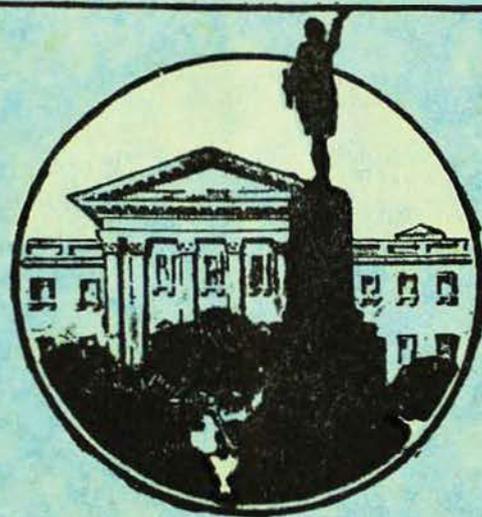


*The*  
**AUSTRALIAN  
MUSEUM  
MAGAZINE**

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



Captain Cook's Artists	- - - -	<i>Tom Iredale</i>
A Visit to Kandy Museum	- -	<i>James McKern</i>
The Cultivation of the Oyster	- -	<i>T. C. Roughley</i>
The Sand Wasp's Burrow		<i>Anthony Musgrave, F.E.S.</i>
Feathered Sylphids of the Forest	- -	<i>P. A. Gilbert</i>
Stranded Seafarers	- - - -	<i>Gilbert Whitley</i>
Australian Ants at Home	-	<i>Charles Barrett, C.M.Z.S.</i>
Stencilled Handmarks	- - - -	<i>W. W. Thorpe</i>

**PROFUSELY ILLUSTRATED.**

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PUBLISHED QUARTERLY.

# THE AUSTRALIAN MUSEUM

COLLEGE STREET, SYDNEY

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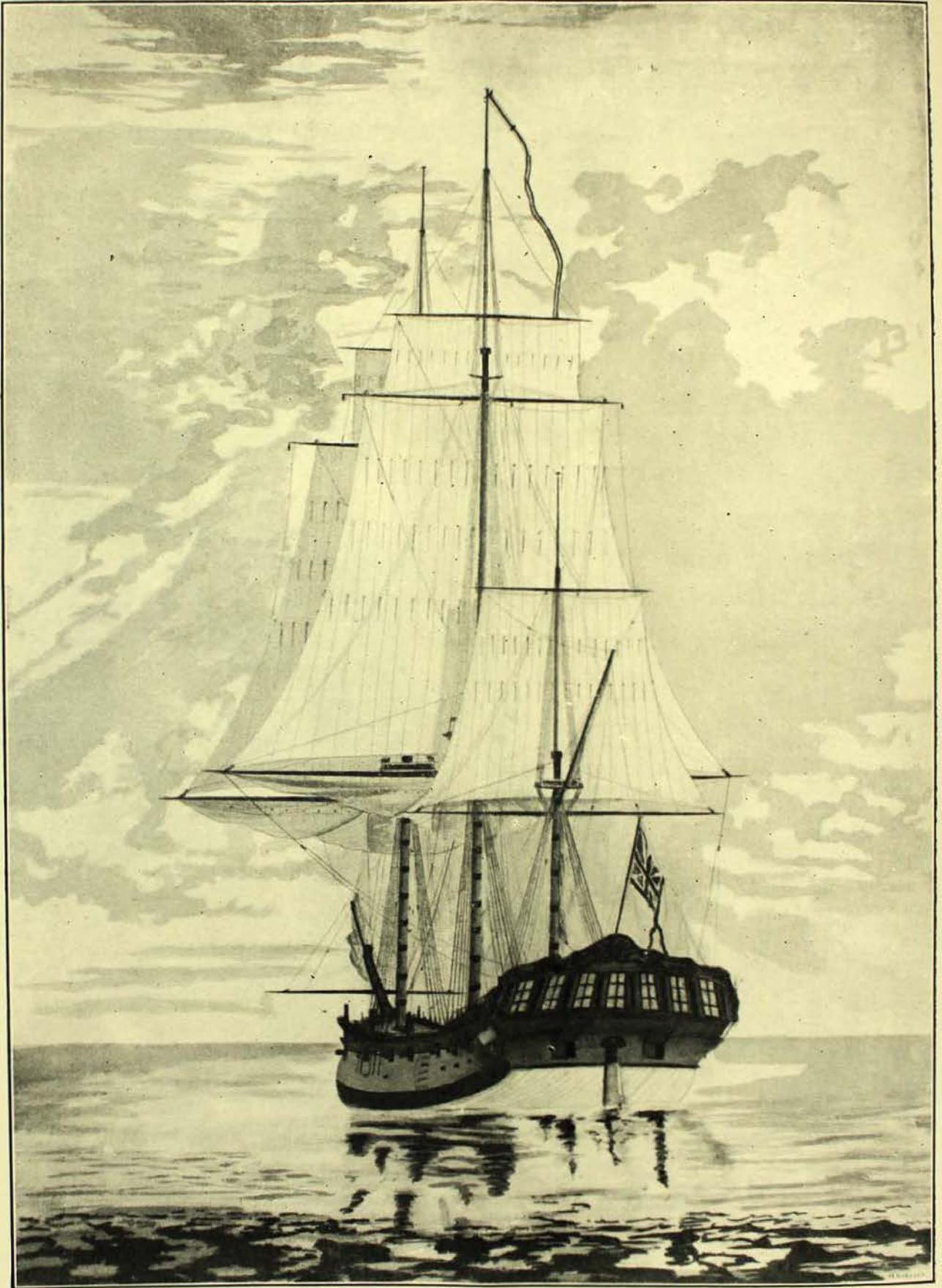
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H.M.S. "Resolution," which visited Tasmania during Captain Cook's third voyage.

[H. Roberts, del.]



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VOL. II., No. 7.

JULY-SEPTEMBER, 1925

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## Editorial.

**T**HROUGH the generosity of Mr. Ernest Wunderlich, F.R.A.S., Trustee, the Australian Museum will shortly be able to place on view a fine aboriginal group consisting of a man in the act of throwing a boomerang, a woman, and a child. The figures have been executed by Mr. Rayner Hoff, and are life-like representations of this fast disappearing race.

When in 1788 the first settlement was formed on the shores of Port Jackson, the estimated number of blacks then inhabiting the coastal strip between Botany Bay and Broken Bay was fifteen hundred, who, no doubt, were able to obtain plenty of food and shelter on the shores of the many bays and inlets which lend so much charm to this district. To-day the only evidence in this area of the former presence of this vanished people is their rock shelters, kitchen middens and rock carvings and paintings. The aboriginal population of New South Wales in the days of Governor Phillip must have numbered many thousands. In 1882 there were 6540 full bloods in this State, but at the present time they number no more than 1059, and there can be little doubt that we are within measurable distance of the time when the Australian blackfellow will be extinct

in New South Wales. In some of the other States, notably parts of the Northern Territory and of Western Australia, the natives are still fairly numerous and are living under much the same conditions as their forefathers did before the white man came. But the march of civilization will surely overtake the blackfellow even in those remote parts, and he will wither beneath the blighting influence of contact with Europeans. His ways are not our ways and he seems incapable of adapting himself to civilized customs while retaining his racial purity.

The Australian is a nomad and a hunter; he does not till the fields or rear useful domestic animals. His best hunting fields have already, for the most part, been alienated from him for settlement and pastoral purposes, and he is now restricted to poorer country, or to Government reserves, where his material needs and the education and training of the young people can be attended to.

Surely no one can contemplate the passing of the Australian blackfellow without a feeling of regret and a pricking of conscience. He has often been referred to as one of the lowest human types, but he has many fine qualities and accomplishments which have

been called forth by the conditions under which he has had to live. His wonderful ability as a tracker, his great powers of observation, and his intimate knowledge of the habits of animals are necessary to his very existence, for the procuring of food is his greatest problem. He cultivates the manly virtues of courage and endurance, and he is capable of fidelity and self sacrifice as has been demonstrated more than once. The elaborate rules which govern his family and social life, the severe initiation rites which the youth must endure before he attains the status of manhood, constitute a stern code of discipline and submission to authority which must have demanded a long period of evolution and mental powers of no mean order.

It is to be hoped that a remnant of this interesting race, the real Australians, will for years to come be able to live the wild free life

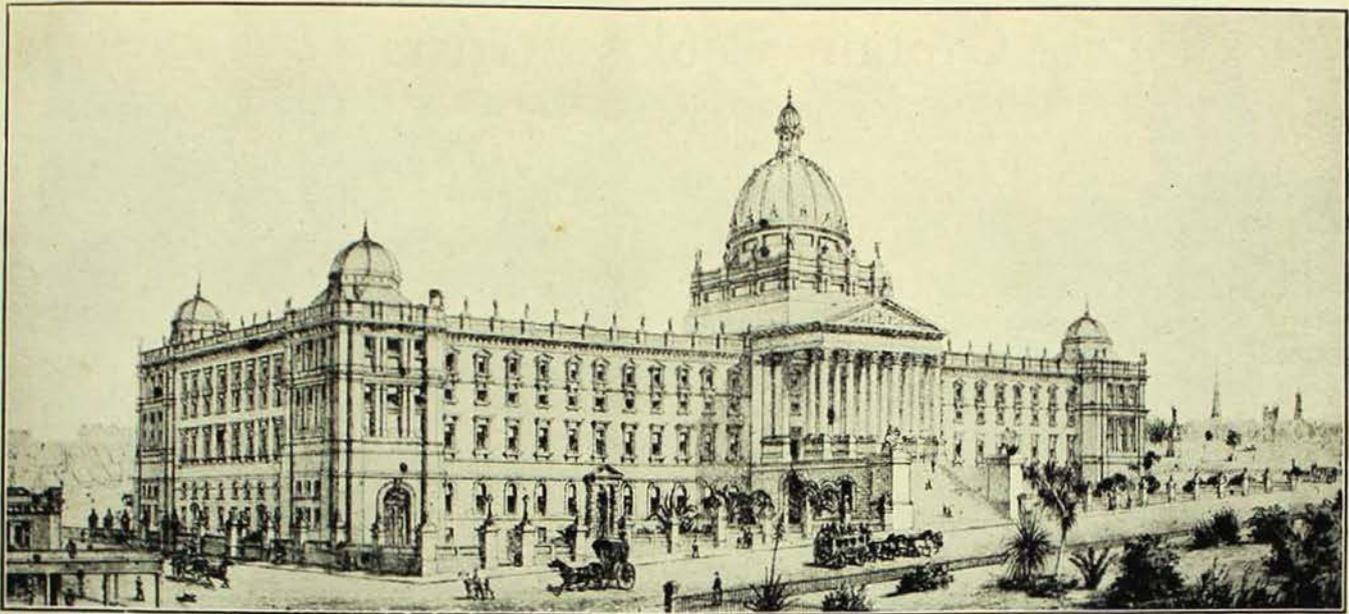
of their ancestors, but the next best thing is that our descendants may be able to see with their own eyes what manner of people they were, and this can best be achieved by means of exhibits such as Mr. Wunderlich has, with fine public spirit, made available to the Trustees of the Australian Museum. His action will be appreciated and applauded by all citizens to whom the blackfellow is not the degraded representative of an inferior race but a fellow creature deserving of the very best we can give him. The day has almost gone by when it was possible to study the New South Wales blackfellow living under natural conditions, but it is still possible to perpetuate his physical characteristics, and the Trustees hope that Mr. Wunderlich's fine example will be followed by others, so that some of the curious customs of the aborigines may be similarly represented by group exhibits in the Museum.

ON several occasions the need for increasing the Museum buildings has been stressed in these pages. The need is an urgent and growing one and the hampering effects of congestion are felt in many directions, so many in fact, that it is difficult to say where the shoe pinches most. In the aspect noticeable particularly to the layman, we would like to see extra accommodation provided in the lecture hall and galleries. The former was designed to accommodate 250; actually 350 have been present on occasions, and too frequently have we had to close the doors and repeat the lecture at a later date. To have to invite the public to attend these lectures to be disappointed is not only unfair to them but also to the institution catering for them. The seating should be doubled at least.

Our galleries are also sadly inadequate both as regards area and utility. The lighting of some of these halls is so deficient that during winter months it is practically impossible to see anything during the latter half of the day. The institution possesses many treasures which have either to be stored, or, if exhibited, are not able to be shown to the greatest advantage. During the past few years great improvements have been made in the way of group exhibits and several of these have been added to the galleries. Amongst the exhibits they are, doubtless, without an

equal as an educational factor, portraying as they do the life of creatures seldom noticed by the layman in their natural habitat. Much as we should like to add to these it is obvious that we are within measurable time when we shall have to cry a halt. These are, perhaps, the most obvious of our needs but there are others equally, if not more, urgent. Almost daily we are visited by students conducting researches and wishing to consult literature and material from the collections. In our state of congestion it is impossible to provide them with the accommodation to which they are entitled, they have, therefore, to be placed in any odd corner which, at the moment, happens to be idle. In an institution such as this, it is of paramount importance that proper and adequate facilities should be available to all classes of students, be they tyros or advanced workers.

There are many other directions in which the institution would like to expand, but lack of space and funds hampers us on all sides. It is now some sixteen years since the last additions were made to the building. Sydney then had 600,000 inhabitants, now it boasts of a population exceeding one million, and, unfortunately, whilst the institution's collections and activities have increased the wherewithal to enable it to function satisfactorily has not.



The Australian Museum as it would appear were it completed to the original design. This is the frontage to William Street which will be the main one.

[Jas. Barnet, Architect.]



The same frontage as it is to-day. It is to this facade that the next additions will be made.

[Photo.—G. C. Clutton.]

On this page we illustrate the William Street facade; it is to this that the next additions will be made. With it we show the same frontage as it would appear were the building completed according to the original design. This frontage will be the main one, and the building will possess a dignity befit-

ting the institution whose home it is, and in keeping with the magnificent site it occupies.

May we not then hope for some generous treatment from the hands of the Government and from citizens more fortunately endowed than most and who are interested in philanthropic and educational matters? To such there is a wide field available.—W.A.R.

## Captain Cook's Artists.

BY TOM IREDALE.

SOME years ago, through the energy of the then Agent-General for New South Wales, Sir Saul Samuel, many objects or relics associated with Captain Cook were secured in London for the Trustees of this Museum. These were acquired from Captain Cook's relations, on his wife's side, and include many strange articles brought back by the explorer from the south seas.

Whilst the relics may be reviewed in later numbers of this MAGAZINE, the present article deals only with two books of paintings which have never been exhibited. These books were the property of Canon Bennett, who has attached some notes to the effect that they had belonged to Admiral Isaac Smith, and that some manuscript notes therein were in the handwriting of the Admiral. Canon Bennett was the son of Mrs. Cook's second cousin to whom all her belongings were bequeathed. Admiral Isaac Smith was a half cousin of Mrs. Cook and when he retired he resided with her, both living to a very old age. As a youngster Isaac Smith accompanied Captain Cook on his first two voyages, and the tradition in the family was that Isaac Smith was the first to land at Botany Bay.

