploited for industrial purposes, being used as roofing slates and for the manufacture of table tops, ovens, and for other purposes, and, during quarrying operations, the workmen frequently encounter the fossilized bones of these long extinct reptiles. It was soon realized that these fossils had a monetary value, and a brisk trade in these specimens has been carried on for many years. O. Fraas has

given a fine description of the occurrence of, and trade in these fossils.¹

There they lie in their ancient stone coffins, closely wrapped in slate like cloth-enveloped mummies. A head appears, some vertebræ, limbs, the whole length of the animal, and the workman readily discovers whether the animal has fins or "claws". A clawed animal is worth three times as much as one with fins, but the price does not depend on that alone. Most important are the conditions of its preservation, whether it is imbedded in solid rock (which is the most desirable), or is contaminated by pyrites, which unfortunately often renders the finest specimens useless, and especially whether none of the parts are missing should the slab fall into pieces.

The workman takes no steps to sell his find; he places it quietly on one side, for he knows that almost from week to week buyers will come, representatives of dealers and scientific collections. No horse deal is concluded with such eagerness, with such display of eloquence and the employment of every art and trick, as is the reptile trade, and none demands, in addition to expert knowledge of the specimens, so much shrewdness so that one may not suffer a loss, for otherwise one may buy a pig in a poke. And no bargain is struck unless the buyer pledges himself to celebrate the funeral obsequies of the fallen hero with several bottles of wine and cider.

There remains, however, the most difficult task, for it is now necessary to "trim" the reptile, that is, to free it from its covering of slate and bring its old bones to the light of day. Such work must be entrusted only to an expert, for an unskilful hand "butchers" the animal. In some cases this work takes months, for the stone must be removed from the

¹ Quoted by Abel, *loc. cit.*, pp. 527-528.

bones more by graving tool and needle than by hammer and chisel.

He who has not himself wielded the graving tool understands nothing of the joy which animates the expert, as he follows the course of a bone in the slate, and each day a portion, and finally the harmonious whole of the animal lies before his eyes.

DESCRIPTION OF SPECIMEN.

The animal, which is lying on its under surface, is seven feet three inches long, the head occupying twenty-one inches; the tip of the tail is perhaps missing. The skull is almost perfect, showing the long slender snout with the nostrils at the extreme anterior end, which expands spoon-like, the oval eye openings com-

pletely surrounded by bone, and the large supratemporal fossæ. A few teeth are visible on the right side, the snout inclining slightly to the left. The larger limb bones are well preserved, but some of the smaller terminal joints are missing. The dorsal armour appears over and alongside the body as stout plates roughly rectangular in shape and pitted on the upper surface.

In completeness and excellence of preservation this specimen compares favourably with any similar exhibit in the great museums of the world, and the Australian Museum is very fortunate in the possession of so fine an example of this long extinct group of reptiles.

Review

NATURE FANTASY IN AUSTRALIA. By Alec. H. Chisholm. (J. M. Dent & Sons, Limited, 1932; 16/6 net).

This is a distinctive work both as regards its subject matter and its literary form. For Mr. Chisholm is an accomplished writer, a weaver of fine phrases, who understands the subtleties of language and the appeal of *le mot juste*. Some of his word-pictures have a glamorous beauty; witness his description of the song of the Crested Bell-bird (p. 147): "Here was no mere lyrical outburst, no tinkling, no suggestion of the metallic, but a rich tolling, serene, unhurried, unworldly, an angelus-bell in Australian wilds, and yet something more, for in this music were tender passages that no tongue of metal could achieve. It began very softly, airily, an unbodied voice, coming from neither the earth nor the air; steadily it swelled and extended, and as it grew louder the notes began to ripple and roll, but always they fell at the end of each bar into a single pearl of sound, the note which above all gives the bell-like effect to the entire song. From a faint contralto beginning the voice rose

to a mezzo, and as it rose it changed, ever so gently, to a lyric soprano, after which it ceased, only to begin again with the Celtic crooning and to swell into the glory of full song."

A carping critic would perhaps call attention to the superabundance in certain passages of qualifying adjectives and adverbs, as in phrases such as "rovingly beautiful waterway," "greenly beautiful highlands" and "persuasive estuaries." The author, too, may seem to be overfond of certain words, such as *sunlit*, *elfin* and *mellow*, but these are fine expressive words which appeal to the senses, and so we thankfully forgive him. The truth is that, though this is a prose work, it glows with poetical fancy and expression, and we may reasonably allow some poetic licence.

The book opens with a description of the geological and topographical features of the Sydney area, with its varied and picturesque scenery, winding waterways, rugged gorges and fertile patches of shale or basalt. Here we have a variety of environmental conditions, sandstone ridges, heath-clad expanses, patches of

forest and jungle, and a corresponding variety in the vegetation and the bird life of the area, which Mr. Chisholm describes in an engaging manner. Few men are so well acquainted with the birds of the Sydney district, and the book contains an intimate account of the birds themselves, their songs, habits, and family affairs. The book is thoroughly scientific, though this aspect is not obtrusive; it is rather the work of an enthusiast who endeavours to arouse in the reader something of his own keen appreciation and understanding of the many charming feathered inhabitants of this favoured region. There is no doubt that he has succeeded. Many, like the reviewer, will read the book with lively enjoyment, but with a feeling that they have missed golden opportunities of becoming better acquainted with the natural attractions of the land in which they live, and will make resolution that in the future they will walk abroad with open eye and hearkening ear.

A special chapter is devoted to the Rock-warbler or Cave-bird, which is restricted to the Hawkesbury Sandstone,

and with surpassing skill suspends its nest from the ceiling of a cave or from a shelf in a rock shelter, or even, grown bold, in a convenient structure of human origin. A fascinating chapter deals with the Lyre Bird, prince of mimics, and others to the Wrens, Bell-birds and Cuckoos, "the world's strangest parents." There is a lengthy discussion of the parasitic ways of the Cuckoos,¹ which an unfortunate schoolboy described as "birds which do not lay their own eggs, but those of other birds, and *sotto voce*." Particularly charming are the sections devoted to the Flycatchers, "merry, babbling, restless birds," and to the Bower-birds, with their extraordinary habit of constructing ornamented and *painted* playgrounds.

The work is illustrated by numerous fine photographs of trees, flowers and birds; some of these are magnificent examples of the art of the nature photographer, triumphs of enterprise and patience.

C.A.

¹In an article in this issue Mr. Chisholm deals with this problem.

There are frequent requests from various bodies for lectures by members of the Museum staff, and as far as possible these requests are granted. Among lectures delivered within the last few months, the following may be mentioned:

Mr. W. W. Thorpe, to Rover Scout Leaders: "The Australian Aborigines."

Mr. J. R. Kinghorn, to the Tree Lovers' League, Longueville: "The Association of Trees with Animal Life."

Mr. H. O. Fletcher, to the Hurstville Parents' and Citizens' Association and to the Girls' Intermediate High School, Petersham: "Antarctic Life and Exploration."

Dr. C. Anderson, to the Italo-Australian Luncheon gathering: "Italy's Contribution to Natural Science."

Mr. T. Iredale, to the Legacy Club: "Lord Howe Island."

Mr. A. A. Livingstone, to the Workers' Educational Association: "Cruising in the Santa Cruz."

The Way of the Wasp

PART II.

By KEITH C. MCKEOWN.

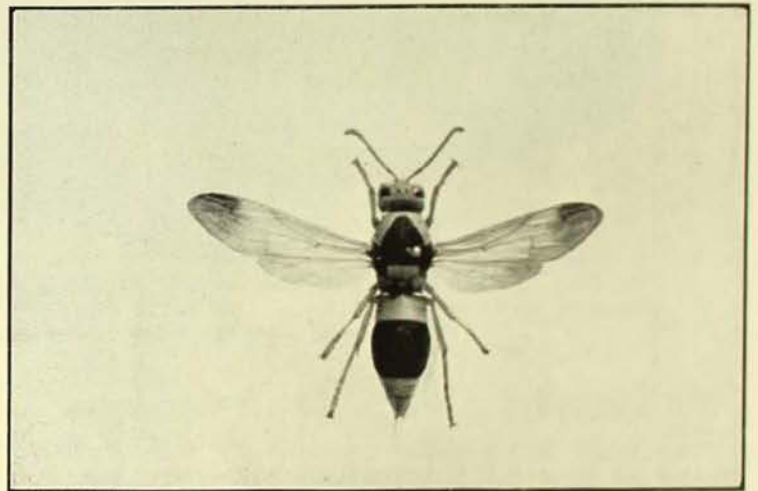
THE MUD-DAUBER OR MASON WASPS.

