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PROCEEDINGS
OF THE
**Royal Zoological
Society**
OF
NEW SOUTH WALES
for the year 1951-52



Price, 3/-
(Free to all Members and Associates)

Sydney:
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November 5, 1952

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ROYAL ZOOLOGICAL SOCIETY OF NEW SOUTH WALES

Established 1879

REGISTERED UNDER THE COMPANIES ACT 1899 (1917)

Patrons :

Sir Philip Woolcott Game, K.C.B., K.C.M.G., G.C.V.O., G.B.E., D.S.O.
The Right Honourable Sir John Greig Latham, G.C.M.G.

COUNCIL, 1952-53

President : James Roy Kinghorn, F.R.Z.S., C.M.Z.S.

Vice-Presidents :

Sir Edward John Lees Hallstrom, K.B., F.R.Z.S.
Frank Marshall, C.M.G., D.D.S. *
Garnet Halloran, M.D., B.Sc., F.R.C.S. (Edin.), F.R.A.C.S.
Emil Herman Zeck, F.R.Z.S.

Members :

Henry Burgh
Norman Chaffer
Percy Fincham Harvey
James Allen Keast
Keith Collingwood McKeown, F.R.Z.S. *
John Waterhouse
Anthony Irwin Ormsby, LL.B.
Theodore Cleveland Roughley, B.Sc.,
F.R.Z.S.
Ellis Le Geyt Troughton, F.R.Z.S.,
C.M.Z.S.

Officers :

Honorary Secretary : Mrs. L. Harford.
Honorary Treasurer : C. F. Laseron, F.R.Z.S.
Honorary Editor : Gilbert Percy Whitley, F.R.Z.S.
Honorary Librarian : Mrs. M. D. Scott-Sim
Assistant Honorary Secretary : Mrs. F. E. Lane
Assistant Honorary Treasurer : L. Webber.
Honorary Auditor : M. S. Davies
Honorary Solicitor : Aubrey Halloran, B.A., LL.B.

OFFICERS OF SECTIONS

Avicultural Section :

Chairman: L. Webber
Hon. Secretary: Percy F. Harvey

Budgerigar Section :

Chairman: H. Yardley
Hon. Secretary: J. L. Bright

Marine Zoological Section :

Chairman: C. F. Laseron
Hon. Secretary: L. Walters

Ornithological Section :

Chairman: J. J. Francis
Hon. Secretary: A. R. McGill

General Section :

Chairman: Elizabeth Pope, M.Sc.
Hon. Secretary: P. R. Johnston

* Since Deceased

It was with profound regret that Members of the Royal Zoological Society of New South Wales learnt of the death last February of

HIS MAJESTY KING GEORGE VI.

The President, on behalf of Members, offered appropriate messages, and the following communication has been received from His Excellency the Governor of New South Wales:—

*Government House,
Sydney.*

"The Governor of New South Wales, Lieutenant-General Sir John Northcott, has it in command from Her Majesty Queen Elizabeth the Second to say that your message of sympathy and loyalty has been received at Buckingham Palace and was much appreciated by Her Majesty and other Members of the Royal Family."

ROYAL ZOOLOGICAL SOCIETY

OF

NEW SOUTH WALES

The Seventy-second Annual Meeting was held at Taronga Park on Saturday, 26th July, 1952. Over 70 members and friends were present. The Hon. Secretary presented the

72nd ANNUAL REPORT

Membership at 1st July, 1952.—The total membership of the Society is 577, which is only one less than that for the previous year; these are divided as follows:—1 Endowment Member, 3 Associate Benefactors, 8 Honorary Members, 55 Life Members, 371 Ordinary Members, 2 Honorary Associate Members, 18 Life Associate Members, 111 Associates and 22 Junior Members.

A total of 61 members were removed from the Register; 44 of these in terms of Article 9 of the Constitution; 16 by resignation and 7 by death. In respect to the latter it is felt that special reference should be made to the late Dr. Frank Marshall, who died on the 16th of January of this year. Dr. Marshall was a member for twenty years and was President from 1945 to 1948. He did much to foster the interests of the Society. (See obituary notice on page 11.)