That the manuscript notes were written in Admiral Smith's old age is evident, for they are scribbled on the backs of the old fashioned folding envelopes, paper in those days being a scarce commodity. One is addressed to "Mrs. Cook, Clapham," and the other to "Admiral Isaac Smith, Near the Five Brewers, Clapham, Surry," and they were written in or



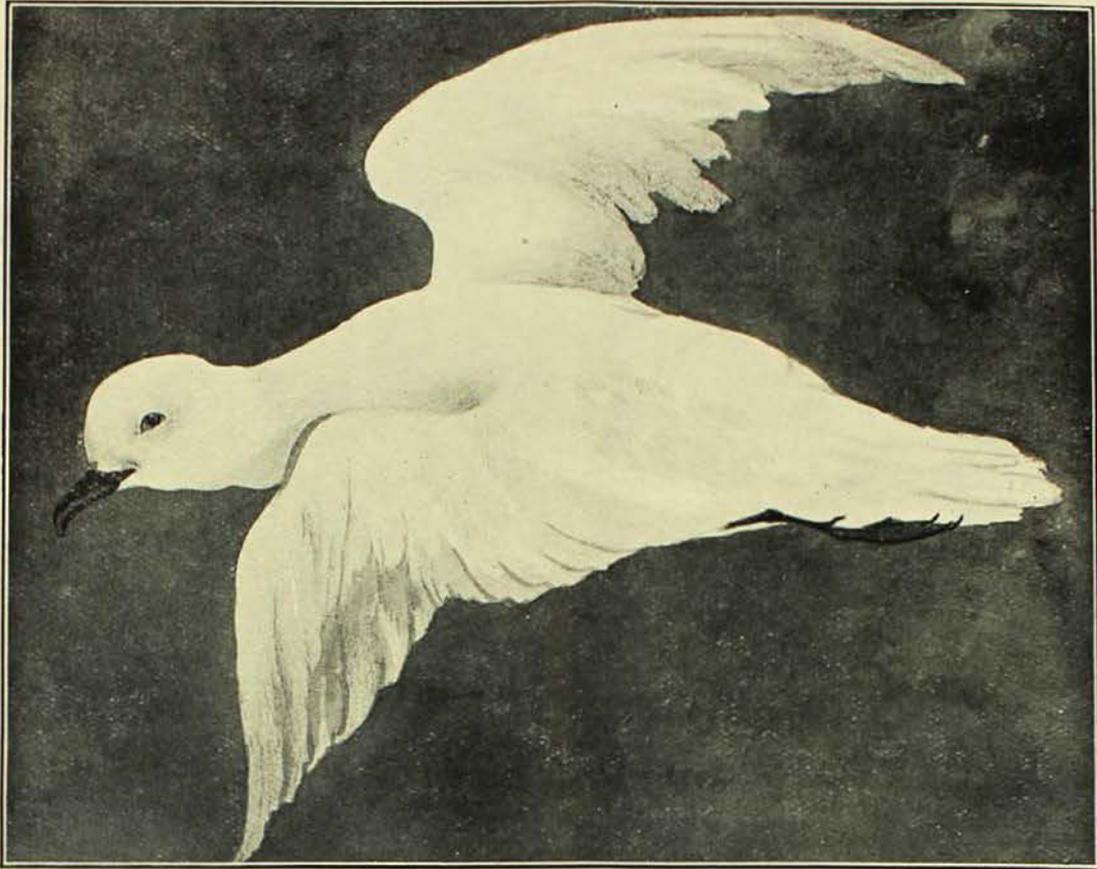
Potatow—"The Otaheite Admiral." [W. Hodges, del.]

after 1820: A scrap of paper utilised has "Cook" written on it and the handwriting is suspiciously like that of Cook himself. The notes consist of a MS. index to the paintings, and, in order to refresh his memory, Admiral Smith has carefully read the published accounts, jotting down the supposed references to the paintings and then checking them back.

With regard to these two books of paintings



H.M.S. "Resolution" taking in ice for water, in the Antarctic Seas. The men straining at the line give an adequate idea of the small size of this, and its companion ship, H.M.S. "Adventure." [H. Hodges, del.]



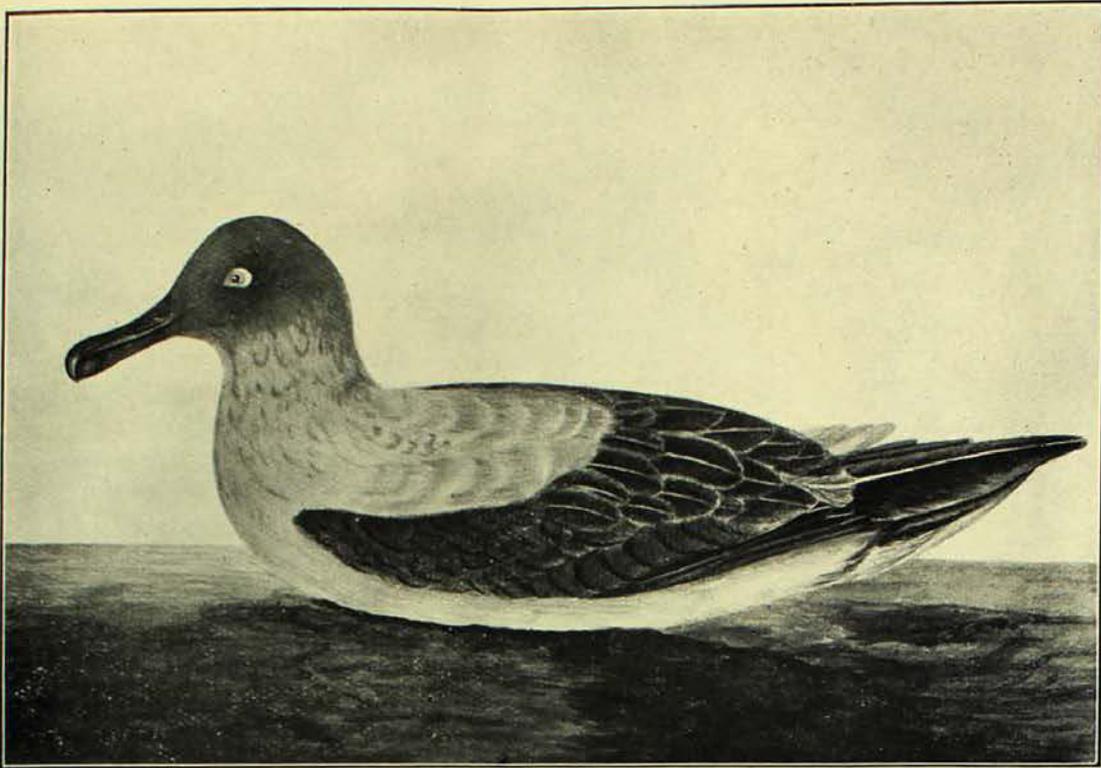
The Snowy Petrel (*Pagodroma nivea* Forster) a characteristic inhabitant of the Antarctic seas.  
[G. Forster, del.]

one consists of landscapes and portraits, and the other of illustrations of birds, with one tree and one fish. The landscapes are fairly accurately determined by the old man, but he was obviously no ornithologist, as most of the latter are hopelessly incorrect both as to identity and locality.

On the second voyage, to which these books of paintings refer, the government appointed a painter, selecting W. Hodges, while as naturalist painter George Forster assisted his father, J. Reinhold Forster, the accredited scientific investigator of the trip. Two vessels were commissioned, the *Resolution*, under Captain Cook, and the *Adventure*, under Captain Furneaux. Both the artists and the scientific staff were attached to the former vessel, no one interested in painting or natural history accompanying the *Adventure*. Had there been someone we would have had some early paintings of Tasmanian subjects, as the *Adventure* called at the Bay since known as Adventure Bay, South Tasmania. The appointment of any artist or naturalist was due to the success of Banks and Solander

on the first voyage, and, though the unfortunate artists accompanying Banks died comparatively early on the long voyage, the results were sufficient to indicate the great value of their work.

The work of Hodges was reproduced in the published account of this second voyage written by Captain Cook, and is familiar to students of our national history, but the reproductions have lost a lot of their brilliancy due to the art of the engraver. George Forster's paintings of birds have never been published, though the volume preserved in the Banksian collection in the British Museum contains one hundred and sixty odd paintings. Though called paintings only a few are finished works of art, the majority being merely rough paintings, very often unfinished, to show the form and colouring of the bird, while quite a number are merely outline pencil sketches. Their importance lies in the fact that they constitute the earliest delineations of the subjects limned, and are therefore historically and scientifically invaluable.



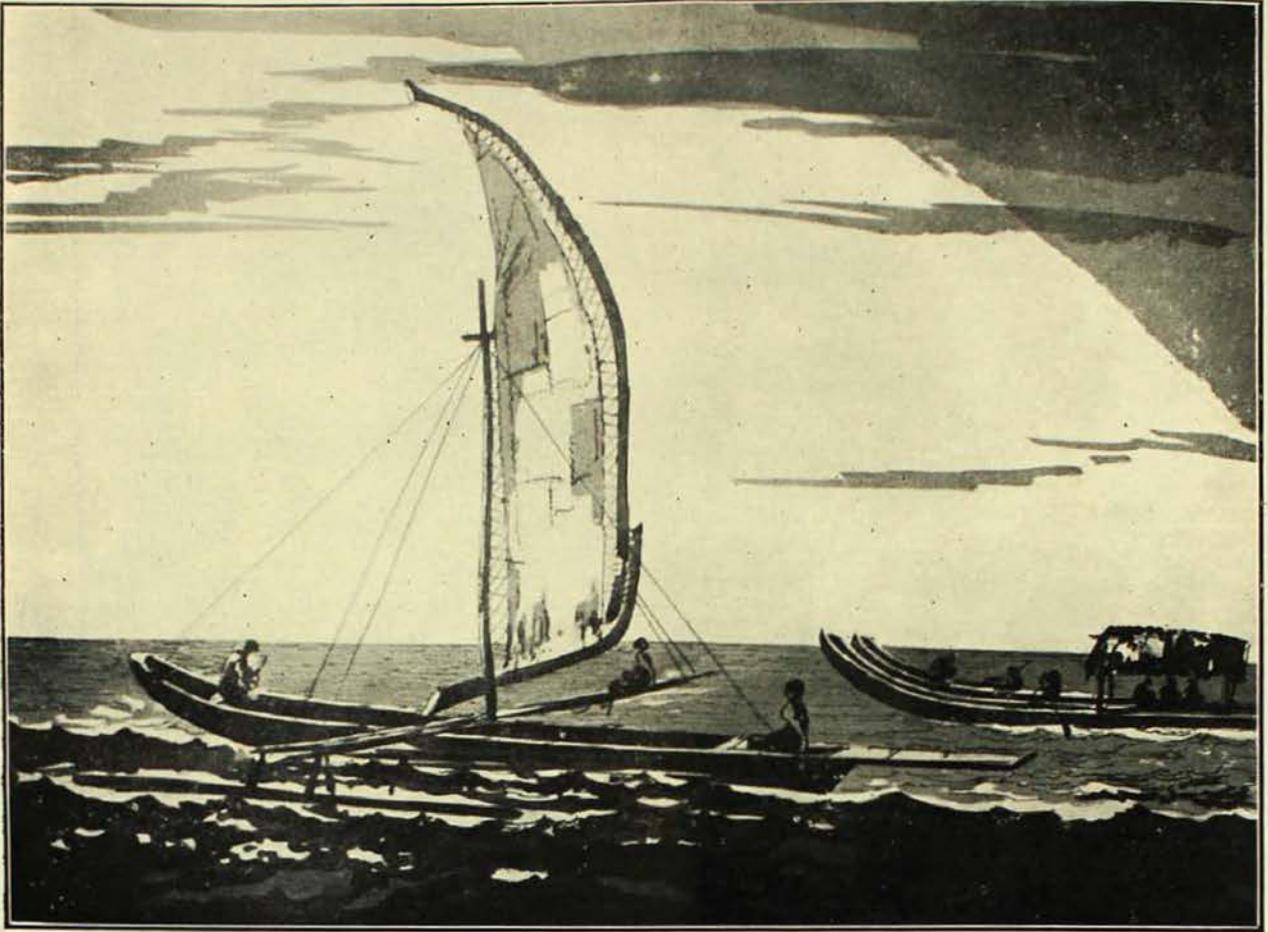
The Lightmantled Sooty Albatross (*Phoebastria palpebrata* Forster), another Antarctic dweller, a darker form frequents the southern lower latitudes.

[G. Forster, del.]

That Cook was a naval genius is amply evident, for his chart-making inaugurated a new era in that science, and the extraordinary accuracy of his survey of the eastern coast of Australia is commented upon by mariners to this day. It was Cook's survey of the Gulf of St. Lawrence that enabled the Royal Navy to land the army under Wolfe which conquered Quebec and his success was recognised by his appointment, after the capture of Newfoundland in which he took part, to make surveys of the shores of the captured isle.

The first page in the book of general subjects shows two charts prepared by Cook before he sailed on his first voyage. These are, one of the Harbour of St. John, the other of the Harbour of Croque, both in Newfoundland, the latter dated 1763. They are entirely drawn by Cook. All the rest of the subjects are relative to the second voyage, which ran from the Cape of Good Hope into the high latitudes of the south Antarctic along to New Zealand, thence into the Pacific and back again to New Zealand, from which place a course was steered eastward to Cape Horn and thence home again via the Cape of Good Hope.

Pictures painted by Hodges at many points appear in this book, some of which are the original sketches from which the engravings illustrating Cook's Second Voyage were prepared. We can just notice one or two of the paintings, here reproduced, as illustrative of the work of Hodges. Amongst these is that of the *Resolution* and *Adventure* taking in ice among the Ice Islands. A note by Admiral Smith reads: "The *Resolution* and *Adventure* Jan. 4 1773. Employed watering by taking in Ice for water Lat. 61°S. The salt water drains off after lying on the Deck for a short time the water the ice yielded was perfectly sweet and well tasted. Part of the ice was broken in small pieces & put into the water casks in hold and some melted in the coppers and filled up the casks in the hold with the water and some kept on deck for present use . . . always hoisting as large pieces of Ice as possible." This fine painting is by W. Hodges, and from a note by Canon Bennett we read that he "was a pupil of Richard Wilson, R.A." "As an artist he chiefly painted scenes from nature, collected during his travels, some of which may be said to possess considerable merit; but in the aggregate of his works the colouring is too monotonous and



Sailing canoes at Otaheite.

[W. Hodges, del.]

sometimes heavy, with an abruptness in the light and shade approaching to hardness." The bold draughtsmanship and treatment is seen in this painting, which shows the failings indicated but which in this subject tend to beautify rather than otherwise. Several other pictures dealing with the same subject are included, even the sketch of the one engraved, while one in almost monochrome blue, showing the two ships against a setting sun, with icebergs in the foreground, is a really beautiful study.

