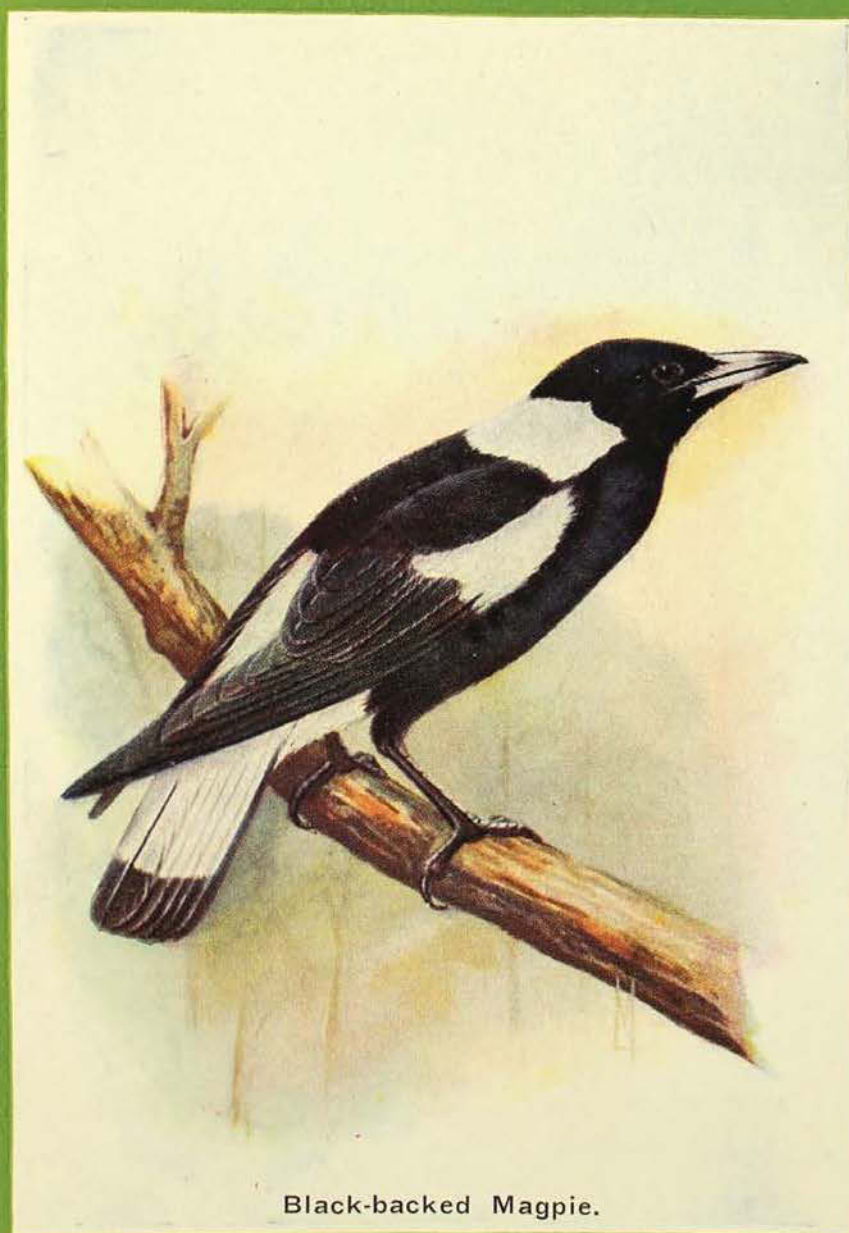


*The*  
AUSTRALIAN  
MUSEUM  
MAGAZINE

Vol. VI, No. 9.

JANUARY-MARCH, 1938.

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Black-backed Magpie.

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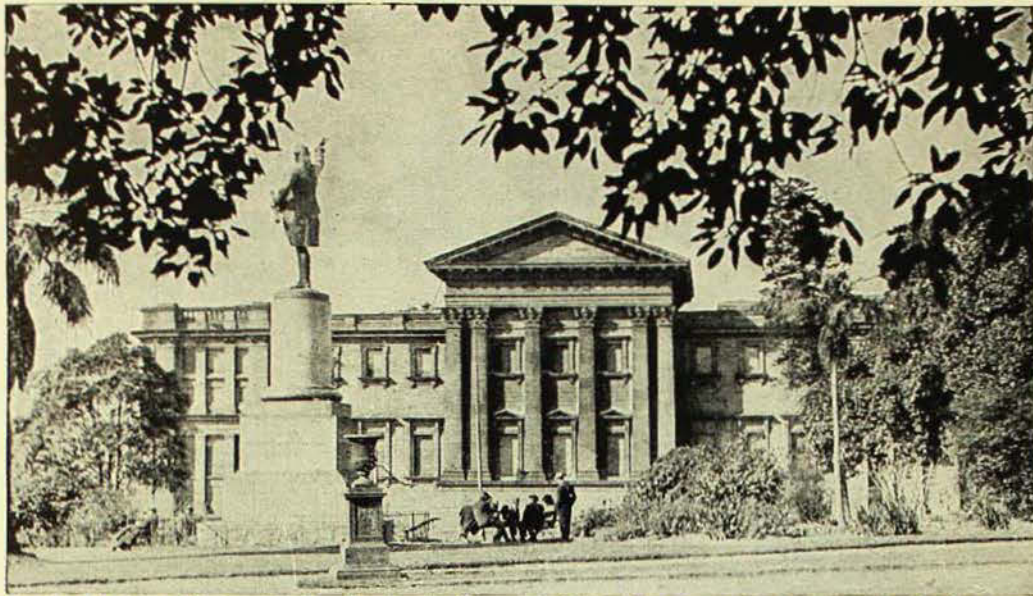
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# THE AUSTRALIAN MUSEUM MAGAZINE

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*Photography, unless otherwise stated, is by G. C. Clutton.*

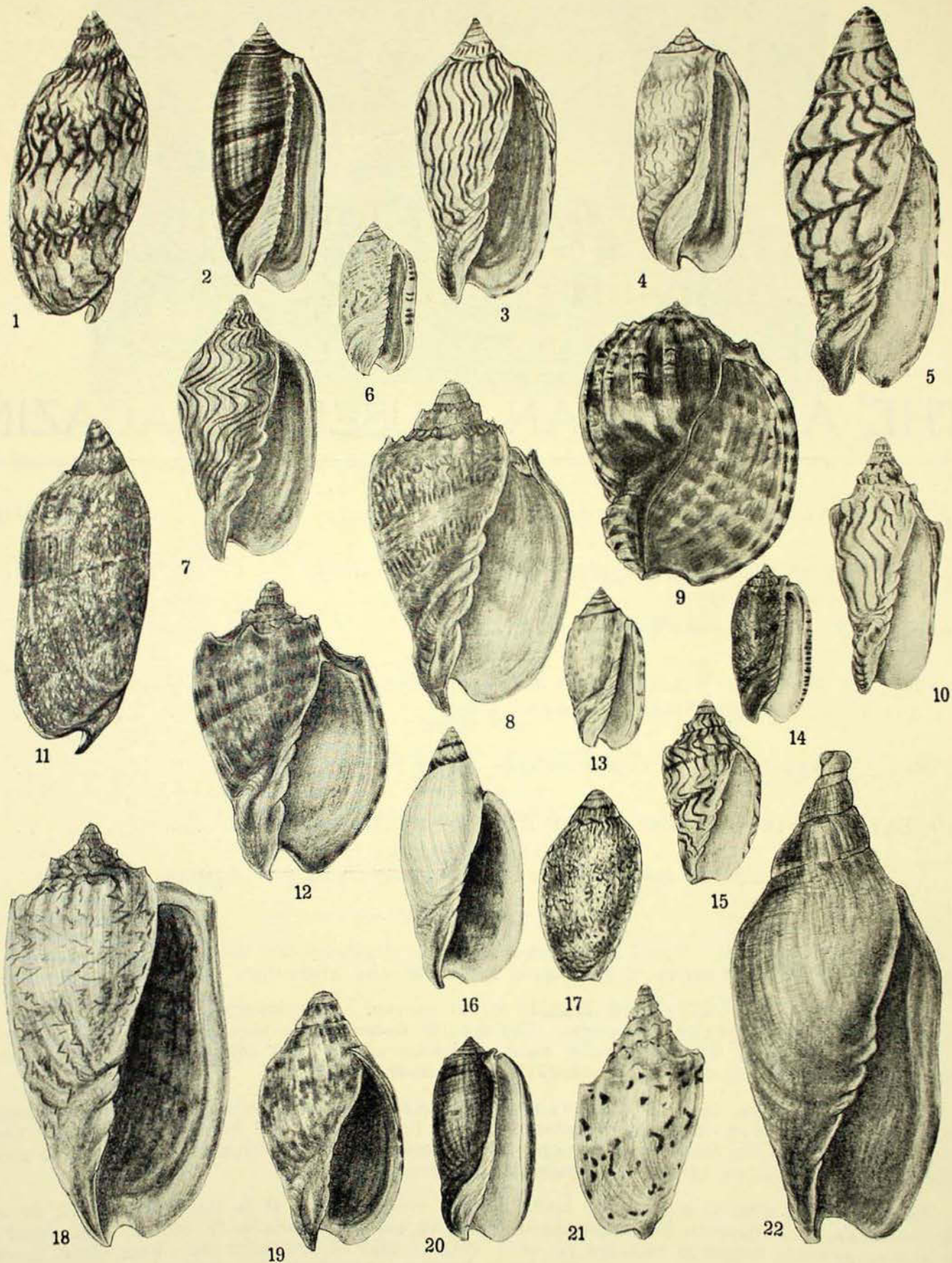
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● OUR FRONT COVER. The Black-Backed Magpie (*Gymnorhina tibicen* Latham) is by Lilian Medland. It is one of a series of post cards issued by the Australian Museum.

The familiar and well-beloved Magpie is, of course, not a Magpie at all, but nothing will ever eradicate the use of the name now. The specific name *tibicen* means a fluteplayer, and refers to the glorious piping, gurgling song, most delicious of all bird songs, in the early morning when the birds are uttering a thanksgiving for their breakfasts.

The Magpie ranges over the greater part of Australia, and frequents many kinds of country, but is essentially a bird of the open grasslands and lightly timbered areas. It is chiefly insectivorous, and obtains its food entirely upon the ground, destroying enormous numbers of noxious insects, so that it is one of the most valuable birds to the farmer.

Its large twig nest is a familiar sight almost everywhere. It is lined with bark or other soft materials, and three to five eggs are laid, which are very variable in colour. The usual type has a grey ground, which is mottled all over with streaks of brownish red. Very often, however, the ground colour is greenish grey. The birds become savage during the breeding season, and will often viciously attack anyone passing by the nesting tree.



*Volute, Olive, and Harp Shells.*

Joyce Allan, *del.*



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JANUARY-MARCH, 1938.

## Naturalists of the First Fleet

By GILBERT P. WHITLEY, F.R.Z.S., R.A.O.U.

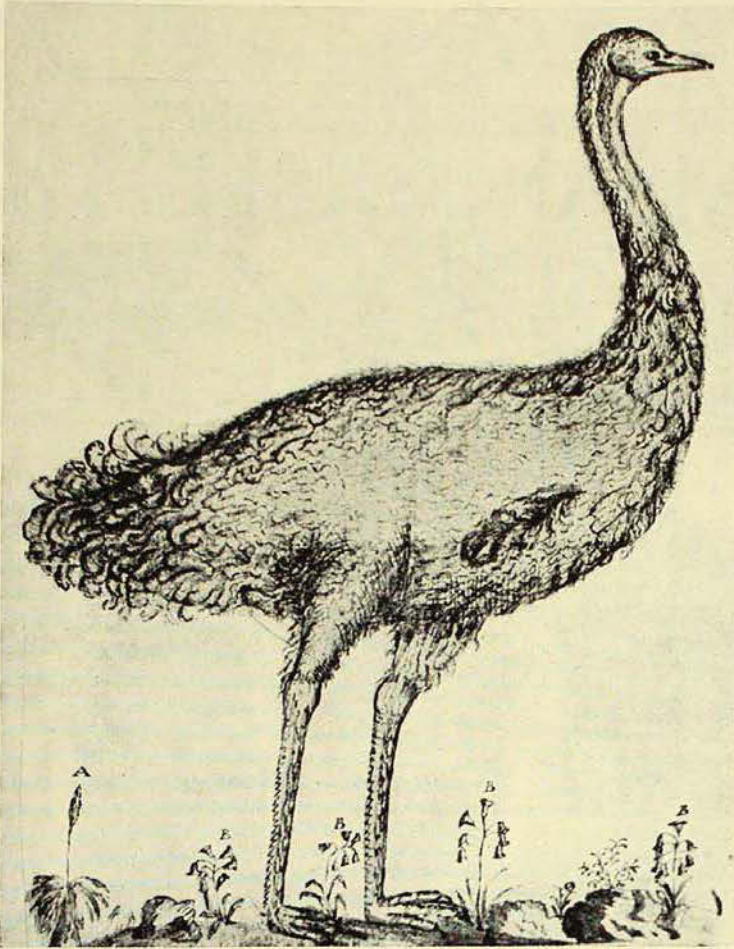
AUSTRALIA is now celebrating its sesqui-centenary and Sydney is gaily decorated in honour of the arrival of the First Fleet in its harbour in January, 1788. To-day a flourishing modern nation thinks of the eleven little vessels which brought a heterogeneous collection of over one thousand people to found a colony in those far off days. Generations have passed, and now our information about that period can be obtained only by reading the old books and manuscripts and inspecting the drawings which have been handed down to us, and in this way we can gain a little idea of the natural history of Sydney before it became the city it is to-day.

Many journals, letters and papers of the First Fleet period have been brought to light in different places, some in quite recent years, and all of them have not yet been critically examined by naturalists. Yet, from the sources available, briefly sketched in this article, it is evident that, with the adaptability of pioneers, some of the first Sydney-siders

made naturalists of themselves in a strange land.

The aborigines, the animals and plants in the penal settlements of Sydney and Norfolk Island were so strange that they could not fail to impress these exiled Englishmen. Some of the animals and birds they described or drew are now extinct in Sydney and on Lord Howe or Norfolk Islands, so that the MSS. and drawings of the First Fleet naturalists are priceless.

Lack of space prevents my giving biographical details, which may be found in Rumsey's *Pioneers of Sydney Cove*, 1937, or in various encyclopaedias. I here stress only the natural history items which have been gleaned after some years of searching. For convenience I arrange the men under the alphabetical order of their names and conclude this article with references to some very interesting natural history paintings made in New South Wales in the eighteenth century, of which about one thousand are still in existence.



*The earliest known original drawing of an Emu (*Dromiceius novae-hollandiae*) of Botany Bay, made by Arthur Boves in 1788. This bird was over seven feet high and ninety pounds weight, and its skin was preserved for Governor Phillip. It had fed on the Christmas Bell flowers (B) here shown beside a Grass Tree (A). From Boves' manuscript diary in the Mitchell Library, Sydney.*

DAVID BLACKBURN.

Captain of the *Supply* and one of the first white men to visit Sydney, he wrote to his friends in England letters which have been published in the *Journal Royal Australian Historical Society*, xx, 1934, p. 319, and the *Manchester Guardian*, 31 Oct. and 1 Nov., 1930. In these we find a few notes on the faunas of Port Jackson and Lord Howe Island. For example:

The Animals of this Country are all Curious. The Kangaroo is frequently shot by our Parties, & is the only fresh Meal they can get; Some of them are Very Large weighing upwards of 140 Pounds. Capt. Cook has Describd. their form. I shall only Remark that A stout Greyhound has little chance of overtaking them they Hop on their hind legs with Great Swiftness over the High Grass. The Tail is Certainly their principal Weapon of Defence, which they Can use with force sufficient to break a Bone. The Root of the tail of a large one Measured Eleven Inches Round & was Near 4 feet Long. They have a False Belly which is a Loose skin which they have the Power of Expanding or Contracting at Pleasure—They bring forth the Young Perfectly formd. Not Bigger than a Mouse; & in time of cold or Danger always take shelter in the false Belly—To what age

the parent Protects them in this Manner we do not know but I think not after they are the size of a Cat— The Flying Squirrel is an Inhabitant of these woods & two or three Animals of the Opossom kind, & I am informd. some Tiger Cats have been seen. The Natives have small dogs of the fox kind— The Birds are in No Great Number or Variety. In the Marshy Grounds some Large Black Swans have been killed differing from ours in Nothing but the Colour. The Woods abound with Beautiful Paroquets & some Beautiful Hawks. The Harbour is Tolerably well stockd. with fish some of them Very Good.

And, concerning Lord Howe Island:

The Island (these two Mountains Excepted) is Moderately Low. A Light Sandy soil & no Running stream of fresh water that we saw. However, it will be a Valuable Acquisition to the Colony at Port Jackson—for it Abounds with Turtle Much superior to any I have ever seen, on the Shore we Caught several sorts of Birds, Particularly a Land fowl of a Dusky Brown About the size of a small Pullet, a Bill 4 Inches Long and feet like a chicken. Remarkably fat & good, Plenty of Pigeons, a white fowl—Something like the Guinea hen, with a very strong thick & sharp pointed bill of a Red Colour—stout legs & claws— I believe they are Carniverous they hold their food between the thumb or Hind Claw and the Bottom of

the foot & lift it to the mouth without stooping so much as a Parrot. Some of them have a few Blue feathers on the wing. Here is also a Web footed fowl In General of a Deep Blue. Its Bill 2 Inches long—straight but suddenly bent Downwards at the end. Very sharp and strong. The Tail 3 Inches long. It does not seem formd. for a Long flight having only six long feathers in the Wing. Its Breast is covered with very thick & Long Down which Grows from the Tips of Very Strong feathers with which the whole Breast & Belly is covered. Its length from Tip of Bill to tip of tail 22 Inches, the extent of its Wings from tip to tip 25 Inches. We took them Burrowing in Holes like Rabbits— The Bay Abounds with a Variety of Excellent fish. At 4 o'clock in the afternoon, we took possession of this Island in the Name of His Brittanic Majesty & Displayd. the English Colours— & Mr. Ball Namd. the Different Parts of the Island.

ARTHUR BOWES.

