PROCEEDINGS

OF THE

Royal Zoological Society

OF

NEW SOUTH WALES

for the year 1957-58

Price, 10/-

(Free to all Members and Associates.)

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ROYAL ZOOLOGICAL SOCIETY OF NEW SOUTH WALES

Established 1879.

REGISTERED UNDER THE COMPANIES ACT 1899 (1917)

Patron:

His Excellency Lieutenant-General Sir Eric Woodward, K.C.M.G., C.B., C.B.E., D.S.O.

Vice-Patrons:

The Right Honourable Sir John Greig Latham, G.C.M.G.
Sir Edward Hallstrom, K.B., F.R.Z.S.

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Honorary Editor: Gilbert Percy Whitley, F.R.Z.S.

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Hans Verboog
John David Waterhouse, A.A.I.I.

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Assistant Honorary Secretary: Miss J. M. Coleman

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Hon. Secretary: Mrs. O. Wills

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Chairman: K. A. Hindwood, F.R.Z.S.
Hon. Sec.: A. R. McGill, F.R.Z.S.

Entomology Section:

Chairman: L. C. Haines
Hon. Sec.: M. H. Gregg

Avicultural Section:

Chairman: Mrs. F. Blaxland
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Mammals & Reptiles Section:

Chairman: H. Verboog
Hon. Sec.: R. D. Mackay

ROYAL ZOOLOGICAL SOCIETY

OF

NEW SOUTH WALES

The Seventy-eighth Annual Meeting was held at Taronga Zoological Park, Mosman, on Saturday, 13th September, 1958, at 2.30 p.m. Many members and their friends were present. The President presented the

78th ANNUAL REPORT

MEMBERSHIP: At 1st July, 1958, the membership of the Society was 564, consisting of:

1 Endowment Member, 4 Associate Benefactors, 9 Honorary Members, 53 Life Members, 379 Ordinary Members, 19 Life Associate Members, 5 Honorary Associate Members, 78 Associate Members, and 16 Junior Members.

During the year the Society lost 11 members by resignation, 7 by death, and 19 in terms of Article 9 of the Constitution.

This year we increased our overall membership by 31 members, a very good sign which we hope will continue in the years to come.

COUNCIL: Twelve Council Meetings were held, with the average attendance of 11 Councillors. One new Councillor was elected during the year in terms of Article 26: Mr. Hans Verboog.

PATRON: His Excellency the Governor of New South Wales, Lieut.-General Sir E. W. Woodward, granted his patronage to the Society.

PUBLICATIONS; A Reclassification of the Order Odonata by Lieut.-Col. F. C. Fraser was published 27th November, 1957.

The PROCEEDINGS for 1956-57 was published in its new size 27th June, 1958.

The Ingram Trust donated £250 towards the cost of printing "Birds of Sydney", which should be available late in 1958. New membership forms were also printed.

DELEGATES: At the International Zoological Congress, London, the Society's representatives were—Dr. Garnet Halloran and Lieut.-Col. H. Burgh. Mr. Ellis Troughton attended the meetings of the Fauna Protection Panel, and his definition of a Primitive Area was readily accepted. Dr. A. Keast and Mr. Troughton were our delegates on the Kosciusko Committee.

Mr. R. D. Mackay was the Society's representative at the A.N.Z.A.A.S. Conference in Adelaide.

CHIEF GUARDIAN OF FAUNA: The death in January, 1958, of Mr. F. J. Griffiths, who was the Foundation Chief Guardian of Fauna, was a great loss to the Society.

The Marine Section was responsible for a Shell Display in the Sydney Town Hall 9th to 12th October, 1957, and a Budgerigar Show was held at Birrell Street, Bondi, 16th November.

A Social Evening was held Friday, 20th September, at the home of Mrs. Harford.

The Society's thanks go to Mrs. G. A. Johnson for her generous donation. Captain D. Comtesse bequeathed a collection of shells.

MOVE: Due to lack of finances, we were forced to give up our lecture room in 28 Martin Place. New arrangements were made, so that all lectures and meetings are now held in Anzac House, College Street, in the "Meeting Room". The Library is now housed at Taronga Zoological Park—by the kind arrangement of Sir Edward Hallstrom and Taronga Park Trust, but is not available to members at the moment. The Office is still situated at 28 Martin Place.

The President (Mr. E. J. Gadsden) delivered an address on the activities of the society.

The adoption of the Annual Report was moved by Mr. J. R. Kinghorn, seconded by Mr. G. P. Whitley, and carried.

The Treasurer's Report was read by Mr. G. A. Johnson, seconded by Mr. Hans Verboog, and adopted.

The Guest of Honour was Mr. Don Francois, from the University of Idaho, who addressed the assembly on the studies he was conducting on the ecology of freshwater crayfishes in the United States and Australia.

A hearty vote of thanks to Mr. Francois was proposed by Dr. Garnet Halloran, seconded by Mr. R. Mackay, and carried by acclamation.

The six retiring councillors were all re-elected.

Members and their friends then partook of afternoon tea.

OFFICERS FOR THE YEAR 1958-59.

Patron: His Excellency the Governor, Lieutenant-General Sir Eric Woodward.

Vice-Patrons: Sir John Latham, Sir Edward Hallstrom, and Mr. Aubrey Halloran.

President: Dr. Garnet Halloran.

Vice-Presidents: Messrs. E. J. Gadsden, G. A. Johnson, J. R. Kinghorn and E. H. Zeck.

Honorary Secretary: Mrs. L. Harford.

Honorary Treasurer: Mr. G. A. Johnson.

Honorary Solicitor: Mr. A. Halloran.

Honorary Editor: Mr. G. P. Whitley.

Honorary Auditor: Mr. M. S. Davies.

Assistant Honorary Secretary: Miss J. M. Coleman.

Assistant Honorary Treasurer: Mr. R. Murnin.

ROYAL ZOOLOGICAL SOCIETY OF NEW SOUTH WALES

REVENUE ACCOUNT FOR THE YEAR ENDED 30th JUNE, 1958

GENERAL ACCOUNT

	£ s. d.		£ s. d.	£ s. d.
To Office Rent	1113 0 0	By Subscriptions	921 12 9	
Stationery, Stamps and Duplicating	115 13 3	Rent—Subletting	768 15 0	
Telephone	23 16 8	Interest—Bank	10 19 5	
Electricity	18 9 7	Interest—Bonds	33 19 0	
Insurance	14 13 2	Government Grant	50 0 0	
Publication Expenses—General	612 6 6	Sundry Income	34 0 0	
Publication Expenses—Zoologist	64 15 4			1819 6 2
Sundry Expenses	93 8 6	Excess of Expenditure over Income for the year ended 30th June, 1958		236 16 10
	£2056 3 0			£2056 3 0

PUBLICATION ACCOUNT

	£ s. d.		£ s. d.
To "Odonata" Costs	704 0 0	By Sales—Handbooks	30 19 6
		Excess of Expenditure over Income for the year ended 30th June, 1958	673 0 6
	£704 0 0		£704 0 0

BUILDING FUND

	£ s. d.		£ s. d.
To Balance transferred to Building Fund	36 1 6	By Interest—Investments	34 14 9
		Interest—Bank	1 6 9
	£36 1 6		£36 1 6

ROYAL ZOOLOGICAL SOCIETY OF NEW SOUTH WALES

BALANCE SHEET AS AT 30th JUNE, 1958

LIABILITIES

		£ s. d.	£ s. d.
ACCUMULATED FUNDS:			
Balance as at 30th June, 1957		3177 9 5	
Less Deficiency for the year ended 30th June, 1958 (General Account)	236 16 10		
Publication Account	673 0 6		
		909 17 4	
			2267 12 1
"BIRDS OF SYDNEY" (Finance held pending completion)			198 12 8
BUILDING FUND:			
Balance as at 30th June, 1957		1016 3 5	
Add Interest received for year		36 1 6	
			1052 4 11
SUBSCRIPTIONS PAID IN ADVANCE			43 16 0
MARINE SECTION FUND			37 16 3
			£3600 1 11

ASSETS

		£ s. d.	£ s. d.
FURNITURE AND FITTINGS:			
Office, Lecture Room, Furniture and Equipment at Cost		494 7 11	
Library Books at Cost		503 4 6	
"Parrot" Paintings at Cost		500 0 0	
Projector at Cost		54 18 6	
			1552 10 11
Rent paid in advance, "Anzac House"			21 0 0
INVESTMENTS AT COST:			
Australian Commonwealth Inscribed Stock		810 0 0	
Australian Commonwealth Treasury Bonds		100 0 0	
			910 0 0
COMMONWEALTH SAVINGS BANK:			
Current Account		59 6 1	
Cash in Hand		5 0 0	
			64 6 1
BUILDING FUND INVESTMENTS:			
Australian Commonwealth Treasury Bonds		980 0 0	
Commonwealth Savings Bank		72 4 11	
			1052 4 11
			£3600 1 11

AUDITOR'S REPORT TO THE MEMBERS OF THE ROYAL ZOOLOGICAL SOCIETY OF NEW SOUTH WALES

I hereby report that I have audited the books and accounts of the Royal Zoological Society of New South Wales for the year ended 30th June, 1958, and have obtained all the information and explanations I have required, and, in my opinion, the above Balance Sheet exhibits a true and correct view of the state of the Society's affairs as at 30th June, 1958, according to the best of my information and the explanations given to me and as shown by the books of the Society.

I have examined the Register of Members and other records which the Society is required to keep by Law or by its Articles and am of the opinion that such records have been properly kept.

(Signed) M. S. DAVIES, F.C.A. (Aust.),
Hon. Auditor.

SYDNEY, 12th September, 1958.

OBITUARY NOTICES

It is with deep regret that we record the deaths of several of our naturalist members during the year.

The death of Mr. Francis James Griffiths on January 29, 1958, at the age of 58, was a great loss to the Society. Mr. Griffiths was the Foundation Chief Guardian of Fauna in New South Wales and an ardent conservationist.

Mr. Philip Crosbie Morrison, of Melbourne, the well-known author and broadcaster on nature topics, died on March 1, 1958. Tributes to this charming and cultured gentleman, who was one of our Life Associate Members, have appeared in *The Emu* 58:161 and the *Victorian Naturalist* 75, 1958: 21.

Mr. Robert Anthony Patten, who had been superintendent, veterinary surgeon and curator of Taronga Zoological Park, died in October 1958 at the age of 68. Born at Wellington, New South Wales, "Bob" Patten was one of the first graduates from the Faculty of Veterinary Science at the University of Sydney. He served in the First World War in the Australian Imperial Forces, attaining the rank of Major. He was most painstaking in his care of the animals at the Zoo; Mr. Patten and his wife reared the chimpanzee "Keefi" as a baby in their home for a year. He was also well known for his part in the "Nature Speaks" panel as a broadcaster in Sydney.

—G.P.W.

REPORTS OF SECTIONS

Marine Zoological Section

Once again we come to the end of another year of the Marine Zoological Section's activities. Increase in the number of sections of the Society resulted in meeting nights for the Marine Section being confined to the first Tuesday in every second month, instead of every month as before.

The first meeting of the New Year usually falls whilst most members are on vacation. It was therefore decided to cancel this meeting, which now leaves us with a total of five meetings for the year.

In June, 1957—the last of our June meetings—a number of transparencies were shown by Mr. McCamley of places recently visited for collecting—Fiji, Honolulu, America, etc.

The Lecture given by Mr. G. P. Whitley in July on "N.S.W. Game Fishes" was followed very closely, especially by male members, many of whom are very keen fishermen.

Owing to Mr. Mel Ward's sojourn in America, he was unable to prepare the lecture on "Australian Crabs" for September meeting, so rather than disappoint us he showed many transparencies of this trip to the U.S.A.

"Marine Worms" was the subject chosen by Miss Barbara Dew for her lecture, and it was surprising to find that worms could be so interesting. Live specimens were also on display.

Miss Elizabeth Pope's lecture on "Invertebrates in Man's Economy" left us with much to think about.

The Annual Meeting and Election of Officers of the Marine Zoological Section will, in future, be held in May.

During October, in conjunction with the Conchological Section and with the kind permission of the Royal Horticultural Society of N.S. Wales, we arranged a display of marine specimens and shells at the Sydney Town Hall. The collection of crabs caused much interest.

Average attendance at lectures was 25 Members and visitors, and we are hoping for much better results during the coming year.

Our sincere thanks go to lecturers who were kind enough to spare us their valuable time. Our knowledge is all the richer because of their efforts. Thanks also to Members and visitors for their co-operation during the year.

MRS. O. WILLS,
Hon. Secretary.

Conchological Section

In June, at the end of our year, we can look back with pleasure on some very enjoyable meeting nights and field days. During the year we had six study nights, subjects and lecturers being as under:

Cardiidae, Mrs. Woolacott; Cassididae, Mr. Laseron; Olividae, Conidae, and Mitridae, Miss Thornley.

Transparencies and shells collected abroad were shown by Mr. McCamley in July.

Mr. Knight on September 12th gave a very interesting lecture entitled "Shell Collecting at Bowen", and, as he had lived and collected in that area for a number of years, was able to tell us much of the shells and their habits.

November 14th Mr. McCamley filmed transparencies of "Museums & Museum pieces abroad," which included photos of many places and architecture of historic value.

The December night was a most successful one, as it brought together in re-union members old and new in a Christmas spirit of good fellowship.

As Mr. Kellner was interstate and unable to deliver his lecture for February, Mr. McCamley kindly substituted with colour transparencies of his "Trip to New Guinea".

"Collecting Land Shells in Papua & New Guinea" was the title chosen by Dr. McMichael for his lecture in April. Colour slides, maps of the areas, and specimens collected were displayed.

During the Waratah Festival in October, 1957, we had the opportunity, together with the Marine Section, of arranging a display of shells and marine specimens at the Sydney Town Hall. Members provided a large and good variety of shells, the large ones displayed on shelves erected near walls, and the smaller ones in 14 glass-topped cases on counters in front. Members were in attendance each day to give information to the public.

Field days at Simpson's Beach, Balmoral, Garrie Beach, Gunnamatta Bay (2), The Spit, and Long Reef were enjoyed by all who attended. By courtesy of the Maritime Services Board our Annual Picnic was held at Shark Island. Two week-end trips were made by Members to Shellharbour and Saratoga. Whilst at Saratoga we visited Mr. Thompson, of Avoca Beach, who kindly showed us his beautiful collection of shells, giving Members numerous specimens.

With deep regret we report the loss of two of our oldest and valued Members, Mrs. Lee Woolacott and Capt. Comtesse, who passed away during the year. They are sadly missed by all Members of the Section.

Average attendance during the year was 20 Members and Visitors.

Once again, our sincere thanks to all who were responsible for making our meetings so instructive and enjoyable. Also thanks to Members and visitors for their co-operation during the year.

MRS. O. WILLS,
Hon. Secretary.

Ornithological Section

Well-attended meetings during the past twelve months can be judged as indicative of the enthusiasm and support of the members. Keen field work has been evident, resulting in a number of unusual records; matters pertaining to conservation have been probed and reports forwarded to the proper authorities; and every effort has been made to secure good speakers for lectures and present on the screen the best efforts of our competent bird photographers. The average attendance at each meeting, at which members of the State Branch of the Royal Australasian Ornithologists' Union conducted their business in conjunction by invitation as in previous years, was 58.

A brief summary of meetings held is as follows:

1957.

July 18: "Life in the South Seas off the Beaten Track", by Mrs. McComish, F.R.G.S.

August 15: "Birds of the Rain-forests", by Ellis McNamara.

September 19: "Some Birds of Victoria", by Roy P. Cooper.

October 17: "Life of the Mallee Fowl", by H. J. Frith.

November 21: "Birds of south-western New South Wales", by S. G. Lane.

December 19: "Photographing Sydney Birds", by W. R. Moore.

1958.

January 16: "Rambles of an Ornithologist", by J. D. Waterhouse.

February 20: "Bird Photography", by Norman Chaffer.

March 20: "Sea-birds of Australia, New Zealand and Macquarie Island", by Dr. R. Carrick.

April 17: "Impressions of Bird Life in Europe", by J. D. Gibson.

May 15: Observation Night, and Bird-call Imitations by Mr. Grace.

June 19: Annual Meeting: Election of Officers.

The thanks of the members are extended to all the lecturers named for well-prepared addresses, at most of which many colour transparencies were screened.

Among the most important of unusual occurrences of birds within the County of Cumberland limits were a flock of nine Little Whimbrels *(Numenius minutus)* for a period of three months at Haberfield, one White-winged Black Tern *(Chlidonias leucoptera)* and a Gull-billed Tern *(Gelochelidon nilotica)* at Botany Bay, good numbers of Crested Grebe *(Podiceps cristatus)* at Prospect Reservoir, large flocks of migrating Cape Petrels *(Daption capense)* off Malabar, as many as ten Little Bitterns *(Ixobrychus minutus)* at once at Centennial Park, a Little Egret *(Egretta garzetta)* at Shell Point, an Avocet *(Recurvirostra novaehollandiae)* at Richmond, the Plumed Tree-duck *(Dendrocygna eytoni)* both at Richmond and Ryde, three Freckled Ducks *(Stictonetta naevosa)* in the Hawkesbury area, a Silver-grey Petrel *(Fulmarus glacialoides)* off Bald Hill, flocks of over 1,000 Swift Parrots *(Lathamus discolor)* and as many as thirty Yellow-tipped Pardalotes *(Pardalotus striatus)* in various suburban areas during winter. All the foregoing species had been recorded, but only occasionally, for the Sydney area—the occurrence of the Freckled Duck was the first known for over fifty years.

Visitors were welcomed at all meetings, some from country areas, some interstate, and a few from overseas. After a term of two years as Chairman, Mr. E. J. Gadsden relinquished that office in June, and Mr. K. A. Hindwood was elected to the position. All other officers were re-elected. Members formed a working-bee immediately following the annual election of officers at the June meeting to assist in packing furniture and the library for removal. We now look forward with enthusiasm to a successful year in the new modern lecture room which the Society has thoughtfully engaged at Anzac House.

ARNOLD R. McGILL,
Hon. Secretary.

OFFICERS OF THE ORNITHOLOGICAL SECTION FOR 1958-1959.

Chairman: K. A. Hindwood.

Vice-Chairman: Dr. J. A. Keast.

Secretary: A. R. McGill.

Assistant-Secretary: F. G. Johnston.

Committee: N. Chaffer, A. H. Chisholm, N. C. Fearnley, E. J. Gadsden, G. R. Gannon, W. R. Moore, J. A. Palmer, and J. D. Waterhouse.

Some Unusual Bird Observations in a Suburban Garden

By L. Courtney Haines.

The first, and most remarkable species to visit the garden, was a Satin Flycatcher, *Myiagea cyanoleuca* Vieillot, an inhabitant of the tall timbers and shady gullies; and seldom observed in areas devoid of forest. Therefore, it is with interest I place on record the freak occurrence of a male of this species in excellent plumage on the morning of October 18th, 1956, at Haberfield, an old established western suburb of Sydney, N.S.W. The bird was singing continually, as it hopped about and displayed its plumage among the branches of a White Cedar tree growing in my garden. It was its song, quite new to me, that first attracted my attention.

Another unusual observation, was the appearance of a Reed Warbler, *Acrocephalus australis* Gould, on the 10th October, 1957. The bird was first heard singing at 7 o'clock in the morning and stayed about the garden, keeping to the dense foliage of some Privet trees, which had been allowed to grow wild, until approximately 11 o'clock, when it moved on. As far as I know, the nearest reed-bed to Haberfield, is Wolli Creek, some four miles away. Another instance of a Reed Warbler visiting a garden has been mentioned in "The Emu," vol. 45, page 82.

The third record, is that of a Spangled Drongo, *Notochibia bracteata* Gould. This satiny bird, with its pecular fish-shaped tail, was first noticed moving quietly about in the Loquat tree, on 18th March, 1958. After watching it for awhile, the bird alighted on the ground, and picking up something in its bill, returned to the tree in a manner somewhat similar to that of a Black-Faced Cuckoo-shrike, *Coracina novaehollandiae* Gmelin. It repeated the same performance from an apple tree growing next door. A compost heap, in the vicinity, interested it very much and this rotting heap of vegetation and the surrounding area were continually inspected. Eventually, the bird flew off to a Camphor Laurel, where it chose to remain for the rest of the day. A perch was selected and from this observation post, passing insects were hawked.

The next remarkable observation was that of a Black-faced Flycatcher, *Monarcha melanopsis* Vieillot, on 17th February, 1959. This species is a lover of forest glades, but is said to frequent more open country, during late summer. An immature bird and quite tame, it allowed a close approach, as it fossicked about the Privet bushes and Buddleias, catching and eating plant-bugs. This most attractive species stayed in the garden for several hours, doing a service by catching numerous insect pests, and then apparently moved to other areas, as it was not to be seen the following day.

Finally, during the morning of March 3rd, 1959, a Rufous Fantail, *Rhipidura rufifrons* Latham, graced the garden with its agile presence. I first noticed this pretty little bird, with its lovely fan-like tail, flitting about the Kunzea bushes, hunting insects. It allowed one to approach within a few feet, appearing not to take the slightest notice. A little later in the morning, while I was watching it through the glass window of an old shed, built under the trees, it suddenly darted through the open door and snapped up an insect on the window pane and in doing so, actually brushed my head with its wings. The delicate little thing remained in the garden, feeding continually for most of the day, but during late afternoon it had apparently departed, as its sprightly movements among the bushes were not to be observed.

Although bird watching has interested me for many years, I have never before recorded the five species, mentioned here, in the Haberfield district.

A New Agamid Lizard from Queen Victoria Springs, Western Australia

By L. Glauert, F.R.Z.S.

During a recent visit to the Queen Victoria Springs area, Mr. W. H. Butler collected five specimens of *Diporiphora* which appear to be undescribed, differing considerably from *Diporiphora winneckei* which might be expected to occur in that area.

Family AGAMIDAE

Genus DIPORIPHORA Gray, 1842.

Diporiphora Gray, Zool. Miscell. 3, April 1842, p. 53. Haplotype, *D. bilineata* Gray from Port Essington, Northern Territory.