The next two paintings illustrate the work of George Forster, being two bird studies of Antarctic bird life. The series of bird paintings are fifty-three in all, painted by George as figures illustrating the detailed descriptions drawn up by his father, who intended to write a complete account of the natural history objects met with during the voyage. When the *Resolution* returned to England his commission to furnish a report for publication was denied, the contention being that Forster had been engaged only to

collect and make notes. The absurdity of this argument is obvious to anyone, when it is recalled that Forster, senior, was the most able naturalist of his day, learned and literary, and had already published many translations into English of previous foreign voyages. However, as the Government were able to enforce their view, J. R. Forster retired to Germany, where he took up a professorship at Halle. He retained his manuscript notes and descriptions and these were printed many years after his death. He published some philosophical observations without any illustrations, and his son George published an account of the voyage but also without illustrations.

The paintings prepared by George came into the possession of Sir Joseph Banks, and thence into the British Museum, where they are still preserved. George accompanied his father to Germany and flourished, but died comparatively young. Though the Forster drawings were available for study at the British Museum, no account was published, even of

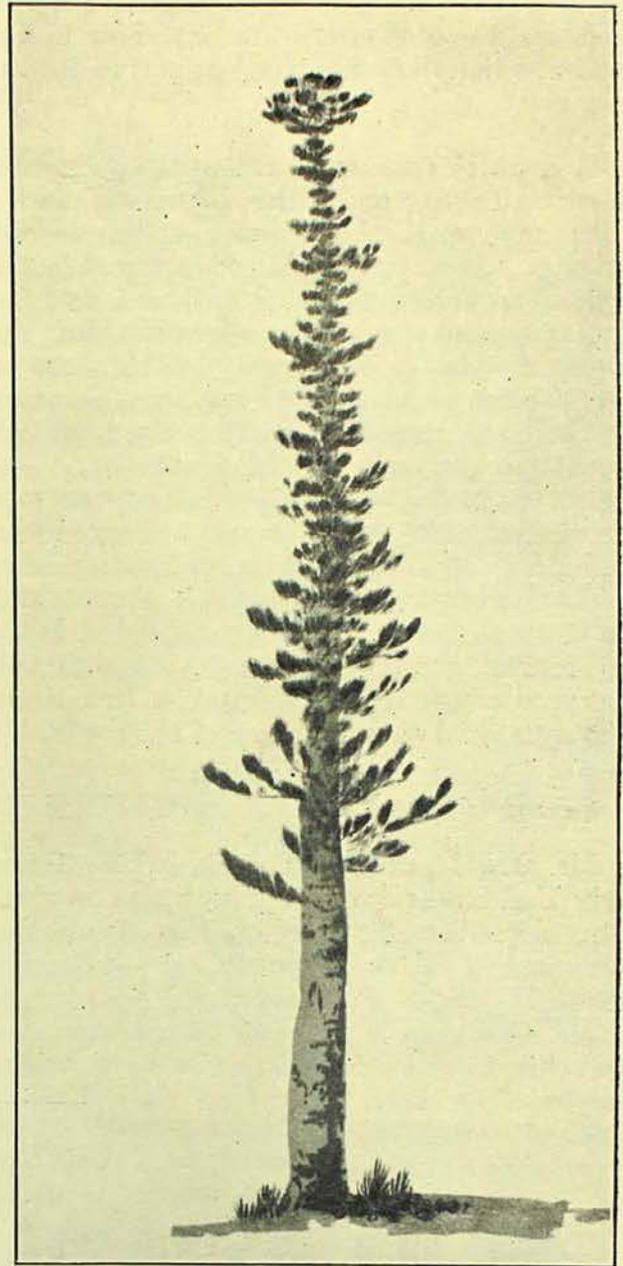
their extent, until 1906, when a list with the names of the objects delineated was issued. The present series show some objects of more than usual interest, including some not represented in the British Museum collection, and some more complete than the corresponding ones in that collection.

The Snowy Petrel got its name from its plumage, and this, given by Forster who was the first naturalist to describe such a bird, has been used ever since. This bird is characteristic of the Antarctic region and two forms, a larger and a smaller one, occur. Though these were only correctly distinguished less than twenty years ago, both are figured in this volume and regarded as different. The plumage is pure white, the legs and bill being black. Its nesting place was found by the Australasian Antarctic Expedition in the icy land due south of Australia.

The Albatross shown had just as remarkable a history and it so attracted J. R. Forster that he published a description of this bird and reproduced the painting here used, but the memoir was issued in a French scientific periodical and owing to the wars in France and on the Continent it was overlooked until some twenty years ago. In the meanwhile a commoner bird had usurped Forster's name and the rarer one had been redetermined through the Antarctic voyages at the beginning of this century. The reason for this confusion was that the intrepid Cook had ventured into latitudes so far south that few had dared to follow him. The attack upon the South Pole necessitated direct attempt upon the icy fastnesses, and thus the birds pictured by G. Forster on this voyage were rediscovered so many years afterwards.

Many pages could be written upon the bird subjects, as it must be remembered that these were all novelties when met with.

The first illustration reproduced is that of Potatow, the "Otaheite Admiral." This is drawn by Hodges in brick red crayon and the effect is not the best nor is the medium a satisfactory one. The artistry of Hodges is apparent, but it must be conceded that he was not very successful in portraiture. This is the original sketch from which the engraving was made which adorns the pages of Captain Cook's Second Voyage, but it will be seen that the engraver has very freely interpreted his task.



Spruce Pine, from which the Isle of Pines, to the south of New Caledonia, derived its name.

The canoes used in the Pacific Isles afforded beautiful objects for the brush of Hodges, but another artist, H. Roberts by name, also made studies which are included in this volume. His paintings are more delicate than those of Hodges and appear to show better technique in draughtsmanship, so that it is presumed that Roberts was an officer on board the *Resolution*.

The painting of the canoes at Otaheite here presented is apparently the work of Hodges, but the bold black and white effect so commonly used by that artist is broken by bright yellow lines along the edges of the

canoes, the sail also being tinged with this colour; these of course do not show in the reproduction but are very effective in the original.

A double canoe was presented to Captain Cook and was named the *Britannia* and a plan appears in the account of the second voyage. The original plan is included in the volume of paintings and is unsigned, but the draughtsman was of the highest class, the workmanship being unsurpassable. As a frontispiece we have shown the finest painting in the book, signed by H. Roberts, a magnificent representation of the *Resolution*. The detail is admirable, the colouring superb, and it is unfortunate that it cannot be reproduced in colour. A note by Admiral Smith reads: "The *Resolution* Captain Cook Ship which sailed from leaving the Cape of Good Hope to returning to the Cape G. Hope 20,000 Leagues which is nearly equal to three times the equatorial circumference of the earth."

Mr. R. H. Cambage, C.B.E., F.L.S., formerly Under-Secretary for Mines, was on June 5th elected a Trustee of the Australian Museum to fill the vacancy caused by the death of Mr. W. H. Hargraves.

Mr. Cambage is by profession a surveyor but his interest in science is very wide; he has long been recognised as a leading authority on Australian botany. For many years he has been a member of the councils of the Royal and the Linnean Societies of New South Wales and is a past-president of both. Since 1919 he has been honorary Secretary of the Australian National Research Council and was honorary Secretary of the Pan-Pacific Science Congress held in Australia in 1923. Mr. Cambage is deeply interested in historical questions, particularly in regard to early explorations and scientific movements.

In our last issue reference was made to the excellence of Gunnamatta Bay as a collecting ground. We have now to thank the Chief Secretary for kindly allowing us to make use of the Fish Hatchery situated on the shores of the Bay as a collecting base, and already very interesting and valuable results have been obtained, which will be described in illustrated articles in subsequent issues.

This second voyage brought Captain Cook fame as a humanitarian, for it was made without the loss of a single man from sickness, the solitary death being that of a seaman affected with tuberculosis before the voyage began. For this achievement in seamanship Captain Cook was granted the Copley Medal of the Royal Society of London, and, had he survived the third voyage, many more honours might have been conferred upon him. But somehow the plain and familiar "Captain Cook," seems the highest compliment that could be paid to this "plain man" as he terms himself in the only account we have from his pen.

Always on his voyages Captain Cook was on the lookout for items of economic importance, *e.g.*, the Bread Fruit, the New Zealand flax, the Norfolk Island Pine, and similar objects, and we show "A Kind of Spruce Pine on the Isle of Pines on the south end of New Caledonia fitt for masts of a very large sort, seen Sept. 1774, a new species."

A lady who wishes to remain anonymous has presented the sum of ten shillings and a small collection of shells and echinoderms in recognition of the pleasure she has derived from attending the Museum lectures. We take this opportunity of thanking her heartily and expressing our gratification that our lectures are so thoroughly appreciated.

The Railway Commissioners have announced that the City Railway station at the corner of Liverpool and Elizabeth streets, about two minutes walk from this institution, will be called "Museum."

On 21st May, His Excellency Sir Dudley de Chair with Miss Elaine de Chair and Master de Chair paid an informal visit to the Museum. He was received by the President and inspected the collections, evincing great interest in the Cook relics and records.

Among other recent visitors to the Museum were Sir C. Hercules Read, formerly President of the Royal Anthropological Institute and Keeper of the British Museum, accompanied by Mr. Oscar Raphael of the Oriental section of the Museum; Mr. Leo. Austin, Assistant Resident Magistrate, Daru, Papua; Mr. A. C. English formerly an official of the Papuan Government; Mr. L. T. Griffin of the Auckland Museum and Zoological Gardens.

## A Visit to Kandy Museum.

BY JAMES MCKERN, CROWN TRUSTEE.

SET amongst the hills, Kandy, the ancient capital of Ceylon, is, perhaps, without rival in its charm of sylvan beauty. But beauty is not its only possession, for it has a quaint little museum, which is quite Kandyan in character, and



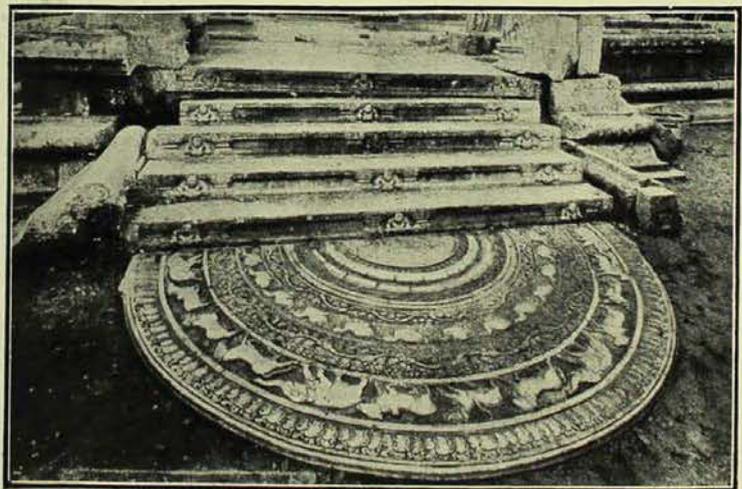
The Kandy Museum and Art Association.  
[Photo.— J. McKern.]

which contains archaeological treasures dating back for centuries in the island's history. The museum is housed in what was once the Palace of the Queens, for, from a notice near the entrance, we read— "This building was a portion of the Palace of the Queens in the days of the monarchy. It was built in 1774 A.D. by Kirtisiri Raja Sinha and was known as the Palla Wahala and was used by the Queens and Ladies of the Royal Household." The building is prettily situated overlooking a lake and backs on to the fringe of a large primary jungle, a reserve, adjoining the town. Part of the building is shown in the accompanying illustration and in this is contained the curator's office and the showrooms of the Kandyan Art Association, to which I shall refer later. The actual museum is in a smaller building in the courtyard.

The doorstep at the entrance to the museum is a beautiful moonstone, semi-circular and measuring nine feet in diameter. These moonstones are a feature of Sinhalese

architecture and are to be found adorning entrances to many buildings important in the past. They are exquisitely carved as may be seen from the accompanying photograph. The stone is divided into a number of concentric bands and upon these bands are richly carved a scroll of lilies, procession of animals—elephants, bullocks, horses and, strange to say, lions which are not known in Ceylon, and probably never were—floral designs, a procession of sacred geese or hansas, each carrying in its beak a lotus with small leaves, another conventional design, and in the centre the usual conventionalized lotus flower. How old some of these stones are it is hard to say, perhaps 2,000 years or more, for certain it is that they are of considerable antiquity. It is strange that very few examples of moonstones are to be found in India, and those that are cannot be compared with those of Ceylon. On each side of the doorway is a Kandyan lion, emblematic of the former Kandyan dynasty.

Upon entering one is greeted by the sight of several very old cannon. One bears the

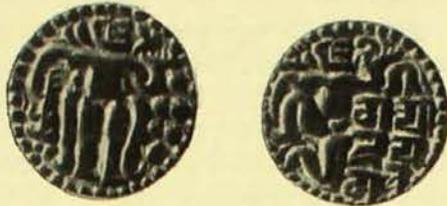


A typical Sinhalese moonstone.

label "Old cannon Dalada Māligāwa (Temple of Tooth) used in the Perahēra procession," to which I will later refer. Accompanying these cannon is a nest of stone cannon balls, of much larger calibre. Adjacent is an exhibit of sandalwood stones. Sandalwood

is much used for incense, and these stones, which are several inches thick, stand on small feet and are elaborately carved on the under side, are utilised to reduce the sandalwood to a fragrant paste.

Close by is a large collection of coins of the old kings of Kandy, dating back to the twelfth



Sinhalese coins of the reign of Sri Mat Sahasa Malla, A.D. 1200-1202. These are from the collection in the Australian Museum.

[Photo.—G. C. Clutton.

and thirteenth centuries. On the obverse is an image of the king standing and holding a lotus flower in his right hand, whilst with his left he grasps a sceptre sometimes called the "trisul emblem." On the reverse is the same figure sitting, with the king's name inscribed in Nagari Sanscrit characters. In the Australian Museum numismatic collection are a number of coins of the Kandyan monarchical days, and some of these are illustrated here. With these coins is exhibited a copper crown, formerly belonging to King Raja Sinha II. who reigned from 1634 to 1687, and of whom the following story is related. Whilst on his way to give battle to the Portuguese, who then held the island, the cross stick of his palanquin broke, forcing him to alight. Upon enquiring the name of the place he was informed that it was Doda-wela, whereupon he informed the residents that if victorious he would present his crown and jewels to the village. He was victorious and kept his promise.

Weapons of those bygone days are exhibited in plenty—knives of curious shapes, daggers, beautifully lacquered spears, and many other weapons including an old Kandyan execution knife. Then there are fittings from the treasure chest of the last Kandyan king, Wickrama Raji Sinha, who reigned from 1798 to 1815. These consist of two massive handles and a bolt richly inlaid with silver.