Mr. K. A. Hindwood<sup>1</sup> has written an account of "An Historic Diary", referring to the manuscript journal of Arthur Bowes, surgeon, aboard the *Lady Penrhyn*, 1787-1789, which I too have consulted at the Mitchell Library. Mr. Hindwood points out that Cook's naturalists observed no emus in Australia and shows that Bowes must have been one of the first white men to see our Emu. He made a drawing of this extraordinary bird, and a similar one was made by Lieut. Watts, both of which Hindwood reproduced. Bowes made notes on other birds of Sydney and Lord Howe Island, and drew the White Gallinule, now extinct.

Bowes mentioned in his journal an alligator about eight feet long seen close by where he went to birdlime. Mr. J. P. McGuanne<sup>2</sup> says, "It was the iguana he saw, and this gave rise to the slang expression, 'Oh great gohanner!'" McGuanne also relates, "The head and neck of an emu would be nicely drawn an inch or two over the tail of a kangaroo and exhibited as a monstrous reptile whose bite produced lockjaw", a tall tale foisted upon the new-chums of the old days.

WILLIAM BRADLEY.

Prepared some of the first maps of Port Jackson, where Bradley's Head is named

in his memory, and made the earliest known drawings of Sydney Cove. His manuscript diary of a voyage to New South Wales covers the years 1786-1792, and is preserved in the Mitchell Library, Sydney. In it he has various notes on Australian birds, those of Norfolk Island, etc.

DANIEL BUTLER.

"A Fish of New South Wales" was drawn by D. Butler, and the drawing was sent to England and reproduced in the *Voyage of Governor Phillip to Botany Bay*, 1789, p. 281, plate. It is a crude representation of Captain Cook's Leatherjacket<sup>3</sup>. Another "Fish of New South Wales" is unidentifiable at present. It has been named *Stromateus maculatus* in Forster's *Die neuesten Reisen nach der Botany Bay*, published 1794.

In his letters, Southwell refers to him as "Little Dan Butler" or "Cousin Dan Butler" (Southwell's uncle was the Rev. Weeden Butler), and says<sup>4</sup> "he is quite a clever little tar".

I may mention here a fish, called the Sergeant Baker to this day, which was evidently named after a First Fleet marine, not otherwise distinguished.

RALPH CLARK.

A second Lieutenant of the Royal Marines who went to Norfolk Island in March, 1790. There he kept a diary which included a tally of the number of Petrels (called Birds of Providence on account of their timely arrival) killed as food, and his data are of importance since the species became extinct in that locality.<sup>5</sup> He also undertook the first bird-marking experiments in the Pacific.

Clark has been styled "The Pepys of early settlement and of the First Fleet", and Clark Island in Sydney Harbour was named after him.

Clark left Norfolk Island in November, 1791, and returned to England.

<sup>1</sup> *Emu*, xxxii, 1932, p. 17, illustr. (see also *Emu*, xxxiii, 1933, p. 112).

<sup>2</sup> *Journ. Roy. Austr. Hist. Soc.*, i, 1906 (1920), p. 35.

<sup>3</sup> Iredale and Whitley, *Austr. Mus. Mag.*, iii, 1929, p. 421, illustr.

<sup>4</sup> *Hist. Rec. N.S. Wales*, ii, 1893, p. 668.

<sup>5</sup> Whitley, *Austr. Zoologist*, viii, i, 1934, pp. 42-49, pl. i.

## DAVID COLLINS.

Collins was Judge-Advocate of New South Wales. Though he was not himself a naturalist, his *Account of the English Colony* contains many notes on mammals, birds, snakes, and fishes. In the second edition are pictures of the Bird of Paradise [Lyre-Bird], Eagle, Emu, Platypus, and Wombat, also a list of aboriginal names of animals.

## DENNIS CONSIDEN.

John White's Assistant Surgeon of the First Fleet, he came out in the *Scarborough* (Captain Marshall), but owing to ill-health remained but a brief period in Australia. He visited Norfolk Island in 1790 and returned to England by the *Kitty*.

Home<sup>6</sup> says "Mr. Consider was seven years an assistant surgeon to the general hospital in New South Wales", where he studied the organs of generation of the kangaroo.

He sent mammals, birds, and insects to Sir Joseph Banks as well as botanical specimens.

On his return to England, he was consulted by Everard Home, who was working out the anatomy and embryology of our animals from specimens sent by a Mr. Lang, though the latter was not a First-Fleeter.

## WILLIAM DEW.

He was born February 28, 1764, and his journal, written up when he was about seventy, was edited by L. Becke and W. Jeffery as *A First Fleet Family*, published 1896. He came out on the *Sirius* as a Marine. He was not a naturalist, but noted in Port Jackson (*ibid.*, p. 120):

There were no wild beasts or other monsters to add to the terrors of our position, except very ferocious sharks, with which the waters of the bay were infested. There was one curious animal, called a kangaroo, which walked and leapt upon its hind legs in a very diverting manner, and there were hundreds of bright-coloured parrots.

This is one of the first references to the shark danger in Sydney Harbour. Marooning on Rock Island (later Pinch-

gut) was then a common punishment instead of flogging (p. 126), and the prisoner dared not swim back because of sharks. Dew encountered Smith or Schmidt, the Dutch captain of the snow *Waaksamheyd*, and described him (p. 204) cockle gathering at Farm Cove.

Some escapees took a boat to Timor and noted a great bird covered with black hair and with a horned head [Cassowary] on Cape York Peninsula.

Dew returned to England on the *Gorgon*.

## THOMAS GILBERT.

Master of the *Charlotte*, who, on his way from Sydney to Canton in 1788, kept a journal, published in London in 1789. In this he describes living birds of Lord Howe Island which are nowadays extinct. See Mr. Hindwood's article in this MAGAZINE.

## JOHN HUNTER.

Hunter "had a pretty turn for drawing", according to White, and a vignette from one of his sketches adorns the title page of his *Historical Journal*, 1793, whilst his views of Sydney illustrate the first Royal Quarto edition. Hunter observed the first platypus alive, and sent an account of it to Home, and a stuffed specimen to Banks. His drawing is reproduced in Collins' *Account of the English Colony in New South Wales*, ed. 2, 1804, p. 426, and fig., and a historical story by J. H. M. Abbott<sup>7</sup> entitled "Ornithorhynchus" has been woven around the specimen.

In his *Historical Journal* (p. 53), Hunter notes fish, patagorong or kangaroo, a pet wild dog, opossum, various birds and insects, and sketches a spider's nest. He thought our animals had a sameness about them suggesting indiscriminate interbreeding, a fallacious belief common in those days.<sup>8</sup> Hunter<sup>9</sup> sent birds home to Under-Secretary King and Sir Charles Middleton in 1796, and presented a wombat and a platypus to the

<sup>7</sup> *Sydney Mail*, Jan. 25, 1933.

<sup>8</sup> Compare White, *Journ. Voy. N.S. Wales*, 1790, p. 183.

<sup>9</sup> *Hist. Rec. N.S. Wales*, iii, 1895, p. 75.

<sup>6</sup> Home, *Philos. Trans.*, 1795, p. 540, of abridged ed., 1809.



Newcastle Museum, England<sup>10</sup>. Amongst some bird drawings, purchased with some maps by the South African Government and probably now in Cape Town, was one of the Australian Crane signed by John Hunter. Hunter succeeded Phillip as Governor in 1797, and was recalled 1800.

PHILIP GIDLEY KING.

Writing to Banks from Sydney, in June, 1802, King said: "I do not recollect what things I sent by the *Buffalo* besides the duck-bill, the Spanish wool, and Cayley's Boxes. The first I hope [you] got safe and perfect, as no pains or spirits were spared to preserve it". . . . King also sent a human head and other specimens.

King's sketch of "A Family of New South Wales", published in Hunter's *Histor. Journal*, 1793, shows he was an artist of no mean order. Amongst the King Papers in the Mitchell Library are some early drawings of Norfolk Island birds and fish.

"Philip Gidley King also wrote to Banks from Norfolk Island on March 3, 1793, stating that he was sending a small box containing 21 drawings". Amongst some drawings, apparently of South American fishes, made by Philip Gidley King on *H.M.S. Beagle*, 1833-4, and now in the Mitchell Library, Sydney, there is a painting of a parrot fish labelled "Norfolk Island. Painter unknown, 1793-4". This drawing may have been made by T. Watling. The species is *Thalassoma trilobatum* (Lacépède), known from Lord Howe and Norfolk Iss., Tahiti, etc., and the drawing was reproduced in the *Australian Zoologist*, viii, 1937, p. 227, pl. xiv, fig. 1.

P. G. King's son, Phillip Parker King, was born on Norfolk Island in 1791. He later became famous for his marine explorations in tropical and western Australia, and some of his paintings of animals are preserved in the Public Library, Perth, Western Australia. He was associated with the Australian Museum as a member of its committee from 1836 to 1853, and as an elective trustee from 1853 to 1856.

ARTHUR PHILLIP.

That Governor Phillip spared a little time from his arduous duties for botany and zoology is apparent from his writings. From Rio, September 3, 1787, he writes to Nepean, "If I can preserve the seeds and plants procured here, I shall be very indifferent about those articles at the Cape. Sir Joseph Banks will receive . . . some plants he was very anxious to procure", and "Tell Pollock this is not a country for shells".

Arrived in Sydney, Phillip's hands were more than full, yet he notes kangaroos and birds as he goes his rounds. The Black Swans referred to in the *Historical Records* as from Lake Narrabeen were more likely seen by Phillip on the lagoon, now much reduced, at the north end of the present Manly beach. A picture of a "Black Swan, shot by Captain Cook during the first voyage of the *Endeavour*", appears in Calvert's *The Discovery of Australia*. Since Cook and his men obviously saw no black swans or emus, this specimen more likely dates from the time of the First Fleet.

In April, 1791, Phillip crossed from Rose Hill to the Hawkesbury River and observed numbers of "Pattagorong" and "Baggary" [two kinds of kangaroos], and ducks. He noted<sup>11</sup> that natives ate a large worm found in decayed wood drawn out of the creek. This is the first reference to the shipworm or cobra (*Teredo*) as food in Australia. Phillip also kept pet emus and observed their eggs and young.

KANGAROOS SENT BY PHILLIP TO  
KING GEORGE III.

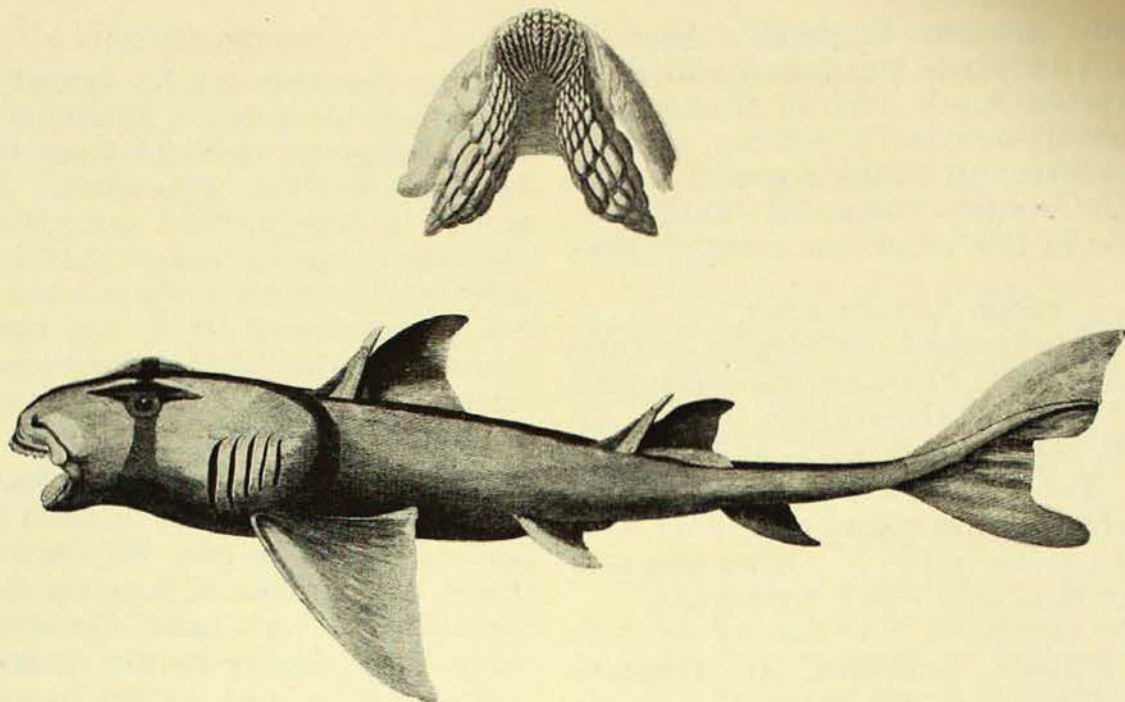
In the *Historical Records of N.S.W.*, i, 2, 1892, p. 559, occurs the following despatch:

Governor Phillip to Lord Grenville.  
Sydney, November 22nd, 1791.

My Lord,  
The commander of the armed tender Supply has an animal in charge which is known in England by the name of kangaroo, and which I hope will live to be delivered to your Lordship for the purpose of being sent to his Majesty.

<sup>10</sup> Iredale, *Australian Museum Magazine* ii, 3, 1924, p. 91; cf. also *Austr. Zool.*, v, 1929, p. 358.

<sup>11</sup> Hunter, *Hist. Journ.*, 1793, 4to ed., p. 516; 8vo ed., p. 447.



A "living fossil", the harmless Port Jackson Shark (*Heterodontus portusjacksoni*), with its teeth shown above. These teeth and the fin-spines show relationship with similar structures found as fossils in other countries. From Governor Phillip's "Voyage to Botany Bay", first published 1789.

I have taken this liberty, as it is not known that any animal of this kind has hitherto been seen in England. I have, etc., etc.,

A. PHILLIP.

This is followed by another (p. 566) on the same subject:

Sydney, December 14th, 1791.

My Lord,

I had the honour of informing your Lordship in my letter of the 22nd of last month that an animal known in England by the name of kangaroo had been put on board the Supply, as I presumed that so uncommon an animal might not be judged improper to be sent to his Majesty.

I have now the honour of informing your Lordship that another of those animals is put on board his Majesty's ship Gorgon, for the same purpose. I have, etc., etc.,

A. PHILLIP.

Phillip also sent a live dingo to Mr. Nepean, from whom it came into the possession of the Marchioness of Salisbury at Hatfield House. The specimen is illustrated in the *Voyage of Governor Phillip to Botany Bay*, 1789, p. 274, pl. A second specimen belonged to Mr. Lascelles in England. Probably other animals featured in this *Voyage* were sent over by Phillip.

Two "kangaroo-rats" were exhibited alive in 1789, "at the curious exhibition of

animals over Exeter Exchange", where they reared young ones.

Emus and Black Swans were sent to Banks on the *Buffalo* in 1801.

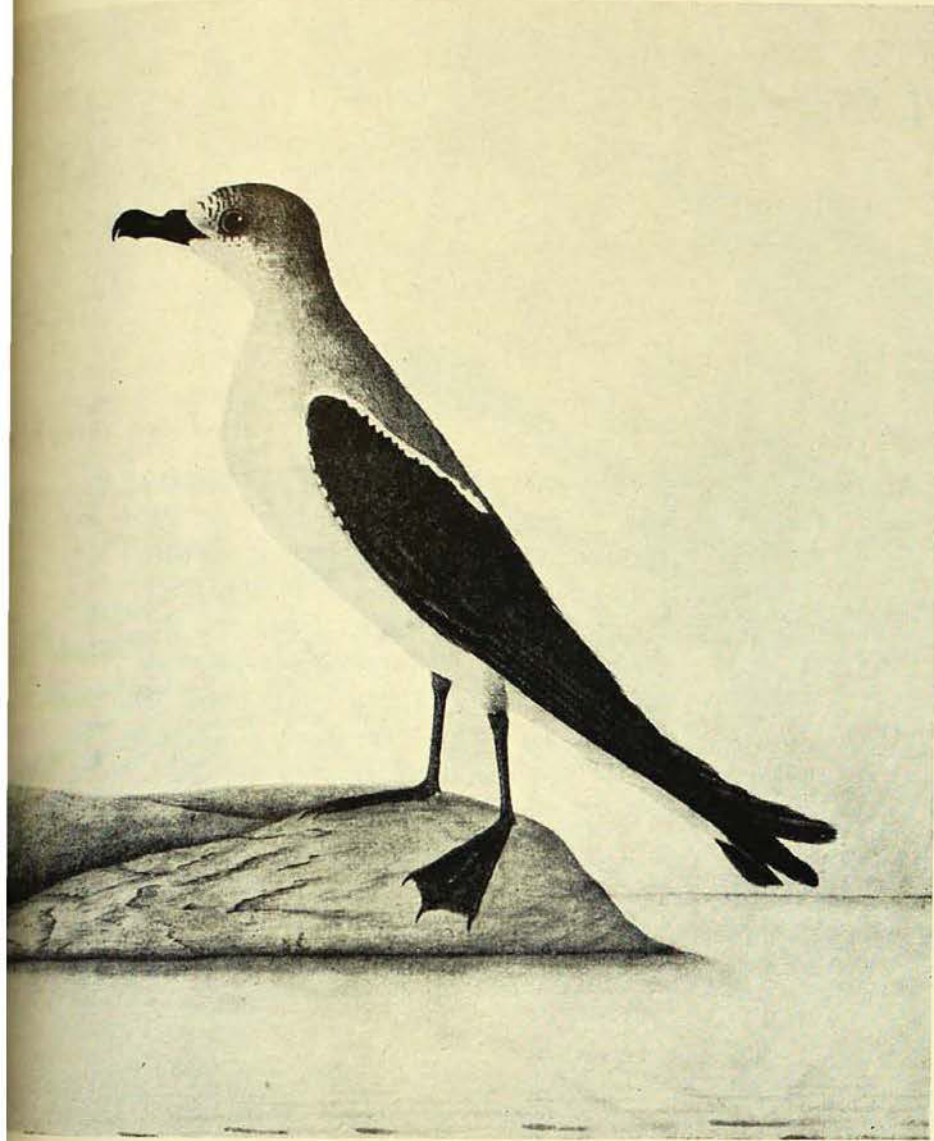
In his unpublished correspondence, now in the Mitchell Library, Phillip mentions kangaroos, a bird [the Emu], supposed to differ from the ostrich and the emu [of South America, or Rhea], fish, black swans, the fox bat, the fact that Norfolk Island was overrun by rats, and other natural history items.