Diporophora Agassiz, Nomencl. Zool., 1846, Index Univ., and of authors.

DIPORIPHORA REGINAE, sp. nov.

The lizard is slender, the distance between the tip of the snout and the fore limb 1.1 to 1.4 in distance between the axilla and the groin; head slender, canthus rostralis sharp, covered with strongly keeled scales except on the canthus rostralis and over the eye where they are plate-like, largest between the eyes; nostril nearer to the eye than to the tip of the snout; tympanum small, oval, not half the size of the eye; a slight fold on the side of the neck; a distinct gular fold; dorsal scales strongly keeled, the keels forming regular slightly converging lines along the back; chin-shields smooth, gular scales and ventrals strongly keeled with a small spine; laterals smallest, ventrolaterals largest, ventrals smaller than the dorsals.

Limbs rather elongate, when adpressed they overlap, the fore limb reaches the nostril, the hind limb reaches to the eye; the hind foot about as long as the fore limb; the scales almost forming fringes to the digits. Tail long, twice and one half as long as the head and body. Scales strongly keeled, the keels forming lines along the appendage to the tip; no preanal or femoral pores.

In life the lizards have a very vivid coloration, the upper surface being dark olive brown, more greyish on the head with two bright yellow bands extending from the nape to the tail. The under surface is whitish, uniform or with a few faint longitudinal markings; the limbs above are coloured like the back, below they resemble the ventral surface of the body. On each side of the base of the tail there is a bright coral-red patch about an inch in length, it does not extend on to the body or limbs and is probably the nuptial dress of the male during the mating season. There is no trace of a light band between the axilla and the groin. The colours gradually fade in spirits to an almost uniform yellowish brown with faint indications of the dorsolateral bands. There is no trace of banding on the tail. The new species differs from the other *Diporiphora* spp. with a gular fold in its proportions and marked coloration.

MEASUREMENTS IN MM.

	Head and body	*Tail*	*Fore limb*	*Hind limb*	*Length*
R.12960	71	158	27	45.5	227
R.12961	57	140	22.5	45	197
R.12962	57.5	147	23	43	204.5
R.12963	56	143	23	43	199

Type material: R.12961 is designated the holotype and R.12962, R.12963 and R.12964 paratypes; R.12960 (another paratype) is badly preserved and swollen and R.12964 immature. All these are in the collection of the Western Australian Museum.

Locality: Karin Rock, 14 miles from Cunderlee Mission in the Queen Victoria Springs area, Western Australia.

More Ichthyological Snippets

By G. P. Whitley.

(Contribution from The Australian Museum)

Family ALOPIIDAE.

Genus ALOPIAS Rafinesque, 1810.

ALOPIAS VULPINUS (Bonaterre).

A male thresher shark, 12 ft. 4 in. long and weighing 315 lb., was caught by Mr. L. Downie off Bluefish Point, Manly, New South Wales, on 24th August, 1958.

It had the following characters:—

Dimensions in inches.

Length from snout to upper caudal pit	73″
Caudal pit to end of tail (incomplete)	75″+
Upper lobe of tail (incomplete)	72″+
Preoral length	5″
Nostrils	½″
Internarial	1½″
Level of nostrils to upper lip	1½″
Diameter of eye	1″
Orbit	1½″
First gill-slit	3″
Interorbital width	5″
Distance from eye to first gill-slit	12″
Length of pectoral fin	24½″
Greatest width of pectoral	13⅛″
Length of dorsal fin	13⅝″
Base of dorsal fin	11¼″
Length of ventral fin	10″
Greatest breadth of ventral fin	11″
Clasper	12″
Depth of caudal peduncle	7½″

No nictitating membrane. Spiracle minute. Teeth with central cusp slightly oblique, without marginal denticles. Lower caudal pit present. Anterior margin of first dorsal fin strongly convex. Rear tip of first dorsal fin terminates considerably anterior to origin of ventrals. No interdorsal ridge. Area of ventrals less than that of first dorsal. Anal fin entirely posterior to levels of second dorsal fin. Anterior margin of pectoral fin nearly straight.

Colour originally blue above, now grey; white and pink below with blotches at junction of the two colours. Pectorals dark greyish-blue above and below. Some green in slime on body.

Stomach Contents: Apart from the bait (forequarters of Bonito, *Sarda australis)* there was a fair-sized, digested mackerel in the stomach, probably *Auxis thynnoides.*

This specimen is about the sixth caught by game-fishermen in N.S.W., other Threshers having been taken by Zane Grey, Errol Bullen, Max Lawson and Mrs. R. Duncan.

Family ANTIGONIIDAE.

Genus ANTIGONIA Lowe, 1843.

ANTIGONIA RHOMBOIDEA McCulloch

Antigonia rhomboidea McCulloch, Biol. Res. Endeavour iii, 3, April 21, 1915, p. 111, pl. xviii, fig. 1. Victoria.

One small specimen trawled by M.V. "Challenge" north-east of Newcastle in 75 to 85 fathoms on 6 July 1959.

Australian Museum regd. No. IB.4400.

New record for New South Wales.

Colours from life, according to Dr. A. A. Racek, in lit., 5 Aug., 1959:— "On a grey-blue background there are orange to golden vertical bands (I think altogether 3). There is a large band just behind the operculum, a more narrow one in the middle, and a narrow one along the caudal peduncle. All fins light grey, no visible colour pattern. Eyes bright orange-red."

ANTIGONIA BENHALATATE (Bleeker)

Hypsinotus benhalatate Bleeker, Verh. Bat. Gen. xxv, 1853, Nalez. Ichth. Japan, p. 13. New name for *Hypsinotus* Temminck and Schlegel, genus caelebs, from Japan.

Hypsinotus rubescens Gunther, Cat. Fish. Brit. Mus. ii, 1860, p. 63. New name for *Hypsinotus* from Japan. New synonym.

Antigonia benhatatate (sic) Berry, Bull. Florida State Mus. Biol. Sci. iv, 7, 1959, p. 227.

This species should be called by Bleeker's name which is earlier than Gunther's.

Antigonia mulleri Klunzinger is the young of *Capromimus abbreviatus* (Hector).

Family APOGONIDAE

Genus APOGON Lacepede, 1802, s.l.

APOGON DARNLEYENSIS (Alleyne & Macleay).

(Figure 1.)

? Apogon melas Bleeker, Journ. Ind. Arch. ii, 1848, p. 635. Sumbawa, Indonesia.

Apogonichthys darnleyensis Alleyne & Macleay, Proc. Linn. Soc. N.S. Wales i, Feb. 1877, p. 268, pl. v, fig. 3. Darnley Island, Queensland. Holotype in Macleay Museum, University of Sydney. And of lists.

Amia melas Fowler, Proc. Acad. Nat. Sci. Philad. 1918, p. 17, fig. 8. Philippine Islands.

Apogon darnleyensis Whitley, Proc. Roy. Zool. Soc. N.S. Wales 1949-50 (1951), p. 64, fig. 9 (synon.).

Here illustrated from the holotype of *darnleyensis,* kindly made available by the Curator of the Macleay Museum. It has the following characters:

D. vii/1, 9; A. ii, 8; P .15. L. lat 25 to hypural. Tr. 1½/1/6. Predorsal scales 3. Eye, 7 mm.; postorbital, 9; interorbital, 5; standard length, 47.5.

Maxillary keeled, not reaching posterior orbital margin. Anterior preopercular edge entire; posterior serrate near angle. Villiform teeth on jaws, in a boomerang-shaped patch on vomer and apparently present on palatines. Fourth dorsal spine longest. Ventral fin reaching anal.

May be a synonym of *melas* Bleeker.

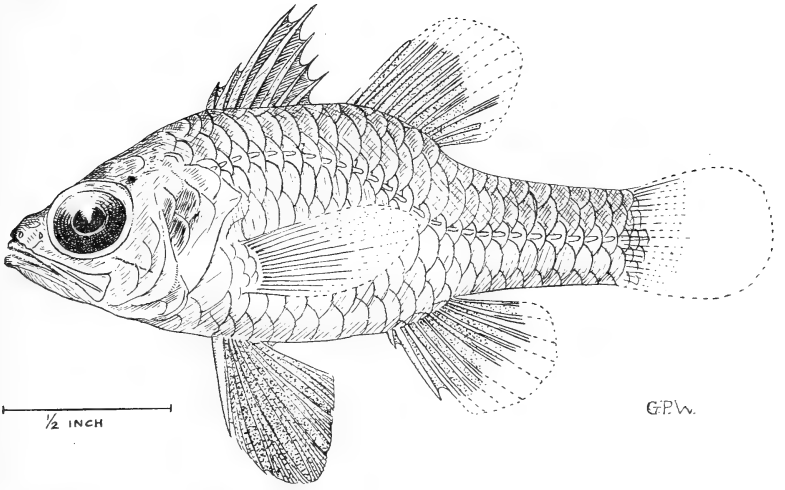

Figure 1.—Torres Strait Soldier Fish, *Apogon darnleyensis* (? = *melas*). Holotype. Queensland.

G. P. Whitley del.

APOGON NOUMEAE Whitley.

(Figure 2.)

Apogon noumeae Whitley, Proc. Roy. Zool. Soc. N. S. Wales 1956-57 (1958), p. 33, Noumea, New Caledonia. *Id.* Catala, France australe (Noumea) 19th Nov. 1958, figure. Type-loc. "Isoles" islets, Magenta Bay, New Caledonia.

Here figured from the holotype. A second (duplicate) example of this species has been presented by Dr. R. Catala to the Australian Museum (regd. No. IB.4142).

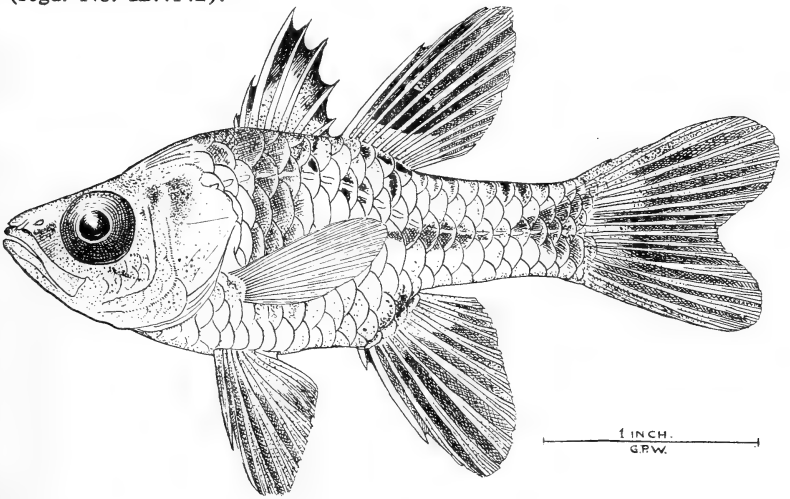

Figure 2.—Noumea Soldier Fish *Apogon noumeae*. Holotype. New Caledonia.

G. P. Whitley del.

Genus APOGONICHTHYS Bleeker, 1854.

APOGONICHTHYS AHIMSA Whitley.

(Figure 3.)

Apogonichthys ahimsa Whitley, Austr. Zool. xii, 1959, p. 314. Heron Island, Queensland.

Here figured from the holotype of the species.

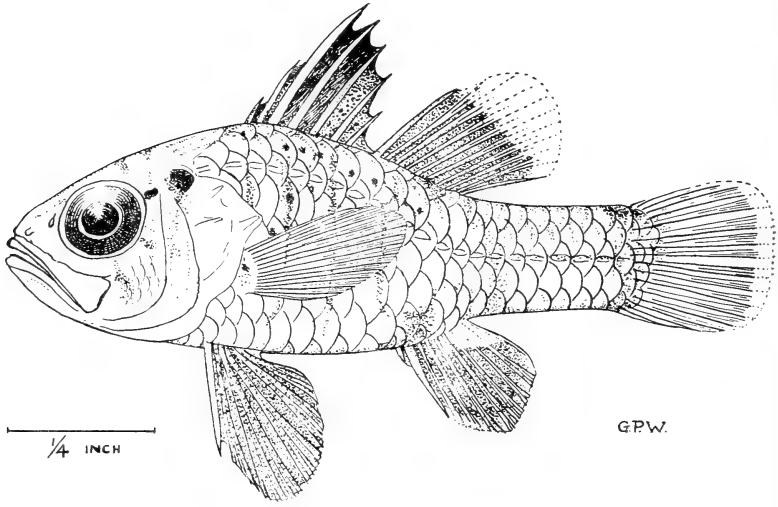

Figure 3.—Gentle Gobbleguts, *Apogonichthys ahimsa.* Holotype. Queensland.

G. P. Whitley del.

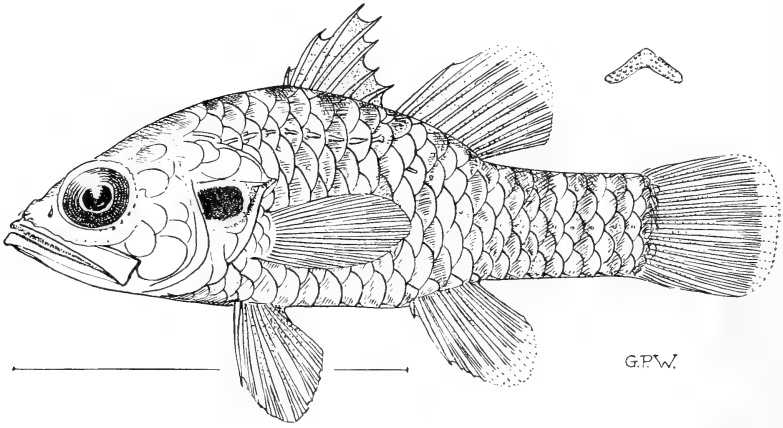

Figure 4.—Eared Soldier Fish, *Fowleria marmorata.* Lectotype. Queensland. Inset: Vomerine teeth.

G. P. Whitley del.

Genus FOWLERIA Jordan & Evermann, 1903.

FOWLERIA MARMORATA (Alleyne & Macleay).

(Figure 4.)

Apogonichthys marmoratus Alleyne & Macleay, Proc. Linn. Soc. N.S. Wales i, Feb., 1877, p. 268, pl. v, fig. 2. Cape Grenville, Queensland. Cotypes in Macleay Museum. *Id.* Jordan & Seale, Bull. U.S. Bur. Fisher. xxv, 1905 (1906), p. 250, fig. 44 (Samoa).

Fowleria marmoratus McCulloch & Whitley, Mem. Qld. Mus. viii, 1925, p. 146.

Fowleria marmorata McCulloch, Austr. Mus. Mem. v, 1929, p. 173.

Apogon marmoratus Lachner, Bull. U.S. Nat. Mus. 202, 1953, pp. 432, 433, 442, 474 & 476.

Here figured from the lectotype of the species, the larger of two cotypes which I have been privileged to examine in the Macleay Museum, University of Sydney. The coloration has faded after more than 80 years in alcohol, so the pattern has been copied from the small 1877 figure.

D. vii/i, 9; A. ii, 8; P. 14; C. 15 main rays. L. lat. 8 tubes. Sc. 20. Tr. 1½/1/5; predorsal scales 6.

Head, 17 mm.; depth of body, 14; its width, 8; predorsal length, 19; snout to origin of anal fin, 26; eye, 5; interorbital, 2.5; snout, 3; postorbital, 9; maxillary, 8; depth of caudal peduncle, 7; its length, 10.

Chin terminal. Maxillary reaching below posterior border of eye. Both edges of preoperculum entire. Anterior nostril in short tube. Coarse villiform teeth in jaws, vomerine teeth in three rows on broad, V-shaped patch; apparently no palatine teeth. Third dorsal spine longest. General facies as figured. No silvery gland. Lateral line tubes ceasing by second dorsal's origin; thence a few pits along middle of peduncle.

"Coloration reddish-yellow, transversely marbled with brown. There is a broad yellow patch on the praeoperculum, and a large blue white-edged spot on the operculum. All the fins except the pectoral are marked with several small wavy fasciae formed of minute spots." (Alleyne & Macleay.)

Described and figured from the lectotype of the species, 41 mm. in standard length or about two inches overall.

Loc.—Cape Grenville, Queensland.

Some authors regard *marmoratus* as a synonym of *aurita* (Cuv. & Val.), but Lachner distinguishes them.

Genus SIPHAMIA Weber, 1909.

SIPHAMIA ZARIBAE Whitley.

(Figure 5.)

Siphamia zaribae Whitley, Austr. Zool. xii, 1959, p. 323. Heron Island, Queensland.

D. vi/i, 9; A. ii, 8; P. 15. Sc. c. 21. Tr. about 2/6.

Dimensions in millimetres: Head, 8; depth of body, 8 (both 40% of standard length); depth of head nearly 8, its width 5; interorbital, 2.5; eye, nearly 3; snout, about 1; maxilla, 5; predorsal length, 9 (45% of s.l.); dorsal bases, 8; anal base, 2.6; middle caudal rays, 5; depth of caudal peduncle, 2.3. Standard length, 20; total length, 26 mm.

Profile convexly rounded, chin bulging. Nostrils porelike, circular. Maxilla truncate, reaching below middle of pupil. Head mostly naked with few rows of papillae. Preoperculum entire except for about three very inconspicuous denticles at posterior angle. Tongue acute, white at tip, otherwise with thick black glandular tissue. Isthmus very narrow.

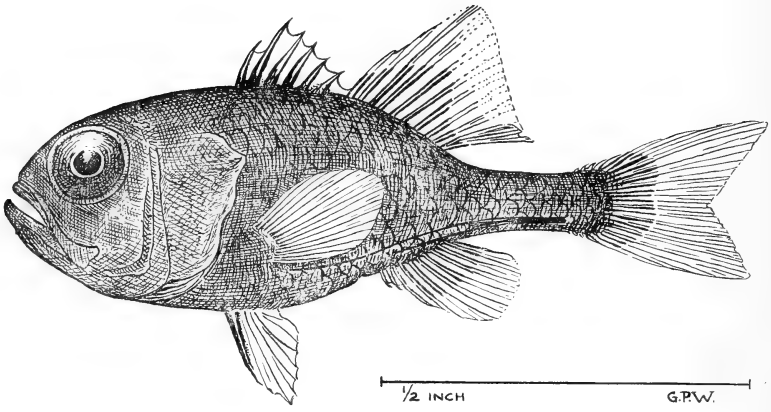

Figure 5.—Zariba Fish, *Siphamia zaribae*. Holotype. Queensland.
G. P. Whitley del.

Body compressed. Scales deciduous, l. lat. inconspicuous. A black glandular area extends back above anal fin on each side to near procurrent caudal rays. Vent a little distance before anal fin. Caudal peduncle long and shallow.

Spinous dorsal fin originating over opercular flap, its second spine longest (nearly 3 mm.). Anal fin smaller than second dorsal. Pectorals rounded 5 mm. long. Ventrals small. Caudal forked.

Colour in formalin black with the fins white, but the proximal parts of fin rays of unpaired fins have black pigmentation. In life, the fish is said to have green iridescence, imitating the shining areas of the sea-urchins amongst whose spines it lives in numbers. Notes on this inquilinism are being prepared by Queensland colleagues for separate publication.

Loc.—Heron Island, Queensland; Mr. K. Gillett, 1958.

Described and figured from the holotype (Australian Museum regd. No. IB.4129), about one inch long; there is a slightly larger paratype (IB.4132) measuring $1\frac{3}{16}$ inches overall.

Near *Siphamia cuprea* Lachner (Bull. U.S. Nat. Mus. 202, 1953, pp. 415, 418, 423 & 424, fig. 72) from the Philippines but differs in having the second dorsal spine longest of the six in that fin and in its longer, slenderer caudal peduncle.

Siphamia zaribae is evidently closely related to *S. majimai* Matsubara & Iwai (Ann. Mag. Nat. Hist. (13) i, 9, 1958, p. 603, figs. 1-3) from the Amami Islands, China Sea, but differs in having larger eye, higher second dorsal fin, slenderer caudal peduncle, and nostrils not one above the other.

Apart from the holotype and paratype of *zaribae*, the Australian Museum now has 15 specimens from Heron Island (up to $1\frac{1}{2}$ inches long, a ripe female) collected by Mr. Donald Francois amongst spines of the sea-urchin, *Diadema setosa;* also 6 more which Mr. R. Slack Smith collected from *"Echinothrix" calmaris* at Heron Island, Queensland, on 25th August 1958. Registered numbers IB.4206-4208 and 4242-4243.

Do the luminescent glands of *Siphamia* imitate or blend with parts of the urchins?

Other fishes associated with the spines of sea-urchins are the razor-fish *(Æoliscus)* and the clingfish *(Diademichthys),* but there is a similarly dark and light striped shrimp which takes up the same habitation.

*Notes on protectionism**—

Mr. F. A. McNeill, of the Australian Museum, has identified a shrimp, found amongst the spines of the sea-urchin, *Diadema setosa,* from 15 feet of water off Heron Island, Queensland, as *Stegopontonia commensalis* Nobili (Bull. Mus. Hist. Nat. Paris xii, 1906, pp. 258 & 644), a species originally described as "commensal de *Echinothrix turcarum*" in the Hao Lagoon, Tuamotus, but since (1940) recorded by Mortensen from Mauritius. Mr. McNeill kindly suggested that I publish the Heron Island occurrence, a new record for Australia, here. The Australian Museum has a male and a female shrimp, the female being twice the bulk of the male and ovigerous. The colour in life was dense purple, appearing almost black, with a white stripe along the middle of each side. This coloration is strikingly like that of the clingfish, *Diademichthys,* which occurs in a similar situation.

Lovamia fasciata swims amongst the spines of sea-urchins, but, as far as I know, does not hide amongst them as *Siphamia zaribae* does (the trivial name refers to this thorny or palisaded enclosure). Gudger (Zoologica ix, 1927, p. 2) discussed inquilinism between *Apogonichthys puncticulatus* and the univalve mollusc, *Strombus bituberculatus.* Various kinds of fishes have been found associated with the spiny sea-urchin, *Diadema,* according to Mortensen, whose records were elaborated upon by Pfaff (Vidensk. Medd. fra Dansk. nat. Foren. cv, 1942, p. 419), one of the identifiable cases being "commensalism" in Madagascar between *Diadema savignyi* and *Apogon endekatoenia,* recorded by Decary in 1921. More recently, Lachner (Copeia 1955, 1, p. 53) reported inquilinism between *Paramia bipunctata* and sea-urchins.