The potteries of old Ceylon turned out some fine earthenware, and there are many examples ranging from articles of household utility

to richly ornamented and enamelled vases, urns, etc. One notable specimen depicts the head of a crowned king (larger than life) surmounted by several Kandyan lions. Cooking utensils from the king's kitchen form another group. These are principally wooden moulds and a wooden press, for, as labelled, squeezing rice through as is done with mashed potatoes.

Old brass lamps such as were used in temples and households form a conspicuous collection. Some of these are hanging lamps, others are upon standards, some have several wicks and are surmounted by a sacred peacock.

An attractive exhibit is that of a row of

bells hanging from a beam across the room. Some are of wood and all of wondrous shapes and antiquity. One of the wooden ones, an oblong block about nine inches long, was hung upon the neck of the buffalo to protect the beast from the "evil eye"; on it is inscribed the Sinhalese word "A h a v e n á" meaning eye.



Guard figure.

[Photo.—J. McKern.

Kandyan doorways make another exhibit. These are very massive and some show the wear of centuries. It was the custom to erect at doorways of more than ordinary importance carved figures. These figures symbolized the guardianship of the dwelling or temple. The one here illustrated is labelled "Dorala Pala tupa Dalaga Mah-ganna," and is from the doorway of the Temple of the Tooth. A style of doorway found in Buddhist temples in Ceylon is the makara-torana. This is an arch decorated with the makara, a fabulous creature, part fish or shark and part crocodile, and possessing the trunk of an elephant, feet of a lion, ears of a pig, body of a fish, teeth turned outward, eyes like



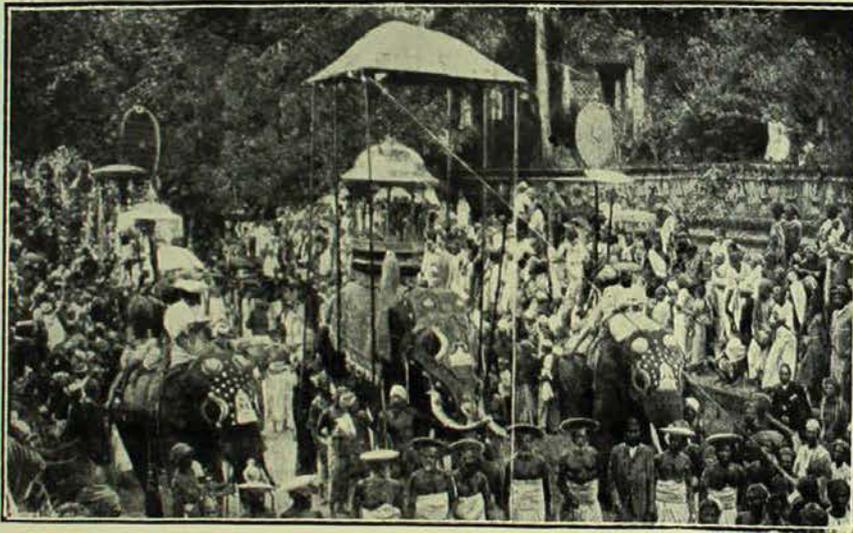
The Sacred Tooth Relic.  
[From *Spolia Zeylanica*

those of a monkey god, Hanuman, and finally a gorgeous tail.

In the courtyard surrounding the Museum native artificers are at work producing the far famed Kandyan brass and silver work. These men have been drawn together by the Kandyan Art Association, an organization formed with the object of encouraging and fostering native arts and crafts. The articles

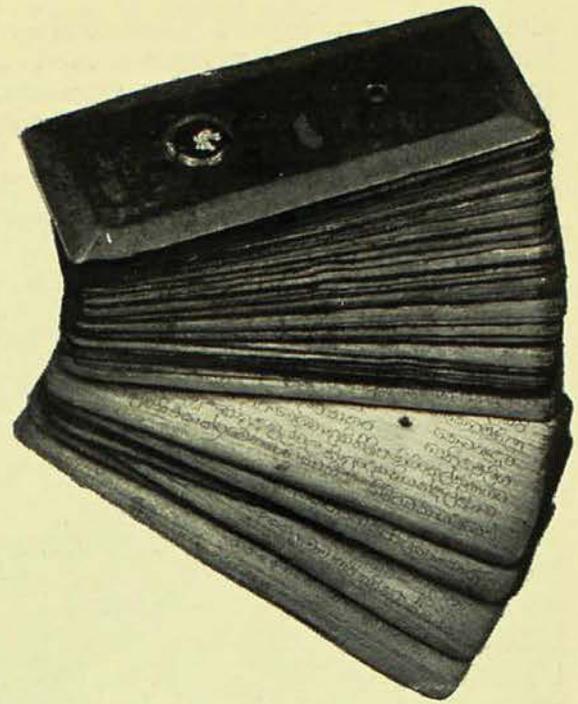
manufactured are for sale at moderate prices.

Separated from the Museum by a narrow street is the Temple of the Sacred Tooth, the stronghold of Buddhism in Ceylon. In this temple is kept the sacred tooth of Gautama,



Buddhist Procession in Kandy : the annual Perahera.  
[From *Spolia Zeylanica*.

which is jealously guarded and preserved in a shrine of the utmost splendour. It is the most celebrated Buddhistic relic in Ceylon, and was a national palladium during the troublous days of the dynastic past.



An Ola, the MS. of an ancient medical work from Kandy, in the collection of the Australian Museum.  
[Photo.—G. C. Clutton.

This relic has passed through many vicissitudes and is credited with being over 2,500 years old. It came to Ceylon from India about 310-313 A.D. According to legend many attempts have been made to destroy it,

but it reappeared resting upon a lotus flower, where it now reposes. The Portuguese, it is said, captured it and removed it to Goa, where it was crushed and burnt, yet Phoenix-like it arose and is now in the temple at Kandy. During the Perahera procession, an annual Buddhist event in the month of August, the tooth in its shrine is placed in a howdah upon a wonderfully caparisoned elephant.

In this temple is the former throne room of the kings. It is now the Oriental Library and is the repository of many sacred books or olas.

These books are written, or, more correctly, scratched with the stylus, on narrow strips of palmyra leaf which are strung together between two boards, forming the cover. Frequently these boards are

elaborately ornamented, jewelled or overlaid with silver. The high priest was good enough to show me how these olas were written. A strip is held between thumb and forefinger, and the stylus, held with the other hand, rests in a small V-shaped nick in the thumb nail which serves as a fulcrum, and the characters are thus scratched. The strip is then smeared with black ink which is wiped off, leaving the inscription clearly visible.

In the Colombo Museum I saw another large collection, and in the Australian Museum, amongst similar writings, there happens to be the MS. of an ancient medical work from Kandy.

Perhaps this article may induce the numerous Australians who visit Ceylon to wend their way to Kandy. The notes here given are, of necessity, brief and refer to a few only of the many things to be seen there.

## Obituary.

By the death on 9th April of Mr. W. H. Hargraves, son of E. H. Hargraves, who was the first to prove the existence of payable gold in Australia, the Museum suffers the loss of a zealous Trustee, and the State of a citizen who always evinced a keen interest in matters of educational and scientific importance. Mr. Hargraves was born at Dapto, in 1839, and from his earliest recollections was an enthusiastic collector of shells. Passing his childhood in the Gosford district he came to Sydney to receive his education, and subsequently entered the office of the Master in Equity, advancing to the position of Deputy Master in Equity from which he retired in 1915 after fifty-eight years' service.

In his younger days, and prior to his election as a Trustee, Mr. Hargraves formed a valuable collection of shells. He spared neither pains nor labour in accomplishing this, and was well known to all island traders and whalers who sailed into the port of Sydney. His enthusiasm led him into arranging with the messenger at the Observatory to advise him when the arrival of one of these was announced so that he might board it quickly. He was equally familiar to the fishermen upon the coast and was a welcome visitor to their camps. The collection thus formed was presented in 1877 to the Trustees of the Australian Museum by the late Thomas Walker of Yaralla, Concord, a citizen to whom the then colony was indebted for many generous acts in the cause of education and science. The young collector's health had failed and he was compelled to dispose of his treasures. The collection was then valued at £1,600 to £2,000 and taking the lower figure as its worth, the owner announced that if some generous

donor would present it to a colonial museum he would accept £800.

The late Mr. Hargraves was elected a Trustee of this Museum in 1901, and was always deeply concerned in the Museum and the staff. A few days prior to his decease he sent a characteristic message to the staff wishing to be remembered to all "from the highest to the lowest, officer, boy or attendant." At the May meeting of the Board of Trustees a resolution of condolence with Mrs. Hargraves was passed.

The Australian Museum sustained a further loss by the death of Dr. Eric Sinclair on 19th May. He was born at Greenock, Scotland, and was educated at the University of Glasgow. For the past twenty-seven years Dr. Sinclair had held the responsible position of Inspector-General of Insane and as the result of incessant labour and a rare gift for administration and organization he had brought his department to a high state of efficiency.

Despite the fact that his official duties left him but little leisure he found time to interest himself in many of the public institutions of Sydney. He was a keen and accomplished microscopist and was one of the founders of the Microscopical Society of New South Wales.

He had been a Trustee since 1907 and his opinion and counsel were highly esteemed by his fellow members. He was for many years a member of the Scientific and Publication Committee and acted as Chairman of that Committee from 1920 till 1924. At the Board meeting on June 5th a resolution of sympathy with Dr. Sinclair's two sons was unanimously passed.

## The Cultivation of the Oyster.

BY T. C. ROUGHLEY.

THE casual observer in his wanderings along the foreshores of our rivers and estuaries, noticing an abundance of oysters attached to the rocks or mangroves, probably imagines that oysters, like the proverbial and obliging "Topsy," just grow, and require only to be gathered and sent to market. The percentage of such naturally grown oysters that are marketed in New South Wales is a very small one, the great bulk being cultivated by artificial means, oftentimes with as much care as an orchardist gives to his fruit or a farmer to his wheat.

For about a century after the colonisation of Australia began, the natural crops of oysters were sufficient to meet the requirements of the market, not only for edible purposes but also for conversion into lime. Oyster beds were depleted without thought of the morrow, and in the 'seventies and 'eighties of last century the available supply of naturally grown oysters failed to meet the demand. Means had then to be devised to bring the supply up to normal requirements, and artificial culture had to be resorted to. By the artificial culture of oysters is meant the laying out of suitable material in positions where the free-swimming oyster larvae abound in order that they may have an opportunity of attaching themselves, and the transference of these attached larvae, or spat as they are then called, to a faster growing ground if the one where they were caught is not conducive to rapid growth.

We have seen in the last issue of the AUSTRALIAN MUSEUM MAGAZINE that in its early life the oyster leads a free-swimming existence, later developing a foot which enables



Stone heaped into long rows to catch the young oysters, or spat as they are termed. When from twelve to eighteen months old the oysters are knocked off and laid on level beds topdressed with shells or gravel. Brunswick River, New South Wales.

[Photo.—T. C. Roughley.]

it to crawl about, and that, if a reasonably clean surface is not encountered within a couple of days after the complete development of the larva, it must perish. The object of the oyster cultivator is to place material in the water during the summer months when oysters are expected to spawn, in order to provide suitable surfaces to which the larvae may attach themselves. Indications of areas where oyster larvae abound are usually given by the abundance of the catch on rocks and mangroves in the vicinity. The best spat-catching grounds are generally found at or near the mouths of rivers where the water is clear and the salinity fairly high, for not only do the larvae thrive best under such conditions, but the material placed in the water remains comparatively clean. Such situations are not favourable to quick growth, the best maturing grounds being found where the water is more brackish upstream. The ideal method of cultivation, therefore, is one which allows the material

to be placed in the clearer water to catch an abundance of spat, and later to be transferred to more brackish water where food is plentiful and growth is rapid.

The commercial oyster of New South Wales (*Ostrea cucullata*) grows and thrives both between tide levels and when submerged in water down to depths of fifty feet or more. Cultivation varies according to the locality of occurrence, which may be a long narrow foreshore, an extensive mud flat, or a firm, shelly, gravelly, or shingly bottom never bared by the tide.

The essential requirements of material used to catch and rear oysters are (1) the surface must be reasonably smooth and firm; (2) it should last for at least three years in the water without decay, (3) it should allow the oysters to be detached without breaking their shells. The material which satisfies these demands most adequately is sandstone, which cleaves easily, lasts indefinitely, and readily parts with the oysters. The foreshores of several of our rivers are abundantly supplied with sandstone, but there are many on the north and south coasts where it does not occur. On some of these a shale or slate is used, while on others the stone is so hard that a large proportion of the oysters which attach to it is broken when an effort is made to remove them. On such rivers the sandstone ballast which in the early days was dumped over from sailing vessels has been conserved and the utmost use made of it, but the bulk of the cultivation has to be done by means of

other materials. Of these, sticks of various kinds have of recent years come largely into vogue. The trees used are very limited in number for the reason that all but a few are subject to such rapid decay, due to the ravages of boring marine animals such as "cobra" (*Nausitoria*), that they fall to pieces before the oysters are mature. The best stick is that obtained from the Black or Red Mangrove (*Aegiceras majus*), which not only lasts well in the water when used in even very small dimensions but which has a smooth bark capable of being readily detached from the wood when it is necessary to remove the oysters. To a lesser degree Swamp Oak (*Casuarina glauca*) and White Honeysuckle (*Banksia integrifolia*) sticks are also used; these last well but the surface of the bark is rougher than that of the Black Mangrove and rarely catches the quantity of spat secured by the latter.

Cultivation in New South Wales is about equally divided between stones and sticks. Stones possess the advantage of permanency, but sticks, owing to their ease of transportation in large numbers, are more efficient for intensive cultivation; they may be laid down in great numbers on a good spat-catching ground and removed, thousands at a time, to a good maturing ground. In this way the greatest numbers of oysters are grown most rapidly.

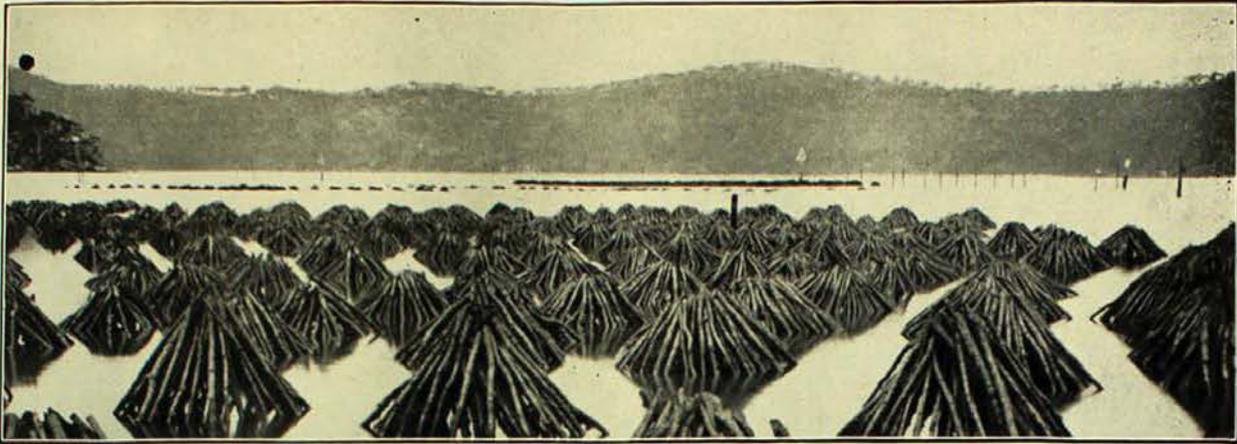
#### STONE CULTIVATION.