GEORGE RAPER.

Raper arrived with the First Fleet and returned home on the *Waaksamheyd*. He made many paintings of Australian, Lord Howe, and Norfolk Island landscapes, birds, fishes, flowers, etc. See the remarks on Early Paintings at the close of this article. The extinct Lord Howe Island pigeon was named *Raperia* in his honour, also a White Swamp Hen *Porphyrio raperi*.

DANIEL SOUTHWELL.

Lieutenant Daniel Southwell was a mate in H.M.S. *Sirius* and recorded his impressions in a diary and letters, pre-



*A handsome Petrel (Cookilaria hindwoodi) from Norfolk Island. Painting No. 96 in the Sydney Series. By courtesy of the Mitchell Library.*

served in the British Museum, and printed in *Historical Records of New South Wales*, vol. ii, 1893, appendix D, where his biography is noted.

He was given charge of the Look-out Station at South Head, Port Jackson, by Phillip. His thoughts seem to have anticipated the trend of Darwin's, as he stated<sup>12</sup> in 1788, "Most quad[ruped]s of the place are handy with their paws, and, though not to be pronounced of the monkey kind, are monkeyish in their manners, and were it not that we meet with no regular gent of that class should suspect that there was a distinct gradation as links in the chain which naturalists affirm is insensibly continued from one order to another".

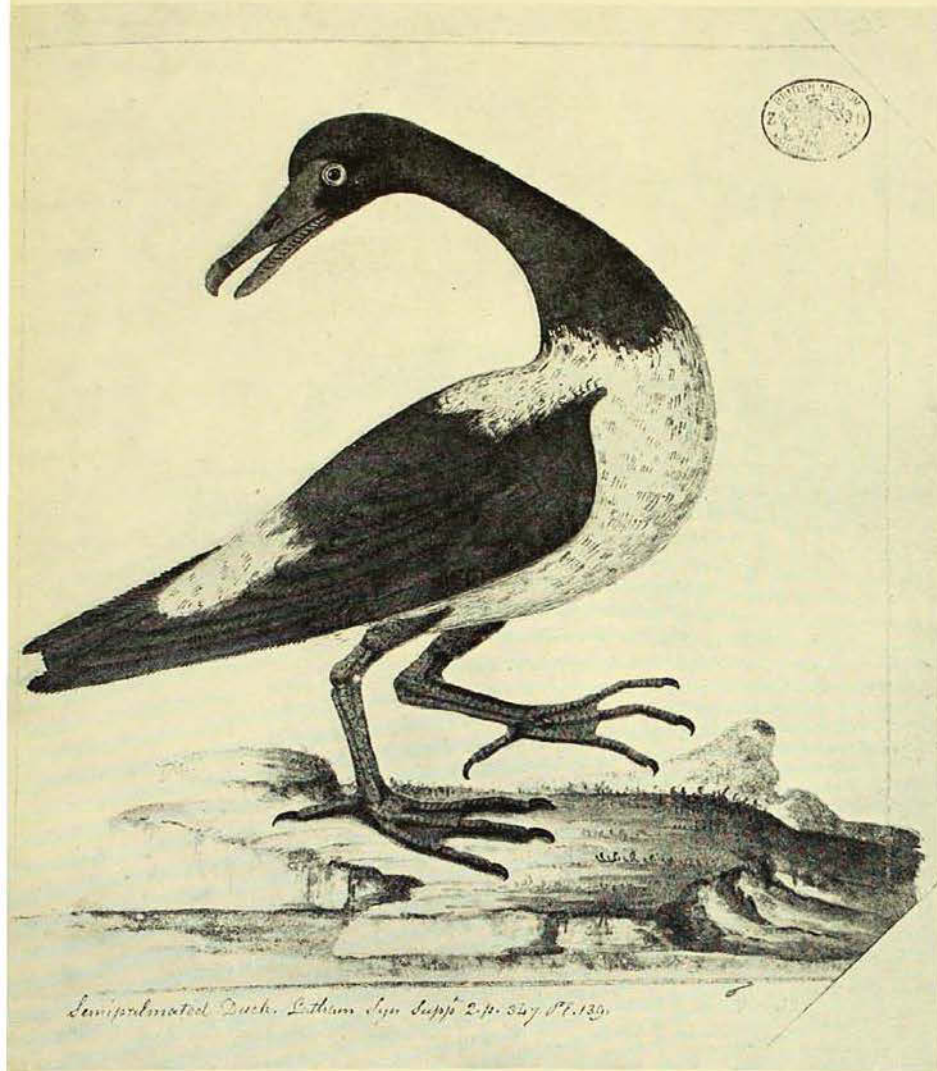
<sup>12</sup> E. S. Edwards, *Austr. Naturalist*, iii, 1914, p. 6; also *Hist. Rec. N.S.W.*, ii, 1893, p. 667.

Southwell also noted the variety of sharks here, and observed birds. He described one, probably a tiger shark, thirteen feet six inches long, but certainly not a Port Jackson Shark, as marginally noted in the *Historical Records*, vol. ii, 1893, p. 696. He also describes how a whale attacked a boat in Sydney Harbour, and three men, who could not swim, were drowned.

Southwell sailed from Sydney on March 28, 1791, in the *Waaksamheyd* with Captain Hunter, and the shipwrecked crew of the *Sirius*.

#### WATKIN TENCH.

This was a cultured man, with a sense of humour. I have an original paper-covered copy of the third edition of his famous *Narrative of the Expedition to*



A drawing by Thomas Watling of the "Semipalmated Duck" or Pied Goose (*Anseranas semipalmata*) from near the Hawkesbury River, New South Wales, January 2nd, 1794; native name "Now-al-gang". Original (Watling painting No. 288) in the British Museum (Natural History).

Botany Bay and have seen ten different editions in various languages. This book is being re-published in Australia now.

"To the naturalist", wrote Tench, "this country holds out many invitations", and he described the birds, giving the first published account of our emu, also kangaroos, fish (such as the "light-horseman" which we call the Snapper nowadays), snakes, etc.

#### JOHN WATTS.

This man had sailed with Cook in the *Resolution* and had linguistic and artistic leanings. He drew the emu which is engraved in *The Voyage of Governor Phillip to Botany Bay* (1789, p. 271) as the New-Holland Cassowary, the first published picture of this bird. In that book,<sup>13</sup> too, "Watts's shark" (the Wobbegong or Carpet Shark) is

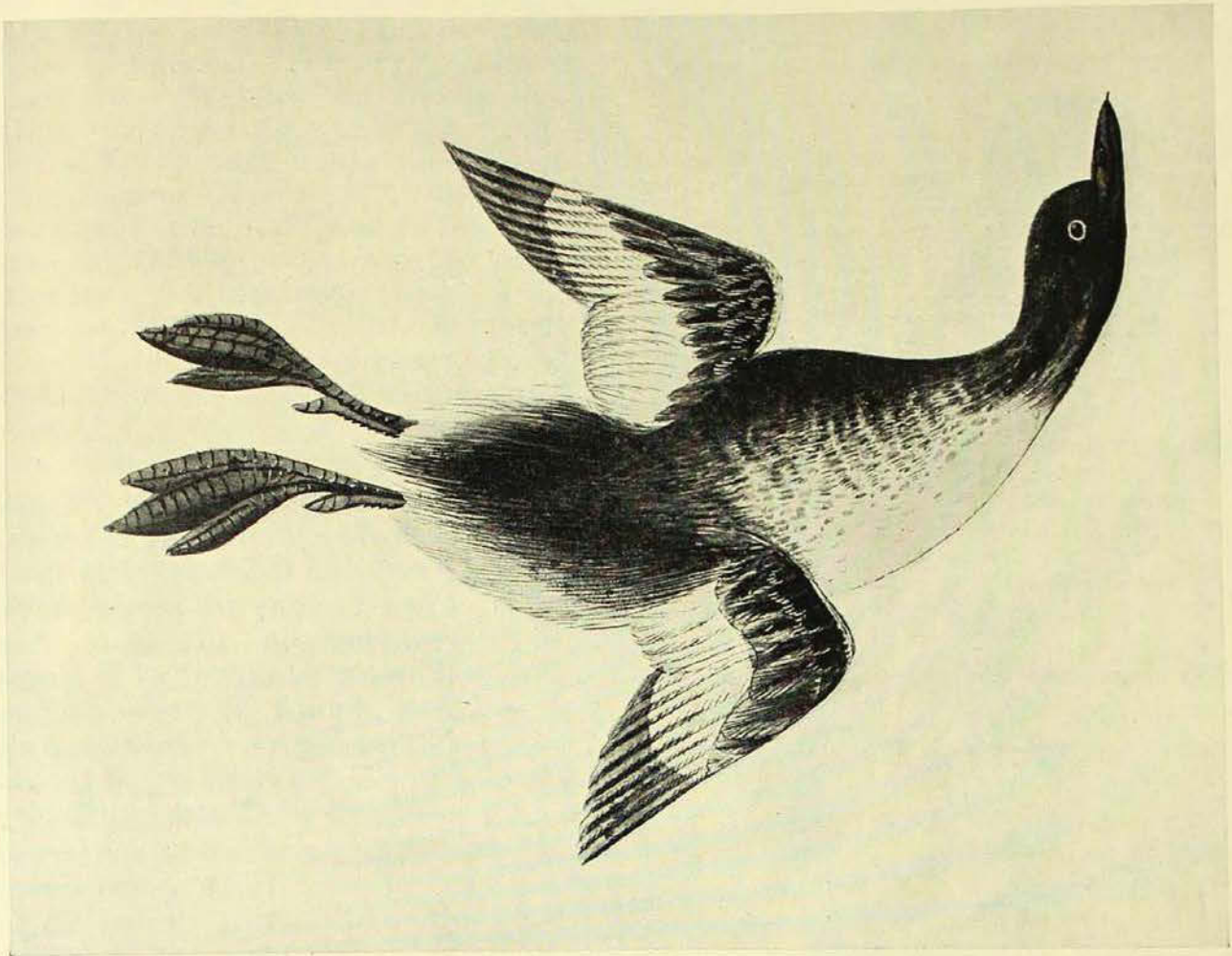
<sup>13</sup> Phillip, *Voy. Bot. Bay*, 1789, p. 286.

pictured: "This fish was met with in Sydney Cove, Port Jackson, by Lieutenant Watts, and is supposed to be full as voracious as any of the genus, in proportion to its size; for after having lain on the deck for two hours, seemingly quiet, on Mr. Watts's dog passing by, the shark sprung upon it with all the ferocity imaginable, and seized it by the leg; nor could the dog have disengaged himself had not the people near at hand come to his assistance".

Much later, this unfortunate terrier, "Savage", was apparently thrown overboard by some sailors, so may have finished up inside a shark after all.

#### JOHN WHITE.

Born Sussex, England, 1750, and died there, near Worthing, February 20, 1832. Little is known of his early life, but he served on various vessels and was



A Dabchick (*Poliiocephalus ruficollis*), apparently coming to the water-surface, but with wings outstretched. From one of the Lambert Paintings (Vol. i, No. 73), now in the possession of the Earl of Derby.

appointed Chief Surgeon of the proposed Settlement in New South Wales in October, 1786. His colleagues were William Balmain and George Bonchir Worgan when he came out with the First Fleet in the *Charlotte*.

In New South Wales he collected natural history specimens for his friends in England: Thomas Wilson, Gower Street, obtained the Black Swan figured by Shaw and Nodder, *Naturalist's Miscellany*, iii, 1792, pl. 108, etc. Many objects went to the Leverian Museum and the English artists, Miss S. Stone, Catton, Nodder and others drew them, and probably Dr. George Shaw classified them for White's famous *Journal of a Voyage to New South Wales*, 1790 (French ed., 1795). White does not give much credit to the men who must have helped him in collect-

ing and painting our animals, otherwise we might have fuller details regarding Watling, Consider, and others. A biography of White by Douglas Anderson<sup>14</sup> is valuable, and tells us that some of White's specimens are still exhibited in the Royal College of Surgeons.

White himself also painted various objects, as witness the following facts.<sup>15</sup> A man named David Burton, who was a gardener, was sent out to New South Wales by Sir Joseph Banks in 1791. Soon after arrival, he was out shooting ducks when he was accidentally shot in the arm, from which wound he died. At the sale of his effects (an inventory of which is in the

<sup>14</sup> D. Anderson, *MED. JOURN. AUSTR.*, Feb. 11, 1933, p. 183. See also *Austr. Encycl.*, ii, 1926, p. 665, and *Emu*, xxxi, 1931, p. 101.

<sup>15</sup> Hindwood, *in lit.* to Captain Gladstone, 20/4/37.



*The Owlet Nightjar (Aegotheles cristata), known as the "Musketo Hawk" or Goatsucker to the First-Fleeters, one of whom made this painting to illustrate Surgeon White's "Journal of a Voyage to New South Wales". From the Davies Series (Banksian Folio 34, No. 97), by courtesy of the British Museum (Natural History).*

Mitchell Library, Sydney; Banksian MSS.) appears the following:

Mr. White's account.

One chip box containing colours and brushes.

One marble stone for preparing colours.

Drawing book with about  $\frac{1}{4}$  quire of drawing paper.

One book  $\frac{1}{2}$  wrote, stst'r and pencils.

8/-.

John White returned to England in the *Daedalus*, Dec. 17, 1794, though he wished to leave Australia before that time.

Mr. K. A. Hindwood has shown me a photograph of White's last resting-place,

at Broadwater Church, Worthing, the rector of which, the Rev. B. C. Mowll, in sending the photo to Mr. Hindwood, wrote:

15 March, 1931. Dear Sir—The stone slab to the memory of John White is in the lower aisle between the choir stalls, and is in this shape with the wording on it.

JOHN WHITE, M.D., R.N.  
1832

I do not know of any portrait, history, descendants, or information of John White except what you have told me in your letter. . .

I have been unable to discover any satisfactory picture of White. In the British Museum (Natural History), London, amongst the "Watling" drawings, is a painting, number 34, of "Mr. White, Harris, & Laing with a party of Soldiers visiting Botany Bay . . .", but White's features cannot be discerned in this.

Some say that he is represented attending Governor Phillip when the latter was speared at Manly Cove, 7th September, 1790. White was not present on that occasion, however, as the contemporary journal of a Sergeant of Marines, quoted by Mr. Wm. Dixon<sup>16</sup> states: "As Mr. White the Principal Surjon went that Morning on an Expedition, Mr. Belmane, Assisten Surjon, took the Spere out and Dressed the Wound."

RICHARD WILLIAMS.

Fish and cockatoo of Port Jackson are mentioned in passing, and turtle and birds are noted as being common at Norfolk Island, in the *Extract of a Journal from England to Botany Bay, by Richard Williams, belonging to the Ship Borrow Dale, Capt. Reed*. A quarto page of printing, undated, this article covers in the precisest way events between 1787 and 1789, when Williams "arrived safe at Plymouth". Natives, executions of convicts, and ships' itineraries are all mentioned in some six hundred words.

Bound with the Mitchell Library copy is "A succinct account of New South Wales" in *The Universal Magazine* for March, 1787, pp. 137-140, and map, wherein Botany Bay birds are mentioned by an anonymous reviewer. There are other newscuttings, also an "Account of Botany Bay (with a beautiful Engraving, from Nature)" *ex* the *Ladies Magazine*, January, 1790.

In the same volume there is pasted an old handbill (accompanied by an engraving after Cook by Thornton of the Kangaroo, but with a joey in the pouch) which reads as follows:

THE WONDERFUL  
KANGUROO,  
from  
BOTANY BAY,

<sup>16</sup> W. Dixon, *Journal Royal Australian Historical Society*, ix, 1923, p. 198, with reproduction of "Watling" drawing No. 33.

(The only One ever brought alive to Europe)  
Removed from the Hay-market, and now exhibited at the Lyceum, in the Strand, from 8 o'Clock in the Morning, till 8 in the Evening.

This amazing, beautiful, and tame Animal, is about five Feet in Height, of a Fawn Colour, and distinguishes itself in Shape, Make, and true Symmetry of Parts, *different from all other QUADRUPEDS*. Its Swiftmess, when pursued, is superior to the Greyhound: to enumerate its extraordinary Qualities would far exceed the common Limits of a Public Notice. Let it suffice to observe, that the Public in general are pleased and bestow their Plaudits; the Ingenious are delighted; the Virtuoso, and Connoisseur, are taught to admire! impressing the Beholder with Wonder and Astonishment, at the Sight of this unparalleled Animal from the Southern Hemisphere, that almost surpasses Belief; therefore Ocular Demonstration will exceed all that Words can describe, or Pencil delineate. . . .