PERHAPS the most striking of the mason wasps is *Abispa ephippium*, a large orange wasp with a belt of black about the abdomen. Perhaps the best idea of the habits of this species will be conveyed by describing their life as observed in the field from my own notes during the months of January and February, 1923, on a female which was building her nest under the eaves of a building, using the rough-cast wall as a foundation. The female was the first to appear, and devoted the whole of her time to the construction of the first cell, the mud for the masonry being obtained from about forty feet away, where a leaky stand-pipe provided a conveniently damp spot. After the completion of the walls of the first cell, she erected a remarkable entrance passage, or porch, to it, shaped like the barrel of an old fashioned bell-mouthed blunderbuss; this was constructed directly outwards from the actual cell entrance for about half an inch, then drooping vertically downwards. The entrance porch was built of the finest clay, the walls being only a fraction of an inch in thickness, the exterior rough, but the inner surface smoothed and polished to an almost porcelain-like finish.

The work of building the first cell and vestibule, together with the stocking of the cell with caterpillars, in a paralysed condition, for the food of the larvæ, occupied about a week, a period that was fairly consistent for each cell during the whole construction of the nest. At the end of the first week, immediately prior to the laying of the egg and the closing of the cell, after the provisioning was completed, the male appeared, and pairing took place. The male was easily dis-

tinguished from his mate, being slighter in build and having a pale yellow "face," that of the female being reddish-orange in colour.

On one occasion two males arrived at the same time, but after a little tussling and much loud buzzing, the vanquished wasp flew off, apparently little the worse for the brawl, but subsequently only the



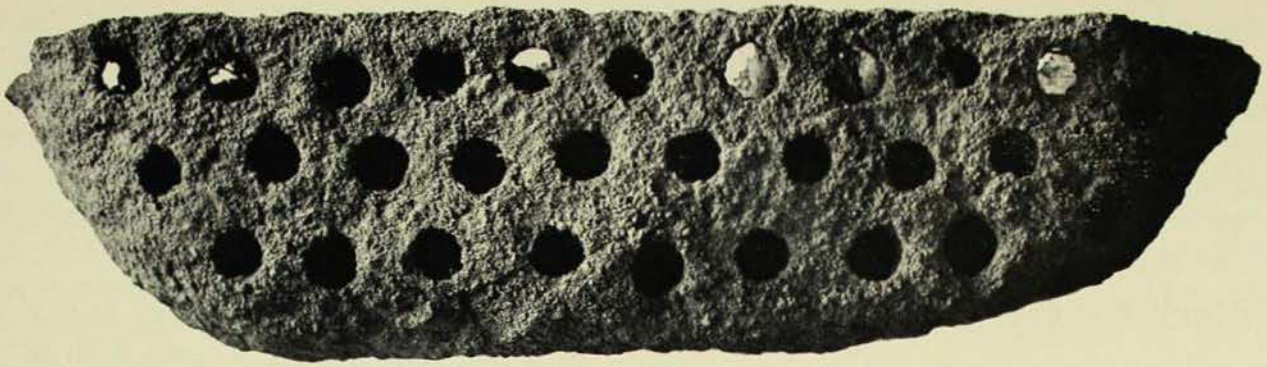
The large Mason Wasp (*Abispa ephippium*), which constructs trumpet-shaped entrance chambers when constructing its cells.

[Photo.—G. C. Clutton.

one male, marked with a spot of white paint for identification purposes, was seen near the nest.

Once the provisioning was completed and the egg deposited, the entrance structure was torn down by the strong mandibles of the female and the clay obtained in the course of the work of demolition used for closing the cell. With each new cell the blunderbuss-shaped entrance was constructed anew.

Much to my surprise, the text books having led me to believe that pairing took place but once in the season, the male once more arrived and pairing again took place prior to the closing of the cell; and subsequently about the end of each week, before each egg was deposited, he would turn up just before sunset and pair



A typical nest of the Mason Wasp (*Sceliphron laetum*), showing holes by which the wasps have emerged from the cells (upper), and a nest of the large Mason Wasp (*Abispa ephippium*) also showing emergence holes (lower).

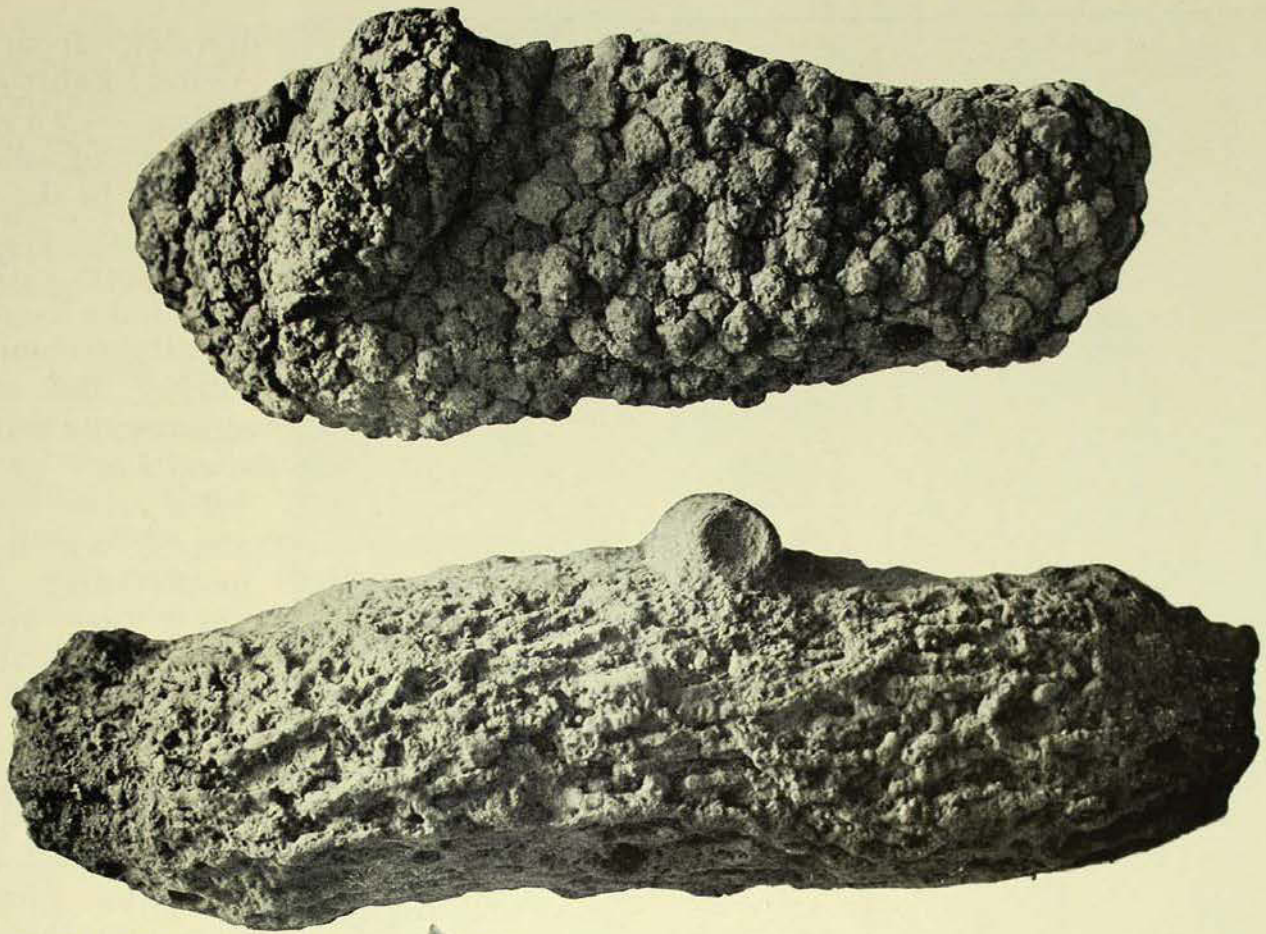
[Photo.—G. C. Clutton.]

with the mistress of the nest, but shortly after the direct light of the setting sun was lost he would fly off with a buzz, not to be seen again for another week, at the same hour. So regular was his appearance that it could almost be predicted in advance. As a rule before flying away the male would run rapidly over the nest, vibrating his wings and tapping the walls of the nest with his antennæ and stamping his feet, at the same time uttering a high-pitched buzzing note. On one occasion, having arrived while the female was in the nest, the male stood at the entrance of the vestibule, scraping the thin walls with his mandibles, the fine smooth clay making a chirping or squeaking noise. He made no attempt to enter the nest, but the lady did not long remain coy.

While the cell remained empty, the female camped in it at night, backing carefully in through the entrance tube, and would frequently remain in this position for some minutes with her head outside, surveying the world before retiring for the night.

Finally at the end of February the male failed to arrive as usual and was not seen again. The following day the female demolished the entrance tube, closed the nest, and disappeared. The completed nest contained eight cells and formed a mass about the size of a man's clenched fist, the outer walls being thickly coated over with clay.