In October 1958, Dr. R. Catala sent from New Caledonia a fish which he called a "vicious Apogon" for identification and wrote, "By a pure hazard, we put this Apogon some day in the small tank where a deep sea (35 metres) anemone was still alive after many months. After about ten days this Apogon was spending all his time in the anemone, rubbing himself against it with an extreme ardour (more intensively than the most active *Amphiprion* do). He kept up this peculiar habit for eight months and this continual friction caused an inflammation on his belly." The fish was classified as a variety of *Lovamia novemfasciata.* Dr. Catala continued, "In nature we never observed any symbiosis between Apogon and anemone (only certain species of *Apogon* live close to or among sea-urchins, *Diadema*). In this case, it was of course an accidental adaptation and I would be very interested to see if other specimens of this species of *Apogon* will find the same 'pleasure' with this anemone."

SIPHAMIA TUBIFER Weber, 1909.

Siphamia tubifer Weber, Notes Leyden Mus. xxxi, April 6, 1909, p. 168. Timor. Id. Weber, Siboga Exped., Fische, 1913, pp. 235, 243 & 672, pl. x, figs. 9 a-b and text-fig. 61. *Id.* Weber & Beaufort, Fish. Indo-Austr. Archip. v, 1929, p. 356, fig. 84. *Id.* Koumans, Temminckia ix, 1953, p. 217 (scales are *cycloid*). *Id.* Lachner, U.S. Nat. Mus. Bull. 202, 1953, pp. 414 and 418. *Id.* Smith, Ann. Mag. Nat. Hist. (12) viii, 1955, p. 61.

? Siphamia fuscolineata Lachner, U.S. Nat. Mus. Bull. 202, 1953, pp. 415, 418, 425 and 427, fig. 73. Bikini.

D. vi-vii/i, 8-9; A. ii, 8; P. 13. L. lat. about 20 to 22. Tr. 1/1/5. Four or five keeled predorsal scales.

Head 2.3 in or 42% of standard length. Depth 2.6 and 38%. Head-depth 34 to 40% s.l. Eye 43-44% of head-depth, or about 2.7 to 3 in head-length. Snout = interorbital. Predorsal length 42-44% s.l.

* The name for this phenomenon coined by Pfaff (Vidensk. Medd. fra Dansk. nat. Foren cv. 1942, p. 421).

Free edge of preoperculum slopes slightly ventrocaudally. Preoperculum strongly serrated on both limbs. Operculum with two spines (upper sometimes obsolescent) and several large scales, its posterior border concave above. Lower jaw projecting. Mouth oblique, maxillary concave, reaching half-way below eye. Angle between line of upper jaw and horizontal between middle of eye and midbase of caudal fin about 35°. Teeth in coarse villiform bands on jaws, along palatines, and on V-shaped vomer. Tongue scoop-shaped with acute rounded tip. Eight slender gill-rakers on lower part of first gill-arch.

Scales thin, deciduous, cycloid. Lateral line complete, with simple tubes. Peritoneal tubes from mouth to lower part of caudal peduncle, splitting before vent and levelling off at lowest pectoral ray.

First dorsal spines weak and short, sometimes obsolescent or lacking. Third dorsal spine longest, about twice length of second and almost as long as height of soft dorsal. Caudal moderately forked or deeply incised.

Colour, after long preservation in alcohol: Dark brown, sprinkled with blackish chromatophores, darkest around dorsal bases. A few small, photophore-like blue spangles on myomeres of back or below soft dorsal base. Three faint, coppery lateral bands; the median one, just behind the head, is about equal in depth to the silvery band above it. Peritoneal tubes silvery, cross-hatched by crescentic or wavy black lines. Fins mostly plain whitish but rays and spines brown basally or brown spotted as is also the membrane to some extent. Caudal root generally dusky or with two dark spots. Base of ventrals blackish. Snout and chin with scattered brown spots, just visible to naked eye.

Larger males practise buccal incubation, eyed larvae being distinguishable in their mouths.

Described from a selection of 53 specimens, $\frac{3}{4}$ to $1\frac{3}{8}$ inches long.

Locality: Mallicolo, New Hebrides; collected by Commander Cross of H.M.S. "Undine" many years ago. Australian Museum registered Nos. IB.4244-7.

Very close to *S. fuscolineata* Lachner, but fins with dark marks, scales cycloid, angle of mouth less oblique and operculum usually with two spines. *Apogonichthys guttulatus* Alleyne & Macleay, 1877, is also a *Siphamia* but has stouter build, ciliated (frayed ctenoid) scales, about 6 gill-rakers on lower portion of first gill-arch, and dark-dotted coloration.

Family PLECTROPLITIDAE.

Genus PLECTROPLITES Gill, 1863.

PLECTROPLITES AMBIGUUS (Richardson).

(Figure 6.)

Datnia? ambigua Richardson, Zool. Erebus & Terror, Fish., 1845, p. 25, pl. xix. "Western Australia."

A young specimen of the Callop is here figured from Hillston, Lachlan River, New South Wales; presented by Mr. J. Facey (Austr. Mus. reg. No. IB.2505, part). This fish is distinguishable from the Macquarie Perch (*Macquaria*) by its much smaller scales and the maxillary extends to about middle of eye. The figured example has the following features: D. x, 10; A. iii, 7; P. 15; total length, 26 mm.; standard length, 21; head, 8; depth of body, 7; depth of caudal peduncle, 3; eye, 2.3; maxillary, 4; length of pectoral, 5; of ventral, 4; second anal spine, 3 mm. Pectoral reaching vent. The pores on the head are smaller and rounder than in adults and those of the chin are shown as an inset.

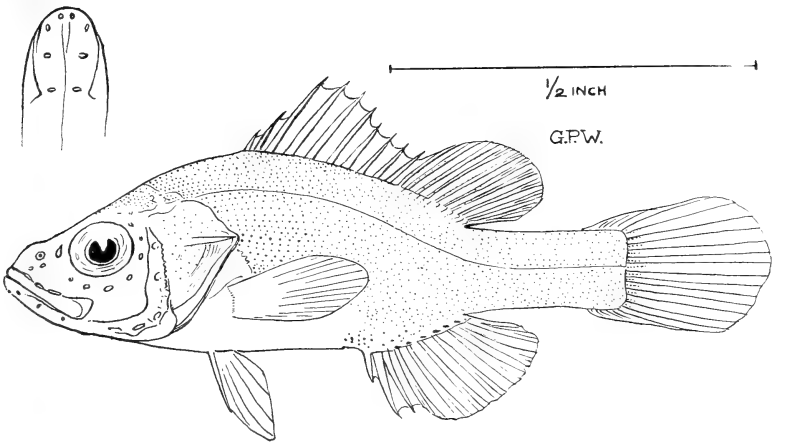

Figure 6.— Callop, *Plectroplites ambigus*. Juvenile from Hillston, Lachlan River, New South Wales. Inset: Pores on chin.

G. P. Whitley del.

Family ANTHIIDAE

Genus LEPIDOPERCA Regan, 1913.

LEPIDOPERCA OCCIDENTALIS Whitley

Lepidoperca occidentalis Whitley, Rec. Austr. Mus. xxii, 1951, p. 398. Western Australia.

I have found twelve more specimens of this species in the "Endeavour" collection which show that it reaches 7½ inches in length and that its range extends into South Australia.

One, 4¼ inches long (No. E.2443) was trawled in 74 fathoms, at 33°50′ S. lat. by 137°30′ long; new record for South Australia.

Eleven (E.2362, 2363, and 2435; I.12341, 12342 and 12399) up to 7½ inches long were taken in between 70 and 120 fathoms, about 80 miles west of the meridian of Eucla, Western Australia in March, 1912.

The colours of I.12341-2 were noted as "Pink above, white below. Lateral line yellow. Eye pink and gold. Dorsal fin yellow. Caudal yellow exteriorly, pink medianly. Pectoral pale yellow. Ventral colourless. Outer half of anterior rays and spines of anal bright orange, rest colourless."

Family LABRIDAE.

Genus THALASSOMA Swainson, 1839.

THALASSOMA STUCKIAE, sp. nov.

(Figure 7.)

D. viii, 10; A. 11; P. i, 14; V. i, 5; C. 15 main rays. L. lat. 21. Tr. 2/1/5.

Head (9 mm.) 3, depth of body (7) 3.8 in standard length (27). Eye (3) 3 in head. Snout 2.3 mm.; postorbital, 4; length of pectoral fin = depth of caudal peduncle, 5; greatest width of fish (at head), 4.

Head naked. Interorbital convex, 2 mm. across. Snout subconic. Front canines small, conic; no posterior canines. General facies as figured. Body oblong, compressed. L. lat. complete, tubes of front scales bifid. Scales on thorax smaller than those on lower parts of sides. Slight scaly sheaths to dorsal and caudal bases. Fins all rounded. Anal spines concealed. Ventrals small.

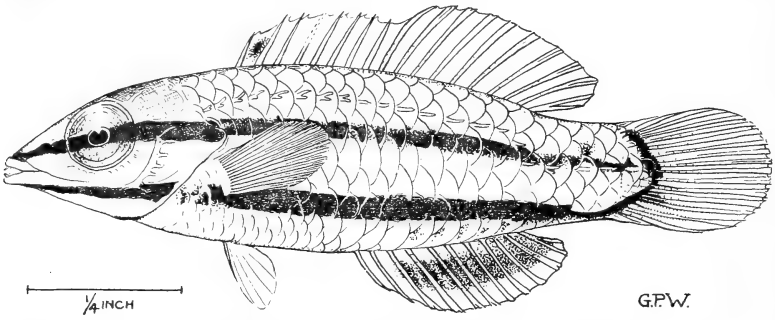

Figure 7.—Madame Catala's Wrasse, *Thalassoma stuckiae*. Holotype, New Caledonia.

G. P. Whitley del.

Colour in formalin, pale sea-green with a blackish stripe from nose to tail and another from chin to tail. Both stripes meet their fellows of the other side to form V-shaped marks on nose and chin. Across the base of the caudal fin the two longitudinal bands are united by an irregular black crescent. A small blackish blotch on anterior membrane of first dorsal fin. Anal fin mostly dusky. Pectorals white.

Described and figured from the unique holotype of the species, a specimen 27 mm. in standard length or 31 mm. (nearly 1¼ inches) overall. Australian Museum regd. No. IB.4151.

Loc.—Noumea, New Caledonia. Presented by Dr. Rene Catala, after whose wife, Madame Ida Catala-Stucki, I have pleasure in naming this elegant species.

The new species differs from others in the genus in having fewer than 25 scales in the lateral line and in its black-banded coloration. A few other species are dark-banded but there is no band from the chin to the tail as in *T. stuckiae*.

The colour-pattern of *Thalassoma stuckiae* is similar to that figured for young *Gomphosus varius* in Gunther's Fische der Sudsee, pl. 147, fig. B, which has lower dorsal spines and more numerous scales.

The coloration of this small fish suggests the deduction that it might have some association with other fishes such as that dealt with by Randall (Pacific Science xii, 1958, p. 333) concerning young *Thalassoma bifasciatum* and other striped fishes (*Elacatinus, Labroides,* etc.) which are believed to feed on the ectoparasites of larger fishes.

Family PENTAPODIDAE.

Genus PENTAPODUS Quoy & Gaimard, 1824.

PENTAPODUS MICRODON (Bleeker).

Heterognathodon microdon Bleeker, Nat. Tijdschr. Ned. Ind. iv, 1853, p. 464. Batavia.

Pentapus microdon Bleeker, Atlas Ichth. vii, 1872, Pl. ccxcviii, fig. 1 and viii, 1877, p. 101. *Id.* Weber and Beaufort, Fish. Indo-Austr. Archip. vii, 1936, pp. 382 and 389.

Pentapodus microdon Marshall, Ichth. Notes i, 3, 1957, p. 122.

There are three specimens, up to 7 inches long, in the "Endeavour" collection, trawled 3 to 7 miles N.W. Hervey Bay, Fairway Buoy, Queensland; 9 to 11 fathoms, 27 July 1910. The Australian Museum has also one of Mr. T. C. Marshall's specimens from North Palm Island, Queensland; coll. George Coates, 15 August 1952.

Family AMPHIPRIONIDAE.

Genus ACTINICOLA Fowler, 1904.

ACTINICOLA NOLAN, sp. nov.

Actinicola sp. nov. Whitley, Mem. Queensland Mus. ix, 1929, p. 214.

D. xi, 17; A. ii, 12; P. i, 16; C. 16. L. lat. 42 tubes. Sc. 60 to hypural joint. Tr. 9/1/29. Predorsal sc. 12.

Head (18 mm.) 3.3, depth (26) 2.3 in standard length (60). Eye (5) 3.6, interorbital (6), 3, and longest pectoral ray (14) 1.2 in head.

General characters as in my description and figure of *Actinicola bicolor* (Whitley, loc. cit., p. 215, pl. xxvii, fig. 2) but differing in formulae, as above, and has the profile sloping, not gibbous, before the dorsal spines. Four or five preorbital and 12 suborbital spines. Predorsal scales reach the back of the white nuchal band.

Colour, after long preservation, dark chocolate-brown, lighter on front of head. Eye blue. Three thick, white-edged cream bands. The first almost encircles head from posterior edge of orbit and is bent like a horseshoe over opercles to be interrupted by the isthmus. The second extends from posterior dorsal spines, crossing 10 or 11 lateral line tubes to descend to first anal spine and vent and is extended forward as a V whose angle is covered by the adpressed pectoral fin. Third band around caudal peduncle. Fins all dark brown and all except ventrals with white margins.

Described from the holotype, 76 mm. or nearly 3 inches overall. Australian Museum registered No. IB.4269.

An "old collection" specimen, unlocalised, so named after Philip Nolan.

Family CHAETODONTIDAE.

Genus CHAETODONTOPLUS Bleeker, 1876.

CHAETODONTOPLUS BALLINAE, sp. nov.

(Figure 8.)

D. xiii, 18; A. iii, 18; P. 2, 14; V. i, 5; C. 13 main rays. About 90 transverse scale-rows between head and hypural joint. Head (41 mm.) 3.8, depth of body (81) 1.9 in standard length (159). Interorbital width (15) greater than eye (12). Pectoral fin (31) shorter than head. Depth of caudal peduncle, 19 mm.

General facies as figured. Profile arcuate, chin prominent. Teeth movable, long, compressed and curved with pointed tips; teeth of upper and lower jaw subequal. Posterior nostril the larger. Cheek as broad as deep. Preoperculum with about 12 to 15 serrae posteriorly and one large spine at its angle. Preorbital smooth, its anterior margin forming an obtuse angle with its lower margin which is slightly convex; hind margin of preorbital concealed by scales. Interoperculum with regular outline, not emarginate, large and without spines, covered with scales and agreeing with Fraser-Brunner's figure 1E (Proc. Zool. Soc. London 1933, p. 544).

Figure 8.—Arrow-backed Angel Fish, *Chaetodontoplus ballinae* Whitley. Holotype. New South Wales.

G. P. Whitley del.

Scales all small, of regular size, strongly ctenoid and with ridges corresponding with the ctenii. They are without auxiliaries and have only a couple of radii. Scales of head similar to those on body, not minute or velvety. Lateral line indistinct, following contour of body to caudal peduncle.

No recumbent dorsal spine. Fifth to last dorsal spines longest. Fins not produced. Pectorals, dorsal and anal lobes rounded. Ventrals pointed, reaching vent. Caudal truncate.

Colours, when fresh: mostly pearly grey. Lips and sides of jaws black. Teeth brown, purple towards their bases. Pupil bluish-black; iris bright yellow. A very dark grey patch uniting the eyes across top of head; not continued down cheek as an ocular band. Pectoral base black. A black area reaching from pectoral axil up to shoulder, running forwards to predorsal scales and first two dorsal spines, is united to the black area of the back and lower parts of the dorsal fins which ceases abruptly over the caudal peduncle and as a sinuate curve over top of flanks. Looked at from above, the dark area appears arrow-shaped. Distal third to half of dorsal fins pearl-grey. No mottling or vermiculations. Pectoral and caudal fins yellow, also most of caudal peduncle. Ventrals and anal pearly.

Described and figured from the unique holotype (Australian Museum registered No. IB.4233), a specimen 159 mm. in standard length or 19 cm. ($7\frac{1}{2}$ inches) overall.

Loc.—Caught in a trap off Ballina bar, northern New South Wales, in deep water in March 1959 and presented by Mr. J. C. Woore.

Easily distinguished from its congeners by its colour-pattern and squamation. The species of this genus seem to be as rare, beautiful and localised as volute shells.

CHAETODONTOPLUS CONSPICILLATUS (Waite)

Holacanthus conspicillatus Waite, Rec. Austr. Mus. iii, June 15, 1900, p. 203, pl. xxxv. Lord Howe Island. *Id.* Fowler and Bean, Bull. U.S. Nat. Mus. 100, viii, 1929, p. 194 (excluding *personifer*).

Chaetodontoplus conspicillatus Fraser-Brunner, Proc. Zool. Soc. London 1933, pp. 549 and 552. NOT of Ogilby, Mem. Q'ld. Mus. iii, 1915, p. 114, which was *personifer.*

Holacanthus (*Chaetodontoplus*) *conspicillatus* McCulloch, Mem. Q'ld. Mus. vii, 1922, p. 242.

A six-inch specimen from the aquarium at Noumea, presented by Dr. R. Catala, constitutes a new record for New Caledonia (Austr. Mus. Regd. no. IB. 4433).

Family URANOSCOPIDAE.

Genus URANOSCOPUS Linnaeus 1758, s.l.

URANOSCOPUS TERRAEREGINAE Ogilby.

Uranoscopus terraereginae Ogilby, New Fish. Q'ld. Coast, Dec. 20, 1910, p. 131. Trawled in South Queensland. Type in Queensland Museum; cotypes in "Endeavour" collection housed in Australian Museum.

One specimen, 110 mm. long, trawled by M/V "Challenge" at Station 337, off Newcastle in 72 fathoms, 6 July 1959.

Australian Museum regd. No. IB.4382.

New record for New South Wales.

Colours from life, according to Dr. A. A. Racek, in lit, 5 Aug., 1959:— Upper side bluish-grey, with occasional and irregular dark grey spots, widely interspaced. Projecting spines reddish brown. Ventral side light grey. Caudal fin with yellow tinge. Eyes light blue.

FAMILY GOBIOMORIDAE.

Genus OPHIOCARA Gill, 1863.

Subgenus OPHIELEOTRIS Aurich, 1938.

OPHIOCARA APOROS ALEXIS, subsp. nov.

D. vi/i, 8-10; A. i, 9-10; P. i, 13-14; V. i, 5.

Sc. 26-28 (head to hypural). Tr. 10 to $\frac{1}{2}/4/\frac{1}{2}$ or $\frac{1}{2}/5/\frac{1}{2}$ on caudal peduncle. Predorsal sc. (18) 20-21.

Head (13 mm.) 3.4, depth (10) 4.5 in standard length (45) or 4.1 and 5.4 in total length (54). Eye (4) 4.2 in head. Interorbital slightly more than, and snout less than eye-diameter.

Tip of snout before middle of eye. Profile gently convex. Few rows of papillae on scaly sides of head, not in grooves. A groove behind eye and over operculum. Couple of pores at edge of preoperculum. Supraciliary scales present. Most of head scaly, including interorbital and top of snout. Interorbital flat, without crests. Nostrils well separated, with low rims.

Mouth small, not reaching eye; teeth minute, ones in front of jaw slightly enlarged and spaced. No canines. Chin terminal. Opercles unarmed. Gill-membranes not extending far forward and separated by broad isthmus.

Body rather elongate, moderately compressed. Scales smooth but becoming ctenoid posteriorly. A shield-shaped genital papilla.

Dorsal fins separate, first about half as high as body, 3rd and 4th spines longest. Second dorsal higher than first and similar to anal. Pectoral about equal to distance from middle of eye to upper opening of gill. Ventral fins separate. Fourth ventral ray longest, reaching vent. Caudal truncate, slightly shorter than head.

General colour in formalin, pale greenish (bronze-green in life) to grey or dark greyish brown. A bluish-grey spot, surrounded by a lighter area, just before middle of tail. Head generally dusky brown and darker than body. Fins either plain (except for the caudal which is grey mottled) or the dorsal and anal fins are black with white spots and borders and the ventrals are infuscated, with white margins. No dark bars on cheeks or pectoral base.

Described from the holotype (Austr. Mus. regd. No. IB.4171) and six paratypes (IB.4172-6) about 2 to 2¼ inches overall.

Loc.—A freshwater lake at Alexishafen, near Madang, New Guinea; Mr. Ned Blood, 1958.

Differs from *O. aporos* (Bleeker, 1854) in having fewer transverse rows of scales and more predorsal scales and maxillary does not reach eye. *O. aporos rigonis* = *guntheri* Koumans, 1937, has fewer predorsal scales and broader interorbital besides different coloration.

Family SCORPAENIDAE.

Genus SCORPAENOPSIS Heckel, 1837.

SCORPAENOPSIS PALMERI FURNEAUXI, subsp. nov.

D. xii, 9 (10); A. iii, 5; P. 17 (1 simple + 6 divided + 10 simple). L. lat. 26 tubes. Sc. c. 35 above l. lat. L. tr. 5 to 9/1/16 to 18. Predorsal sc. 5, reaching to between nuchal spines.

Head (40) 2.3, depth (37) 2.5, length of caudal (24) 3.8, of pectoral (25) 3.7, of ventral (23) 4 in standard length (93). Eye (9) 4.4, interorbital (6) 6.6, snout (14) 2.8, maxillary (21) 1.9, longest (4th) dorsal spine (19) 2.1, second anal spine (18) 2.2 in head. Postocular length of head (21) greater than longest dorsal spine.