Stone is used either broken up into small boulders or cut into flat slabs. When the



Sandstone slabs laid in pairs like an inverted "V." The spat that is caught on these stones is allowed to remain attached until it matures into marketable oysters. Pelican Point, George's River, N.S.Wales.

[Photo.—T. C. Roughley.]



Sticks of the Black Mangrove (*Aegiceras majus*) clustered together in order to catch the spat. Hawkesbury River, New South Wales. [Photo.—T. C. Roughley.]

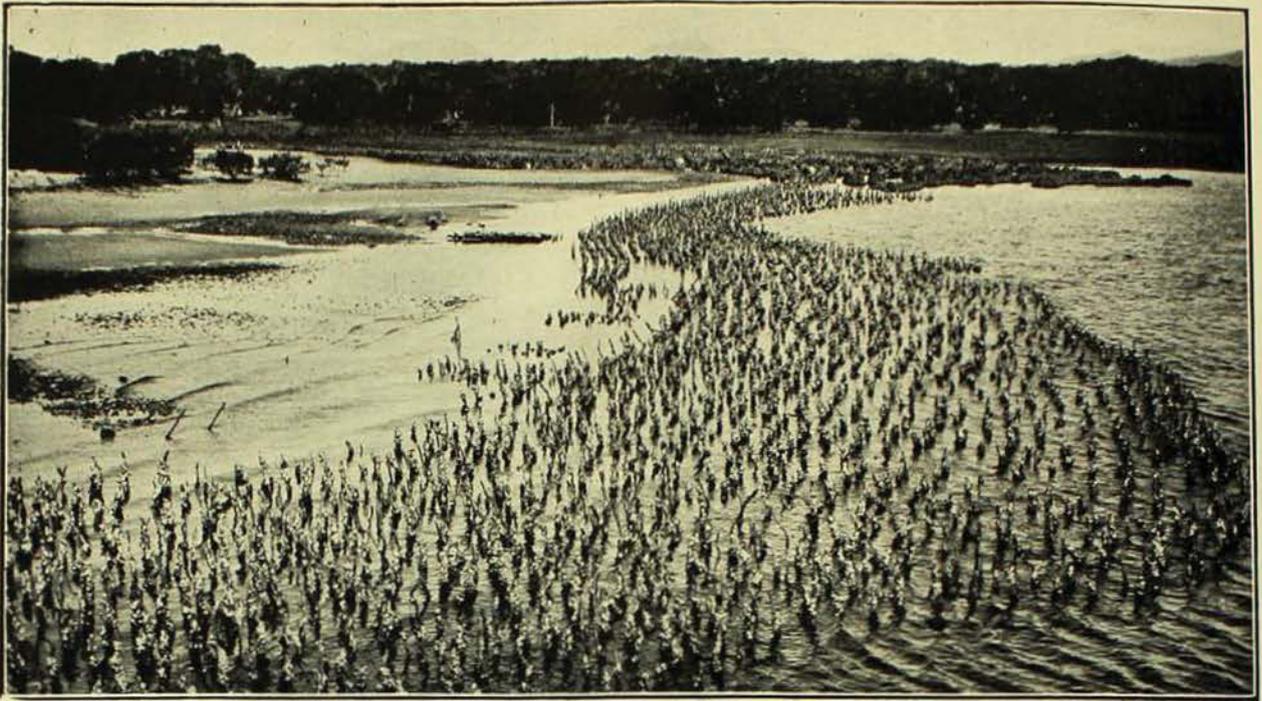
former method is adopted the broken stone is piled into heaps and arranged in rows varying from a foot to many feet in width, laid either direct on the bottom if it is firm or supported on long poles if it is soft. When the oysters are old enough to be removed they are knocked off and complete their development on a firm, level bottom or on wire-netting trays. In other cases the stones with the attached oysters may be transported to a maturing ground and laid in a single layer along poles to keep them off the mud. When stone slabs are used they are stuck into the mud in pairs, one leaning on the other forming an inverted "V"; in this case, owing to the larger size of the stones employed, the oysters are not removed until ready for market. The reason the stones are inclined is to present an upper and under surface, for it is found that far greater numbers of spat attach to the latter than to the former. When the oysters are about a year old, the stones are reversed, each one being turned to lean on its neighbour, the surface which was formerly uppermost now being beneath. In this manner both sides are utilised to secure the maximum catch of spat.

Stones can be laid in

heaps efficiently only where the water is clear, otherwise large accumulations of sediment will prevent the attachment of spat. This method is used at Port Macquarie near the entrance and on the Brunswick River, while stone slabs are used extensively on the George's and Clyde Rivers. On one lease alone on the George's River there are upwards of half a million such slabs under cultivation; these measure roughly two feet long, one foot wide, and four inches thick. They were cut from a sandstone



Black Mangrove sticks tied together in bundles to catch spat. Many miles of such bundles line the foreshores of the Manning River. [Photo.—T. C. Roughley.]



Black Mangrove sticks, originally laid in bundles, are stuck into the mud singly and upright when the oysters are about twelve months old, and here remain till the oysters are mature. Myall River, Port Stephens.

[Photo.—T. C. Roughley.]

quarry on the foreshore and towed to the lease by means of launches and punts.

#### STICK CULTIVATION.

Cultivation with mangrove sticks has been carried on most extensively at Port Stephens for upwards of twelve years, and its more recent introduction into the Hawkesbury River has led to its widespread adoption there. The stone lining the foreshores at Port

Stephens is not adapted to oyster culture on account of its great hardness, and the lessees were left with no other alternative but to use the mangroves which occurred there in abundance; on the Hawkesbury River, however, mangrove sticks are employed principally on the mud flats offshore, the foreshore leases being cultivated by means of sandstone boulders which everywhere abound.

When laid to catch the spat, the sticks are



The most extensive Mangrove maturing ground on the coast of New South Wales, Bundabah, Port Stephens.

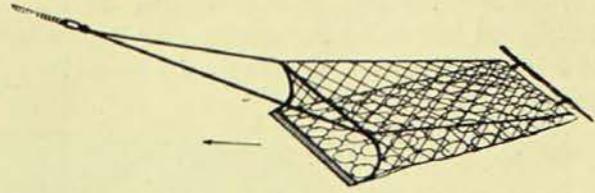
[Photo.—T. C. Roughley.]



A close view of oysters, sixteen months old, maturing on Mangrove sticks, Hawkesbury River.

[Photo.—T. C. Roughley.]

bunched very close together by being (1) arranged in bundles shaped like a bell-tent; (2) laid across a rack to a depth of about a foot, or (3) stuck into the mud in a slanting position, each stick leaning on its neighbour. The reason the sticks are packed closely is because a far greater catch of spat is secured than when they are arranged singly, due probably to the eddies which are created in the crevices, for matter suspended in the water tends to collect in such eddies. The bundles are left in their original position until the shells of the young oysters are sufficiently



An oyster dredge. It is hauled in the direction shown by the arrow, and scrapes the oysters off the bottom as it proceeds.

[T. C. Roughley, del.]

well formed to withstand handling, usually from six to twelve months; they are then loaded on to punts and towed upstream into bays and creeks which are being fed continually by fresh water from their sources. Here the sticks are stuck into the mud singly and upright, from one to two feet apart, and are allowed to remain there until the oysters are ready for market, when they are again lifted, taken ashore, and the mature oysters knocked off, sorted, and packed into 3-bushel bags to await shipment to Sydney. The sticks from first to last are submerged at high tide and exposed when the tide is low.

On rivers, such as the Manning and Bel-linger, where the bulk of the oysters are grown on deepwater beds, sticks are used solely for the purpose of catching spat to stock the beds. Here the sticks are tied together in bundles and laid on wooden poles, at right angles to the shore and current. When the attached spat is from twelve to



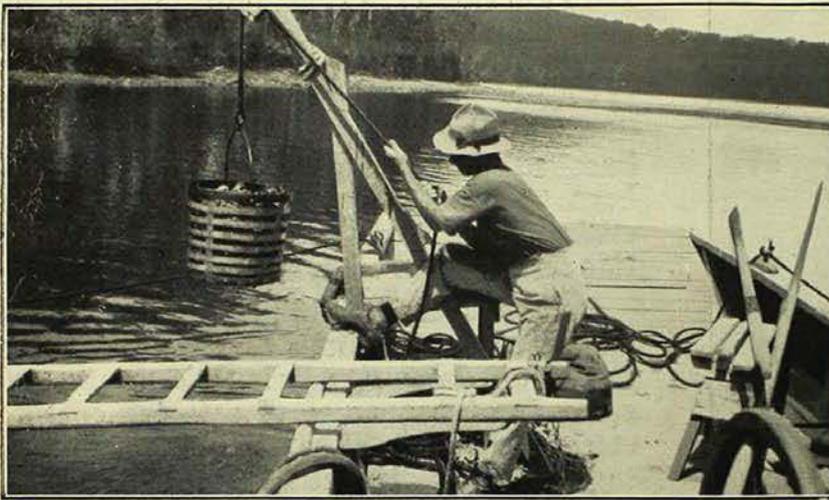
Dredging for oysters which are not uncovered by the tide. The dredge is dragged over the bottom as the man at the winch hauls the boat towards the anchor. Karuah River, Port Stephens.

[Photo.—T. C. Roughley.]

fifteen months old, it is knocked off into a punt and towed to the deepwater beds where it is shovelled into the water to be gathered when mature.

#### DREDGING FOR OYSTERS.

Oysters grown on beds which are not uncovered by the tide are usually recovered by means of an oyster dredge. This consists of an iron frame with a rectangular opening which leads into a net composed of iron rings and closed at the rear end. It is operated as follows: a boat is anchored for'ard and is then rowed back a distance of thirty or forty yards, the anchor rope being payed out over



Bucket of oysters gathered for market by a diver in a diving suit.  
Clyde River.

[Photo.—T. C. Roughley.]

a hand winch as it proceeds. Having travelled the desired distance, the dredge is lowered and secured by means of a rope and the boat slowly hauled to the anchorage, the dredge dragging over the bottom the whole time. As it moves forward the loose oysters on the bottom are scooped into the net, and when the course is completed it is raised, the oysters emptied out, and the boat rowed back to begin another haul.

Dredge oysters are usually a better shape than those grown on the foreshores for the reason that they are separated when young, and, by lying loose on the bottom, have a chance to correct such irregularities of growth as may have been caused by their crowded condition when growing on the sticks. It frequently happens that good catches of spat are obtained naturally on dead shell or gravel on a deep-water bed; these are recovered

along with those which had caught originally on the mangrove sticks.

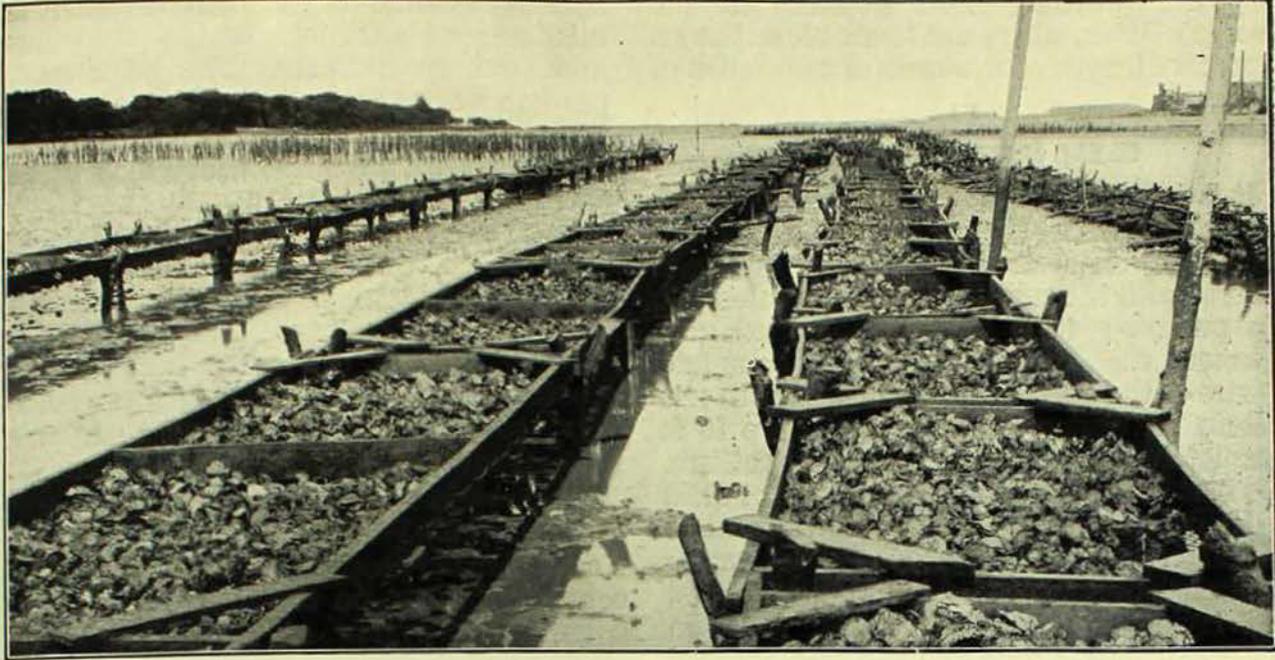
#### DIVING FOR OYSTERS.

On the Clyde River, oysters are frequently obtained by men in diving suits. A diver descends into the water, a bucket is lowered to him, and he proceeds to gather the marketable oysters which are either growing naturally or have been dumped on the bottom to mature. Many years ago diving for oysters was an extensive industry; in most cases diving suits were used, but for a considerable time South Sea islanders were employed on the George's River to gather the oysters without the aid of a suit.

Prior to the year 1870, when the mud-worm (*Polydora ciliata*) began to cause havoc amongst the oysters grown on the dredge beds, most of the oysters marketed in New South Wales were obtained from those sources, but as the ravages of the worm spread from river to river, dredge beds were abandoned and cultivation between tide levels concentrated upon, until at the present time only a small proportion of the oysters marketed is the product of deep water leases, a few rivers only having remained free or comparatively free from the pest.

#### WIRE-NETTING TRAYS.

An excellent method of maturing oysters is by means of wire-netting stretched over frames of sawn timber and supported above the bottom on wooden posts. The oysters used to stock these trays are obtained from various sources—from the artificially cultivated oysters caught on Black Mangrove sticks, from stone slabs and boulders, from the naturally occurring oysters attached to the bases of the Grey or White Mangrove (*Avicennia officinalis*) and its pneumatophores (aerial roots), and from the rocks high up on a lease where the tide covers the oysters for a few hours only each day and where growth is consequently slow. Wire-netting trays offer several advantages over other methods of cultivation inasmuch as (1) the oysters it is intended to mature on



Wire-netting trays used for maturing oysters gathered, when young, from stones and Mangrove sticks.  
Hunter River.