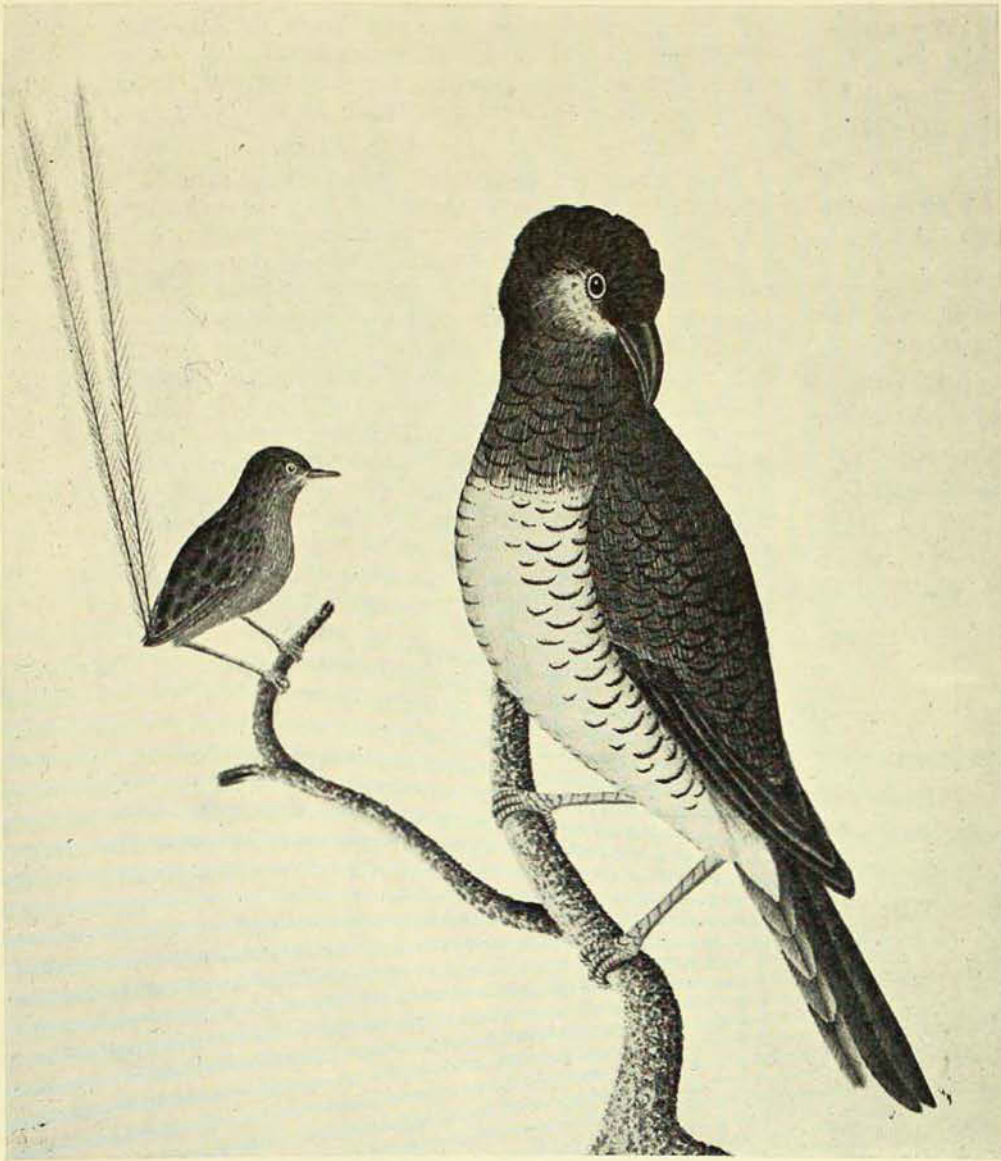
Admittance, ONE SHILLING each.

FIRST FLEET ARTISTS.

Governor Phillip, Surgeon John White, and probably others, employed artists to draw the nondescript animals encountered, and modern researches, notably by Messrs. Iredale, Mathews, and Hindwood, have revealed the fact that several collections of drawings dating from the days of the First Fleet and the 1790's are still in existence. Many of them are unsigned and are obviously the work of several distinct artists.

Since the data regarding these men and their work are still incomplete and are receiving the attention of my friends already mentioned, I merely note here very briefly the collections already known.

(A) *The Sydney Series*.—One hundred drawings of birds now in the Mitchell Library, Sydney. Purchased from a London bookseller in 1887 and discovered by Mr. Hindwood in the Public Library, Sydney, in 1929. Perhaps part of the collection of drawings taken to England by Governor Phillip. Artists unknown. See Hindwood, *Emu*, xxxi, 1931, p. 100. Some have been reproduced in this MAGAZINE (Vol. iv, 1930, pp. 20 and 84), also in Mathews' *Suppl. Birds of Norfolk and Lord Howe Islands*, 1936, p. 4, pl. 83 [*Cookilaria leucoptera* (not of Gould) = *hindwoodi*, sp. nov.].



A painting by George Raper of two birds of Port Jackson: left, the Emu Wren (*Stipiturus malachurus*), and right, the Ground Thrush (*Oreocincla lunulata*). Original (No. 65) in the Dame Alice Godman set, British Museum (Natural History).

(B) *The Watling Paintings*.—Many drawings of birds, etc., in the British Museum, made about 1792, a few of which have been reproduced in *Austral Avian Record*, 1915 to 1922. Painted by Thomas Watling, but some of the collection earlier or by at least two other unknown artists. See Sharpe, *Hist. Coll. Brit. Mus.*, ii, 1906, p. 108, and W. Moore, *The Story of Australian Art*, 1934.

Thomas Watling was not a First-Fleeter, as he arrived in Sydney in 1792. A most interesting biography of him has just been written by Captain H. Stuart Gladstone, of Penpont, Dumfriesshire.

The "Watling" drawings seen by me in the British Museum (Natural History) consist of 407 paintings, the subjects being as follows:

1-6. Maps of parts of New South Wales and Norfolk Island.

- 7-16. Views of Van Dieman's Land and New South Wales.  
 17. [Lord] Howe Island.  
 18-30. Views of Sydney.  
 31. Wreck of the *Sirius*, Norfolk Island.  
 32-33. Wounding of Governor Phillip at Manly Cove.  
 34. "Mr. White, Harris & Laing with a party of Soldiers visiting Botany Bay. . ."  
 35-82. Natives of New South Wales, fishing, etc., with MS. notes and instructions to engravers.  
 83. A native spearing a Kangaroo [tiny sketch in colour].  
 84. Method of climbing trees [a Flying Fox and a Possum in the branches].  
 85-87. Native weapons, etc., of New South Wales.  
 88. "A Norfolk Island Hand Adges" [adze from Norfolk Island!]  
 89-96. Marsupials.  
 97. The Pattagorang, a kind of Kangaroo.  
 98. The Baggaree, another kind of Kangaroo, of which Phillip has taken home the skin and bones of the head.



- 99-101. Marsupials.  
 102-104. Echidna, with notes on habits.  
 105-295. Birds.  
 296-304. Reptiles.  
 305-318. Fishes.  
 319-335. Mollusca of New South Wales.  
 336-348. Insects, etc., and a Crab.  
 349-407. Botanical Subjects.

(C) *The Lambert Series*.—Many paintings were taken to England by John White and came into the possession of Aylmer Bourke Lambert (1761-1842), a botanist and zoologist.<sup>17</sup>

These drawings are in three volumes, and some of them are similar to, and contemporary with, the Watling ones, but the artist or artists are unknown. There are 225 drawings. Volume 1 contains one landscape, ten mammal subjects, and 69 birds; vol. 2 has 96, and vol. 3 has 49 bird paintings. Some of them represent the types of species. These drawings were purchased by the Earl of Derby in 1842, and the present owner, Lord Derby, of Prescott, England, has given Mr. Hindwood, from whom my information is derived,<sup>18</sup> full information concerning them.

(D) *The Davies Series*.—Seventy drawings of animals and plants contemporary with the Watling and Lambert drawings and now in the British Museum, Banksian folio number 34; described by Mathews and Iredale.<sup>19</sup>

The Emu, Owlet Nightjar, and other subjects are apparently the originals of the engravings in White's *Journal* (1790). Others may have been drawn in London from King's birds. General Davies was never in Australia, and the artists are unknown.

(E) *The Raper Drawings*.—George Raper has already been mentioned as a First Fleet naturalist. His paintings are often signed G:E:O:Raper in a scrawling fashion so that the abbreviated "George" has been misinterpreted as various initials by historians. Many were in the possession of Dame Alice Godman in England,<sup>20</sup> but are now deposited in the

British Museum. Since Raper's work is most authenticated of any, I give brief lists of some which I have studied.

- (1) Original sketches by George Raper, in the British Museum (Natural History). Seventy-three paintings made on the voyage of H.M.S.S. "Sirius" & "Supply" to Botany Bay.
1. Piece of Ordnance, 24 lb. French Calibre.
  2. Native and implements, Port Jackson.
  3. H.M. Brig "Supply" and H.M.S. "Sirius".
  - 4-11. Views (not Australian).
  - 12-16. Views, Tasmania and New South Wales.
  17. Natives and implements.
  18. Icebergs round Cape Horn.
  - 19-24. Norfolk Is. and wreck of "Sirius".
  25. Three views of Lord Howe Island.
  - 26-30. Extra-Australian islands and their canoes, also Batavia.
  31. Antelope.
  32. Fish of Port Jackson [an Elephant Shark, perhaps from Tasmania].
  33. Porpoise.
  34. Fish from Rio de Janeiro [Flying Gurnard].
  - 35-61. Birds.
  62. Fishes of Port Jackson ["Old Wife" (*Enoplosus*), and "Maori" (*Ophthalmolepis*)].
  63. Birds and Flowers of Port Jackson.
  64. Fish of Port Jackson [Snapper].
  65. Birds of Port Jackson [Emu Wren and Ground Thrush, figured here].
  66. Birds and Flowers, Port Jackson.
  67. Emu of Port Jackson.
  68. Tropic Bird, Norfolk Island.
  69. Birds of Norfolk Island.
  70. Mount-Pitt-Bird, Norfolk Island [*Pterodroma*].
  71. Ground Bird of Lord Howe Island [The Wood Hen].
  72. Pigeon of Lord Howe Island [now extinct].
  73. Ground-Bird of Lord Howe Island [White Gallinule,<sup>21</sup> now extinct].

(2) Original paintings by George Raper and others, in the Mitchell Library, Sydney.

Two volumes "submitted by M. Marks through courtesy of Sir T. G. Carmichael, 2 May, 1911". The first contains fourteen paintings of fishes and two of mammals and the second volume is of flowers, sometimes with insects or a spider. See Whitley, *Austr. Zool.*, viii, 1935, p. 150.

(3) The Cane Collection.

In 1937, I noticed a large folio volume of Australian Bird paintings in the Alexander Turnbull Library, Wellington, New Zealand. This was entitled "Birds of Australia and South Seas. Original Drawings 1788-90. From E. Cane."

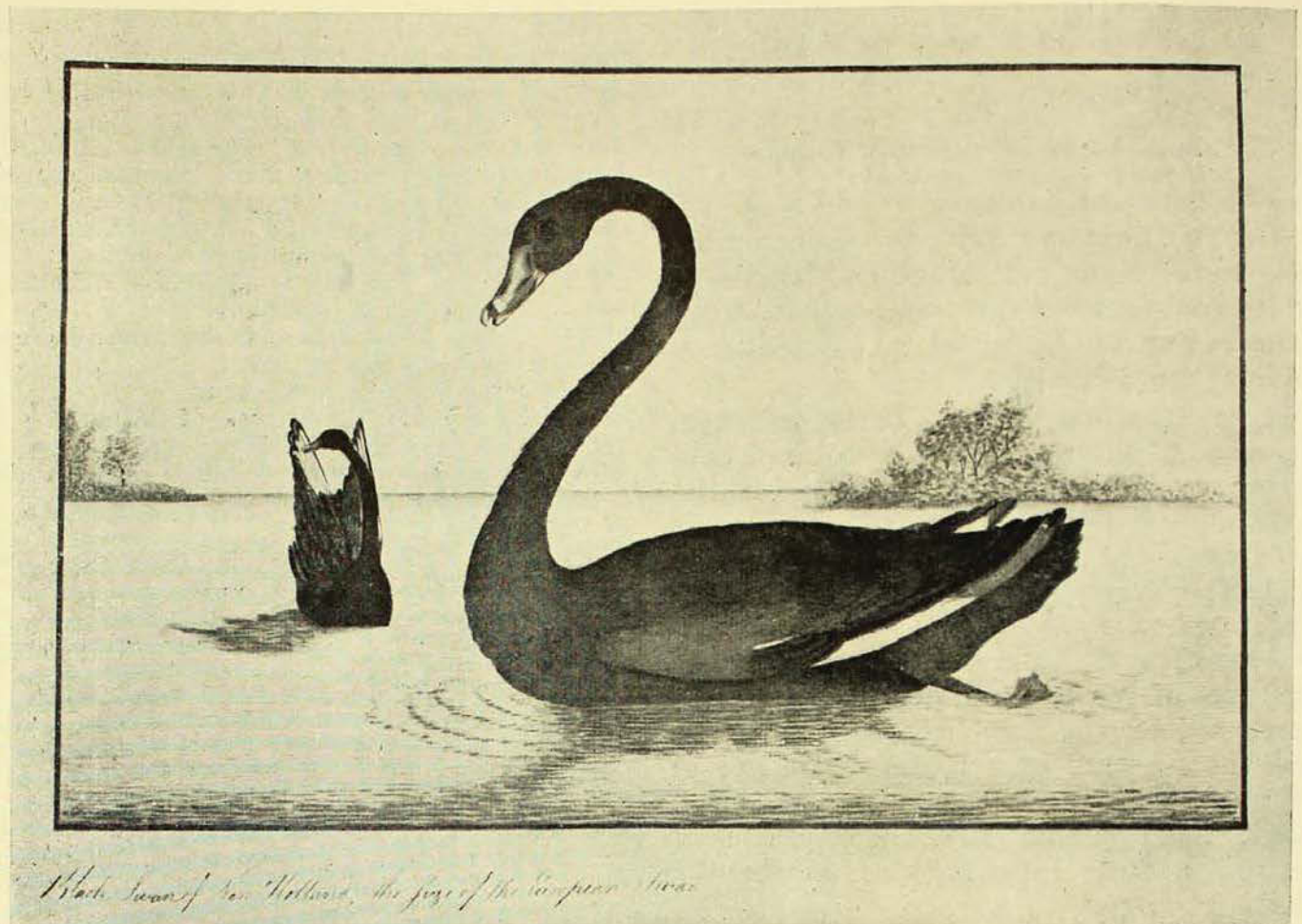
<sup>17</sup> Lambert, *Trans. Linn. Soc. London*, viii, 1807, p. 319.

<sup>18</sup> See also Mathews and Iredale, *Austral. Avian Record*, v, 1923, p. 69, and Mathews, *Suppl. Birds of Norfolk and Lord Howe Iss.*, 1936, p. 46, pl. 74.

<sup>19</sup> *Austral. Avian Rec.*, iv, 1920, pp. 114-122.

<sup>20</sup> See Salvin, *Proc. Zool. Soc. Lond.*, 1877, p. 95; the *Austral. Avian Rec.*, iii, 1915, p. 23; Mathews' *Birds of Norfolk and Lord Howe Iss.*, 1928, p. 2, pl. ii; Whitley, *Australian Zoologist*, viii, 1935, p. 150.

<sup>21</sup> This painting of the White Gallinule by Raper has been reproduced by Mathews, *Suppl. Birds of Norfolk and Lord Howe Islands*, 1936, p. 1, pl. 46.



A striking painting of the Black Swan (*Chenopsis atrata*) made by an unknown First Fleet artist. From the Cane Collection, Alexander Turnbull Library, Wellington, New Zealand.

These sixty-six coloured drawings, all of them at least of foolscap size, are largely by George Raper, several being signed by him and dated 1788 and 1790, but some are obviously by other painters. They show birds mostly, some of them being of species now extinct, but there are also flowers, fruits, insects (cicada, caterpillars, moth, Emperor Gum moth), spiders, a kangaroo, and a frog.

(F) *King Estate Drawings*.—Amongst the relics of Governor P. G. King in the Mitchell Library, Sydney, are a few drawings by unknown artists. Two of the Birds of Providence, whose timely appearance saved the first white inhabitants of Norfolk Island from starvation, were reproduced in the *Australian Zoologist*, viii, 1934, p. 42, pl. i. I have already mentioned another, perhaps by Watling, of a Norfolk Island fish (*Thalassoma trilobatum*).

These lists could be extended to include the drawings of British artists, such as Latham, Nodder, Miss Stone, S. Edwards,

and others, who depicted Australian animals sent to England in the eighteenth century. Then Governor Paterson made careful drawings, but, as he was not a First-Fleeter, he is beyond the scope of this article.

#### ACKNOWLEDGMENTS.

I am indebted to several friends for help and advice in the preparation of this article, notably Mr. Tom Iredale, of Sydney; Mr. Keith Hindwood, of Willoughby, New South Wales; and Mr. G. M. Mathews, of Winchester, England. The Director and library officials of the British Museum (Natural History), South Kensington, London, and the librarians of the Mitchell Library, Sydney, the Alexander Turnbull Library, Wellington, New Zealand, and the Public Library, Perth, Western Australia, have kindly placed original drawings and manuscripts at my disposal.

# Zeolites

By T. HODGE-SMITH

IF you look up a textbook on mineralogy you will find that the zeolites form a family of well-defined hydrous silicates, and other technical details. It is much more interesting if we start right at the beginning and find out how these beautiful and interesting minerals come into being.

## ORIGIN OF ZEOLITES.

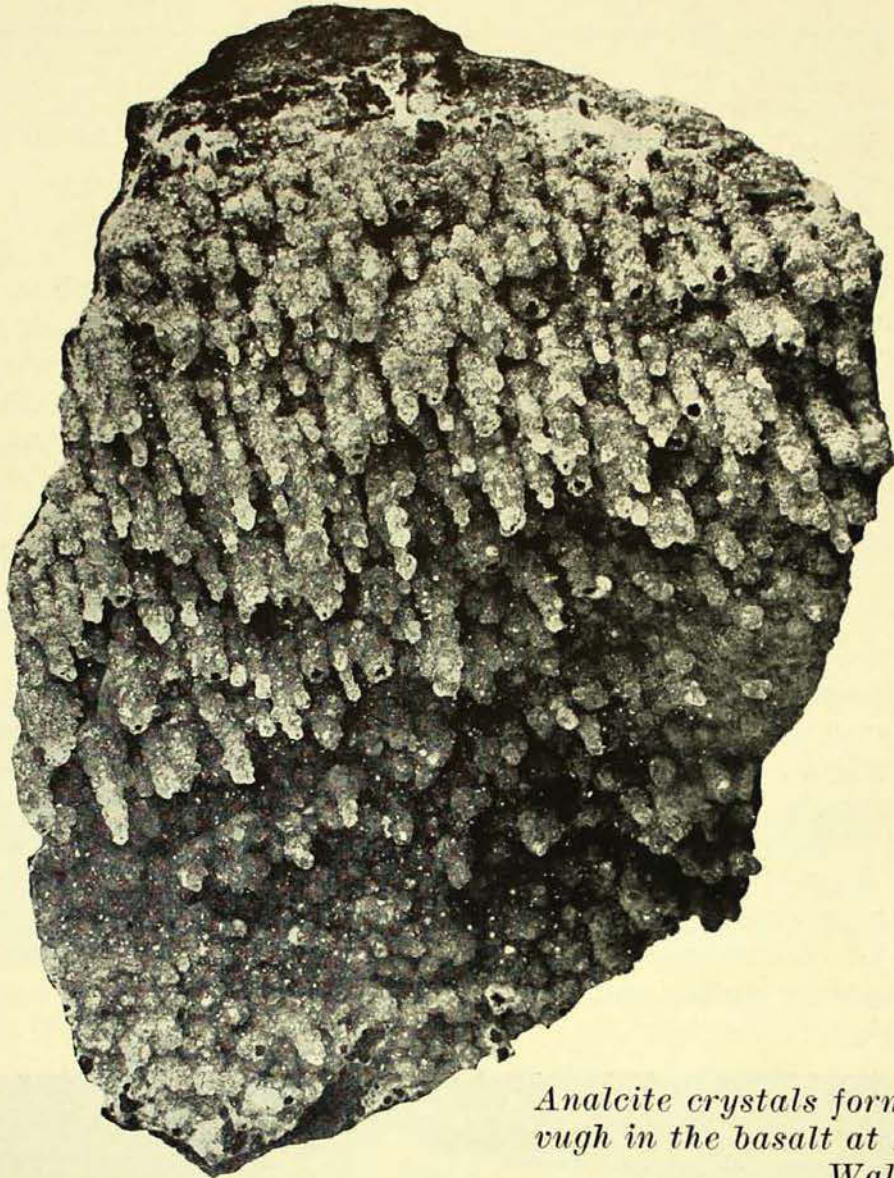
Can you imagine anything so terrible and destructive as a huge lava flow slowly pushing its way along the ground, consuming everything in front of it, covering the land with its rough ugly surface! Alas, we say, all that is beautiful has been replaced by utter desolation, and the stately trees, with their attendant birds, have gone for ever. Of course that is not true. The lava will weather on the surface

to a soil which will support a new and more luxuriant growth than before.