A naked pit below anterior border of the eye. Two coronal ridges (not connected posteriorly by a transverse ridge as in typical *S. palmeri* Ogilby). Lower jaw the longer, without symphysial knob. Maxillary extending almost to below hinder margin of the eye, the width of its distal extremity (8) greater than that of interorbital. Cardiform teeth on jaws and vomer, none on palatines. Nine hooked, short spiny gillrakers on lower part of first branchial arch.

Apart from coronal and postfrontal ridges, the following head-spines are present:— Nasal, preocular, supraocular, postocular, tympanic, several sphenotic, parietal and nuchal united by ridge, pterotic, posttemporal, humeral, postorbital (few, very small), suborbital (3), preorbital (anterior pointing forward, posterior pointing back, and a third low median spine or ridge), 2 over 4 preopercular, and 2 opercular spines.

Occipital groove deep and transversely oblong, not bordered anteriorly by a low arcuate ridge as in *palmeri* and *macrochir*. Head and body with cirrhi.

Fringed tentacles at anterior nostrils and over eyes, between parietal and nuchal spines, at preorbital spines, below chin and lower jaw, each side of snout, around and across preoperculum and along lateral line. A series of lappets around iris of eye. Postocular region and most of operculum scaly (the lower half of the operculum in typical *palmeri* and *macrochir* is naked).

Body scales imbricate, in ascending rows, ctenoid, with 7 to 9 radiating striae. They cover the body and breast and basal portion of pectoral fin; other fins naked.

Dorsal fin originating over operculum. No produced fin-rays. Length of base of soft dorsal fin (18 mm.) 2 in that of spinous dorsal (37). First dorsal spine (10) longer than the eleventh (4); last spine, 11.5 mm. Soft dorsal fin lower than longest dorsal spines. Anal origin below that of soft dorsal. Pectoral reaching beyond vent, its base 15 mm. Ventrals reaching vent. Caudal rounded.

Colour, after long preservation, brown with irregular darker marblings on body and fins. A couple of dark grey spots in pectoral axil.

Described from the holotype of the subspecies, a specimen 93 mm. in standard length, or 4¾ inches overall. Smaller paratypes show no important variation.

Localities.— Trawled eleven to fourteen miles N.W. of Pine Peak, Queensland; 24-26 fathoms, 1 August 1910; F.I.V. "Endeavour" (Holotype and paratype, both registered no. E.2896).

Trawled north of Hayman Island, Queensland; 20 fathoms; 1957. Mr. K. De Witte (two paratypes, IB.3978 and 3983).

Near typical *S. palmeri* Ogilby (Proc. Roy. Soc. Qld. xxiii, 1910, p. 27) but with deeper, less elongate form, larger scales, lower half of operculum scaly, coronal ridges not connected by a raised transverse arcuate ridge, and nine gillrakers on lower part of first branchial arch instead of 11. *S. macrochir* Ogilby 1910 is said to have interorbital width 3.9 in head, pectoral 2.7 in length, width of distal extremity of maxillary 1.5 in interorbital, and pectoral base more than 2 in its longest ray. The only other Australian species is *S. diabolus* (Cuv. and Val.) which has a hunched back, broader and less concave interorbital, etc.

Named in honour of Captain Tobias Furneaux, of whom a biography has recently been given by F. S. Blight, Ann. Rept. Trans. Plymouth Instit. and Devon and Cornwall Nat. Hist. Soc. xxii, 1956, p. 70.

Family TRIGLIDAE

HATHA, gen. nov.

Orthotype, *Lepidotrigla mulhalli* Macleay (Proc. Linn. Soc. N.S. Wales viii, 4, Feb. 21, 1884, p. 460, from 40 fathoms off Port Jackson) = *Hatha mulhalli.*

The gurnard named *mulhalli* by Macleay differs from other species of *Lepidotrigla* in having the interorbital space only slightly concave and has the profile convex before the eyes. The new name *Hatha* is supplied for it. The lateral line is without armature and the dorsal fin has no black spot as in *Paratrigla* and *Aoyagichthys.* There is a row of spines along bases of both dorsal fins and the scales are larger than in *Currupiscis.* The genotype and only known species of *Hatha* was hitherto known only from New South Wales, where it is commonly trawled, up to 9 inches in length and is known as Cock Gurnard. It has been described and figured by Waite, Austr. Mus. Mem. iv, 1899, p. 105, pl. xxii.

Hatha mulhalli may now be added to the Victorian fauna, as the "Endeavour" trawled a specimen (E.5458), 7½ inches long, off Gabo Island in 160 fathoms on 28 August 1914, and another (E.1195), 8¾ inches long, 25 miles S.W. from Cape Everard.

Genus LEPIDOTRIGLA Gunther, 1860.

LEPIDOTRIGLA CALODACTYLA Ogilby.

(Figure 9.)

Lepidotrigla calodactyla Ogilby, New Fish. Qld. Coast, Dec. 20, 1910, p. 125. North Reef, Capricorn Group, Queensland. And of lists. *Id.* Whitley, Austr. Mus. Mag. xi, 1953, p. 27, fig. of co-type.

Lepidotrigla kanagashira Kamohara, Zool. Mag. (Japan) xlviii, 12, 1936, p. 1007, fig. 2; Fish. Tosa, 1938, p. 54, fig. 29; Rept. Kochi Univ. iii, 1952, p. 74, fig. 73. Mimase, Japan.

Two specimens (No. E.1790), 7 to 7¼ inches overall, were trawled by the F.I.V. "Endeavour" eleven miles S. by E. from Ballina, in 28 fathoms on 25 June 1910, are not only of record length but show that this species must now be added to the New South Wales list.

L. kanagashira appears to be a new synonym.

The accompanying figure was drawn from one of Ogilby's co-types. Mr. T. C. Marshall noted the life-colours of a Queensland specimen (Dept. Harb. Mar., Brisbane, No. 1718) as "General colour bright tomato-red, passing into pink below; head bright red; spinous dorsal pinkish-red with a dark red blotch as large as eye on terminal half of 4th and 5th spine, extending to the ends of the 3rd and 6th spines; soft dorsal pink with red spots along the rays; pectorals blackish with wavy markings of pale blue and with a large jet-black patch on the basal half on which are superimposed a few small white spots; ventrals pale yellowish; anal hyaline, the rays pinkish; caudal red, with a wide pink vertical band across its centre, widest at the upper and lower edges of the fin."

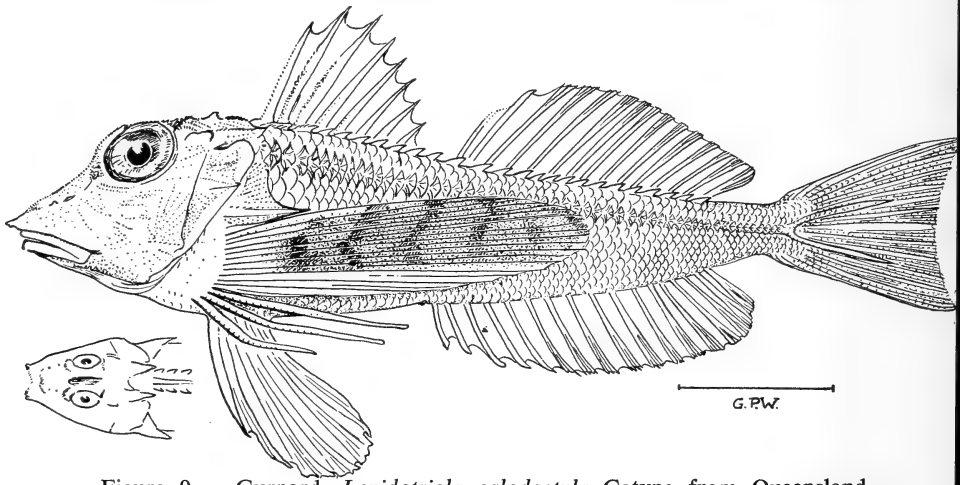

Figure 9.— Gurnard, *Lepidotrigla calodactyla* Cotype from Queensland. Block by courtesy of the Australian Museum, Sydney.

G. P. Whitley del.

Family CHAUNACIDAE.

Genus CHAUNAX Lowe, 1846.

Chaunax Lowe, Proc. Zool. Soc. Lond. xiv, Nov. 1846, pp. 81 and 339. Haplotype, *C. pictus* Lowe.

CHAUNAX PENICILLATUS McCulloch.

Chaunax penicillatus McCulloch, Biol. Res. Endeavour, iii, 3, Apr. 21, 1915, p. 167, pl. xxxiii, fig. 2. Off Cape Everard, Victoria. Type, on deposit, in Austr. Mus.

One specimen, 130 mm. long, trawled by M/V "Challenge" east of Newcastle in 100-160 fathoms on 2 July, 1959. Presented by Dr. A. A. Racek. Rosy pink with greenish spots.

Australian Mus. regd. No. IB.4378.

New record for New South Wales.

Colours from life, according to Dr. A. A. Racek, in lit., 5 Aug., 1959:— Upper part of body, about down to "lateral" line nearly uniformly pinkish brown, with numerous irregularly shaped and arranged blotches of conspicuously light green colour. These blotches in life appear to change colour, but this is not quite so. Seen from above the blotches reflect the light as green, seen from below they appear orange to bright yellow. These blotches appeared to "glow" at night, but this could have been also caused by adhering phosphorescing plankton, as in the case of a starfish taken at the same time. Eyes dull pink.

Southern Records of the Northern Painted White Butterfly (*Delias argenthona argenthona* Fabricius, 1793)

By L. Courtney Haines.

The Northern Painted White, *Delias argenthona argenthona,* is a tropical species occurring commonly from Cape York, Queensland, to the Richmond River, New South Wales, which is its normal range. Farther south, although it has been taken at Port Macquarie and Camden Haven, *Delias argenthona* is considered an extremely rare butterfly.

It was with some interest and surprise therefore, whilst looking through Miss Margaret Dowling's collection at Bandon Grove, N.S.W., that I noticed a specimen of this butterfly. This specimen, a female, was taken by Miss Dowling at Fosterton, near Dungog, a village approximately 65 miles due south of Port Macquarie.

The butterfly had alighted on a Red Guava tree and was in perfect condition; unfortunately, in her excitement of capturing an "unknown" butterfly, a section of the apex of the right fore-wing was broken off. The date of capture was as long ago as the spring of 1949.

Mr. A. N. Burns, M.Sc., F.R.E.S., writing to me from the National Museum of Victoria about the Fosterton capture, says: "The taking of a specimen of *Delias argenthona* as far south, is interesting; it occurs at Camden Haven rather sparingly, also at Port Macquarie. I have not heard of its being taken around Sydney. This record of Miss Dowling's is a very good one."

Since the above-mentioned discovery, another capture of this butterfly was made during the summer of 1955 at Haberfield, Sydney, N.S.W.

This specimen, also a female, was in a badly tattered condition. The collector, not being an entomologist, but merely a casual admirer of butterflies, did not realise the rarity of his capture and laid it aside in an envelope with a number of other common species; where it lay, until this "collection in papers" was shown to me during the evening of September 24th, 1958.

In all probability, this most important capture is the first definite record of *Delias argenthona* for the Sydney district.

Dr. A. G. Waterhouse mentions in his book "What Butterfly Is That?" "two specimens caught at Sydney" but says, "in all probability they are not authentic."

Notes on Lycaenidae

Violet-blue Azure Butterfly *(Ogyris genoveva)* in the Goulburn District, New South Wales.

By E. O. Edwards

Ogyris zozine and *genoveva* have created some confusion in naming due to their dimorphic females (that is, one species producing two distinct types of females). Hewitson, who named the species in 1853 did not know of the dimorphic females and regarded them as two separate species. The confusion was added to by Bethune-Baker in 1905 in the Transactions

of the Entomological Society of London. He applied the name *genovena* to the commoner blue and green forms and *zozine* to the rarer purple forms.

In 1914 Waterhouse & Lyell dropped the name *genoveva* and described three races all under *zozine*. Waterhouse continued this classification in 1932 in "What Butterfly is That?" In 1941, following a trip to England, Waterhouse again reorganised the species, dividing it into two: *zozine* and *genoveva*. The northern species retained the specific name *zozine* and the southern species was given the name *genoveva*.

The races were then divided as follows:—*Ogyris zozine zozine* from Brisbane district with *O.z. typhon* from northern Qld. and *O.z. zolivia* from Hayman and Whitsunday Ils., Qld. *Ogyris genoveva genoveva* apparently overlaps in the Brisbane district and extends south over the N.S.W. border. It is divided into five races: *O.g. duaringa* from inland south and west Qld.; *O.g. gela* from Murrurundi-Scone district to Sydney; *O.g. araxes* from Victoria; *O.g. genua* from Lofty Ranges and Woodside, S.A.; and *O.g. splendida* from Flinders Ranges, S.A.

There seem very slender differences between *zozine* and *genoveva,* however, in his paper in *Proceedings of the Linnean Society of N.S.W.* 1941, Waterhouse stated that the larvae and pupae of *genoveva* are always found in sugar ants' nests at the foot of trees on which their foodplant (Mistletoe) is growing. The larvae and pupae are usually attended by sugar ants and live in nests of the ants (or more often branch nests from a central nest some distance from the tree) at the foot of the tree, but as indicated below this is not a satisfactory distinction.

On the 6th of October 1957, my son and I collected three *Ogyris* larvae at Bungonia Lookdown, N.S.W., which is some 16 miles from Marulan and 23 miles north of Goulburn on the Southern Tablelands about 2,000 ft. above sea level, in limestone country, overlooking the Shoalhaven River.

The larvae were found in a hollow in the dead branch of a Eucalyptus with the Mistletoe *(Amyema (Loranthus) pendulus)* a few feet away and about six feet from the ground. Although there were sugar ants (Camponotinae) with nests in the vicinity, they were attended by small black ants.

The larvae were in two distinct age-groups; two about the same size and one much smaller, together in a hollow. At the time of collecting they were not suspected of being *O. genoveva,* but were large for the average *Ogyris* larvae. They were much darker than the larvae of *genoveva* in the Sydney district with differences in marking.

The larvae had the typical flattened head, yellowish brown marked with a white cross edged with black. 1st to 4th segments black-brown with the 3rd and 4th marked with yellowish brown and giving a fishbone appearance to the markings. The 8th and 9th segments yellowish brown, remaining segments black-brown with the rear segment flattened and marked with a black cross. One small projection on each segment on the sides with three fine white hairs projecting from each. On the 10th of November a male specimen of *Ogyris genoveva* emerged, followed by another male on the 12th November. They were identical specimens. It was not till the 25th December that a male emerged from the third pupa, leaving us without any female specimen.

The pupae were typical *Ogyris* but almost pure black with the abdomen brown-black.

In comparison with other *genoveva* larvae they were much darker and without any pinkish tinge. In size they were much smaller than either local (Sydney district) *genoveva* larvae or those I have bred in Western Queensland.

The three butterflies were smaller than the usual *genoveva.* No. 1 measured 45 mm.; No. 2 45 mm. and No. 3 42 mm. Compared with the

average size of *Ogyris orotes* at 42 mm, and *O. olone ocela* 39 mm. there was not much difference in size from the smaller *Ogyris.* By courtesy of Mr. A. Musgrave of the Australian Museum we compared the butterflies with specimens in the collection of Dr. Waterhouse. This revealed that the closest type was the Victorian *araxes,* but even then there were outstanding differences. Both in colouring and the entire absence of any brown suffusion on the underwings, they showed differences from the Sydney type, *gela;* in fact, the only specimen in the collection which showed very close resemblance came from Gunnedah. A check on the records revealed that it had been caught by a snare so there were no records of life-history.

The absence of a female prevents any final decisions. Additional material is needed for any definite conclusions, but if it is not a separate species then we must conclude that *genoveva* does not always live in a sugar ants' nest at the foot of the tree on which its foodplant grows.

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Waterhouse, G. A. (1941).—Notes on Australian Lycaenidae. Part viii. On *Ogyris zozine* Hew. and *O. genoveva* Hew. *Proc. Linn. Soc. N. S. Wales* 66: pp. 234-238.

Waterhouse, G. A. & G. Lyell (1914).—The Butterflies of Australia.

Comparative Tests of Corks and Plastic Stoppers for Use with Specimen Tubes in Entomological Collections

By K. M. Moore.

(Forestry Commission of New South Wales.)

(Figure 1.)

In the modern concept of entomological collections the preservation of larval and soft-bodied forms of insects in liquid media is becoming increasingly important.

The retention of specimens in large numbers of glass specimen tubes with stoppers of either cork or rubber has generally been regarded as unsatisfactory because of the evaporation of alcohol, the usual preserving medium, resulting in continual attention to the refilling of the tubes. When not attended to regularly, the preserved specimens may become desiccated, and spoilt. Alternative methods of retaining specimens in alcohol often make the examination of the contents of tubes a comparatively difficult or unpleasant task.

With improvements in manufacture, and the continued use of plastics, manufacturers have designed stoppers to be used with glass specimen tubes for packaging drugs which allow only limited tolerances of moisture-absorption. The two designs of polythene stoppers shown in figures 1a and 1b, together with considerable precision in the formation of the neck of the tubes, have given containers with an air-seal much more effective than the older-type stoppers of cork or rubber.

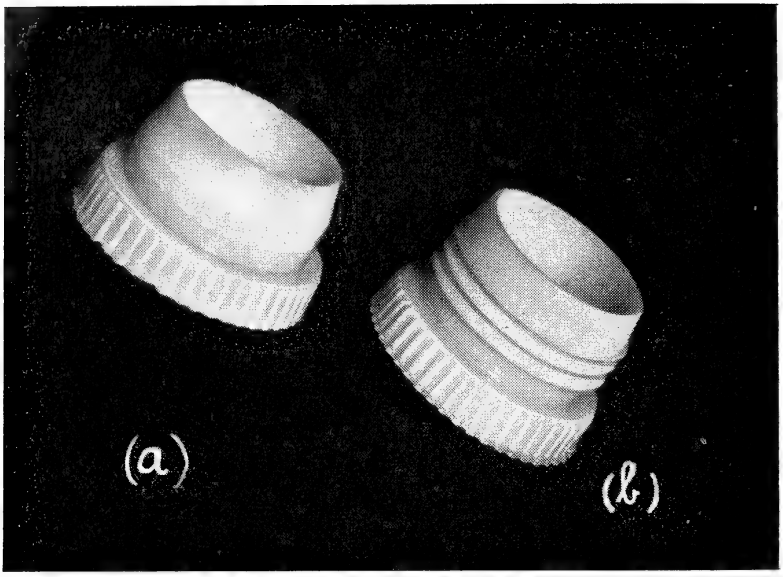

FIGURE 1.

(a) Single-rimmed plastic stopper.
(b) Double-rimmed plastic stopper.

Photo—R. Moulton.

When these plastic stoppers became available through the Australian Glass Manufacturers Pty. Ltd., Sydney, an experiment designed to compare the effectiveness of the air-seal given by these and other types of stoppers used in 3 in. x $\frac{5}{8}$ in. glass specimen tubes containing alcohol, was carried out.

METHOD.

Stoppers sealing flat-bottomed glass specimen tubes containing approximately six grams of 95% alcohol (about two-thirds full) were tested under the following three conditions:—

(a) Continuous oven temperature of approx. 122°F.
(b) Alternating oven and room-temperature, 60°-122°F.
(c) Continuous room temperature, 60°-95°F.

The stoppers under each set of conditions operating in (a), (b) and (c) were tested with the following treatments:—

1. Three tubes fitted with standard cork stoppers not treated in any way, and three treated by dipping in paraffin wax to include a portion of the tube beyond the stoppers.

2. Three tubes fitted with single-rimmed plastic stoppers (Figure 1a) not treated in any way, and three treated by dipping in paraffin wax as above.

3. Three tubes fitted with double-rimmed plastic stoppers (Figure 1b) not treated in any way, and three treated by dipping in paraffin wax as above; three were also treated by dipping in nitrocellulose lacquer to beyond the stoppers.

The experiment commenced on 12th August, 1958, and continued until 13th March, 1959, a period of seven months. The tubes with the 95% A. and stoppers, were weighed at the commencement of the experiment, after one week, after two months, and at the completion of the experiment.

The percentage loss of alcohol for each tube at the completion of the experiment is given.

RESULTS.

Legend:

C	Cork stoppers not treated in any way.
S.	Single-rimmed plastic stoppers not treated in any way.
D	Double-rimmed plastic stoppers not treated in any way.
CW	Cork stoppers waxed.
SW	Single-rimmed plastic stoppers waxed.
DW	Double-rimmed plastic stoppers waxed.
DL	Double-rimmed plastic stoppers lacquered.

115°-122°F.		60°-122°F.		60°-95°F.	
59.9	52.4	31.9	54.4	20.6	6.4
C 40.3	CW 49.3	C 41.7	CW 33.8	C 11.7	CW 22.5
64.8	37.4	15.0	50.3	19.7	6.0
7.2		1.6	0.7	0.2	0.2
S 38.1	SW *	S 1.7	SW 1.3	S 0.2	SW 0.3
39.0		7.7	3.5	0.4	0.2
4.7	4.0	1.3	0.9	0.3	0.3
D 4.5	DW 8.5	D 2.4	DW 5.9	D 0.3	DW 0.3
11.5	23.8	1.1	1.3	0.5	0.3
	4.2		5.8		0.3
	DL 4.7		DL 1.2		DL 0.4
	5.4		1.2		0.3

* As the high temperatures apparently displaced two of the stoppers replication SW at 115°-122°F. was interpreted as failing completely.

CONCLUSION.

(a) The test of replications under continuous temperatures of 115°-122°F. was considered to be severe, and such conditions under which tubed material may be held, would not normally be encountered. However, the results indicate the advantages of using plastic stoppers rather than corks under these conditions.

(b) The test of replications at temperatures fluctuating between 60°-122°F. was also considered to be severe and of greater severity than would normally be encountered. The advantages of using plastic stoppers rather than corks at these temperatures are indicated.