Council.—Twelve meetings of the Council were held during the year, the average attendance being 13; an increase over the last two years.

Honours.—The Council is pleased to record that Her Most Gracious Majesty Queen Elizabeth II. has conferred a knighthood on our esteemed member, Edward John Lees Hallstrom, in honour mainly of his great philanthropic work in this country and his contributions in the cause of the advancement of medical science. I am sure that members of the Society join with the Council in congratulating Sir Edward, wishing him long life to enjoy this great honour.

Appointments.—Mr. Charles Laseron, who was acting Treasurer, has offered to continue and was officially elected to that office, ably assisted by the Assistant Treasurer, Mr. Webber. Through Mr. Laseron's efforts the Society has been able to present two, and possibly three, long overdue balance sheets.

Mr. Vincent Fairfax has been made an Honorary Member of the Society in appreciation of the work he has done, particularly on behalf of the Budgerigar Section.

Mr. S. Davies has accepted the position of Honorary Auditor. The Council has created a new office—that of Honorary Solicitor—and is pleased to announce that its senior and revered member, Mr. Aubrey Halloran, has accepted that office.

Ladies' Auxiliary.—During the year the Honorary Secretary and Mrs. Gadsden were asked to convene a meeting to form a Ladies' Auxiliary with the object of arranging social events, hoping thereby to add to the revenue of the Society. On the 20th November, 1951, the visiting scientists of the Danish Deep Sea Expedition, from the "Galatea," were entertained at Taronga Park, and later Dr. Anton Bruun and several of his associates attended a Christmas social held in the Society's room. This was a most enjoyable evening, and promised success for further ventures of the Auxiliary.

Financial.—Unfortunately, the balance sheet shows a heavy deficit for the year, but this is due almost entirely to the greatly increased rental for our headquarters. Following the announcement of this to the Council, a special finance committee was formed, and reported that to save the Society any further financial embarrassment the fees of members must be raised.

Special General Meeting.—A Special General Meeting was held in the lecture hall of the Australian Museum on the 22nd April, 1952, when it was agreed to amend Article 9 so that subscriptions be increased as follows: Members, £2/2/- per annum; Association Members, £1/1/- per annum; the increase to affect subscriptions commencing the year 1952. Following this meeting, Mr. A. Musgrave, a Life Member, made a donation of £20 to the Society's funds—a gesture greatly appreciated by the Council.

Publications.—The Australian Zoologist, Vol. xi, Part 4, was issued in July, 1951, and the Proceedings for 1950-51 was published in March, 1952.

Entomological Activities.—Following a suggestion by the President at the last Annual Meeting regarding the possibility of establishing an insect breeding house at Taronga Zoological Park, all available information has been collected from overseas Zoos. This was submitted to entomologists within the Society and will be put to the Entomological Society of New South Wales by the President at an early date. It is hoped that an Entomological Section of this Society will eventuate and that some valuable work will result therefrom.

Fauna Panel.—Your representative on the Panel, Mr. E. Le G. Troughton, has attended all meetings during the year and he has played a very active part, and submitted valuable suggestions for the better education of New Australians and others, so far as the protection of fauna is concerned. The Panel is giving every possible help to country groups wishing to form local fauna societies, and in addition has carried out a successful survey of the status of the Mallee Fowl, and is now engaged on one concerning the Plain Turkey and the Scrub Turkey.

A letter of protest was sent to the Minister for Local Government re the proposed oil refinery at Cowan Creek.

Sections.—The sections continue to function satisfactorily, as their various annual reports (printed elsewhere) will show.

The adoption of the Annual Report was moved by Lieut.-Colonel H. Burgh, seconded by Mr. G. P. Whitley, and carried unanimously.

The following were re-elected to the Council:—Lieut.-Colonel H. Burgh, Dr. G. Halloran, Messrs. T. Roughley, N. Chaffer, K. McKeown and E. Troughton.