The commonest mason wasp is, perhaps, *Sceliphron laetum*, which is widely distributed over the whole of Australia, and constructs its large clay nests on the walls and rafters of outhouses or in other sheltered positions; they will on occasion also build in occupied rooms of houses and usually institute a reign of terror as they fly backwards and forwards through the open window carrying their loads of clay for construction purposes or provisions for the nest, but they are quite inoffensive unless interfered with. The wasp is of a pale yellow colour marked with black, the abdomen being separated from the thorax by a very long and inordinately thin "waist." The clay for nest building is usually obtained from the banks of



Nests of the Mason Wasp (*Sceliphron lætum*) showing (lower) the typical decoration of ridges applied to the surface after completion, and (upper) the mud pellets of which the nest is composed.

[Photo.—G. C. Clutton.

some neighbouring creek or excavated tank, but a leaky tap will be found to provide sufficient building material for all the wasps in the district; such a tap will present quite a scene of industry as the wasps come and go at their labours. The wasp kneads the clay into a ball by means of her jaws and legs, buzzing contentedly the while with a full-toned hum. The ball of clay is carried to the nest in the legs, and on arrival the hod-carrier assumes the duties of mason and plasterer, and while engaged on this work she hums in a curious high-pitched note, somewhat reminiscent of that of a blow-fly caught in a spider's web.

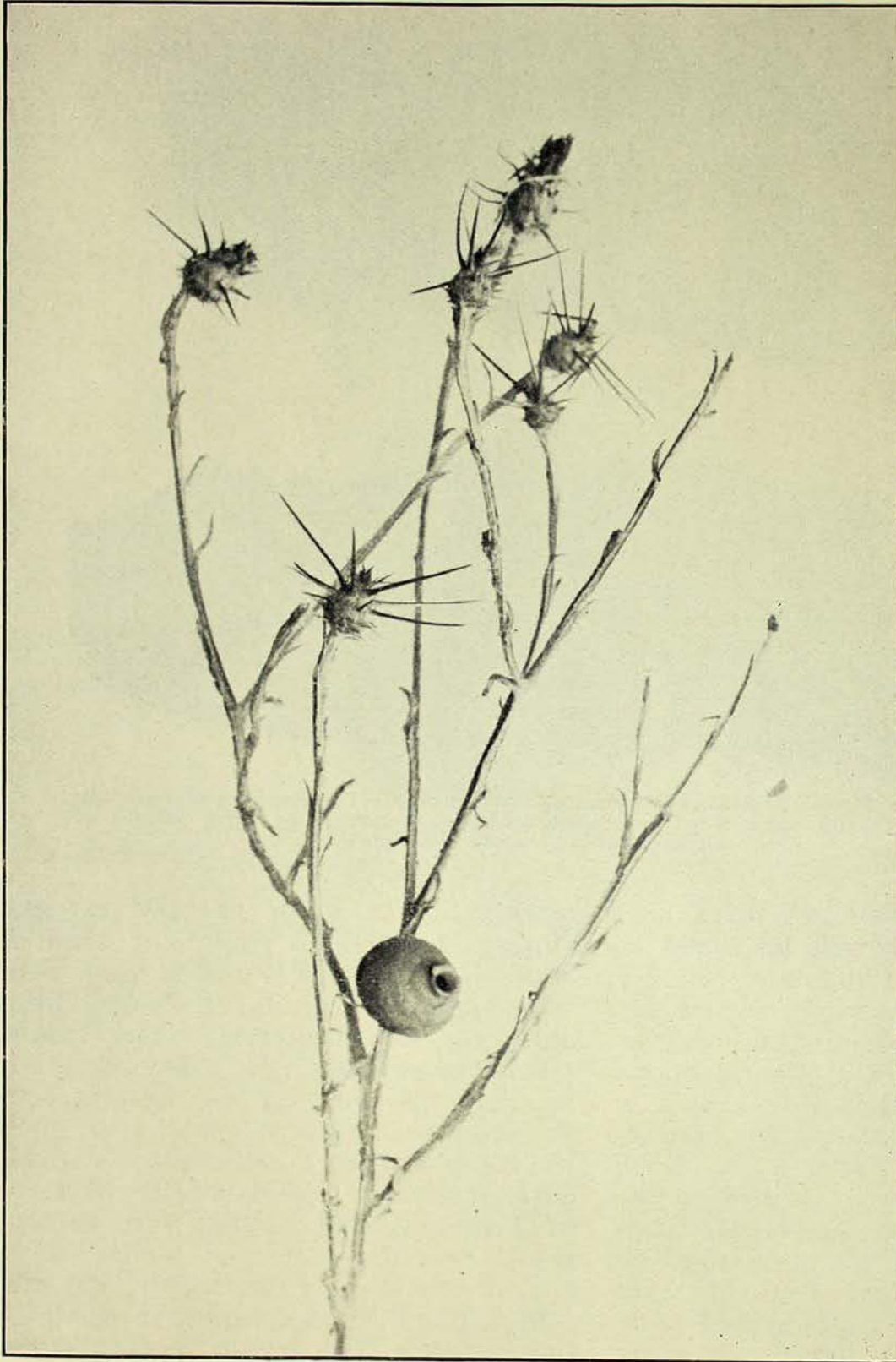
As each cell is completed it is stocked with the paralysed bodies of spiders to serve as food for the young, and when the cell is filled a single egg is deposited, and the cell closed with a plug of clay. The cells are usually arranged in two or more tiers, and vary in number according to the size of the nest.

When all the cells are completed the irregularities between them are carefully filled up, until the nest looks, for all the

world, like a lump of clay carelessly thrown against the wall. In some instances, however, the parent wasp is not satisfied to leave things in this condition, and goes to considerably more trouble, but for what reason is unknown, and, after levelling up the nest she decorates the surface with curious ridges of clay, giving the completed work somewhat the appearance of certain chocolate-iced cakes.

The larva, on emerging from the egg, feeds upon the moribund bodies of the spiders provided by the mother, and when fully fed and the food supply is exhausted, pupates in a frail, brown, papery cocoon within the cell.

Other species of mud-dauber wasps provision their nests with different kinds of prey. Most of the Eumenid wasps capture lepidopterous caterpillars, and suspend the egg by a slender thread from the roof to prevent it from being crushed by the movement of the imprisoned caterpillars, while members of the family Trypoxylidæ (*Pison* spp.), small black wasps with silvery bands on the abdomen, capture small spiders and store them in



A fragile vase-like nest of a Mason Wasp (*Eumenes* sp.) attached to the stem of a thistle.

[Photo.—G. C. Clutton.]

worm holes or other similar cavities in timber; and occasionally even use a key-hole, blocking up the nest with clay.

THE "POLICEMAN FLIES."

The active little wasps known to the bushman as "Policeman Flies" are familiar insects, especially throughout the Riverina

district, from their curious habit of capturing various species of flies belonging to the family Muscidae. When travelling through the bush one is usually accompanied, during the summer months, by a buzzing swarm of flies (*Musca vetustissima*), which crawl persistently over one's face and into the eyes, until one is driven almost frantic, and it is a common sight to see horses standing together, head to tail, swishing flies from one another with their tails. Under these conditions the policeman flies may be seen in action, and they become familiar companions, snapping up the resting flies and carrying them off in their legs to store in their burrows in the sand. When about to seize on a fly, the wasp flattens its body and, slightly spreading its wings, lands upon the back of its unsuspecting victim, gripping it behind the head and apparently killing it in-

stantly; some species are reported to paralyse their prey by crushing the thorax and nerve centres, but in the case of others there is no indication of such crushing of their prey.

The "Policeman Flies" belong to the families Stizidæ, Arpactidæ (*Gorytidæ*), and Nyssonidæ, and are alert little insects,

not much larger than the flies upon which they prey, and they wander about among their prospective victims, which apparently do not recognize them as enemies.

The Variegated Policeman Fly (*Stizus turneri*), a small black and yellow wasp, is a typical example, found in company with other species along the Murrumbidgee River.

THE BEMBEX WASPS.

Similar in many respects in their life-histories are the members of the family Bembecidæ; these insects are mostly large handsome wasps, frequently with yellow legs and "faces"; the body blackish and marked with crenelated white bands across the abdomen.

These wasps may be described as semi-social in their habits, since, although each insect constructs and stocks its own burrow, the tunnels are usually placed over a limited area, being separated from one another in many instances only by a few inches. One of these Bembex colonies presents a scene of great activity, the insects coming and going at frequent intervals, all busily engaged in constructing their burrows or stocking them with flies. The Bembex wasps store their nests with flies, which they capture on the wing after the manner of the "Policeman Flies." The shallow burrows are excavated in the sand and the larvæ are fed from day to day on the bodies of the captured flies.

Bembex wasps are not aggressive and seldom take the offensive unless interfered with, but they are very quarrelsome among themselves over the ownership of a captured insect. The species most frequently met with in eastern Australia are *Bembex furcata* and *B. tridentifera*.

THE SAND WASPS.