(c) Temperatures fluctuating betewen 60°-95°F. approximated normal conditions under which collections of tubed entomological specimens would be held. The results obtained from (a), (b) and (c) clearly indicate the advantages of using plastic stoppers rather than corks, but whether single-rimmed stoppers should be used in preference to double-rimmed stoppers is doubtful.

The results expressed as percentage loss of alcohol for each tube should enable a statistical analysis to be made if required.

When used continually in tubes containing alcohol, rubber stoppers swell and eventually perish. Although the plastic stoppers tested have been

in constant use for abour nine months only, there has been no evident deterioration and it would appear that they will last indefinitely, even though kept in contact with 95% A.

Figures or letters formed in the plastic stoppers by means of a hot scriber, and filled in with white ink, facilitate the selection of required tubes from a large collection.

ACKNOWLEDGMENTS.

The writer wishes to acknowledge assistance given by Messrs. K. G. Campbell and P. Hadlington.

Observations on Some Australian Forest Insects

5. Some Additional Wood-destroying Larvae of Lepidoptera and Coleoptera.*

By K. M. Moore.

(Forestry Commission of New South Wales.)

(Figures 1-10.)

The biology and larval taxonomy of several species of Lepidoptera of the families Oecophoridae, Tineidae and Lyonetiidae, feeding on injured and dead tree tissues and constructional timbers, have been recorded (Moore, 1959). Other species, the larvae of which feed in a similar manner, have been investigated and form the subject of this paper.

Samples of damaged timber together with larvae were submitted to the writer during 1957-58, and adults of the following species were reared:—

LEPIDOPTERA.

Oecophoridae.

(a) *Barea turbatella* (Walk.).

(b) *Machetis aphrobola* Meyr.

Cosmopterygidae.

(c) *Labdia deliciosella* Walk.

Xyloryctidae.

(d) *Scieropepla* nr. *rimata* Meyr.

COLEOPTERA.

Oedemeridae.

(e) *Nacerda melanura* L.

OECOPHORIDAE.

(a) *Barea turbatella.*

Reports of damage by lepidopterous larvae to pit-props and other constructional timbers in the south coast mine of Kembla No. 2 Colliery, Unanderra, New South Wales, were received during August 1957. Extensive damage was reported to be occurring in timbers either at the mine-entrance or up to 600 yards along the working-shaft, and 300 yards along the

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* Earlier parts of this series were published in:
(1) Proc. Roy. Zool. Soc. N.S.W. 1955-56 (1957), p. 74.
(2) Proc. Roy. Zool. Soc. N.S.W. 1956-57 (1958), p. 77.
(3) Austr. Zool. 12, 1959, p. 337.
(4) Proc. Linn. Soc. N. S. Wales (in press).

air-return shaft. The air-return shaft was considered to be warmer and more humid than the air-intake shaft.

The species of timber mainly concerned was *Eucalyptus maculata* Hook. (spotted gum), and all constructional members attacked appeared to be associated with considerable dampness. Varying amounts of decay due to fungal attack were present and the average life of timber props and bars was estimated at about three years in air-return shafts and eight years in air-intake shafts. Each year, replacements of timber amounted to approximately 58,000 cubic feet, and costs were considered to total many thousands of pounds for replacements and erection of props and bars (Unpublished report, N. Tamblyn & D. Edwards, May 1957).

Samples of wood containing larvae from this mine were received during August and September 1957 and from these adults emerged during October 1957. *B. turbatella* has been reared previously from the sapwood of *E. saligna* Smith (Sydney blue-gum), and sapwood and truewood of *E. acmenioides* Schauer (white mahogany).

Under conditions prevailing in the mine the workings of *B. turbatella* were very numerous, most of the sapwood being destroyed. The thin external layers of the affected timbers were usually covered with larval excreta attached to fine silken webbing, from which also hung strands of silk with excreta attached.

Because of very heavy attack by larvae and fungi in the timber sample submitted, it was difficult to determine accurately whether or not the sapwood only was attacked.

Adults of *B. turbatella* have a wing-span of approximately 16 to 18 mm. The fore-wings are mottled with black, grey and fawn, on a fawn background, and in general appearance are typical of the other species in the genus *Barea*. The hind-wings are pale fawn. The moths appear rather drab, and are usually inconspicuous when resting on poles, trees, or timber which has become weathered on the surface.

Last instar larva:

Length approximately 13 mm. General colour, cream. Head-capsule dark tan. Prolegs on abdominal segments three to six and ten. The positions of the ocelli on the head-capsule, and the setae surrounded by coloured markings on the abdominal segments, are as those on the corresponding segments of *B. consignatella,* but the coloured markings are so reduced in area as to be indistinct without magnification, as are those on *B. confusella.*

The last instar larva of *B. turbatella* may be distinguished from those of the same instar of *B. consignatella, B. banausa* and *B. confusella* by its smaller size, and from the two former species particularly, by the considerably paler brown colouring of the areas surrounding the setae. The absence of the pale oval mark antero-dorsal to the prothoracic spiracle on the pale yellow coloured band, and the absence of the series of smaller oval marks in a more or less longitudinal line anterior to this spiracle serve to distinguish larvae of *B. turbatella* from those of *B. confusella;* also, the pale yellow area on the prothorax surrounding the spiracle (fig. 1) is not separated anteriorly from the broad coloured band as in *B. confusella* and is but indistinctly separated posteriorly from it.

Larvae are in the collection of the Forestry Commission of N.S.W.

(b) *Machetis aphrobola*

Larvae of this species were collected during September 1957 at Ourimbah State Forest, No. 290, from a small, dead stem of *Acacia prominens* A. Cunn. ex G. Don. (Gosford wattle), from which no excreta hung externally in loose webbing, as was the case with larvae of the genus *Barea.*

Pupation occurred in fine silken cocoons in the workings, and adults emerged during September 1957. Adults superficially resemble those of the genus *Barea* because of the similar mottling of the fore-wings, which are black and white.

Distribution:— Queensland, N.S.W., Victoria, and according to Meyrick (1883) occurs from Sydney to Hobart in Tasmania, from October to December, and is rather common, usually at rest on fences.

Last instar larva:

Length approximately 15 mm. General colour almost white. The colour of the head-capsule is distinct from those species of the genus *Barea* reared by the writer. An area which includes the clypeus and frons, and extending in an arc laterally to the ocelli, is of a paler brown than the remainder of the head-capsule which is mottled brown and dark-brown. The positions of the setae on abdominal segments 1 to 8 are as those on the corresponding segments of *B. consignatella,* but the dark spots are much reduced in area and are indistinct. A setal map of the thoracic segments and abdominal segments 9 and 10 is given (fig. 2).

Larvae are in the collection of the Forestry Commission of N.S.W.

COSMOPTERYGIDAE

(c) *Labdia deliciosella*

Several larvae and pupae were collected during August 1957 at North Sydney, from the branches and trunk of an unhealthy apple tree (cultivated variety), which had also been attacked by larvae of the Cerambycidae (Coleoptera). This tree was dominated by larger trees and appeared to be debilitated by their competition for space, light and probably nutriment.

Larvae were feeding on either the bark or dead and dying areas beneath, or on the wood. They occurred in either wet or dry areas on the one tree, from near ground-level to the upper branches. Larvae pupated among the excreta and debris in the longicorn workings, and it appeared likely that they also fed on these substances.

Larvae from *Wistaria* sp. attacked by longicorns, from St. Ives (Sydney) were also reared to the adult stage during 1959.

On some of the larvae there were two spots, rose-pink to pale orange in colour, one on each side of the medio-dorsal area of either one or each thoracic segment and abdominal segment 1. These spots disappear from specimens preserved in alcohol. Those with the coloured spots were reared separately from those without the spots, and it was determined that all larvae, either with or without the spots were those of *L. deliciosella.* These spots persist into the early pupal stage.

Larvae pupated in thin silken cocoons covered with excreta and/or chewed particles of wood and bark, and pupation occupied about 20 days during October. Adults emerged during September to November, and April.

The wing-span of the adults is approximately 16 mm. The forewings are beautifully coloured, being golden-yellow, with a golden spot on a black area at the apex of the wing, the basal area being golden brown with narrow blue and silver longitudinal stripes. Hindwings are of a uniform shade of brown.

The distribution of this species, as determined from label data on specimens, is from Darwin in the Northern Territory, through Rockhampton, Yeppoon (Turner, 1925), Atherton, Bundaberg, Toowoomba, Brisbane and Mt. Tambourine, in Queensland, and to Newcastle and Sydney in New South Wales.

Meyrick (1897) states "it is very common where it occurs."

Last instar larva:

Length approximately 10 mm. General colour, cream. Either with or without a spot each side of the medio-dorsal line on any or each thoracic segment and first abdominal segment, rose-red to pink or pale orange in colour. Segments on which the spots occur are suffused yellow on fresh specimens. Prothorax with a pale yellow band from near the medio-dorsal line to above the spiracle. This marking is often incomplete on immature specimens. A pale yellow area, often indistinct, surrounds the group of 3 setae anterior to the spiracle. Setae on abdominal segment 1 are as those on segment 2 except that where there is a group of 3 ventral setae on segment 2, there are sometimes only 2 setae on abdominal segment 1. (Setal map fig. 4, head-capsule fig. 3, and pupa fig. 8.)

XYLORYCTIDAE

(d) *Scieropepla* nr. *rimata*

Larvae of this species were collected during January 1959 in a thich red-brown mass of webbing around the stems of a low, native shrub growing at Katoomba, New South Wales. About 15 larvae occurred together in the webbing which had excreta and dark red-brown shiny "shavings" mixed with it. Beneath the webbing the sapwood of the dead stem was attacked. The larvae pupated, and adults emerged during January, the pupal period occupying about 8 days.

Larvae attacking the dead centres of *Banksia* sp. inflorescence, by comparison were considered to be of a different species.

Adults of *S.* nr. *rimata* have a wing-span of about 19 mm. The forewings are grey, composed of black and silver-grey scales, paler along the costa and darker toward the dorsum. Hindwings are greyish-fawn. The maxillary palps curve over and beyond the dorsal aspect of the head.

Mr. I. F. B. Common, in a personal communication (1959) said, "I think your species is very near to *S. rimata* Meyr., but I would need to study the genitalia before I would be prepared to say this definitely."

Last instar larvae (fig. 5) are about 10 mm. in length, and vieux-rose in colour. The intersegmental mebranes are folded to form paler bands between each segment. Prolegs are on segments 3 to 6 and 10. Crochets vary in number from 4 to 7 (usually 6), and are illustrated in fig. 9.

Larvae are in the collection of the Forestry Commission of N.S.W.

The pupa, 6 to 7 mm. in length, is shown in fig. 7.

OEDEMERIDAE (Coleoptera)

(e) *Nacerda melanura*

This insect is also known as "the wharf-borer." It occurs in England (Imms, 1948), along the Atlantic coast and around the Great Lakes in the U.S.A., and in New Zealand (Craighead, 1950); Australia, in the States of New South Wales and Victoria (Blackburn, 1899), and Tasmania (Walker, 1936).

The species is recorded from Denmark, Siberia, Japan and the Bahama Islands. It is not dependent on maritime conditions and occurs in localities over a thousand miles from the sea (Balch, 1937; Fisher, 1936).

Biology of the species is also recorded by Blair (1936) and Laing (1936).

In the collection of the Agricultural Department of N.S.W. is one specimen, collected at Gosford, New South Wales, 2 Feb., 1934, by

N. C. Lloyd. There is one specimen in the Australian Museum, without date, labelled "Annandale, near Sydney, determined A. M. Lea, introduced." Presented to Australian Museum 1900 from S. W. Griffith's Museum. In the collection of C.S.I.R.O., Canberra, A.C.T., are two specimens from Auckland, New Zealand, 12 Dec. 1947, and two labelled E. W. Ferguson Collection, Sydney.

N. melanura now appears to have been established in this country for many years.

During August 1957, larvae occurring in the corner-moulding of a building in Sydney, New South Wales, were submitted to the writer for identification. The larvae were reared to the adult stage, and emergences occurred during October 1957.

During January 1958, several larvae were collected at Cockatoo Island dockyards, Sydney Harbour, from the basal area of piles six feet below ground-level. Adults were also collected at Lane Cove, Sydney, during January 1958. During the same month larvae were found infesting timber girders below-deck, on the ketch "Wyatt Earp" which is well known because of its activities in the Antarctic during the International Geophysical Year. This vessel, later re-named the "Natone," was wrecked in a cyclone during January 1959, on the coast of Queensland.

Larvae of all instars occurring together in the damaged areas were found in the timber samples received, and all samples showed varying amounts of rotting in the areas attacked. In the attacked areas on the base of the piles from Cockatoo Id., and the girders in the "Wyatt Earp," there was evidence of considerable moisture, which was reported as being due to contact with salt water.

Eucalyptus sp. is stated to be attacked (Walker 1936).

The corner-moulding from the Sydney building was identified as *Doryphora sassafras* Endlicher (sassafras), and the piles were of *Syncarpia laurifolia* Tenore (turpentine). Both of these timber species are indigenous to Australia. The girders in the "Wyatt Earp" were identified as *Pinus sylvestris* Linn. (red Baltic pine).

The adult beetle, approximately 16 mm. in length, is of a rusty-brown to pale brown colour on the basal two-thirds of the elytra, the remainder bearing varying amounts of dark blue to black at the tips.

Last instar larva: (fig. 6).

Length approximately 18 mm. Opaque white. Antennae comparatively long, four-jointed, projecting anteriorly to beyond the closed mandibles. A group of a variable number of dark, minute ocelli (?), sometimes in two lines, at the base of each antenna laterally. Head-capsule (fig. 10) pale cream, with darker cream longitudinal dorsal and lateral striations; slightly wider than prothorax; more or less flattened dorso-ventrally, broadly rounded laterally; mouthparts prognathous; mandibles elongate, sides sharply narrowing to approximately two-thirds, then more or less parallel to the tips; labrum pale brown; anterior half of clypeus cream, posterior half dark brown; frons and a narrow area each side extending to and surrounding antennae, pale cream. A pair of true-legs with single tarsal claw on each thoracic segment; a series of brown ventral spines on each tarsal segment; width of thoracic segments reduced evenly to the abdominal segments which are more or less equal in width, except segments 9 and 10; well developed pseudopods with a series of ventral spines on abdominal segments 3 and 4; a series of short, brown, dorsal spines on raised areas of each thoracic segment and abdominal segments 1 and 2.

Lateral view of a larva and the right mandible is figured by Peterson (1953), and Craighead (1950).

ACKNOWLEDGMENTS.

Thanks are expressed to Mr. K. Bamber of the Division of Wood Technology, Forestry Commission of N.S.W., for the identifications of the timbers; to Messrs. P. Callaghan and J. Cope for submission of specimens, and their interest in the project; to Messrs. I. F. B. Common of the C.S.I.R.O., and D. K. McAlpine of the Australian Museum for identifications of the adult insect specimens; to Mr. A. Musgrave of the Australian Museum, and Mr. K. L. Taylor of C.S.I.R.O., Canberra, for valuable assistance with the references.

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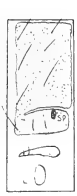

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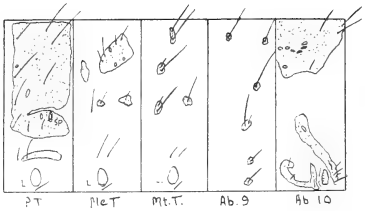

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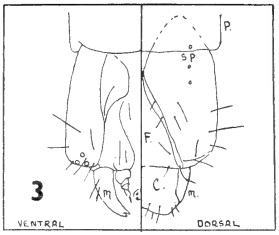

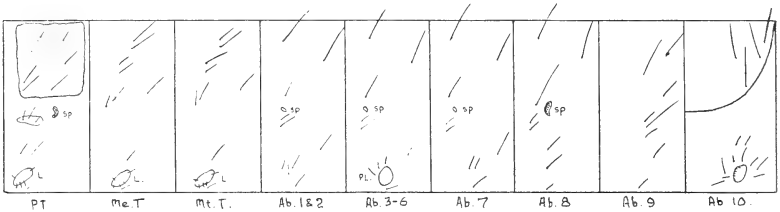

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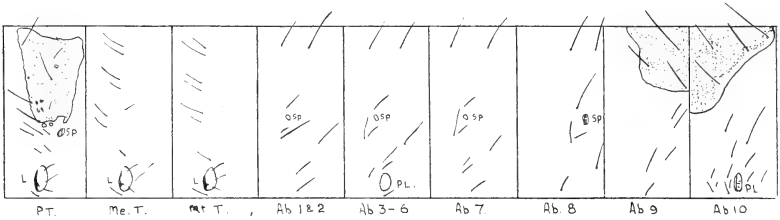

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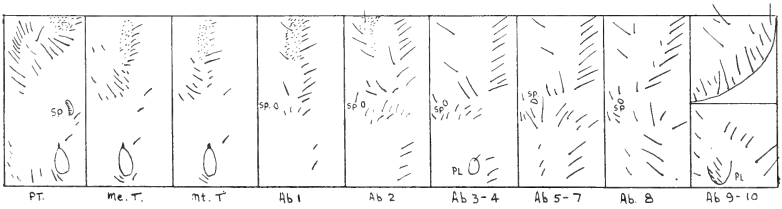
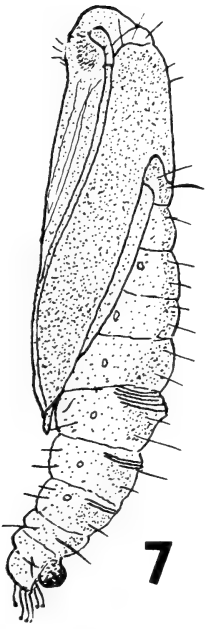
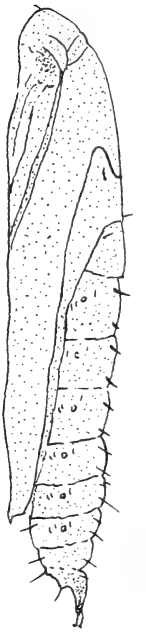


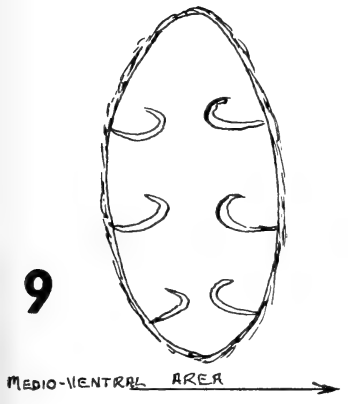
6

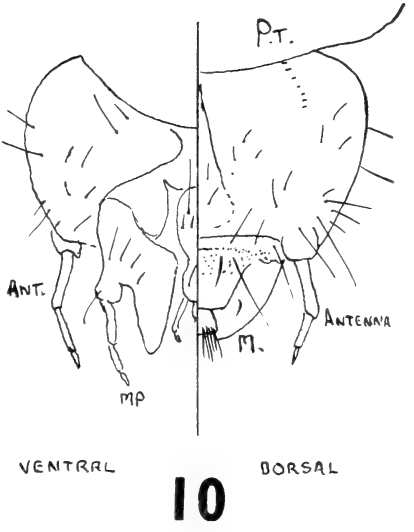
EXPLANATION OF FIGURES.

1. Setal Map of prothorax of *Barea turbatella.*
2. Setal Map of thorax and abdominal segments 9 and 10 of *Machetis aphrobola.*
3. Head-capsule of *Labdia deliciosella* (ventral and dorsal views): sp—sensory pits, c—clypeus, m—mandible, f—frons, p—prothorax.
4. Setal Map of *L. deliciosella.*
5. Setal Map of *Scieropepla* nr. *rimata.*
6. Setal Map of *Nacerda melanura.*









7. Pupa of *Scieropepla nr. rimata* (x 12).
8. Pupa of *L. deliciosella.*
9. Crochets on prolegs of *S.* nr. *rimata.*
10. Head-capsule of *N. melanura* (x 15).
m—mandible, ant.—antenna, mp—maxillary palp, pt—prothorax.

Notes on Australian Cicadidae

By A. Musgrave.

(Contribution from the Australian Museum, Sydney.)

In the *Australian Naturalist* for July 1932 appeared a paper entitled, "The Identity of *Psaltoda harrisi* and that of a near Ally," by the late Dr. E. C. Chisholm who was then stationed on the Comboyne Plateau, New South Wales. In his paper he describes and figures as new a species of *Psaltoda* from Camden Haven, New South Wales, which he calls *longirostris,* while another species of *Psaltoda* is regarded as *harrisii* Leach. In the present paper I discuss the validity of these species. I am indebted to the late Miss E. A. King for the accompanying illustrations.

PSALTODA CLARIPENNIS Ashton.

(Figs. 1, 2.)

1921. *Psaltoda claripennis* Ashton, Proc. R. Soc. Vict, (n.s.) xxxiii, May. 94. Queensland.

1932. *Psaltoda harrisii* Chisholm, Aust. Nat., viii (7) July: 131-134, figs. A, B. Camden Haven River, N.S.W. Not *Psaltoda harrisii* (Leach).

In the Australian Museum is housed the J. H. Ashton collection of cicadas, and I have selected a male specimen of *claripennis* from Maryborough, Queensland, to be figured. It agrees with male specimens from Trial Bay, New South Wales, collected by me. This is the unnamed species of *Psaltoda* mentioned in the popular article in the *Australian Museum Magazine,* iv (5) 1931: 154, by myself and Mr. G. P. Whitley. The differences between this species and *harrisii* Leach are given by Ashton in his description. The length of the proboscis which differs markedly in the two species is also cited by Dr. Chisholm, but the character of the opercula is overlooked by him. As Ashton points out, "The opercula of this lighter species meet in the centre, those of *harrisi* do not." This overlapping of the opercula will be seen in the illustration of the ventral surface of the abdomen (Fig. 2).

The frons of *harrisii* is black, that of *claripennis* "greenish-yellow or brownish-yellow" with light transverse black bars on the upper part.

PSALTODA HARRISII (Leach).

(Fig. 3.)

1814. *Tettigonia harrisii* Leach, Zool. Misc., i: 89, tab. xxxix, f. ii. New Holland.