Address by Guest Speaker.—Dr. John Hough, of the University of Colorado, U.S.A.:—

I may claim to be somewhat of a zoologist by marriage, and also by avocation, since Mrs. Hough and I spend many of our spare hours in the operation of the bird banding station in the garden of our home. Hence,

very unofficially, but nonetheless sincerely, I may be permitted to express greetings to you from the research branch of my Government, the Fish and Wild Life Service of the Department of the Interior, under which the bird banding programme in the United States is administered.

Being a layman, I am encouraged by my observations here of the large number of laymen who take a keen interest in research in the natural sciences, who make of the membership of the sections I have been privileged to attend, butchers, bakers and candlestick makers, as well as others of less strenuous occupations. I am encouraged to speak briefly of the work to which our contribution is a tiny part.

We are but one pair of approximately 2,000 amateurs who, simply because they are interested in birds and in the forwarding of the programme, serve as banders of as many birds as possible in order that there may be banded and recorded individuals from whom the small per cent. recovered provide data for scientific conclusions. All our records, both of our own banding, returns to our own station after an interval of a breeding season, or birds banded elsewhere that may appear in our traps, go to the central office in Washington, where they are immediately duplicated and sent to Ottawa. Canadian records are similarly shared, not only for the obvious reason that on the North American continent birds do not recognise the 49th parallel, but for the more serious purpose of providing information on which both Canadian and American laws and regulations may be based, dealing with, in the case of game birds, for example, season and bag limits, protected areas and such like. All these records are filed on IBM cards, suitably punched in code design of all pertinent information, so that the specialists who use them may, simply by setting the proper push buttons, immediately and automatically extract all records desired, say, for example, all female mallard ducks banded in a given State, or at a given station within a given length of time, or conversely, all other recoveries of the above ducks in other areas. Data of this sort are actually provided by Federal and State officers who band huge numbers of game birds in colony or roost banding. The amateur, like myself, provides anywhere from 500 to 2,000 banding records per year, of many different species, mostly song birds, on which depends an appreciable fraction of the material necessary for ornithological research of all kinds. Even more satisfying than this are the opportunities for small but important contributions of our own, for studies of plumage, longevity and local problems of distribution and movement which can be, and are, not infrequently made. The use of colour bands, for identification of an individual without necessity for retrapping, greatly enlarges the scope of the layman's possible activities.

In addition to general banding, we are not infrequently given special instructions by the Service to make an effort to band as many as possible of a certain species, since the Service itself may be working on a particular problem over a wide area. The last few years, for example, all banders have been requested to band large numbers of Mourning Doves, to note carefully conditions of health on all birds handled, and report thereon in order to provide the Government with the necessary information concerning the carrying and spread of certain diseases which is of serious concern to this species.

Special observations are also required of us on some matters which may not actually have a direct bearing upon our own banding. The Service itself for some years now has been placing different coloured bands on nestling gulls from the Great Lakes breeding grounds as opposed to those along the eastern coasts. All banders are expected to co-operate in field observation of gulls and send in information which will contribute to the solution of the problem of dispersal of nestlings from one nesting area to subsequent mature life in the other area.

Passing from those activities in which the bander takes a direct or indirect part, I may note some of the more exciting activities which have recently attracted much attention. The breeding grounds of the 37 remaining

Whooping Cranes have been the object of search by the Service, by following the Cranes into northern Canada in the spring. The efforts have so far failed, as each time the Cranes succeeded in losing the airplane in fog or bad weather. But another attempt will be made, I believe, next spring, and when the place is known it will be the object of strenuous efforts to protect this fast disappearing bird.*