We are not concerned with this, but rather with the beauty that is being created within the lava itself. We know that the molten rock before it reaches the surface contains a considerable amount of water, for we can see great clouds of steam coming from it as it leaves the crater or vent, and, indeed, it still escapes as the lava spreads itself over the land. The flow becomes more and more viscid, until finally it is a solid mass of rock, which may be basalt, andesite, trachyte, or rhyolite. Some of the water never escapes from the thickening mass, but is caught in cracks and crevices, or again in its struggle to reach the surface innumerable bubbles are caught in the solid rock.



*Large crystals of calcite and basalt, coated with chabazite, from the Kyogle Shire Quarry.*



*Analcite crystals forming stalactites in a vugh in the basalt at Ardglen, New South Wales.*

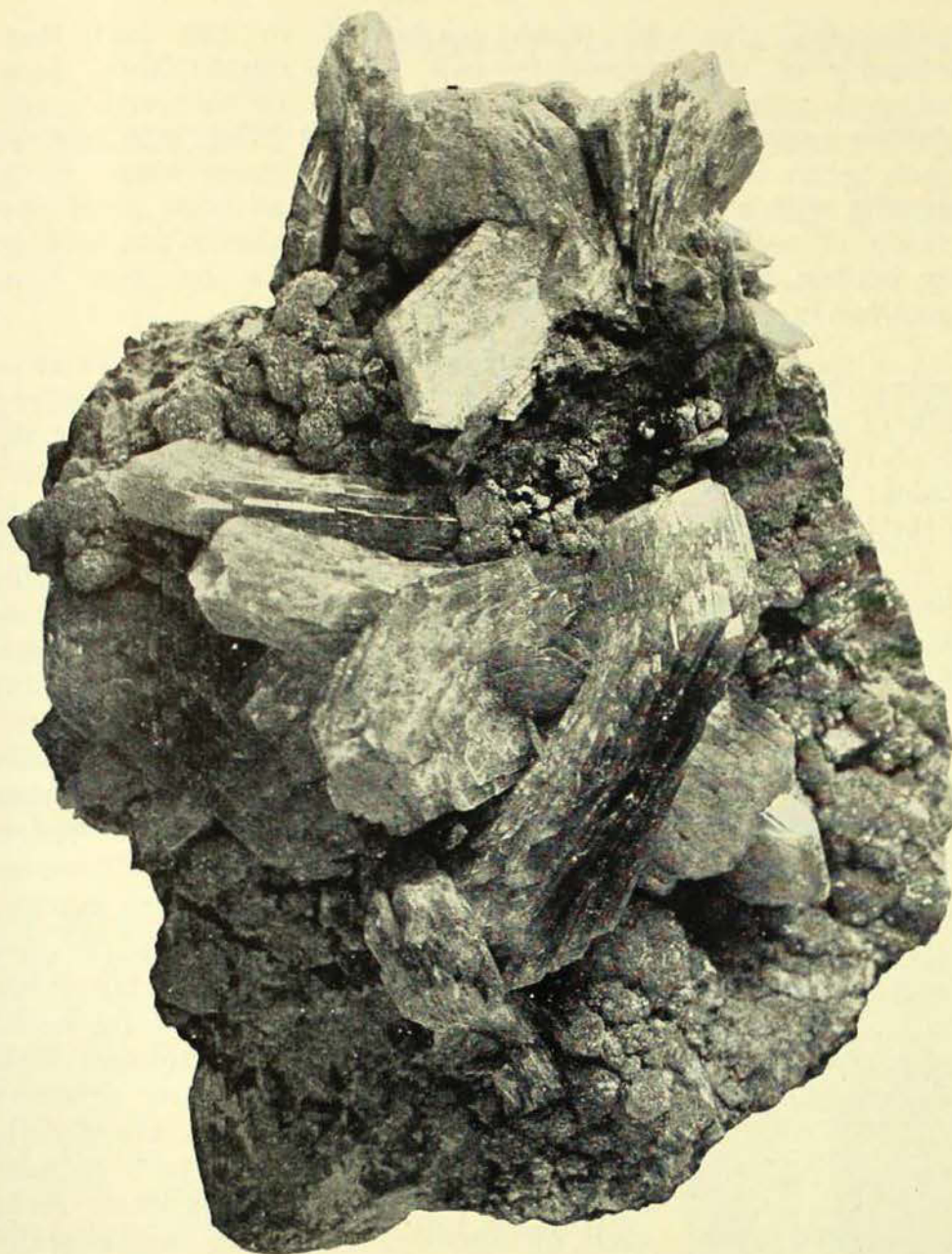
#### THEIR FORMATION.

Now this water is not like our tap water, for it contains a number of oxides, such as silica, potash, soda, lime, alumina, and occasionally some baryta. Some of these it may contain when it comes to the surface, but it may enrich its stock by attacking the rock that has imprisoned it.

As the cooling process goes on, various minerals called zeolites crystallize out from this water, and the particular "well-defined hydrous silicate", to form depends on a number of factors, but principally on the relative amount of oxides contained in the water. Thus a hydrous silicate of lime, soda, and alumina may crystallize out in the form of chabazite, gmelinite, mesolite, stilbite, or thom-

sonite. If a hydrous silicate of soda and alumina crystallizes out, the mineral may be either analcite or natrolite. Again, if a hydrous silicate of lime and alumina is deposited, either laumontite, heulandite, scolecite, or levynite may result. Similarly, a hydrous silicate of lime and potash may form phillipsite or apophyllite, or if baryta is present, wellsite will crystallize instead, and if the lime be completely replaced by baryta, then harmotome will be the mineral to form. From this description of the chemical composition of the various zeolites it is not difficult to understand that a number of them may form in the same crack or steam hole, even from the same solution.

This is what actually happens in nature. At Kyogle, New South Wales,



*Crystals of stilbite on quartz. This reproduction is almost natural size, the complete crystal in the centre being two and a quarter inches long.*

chabazite, mesolite, and analcite occur together, while at Ardglan, New South Wales, is found natrolite, apophyllite, analcite, and chabazite. At Garrawilla, New South Wales, the assemblage is stilbite, laumontite, and analcite. In the Permo-Carboniferous flows of the South Coast District of New South Wales both stilbite and analcite have been found.

#### PHYSICAL CHARACTERS.

Frequently when a family of minerals are so closely related chemically they are all similar in their crystal structure. For instance, the feldspars, which are analogous to the zeolites, are closely related both in their chemical and

crystallographical properties. The zeolites are quite different in this respect. Heulandite crystallizes in what is called the monoclinic system, chabazite in the rhombohedral, natrolite in the orthorhombic, analcite in the cubic, and so on.

They are all, however, characterized by an inferior hardness, and a low specific gravity. They are generally white to colourless, though stilbite is often coloured various shades of red.

When they are heated in the flame of a blowpipe they easily fuse, and mostly appear to boil or intumesce, and it is from this property that they have derived their family name of zeolites, from the Greek words, ζέιν, to boil, and λίθος, stone.

The accompanying illustrations give but a faint idea of the beauty of the minerals. A visit to the mineral gallery, where a large collection of these minerals is exhibited, will give a much better idea of their beauty. But even this will not convey any idea of the thrill of seeing the blue-black basalt being broken open and disclosing glistening zeolites in their original setting.

You would certainly be attracted by the white, almost opaque crystals of chabazite from Kyogle in the far North Coast District of New South Wales; but when they were first taken from the basalt they were colourless. After a few hours' exposure to the air they lost their transparency and assumed the opacity that they now display in the Museum.

It is no wonder that the quarrymen hewing the basalt for road metal or concrete metal are so struck by their beauty that they invariably bring them to a museum. Our first knowledge of zeolites at Kyogle was obtained from a quarryman who came to the Museum, just 518 miles from his quarry, with a specimen. Some of the best specimens from Ardglen were not obtained from the quarry, but from the homes of some of the quarrymen, who very generously presented them.

#### USES.

Man never seems to be satisfied with a thing of beauty is a joy for ever, nor is

he much interested in the fact that scientists can learn much from these interesting minerals. In this utilitarian age he must find out what use can be made of anything and everything. So it is that the scientist has been given the task to find out what exactly can zeolites be used for. In this he has been successful.

He has found that when hard water is allowed to filter through certain zeolites it becomes soft. That is to say, that the lime and magnesia content of the hard water replaces the alkali (soda and potash) content of the zeolite, and so the water becomes soft. Because of this property zeolites have been used as filter beds to purify certain sewerage waters. After all the available alkali from the zeolite has been used up, it is only necessary to soak the filter in brine and the zeolites give up the lime and magnesia content and again take up alkali, and so are ready to do their work again.

While zeolites mostly occur in the way described, they are found under quite different conditions. For instance, the action of percolating waters on the bricks and mortar of the ancient Roman baths at Plombières in France has produced chabazite, phillipsite, and apophyllite. Analcite has been recorded as a primary mineral in a number of igneous rocks, such as syenite, tinguaitite, monchiquite, and basalt.

E. H. Rainford, Honorary Correspondent of this Museum, died recently in Brisbane at the advanced age of eighty-four. He was a valued voluntary collector for the Australian Museum, and to him we are indebted for many fine specimens and several new species.

Before coming to Australia, Mr. Rainford lived for some time in Italy, where he was engaged in wine-making. He took a keen interest in marine zoology and worked for some time at the famous Naples Marine Biological Station. On arriving in Australia he was appointed

viticulturist to the Department of Agriculture and Stock, Queensland, a position which he held from 1898 till 1903, when he became an inspector under the Diseases in Plants Act. He retired in 1918, and thereafter devoted himself to marine biology and the study of the Great Barrier Reef.

He was a keen observer and a discriminating and successful collector, and supplied us with many interesting and valuable notes on marine creatures and their habits.

C.A.

# Australian Shells

## Volutes and Melon Shells, Olives, Rice, Harp, Margin, and Cross-barred Shells

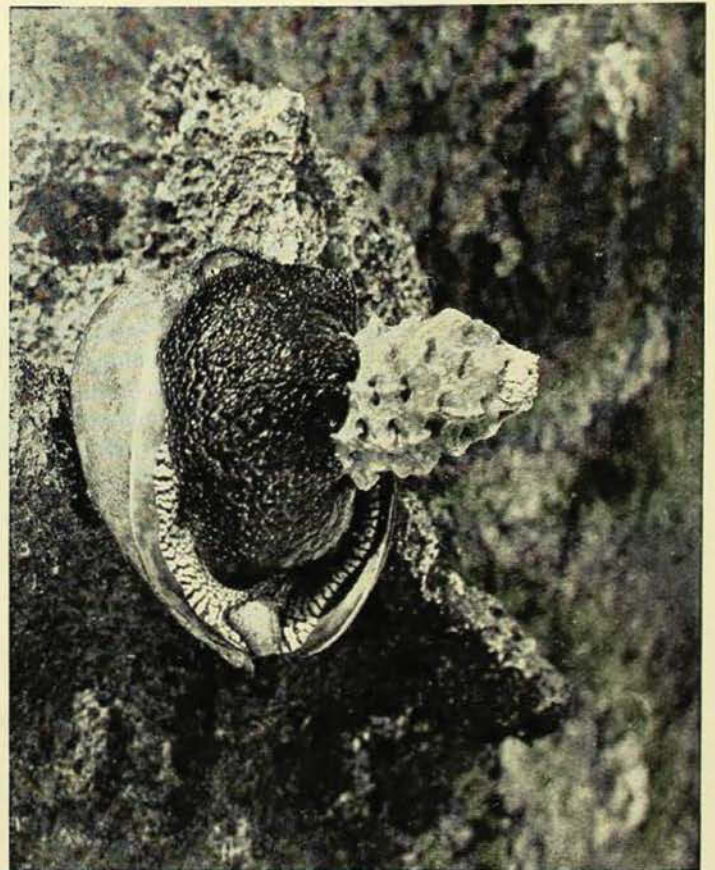
By JOYCE ALLAN\*

### VOLUTES AND MELON SHELLS.

**E**IGHTY per cent. of the very beautiful and showy Volute and Melon shells are found in Australasian waters, as Australia forms their centre of distribution. They are a carnivorous group, living mostly in deep water in tropical and subtropical regions, and are prizes eagerly sought by amateur collectors, but owing to their habits they are rarely obtained. They are at times found washed up on beaches round Australia, especially in southern New South Wales, but generally the only means of obtaining them is by dredging. In recent years, trawlers working on the continental shelf have brought to light many interesting forms, which have not only provided science with new species, but, more important possibly, have illustrated the variation of species due to a widened distribution. This is particularly noticeable in the comparison of forms from southern and eastern Australia, for instance, or New Zealand and Australia. Some of the largest ones, the Melons, grow to a length of over twelve inches, and make very handsome ornaments. Their colouring is usually confined to buff-orange shades with brownish markings, but some are purplish-red, and the mouths are often brilliant orange-red. It is in the smaller species, however, that the very beautiful, graceful marking and delicate shape are most conspicuous. The Volutes and Melon shells belong to the family Volutidae.

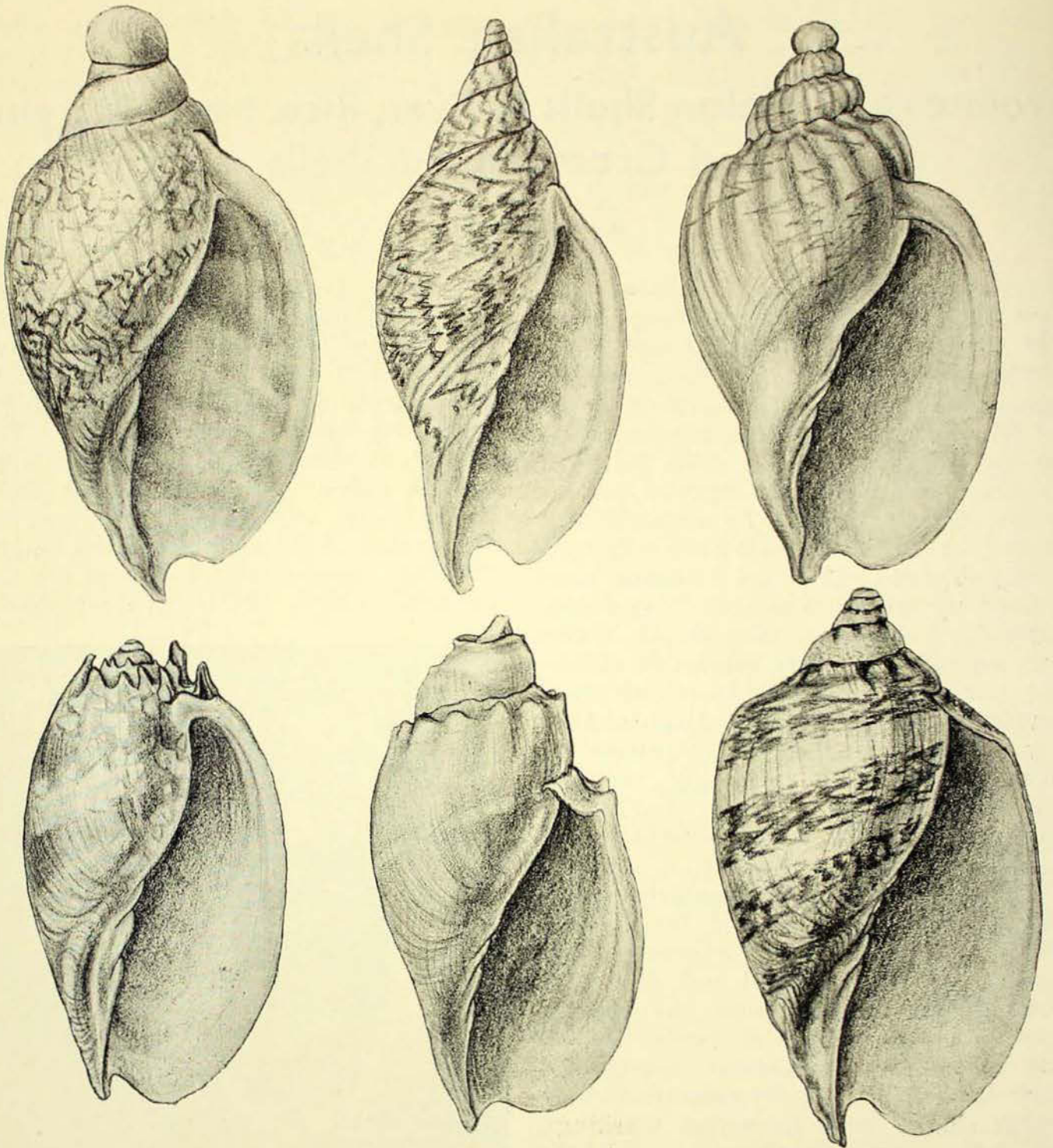
Of the larger species, the best known possibly is the Baler shell (*Melo flammea*), a common north Australian species which is used by native races as a baler and water carrier. Large balers

have been found almost eighteen inches long and capable of holding a considerable amount of water. This species lays its eggs in a tight mass of leathery capsules cemented together, and a single baler develops in each capsule. The animal, as with the majority of the large volutes, appears too large for the shell, and extends well round it, giving the appearance of the shell being sunk within it. The largest southern volutes are the common False Melon shell (*Livonia*



*The Baler shell, Melo flammea, laying its egg-case. The separate compartments, each containing an egg which will later develop into a small Baler, can be distinctly seen. This was taken in situ on the Great Barrier Reef.*

\* Illustrations by the author.