1835. *Cicada dichroa* Boisduval, Voy. de "Astrolabe," p. 613, pl. x, f. 7. Sydney.

1850. *Fidicina subguttata* Walker, List. Hom. Brit. Mus., Pt. i: 95. New Holland.

1861. *Psaltoda harrisi* Stal, Ann. Soc. ent. Fr., (4) i: 614.

1904. *Psaltoda harrisii* Goding and Froggatt, Proc. Linn. Soc. N.S.W., xxix (3) Dec. 16: 590.

1921. *Psaltoda harrisi* Ashton, Proc. R. Soc. Vict., (n.s.) xxxiii: 94.

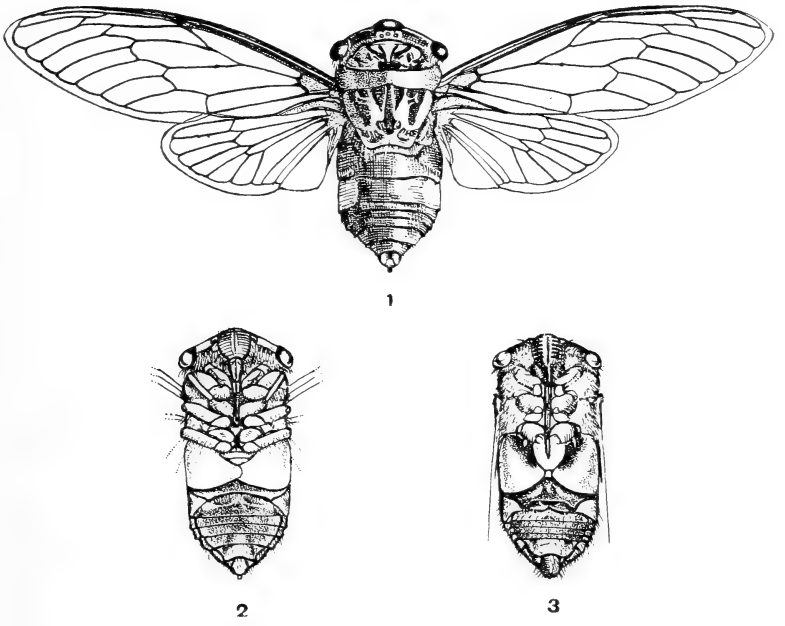
1931. *Psaltoda harrisii* Musgrave and Whitley, Aust. Mus. Mag., iv (5) Jan. 16 = 21: 153. Trial Bay, N.S.W.

1932. *Psaltoda longirostris* Chisholm, Aust. Nat., viii (7) July: 131. Camden Haven River, N.S.W.

Dr. Chisholm's *longirostris* appears to be exactly synonymous with this species. While some doubt may exist as to the identification of Leach's *harrisii,* I think there can be little doubt that Dr. Chisholm's species is referable to the form that we have come to regard as Leach's species, and, moreover, the emphasis that Dr. Chisholm puts on the "song" of the species, suggests that it can be only the true *harrisii.*

He states, "The main functional difference, which, to anyone who has studied the species in the field, at once puts the distinction of the two species beyond doubt is the song, which, of either, once heard could never be confused one with another." In our joint article in the *Australian Museum Magazine,* cited above, Mr. G. P. Whitley and I pointed out some peculiarities of the song of *Psaltoda harrisii,* our observations being based on specimens observed and collected by us at South-West Rocks, Trial Bay, and not very far north of Camden Haven River the type locality of *longirostris.* As long ago as 1814 the species was known as the "Razor Grinder," according to G. P. Harris who sent specimens to Leach. Both ***P. harrisii*** **Leach and** ***P. claripennis*** **Ashton,** were common among the Banksia trees on the sand dunes at South-West Rocks.

I feel confident, therefore, that the songs of Dr. Chisholm's *longirostris,* and that of the insect heard by Mr. Whitley and myself at South-West Rocks, Trial Bay, are those of the same species.



Australian Cicadas of the genus *Psaltoda.*

Ethel King del.

All specimens in the British Museum identified by the late W. L. Distant, and including the possible type, agree with specimens from Trial Bay, N.S.W.

The synonymy of this species calls for comment, and it would appear that literature on the subject was not available to Dr. Chisholm since no mention is made to previous contributions on the taxonomy of the species.

Leach's original descriptions in Latin and English are practically valueless, as may be seen from the English description which is given here and which is simply a translation of the Latin one. His plate is also of but little value though it shows the wings to be devoid of infuscations.

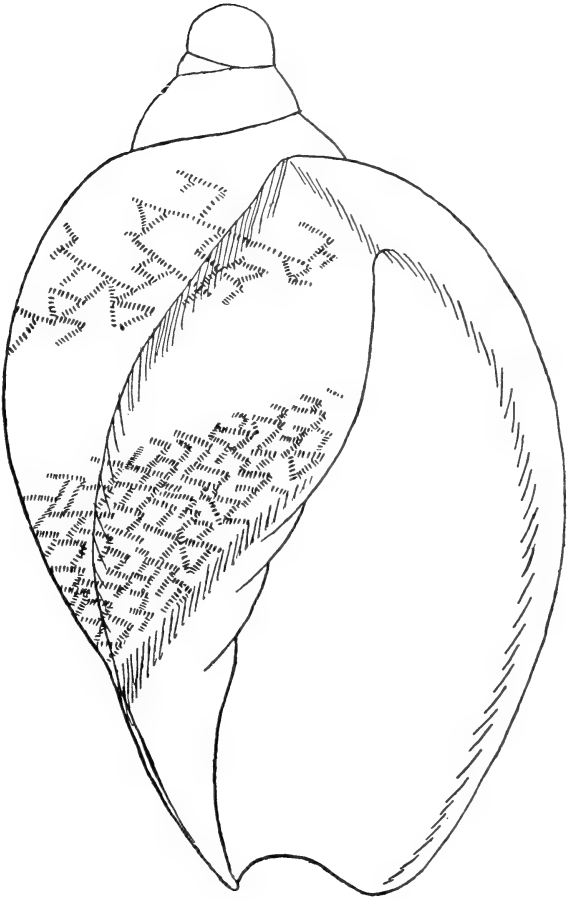
"(TETTIGONIA HARRISII) Harrisian Tettigonia.

Black; head and thorax spotted, and back banded with reddish; hinder feet, four anterior thighs, and belly, dirty yellow; abdomen on either side with a lateral, pale, silky spot. *Tettigonia Harrisii* is very common in New Holland. It was first sent home by the late G. P. Harris, Esq., who informed me that it was named by the colonists (from the noise it made whilst on the wing), the Razor-grinder."

In 1835 Boisduval described this species from Sydney under the name of *Cicada dichroa,* his figure, showing the ventral surface of the insect, leaving no doubt as to the identification of the species.

Walker's *Fidicina subguttata* is also an absolute synonym of this species.

THE MARINE ZOOLOGIST



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Some Observations on the Development of Two Australian Octopuses

By Barbara Dew.

(School of Public Health and Tropical Medicine, University of Sydney.)

SUMMARY.

This paper deals with the development of two species of Sydney Octopuses, *Octopus cyaneus* Gray 1849, and *Hapalochlaena maculosa* Hoyle 1883. Details are given of the development of both species and a comparison made. The paper is illustrated with line drawings.

OCTOPUS CYANEUS Gray 1849.

On the 28th May 1957, a medium sized octopus of the common Sydney species, *Octopus cyaneus,* was found in a large stone jar on the sand flats at Gunnamatta Bay, Port Hacking, New South Wales. It was brought into the aquarium at C.S.I.R.O. Division of Fisheries and Oceanography and placed in a large concrete tank, 4 ft. 10 ins. deep. She fed readily on crabs and pieces of fish and on one occasion was seen to catch and eat one of the fish sharing her tank.

On 8th October it was noticed that she was not eating or behaving as she had previously and an examination was made of her "nest." This "nest" had been built in the darkest and deepest corner of the tank and consisted of dead and living mollusca, chiefly mussels (*Trichomya hirsuta*). It was noted, once the octopus had been removed from the "nest" that she was brooding a large batch of eggs. One of the egg strings was examined and it was found that development had just started. This was very interesting as the octopus had been alone since capture. When captured on 28th May another large octopus was disturbed on the outside of the jar and swam away when the jar was examined. If this was the male, copulation must have occurred at least 110 days before the laying of the eggs, showing that active sperm can be stored for a long period.

On a previous occasion in this laboratory in April 1957 a very large female of the same species laid and hatched eggs. In both cases the females laid eggs in the darkest corner. Laying commenced on 4th April and hatching began on 8th May and continued until the 14th, when the mother died.

CARE OF EGGS.

The octopus, when disturbed, showed considerable agitation and returned to the egg mass as soon as she was released. This care of eggs by marine invertebrates is not very common and was watched with interest. When food and other objects were put near the female she tried to push them away and if this failed tried to hide by pulling loose mollusca over the narrow opening to the "nest." If the "nest" was disturbed by removing

some of the molluscs these were replaced as soon as the "danger" had passed. Owing to the darkness and depth of water it was difficult to make detailed observations of parental care. The mother used her siphon to squirt water over the eggs, and her tentacles were usually weaving in and out among the egg-strings. The same thing was observed with the female in April 1957, and Le Souef & Allan recorded the fact in some detail in 1933 and 1937.

Unfortunately on 29th October 1957 the tank had to be emptied and cleaned and the octopus was released into the sea in a rather weak state. Her "nest" was destroyed and the eggs removed and examined. It came as a surprise to find that hatching had commenced and was progressing at a rapid rate because the eggs examined on 8th October showed little sign of development and it was believed that, as reported by Le Souef & Allan (1937), 5-6 weeks had to elapse between laying and hatching.

The opportunity was taken to make some observations on the development of the eggs and larvae and to compare the results with those observed during the previous April.

EGGS AND EGG-SHEET.

The eggs were laid in a compact sheet, covering an area of 18 sq. cms. and consisting of 230 strings, each containing between 700-800 eggs. The oval eggs, yellowish in colour, were carried on a fine stalk 2.5 mm. in length, the eggs themselves being 2.5 mm. long and 1 mm. in breadth. The ends of the stalks were entwined together and formed a central string, which was brownish-green in colour, largely due to attached detritus. Of the 230 strings, 180 were measured in a fresh state, the remainder having either been preserved or lost. Those measured had a size-range from 60-83 mm. with the vast majority falling between 70-80 mm. One string in this range was examined and found to contain 796 eggs. Taking 700 as a conservative average, this octopus had laid more than 161,000 eggs, a very large number in view of the care and protection given to the eggs by the female.

The individual strings, with ova in many stages of development, were firmly cemented to the wall of the tank, the whole sheet looking like dozens of bunches of tiny grapes. Figure 1a shows part of a string with some of the eggs removed to show the main string. As development continued the colour deepened and the developing embryo could be clearly seen. Even at this stage, before hatching, and while remains of the yolk sac were still present, the black and orange-tan chromatophores were quite well developed and seemed fully functional.

HATCHING.

As has been observed with other species of octopods, normal emergence was rear end first, followed by the head and tentacles. The time taken for emergence varied and some larvae failed to get clear at all and died half out of the egg. The siphon and mantle actively helped the larvae to emerge. Le Souef and Allan (1937) recorded and illustrated a larva which emerged head first, but this was not seen among the present series.

Once hatching was completed the small active larvae swam to the surface of the dish in little jerks, leaving behind the empty egg-case with its narrow vertical slit at the top of the free end.

LARVAL DESCRIPTION.

The larvae on hatching were on the average 2.5 mm. in length and a little over 1.0 mm. in breadth. Once the larvae were dead and fixed considerable shrinkage occurred. The general shape of the young octopus was decidedly squid-like and not at all like that of the adult octopus, this shape probably suiting it better for a planktonic existence.

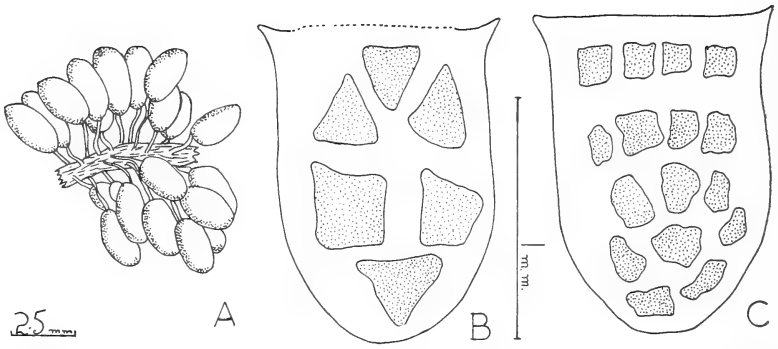

Figure 1: *Octopus cyaneus.* A—Cluster of eggs, with some removed to show the stalk. B—Dorsal chromatophore pattern. C—Ventral chromatophore pattern.

The large deeply pigmented eyes were well developed and apparently could perceive light and colour as indicated by the reaction of the chromatophores. The short tentacles were not fully developed and had only three suckers near their base. There were usually three black chromatophores on each tentacle.

The heart and gills were very clear and the action of the heart could be seen even after it had been anaesthetised with a 7½% solution of Magnesium Chloride. At the top of the branchial gills were the two stellate ganglia.

On the dorsal surface (figure 2B), the large cerebral ganglia took up a central place in the future head. The lower dorsal chromatophore pattern was fairly constant and a typical arrangement is illustrated in figure 1B. There were usually 6 orange-tan chromatophores, although this number varied somewhat.

On the ventral surface (figure 2a), the most obvious structure was the large muscular siphon which plays such an important part in the development and life of the octopus. It had four small black chromatophores, two near the lip and two on or below a line level with the edge of the mantle (figure 2c). Behind the siphon and within the future head lay a pair of otocysts with their otoliths, the important organs associated with balance.

Within the lower part of the body could be seen the relatively large and conspicuous ink-sac. The lower ventral chromatophore pattern was fairly constant but there was some variation (figure 1c). There were usually 16 orange-tan chromatophores, but this number could be 19 or 20.

LARVAL BEHAVIOUR.

On hatching the larvae were strongly phototropic and negatively geotropic. They swam actively near the surface using their siphons continuously. After 2-3 days quite a number were seen lying either resting or dying on the bottom of the dishes or tanks. Batham (1957) had difficulty in keeping the larvae alive and similar difficulties were encountered here.

A few larvae were kept in a large dish placed on a bench in the laboratory, the remainder were kept in the aquarium. Two groups were placed, side by side, in large perspex tanks, one with and one without aeration, but all these methods were without avail and the larvae died over the weekend of 2-4 November. Another group was placed in a tank of running sea-water; a few larvae were alive on the 3rd, the last one dying on the morning of the 4th November.

Whether death was due to a sudden change in weather (the temperature over the weekend was over 90°F.) or lack of food is hard to say. Several attempts to feed the larvae were made but without success. Copepods, brine shrimps and very small pieces of fresh fish and mollusca were offered but all were refused.

The length of larval life is unknown and the several attempts to raise the larvae have failed. When further attempts are made due consideration must be given to accurately controlled temperatures and food-requirements. *Octopus cyaneus* has been recorded as breeding in October-November (Le Souef & Allan, 1937), September-October (Le Souef & Allan, 1933), and in the Fisheries Laboratory, Cronulla, in both April and October-November, 1957. To date it is not certain if this species breeds throughout the year in its natural environment.

HAPALOCHLAENA MACULOSA Hoyle 1883.

This small octopus is quite common around Sydney and its conspicuous coloration makes identification certain. At rest and in an undisturbed state the general body-colour is a dull yellowish ochre with conspicuous rings and lines of blue. When the animal is agitated these colours become brilliant, especially the blue.

On 24th October 1957, an average sized female was found brooding eggs in an empty *Pinna menkei* shell. On examination it was found that the eggs, 96 in number, were in various stages of development. The *Pinna* was in a very damaged state and during the night the female left the shell with her eggs and established herself in a corner of the glass tank. Next morning the female was examined and it was noticed that the eggs were attached to her body, both to the web and the tentacles. Whether this is the normal habit or only occurred because the female left the shell cannot be determined, but it showed that the animal can and will move her eggs if necessary. Later in the morning an empty scallop shell was placed in her tank and the octopus "moved in" with the eggs still attached to her body.

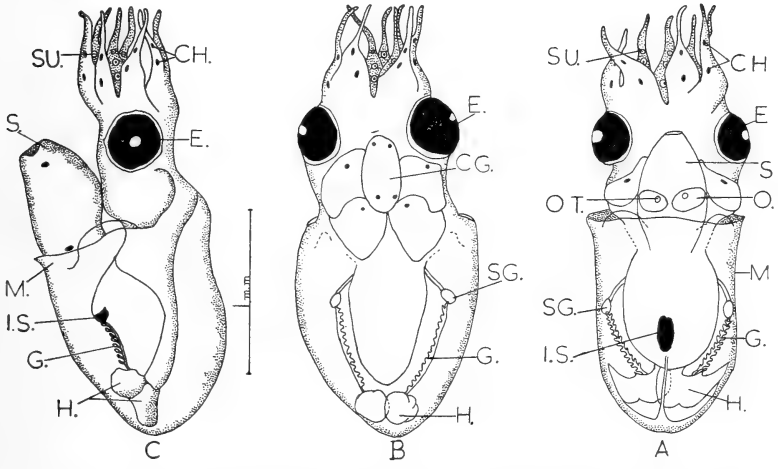

Figure 2.—*Octopus cyaneus.* A—Ventral view of a freshly emerged larva. B—Dorsal view of a freshly emerged larva. C—Lateral view of a freshly emerged larva. CG—Cerebral ganglia. CH—Chromatophores. E—Eye. G—Gills. H—Heart. I.S.—Ink Sac. M—Mantle. O—Otocyst. OT—Otolith. S—Siphon. SG—Stellate Ganglia. SU—Suckers.

CARE OF THE EGGS.

The female exhibited great care for her eggs, and if one of the egg-clusters was removed and then placed near her, she at once picked it up and replaced it among her tentacles. She did not use her siphon to wash the eggs to the same degree as *Octopus cyaneus.* She formed a sort of "basket" with the web and tentacles and cradled the eggs in this. All food was refused, even if a crab came in or near the shell no action was taken.

EGGS AND EGG MASS.

The eggs were laid in small clusters of 5-20 (figure 3a), each carried on a fine stalk, the stalks being united and attached to the female. The relatively large eggs, 8 mm. in length by 3 mm. in breadth, were oval in shape and contained a very large yolk. This yolk gave the eggs a yellowish colour which changed as the embryo developed. As with the preceding species, the developing embryo could be clearly seen through the transparent egg-membrane, and the action of the chromatophores observed.

The large yolk of the egg occurred in two positions, either near the free end or more uncommonly at the end near the stalk. Before hatching occurred, development seemed to have reached about the same stage within any one cluster, although among the whole egg-mass there were eggs in various stages of development.

HATCHING.

Hatching was not observed, but when the larvae were first seen on 18th November they were actively crawling on the glass of the tank. The larvae did not appear to have a free-swimming stage and only swam when really disturbed. Of the 96 eggs, 17 failed to hatch, while 16 were preserved. The remainder were of two types, those which still had the remains of the yolk-sac attached and those without, the latter being in the majority.

On the morning of 18th, as the female was dead, an examination was made of the unhatched eggs before they were preserved. It was noted that the majority of the developing embryos had the yolk-sac towards the free end. As the egg splits along the free end it would seem that the larvae would have to emerge head first, which is unusual with octopods. One can only assume that the failure of these particular larvae to develop at the same rate may have been due to this abnormal position.

LARVAL DESCRIPTION.

The embryos were examined on several occasions before hatching, the first being on 25th October and the last on the day of hatching, the 18th November.

On the 25th October, the day after the female was brought into the laboratory, the degree of development varied. The future suckers were well developed and the chromatophores, although small, were beginning to function. The siphon was developing and the heart beating strongly.

On 7th November, another group of eggs was examined and showed further development (figure 3B). The suckers on the tentacles were larger and stronger and the tentacles themselves moved backwards and forwards

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Figure 3.—*Hapalochlaena maculosa.* A—Cluster of eggs, showing developing larvae and some empty cases. B—Developing larva of 7/11/57, showing the early chromatophore pattern. C—Ventral view of a freshly emerged larva. D—Dorsal view of a freshly emerged larva. F—A tentacle showing sucker arrangement. I.S.—Ink sac. M—Mantle. O—Otocyst. OT—Otolith. S—Siphon.

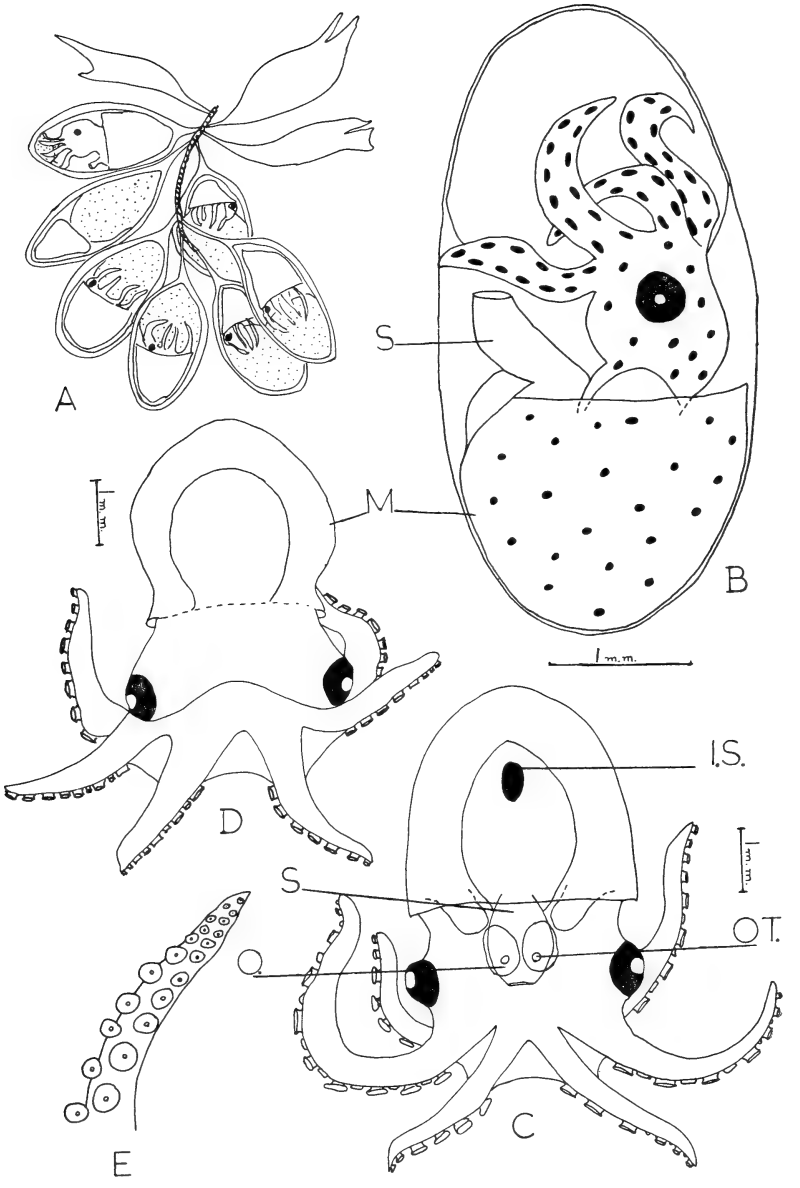

Figure 3.

over the remains of the yolk-sac. The chromatophores were larger and better developed, there being two rows along each tentacle, while the head, body and mantle contained a large number of irregularly scattered ones. The siphon was well in evidence on the ventral side.