Similar data previous to protective measures have in the past, often in co-operation with Audubon Societies, succeeded in preserving the Egret from a different kind of danger, the millinery trade. The fate of the Ivory-billed Woodpecker, now reduced to only two known individuals, both females, warns us of the necessity for reconciling ornithology with progress. The removal of dead trees, which are the natural nesting place also for the once common and much beloved Red-headed Woodpecker, forced them to use telephone poles instead. But of this the telephone companies took a dim view. After having just rejoiced at the virtual extinction of the Bison, which chose poles against which to rub themselves, and often knocked them down, telephone companies then found that the woodpecker holes were repeatedly causing the poles to break in high winds. A coat of creosote effectively discouraged the bird from nesting, but it has also effectively cut down his numbers. Even the common bluebird suffers also from "progress," and the Service lends strong support to the Audubon Society programme of providing man-made boxes for the nesting of this species.

Other important work in which the bander is expected to co-operate is the very difficult task of educating the public, especially farmers, to a realisation that many species, especially Raptores and various kinds of black-birds, are more beneficial than harmful, and that against the occasional chicken that may disappear from the farmyard, the same bird devours thousands upon thousands of rats, mice, grasshoppers and other pests that destroy the same farmer's crops. These facts, incontrovertibly established by stomach analyses, make a greater appeal when reinforced by popular demonstration, as occasionally happens when a crop is actually saved by the appearance of a flock of the birds in question. I recall, off hand, that Massachusetts farmers were finally convinced of the value of Grackles when, after shooting them by the thousands, they lost their crops all the faster, since it then lay open to the grasshopper, which, the farmer now knows, is the natural food of his supposed enemy, the Grackle. We in the west love our inland gulls, who light by thousands upon the wheatlands to feed on this same destructive insect. You may have heard of the granite monument in honour of the gulls in Salt Lake City, set up by grateful Mormons, the saving of whose crops in their pioneer days was more than of scientific interest.

As the name indicates, the Fish and Wild Life Service has other interests. Wide scale fish marking with similar purposes and similar results, and in co-operation with State agencies, produces the Canadian and U.S. laws, of benefit alike to fish and fisher. The Columbia River salmon experiment bids fair to revolutionise the salmon industry. The Great Lakes lamprey danger is under close survey. In my State, and very close to my home, in co-operation with the Park and Forest Service, airlift operations preserve the elk, deer and antelope in winter blizzards.

These are but a few of the activities which come to my mind, random samples within and without my own field of interest. If they have been of even the mildest interest to you who are the leaders in scientific research, both amateur and professional, I shall be even more deeply honoured than I already am by the kind invitation to speak to you. In any event, to the furthering of our common interests in nature and natural science, I greet you and wish you well, with friendly "hands across the sea."

* Since Dr. Hough spoke, two workers from the U.S. Field and Wild Life Service have seen two adult Whooping Cranes near Great Slave Lake, northern Canada, according to the "Sydney Morning Herald," 6th August, 1952.—Ed.

A vote of thanks to the Guest Speaker was moved by Dr. G. Halloran and carried by acclamation.

There was no formal *Presidential Address*, but Mr. J. R. Kinghorn made special mention of the following matters:—

1. The proposed Insect House at Taronga Park.
2. Possible re-formation of a strong Entomological Section in the Royal Zoological Society.
3. The excellent work of the new Ladies' Auxiliary.
4. Efforts to have the National Park Cabin rebuilt.
5. Advantages of a biennial or even annual conference of all Sydney natural history societies.
6. The suggested preparation by ornithologists of a metropolitan Bird Calendar.
7. A proposed map of marine collecting grounds near Sydney, showing also accessibility by transport.
8. Abstracts of scientific papers at sectional meetings.
9. Sections to notify Council regularly of any outstanding work being done; and
10. Recommendation that the President or a Councillor should be officially present at all meetings.

The Hon. Treasurer, Mr. C. F. Laseron, read his report. The adoption of this report, subject to audit, was proposed by Mr. P. F. Harvey, seconded by Mr. A. Stephen, and carried. The President thanked the Honorary Secretary for her fine work during the year and congratulated the Honorary Treasurer on the preparation of his report.

OFFICERS FOR THE YEAR 1952-1953

President: Mr. J. R. Kinghorn.