[Photo.—T. C. Roughley.]

them must be laid down singly or at most in bunches of two or three, consequently the individual oysters have room to expand and to improve their shape; (2) the height of the tray can be regulated and the best level for ensuring the maximum amount of growth obtained; (3) a free circulation of water about the oysters is provided, and (4) they are comparatively free from pests. A disadvantage is the limited life of the galvanised wire and the wooden frames, the former lasting only

from two to three years. In order to obtain the best results, all oysters grown on sticks should be finished off on wire trays, when such irregularities as are caused by an oyster growing round a stick, leaving a groove in the exterior round the shell when detached, are largely corrected. The market value of mangrove oysters is considerably increased by this means.

There are few rivers of New South Wales on which trays are not used to some extent;



Shell beds used for maturing oysters. This flat consisted originally of soft mud, but has been top-dressed with large quantities of dead shells and carefully drained. George's River.

[Photo.—T. C. Roughley.]

they are probably most popular on the George's River, where one lessee alone has an aggregate length of upwards of two miles of them.

#### SHELL MATURING BEDS.

It is very rarely found that a flat bared at low tide is sufficiently level and of a suitable consistency to mature oysters laid in direct contact with the surface. Sand is useless for the purpose; it is too unstable and gets between the shells, preventing complete closure of the valves, while soft mud will not sustain an oyster for long, and once it is completely submerged it quickly smothers. The best maturing beds are composed of dead shells, or finely broken stone or gravel, and on several rivers of New South Wales much labour has been expended in levelling ground and laying out these materials. On the Bermagui River, a solid foundation of Spotted Gum (*Eucalyptus maculata*) logs has been laid over an extensive area, and a top-dressing of dead shells has ensured a good permanent bed on which succeeding generations of oysters are laid to mature. On the Wallaga Lake, where large deposits of mud cockles (*Arca trapezia*) line the foreshores, these shells have been spread over the bottom between tide levels and durable maturing beds formed. It is on the George's River, however, that the most extensive work of this nature has been carried out. Large areas composed originally of soft mud into which one would sink half way to the knees, have been heavily top-dressed with old oyster shells dug up from below the mud, drains cut to low tide level, and very fine rectangular shell beds constructed. The cost has been heavy but their permanence repays for the expenditure involved.

#### MARKETING THE OYSTERS.

When the oysters are removed from the stone, sticks, trays, dredge, etc., the mature specimens are loaded into standard 3-bushel bags, while those that are immature are relaid on the beds or trays to complete development. The bags are shipped by boat or rail to

Sydney, whence they are distributed by commission agents throughout the city, suburbs, and country districts. The price received per bag varies from £3 to £4 10s. according to quality. The length of time taken for oysters to reach a stage which may be designated average quality is usually about 3 years; under very favourable conditions two years may suffice, and when seasons, situations, etc., are adverse, it may take the oysters four years to mature. The shells of fast-growing oysters are softer than those of specimens grown more slowly; they do not carry so well in the bag and their market value frequently suffers in consequence.

There were 28,380 bags of oysters produced in New South Wales during 1924. Of these, a considerable proportion was exported to the southern States, on the shores of which the commercial oyster of New South Wales (*Ostrea cucullata*) does not occur.

The shells which accumulate in the shops of Sydney and its suburbs are regularly collected and either burnt for lime or ground into grit for bird feed.

The cultivation of oysters in New South Wales is developing steadily. Given suitable ground, an industrious, intelligent cultivator can make good money. Fortunes have been made out of the industry and doubtless fortunes remain to be made. But it must not be thought that the oyster grower has a perfectly smooth path to tread. I hope to tell you, in the next issue, of some of the difficulties he has to contend with. Oyster culture is like other avenues of farming—there are good grounds and poor grounds, good seasons and bad ones, and there are pests which must be continually combated in order to ensure an adequate harvest, which alone makes the industry worth while.

The great majority of oyster growers are Australian by birth, and many returned soldiers were repatriated on to leases. With the assistance of scientific effort, it is hoped that the pitfalls, into which the pioneers of the industry stumbled, may be avoided, and the way made smoother for men who in the past have battled through unaided.

## The Sand Wasp's Burrow.

BY ANTHONY MUSGRAVE, F.E.S.

THROUGH the courtesy of Mr. F. Danvers Power there has been installed recently in the Insect Gallery of the Australian Museum, a model of a Sand wasp's burrow which gives an excellent idea of the structure of the nest of this insect.

The model was prepared by Messrs. G. C. Clutton and J. Kingsley of the Museum staff, from a plaster of Paris cast of a burrow which Mr. Danvers Power obtained by pouring liquid plaster down the opening to a nest and removing the plaster when it had set. Mr. Power also kindly provided notes, and earth from the locality where he secured the cast.

The Sand wasp, *Exeirus lateritus*, occurs commonly about Sydney during the summer months. It has already formed the subject of an article in the AUSTRALIAN MUSEUM MAGAZINE<sup>1</sup> but a few notes may serve to remind readers of the habits of this interesting insect.

The female has long been remarkable for the habit of paralysing cicadas with her sting in order that they may form the food supply for her larvae when they emerge from the eggs. The wasp after constructing her burrow flies off in search of cicadas; she flies round and round a tree in ascending spirals and on perceiving a cicada darts at it and inflicts a sting in its nerve centres so that the insect falls paralysed to the ground. She then proceeds to drag it to her burrow holding it by her middle pair of legs and using the fore and hind pairs to walk with. The cicada is eventually entombed at the end of a gallery, an egg being first attached to the under surface of the body near the base of the legs. It is believed that sometimes the cicada succumbs to the effects of the sting, the tissues dry up or become mouldy and the wasp grub dies. Should the grub, however, reach maturity, it constructs a cocoon in



Model of nest of Sand Wasp (*Exeirus lateritus*) showing the bodies of entombed cicadas, destined to form the food of the wasp grubs upon emergence from the eggs.  
[Photo.—G. C. Clutton.]

which it pupates to emerge later as an adult wasp.

The model shows a wasp dragging a captive cicada to the burrow opening, while below are seen the galleries in which are deposited the bodies of other victims.

<sup>1</sup>McCulloch—*The Australian Museum Magazine*, Vol. I, No. 7, January, 1923, p. 209.

## Feathered Sylphids of the Forest.

BY P. A. GILBERT.

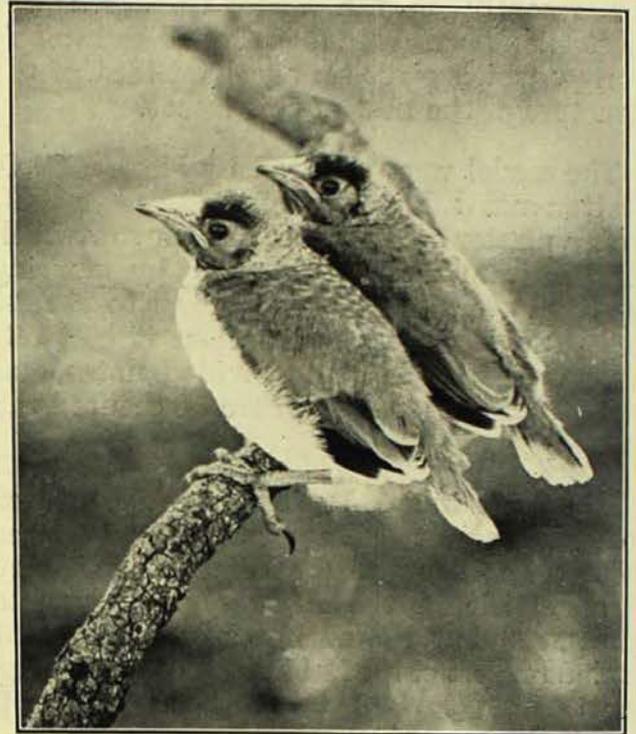
AMONG the many delightful phases of bird life, that of the study of the growth and development of young birds has a lasting fascination. The absence, too, of that sensitiveness to danger, which characterises old birds, especially appeals to the sympathetic side of our nature. But while these woodland sylphids are aimlessly battling with the elements they are quickly losing their gentle demeanour. How soon they become strong and active like their parents!

In many instances extremely ugly chicks emerge from their shells, and, in the course of a few weeks feather into birds of exceptional beauty. In the past these rapid changes have often led to errors of identity, in the future better use will probably be made of them in classifying our birds.

The development of the young bird from the day it hatches until the day it leaves the nest may be conveniently divided into two stages. The first may be described as the physiological, the second as the morphological, although it is impossible to state when one phase ends and the other begins. The earlier stage is occupied in giving strength to the functional side of the young bird's life, while later the likenesses to and differences from the plumage and form of adult birds imperceptibly unfold themselves. Usually feathers do not make their appearance until the young bird has considerably filled out. As feathers require an abnormal amount of nourishment to maintain their growth, nature has arranged that growth shall take place when young birds can consume the necessary quantities of food, without being taxed too heavily in building up various other organs at the same time.

To the general observer, in all likelihood, the most interesting period in the life of a young bird is the three days prior to its quitting the nest and the three days after it leaves it. During the period mentioned the greatest visible changes take place. The nestling becomes the fledgling, and during its adolescence it takes on more and more the feathery clothing which it is to wear.

Many young birds dress like their parents except that they choose a lighter hue for their costume. The young Noisy Miner will serve as an example. Other babies are more



Young Noisy Miners (*Myzantha garrula*) or Soldier Birds.

[Photo.—P. A. Gilbert.]

cautious in their choice of a suit, and very often select one that will effectively hide them in the scrub or on the ground, with no likeness whatever to that of the adults. When they grow strong and alert they show up in the true colours of the species, by taking on the parental dress. Some imitate the mother only, particularly when the father has a showy plumage. Young Crimson Parrakeets are green, and hide in the bushy tops of gum-trees, while the adult birds are of a beautiful crimson and blue, and rather conspicuous. Young Blue Wrens are familiar followers of the brown garb of the female.

The helpless little creatures delight to snuggle together in their nest, or to cuddle each other on a bough, when two or more

comprise the family. They will patiently and expectantly wait for hours in these positions till a parent bird brings them a dainty insect. If the mother bird is overdue they get very restless, the pangs of hunger sharpen their senses, and their little heads turn this way and that in a very watchful manner. The arrival of a parent is greeted with a chorus of squeaks, and with quivering wings and entreating gapes, unmindful of the great struggle the search for food often causes. It is truly remarkable how young birds contend against winds and rain, but

the creek, patches of reeds and other aquatic plants provided breeding haunts for many kinds of insects. Higher in the same tree a pair of Pee-wees had a nest, and shared a common fellowship with the Wagtails. The searchlight vigilance resulting from this entente made it well nigh impossible for an observer to approach without causing alarm.

The parent Wagtails turned and tumbled over this patch throughout the day and nipped up every insect that ventured on the wing. The four sharp-eyed babies followed every movement as they hawked around



Young Wagtails or Black and White Fantails (*Rhipidura leucophrys*).

[Photo.—P. A. Gilbert.]

easily succumb to a wound in the flesh be it ever so slight.

There were four young Wagtails in the nest pictured, but, when the time came to photograph them, one developed bashfulness and quietly sank to the bottom of the nest; there, wriggling beneath one of his mates, he succeeded in hoisting him above the others. The nest was placed on the lowest straggling branch of an Oak-tree (*Casuarina*), which spread out over a creek. Here and there in

for food, their heads moving together in perfect time. These wistful little chaps were a delightful study. A few days after they were photographed they arranged to leave home. It was the prettiest sight imaginable to watch the fussy way they went about it. One bird shuffled on to the bough which held the nest. The other three arranged themselves on the rim of the nest. The parents birds appeared on the scene, and with much twittering the youngsters



Young Black-backed Magpie (*Gymnorhina tibicen*).  
[Photo.—P. A. Gilbert.]

sprang into the air; the breeze caught them and like pieces of fluff, they were wafted away.

Although they beat their wings rapidly they made no direction; they simply flopped into the first sapling they chanced to strike. Meanwhile the continuous calls of the parents issued from the topmost branches of a scraggy old tea-tree, which had the effect of drawing the scattered family in that direction. About a week after vacating the nest the young begin to take on that charming habit of swaying the body from this side to that, which always endears the old birds to every lover of Nature. The young are novices in their first efforts but soon add that grace and beauty to their movements which characterise the adults.

The youthful Black-backed Magpie is an engaging little fellow, and so are its parents, but in a different sense. It may be safely said that there is no more pugnacious and vicious bird in the Australian bush than the Magpie when defending its young. The young Magpie is a voracious feeder. His squeak is a familiar note throughout the country during September and October. The rather quaint waddle of this impish

stripling adds a certain amount of comic aspect to his deportment, as he roams over the meadows in the wake of his parents, always ready to receive the numerous items of food offered.

The youthful Black-eared Cuckoo looks gentle enough perched on the stick; actually, he is a callous little vagabond. His mother had long since lost the art of nest building, so she placed her egg in the nest of the Speckled Warbler. The Speckled Warbler incubated it along with her own three eggs, and when the young cuckoo emerged from the shell he cast out the young Speckled Warblers from their nest. His cruel work accomplished, he remained the sole occupant to receive all the food the beguiled foster-parents could secure.

It will be observed that the young cuckoo perches differently to the other fledglings pictured. It stands with the two outside



Young Black-eared Cuckoo (*Mesocallius osculans*). The foster parent of this juvenile was the Speckled Warbler (*Chthonicola sagittata*).  
[Photo.—P. A. Gilbert.]

toes to the rear, and the two inside toes forward. The other youngsters perch with three toes in front and one pointing backward. The Black-eared Cuckoo is perhaps the most widely distributed, yet one of the rarest of our cuckoos. Its range extends over the greater part of the Australian continent—from the coastal districts of New South Wales to Western Australia.