The fully developed and freshly liberated larvae (figure 3 c and d) had a typical "octopus" shape. They were darker in colour than the adults because of the number and arrangement of the chromatophores. The chromatophores were arranged very irregularly over the whole body, the predominant colours being black, yellow and red-brown. The larvae could regularly flush the chromatophores of its body and mantle together or separately.

The tentacles still had their chromatophore pattern of two rows which were larger and more irregular than in the initial pattern. There were 21 well developed suckers which enabled clinging to the walls of the glass tank. The siphon was quite clear and fully functional. The two otocysts and their otoliths were clearly seen within the head and behind the siphon. At the rear of the body, on the ventral side, was a small ink-sac.

The well developed eye at first had a spherical pupil, but after 10 days this had taken on the characteristic oval slit of the adult. At the same time the body had undergone a change and the gentle curve of the mantle gave way to the more pointed form of the adult.

LARVAL BEHAVIOUR.

The larvae were quite active and showed a definite preference for crawling about the glass tank rather than swimming. For the first week none of the larvae showed any inclination to eat and a few died. On 25th November the remainder began to eat and until the 24th December ate small pieces of fish, crab and mollusc. They were offered food at the end of a mounted needle. If they did not want it, it was blown away by a jet of water from the siphon. One young octopus picked up a piece of fish from the bottom of the tank, but this was unusual as all food-scraps were removed once each octopus had a piece. If food was offered after refusal, more than once, the young octopus first tried to crawl away, and if this failed would swim off in a series of even jerks.

The number of survivors was gradually reduced from 63 to nil, the last one dying on 24th December. The reduction was believed to be due to the escape of the young octopuses between the small holes in the outlet pipe of the overflow and because some of the stronger individuals killed and ate(?) their fellows.

COMPARISON OF THE TWO SPECIES.

Table 1 gives all the available information concerning the developmental story of two of the common Sydney Octopuses. Both species guard and brood their eggs, both refused food during this period and in captivity the female invariably died. Whether this also occurs in nature must remain purely speculative.

The chief differences between the species with regard to reproduction is the size and number of the eggs and the behaviour of the female towards them. Both took good care of their eggs and objected to any interference. *Hapalochlaena maculosa* carried her eggs with her and never left them but did not use her siphon to keep them clean of detritus. *Octopus cyaneus* carefully guarded her eggs, which were attached to the wall of her "nest," kept them flushed by the action of her siphon, but she would occasionally leave them unattended for some minutes. The large *Octopus cyaneus* laid many thousands of small eggs which gave rise to a planktonic larvae while the smaller *Hapalochlaena maculosa* laid fewer, larger eggs without a planktonic stage.

TABLE 1.

Species	Locality	Date of laying	Date of hatching	Incubation period	Egg care and brooding	Egg Size	Egg number	Fate of female	Behaviour of larvae	Fate of larvae	Reference
Octopus Cyaneus	Port Jackson, N.S.W.	End of Sept. '32	—	—	Used siphon and tentacles	3 mm.	—	Died Nov. '32	—	Failed to hatch	Le Souef & Allan 1933
Octopus Cyaneus	,,	13/4/33	—	—	—	—	—	Died 24/4/33	—	,,	,,
Octopus Cyaneus	,,	5/10/37	10-15/11 1937	35-42 days	Used siphon and tentacles	3 mm.	1000 +	Died	Swam to surface	Died	Le Souef & Allan 1937
Octopus Cyaneus	Gunnamatta Bay, N.S.W.	4/4/57	8-14/5 1957	34-40 days	,,	2.5 mm.	1000 +	Died	,,	,,	Dew
Octopus Cyaneus	,,	Before 8/10/57	29/10/57	21 days +	,,	3 mm.	161,000 +	Released into bay	,,	,,	,,
Hapalochlaena maculosa	,,	Before 24/10/57	17-18/11 1957	24 days +	Formed a cage with web and tentacles	8 mm.	96	Died	Crawled on sides and floor of tank	Fed and grew. Last died 23/12/57	,,

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Some Observations on the Development of the Australian Squid Sepioloidea lineolata Quoy & Gaimard 1832

By Barbara Dew.

On 10th December, 1957, a number of eggs of the common Lined or Dumpling Squid, *Sepioloidea lineolata,* Quoy & Gaimard 1832 were collected on the under side of a rock in about 10 feet of water, off Hungry Point, Cronulla, New South Wales. The eggs were brought into the laboratory of the C.S.I.R.O. Division of Fisheries and Oceanography and placed in a tank of running sea water. On examination they were found to be in an early stage of segmentation, probably indicating that laying had recently occurred.

The eggs were left in the tank to see what would happen and if they would develop without the parent as this small squid had been recorded on a number of occasions as "guarding" her eggs by squatting over them.

The adult Dumpling Squid rarely grows more than 50 mm. long. It is a pretty animal having a whitish background with either blue or more commonly brownish lines. They spend most of their time almost completely buried in the sand where they wait for their prey. Their favourite food is shrimps, but they will also eat small crabs and tiny fish. They are thorough feeders and unlike the octopuses leave very little of their victims, most of the carapace and legs being devoured.

EGGS AND EGG MASS.

The eggs, 55 in number, were 10 mm. in diameter, white in colour, and individually attached to the rocks by a very short stumpy stalk (figure 1A). They were laid on the undersurface of the rock and showed no pattern in the way in which they were laid, some were close together yet others were quite isolated from their fellows.

The opaque, gelatinous eggs were quite rigid and were composed of several layers, which could be peeled off quite easily.

EGG CARE.

The eggs developed normally in the aquarium, without the care of the female. In this respect they differ from the octopuses whose eggs apparently do not usually develop without the brooding efforts of the female. Whether squids normally guard and brood their eggs is a problem which needs further investigation. This squid has been reported as "guarding" her eggs, but perhaps she was laying eggs, as I have not seen squids showing the same care of their eggs as octopuses.

HATCHING.

Just before hatching commenced the eggs were removed from the large concrete tank and placed in a small glass one. As with the octopus, normal emergence was rear end first, followed very rapidly by the head and tentacles. The time taken from the first indications of violent larval action to emergence was about a minute. The first indications that a larva was about to emerge was a slight bulge to one side of the egg (fig. 1A); this bulge enlarged slightly and finally ruptured and the larva shot out. Once the membranes were ruptured emergence only took 2-3 seconds.

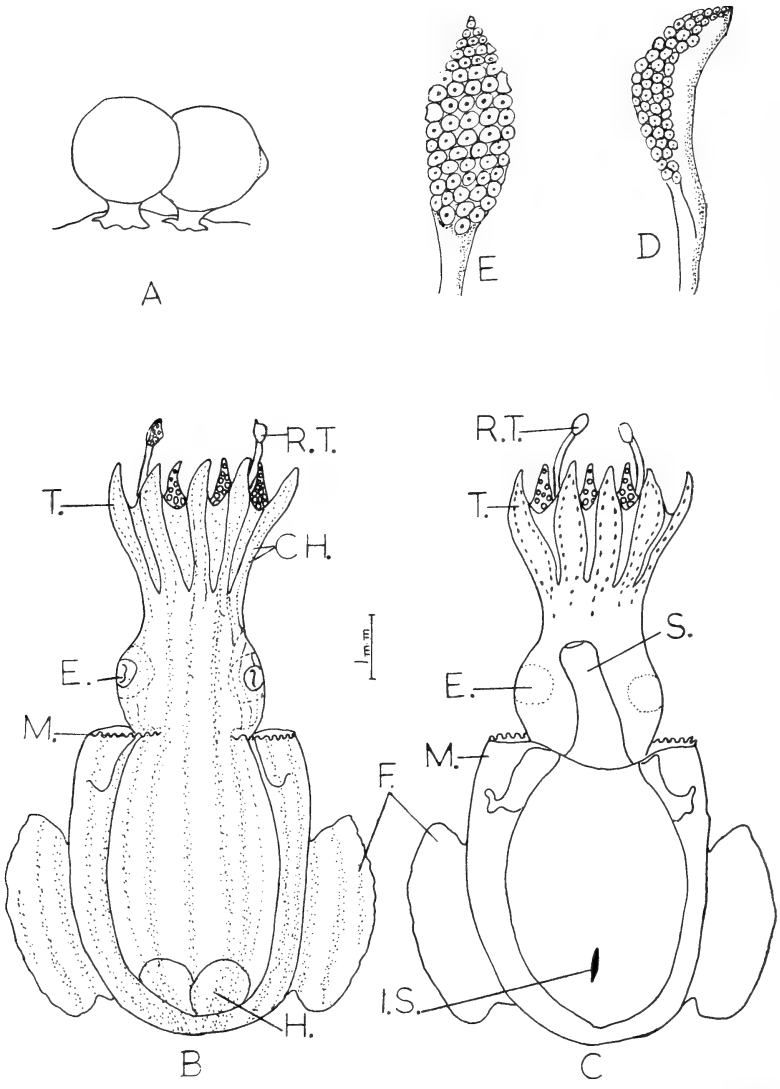

Figure 1.—*Sepioloidea lineolata.* A—Eggs, with one about to rupture and liberate the larva. B—Dorsal view of young larva showing various structures. C—Ventral view of same. CH—Chromatophores. E—Eye. F—Fins. H—Heart. I.S.—Ink Sac. M—Mantle. R.T.—Raptorial Tentacles. S—Siphon. T—Tentacle. D, E—Top of the Raptorial Tentacle showing suckers.

Hatching commenced on 13th January 1958 and continued very spasmodically until the 29th when the last of the 55 eggs hatched. This long hatching period makes one wonder if the female had returned to the rock on a number of occasions or if the eggs were those of several females.

As soon as possible after hatching the larvae were transferred to another small tank with a shallow layer of sand on the bottom in which they buried themselves. Only 4 eggs failed to hatch.

LARVAL DESCRIPTION

On hatching the larvae were 9-10 mm. in length and a little under 4 mm. in breadth; in colour and shape they were very similar to the adults.

The eye was well developed, and protected by a fold-like lid, possibly for protection when buried in the sand. The narrow black pupil, a longitudinal slit, was exactly the same as in the adult. There were two kinds of tentacles (1) eight short ones with 31 small compact suckers arranged along the whole length and (2) two longer semi-retractile raptorial tentacles, used to seize prey. These latter tentacles were of considerable interest as they had on their distal ends a compact mass of at least 40 small suckers (figures 1 D, E).

The chromatophores, yellow, black and tan, were arranged in definite bands, separated by bluish-white areas which have an almost iridescent appearance. These bands run down each side of the eight short tentacles, joining at their bases, and then continuing for the whole length of the body. This colour pattern is only present on the dorsal surface, the ventral surface having comparatively few isolated chromatophores, with the exception of those on the tentacles.

On the dorsal surface the edge of the mantle is fringed while that on the ventral surface is quite smooth (figure 1B). The siphon occupies a central position on the ventral surface and is used actively by the larva. A very small ink sac is present below the base of the siphon and the larva can and does discharge small quantities of "ink" when annoyed or alarmed (figure 1C).

LARVAL BEHAVIOUR.

On hatching the larvae swam about in short jerks for a few minutes and then settled to the bottom. They were largely negatively phototropic, moving away from direct light. On settling the larvae more or less tucked the tentacles under the head and proceeded to dig into the sand. They did this in exactly the same way as the adult; a jerk downwards and forwards and then downwards and backwards and by repeating these movements several times the small larvae quickly disappeared into the protecting sand, leaving only their eyes showing.

Swimming was carried out by means of a combination of the action of mantle, siphon and fins. When swimming the larvae kept to the bottom of the tank and only rarely came near the surface. For the first week they showed no desire to eat, and were probably living on the remains of the yolk sac. After this initial period they attacked and captured small amphipods and similar crustacea which they ate. It was interesting to watch these small squids stalking and capturing their prey in a manner so very like the actions of the adults. So similar were the larvae to the adults in nearly all ways, except size, one wonders if they were true larvae, and if it would be more correct to regard them as immature adults.

A New Haliotid for New South Wales

By Phillip Colman.

Family HALIOTIDAE.

Genus SANHALIOTIS Iredale, 1929.

Sanhaliotis whitehousei, sp. nov.

After much checking of literature and of collections of Haliotidae, I find that this shell, collected by Mr. F. Whitehouse of Brisbane at Long Reef, New South Wales, is sufficiently distinct to warrant a new name.

Gray (1826) described *Haliotis squamosa* from North-western Australia, and his shell is similar to the Long Reef specimen. However, it is more uniformly ribbed, making a much neater shell than *S. whitehousei,* and the row of perforations is about one-fifth the length of the outer lip from the columellar lip, whereas the new shell has it about one-eighth this distance. The dead shell was collected in June of 1958 in an outer pool on the north-western side of Long Reef. Only one was collected, and this Holotype is presented to the Australian Museum, Reg. No. C.62423.

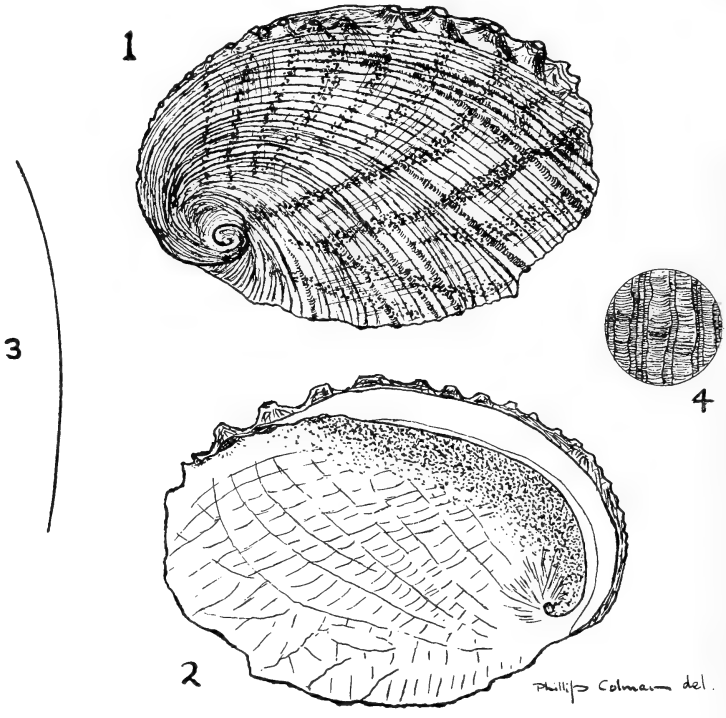

Figure 1: *Sanhaliotis whitehousei,* No. 1, Dorsal view; No. 2, Ventral view; No. 3, Line illustrating curve of columellar lip; No. 4, Magnified section of dorsal sculpture.

Shell ovate-oblong, externally transversely rugose, spirally ribbed, heavy ribs few widely spaced, separated by many smaller ribs, with riblets appearing in the senile shell. Ribs sculptured concentrically with many small, raised scales. Row of many perforations, with five open; holes oblong, perforations situated about one-eighth the length of the outer lip from the end of the columellar lip. Spire scarcely raised, situated very near the bottom posterior edge. Whorls rapidly enlarge from scarcely distinct protoconch. Colour reddish brown. Inside pearly with orange-green tinge, showing some external ribs, and transversely rugose so that many small, similarly sized, rectangular bumps are formed. Columellar lip scarcely depressed, convexly bent, outer lip strong.

Length 6 cm., breadth 4.3 cm.

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Cypraeidae from Long Reef, With a Description of Animals of Some Species

By Phillip Colman.

During 10 years' collecting on Long Reef, near Sydney, N.S. Wales, I have collected 19 species of cowries, of which 17 were found alive. Below is a list of those species found, and following are descriptions of the animals of some species found alive. (A) = Alive, (D) = Dead.

Ravitrona caputserpentis Linne (A).
Erosaria labrolineata nashi Iredale (A).
Erosaria erosa Linne (A).
Erosaria tomlini prodiga Iredale (D).
Evanaria asellus latifasciata Schilder (A).
Evanaria ursellus marcia Iredale (A).
Erronea nimisserans Iredale (A).
Erronea magerrones Iredale (A).
Arabica arabica Linne (A).
Gratiadusta xanthodon Sowerby (A).
Ovatipsa caurica longior Schilder (A).
Palmadusta clandestina extrema Iredale (A).
Palmadusta lutea humphreyii Gray (A).
Mystaponda vitellus Linne (A).
Monetaria moneta Linne (A).
Monetaria (Ornamentaria) annulus Linne (A).
Melicerona melvelli velecia Iredale (A).
Notocypraea verconis Cotton & Godfrey (D).
Paulonaria fimbriata blandita Iredale (A).

Description of animals.

Monetaria (Ornamentaria) annulus Linne, 1758.

Mantle cream lined irregularly with black. Papillae light cream, with colour tending more to yellow at base. Browny grey siphon, and tentacles short and light cream. Foot white striped and speckled irregularly with black, suction disc grey.

Monetaria moneta Linne, 1758.

Mantle white speckled and lined irregularly with black (lines larger and more conspicuous than those of *annulus).* Papillae yellow, darker at their tips. Siphon colourless. Foot light cream lined with black, and suction disc greyish. Proboscis pale pink.

Palmadusta lutea humphreyii Gray, 1825.

Mantle bright red to orange, spotted with minute black spots (papillae). Nothing more noted.

Palmadusta clandestina extrema Iredale, 1939.

Animal jet black studded with small white spots ("spots" really papillae but indistinguishable as these except on close inspection). Foot, tentacles and siphon black.

Ravitrona caputserpentis Linne, 1758.

Mantle base dark brown-grey, with papillae varying from colourless to dark flesh. Both papillae and mantle speckled with white to yellow. Papillae up to 1 cm. in length. Foot grey, speckled (in some) with a suspicion of red. Proboscis yellow, suction disc grey, tentacles grey. The colour of this animal varied from shell to shell, and it was very hard to get a description which suited all.

Erosaria erosa Linne, 1758.

Mantle generally darker than that of *R. caputserpentis* (see above), with grey papillae ringed at base with white. Siphon grey, slightly fringed, proboscis orange, tentacles grey, suction disc light grey. Like *R. caputserpentis,* the *erosa* animal varied somewhat in colouring.

Evanaria asellus latifasciata Schilder, 1930.

Animal jet black, the only trace of colour being the dirty red tentacles.

Mystaponda vitellus Linne, 1758.

Mantle generally black, with white spots in centre of which rise yellow, scarcely fringed papillae. Foot black, siphon black ringed with yellow A really beautiful animal.

Erronea nimisserans, Iredale, 1935.

Mantle cream, mottled and striped with black. Nothing else noted.

Arabica arabica, Linne, 1758.

Those found have all been juvenile specimens, the largest measuring 5.5 cm. long. The shell itself is much darker than the Queensland shell, though patterning is similar to that of juvenile shells I have collected in Queensland. I have not been able to coax the animal out of the shell to record colouring, and can only note that it is very dark, almost black.

Paulonaria fimbriata blandita Iredale, 1939.

Mantle orange, with absence of any visible papillae, surface slightly pustulose. Siphon pale chalky white, well fringed. Tentacles light orange, proboscis red, foot (both top and bottom) light red. I have found only two of these, both right on the reef edge (where they would receive the main wave force), and they were found on Saturday, 16th August, 1958.

Erosaria labrolineata nashi, Iredale, 1931.

Mantle generally light yellow with small dark speckling. Papillae rather long, white and many branched. Siphon short, dull green, minutely fringed, tentacles fawn. Foot grey speckled with minute black marks. Suction disc pale cream.

1958 proved a very good year for cowry collectors at Long Reef. I have always considered it a very good day's collecting to turn homewards with one cowry in the bag. In late April of 1958, cowries started to appear all over the reef, and by the middle of May literally hundreds could be seen in one day.

Formerly one had to turn rocks and feel under crevices for them. 1958 had them overflowing from these hiding places, and many times a *caput-serpentis* was found strolling over the bare rocks in bright sunlight often accompanied by other species; *caputserpentis, erosa, caurica longior,* and *clandestina* were quite abundant, while my best finds were the beautiful *lutea humphreyii* and *fimbriata.* Most likely the long Indian Summer, with temperatures above normal, caused the abundance. By mid July the cowries started to die off, and more were found dead than alive, though *nashi* was more common then than earlier. The *humphreyii,* of which I found four, were all found in the last week of July.

(Other collectors have added *Paulonaria macula,* Angas (A), and *Evanaria kieneri* Hidalgo (D) to my list from Long Reef.)

An Albino Cowry, *Erosaria erosa,* from Long Reef, New South Wales

By Phillip Colman.