Vice-Presidents: Sir Edward Hallstrom, Dr. G. Halloran, Mr. E. H. Zeck and Mr. A. Halloran.

Honorary Secretary: Mrs. L. Harford.

Honorary Treasurer: Mr. C. F. Laseron.

Honorary Editor: Mr. G. P. Whitley.

Honorary Librarian: (To be elected.)

Honorary Solicitor: Mr. A. Halloran.

Honorary Auditor: Mr. M. S. Davies.

Assistant Honorary Secretary: Mrs. F. E. Lane.

Assistant Honorary Treasurer: Mr. L. Webber.

Publication Committee: Messrs. E. Zeck and K. McKeown and Executive Officers.

ROYAL ZOOLOGICAL SOCIETY OF NEW SOUTH WALES

REVENUE ACCOUNT FOR THE YEAR ENDED 30th JUNE, 1951

GENERAL ACCOUNT

	£	s.	d.		£	s.	d.
To Office Rent	485		19				
" Office Stationery and Postages	62		1	9	834	13	10
" Telephone	24		1	9	142	18	0
" Electricity	14		0	6	6	0	0
" Insurance	7		15	0	20	8	7
" Publication Expenses	361		9	11	3	2	6
" Sundry Expenses	129		14	1	0	8	10
				1,085		2	1
				1,085		2	1
							1,021
							19
							8
							63
							2
							5
					£1,085		2
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PUBLICATION ACCOUNT

	£	s.	d.		£	s.	d.
To Surplus of Income over Expenditure for year ended 30th June, 1951	112		16	5			
				112		16	5
							£112
							16
							5
							£25
							7
							5

	£	s.	d.		£	s.	d.
By Sales:							
Handbooks	14		7	7	14	7	7
" "Australian Zoologist"	15		1	11	15	1	11
Interest:							
Inscribed Stock	32		14	4	32	14	4
Savings Bank	0		12	7	0	12	7
Government Grant					62	16	5
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ROYAL ZOOLOGICAL SOCIETY OF NEW SOUTH WALES

BALANCE SHEET AS AT 30th JUNE, 1951

	LIABILITIES			ASSETS			
	£	s.	d.		£	s.	d.
Accumulated Funds:				Furniture and Fittings:			
Balance as at 30th June, 1950	3,474	6	8	Office Lecture Room Furniture	515	7	11
Surplus for year ended 30th				and Equipment—At Cost	21	0	0
June, 1951—Publication Ac-	112	16	5	Less: Sales			
count	3,587	3	1	Library Books—At Cost			494 7 11
	63	2	5	“Parrot” Paintings—At Cost			503 4 6
Less: Deficiency for year ended				Investments (at Face Value):			500 0 0
30th June, 1951—General Ac-				Australian Commonwealth In-	810	0	0
count	3,524	0	8	scribed Stock			
Building Fund:				Australian Commonwealth Trea-	100	0	0
Balance as at 30th June, 1950	822	0	11	sury Bond			
Add: Interest received for year	25	7	5	Commonwealth Savings Bank:			
	847	8	4	General Account			1,085 5 0
Subscriptions Paid in Advance	33	16	6	Cash in Hand			13 14 7
				Building Fund Investments:			
				Australian Commonwealth Trea-	700	0	0
				sury Bonds	147	8	4
				Commonwealth Savings Bank			847 8 4
				Prepayments			51 5 2
							£4,405 5 6

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, 1951, 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, 1951, 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.

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

Sydney, 12th May, 1952.



The late FRANK MARSHALL

Photo L. Le Guay

OBITUARIES



FRANK MARSHALL, C.M.G., D.D.S.