## Stranded Seafarers.

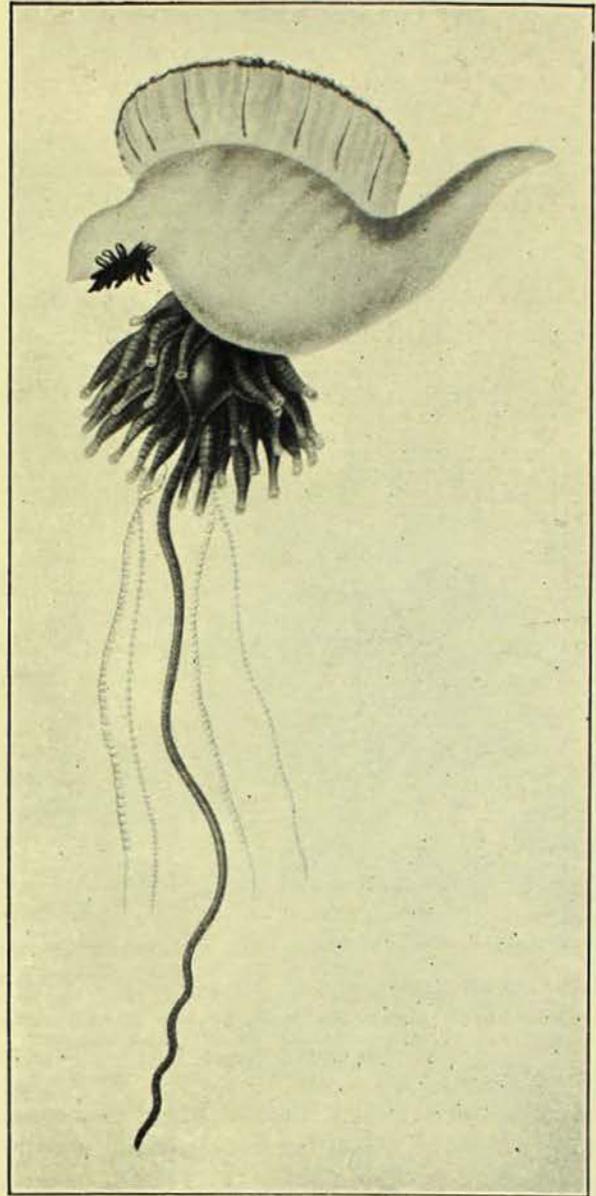
BY GILBERT WHITLEY.

**A**FTER strong easterly winds the ocean beaches near Sydney are frequently strewn with marine animals of various kinds; dead sea-birds, fishes, molluscs, and numbers of creatures which float on the high seas are dotted along the wave-line, together with sea-weeds, jettison from ships, and, perhaps, lumps of lava or pumice which have floated from some volcanic island. Fishermen, surfers, and beach-combers have wonders revealed to them at such times, and those who take a more than temporary interest in what they find bring many and varied objects to the Museum to obtain more information concerning them.

### FLOATING ANIMALS.

Out on the surface of the open sea, live untold numbers of animals of wonderful variety. Though mostly very small in size, these animals form such dense swarms that they provide the main food supply of many oceanic fishes and are the sole means of sustenance of certain kinds of whales. There are jelly-fishes, prawn-like creatures, the larvae of lower animals, blue-bottles and their allies, the eggs and young of fishes, and hosts of other creatures, known collectively as the pelagic drift-life or plankton, which float entirely at the mercy of the winds and waves. After an easterly wind, this drift-life is commonly blown shoreward and cast upon our beaches.

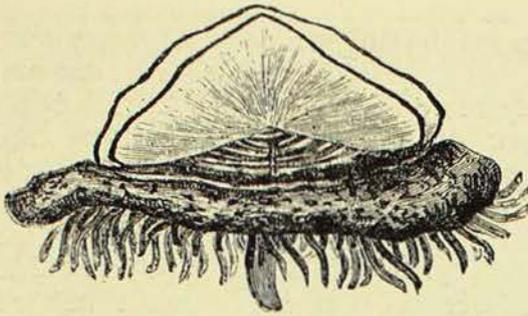
Perhaps the best known member of this floating populace is the Blue-bottle or Portuguese Man-o'-war (*Physalia*), which is notorious because of its power of inflicting severe stings and is well-known to small boys who delight to burst its gas-filled float and so produce a loud report. This float keeps the Blue-bottle at or near the surface of the sea and from it hang bunches of blue polyps and several long stinging threads. These stinging threads are studded with thousands of microscopic darts, each of which is coiled within a tiny sac filled with a poisonous fluid. When the threads come into contact with any small animal in the water, these darts are released by little triggers and penetrate the victim's body, conveying the poison at the same time. This poison is so virulent that a bather unlucky enough to



The Blue-bottle or Portuguese Man-o'-war (*Physalia*), a seafarer which is often stranded on our shores, is well-known on account of the powerful stings which it inflicts by means of its lash-like tentacles.

[After R. P. Lesson.]

encounter the dreaded threads experiences severe pain and may even be partially paralysed for a short period. When a marine animal is caught and killed by the tentacles, it is drawn up to the bunches of feeding polyps beneath the float and thence passes into a common stomach which nourishes the whole colony of feeding and reproductive polyps.



**Velella** floats in numbers on the sea and has an erect sail by which it is blown along by the wind. It preys upon minute animals which it secures in a manner similar to that of the Blue-bottle.

[After W. H. Harvey.]

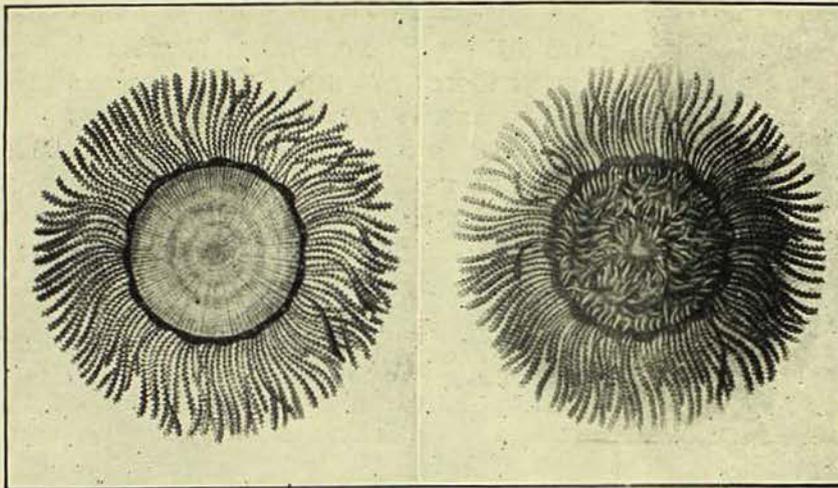


The **Violet Snail** (*Janthina violacea*) is kept afloat by a bubbly raft-like structure, beneath which it lays its eggs. It is sometimes washed up in large numbers on our beaches.

[After H. & A. Adams.]

Another drifting animal is the dainty little *Velella* which belongs to the same class as the Blue-bottle. In place of the crested air-bag of the latter, however, *Velella* has a flattened

it is to some of them that we owe much of our knowledge about pelagic life. One of the creatures which attracted their attention was the Violet Snail (*Janthina*), a beautiful creature which is sometimes cast up on the sands in such numbers that a continuous border of blue fringes the wave-line. This mollusc is enabled to float on the open sea by means of a kind of bubbly float formed by the tail end of its body. The Violet Snail was seen by the men of the old sailing boats with its eggs attached to the underside of its float, but I have no knowledge of any having been cast up on our beaches in this condition. Unlike the vegetarian snails of sea-shore and land, the Violet Snail is a carni-



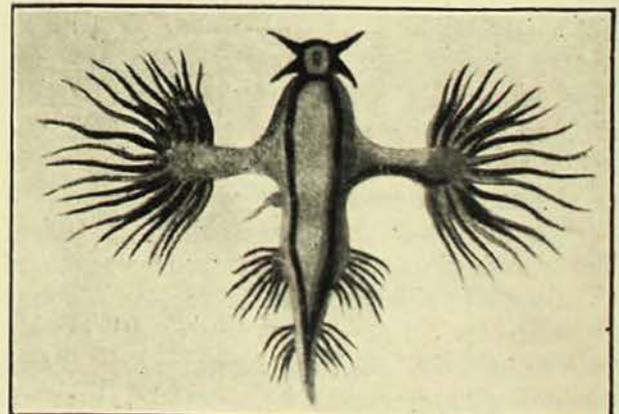
The little blue disc of *Porpita* may sometimes be found at the wave-line. *Porpita* is a relative of *Velella*, but has no sail. The illustration shows the upper and lower surfaces, the latter having many stinging tentacles and feelers, and the mouth protruding from the centre.

[After R. P. Lesson.]

raft-like float upon which a thin oblique sail stands erect. An allied creature of smaller dimensions, known as *Porpita*, has a beautifully sculptured disc from which its polyps and tentacles depend. When these helpless creatures are stranded on the rocks, they afford a grand feast for the ever-watchful rock-crabs, which run off with choice pieces in their nippers to relish in solitude on some wave-washed rock.

THE VIOLET SNAIL.

In these days of fast ocean liners, observations on marine animals are rarely made, but the men of the old sailing ships, when becalmed in the tropics, had ample time to observe the wonders of life around them, and



This curious shell-less mollusc is known as *Glaucus*. It is of a beautiful blue color, and is sometimes stranded on beaches after easterly winds.

[After H. & A. Adams.]

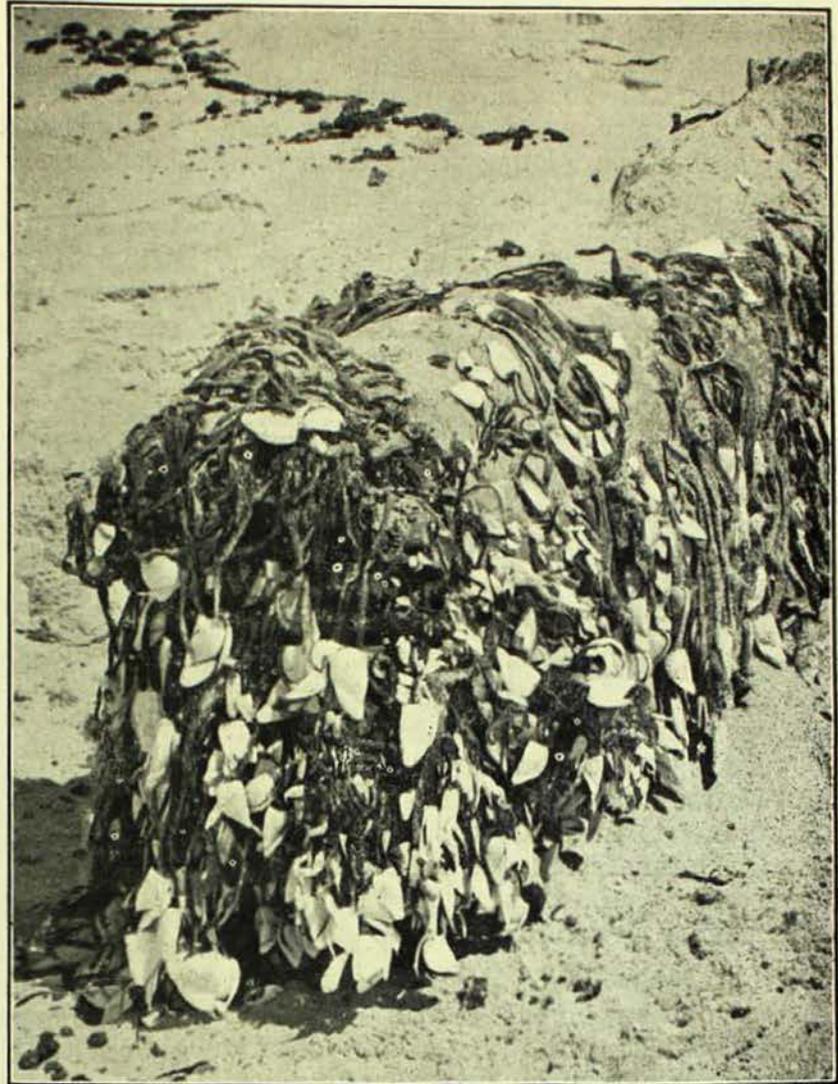
vorous creature with a sharp-toothed tongue with which it tears up its food, which consists of pelagic animals such as *Veleva*.

Likewise a mollusc, but a very queer one, is *Glaucus*, a small, blue, shell-less creature with five bunches of finger-like respiratory and locomotory outgrowths arising from its sides. When washed up by the surf, it lies helpless at the water's edge, sprawling feebly until it dies, often becoming dismembered in the process.

#### LIFE ON A LOG.

Stranded logs or planks which have been floating for any length of time in the sea are often veritable marine zoos. They may be riddled with the burrows of crustacean borers (*Limnoria*), tiny creatures something like the well-known "slaters" or wood-lice which may be found under decaying wood in gardens. This little animal occurs in most parts of the world and is the bane of harbour-masters on account of the tremendous havoc wrought by it among wharf-piles and wooden pontoons. Larger burrows in the log may be excavated by the so-called Ship Worm (*Teredo*), a strange elongated creature which is really a shell-fish, although its bivalve shells are so reduced in size that they cover only the extremity of its tail, and are extraordinarily modified in structure to form wonderfully efficient boring tools.

The exterior of the log may be encrusted with weeds and, perhaps, sea-mosses or Bryozoa. The sea-mosses are not plants but colonies of tiny specks of living animals which grow side by side in such numbers as to present the appearance of minute lacework. Under the microscope they are seen to be flower-like polyps, each one residing in a beautifully ornamented cup of limy material, built up by its own efforts.



Logs which have floated at sea for a while are frequently covered with stalked barnacles. The one shown here was cast upon Maroubra Beach, near Sydney.

[Photo.—A. Musgrave.]

Numbers of barnacles also are nearly always found attached to drift-wood. These are crustaceans whose young are free-swimming creatures with three pairs of limbs and an eye in the middle of the head. The young barnacle affixes itself to any firm support at an early age, however, and degenerates rapidly. It turns the best part of its head into a stalk for attachment, armours its sides with shells, and subsists by combing the water for food by means of the plume-like legs which protrude from the gape of its shell.

#### ASSISTED IMMIGRANTS.

A year or two ago, Mr. A. R. McCulloch of this Museum observed several hundreds of dragon-flies clinging to flotsam on the open sea, miles from land, between Papua and

Bramble Cay in Torres Strait. They had been blown away from the mainland by strong north-west winds, against which they had struggled until exhausted, and were glad to alight upon any floating object to rest. Such passengers are largely dependent upon the ocean currents and can survive only when these drift them sufficiently close to land to enable them to desert their conveyances and gain the shore. Still greater victims of chance are certain rats, land-snails, lizards, etc., which in times of flood may be borne out to sea on floating debris. Though by far the greater number perish miserably from thirst, starvation, or drowning, a few lucky in-

dividuals may survive the hardships of their voyaging until they reach some other shore, where they may establish themselves anew.

A mere catalogue of the names of the animals and plants found washed up on the beaches around Sydney alone would fill a book, so that to deal with more than a few in a short article would be impossible. We are often pleased to have specimens of the varied forms of life revealed by the seashore after stormy weather for the Museum, and anyone who finds any animal of interest is invited to bring it along for identification.

We need not wait until the resurrection for the sea to give up its dead.

On 23rd April Mr. T. Hodge Smith lectured on "Meteorites," describing their origin, composition and physical characteristics.

Dr. T. Harvey Sutton on May 14th took as his subject, "The role of insects in war and peace." The lecturer discussed the problem from the health point of view and divided insects injurious to man into two classes (a) biting insects which directly infect human beings with disease, and (b) those which convey infection to food.