The large black and yellow Sand Wasp or Cicada Killer (*Exeirus lateritus*) makes large tunnels in the ground, often as large as mouse holes, which branch off into chambered galleries, in each of which the female wasp stores up a cicada, and deposits a single large white egg upon the under surface of the thorax. The larvæ on hatching feed upon the cicada and, when it has been reduced to a shell, pupate in the chamber.

The captured cicadas are paralysed by being stung by the wasp and are dragged off over the ground to the burrow, the wasp straddling it with its long legs. When the cicadas are active in the long summer days this wasp may sometimes be seen to drag one of them from its place on the branch where it sits placidly in the sunshine sucking up the sap, and, usurping its position, imbibes the moisture exuding from the puncture in the bark.*

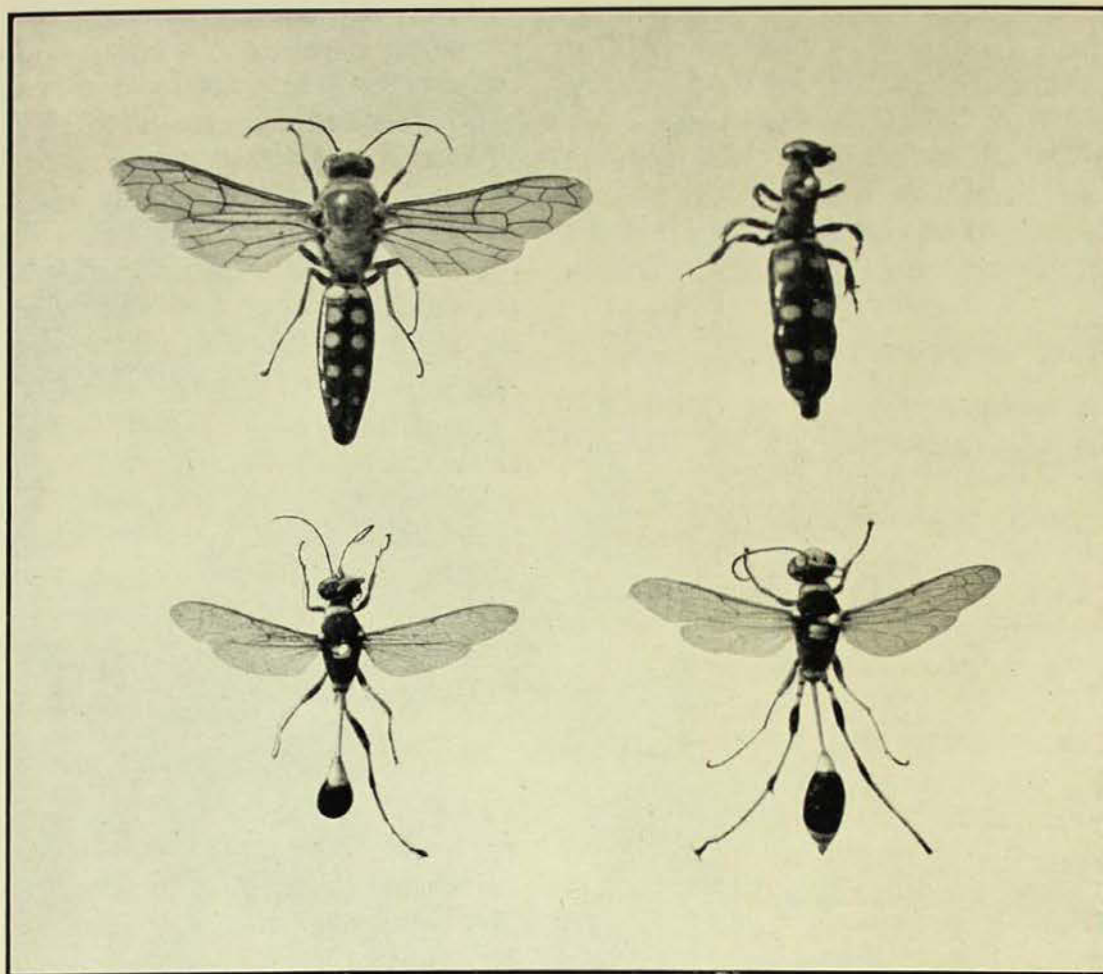
Another Sand Wasp found in eastern Australia is *Chlorion vestita*, which stocks its nest with crickets, and is particularly fond of a small grass-frequenting species. Other species of these wasps attack different kinds of insects, each species appearing to prefer one particular type of prey.

THE THYNNID WASPS.

The Thynnid wasps are a curious group in which the males are striking wasp-like creatures with well-developed wings, while the females, smaller in size, are completely wingless. The family is a large one, and Dr. Tillyard states that four hundred and thirty-eight species have been described from Australia. The wasps are common during the summer months, frequenting the *Leptospermum* and *Melaleuca* flowers, where they may sometimes be captured in large numbers. The females are capable of stinging fiercely, but the males, having no sting, are incapable of causing any harm, although, when captured, they will pretend to sting with the horny process at the end of the abdomen.

When mating the winged male carries the smaller wingless female about with him, and when collecting it is essential that these pairs be carefully kept together, since the females are usually so strikingly different from the males in appearance that in some cases, where specimens have been taken apart, they have been described as different species, causing much confusion, and it is probable that when a properly paired collection of specimens is worked upon the number of existing species will be greatly reduced.

* The habits of the Cicada Killer have been described in detail by A. R. McCulloch in the AUSTRALIAN MUSEUM MAGAZINE for January, 1923.



Male and female Thynnid Wasp (*Zaspilothynnus variabilis*) (upper), and specimens of the Mason Wasp (*Sceliphron lætum*) (lower).

[Photo.—G. C. Clutton.

The larvæ of the Thynnids are parasitic upon the grubs of lamellicorn beetles, popularly known as "curl grubs," and are of economic importance. We know little of their life histories and the most that can be said to be definitely known is that when they pupate they form a cocoon of silk, covered with an external papery layer terminating in a nipple-like projection.

The commonest species around Sydney is *Zaspilothynnus variabilis*, one of the largest members of the family, in which the male is brown in colour with double spots of yellow across the abdomen; the semi-opaque wings are reddish-brown. The female is broad in proportion to her length, reddish-brown in colour, obscurely blotched with dull yellow.

THE RUBY WASPS OR CUCKOO WASPS.

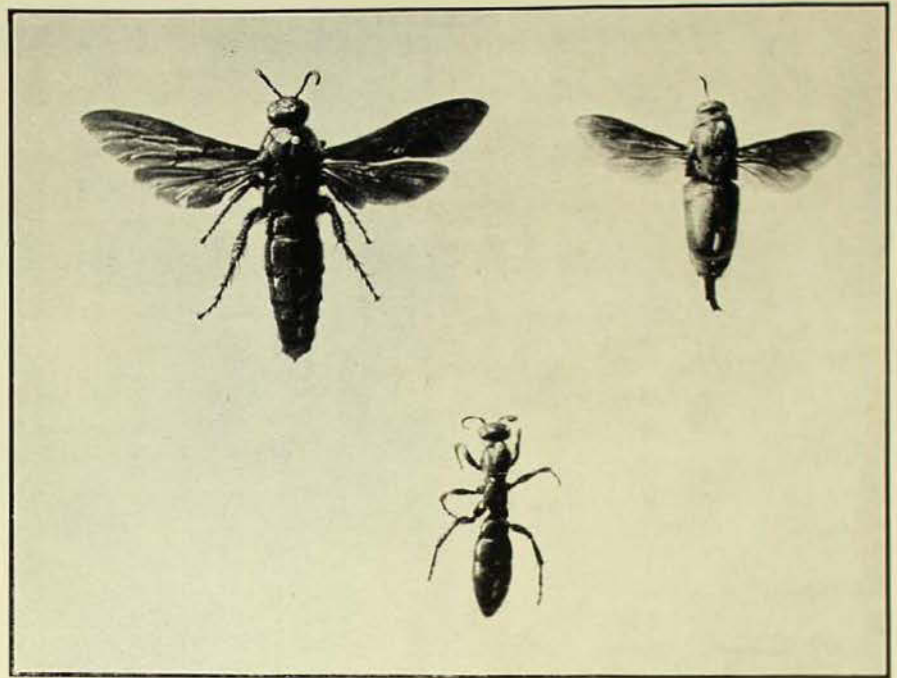
Another curious family is the Chrysididæ, the members of which are popularly known as "Ruby Wasps" or "Cuckoo Wasps." These insects are very rugose, and are

usually a glorious metallic green or blue in colour, so that the name "Ruby Wasp" is not very applicable to the Australian species. The name "Cuckoo Wasp" was originally used in the belief that the insects deposited their eggs in the nests of the mason wasps, their larvæ devouring the food stored up in the nest and leaving the legitimate occupant to perish of starvation, but it is now known that the Cuckoo wasp larvæ are parasitic on the mud wasp larvæ themselves and do not touch the food, but the end is the same—the death of the householders.