The late Dr. Marshall was born in Sydney, September 28th, 1883, and died there on January 16th, 1952. He was educated at Newington College and the University of Sydney (L.D.S., 1904; B.D.S., 1906) and the University of Pennsylvania, U.S.A. (D.D.S., 1909). Lecturer in prosthetic dentistry at the University of Sydney from 1910-15, he was granted leave to join the A.I.F., in which he served at Gallipoli. He was in charge of all jaw cases at No. 3 A.G. Hospital at Lemnos, was also in Egypt, and made a special study of facial restoration at Sidcup Hospital, England. The *London Gazette*, 1916-18, noted that he was twice mentioned in despatches and was honoured by the King by being made a Companion of the Order of St. Michael and St. George. He resumed his lectureship at Sydney between the wars and practised in Macquarie Street. Early in 1940 he was appointed Assistant Director Dental Services with the rank of Lieut.-Colonel, but the responsibility for the vast amount of organisation and administration involved caused an irrevocable decline in his health. He had always been interested in birds and general natural history and kept a large collection of rare birds in bushland surroundings at his Rose Bay home. He also gathered an excellent library of Australiana and ornithological books over the years. He was a member of the Council of the Royal Zoological Society almost continuously from 1935 to 1952, and was President from 1945 to 1948. Councillors will long remember the friendly atmosphere he imparted to the meetings over which he presided.

I.F.M.



KEITH COLLINGWOOD McKEOWN, F.R.Z.S.

It is with deep regret that we record, as we go to press, the sudden passing of Mr. K. C. McKeown, who died at Sydney on August 21st, 1952, at the age of 60. An obituary notice will appear in next year's *Proceedings*.

REPORTS OF SECTIONS

AVICULTURAL SECTION

In printing this annual report, I am happy to be able to say "we have helped the other man."

During the year the section has had numerous inquiries from the Australian Museum and "Nature Speaks" on the treatment for sick birds, and in every case we have been able to save the birds.

The attendances have been satisfactory, with an average of 16. There were 22 at the February meeting, when the Chief Guardian of Fauna, Mr. F. J. Griffith, spoke on the Fauna and Flora Protection Act.

Owing to the ban on foreign birds entering Australia, members are now endeavouring to keep and breed many of our local insectivorous and soft-bill varieties, including the Silvereye, and several members now have them in their aviaries hoping to be of some assistance to Mr. A. Keast in his study of the species of Silvereyes.

Throughout the year we have had very instructive and entertaining evenings, and to the following guest speakers I extend the thanks of the members for their excellent talks and films:—

1951—

July: "Bird Life and Its Economic Value," by Mr. J. R. Kinghorn.

August: "The Silvereye," by Mr. A. Keast.

September: "Soft Bills and Their Care," by Mr. S. Dummett.

October: Films, "Mineral Deficiency," "Birds of Prey," by Mrs. L. Harford.

November: "Birds in Sickness and in Health," by Mr. L. Webber.

1952—

February: The Fauna and Flora Protection Act, by Mr. E. J. Griffith.

March: "Some Mites and Lice Pests of Birds," by Mr. E. Zeck.

May: "Some Birds We Should Know Around Sydney," by Mr. A. R. McGill.

I extend an invitation to members of the Society who are interested in aviculture, whether you have one bird or many, to be present at our meetings; we may be able to help you make the life of your feathered friends healthier and happier.

PERCY F. HARVEY,
Hon. Secretary.

BUDGERIGAR SECTION

(No report submitted for publication.)



GENERAL SECTION

During the past year the work of this section has carried on with increasing success, attendances having shown a 25 per cent. increase over the preceding year.

The thanks of the section are extended to those who delivered addresses during the year.

Of particular interest were two lectures on the subjects of "Spiders" and "The Preparation of Scientific Papers." Other lectures were of the usual high standard.

By introducing an increasing number of discussion evenings, led by professional zoologists, it is felt that a greater degree of co-operation and understanding can be brought about between the professional and amateur elements of the Society as a whole.

Due to unforeseen circumstances, two lectures set down in the syllabus had to be abandoned.