On Thursday, 2nd of July, 1958, I was shown a pure white, live adult specimen of *Erosaria erosa,* Linne. It had been collected the same day at Long Reef by Mr. William Dowling, of Dungog, and was kept alive at my home for two days while a note of the animal was made.

Mantle: General colour is light to medium brown, which on closer inspection proves to be a light brown base with minute darker speckling; papillae clear at base with dirty white stems, rather long (about 1 cm. and longer than those of the typical *erosa*), tips well branched and brown, opaque and fringed at tip. Tentacles short, fawn coloured. Proboscis dark brown. The foot varies from nearly black, and spotted with white anteriorly, to dirty white spotted with brown posteriorly—a complete reversal of colour at each end. Suction disc is light cream.

The shell is pure white, except for the teeth bordering the canal at each end, which are tinged with pink. It is rather more swollen than the typical *erosa* and at a glance could easily be mistaken for *Albacypraea ebernea,* Barnes, which, however, has fewer and much more strongly formed teeth.

Two New Generic Names

"Saltatrix" Edwards in Catesby (Nat. Hist. Carolina ii, 1771 edition, p. 14) is not acceptable* as a generic name for the fish known as Skipjack or Tailor *(Pomatomus).* But there is a generic name *Saltatrix* Klug (Abh. preuss. Akad. Wiss. 1832 (1833), p. 214) for an insect which preoccupies *Saltatrix* Laseron (Rec. Austr. Mus. xxii, 1950, p. 277), a genus of rissoid gastropod molluscs. For the latter I propose

* Compare Stearn Journ. Soc. Bibliogr. Nat. Hist. iii, p. 328.

LASERONULA, gen. nov.

Type-species *Epigrus protractus* Hedley. The "Dancing Lady" shell will therefore be known by the new combination, *Laseronula protracta* (Hedley).

Saltatricula Laseron (Austr. J. Mar. freshw. res. vii, 1956, pp. 433 and 445) was proposed as a substitute but it is preoccupied by *Saltatricula* Burmeister, 1861, in Aves. Three new species, named by Laseron in 1956, will be known as *Laseronula ballerina, L. stringera* and *L. improrsa,* combb. nov.

Also in honour of my late friend, Charles F. Laseron, who unfortunately died as this paper was in the press, I propose

LASERONELLA, gen. nov.

This is a genus of Pyramidellidae, its type-species being *Pandorella declivita* Laseron = *Laseronella declivita,* comb. nov. The new generic name is proposed for *Pandorella* Laseron (Rec. Austr. Mus. xxii, 1951, p. 316) which is preoccupied by the name of another genus of molluscs, *Pandorella* Conrad (Proc. Acad. Nat. Sci. Philad. 1862, p. 572).

G. P. WHITLEY,
Hon. Editor.

The Rediscovery of *Ternivoluta studeri* Martens (Mollusca: Volutidae)

By Donald McMichael.

(Contribution from the Australian Museum, Sydney.)

(Figure 1.)

In 1897, von Martens described *Voluta (Ternivoluta) studeri,* from a single specimen which had been collected by the German research vessel S.M.S. "Gazelle" in 1875. The type locality was given as "East Australia, in a depth of 36 fathoms." However, the "Gazelle" is recorded as having made only one successful dredge haul off the Queensland coast, and this was a few miles North of Cape Moreton, just outside Moreton Bay, in 76 fathoms (see Hedley, 1909, p. 337). This then may be taken as the restricted type locality, and the depth cited by von Martens is probably an error.

This particular specimen had previously been referred to in literature under the name *Voluta (Psephaea) concinna* Broderip, in an article by G. Schacko, contained in Martens' "Conchologische Mittheilungen" (1881). Schacko described the radula in detail, but did not mention the locality from which the specimen came. The identification was due to von Martens, who later studied Crosse's (1871) figure of true *Voluta concinna* Brod., and concluded that the "Gazelle" shell was a new species.

In describing the species, von Martens also erected the new subgenus *Ternivoluta* for it, though he also included *Voluta kaupii* Dunker 1862, as nearest related. Martens did not designate a genotype, but since other workers have cited *studeri* as the type of *Ternivoluta* (notably Smith, 1942) this species becomes the type by subsequent designation. In any case *Voluta kaupii* as figured by Dunker (1865) does not belong with *studeri* at all, but appears to belong with *Aulicina* or *Aulica.*

The species has not been seen again (to my knowledge) since the "Gazelle" first collected it. Hedley (1909) listed the species for Queensland

under the genus *Scaphella,* but neither he nor Iredale ever recorded a second example of the species. Maxwell Smith (1942) simply gave a translation of Martens' description without comment or figure, and followed Thiele (1929) in placing the group as a section of *Volutocorbis* Dall, which genus *Ternivoluta* nearest approaches in form. More recently Pilsbry and Olsson (1954, p. 285) include *Ternivoluta* as a full genus next to *Volutocorbis* Dall, in their subfamily Athletinae, based on the fossil genus *Athleta* Conrad. The subfamily contains a number of fossil genera, but appears to be nearly extinct, as both recent genera contain only one or two living species.

A fine, dead example of this species was recently submitted to the Australian Museum for identification by Mr. Peter Goadby of Indooroopilly, Queensland, in whose collection the specimen remains. The shell is slightly smaller than that described by von Martens, measuring 46 mm. long, by 20 mm. maximum width. Otherwise the specimen agrees exactly with the figure and description given by von Martens. It was found in 15 fathoms, Tin Can Bay, south of Fraser Island, Queensland. This area has proved to be the habitat of a number of hitherto rare or undescribed species, and may yet yield further "lost" Australian species.

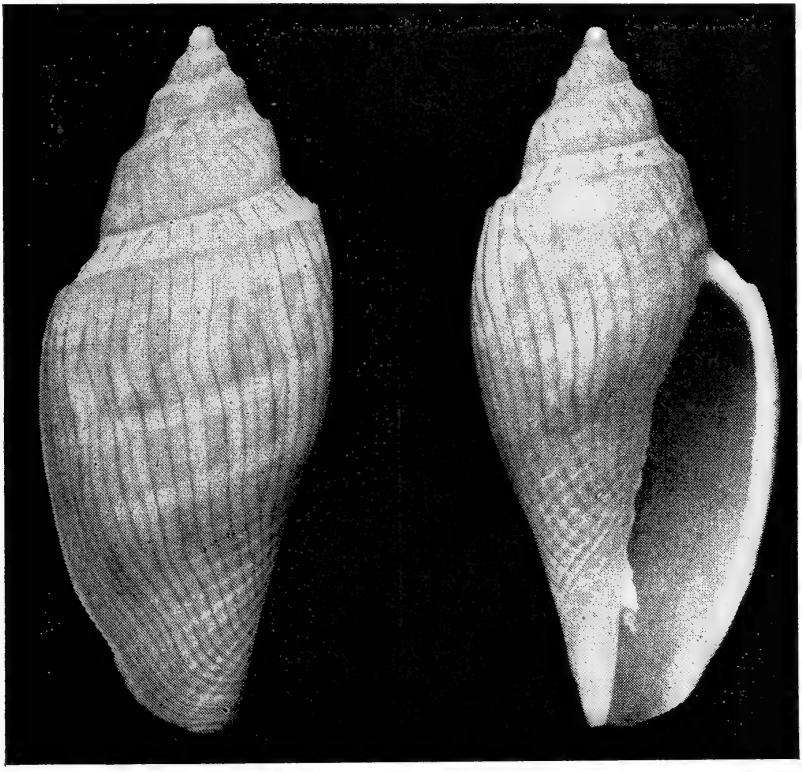

Figure 1.—*Ternivoluta studeri,* a specimen from Tin Can Bay, Queensland. Twice natural size.

Photo—H. Hughes.

A second specimen is reported to be in the collection of Mrs. A. V. Lilley of Gympie, Queensland. This shell was seen recently by Mr. and Mrs. T. Garrard, whose sketch of the specimen allows positive identification. It is slightly larger than Mr. Goadby's shell, and was trawled south of Double Island Point, Queensland, i.e. a few miles south of Tin Can Bay.

The following description is offered.

Ternivoluta studeri Martens 1897.

(Figure 1.)

Shell elongate, sub-fusiform, of 4½ wohrls, surmounted by a globose protoconch. The latter yellowish, translucent; remainder of shell glossy, porcellanous. First post-nuclear whorl with narrow, vertical ribs, crossed by fine spiral threads; second whorl with the vertical ribs more widely spaced, the spiral threads missing; adult whorls with the ribs reduced to almost imperceptible spinose knobs on the shoulder of the whorls. Shoulder noticeably angled, marked at its outer limit by a slightly raised sharp, spiral ridge; suture moderately impressed. Body whorl marked below the periphery by raised spiral threads, which increase in strength towards the anterior end of the shell, then decrease around the columella. Aperture elongate, narrow, with a shallow anterior canal and a slight posterior notch; outer lip sharp, white, interior of mouth creamy-orange; columellar lip with seven or eight fine plaits, of which the four most anterior are strongest, and the posterior four continuous with the spiral threads around the base of the body whorl. Colour creamish-white, with numerous fine, vertical, slightly wavy orange-brown lines; beneath these lines are three indistinct discontinuous spiral bands of yellowish-brown blotches, the uppermost about 5 mm. wide, the others each about 3 mm. wide; columella white.

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Observations at Heron Island, Queensland

By Francis McCamley.

During my vacation on Heron Island, I was indeed fortunate to experience two low tides per day—one very early morning and one in the evening. This was ideal both from the point of view of conchology and of marine study.

Most shell activity was taking place at low water, at the western side of the Island and it was here that I searched for the much desired *Cymbiolacca pulchra woolacottae* (McMichael).

This shell was observed from the size of ½ in. to fully adult, and it was noted that whilst small and in the process of growth the lip of the aperture is extremely fine and fragile, and the whole of the animal cannot be withdrawn into the shell. However, as the animal proceeds to add to the aperture and becomes fully adult, the whole of the body is contained in the shell. The underfoot of the animal is a vivid pink, whilst the upper portion and mantle is cream and mottled red striped. It was observed at the western end of the island, crawling about on the sand and in the rough pieces of dead coral.

At the fall of the tide and low tide, these shells were nowhere to be seen, but at the turn of the tide and when the tide was just beginning to make, colonies of these lovely animals emerged from the sand and commenced to move around, in the moving current, about 150 yards from the high water mark. One animal was observed to be feeding on a bivalve.

The second observation was noted in the fish tanks on the island, where there lived a *Melo amphora,* 10 to 12 in. in length. The foot of this animal when extended was approximately 3 feet, with siphon at that time extended to 12 in. In the same tank lived a *Dolium perdix* of 5 in.—but not for long. I watched the *Melo* extend its foot gradually over the *Dolium perdix* completely covering the shell and animal. With the animal of the *Dolium* facing the underfoot of the *Melo,* the larger animal proceeded to consume the smaller one through the foot, for the following morning the *Dolium perdix* was lying in the tank completely cleaned out.

Shell Collecting, Here, There, and Everywhere

By Francis McCamley.

All around the world, and everywhere to be seen SHELLS, SHELLS, SHELLS! And in WHAT places? The main beach at Aden, fishing boats at Marseilles, the canals of Venice, fish markets of Spain, stalls in the streets of Paris, Billingsgate Markets on the River Thames, beaches in the south of England, Fisherman's Wharf at San Francisco and the native market as in Suva, Fiji. Yes! Shell collecting, but in the queerest places.

Firstly at Aden—4 a.m. to 9 a.m. Five short hours for shopping, photography and sight seeing. Ship about to depart, when lo and behold, I espied a heap of dredgings on the sea shore. Frantically I scratched and scraped, not daring to glance at my watch, to be rewarded by perfect specimens of *Cypraea turdis* (Lam.), *Oliva elegans* (Lam.), *Conus tesselatus* (Hwass), *Eburna spiratus* (Lam.), *Eburna valentianus* (Swainson), *Ancilla ventricosa* (Sowerby) and many small cones, after which I had to run for the last launch back to the ship.

Arriving at Marseilles, a smiling French "Mademoiselle" was much amused at my purchase of live specimens of *Cassis tyrrhena* (Chemnitz) and *Cassidaria echinophora* (Linne). "Did they not feed us well on the ship?" she queried. Perfect specimens were these though, and a welcome addition to my collection.

Passing cafes on the canal sides of Venice, I observed many types of shell fish, which are eaten by the Venetians, in fact every type of shell

fish is consumed throughout Europe. My prize here, however, was the lovely *Murex brandaris* (Linne), but to my horror they were bundled into a paper bag, with no attention to their spikes at all.

Barcelona, Spain, and a huge market place, selling just about everything it was possible to eat in the animal, vegetable, mineral line. Here a happy senorita promised me shells in halting English and the following day presented me with fine specimens of *Apporhais pes-pelicani* (Linne) and *Purpura haemastoma* (Linne), a beautiful brown finely shaped shell with brilliant orange aperture. Whilst at lunch at Vittoria, we were served with bivalve *Tapes decussata* (Linne)—shell and all—and I hurriedly whispered to our fellow travellers "save me the shells."

Along the streets of Paris, beautiful sunny Paris, are the stalls of the shell fish sellers—mainly oysters, *Ostraea edulis cristata* (Poli), and bivalves *Venus verrucosa* (Lamarck). These were very much battered with rough handling, but a search through the stocks revealed a few that were in perfect condition.

In my estimation, the most amazing place of all was the Billingsgate Fish Markets, on the banks of the River Thames. Never have I seen such quantities of fish, shrimps, crabs, lobsters, crayfish, oysters, scallops, winkles, whelks, mussels. The large *Pecten maximus* (Linne), *Modiola edulus* (Linne), the winkle *Littorina littorea* (Linne) and the whelks *Buccinum undatum* (Linne) and *Neptunea antiqua* (Linne).

Then from the small village of Highbury, in a tiny secondhand shop, I purchased The Sacred Shell of India *Voluta (Xancus) pyrum* and from the beach at Brighton collected *Crepidula fornicata* (Linne) and from Padstow in the South of England *Littorina rudis* (Donovan) and *Littorina tenebrosa* (Linne).

Across the Atlantic to San Francisco to the well-known "Fisherman's Wharf." Here, whilst you wait, the attendants obligingly cook the particular crab or prawns of your fancy in the boiling cauldrons along the pavement's edge, the home of the fishing boats—so crowded that one wondered how, once they got in, they ever got out again. Then in baskets on the inner side of the pavements there were just hundreds of *Murex bicolor* (Val), the much commercialised abalone shells *Haliotis fulgens* (Philippi) the green abalone, *Haliotis sorenson,* the yellow abalone, *Haliotis cracherodii* (Leach) the black abalone, and *Haliotis rufescens* (Swainson) the red abalone—all much corroded and in poor condition. Large quantities, too, of the beautiful glowing pink-lipped *Strombus gigas.*

Our last port of call for shells was Suva, Fiji. Shells in these islands have now been much commercialised as compared with our visit some seven years ago. Today almost 50% of the space in the native markets is taken up with shells and shell craft, which appeals to the average tourist. Enquiries in connection with *Cypraea aurantiam* (Mart.) (the Golden Cowry) revealed that they are not plentiful. According to the natives, very few have been collected over the past five years.

Thus was my collecting all around the world—certainly not the joy of reefing or beach collecting, but nevertheless, the opportunity of observing animals, conditions and shells of other lands.

Surprises at Port Stephens

By Muriel Trenerry.

While holidaying at Shoal Bay, Port Stephens, New South Wales, during the month of March, I discovered among the rocks at Halifax Bay a dead specimen of *Turbo militaris* (Reeve).

On searching for live ones further out below low water level, I found them in large numbers among the crevices in the rocks. I had already

collected one live specimen from Black Head near Forster, but here at Port Stephens they must have been breeding, as I observed them in all stages of growth, from ½ inch to fully adult specimens of 3 inches, both plain and noduled, in very clean condition, but with rather a fine lip.

Now my problem was quick removal of the animals from the shells, so placing them in cold water I brought them slowly to the boil. When cool enough to handle a brisk shaking completely released the animal from the shell. I then removed the operculum from the animal in readiness for resetting in the aperture of the shell.

In this same area I also collected very good specimens of *Austrolima nimbifer* in large quantities under rocks. Also I found *Monetaria annulus, Erosaria erosa, Melicerona felina velesia,* and *Paulonaria macula,* of the family Cypraeidae, and *Charonia rubicunda.*

Whilst on the beaches washed up were *Janthina violacea,* a few specimens of *Violetta globosa,* and, with dying animals, dozens of *Quibulla botanica* were there to be collected.

Book Reviews

"Dangerous Marine Animals." By Bruce W. Halstead, M.D. Cornell Maritime Press, Cambridge, Maryland, U.S.A. April 1959, pp. i-xii + 1-146, coloured frontispiece & text-figs. 1-86. Price, in the United Kingdom (Putnam & Co. Ltd., London), 30/-.

This well-produced book reviews the types of animals which must be avoided in all the seven seas because they are liable to sting, bite or poison human beings. They range from certain jellyfishes, corals, worms, sea-urchins, molluscs, octopuses, sharks, rays and fishes to snakes, seals and killer whales. It is remarkable how many different kinds of animals have developed venomous organs of such virulence as to incapacitate humans. Apart from the venomous ones, there are many forms which are poisonous to eat and these are fully treated also; even some turtles, or parts of turtles, are suspect as food. Then there are sharks, barracuda and other savage creatures which are very aggressive against man. The author is a surgeon in the United States Naval Reserve who has had more than fourteen years of experience with harmful marine animals in various parts of the world. A great deal of information is presented in this book in an easily understood manner and, though necessarily condensed from a vast fund of data, is authoritative and up-to-date. The book is fully illustrated, most of the pictures being beautiful, a couple of them horrible. Structures such as the venom apparatus of the stonefish, the cone shell and others are clearly figured. Methods of prevention, treatment and cure are outlined for those hurt. "Dangerous Marine Animals" is a valuable guide to a subject which has been neglected in popular literature and not hitherto treated in such a concise and handy form.

G. P. Whitley.

"South Australian Mollusca. Archaeogastropoda." By Bernard C. Cotton, F.R.Z.S. Government Printer, Adelaide, 1959. 26/8d.

Here we have another Handbook of the Flora and Fauna of South Australia, the issue recently published (July 1st) being fortunately the first part of the Gastropoda, a large and most important section of the molluscan phylum. Already the author, Mr. Bernard C. Cotton, F.R.Z.S., who is well known here and abroad as the Curator of Molluscs, South Australian Museum, is not only known for his scientific and popular

writings, but for the excellent and very useful earlier companion Handbooks of this series: Part 1, the Pelecypoda (1938) and Part II, the Scaphopoda, Aplacophora, and Crepipoda (1940), which serious workers, including most amateur malacologists, have found most useful in identifying Mollusca of those Groups, especially the bivalve shells (Part I) from southern Australian waters.

This present part deals with the more primitive families of the Gastropoda, that is, the ancient gastropods, commencing with the Sea-ears (Haliotidae), through the extraordinary Slit Shells (Scissurellidae), various limpet forms of the family Fissurellidae, the Top Shells (Trochidae) and numerous sections, eventually treating South Australian species of the Turban Shells (Turbinidae) and Limpets of the families Patellidae and Acmaeidae. All species are accompanied by a good description and a text figure.

In Chapter 4, Mr. Cotton provides a bibliography of the principal works on South Australian Gastropoda and Chapter 5 is devoted to a check-list of them, including land and freshwater species, and introduced forms. Finally there is a copious Index, general and scientific.

Ecological data which accompany specific descriptions throughout are most informative, and the less advanced students will find the general Introductory chapter contains a great deal of the type of information they seek and they are advised by this reviewer to read it thoroughly.

The book is well produced, as were the two earlier companion books of South Australian Mollusca; a clear, easily readable type and excellent paper throughout add to its attractiveness and its usefulness to all interested in Mollusca.

The reviewer is wary of books issued in more than one part: whilst they are safe in museums, libraries and similar places, too often individual owners, from one reason or another, find themselves with an uncompleted set. In this instance, the check-list (chapter 5) if published separately (and quite a deal of it has already appeared as separate leaflets by Mr. Cotton) would have enabled species of additional families to have been described and figured, which would certainly be of advantage to the beginner to whom check-lists mean very little when they are unfamiliar with scientific names. But that is purely the reviewer's own opinion, and not meant to detract from the value of the book in any way, and she has pleasure in reviewing the latest work of her friend of long standing, Bernard Cotton, and trusts that it will have the success it fully deserves.

JOYCE ALLAN.

History of New South Wales Shells

[Mr. Iredale's fourth instalment was not received in time for inclusion but it is hoped to publish this in our next issue—Editor.]

New Members of the Royal Zoological Society of N.S.W.

July 1, 1957, to June 30, 1958

[The Council of the Society has decided to postpone publication of a list of its Members until a later issue of the *Proceedings*. The following ladies and gentlemen have joined during the past year.]

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* Omitted from previous year's list.

ROYAL ZOOLOGICAL SOCIETY OF NEW SOUTH WALES

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should be addressed to the Honorary Secretary, Royal Zoological Society of New South Wales, 28 Martin Place, Sydney.

PUBLICATIONS

"The Australian Zoologist," published at irregular intervals since 1914. Twelve volumes to date.

"Proceedings," published annually since 1933-1934.

AUSTRALIAN ZOOLOGICAL HANDBOOKS AND SPECIAL REPRINTS

"Basic List of the Land Mollusca of Australia," by T. Iredale, 1938.

"Australian Insects," by K. C. McKeown, 1947.

"A Check List of the Birds of Paradise and Bower Birds," by T. Iredale, 1948.

"Revision of the New South Wales Turridae," by C. F. Laseron, 1954.

"The Published Writings of Tom Iredale, with an Index of his new Scientific Names," by D. F. McMichael & G. P. Whitley, 1956.

"A Reclassification of the Order Odonata," by F. C. Fraser, 1957.

"Birds of the Sydney District," by . Hindwood & A. R. McGill, 1958.

"A Handbook of the Dragonflies of Australasia," by F. C. Fraser (in the press).

Orders and enquiries should be sent to the Honorary Secretary, Royal Zoological Society of New South Wales, 28 Martin Place, Sydney.

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