The Chrysidid wasps have the sides of the abdomen heavily flanged and are capable of curling themselves up into a pill-like ball, rendering them invulnerable to the stings of the infuriated owners should the marauder be surprised by their unexpected return.

Stilbum splendidum, a large species, the coloration of which varies from green to blue, is widely distributed throughout Australia.

In concluding I cannot do better than quote from John Burroughs' introduction to the Peckhams' wonderful book: "Such a queer little people . . . so whimsical, so fickle, so fussy, so forgetful, so wise and yet so foolish, such victims of routine and yet so individual, with such apparent foresight and yet such thoughtlessness, finding their way back to the same square inch of earth in the monotonous expanse of a wide plowed field with un-failing accuracy, and then at times finishing their cell and sealing it up without the spider and the egg; hardly any two alike; one nervous and excitable, another calm and unhurried; one careless in her work, another neat and thorough; this one suspicious, that one confiding; one species digging its burrow before it captures its game, others capturing the game and then digging the hole; one wasp hanging its spider up in the fork of a weed to keep



The Blue Flower-wasp (*Scolia soror*) (left), a Ruby Wasp (*Stilbum splendidum*), and the female of the so-called "Blue Ant" (*Diamma bicolor*) (lower).
[Photo.—G. C. Clutton.]

it away from the ants while it works at its nest, and then running to it every moment to see that it is safe; another laying the insect on the ground while it digs—verily a queer little people, with a lot of wild nature about them, and of human nature too."

Notes and News

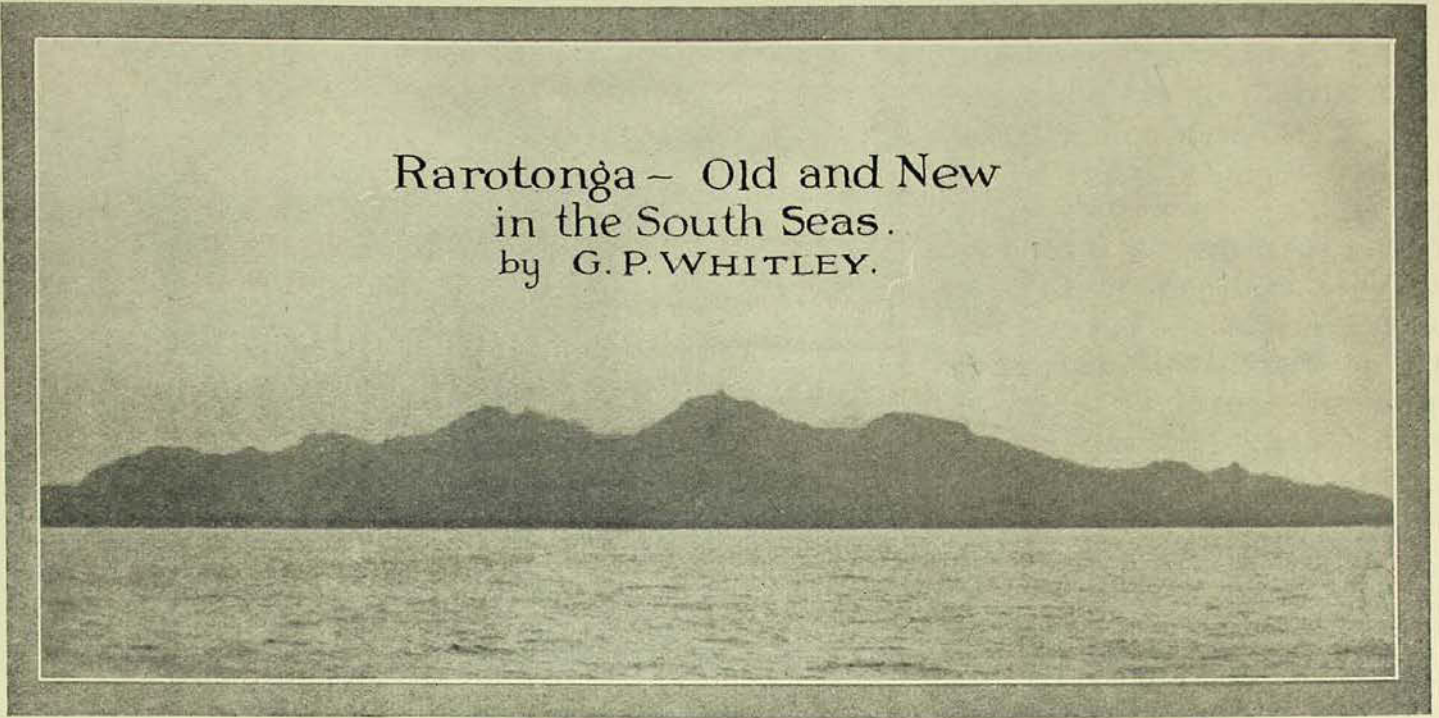
Through the good offices of Dr. Stewart McKay, the heart of Phar Lap, the celebrated racehorse, was for some weeks on exhibition in the Museum, and many visitors came specially to see this unusual exhibit. The heart is remarkable for its large size, its weight being fourteen pounds, and for the unusual thickness, one and three-quarter inches, of the wall of the left ventricle. In an average horse the heart weights nine to ten pounds, and the ventricle wall is no more than one

inch in thickness. The heart has been sent to Canberra, where it will be deposited in the Australian Institute of Anatomy.

* * * *

While on vacation with Mr. E. M. Embury's Barrier Reef party, Messrs. F. A. McNeill and H. O. Fletcher delivered eleven lectures on subjects of topical interest. In addition, several broadcast addresses have been given by various members of the staff.

Rarotonga - Old and New
in the South Seas.
by G. P. WHITLEY.



Almost the entire island of Rarotonga, as seen from the deck of a liner. A mass of vegetation and jungle now hides the scarred and broken flanks of an ancient volcano. [Photo.—G. P. Whitley.]

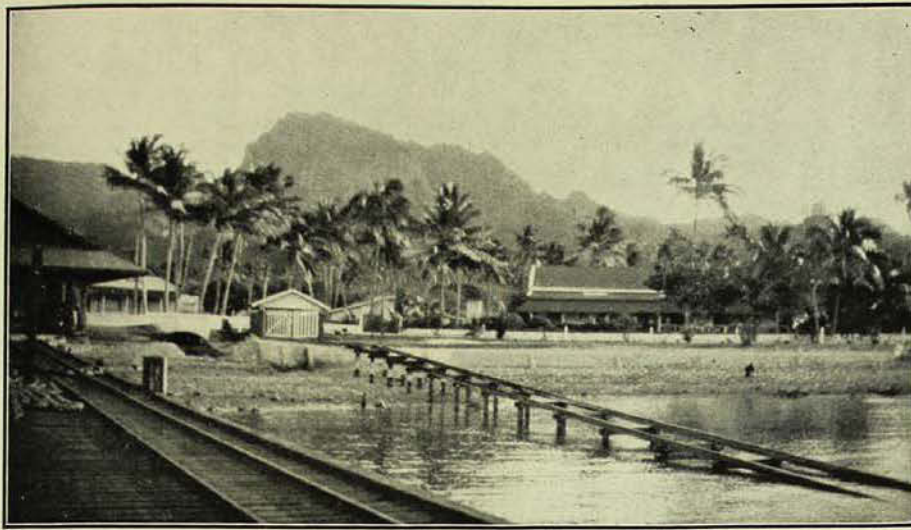
IT is early morning and the rain drizzles dismally, the decks of the steamer are wet and slippery, and the atmospheric humidity most oppressive. Can this be the South Seas, far-famed for warmth and sunshine? The ship is ten days' sail from Sydney, although one day was repeated as the date-line was crossed after leaving New Zealand *en route* for Tahiti and San Francisco. After a while, however, the sky clears a little over the horizon, and by ten o'clock Rarotonga, the chief island of the Cook Group, becomes visible as a series of brown peaks rising over two thousand feet from a misty sea-foundation to a crest of feathery white clouds. A rain storm passes, all sign of land is blotted out, and the ship continues to labour through a squally sea. Presently the weather definitely clears, and spirits are revived as almost the entire island comes into view. The hills are outlined in fantastic shapes as the result of ancient volcanic fury, but that such forces are now spent is indicated by the thick covering of vegetation everywhere, softening the jagged escarpments with billowing masses of varied green. Mists descend over some of the valleys, but as we

approach details become clearer. The settlements at the bases of the mountains, with their patches under cultivation, and brown areas of burnt-off hillsides, are first seen. The white beaches and the surf on the fringing coral reefs, the wireless antenna, and then thousands of littoral coconut palms can be distinguished. We round a point, and the main village, Avarua, comes into sight on the north side of the island, and the ship lays to in water of indescribable ultra-blue about three-quarters of a mile from the wharf.

AVARUA.

On landing, I was most hospitably received, although a complete stranger, and throughout my stay at Rarotonga received many courtesies from everyone I met, from the smallest piccaninny to the Resident Commissioner. About 250 white people live on this island, which is administered by New Zealand, and there are about 4,000 natives.