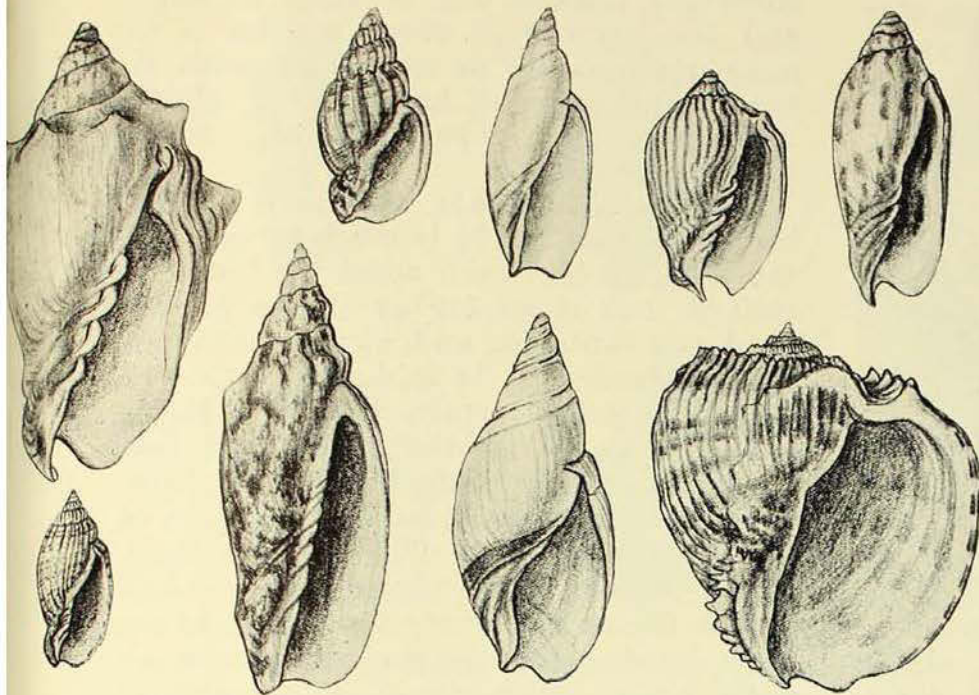


*Large Volute shells. The three upper ones are the False Melon shell, Livonia mamilla, Mesericusa perspecta, and Livonia roadnightae. Below these are, from left to right, the Baler shell, Melo flammea, Cottonia dannevigii, and Cymbiolena magnifica.*

*mamilla*) from the New South Wales and Tasmanian coasts, *Mesericusa perspecta*, *Ericusa kenyoniana* (Fig. 22), *Cymbiolena magnifica*, like the Melon shell *Livonia mamilla*, but with a pointed instead of a bulbous apex, and *Cymbio-*

*lista hunteri* (Fig. 18), all from New South Wales. An easily recognizable southern Australian Volute, *Livonia roadnightae*, comes also into New South Wales, and two other striking volutes, *Ericusa fulgetrum* var. *dictua* and





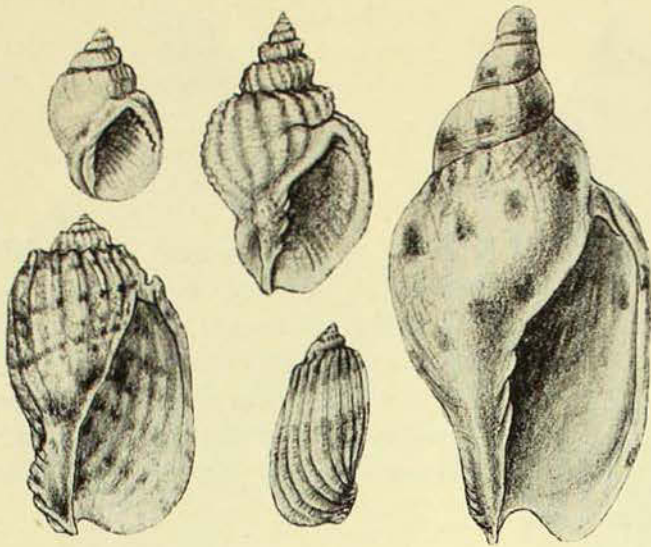
In the top row are *Cymbiola flavicans*, *Lyria mitraeformis*, *Sandella elongata*, *Zebramoria zebra* and *Amoria caroli*; in the bottom row, *Lyria pattersonia*, *Cymbiola thatcheri*, *Ancillista velesiana* and *Harpa costata*.

*Cottonia dannevigii*, occur in South Australia; the latter has a West Australian relative, *Cottonia nodiplicata*.

When we come to the smaller Volutes, it is possible to arrange these into easy groups, the rather squat, nodulose forms, and slender, smooth but gracefully marked ones. Before mentioning these, however, the rare Northern Territory Volute, *Volutoconus bednalli* (Fig. 5), deserves comment, as it occurs only in that region and on account of its rarity is possessed by few amateur collectors. Its rich dark brown and peculiar marking, contrasting so vividly with the creamish yellow body colour of the shell, makes it immediately recognizable. Its shape also is rather different from that adopted by other species of the family. As much as five pounds has been paid for one of these shells. Two nodulose forms are figured in this article: *Cymbiola flavicans*, a very solid shell, about three inches long, from the Northern Territory, and *Cymbiola nivosa* (Fig. 12), from Western Australia. The latter species has a Northern Territory form, *Cymbiola sophiae*, very similar to it, but distinguished by two rows of small violet-brown spots encircling the body whorl. Another Western Australian Volute, *Cymbiola*

*irvinae* (Fig. 8), is larger than *nivosa*, and has two brownish bands on its pink body whorl. There are several variations of *Cymbiola rutila* (Fig. 19), a small, pinkish, South Pacific Volute, but only the typical rather smooth Queensland form is figured here. Other Volutes of this type are *Cymbiola pulchra* (Fig. 21) from Queensland, a rare Victorian shell, *Cymbiola exoptanda* (Fig. 17), and a small prettily marked South Australian and West Australian species, *Nannamoria guntheri* (Fig. 15).

Among the slender forms of the family Volutidae, there are many closely related ones, but even these have characters sufficient to distinguish them. The best known ones only are figured in this article, and these are a small eastern Australian species, *Zebramoria zebra*, a very common New South Wales Volute with a range extending into South Australia, *Amorena undulata* (Fig. 7); a Northern Territory shell, *Amoria gatliffi* (Fig. 1), somewhat resembling, but less elaborately marked than the West Australian species, *Amoria damoni* (Fig. 11); another boldly marked one from the latter locality, *Amoria turneri* (Fig. 3), and two Queensland Volutes, *Amoria caroli* and *Cymbiola thatcheri*. The



The two small shells in the upper left-hand corner are *Sydaphera lactea* and *Sydaphera undulata*; below these are *Harpa minor* and *Harpa gracilis*, and the large shell on the right is a *Volute*, *Ericusa fulgetrum* var. *dictua*.

species *Amoria volva* (Fig. 16) shows considerable variation, and the specimen figured is the more uniformly coloured typical West Australian one, although the Queensland and South Pacific specimens have yellowish-brown longitudinal lines on them, bringing the species very close to *Amoria turneri*. Another species from Queensland, *Amoria perplicata* (Fig. 10), is also figured.

A small group of shells belonging to the family Volutidae, but unlike them in appearance, is represented in this article by *Lyria pattersonia*, from New South Wales, north Australia and the South Pacific islands, and a southern Australian species, *Lyria mitraeformis*. These shells are beautifully sculptured and often elaborately coloured, and though only about one to two inches long, are very handsome.

#### HARP SHELLS.

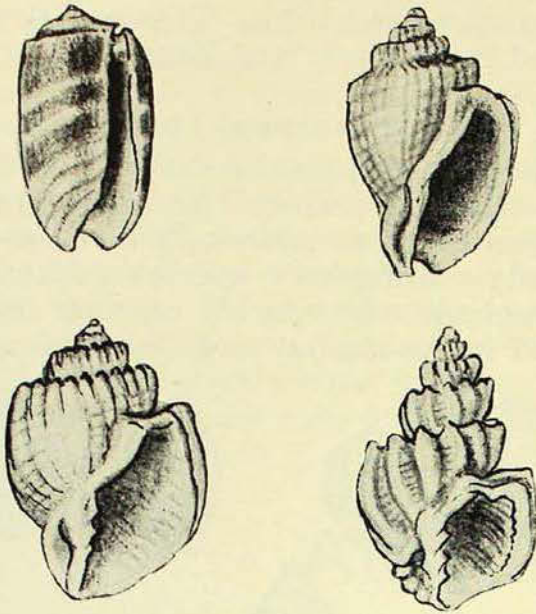
Possibly no other shells combine such symmetry of lines and curves and richness of colouring as the Harp shells. They form a small group of tropical shells inhabiting the Indo-Pacific, and a few species are figured here, because, although rarely recorded from Australia, most

collectors possess one of them at least, and the purpose of these articles is to assist the amateur as much as possible in the identification of his material, chiefly Australian, but, where possible, South Pacific as well.

The animal rivals the shell in its beautiful colours. It is much larger than the shell, so that even when the body has retired into it as far as it can go, the head and tentacles and a crescent-shaped foot protrude. It is said that natives of Mauritius hunt certain species of Harps with net rakes on the sands, and that when crawling rapidly to safety if hard-pressed, the animal can drop off part of the protruding foot. The common Harp, which varies from about two to four inches, seems to be very variable, and has been divided into numerous species, all with little claim to rank as distinct species, as when series are examined the characters are not constant, and so a typical one, *Harpa ventricosa* (Fig. 9), is figured. The elaborately ridged *Harpa costata*, and the small, very graceful *Harpa gracilis* from the South Pacific islands, require no description, as they can be recognized without difficulty; so also can *Harpa minor*, which is about two inches long and is like a larger, coarse *gracilis*. A very delicate representative of the Harps, *Palamharpa exquisita*, a shell about one inch long and covered with a fine epidermis, has in recent years been found in deep water in Twofold Bay, New South Wales, and a figure of it is given. The Harps comprise the family Harpidae.

#### OLIVE SHELLS.

The Olives are essentially a tropical family of shells, most beautifully marked and coloured, and rivalling the cowries in the brilliance of their polish. They are found chiefly in Central America and the Indo-Pacific. Some beautiful specimens are found on the Great Barrier Reef of Australia. The Olives are active animals, living normally on sandy flats, where they burrow under the surface as the tide retreats. The shell has an under-layer with a different colour pattern, but



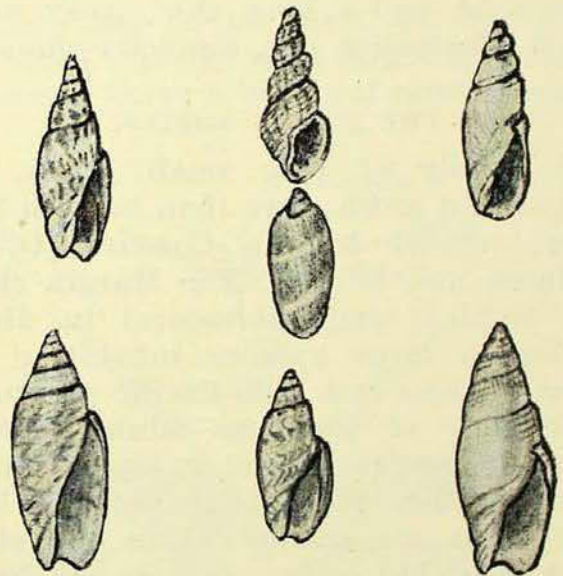
An Olive shell, *Oliva carneola*, is figured on the upper left, and a Harp, *Palamharpa exquisita*, on the right. In the lower row are Cross-barred shells, *Nevia spirata*, and *Trigonaphera costifera*.

this is exposed only in worn specimens or if the outer surface has been removed by artificial means. The best known species is the Red-mouthed Olive, *Oliva erythrostoma* (Fig. 4), which is collected frequently on the Great Barrier Reef and throughout the South Pacific. It is between three and four inches long, and, although its outer colouring varies considerably, the deep orange aperture is constant. To illustrate this variation, a chocolate coloured form (Fig. 2) is also figured. This must not be confused with *Oliva maura* (Fig. 20), a smaller chocolate or almost black species with a white interior, which has a range through the Indo-Pacific and Austro-Pacific. Other Olives figured are the small orange-yellow *Oliva carneola*, common in the South Pacific, where it is frequently used for ornamental purposes by native races; *Oliva variegata* (Fig. 14), also a common shell, with a fine greenish-yellow network pattern on the whorls and an orange-red inner lower lip; and *Oliva guttata* (Fig. 13), a cream coloured species with numerous lilac or blue spots shading to chestnut and an orange-red interior. The last two species are about

the same size, that is, between one and a half and two and a quarter inches. *Oliva episcopalis*, from the Indo-Pacific, is like *guttata*, but is constantly distinguished by a violet interior (Fig. 6). The Olives provide a wonderful example of the artistic blending of colours in Nature.

RICE SHELLS.

Both the Olives and the Rice shells, which are really very small Olives, belong to the family Olividae. The Rice shells are gracefully tapering, less than half an inch long, and normally affect sandy localities, burying themselves below the surface, but if thrown into the water are able to move rapidly by means of a swimming action. They are found in warm seas. The small shiny white ones are used in fancy-work. Only a few are figured here, *Belloлива*



Rice and Margin shells. In the upper row are *Belloлива triticea*, *Pepta stricta*, and *Cupidoliva nympha*, and below are *Belloлива leucozona*, *Belloлива exquisita*, and *Baryspira edithae*. The small Margin shell between the two rows is *Marginella mustelina*.

*leucozona*, *Belloлива exquisita*, and *Belloлива triticea*, all from New South Wales, and *Cupidoliva nympha*, the range of which extends to Queensland and West Australia.

There is another small group of shells belonging to the family Olividae, which resembles its members in habits, dwell-

ing among smooth sand, in which they burrow frequently. The animal is large, and when moving about with a quick, sliding motion the shell is practically enveloped in the large expansions of the foot. They are tropical animals with an Indo-Pacific range, and a few species, some of which are figured in this article, are found in Australia. The common Australian one, and the largest, is *Ancillista velesiana*, from New South Wales and Queensland, a thin white to cinnamon-yellow shell about two and a half inches long, with a conspicuous revolving brown band. There are several species like small forms of this found in southern Australia, notably *Baryspira oblonga*, *Baryspira fusiformis*, and *Baryspira marginata*. There are also a small brown southern Australian species, *Baryspira edithae*, which is only about half an inch long, and a long, thin, ivory white north Australian one, *Sandella elongata*.

#### THE MARGIN SHELLS.

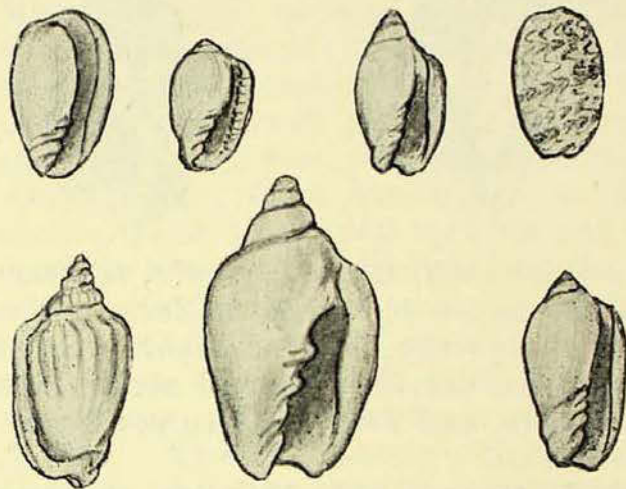
A family of very small shells, the largest not much more than half an inch long, related to the Cowries, Olives, Volutes, and Mitres. The Margin shells are tropical and subtropical in distribution, a large number inhabiting the West African and Indo-Pacific provinces. A number of small to minute species occur in Australia, and it is difficult to separate them without the aid of a lens. The shells are creamy white and shiny as a rule, but a few species are honey coloured, or have honey-coloured bands. They belong to the family Marginellidae.

The species figured are a representative lot, and include *Marginella muscaria*, the most solid species; *Marginella mustelina*, a honey-coloured one with darker bands; a small translucent form, *Marginella translucida*; *Marginella turbinata*, a very distinctive species; *Marginella ovulum*, and *Marginella stilla*—all from New South Wales and other southern States. A Tasmanian species, *Marginella formicula*, is like a small *muscaria*, but has pronounced ribbing on the whorls, and a Western Australian species, *Marginella fulgurata*, is flat-

topped with very beautiful honey-coloured waved lines. This has also been found in Victoria and Tasmania.