On June 11th Mr. W. S. Dun lectured on "The Evolution of the Horse," pointing out that the history of modern horses affords a splendid example of evolution and of adaptation to environment. From the little *Eohippus* of the Eocene, not much larger than a cat and with four toes in front and three behind, a succession of forms has been established, showing that the lateral toes of each foot gradually dwindled until to-day only the middle toe is left, the second and third being represented by mere splint bones.

On 19th May, Mr. W. W. Thorpe, Ethnologist, lectured on the Australian aborigines to the members of the Millions Club. In introducing the lecturer Mr. Aubrey Halloran, B.A. LL.B., spoke feelingly of the needs of the Museum, the necessity for the extension of the buildings and for endowments in aid of the research work of the institution. Mr. Thorpe described the customs and daily life of the Australian natives, and sketched the decline of the aboriginal population.

Mr. A. Musgrave, on 16th June, lectured to the Royal Colonial Institute. His subject

was "Lord Howe Island, the Madeira of the Pacific."

It is one of our privileges to give now and then "talks" on nature subjects to blind and deaf and dumb children, and, by arrangement with the superintendent of the Institution for the Deaf and Dumb and the Blind, small classes of boys and girls who are thus afflicted come to the Museum with their teachers, for this purpose. On 20th May a class of blind children in charge of Miss Reid, B.A., assembled in the Lecture Hall and Mr. E. Le G. Troughton, Zoologist in charge of Mammals and Osteology, discoursed to them on mammals, passing round specimens of the platypus, wallaby, common opossum, flying opossum, and other Australian mammals, so that the children could, by the sense of touch, learn something about creatures they can never see.

On June 4th Mr. Kinghorn spoke to a class of blind children concerning birds, their habits, and their economic and esthetic value. A pleasing feature of the demonstrations was the help given by Master A. Stanner, who whistled the calls of many of the birds as the blind children fondled the specimens. Following the talk to the blind, Mr. Kinghorn then took in hand a class of deaf and dumb children. Here the method adopted was of course different. While the lecturer spoke very slowly and showed specimens and lantern slides, the teacher stood in the light of the reading lamp and, working his fingers rapidly, translated the remarks of the lecturer.

The talks were enjoyed very much, and the quickness of perception displayed by these afflicted youngsters was very striking.

## Australian Ants at Home.

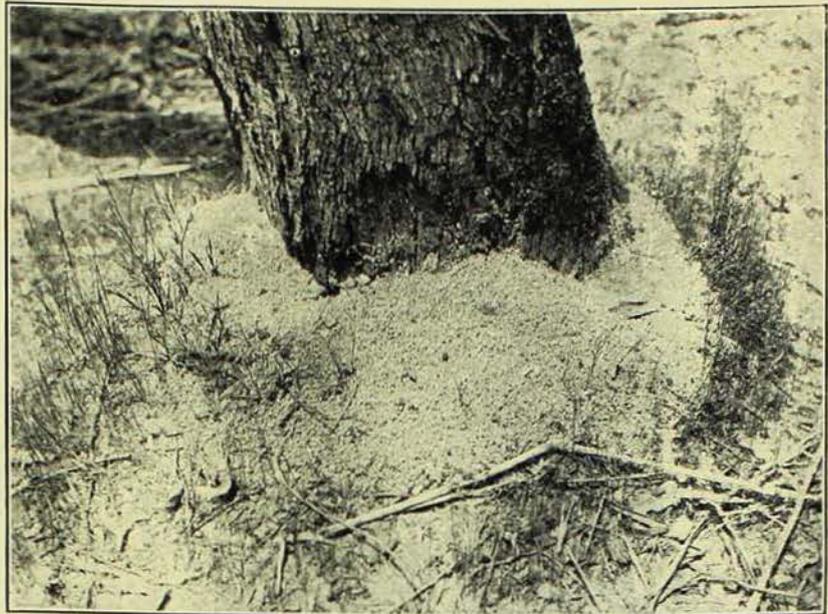
BY CHARLES BARRETT, C.M.Z.S.

WHEN I commenced to observe the ways of ants in my yard and garden, and paddocks near home, I found that my ignorance was profound. The study of ants had appealed as rather easy for an amateur naturalist; but no branch of entomology is more difficult, nor is any so fascinating, whether pursued afield or indoors, with captive subjects.

Our ants have been studied by Mr. W. W. Froggatt and other noted Australian entomologists, while the greatest myrmecologists in Europe and the United States have displayed keen interest in our "bull-dogs" and other remarkable species. My friend, Mr. John Clark, of Perth, W.A., is now working on Australian ants and he has recently described ten new species of the sub-family *Cerapachyinae*. Professor W. M. Wheeler, whose classic volume "Ants" is one of the most entrancing "insect books" ever published, has sent me a number of his papers dealing with different species of Australian ants. He is, I believe, preparing others. The literature dealing with our ant fauna is becoming extensive, and from it might be gleaned facts concerning the ways of "bulldogs" and their kin that would make a most entertaining book for every nature lover.

### "BULLDOG CITADELS."

In the Grampians (Vic.), a while ago, I collected specimens of more than twenty species, including "bulldogs" (*Myrmecia* sp.). There are millions of ants among those rugged hills, famous for wild flowers. Among the snow gums on the summit of one peak I found a colony of curious, slow-moving, hairy little ants. They were clustered beneath a flat stone, and, when the "roof" of their home was lifted, marched at almost a snail's pace, in curves and circles. They

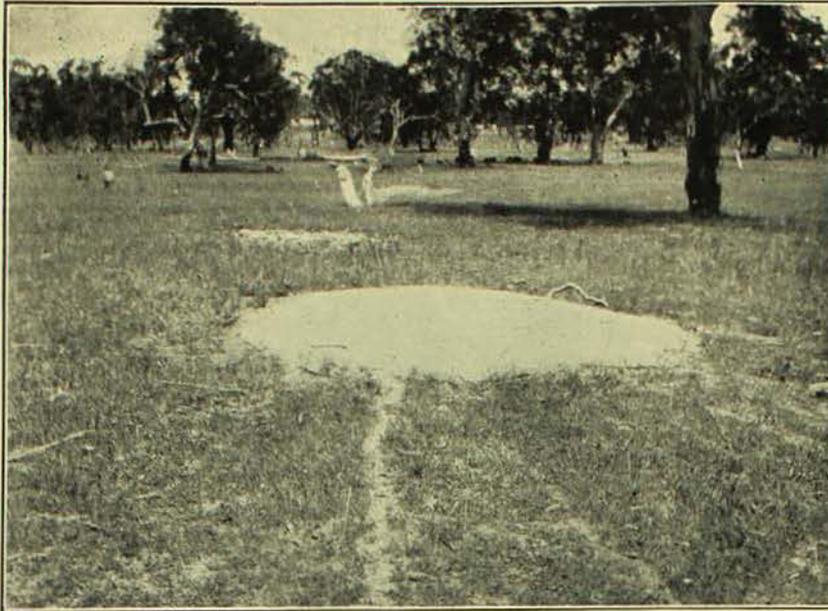


Ramparts of "Bulldog" Ants' (*Myrmecia* sp.) citadel, around bole of Eucalypt. Photo.—C. Barrett.

kept within the boundaries of their territory, the patch of damp soil where the stone had rested, and apparently were blind. I had never seen this species before, nor have I met with it since.

In the Grampians "bulldog" citadels abound. One of the finest I saw had ramparts more than a foot in height around the bole of an old gum tree. Others were hillocks, on hill slopes, and among wild flowers in the valley. Some were raised beside logs, and all, of course, had many chambers and galleries underground.

Black bulldogs proved as fierce as any ants I tried to observe "at home," and I suffered for prying too closely into their hidden ways. An armour-plate suit has been recommended as most desirable for a naturalist on the prowl in "bulldog country." Fierce and beautiful are the ants known to science as *Myrmecia* (*Pristomyrmecia*) *mandibularis*. I discovered only one colony at Hall's Gap, and the "colonists" gave me a lively time. But it was worth while risking a fiery sting or two just to see the angry insects rushing round in the sun; they are black, with gleaming orange-gold abdomen. But there is a species not rare around Sydney (I have seen many



Mounds and Pathways of huge communities of Mound Ants *Iridomyrmex detectus*, Federal Territory.

[Photo.—C. Barrett.]

colonies in National Park), as beautiful as *P. mandibularis*; its name, I think, is *Polyrachis ammon*.

#### MOUND ANTS.

None of our ants are more familiar to the public than the Mound or meat ant, or to quote Froggatt, it is "the commonest and most widely distributed ant in Australia." The mounds are so plentiful in some districts that they form a feature of the landscape. Meat ants raise the low domes of their citadels even on frequented roads and footpaths; along the railway embankments, too, you will find them in scores and in hundreds about timbered paddocks.

At Tuggeranong, in the Federal Territory, I photographed the largest of a series of mounds, linked by narrow highways, a hundred yards or more in length. Roads radiated from the "citadel" of this great ant community in several directions, and they were as busy as Sydney or Melbourne thoroughfares, ants hurrying to and from the

foraging grounds and their city. I traced several of these wonderful highways through the dry grass, and each ended at the base of a gum tree. Ants were traversing the trunks; they had been hunting over the twigs and foliage or were hastening to the boughs in search of prey.

In the ranges near Melbourne craters of the delicate wine or pale amber coloured ants, *Aphaenogaster longiceps*, are so plentiful, that some spots have the appearance of fairy towns, clusters of tiny, hollow-roofed huts, which really are the doorways to *Aphaenogaster* homes beneath the ground, or under stones and fungus-tufted logs. These ants I have

found in abundance, they enjoy a wide range in Eastern Australia

#### GREEN TREE-ANTS.

On Dunk Island I became acquainted with the Green Tree Ant (*Oecophylla smaragdina*), an amazing, if troublesome, little creature. There were nests in the orange trees, close to the "Beachcomber's" bungalow. I pulled a branch aside, to secure



Nest of the Green Tree Ant (*Oecophylla smaragdina*).

[Photo.—C. Barrett.]

better lighting on one citadel of "web" and leaves for a photograph, and the ants were resentful, nay, wild with anger. They swarmed out over the foliage, and on to my hands; they ran up my sleeves, reached my neck, and, wherever they went, inflicted punishment. The pain was neither severe nor lasting, but

I still retain in memory an unpleasant impression of the little green warriors' attack.

A monograph on Australian ants may be published next year or later. It will, perhaps, contain descriptions of nearly one thousand species and subspecies! We are very rich in ants, you see.

## Stencilled Handmarks.

BY W. W. THORPE.

ACCOMPANIED by Mr. G. C. Clutton, the Museum Photographer, and Messrs. G. E. and G. K. Bunyan and a number of local residents, I recently visited a rock shelter at Glenbrook. This shelter had previously been occupied by aborigines and they had decorated it with a fine series of stencilled hand-marks of various sizes and ages; with the exception of two or three all were rendered in red. A vein of ferruginous sandstone was observed, which, when pounded up, made a vivid though gritty pigment, and doubtless this was the identical material used by the aboriginal artists. In the shelter a stone axe was found, and on the floor of the cave were two grooves in a sandstone block indicating where implements of this type had been sharpened. In all probability the shelter was not a permanent camp but a "half-way house" used by the natives when crossing the mountains. This view is supported by the absence of a permanent water supply, the slight evidence of fire, and the small accumulation of ashes. Action is being taken to preserve this shelter from the marauder.

Hand marks are usually produced by stencilling in the following manner:—The extended hand is placed against a smooth moistened rock and powdered material is violently blown from the mouth along the outline, the space between the fingers and elsewhere becoming covered with the pigment. For black figures powdered charcoal was employed, whilst for ruddy ones ochre or human blood was used.

The existence of the symbolical hand on rocks and caves in all parts of Australia has attracted great attention. The hand is usually in an uplifted position and seldom

horizontal, and at many places (as the one under description) a large series is portrayed. When questioned on the subject the aboriginal is usually evasive, one elderly man admitted that they were placed in the shelter to "frighten people away." It is believed that they are painted white in the rock shelters to ward off death, and red to protect them from the "evil eye." In this connection, a somewhat analogous custom obtained amongst the blacks of Gippsland, Victoria. The severed hand of a dead man was worn suspended under the armpit, and was said to warn the wearer of any danger by immediate pressure on the ribs.

Some of the caves once occupied by the men of the Upper Palaeolithic or Old Stone Age contain stencilled hands. At Gargas, in the French Pyrenees, as many as one hundred and fifty examples occur, both stencilled and impressed, most of them showing amputated fingers.

Stencilled hands have been recently discovered at Espiritu Santo, in the New Hebrides. This occurrence is rendered more interesting for the reason that in this South Sea island, a modified form of the boomerang is used to-day.

The cult of the red hand, either stencilled or impressed, is (or was) world wide. It occurs in Egypt, Palestine, Arabia, India, Babylonia, Phoenicia, and its traces have been found amongst the ruins of Mexico and Central America. Speaking generally it is supposed to record some mystic ceremony or to symbolise an ancient deity. Amongst the Red Indians it denoted supplication to the Great Spirit, and in Mexico it was a symbol of power and strength.



Interior of rock shelter near Glenbrook, Blue Mountains, New South Wales. This shelter has been decorated with a splendid series of stencilled hands, most of which have been rendered in red.

[Photo.—G. C. Clutton.]

The North American Indians also render it in different colours, each having a given significance. For instance, a red hand on a Sioux blanket lets the world know that the owner has wounded an enemy, while a black hand signifies that the warrior has, in some way, been unfortunate. Amongst another tribe a yellow hand on the breast of a brave indicates that prisoners have been taken by the bearer. The impress of a muddy hand on the flank of a horse signifies, amongst the Winnebago people, that the rider has killed a man. Impressed red hands are very common amongst the ruins of Yucatan, and their occurrence in the new world has been recorded as far south as Peru. In parts of Southern India the red hand is placed on Brahmin houses to ward off the "evil eye," and is variously styled the protective or beneficent hand. Amongst the Semitic people it typifies Divine Might. The Arabs paint red hands on the lintels and columns of their houses for the purpose of driving away envious people. In other parts of the East white hands are painted over the windows and doors for the same purpose. The people believe that if anyone looks at them with envious eyes they will fall ill or lose something; and they become very

angry with any person who looks admiringly at their horses and camels, fearing he should cast the evil eye of envy on them. Amongst the Jews of Tunis many representations of a bleeding hand have been noticed by travellers. It is believed to be a local token of brotherhood or good fellowship. All through the East the hand is regarded as a symbol of power and in the Bible the power of God is recorded as a "strong hand and a stretched-out arm." The red hand in ancient Ireland was a symbol of good luck known as the "lann dergerina," or red hand. In India to-day it is a symbol of Shiva.

As the hand is a member peculiar to man, and associated with his work and worship, it is not remarkable that it should ultimately represent man himself. In this connection the hand is used to seal compacts, and we are apt to refer to this member in such expressions as "close-fisted" or "open-handed." We are often called upon to express our approval or disapproval by a "show of hands" in the place of oral declaration, and when a suitor seeks a bride he asks for her "hand."

Examples of white and red stencilled hands may be seen in the Museum.