In Avarua there are many spacious buildings, mostly residences and government offices, with stores and a modern hotel. A fine road runs for twenty miles around the island through tropical jungle,



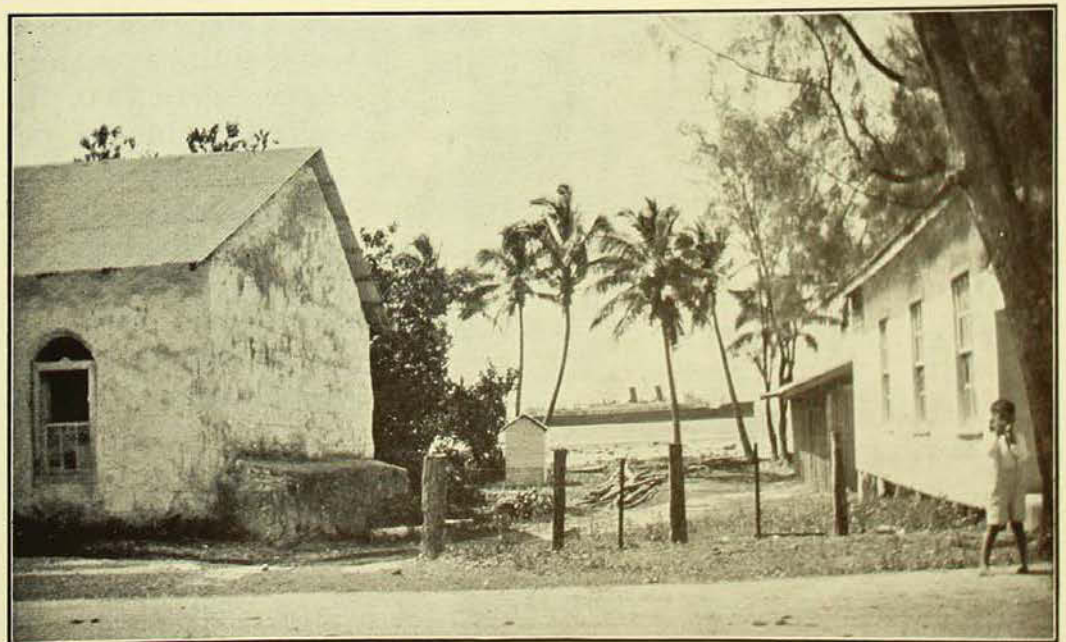
The precipitous slopes of Maungatea form an imposing background to the landing-place and hotel on the promenade at Avarua.

[Photo.—G. P. Whitley.

and visitors usually take a motor trip to gain an idea of the beauty and extent of this South Sea island, the road being flanked by coconut palms, large *utu* or Barringtonia trees, and luxuriant jungle, whilst the flame tree, bougainvillea, and trees of frangipani display a riot of colour. The great London Missionary Society's Church, built of huge sawn-out coral blocks won from the reefs, is surrounded by a peaceful graveyard, wherein repose the remains of many notable island personages. Graves occur in all parts of the island, however, natives having been interred under a simple slab of coral in some loved spot; one grave is even under a verandah, whilst another is protected by a sort of one-roomed house, in which is a portrait of the deceased, and many a headstone bears the fern-leaf symbol to show that some Maori warrior of modern times laid down his life in far-away Egypt or Palestine.

As this is steamer day, natives are everywhere: cheerful, laughing, playing, and seemingly without a care in the world. The men mostly wear straw hats, singlets, and blue dungaree trousers, but on less festive occasions, the *pareu*, or red and white loincloth, is more in vogue. The women and girls are attired in bright but tastefully coloured print frocks, a decided improvement on the "mother hubbards" of a staid generation. No-

body worries about shoes, so there are no tenderfeet amongst the natives. These Polynesian people are of engaging beauty, being magnificently proportioned and with happy, frank faces; the skin is a smooth coppery-brown with the eyes dark and the hair black. A fair skin is regarded as desirable by the ladies, and even the men take care that the sun shall not burn them too black; to them my sun-tan was a matter for mirth. Nearly all the younger natives have a white *Gardenia* flower, called *Tiare Maori*,



A single main road encircles the island and forms a scenic drive of great beauty. A peep of the "Monowai" is obtained from Avarua, beyond the schoolhouse, on the left, which was built from huge coral blocks won from the reef.

[Photo.—G. P. Whitley.

behind one ear. A flower behind the left ear indicates that a friend of the opposite sex is being sought; one behind the right ear shows that a lover has been gained (that is, if I haven't got the ears mixed). Wreaths of frangipani, Tiare Tina, and other fragrant flowers, or bandeaux of small shells, are favourite adornments or parting gifts; what the Hawaiians call leis

are here called *ei*. Some women are showing beads, necklaces of coloured seeds, cowries, and grass skirts for sale, but no "quick-fire salesmanship" is apparent. What does it matter if the turnover and profits are not large, "we have plenty fish, plenty coconut," they smile.

From the hotel verandah, one sees a veritable kaleidoscope of island life, modernized though it be: natives drive past in lorries and motor cars bearing cases of fruit for export, others bicycle or walk by with graceful, erect carriage. Piccaninnies pass hand in hand or scamper out of the way as a little brown boy gallops by on his nag. All are talking Rarotongan, which is akin to the Hawaiian and Maori languages, though most of them understand at least a little English.

The rain comes on again and drenches the lawn, patters on the palm leaves, and paints still brighter the crimson of the hibiscus.

ADVERTISING EXTRAORDINARY.

Early one morning, I was treated to a display of local advertising. A native was beating a drum repeatedly with a rhythmic beat, and was accompanied by



R.M.S. "Monowai," the schooner "Tagua" and the king's launch form an interesting group when "the fleet is in." A gap in the coral reef, near the wharf, forms a safe anchorage for small vessels.

[Photo.—G. P. Whitley.]

others who rattled a curious tattoo from smaller hollowed-out drums, which rapidly sounded louder as they approached. Here each tribe has, or had in the old days, its peculiar drum-beat, and messages could rapidly be sent from one part of the island to another. As I looked out, a gay crowd of native lads passed in a lorry, one throwing papers to the bystanders, and the others, amidst laughter and talking, keeping up their drumming. Attached to the back of the lorry were two placards advertising that night's cinema performance: J. Farrell Macdonald and Louise Fazenda in "Riley the Cop"! The films screened here are of the old silent type, and perhaps it is just as well, as the native portion of the audience keeps up a continual noise throughout the performance, and often sings when the admirable string orchestra strikes up a popular tune. Unfortunately the native songs and dances are giving place to the modern jazz introduced by passengers from the ships. An interpreter tells the natives from time to time what the picture is about or translates the titles, but as he is prone to interpolate stories of his own into the plot of the film, the audience often laughs during particularly dramatic passages. Any funny

feature in a comedy, or exciting incident in the film is greeted with screams and yells by the delighted natives. Dogs mingle with the audience, and it is said that no Rarotongan function is complete without a dog-fight. After the show is over, a stroll along the waterfront in the moonlight makes sleep seem out of the question, the mountains being softly silhouetted and the road a ghostly grey, whilst coconut trees stand back like friendly sentinels, their leaves shining with reflected moonlight. The tropic sky is undescrivable, even when, as now, clouds dimmed most of the constellations. In the east, Orion lay at a tipsy angle and the Dog Star blazed. On a cloud drift of their own, the Pleiades were surely dancing, whilst high above, the moon itself, bright and astoundingly clear, lightened the scene and cast a yellow halo on any cloud that crossed its face.

The sound of guitars steals from a house with the following notice over its door:

Dancing	TIVOLI	Tapiri Mai-are Ura Anga
Tea Ice Cream	CABARET.	E Te Inu, Ice Cream
& Soft Drinks		E Mea Monamona Roa

One does not have to be a Rarotongan to understand two of the "Maori" words, and the term *ura*, equivalent to the Hawaiian *hula*, is recognizable as referring to the dancing.

Modernized Avarua is but the official capital of the island, and, though picturesque, is a port of call which must be left behind by any who would try to reach the heart of Rarotonga, and see something of the real charm of the South Seas in its coral reefs and native communities along the tree-girt shores. When one has eaten *fei*, or mountain plantain, they say the charm of the Islands will act as a magnet and ensure one's return, but to find this magic fruit one must scale the mountain jungles to the now uninhabited sites of an ancient Polynesian civilization.

OLD CEREMONIAL GROUNDS.