#### CROSS-BARRED SHELLS.

These are spiral shells of the family Cancellariidae, which live in tropical and temperate seas. Although there are over seventy different species distributed throughout the world, only a few are found in Australia, and these are mainly



*Margin shells.* In the top row, from left to right, are *Marginella ovulum*, *Marginella stilla*, *Marginella translucida*, *Marginella fulgurata*; in the bottom row, *Marginella formicula*, *Marginella muscaria*, and *Marginella turbinata*.

restricted to the southern States. The animals are vegetable feeders. The Cross-barred shells are represented in this article by the commonest Australian species, *Sydaphera undulata*, a heavily ridged shell about one and a half to two inches long, which occurs in Victoria, Tasmania, and New South Wales. A smaller form with fewer ribs also occurs in New South Wales, and has been called *Sydaphera renovata*, and a more granose species, *Sydaphera granosa*, is found in South Australia, but commonly in Tasmania. Two other southern species—*Sydaphera lactea*, a thin, faintly sculptured, creamy shell, and *Nevia spirata*, a more solid species—are found in Tasmania, South Australia, and Victoria. They are both a little over an inch long, and may be recognized easily, the former by its uniform cream colour and almost

lack of colour, and the latter by deeply excavated sutures and orange-red spots encircling the angles of the whorls. The only northern Australian species figured is *Trigonaphera costifera*, which goes round to West Australia, and a small variety comes into New South Wales and is distinct enough to be known as *Trigonaphera vinnulum*; its widely spaced heavy ribbing makes it immediately recognizable. There are several other Cross-barred shells relatively close to these, but as they are extremely rare and not likely

to be found by amateurs, and are mostly represented in museum collections by single specimens only, they are not mentioned in this account.

Finally, there is a very minute shell, *Pepta stricta*, about three millimetres long, having the appearance of a narrow, much elongated, sculptured Cross-barred shell which is placed in the same family as these. It has been found in deep water on the continental shelf of New South Wales, and is included as a representative of the genus, though it is rare.

## Australian Insects

By KEITH C. McKEOWN

### I.—INTRODUCTION

ENTOMOLOGY, the study of insects, was for very long the Cinderella of the natural sciences. Botany, on the other hand, was not only recognized as a proper study for man, but was sanctioned in a staid and straightlaced age as a suitable pursuit for the leisure hours of young ladies. To take an interest in insects was not merely childish and futile, but might even be construed as evidence of mental deficiency: indeed, it is on record that an attempt was made to set aside Lady Glanville's will on the ground of lunacy, in proof of which it was considered only necessary to indicate her fondness for collecting insects! It was necessary for the scientist Ray to appear as a witness to give evidence of her sanity!

It was only after long years of hard fighting by those devoted to the study that entomology was accorded recognition, and was advanced to its present important status. Yet indications of the ancient prejudice still remain, and the question is sometimes asked, "What is the use of studying insects?" Surely a surprising question in these enlightened days, when man is really realizing the magnitude of his unremitting struggle against the insects—a struggle which some scientists believe is one to decide

whether man or the insect will dominate the world. Today the entomologist saves the world many millions of pounds annu-

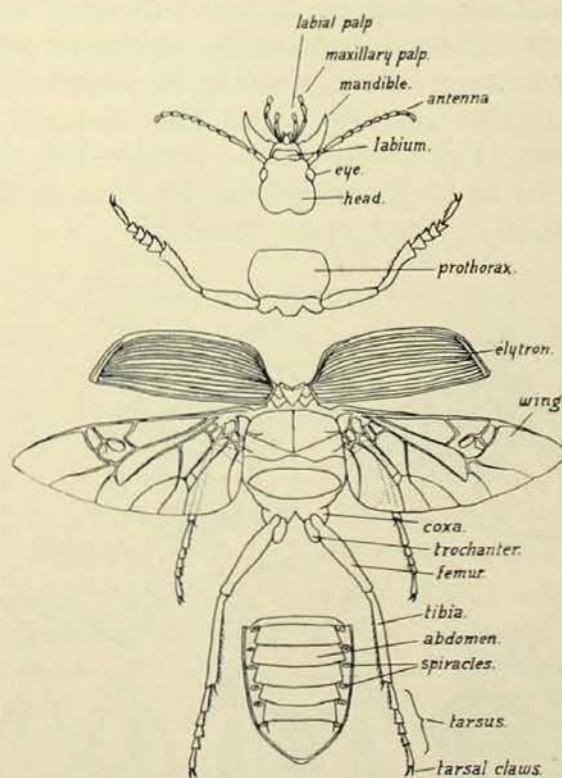


Diagram showing the different parts of a typical insect.

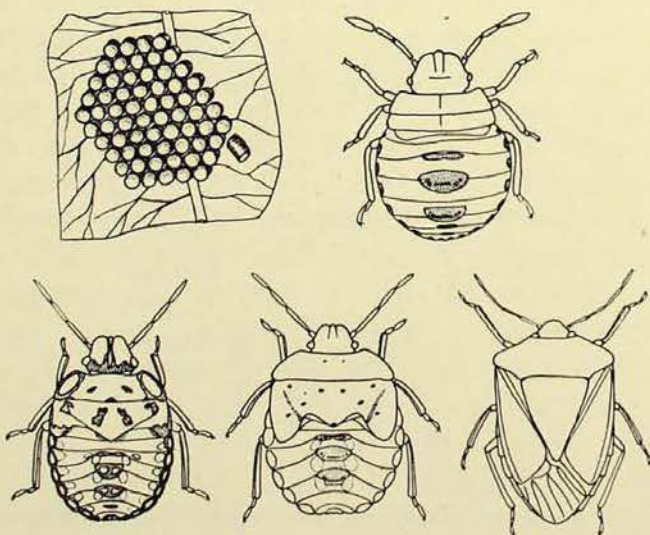
N. B. Adams, del.

ally by reducing the destruction caused by insects to man, his crops, live stock, stored foods, his clothing and habitations.

It needs but little reflection to realize the devastation which would be caused throughout the world were insects permitted to increase without hindrance. In this war against insect pests the entomologist employs every possible means at his command—chemical sprays, deadly gases, and even pits one insect against another in a struggle to the death. Hand in hand with the economic entomologist goes the systematic worker, for it is essential that an insect foe be correctly identified; the life histories of even closely related species differ so widely that the methods employed for the destruction of one may be quite useless against the other.

Something of the importance of insects may be gauged from the fact that the class constitutes some 70 per cent. of all the forms of animal life known in the world.

Most persons can recognize an insect when they see one, but many would find it difficult to provide an adequate definition. Indeed, numerous creatures with only remote affinities with the insects are popularly included in the term, as spiders, ticks, scorpions, centipedes, etc. It will be well, therefore, to answer the question, "What is an insect?"



*The life history of the Green Vegetable Bug (Nezara viridula). An insect with incomplete metamorphosis, showing eggs, nymphal forms and adult.*

After Tillyard.

An insect may be first defined as an Arthropod, but this distinction it shares with many other creatures. It possesses no internal skeleton, but its skin is reinforced with a substance called chitin, so that it is enclosed in a suit of strong but light armour. The muscles are attached to the inner surface of this encasing shell, and the organs are entirely enclosed. The body of an insect, however, is divided into three separate and distinct sections—the head, which bears the principal sense organs and the mechanism for feeding; the thorax, which bears the appendages necessary for locomotion, the legs and wings; and the abdomen, which contains the organs of digestion and reproduction. All insects have six legs—neither more nor less—although certain young forms, as caterpillars, may possess, in addition, certain fleshy claspers or pro-legs, which are discarded when the insect attains maturity. The spiders and their allies, which are not insects, have eight legs; the myriapods many more. The wings of insects, where present, consist of two pairs. In the Diptera, or flies, the wings are reduced to a single pair, but the rudiments of the second pair remain as halteres or balancers.

The mouth-parts of insects are wonderfully fashioned according to the food eaten, and the method of feeding. Those that bite and tear their food are equipped with stout jaws or mandibles, together with certain accessories, the palpi, the labium, etc., which contain the sensory pits and serve not only as organs of taste, but also as "fingers," to aid in tucking the food into the mouth. In those insects which feed upon fluids, the fundamental mouth-parts are present, but adapted to form a long pipe-like sucking mouth, as in the butterflies and moths, or a slender piercing organ such as we find in the mosquito and bug.

During their development to maturity insects pass through a number of distinct stages or forms. Some insects pass through what is known as complete metamorphosis, in others it is incomplete. In complete metamorphosis the life of the insect may be divided into four distinct

and well-marked periods or stages—egg; larva, caterpillar or maggot; pupa or chrysalis—a resting stage; and the adult or imago. Where the metamorphosis is incomplete the baby insect, on emerging from the egg, is in all essentials a miniature replica of its parent. Where the adult bears wings, small wing-pads make their appearance in the young, and increase in size with the growth of the insect. There is no resting or pupal state, the insect remaining active throughout its life. As the insect grows its skin is moulted or shed to permit of further expansion. With the casting of its last

retained within the body of the parent until after hatching. In certain flies—the Hippoboscidae—the young are retained longer, and do not enter the world until they have attained—or are about to attain—the pupal or chrysalis state.

The insect world has been divided by scientists into a number of groups or orders, all the individual members of which are linked together by the common possession of some character or characters. Each order is divided into families; each family into genera; and each genus into species. Some workers go further and subdivide the species into subspecies and varieties, but such subdivisions need not concern us here in this simplified scheme. Perhaps it will make things clearer to give an example. Thus we have the order Orthoptera, family Blattidae, genus *Periplaneta*, species *australasiae*, *Periplaneta australasiae* Fabr. being a common cockroach. The name of the worker who first described the insect, in this case Fabricius, is appended to the name in abbreviated form as a convenience to students.

The orders of insects now recognized are:

Class INSECTA.

Group I. APTERYGOTA.

Primitive wingless insects.

Order I. THYSANURA. Thrips. Order II. PROTURA.

Order III. COLLEMBOLA. Springtails.

Group II. PTERGOTA.

Winged insects.

Sup-group I. EXOPTERYGOTA.

Wings developed outside body. Three stages in life history: egg, nymph, and adult or imago.

Order IV. EPHEMEROPTERA. Mayflies.

Order V. ODONATA. Dragonflies.

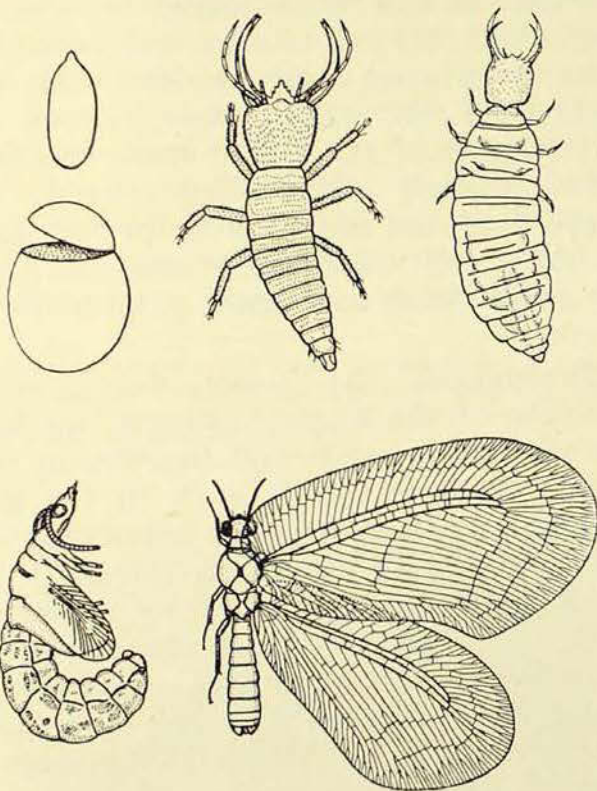
Order VI. ORTHOPTERA. Cockroaches, crickets, grasshoppers, mantids, and Stick-insects.

Order VII. ISOPTERA. Termites.

Order VIII. DERMAPTERA. Earwigs.

Order IX. PERLARIA. Stone-flies.

Order X. EMBIARIA. Web-spinners.



The life history of the Silky Lacewing (*Psychopsis elegans*). An example of complete metamorphosis, showing egg, early and late larval forms, pupa and adult.

After Tillyard.

nymphal skin the insect is mature, and capable of reproduction. No insect can grow once it has emerged from the pupa or has shed its final nymphal skin. In spite of popular belief, little flies do not—cannot—grow into big ones.

In the case of some insects the egg may not be apparent, the young being produced in a living state, the egg being

Order XI. ZORAPTERA (not represented in Australia).

Order XII. PSOCOPTERA. Psocids or Book-lice.

Order XIII. ANOPLURA. Biting and Sucking Lice.

Order XIV. THYSANOPTERA. Thrips.

Order XV. HEMIPTERA. Bugs, cicadas, and scale-insects.

#### Sub-group II. ENDOPTERYGOTA.

Wings developed in pockets, not becoming visible until the pockets turn inside out when the wings are well developed. Four stages in life history: egg, larva, pupa, and imago.

Order XVI. COLEOPTERA. Beetles.

Order XVII. STREPSIPSTRA.

Order XVIII. HYMENOPTERA. Sawflies, wasps, bees, and ants.

Order XIX. NEUROPTERA. Lacewings.

Order XX. MECOPTERA. Scorpion-flies.

Order XXI. DIPTERA. Two-winged flies.

Order XXII. SIPHONAPTERA. Fleas.

Order XXIII. TRICHOPTERA. Caddisflies.

Order XXIV. LEPIDOPTERA. Butterflies and moths.

In this series of articles on Australian insects it is proposed to deal with each of the orders in turn, giving an account of certain typical species, together with their life histories and habits, in the hope that such notes will prove of interest and

value to amateur collectors and others who find pleasure in the ways of our insects, and who desire a more or less systematic account of the different groups.

Insects are to be found in all sorts of places, on trees and shrubs, in mosses, boring in timber, sipping nectar from flowers, under carrion, living in the bodies of other insects or of the higher animals. They fly in the air, traverse the dry land, and swim in the water. Many of them have special adaptations to fit them for their particular mode of life. It is this diversity of taste and habit that has enabled the insects to exploit so successfully every avenue of life, and permitted them to advance their hordes to the four corners of the earth, and even on the icy margins of the Polar areas one finds them securely established, though the melting of the snows may permit them to enjoy but an hour or two of active life before they are again gripped in icy bonds.

Throughout the insect world, as in the case of the higher animals, one finds the various forms bound together by that great "Web of Life," each in the most intimate relation with its fellows, so that the breaking of even one thread of the mesh may upset the intricate balance of nature, and produce most unexpected and disastrous consequences — consequences which have so often followed upon man's interference with the little understood laws of nature.



# The Extinct Birds of Lord Howe Island

By K. A. HINDWOOD

**L**ORD HOWE ISLAND, which lies 300 miles east of Port Macquarie and some 450 miles north-east of Sydney, has, since its discovery in 1788, been a place of great interest to naturalists. In recent years it has become a well-known holiday resort. Long isolation from other land masses has caused considerable divergence in the land-birds, and there are several species peculiar to the island. Eight of the fourteen species of indigenous land-birds\* have become extinct within historical times. All of these birds had relatives in other parts, particularly in the islands of the western Pacific and in eastern Australia; never-

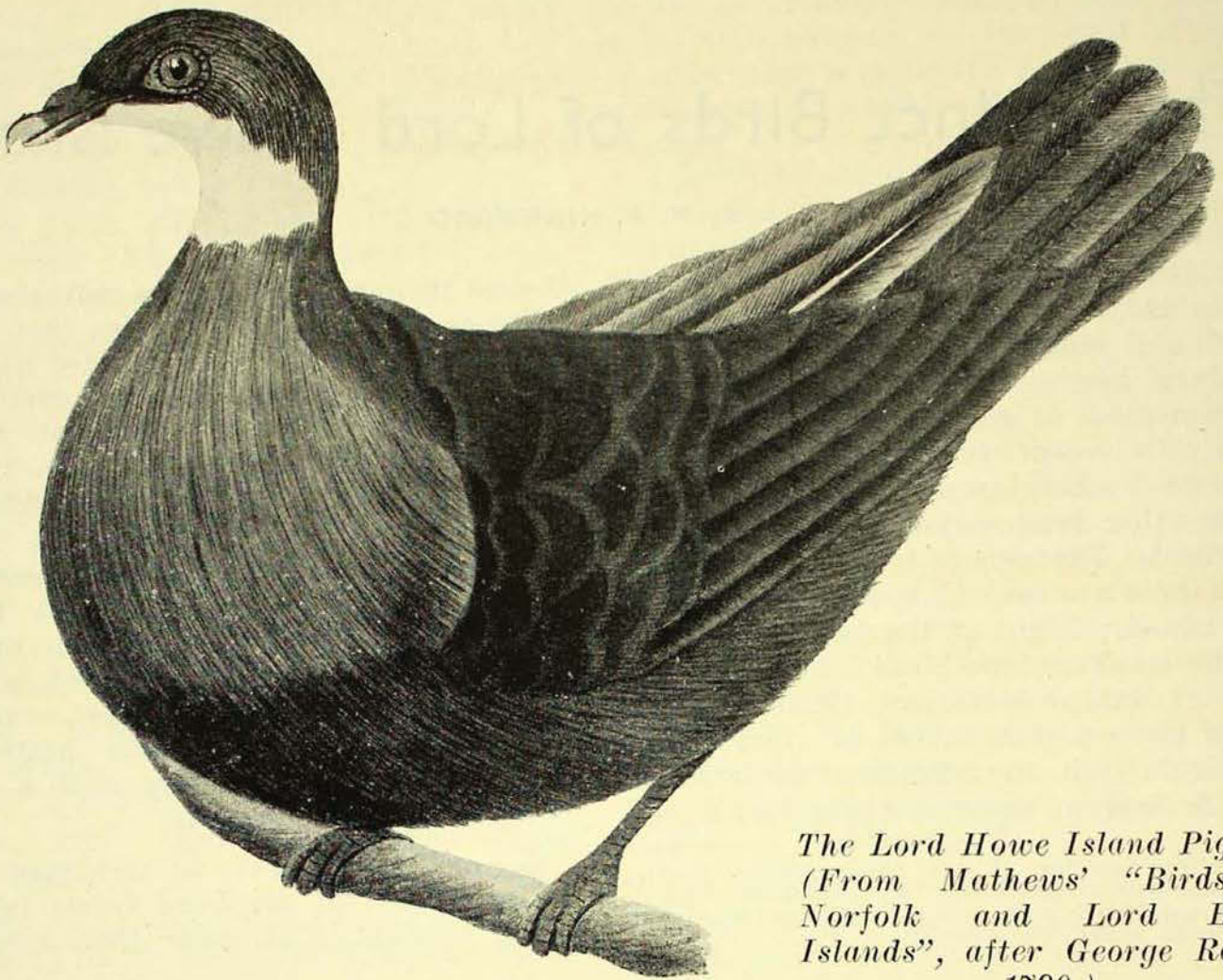
theless their passing clearly indicates the effect of civilization on species that have existed in the seclusion of isolated islands for long periods of time without abnormal interference. The extinction of these birds is a tragedy that has also taken place in other parts of the world—Mauritius, Bourbon, Madagascar, Tristan da Cunha, and many other islands, once fascinating places from a bird-lover's viewpoint, where often extraordinarily interesting birds lived, which now have little to show of past ornithological wonders except the scattered records of early voyagers and a few mounted skins in museums.

\* Fifteen species, if the Green-winged Pigeon (*Chalcophaps chrysochlora*) is considered indigenous to the island, though it is generally believed to have been introduced by man.

No one reason can be advanced for the extinction of the Lord Howe Island birds, though it is clear that man is



The earliest known original drawing of the White Swamp-Hen, painted by Surgeon Arthur Bowes, R.N., in 1758. (By courtesy of the Trustees of the Mitchell Library, Sydney.)



*The Lord Howe Island Pigeon.  
(From Mathews' "Birds of  
Norfolk and Lord Howe  
Islands", after George Raper,  
1790.)*

responsible, indirectly in some cases, for the destruction. The slaughter of birds seems to have been very great during the early years following the discovery of the island. The prospect of a gastronomical orgy and indulgence in a rare sport—knocking birds over with sticks—must have influenced the masters of many vessels to call at the island. Captain Marshall, of the *Scarborough*, which ship was there in May, 1788, records that\* enough birds were taken to serve the entire crew for three days. Three other ships were there at the same time; and it can well be imagined that large numbers of birds were killed. Surgeon Arthur Bowes, of the *Lady Penrhyn*, one of the transports of the First Fleet returning to England, gives a vivid account of the bird life of the island. Bowes went ashore on the morning of

May 16, 1788, three months after the discovery of the island, and remained overnight. He thus describes his experiences:

This forenoon I went ashore wt. Capt. Sever & Mr. Watts in the Pinnace . . . We landed in Hunter's Bay [now Old Settlement Beach] & saw great numbers of Boobies [Masked Gannets] Pidgeons and many other birds. The Capt. & Mr. Watts return'd to dinner, but as Mr. Anstis was coming on shore after dinner, I continued there hunting Birds, &ca. in the woods. Mr. Anstis & the Stewards wt. several of the Ship's Company came in the Afternoon & stay'd on shore all night. The sport we had in knock'g down Birds, &ca. was great indeed tho' at the Expencc of tearing most of the Cloaths off our backs. We made a fire under the trees & supp'd upon part of our game, broil'd wh. was very sweet & good, the Pidgeons were the largest I ever saw, we afterwards slept in thick great coats carried on shore for that purpose, cover'd over wt. the leaves of the Cabbage tree, which are here innumerable, & many of them so small & tender that you may cut them down with a pocket knife. When

\* *The Voyage of Governor Phillip to Botany Bay*, 4to, London, 1789.



*Lord Howe Island Parrakeet. (From British Museum (N.H.) Catalogue of Birds.)*

I was in the woods amongst the Birds I cd. not help picturing to myself the Golden Age as described by Ovid—to see the Fowls or Coots some white, some blue & white, others all blue wt. large red bills and a patch of red on the top of their heads, & the Boobies in thousands, together wt. a curious brown Bird abt. the size of the Land Reel [Rail] in England walking totally fearless & unconcern'd in all part round us, so that we had nothing more to do than to stand still a minute or two & knock down as many as we pleas'd wt. a short stick—if you throw'd at them & miss'd them, or even hit them without killing them, they never made the least attempt to fly away & indeed wd. only run a few yards from you & be as quiet & unconcern'd as if nothing had happen'd. The Pidgeons also were as tame as those already described & wd. sit upon the branches of the trees till you might go & take them off with yr. hands or if the branch was

so high on wh. they sat, they wd. at all times sit till you might knock them down with a short stick, many hundreds of all the sorts mention'd above, together wt. Parrots & Parroquets, Magpies & other Birds were caught and carried on board our Ship & the Charlotte.\*

The early extinction of two species, the White Swamp-hen and the pigeon, is attributable in part to the extreme tameness and curiosity of the birds themselves. Knowing no enemies other than their own kind, for no predatory animals existed on the island, they fell before the sticks and stones of thoughtless sailors, and, later, the nooses and guns of the settlers. A third species, the parrakeet, existed until about 1870, by which time it had been exterminated because of the damage it did to the crops of the settlers.

The first settlers, two men, three Maori women and two boys, arrived on the island in 1834, and seem to have existed largely on fish and birds, which were caught in great abundance. In the 40's and 50's of last century the island was much used as a base by whaling ships; as many as fifty or sixty vessels called there

each year for wood, water, and food; it need hardly be stated that the latter item would include whatever birds were obtainable.

About 1850 a number of cats were liberated from one of the whaling ships. They soon became numerous and found easy prey in the pigeons, parrakeets and woodhens. The pigeons and parrakeets have gone, though the woodhens still frequent the highlands. Cats have not been seen on the island for many years, though they may exist in the more secluded parts; the many fox terriers now used for rat catch-

\* A Journal of a Voyage from Portsmouth to New South Wales and China in the *Lady Penrhyn* by Arthur Bowes, Surgeon, 1787-1788-1789. *MS Mitchell Library, Sydney.*

ing would keep them from the lowlands. The dogs of the early settlers were said to have been large, fierce-looking mongrels used for hunting pigs, though doubtless inclined to chase flightless birds when not under the control of their masters. Goats and pigs, presumably introduced by whalers, formerly roamed the island. The goats are now confined to the hilly parts at either end of the island and the pigs to Mount Gower and Mount Lidgbird. Small cause for wonder then, with rats, cats, men, mice, dogs and pigs that to-day there is so little bird life, apart from seabirds, on the island.

Until 1918 only three Lord Howe Island birds were known to have become extinct—the White Swamp-hen, the pigeon, and the parrakeet. Then within a few years five more species ceased to exist.

But two years ago [1919] the forest of Lord Howe Island was joyous with the notes of myriads of birds, large and small and of many kinds. . . . They were unmolested save by each other, the residents of the island rarely disturbing their harmony. To-day, however, the ravages of rats, the worst enemy of mankind, which have been accidentally introduced, have made the note of a bird rare, and the sight of one, save the strong-billed Magpie and the Kingfisher (*Halcyon*), even rarer. Within two years this paradise of birds has become a wilderness, and the quiet of death reigns where all was melody. One cannot see how the happy conditions are to be restored. The very few birds remaining are unable to breed, being either destroyed upon their nests or driven from them by the rats, and their eggs eaten. One can scarcely imagine a greater calamity in the bird world than this tragedy which has overtaken the avifauna of Lord Howe Island.

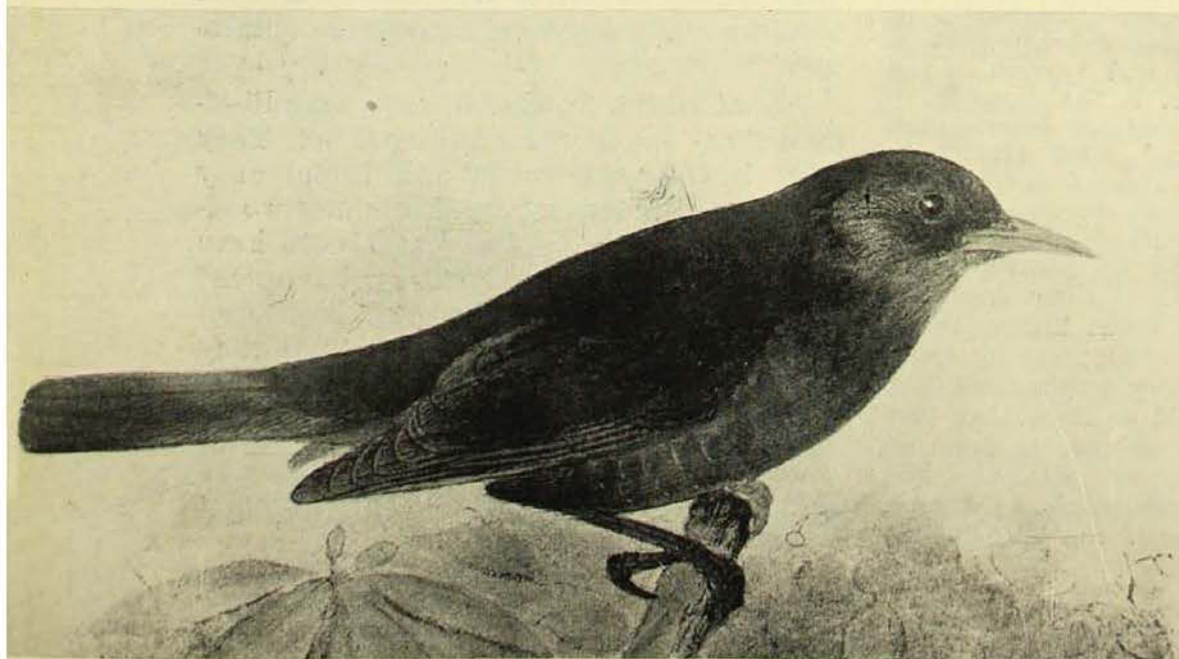
So wrote Allan R. McCulloch,\* whose remains lie buried on the island he loved and knew so well.

The endemic birds, whose extinction was caused by the rats (*Rattus rattus*) are five forest-frequenting species: the Fantail, Robust Silver-eye, Ouzel or "Doctor-Bird", Starling or "Cudgir-maruk", and the Flyeater. The destruction by the rats seems to have been very great soon after they arrived on the island, nevertheless several of the now extinct species existed in gradually decreasing numbers until 1930 or later. Certain introduced birds such as the Californian Quail and the Land Rail have also been exterminated by the rats.

The appearance of rats on Lord Howe Island is generally attributed to the grounding of the *Makambo* on the western end of Ned's Beach on the evening of 14 June, 1918. The rats on the ship had time enough to scurry ashore, for nine days passed before the *Makambo* was refloated. When it is considered that several ships were wrecked on the reefs lying immediately off the main island years before the *Makambo* was beached, there arises the possibility of rats having reached the island before 1918; if they were present they passed unnoticed and had no effect on the bird population.

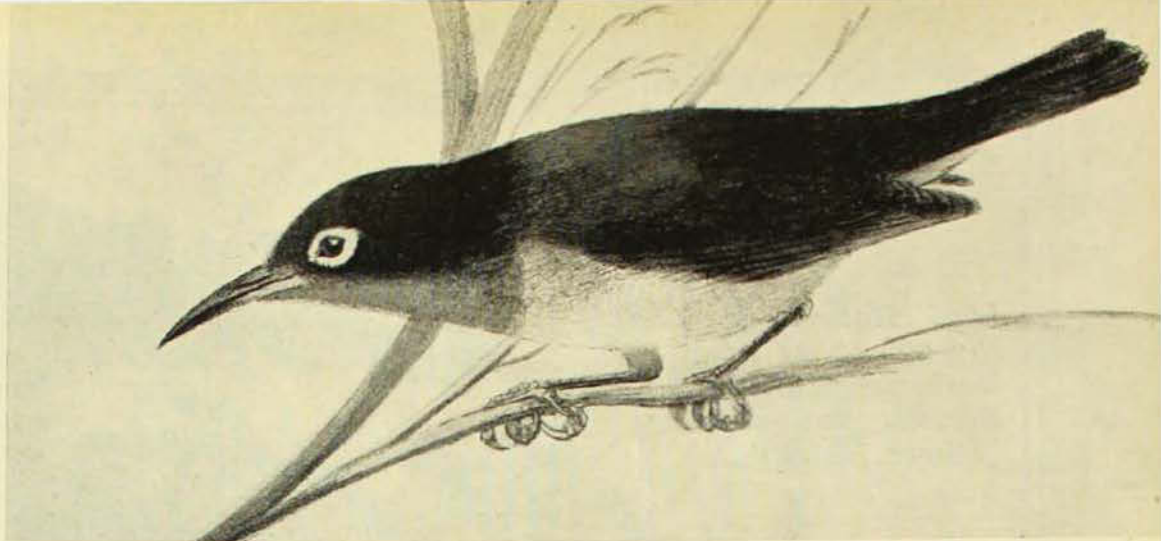
In an effort to check the increase of the rats almost one hundred owls of several kinds were sent to the island

\* THE AUSTRALIAN MUSEUM MAGAZINE, Vol. I, No. 2, August, 1921, p. 43.



Vinous-tinted Ouzel,  
or "Doctor Bird".  
(From Mathews'  
"Birds of Norfolk  
and Lord Howe  
Islands".)

Robust Silver-Eye.  
(From Mathews'  
"Birds of Norfolk  
and Lord Howe  
Islands".)



between 1922 and 1930; also a bounty of a few pence a tail was paid by the Lord Howe Island Board of Control for all rats collected by the islanders. In this respect the following figures, indicating the number of rats on which bounty was paid, are of interest: 1927, 13,771; 1928, 21,214; 1929, 10,175; 1930, 17,803. These figures must represent but a small proportion of the total rat population, and it is not surprising that the smaller birds were so quickly decimated and several species eventually exterminated.

The following notes refer to the eight extinct birds of Lord Howe Island.

White Swamp-hen (*Porphyrio albus*): This is the most famous of the extinct Lord Howe Island birds. Only one skin is known, and it is in the Royal Museum at Vienna, by which institution it was purchased at the sale of the Leverian Museum in 1806. However, several original drawings are in existence, all made soon after the island was discovered. From these paintings we learn that the species when young was entirely black, from that to bluish-grey and from that to an entire white.\* Some of the adult birds were tinged with blue, especially on the wings. Apparently the White Swamp-hen was fairly numerous and probably flightless, for Thomas Gilbert, commander of the *Charlotte*, mentions that he caught six of them by running them down among the low bushes†; this was in May, 1788. They appear to have been exterminated

soon after the island was first settled. The White Swamp-hen was closely related to the Purple Gallinule or Bald Coot (*Porphyrio melanotus*) of eastern Australia, and, in fact, was a fixed albinistic form of this species.

Lord Howe Island Pigeon *Janthoenas godmanae*: This bird was larger than a domestic pigeon, its head and breast were of a purple-mauve tint, its throat was white and the mantle or back of the neck green, the rest of the body being brown. The Lord Howe Island Pigeon was once so numerous and tame that, with the aid of a stick and string, the islanders could snare twenty birds from a flock without the others taking alarm. Surgeon Bowes and others, in 1788, merely knocked them over with sticks. To-day there is not a skin in any museum in the world, and only two paintings are known, one dated 1790 and signed by George Raper, and the other, unsigned, in the Alexander Turnbull Library, Wellington, New Zealand. Several related species occur in New Caledonia, New Guinea, Timor, and other places. The species appears to have been exterminated about 1850.

Lord Howe Island Parrakeet (*Cyanoramphus novaezeelandiae subflavescens*). A solitary pair was seen flying through the forest in 1869\*. In size it was somewhat smaller than a Rosella Parrot, and was mostly bright green in colour, with patches of red on the forehead, sides of neck and rump, and blue on the wings. Birds very closely related to the Lord Howe Island Parrakeet still exist on Norfolk Island, New Caledonia, New Zealand, and some associated islands.

\* "Watling", Drawing No. 258, in the British Museum. "The History of the Collections contained in the Natural History Departments of the British Museum, Vol. ii, 1906, p. 149.

† *Voyage from New South Wales to Canton, in the Year 1788*, Thomas Gilbert, London, 1789, p. 10.

\* Edward S. Hill, Lord Howe Island, 1870.

Lord Howe Island Flyeater. (From Mathews' "Birds of Norfolk and Lord Howe Islands".)



Vinous-tinted Ouzel or Doctor Bird (*Turdus xanthopus vinitinctus*): The general colour of this bird, which was thick-set and some nine inches in length, was a dark reddish-brown. The Vinous-tinted Ouzel belonged to a large group of birds which includes the Mistle-thrush, Song-thrush and Blackbird of England. Its nearest relative is a form living in New Caledonia, and the genus is represented by species on most of the islands of the western Pacific.

The Lord Howe Island Starling (*Aplonis fuscus hullianus*): The genus to which this species belonged has a wide distribution throughout the islands of the western Pacific; its nearest relative is a sub-species existing on Norfolk Island. In size it was similar to the Ouzel and was blackish-brown in colour glossed with bottle-green, the underparts being olive-grey. Both this and the preceding species were common on the island until the advent of the rats.

Robust Silver-eye (*Nesozosterops strenua*): Until recently there existed on the island a big Silver-eye, about half as large again as the Grey-backed species at present living on Lord Howe. The smaller bird was also in danger of being exterminated, but a number of birds of the Australian race, and the Norfolk Island form as well, were introduced in 1924 and 1925, with the result that it appears to be increasing. Birds similar to the now extinct Robust Silver-eye occur on Nor-

folk Island (two species), and in the Solomons (one species).

Lord Howe Island Fantail (*Rhipidura flabellifera cervina*): This bird was an insular form of the well-known Grey Fantail of eastern Australia. It was exceedingly tame and would often enter dwellings and capture flies.

Lord Howe Island Flyeater (*Royigerygone insularis*): The Flyeater of Lord Howe Island was also called "Rain-bird", because it was very active after rain, and "Pop-goes-the-weasel", on account of the supposed resemblance of its song to that air. It was the smallest of the Lord Howe Island birds, and belonged to a group with a wide distribution in Australia, New Guinea, the Pacific Islands, and New Zealand.

Fortunately one of the most interesting birds of the island, the flightless Woodhen (*Tricholimnas sylvestris*), is still to be found on the slopes and summit of Mount Gower and Mount Lidgbird. Only by retiring to these uninhabited parts has the species saved itself from the fate of so many other Lord Howe Island birds.

Lord Howe Island, with an estimated area of 3,200 acres, was rich in land-birds, both in numbers and in species. While we may lament their passing, the countless thousands of mutton birds of several species, Sooty Terns, noddies, Tropic Birds and gannets that breed on the main island and the adjacent islets, remain to interest and attract naturalists to this most fascinating and delightful island.