One afternoon, Captain J. D. Campbell, a keen student of Rarotongan lore, took

me to a valley near Tupapa, whose name, so far as I could gather, was Api, though it is said to have five names altogether, arguments in favour of each being advanced by various natives. We ascended part of the mountainside to see a *marae* or ceremonial ground built by the ancient Rarotongans hundreds of years ago. Here were parallel terraces of stone about fifteen yards apart, which had been built up by slaves who must have hauled all the material from the lowlands. The backs and seats of large stone ceremonial seats, now somewhat askew, or pathways now almost in ruins, could be traced by Captain Campbell's experienced eye, and were distinguishable readily enough when pointed out. Natives seemed to appear from nowhere in the jungle, and voluntarily assisted by clearing away the luxuriant undergrowth so that we were able to take measurements of part of this huge structure, stretched over a mountainside, of which apparently only the outermost edges had previously been de-

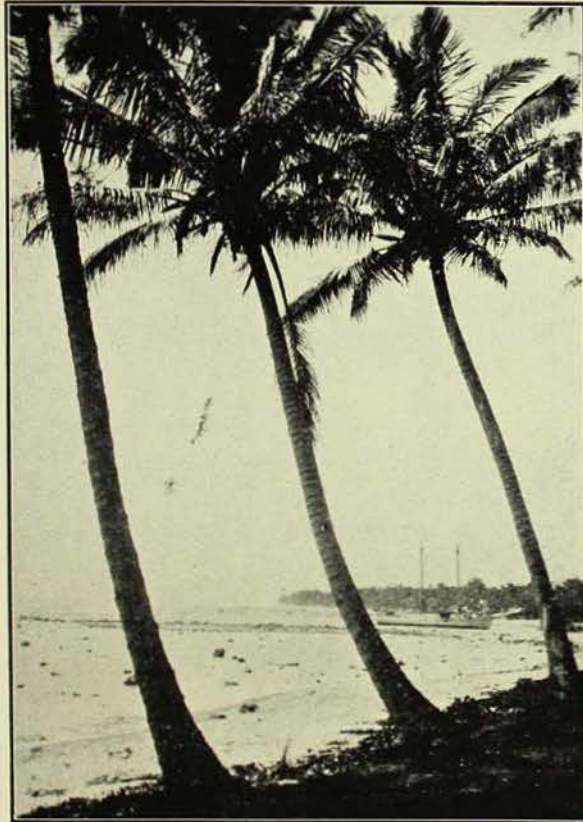


Shy little South Sea islanders emerge from the shadows to the sunbaked coral beach and pose for a snapshot. [Photo.—G. P. Whitley.]



Typical Rarotongan natives in the fertile valley of Tukuvaîne. The boy on the right, Koteka Apolo, spoke and wrote both "Maori" and English, and was a most efficient interpreter. [Photo.—G. P. Whitley.]

scribed.* One felt almost as if transported to the times of Montezuma in this dense hillside jungle, with the old black stones still lying in fairly orderly array after several centuries. We descended



A beach scene at Avarua where stately coconut palms line the waterfront and reveal between their graceful pillars a view of sunlit strand and coral lagoon. [Photo.—G. P. Whitley.]

* See S. Percy Smith: "Arai-te-Tonga, the Ancient Marae at Rarotonga," *Journ. Polynesian Soc.*, xii, 1903, p. 218. The volumes of this journal contain also the history and traditions of Rarotonga, written by eminent scholars.

several of the terraces to a platform where the *taunga* or priests of old probably performed their ritual before an audience of several thousand people, or imparted the teachings of their tribes as handed down orally from generation to generation. Now all is silent in the valley, and no longer does the setting sun, as it slips behind the dip in the opposite hills, light the face of the god, which has long been removed and perhaps even stolen away and buried in these mountain fastnesses.

Exactly where, nobody seems to know, and the oldest natives refuse to tell, even if they know, for, notwithstanding the white man's gods, may not the ghosts of the mountains, the mysterious nocturnal *tupapaka*, wreak fearful vengeance on anyone foolish enough to incur their displeasure by revealing the treasures they guard?

The *marae* or ceremonial ground for religious practices, burial, and even human sacrifice, was an important feature of many South Sea islands two centuries ago. Captain Cook remarked that the "Indian . . . approaches his Morai [*sic*] with a reverence and humility that disgraces the christian," and notes that criminals or lower class men were sometimes beaten to death and sacrificed. In the picture, here reproduced, such a rite is being performed in old Tahiti, and Cook and his gentlemen observe the priests beating drums, holding red feathers, and digging a grave for the corpse, while others burn a dead dog. Other dogs and sacrificed pigs are laid on a malodorous scaffold whilst the exhumed remains of previous sacrifices form a grisly background.

According to Captain Campbell, who learnt the history from the old chiefs in their own exclusive language, the old Rarotongans had a feudal system. There was never a single king, but a series of



A human sacrifice in a marae or ceremonial ground at Matavai, Tahiti, witnessed by Captain James Cook in September, 1777.

[Drawn by J. Webber and engraved in the Atlas to Cook's Third Voyage.

chiefs called *ariki*. Below these were several ranks of lesser chiefs, who were above the common people. Nowadays, some Pooh-Bahs hold several of these ranks in one, and there is no slavery, but in olden times the feudal ranks were thus arrayed:

thrones, and terraces from rocks hauled from the seashore must have been immense, and the "men before the spear", who lived in the valleys, must have had a hard time as serfs in those days; when food was scarce, doubtless a

- | | | |
|-----------------------------|---|---|
| Landowners | { | <p><i>Ariki</i>, Highest Chief; one for each of the principal tribes.
 <i>Taunga</i>, combined Priest and High Chief.
 <i>Mataiapo</i>, Overlord or baron.
 <i>Kamuta</i>, Canoe-builders, craftsmen, woodworkers, etc.
 <i>Rangatira</i>, Knights or Gentlemen under baron, being also Captains of canoes.</p> |
| Without right to land | } | <p><i>Tangata toatoa</i>, Ordinary People, the "men before the spear".</p> |

The higher one's rank in those days, the loftier the elevation of one's dwelling—a strategic layout in times of insurrection, no doubt. The amount of slave-labour required to build the roads, platforms, steps,

few of them were duly sacrificed to "the gods".

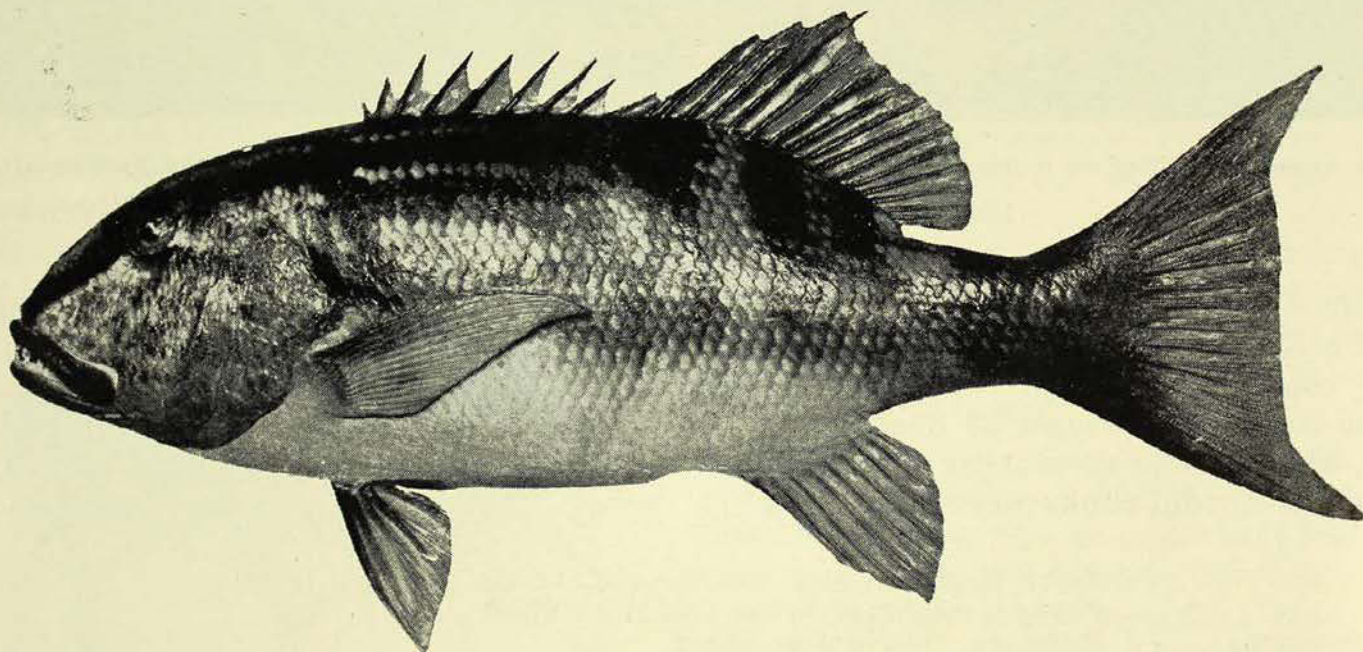
[Further articles will deal with the history, natives, coral reefs, natural history, and other aspects of Rarotonga.]

The Chinaman Fish

BY G. P. WHITLEY.

FORTUNATELY, fishes which are poisonous as food are rare, and most species can be eaten by man. Exceptions, however, occur, and are usually responsible for an unwarranted fear of many strange or venomous-spined fishes which ultimately prove to be edible. Some fishes of coral seas have the reputation of being poisonous when caught on

around when caught, as cats and other animals, to say nothing of children, may be killed by eating them. As early as 1801 a resident of Sydney died after eating a Toado (*Spheroides hamiltoni*), and several cases of poisoning from like cause have since been recorded. Poisoned wounds caused by the spines, venomous or otherwise, of fishes do not concern us



The Chinaman Fish (*Paradicichthys venenatus*).

[Block by courtesy of the Queensland Museum.]

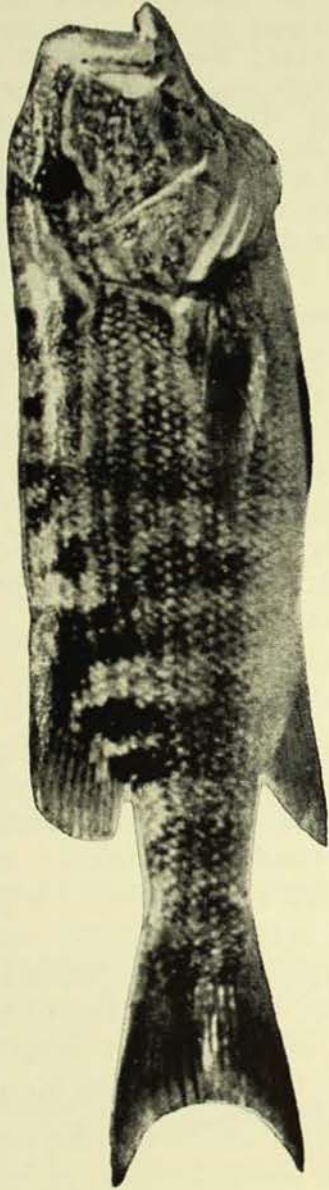
one reef and harmless on another, the cause being attributed to their feeding on certain marine worms. It is recorded that, as a test, a silver coin is placed in a slit in the flesh and the fish is boiled; if the coin is not in any way blackened during this process, the fish is considered good to eat, but the infallibility or otherwise of this test is not proven. Even such good food-fishes as the Sea Salmon (*Arripis*) and the Blackfish (*Girella*) are unfit for food if the viscera be slightly decomposed, and fishermen keep them alive as long as possible after capture and clean them immediately after death. Toadoes and Porcupine Fishes are highly poisonous, and should never be left lying

here; the purpose of this article is to make known a poisonous fish recently discovered in north Queensland.

In August, 1923, a large fish was forwarded in ice to the late A. R. McCulloch at the Australian Museum for identification. It had been presented by Dr. R. W. Cilento, who obtained it from near Townsville, north Queensland. The general colour of the dead fish was crimson-pink, with a network of fine yellow lines on the head and some violet spots on the body; the eye was scarlet with an orange-yellow ring around the pupil. A mould and colour-sketch were made when the fish was thawed out, and the resulting casts are now on exhibition in the fish

galleries of the Queensland and Australian Museums. The classification of the fish presented considerable difficulty, and it was found to belong to an entirely new family, genus, and species.

A little while afterwards, the late Surgeon-Lieutenant W. E. J. Paradise, R.A.N., was studying the fishes of Queens-



A freshly caught Chinaman Fish, showing the characteristic colour pattern. The general tones are rosy, pink, and whitish.

[Photo.—W. E. J. Paradise.

land from H.M.A. Survey Ship *Geranium*, and was successful in obtaining several more specimens from the Great Barrier Reef. The new fish was popularly known as the Chinaman Fish, and Paradise wrote the following account of it in *The Medical Journal of Australia* (Vol. ii,

1924, pp. 650-651), with a photograph, which is here reproduced.

The Chinaman Fish is an attractive looking fish which grows to over nine kilograms (twenty pounds) and is met with all along the Great Barrier Reef. I have not seen an example under four and a half kilograms. The flesh when cooked looks excellent and tastes as good as it looks. In most cases it can be eaten with impunity, but in certain cases (not depending on the time of the year) the fish is very poisonous.

The symptoms are: Pains in the joints and abdomen, with diarrhoea and perhaps vomiting. There is usually a rise in temperature and the patient is very weak for some days after.

Dr. Clarke, of Cairns, informed me that he has treated a number of patients for Chinaman Fish poisoning, on one occasion a whole family being severely poisoned. Both Dr. Clarke and I have eaten the fish without ill-effects. The fish when caught is conspicuously marbled in red and white, but after death is red all over. It has very prominent canine teeth and very strong spines, with a rather small amount of membrane between them in the spinous dorsal fin. . . .

Dr. H. L. Kesteven, who has specialized in the study of fish skulls, kindly undertook to describe the osteology of the new fish, and it is hoped that the results of his researches will soon be published. Until recently, the Chinaman Fish had no scientific name, but was duly christened *Paradicichthys venenatus*, the generic name being given in honour of Dr. Paradise and the specific name referring to its poisonous properties. Its nearest relatives are the Hussars or Queensland Snappers of the genus *Lutjanus*, all the species of which are regarded as excellent food fishes.

On my visits to north Queensland I have made inquiries concerning the Chinaman Fish, but was never fortunate enough to procure a fresh specimen. However, Dr. P. S. Clarke, of Cairns, very kindly provided me with his notes, and the bulk of these are, with grateful acknowledgement, here reproduced:

The Chinaman Fish is fairly plentiful in the neighbourhood of the Great Barrier Reef of Queensland, and is caught in water varying in depth from 40 feet to 150 feet, most frequently at a depth of about 60 feet. It is usually found where the floor of the sea is covered with live coral growths, and does not rise for more than a few feet from the bottom in search of food.

It may be caught by any variety of fish bait, and affords good sport for anglers, as it fights fiercely for its life when hooked. It grows to a weight of about 16 pounds, but the average fish caught does not exceed ten pounds in weight. Its flesh has a delicate flavour when cooked for food, but its ingestion is frequently followed by symptoms of poisoning. I know of many instances in which the Chinaman Fish has been eaten without any resulting ill-effects, but apparently about 50 per cent. of these fish are poisonous. As far as I can ascertain, it derived its local name of Chinaman Fish from the opinion that is held by the professional fishermen that "any fish is good enough to sell to a Chinaman." They have found that fish of doubtful freshness or quality will readily be bought by those lovers of fish diet, the Chinese.

There appears to be a seasonal variation in the poisonous qualities of this fish. The Chinaman Fish caught during the months of June, July and August appear to be more poisonous than those caught during the other months of the year. The poisonous effects are not the result of bacterial decomposition; I have known the fish when cooked shortly after being caught to have poisonous effects. Of two fish caught in the same locality, one Chinaman Fish was found by dire experience to be poisonous and the other to be harmless. The natives of Murray and Darnley Islands attribute the poisonous qualities of these fish to some noxious variety of seaweed eaten by the fish.

SYMPTOMATOLOGY.

The symptoms of poisoning by the Chinaman Fish vary in direct proportion to the quantity of the fish eaten and to the body weight of the patient. The symptoms usually commence within a few hours of the meal, and in a mild attack will continue for twenty-four hours, in a severe attack for seven days. They closely resemble those of an attack of gastro-enteritis, with, in addition, severe pains, tenderness and sometimes cramps in the skeletal muscles. Nausea, vomiting and abdominal pain are the first symptoms to appear, and these are soon

followed by acute diarrhœa and skeletal muscular pains.

In a severe attack, the temperature rises within twenty-four hours of the onset to 103° F., and the pulse rate to 110 to the minute. After a few days the temperature gradually subsides. There is loss of appetite, and thirst is a prominent symptom. The mental condition of the patient is one of irritability, and the muscle pains cause insomnia. Headache is a constant symptom.

There are no characteristic changes in the blood; the blood count remains normal and there is no rapid destruction of the red cells.

Loss of weight continues during the course of the complaint. The tenderness and pains in the skeletal muscles are the last of the troublesome symptoms to disappear. When these terminate, convalescence is rapid.

The prognosis of this complaint is a good one; I have not heard of a fatal case.

The treatment of Chinaman Fish poisoning consists mainly of giving an emetic, a large dose of castor oil or Epsom salts being recommended. Later on in the complaint, hypodermic injections of morphia may be required for the insomnia due to the persistent muscular pains. In the convalescent stage, bitter tonics aid in complete recovery.

In a recent letter to me, Dr. R. W. Cilento writes: "The accounts of the poisoning following the eating of the fish are exceedingly variable. Some fishermen ascribe its poisonous nature to the liver, as in the 'toad' fish, while others assert that it becomes poisonous only when feeding upon a certain kind of 'sea centipede' somewhat sparsely distributed throughout the Barrier Reef. I have no personal knowledge of either, as over a period of some years I was unable to come across any case round Townsville."