At the July, 1951, meeting the section had much pleasure in associating itself with the presentation of a Certificate of Fellowship of the Society to Mr. E. H. Zeck. In making the presentation, the Hon. Secretary of the Society, Mrs. Harford, expressed the appreciation of the Society for the fine work done by Mr. Zeck for science and the Society. The outstanding work done by Mr. Zeck in the field of entomology over the years is such that it needs no introduction. It is felt that the honour bestowed was most richly merited.

In conclusion, it should be pointed out that this is the third year of post-war operation of the section, and that in the coming year, if attendances continue to increase, the section shows promise of reaching its pre-war standard of popularity.

J. R. KINGHORN, Chairman.

PETER R. JOHNSTON, Hon. Secretary.



MARINE ZOOLOGICAL SECTION

The Marine Zoological Section of the Society, with which is incorporated the conchology group, has experienced another successful year with some valuable field days and instructive lectures.

On behalf of the section I wish to extend my sincere thanks to the various lecturers and the past Chairman and Secretary for their contributions of time and knowledge in the interest of our section.

The specimens of molluscs donated for the shell cabinet continue to roll in, but many more are required to complete various families. Thanks are extended to Mrs. Woollacott for her care of the cabinet and exhibits.

The outside dredging expedition, under the leadership of Mr. J. Laseron, was marred by rough seas, but it is hoped that another excursion will be a feature of the coming year's activities.

Attendances averaged 22—a satisfactory figure in the light of past years—but I am sure it is capable of being increased with an appropriate widening of the section's interests.

The following is a list of outings and lectures for the past year:—
Lectures.

1951—

July to November: (As listed in last year's *Proceedings*, page 17.)

1952—

February 5: "The Place of Molluscs in Science," by C. Laseron.

March 4: "African and American Experiences," by J. Hallstrom.

April 1: "Fishes," by A. Colefax and G. P. Whitley.

May 3: "Fresh Water Shells," by D. F. McMichael.

Field Days.

September 16: Fairlight. Leader, Mr. J. Laseron.

December 1: Shark Island. Annual Picnic.

February 23: Gunnamatta Bay.

April 27: Off Shore Dredging Excursion. Leader, Mr. J. Laseron.

A. L. WALTERS,

Hon. Secretary.



ORNITHOLOGICAL SECTION

Continued interest among members has been evident during the year, as shown by enthusiastic field-study and good attendance at meetings. Regular monthly meetings were held during the year in conjunction with the New South Wales Branch of the Royal Australasian Ornithologists' Union. The maximum attendance at any one meeting was 81, and the average 37. Details of the twelve months' programme are as follows:—

1951—

July 19: Film Slides and Commentary, by N. Chaffer.

August 16: "Avifauna of Some Island Groups," by J. A. Keast.

September 20: Question Night.

October 18: Screening of Colour Films.

November 15: Lake Hattah R.A.O.U. Camp-out Discussion.

December 20: General Discussion on Birds of the Sandstone Areas.

1952—

January 17: "Birds and Man," by K. A. Hindwood.

February 21: General Discussion on Vocal Mimicry.

March 20: Screening of Colour Films, by N. Chaffer.

April 17: "A Patch of Heath," by W. R. Moore.

May 15: General Discussion on Birds of the Shale Areas.

June 19: "Rambling with a Colour Camera," by J. D. Waterhouse.

Thanks are extended to lecturers, participants in general discussions and those arranging the film evenings.

Amongst visitors who were given welcome might be mentioned Mr. Poochin, Secretary of the Leicestershire Ornithological Society, England; Professor and Mrs. Hough, from America; Mr. H. Jarman, from South Australia; and Mr. R. P. Cooper, from Melbourne.

A number of members journeyed to Melbourne in October to participate in the Jubilee Congress of the R.A.O.U., and many attended the Lake Hattah Camp-out that followed. A few also joined in the Gould League Camp-out at Castlereagh in late August. Messrs. Chisholm and Ramsay visited interesting areas in central-western New South Wales, Mr. Hindwood paid a visit to Binna Burra in south-eastern Queensland, Messrs. Keast and Mackay were amongst the personnel of the Australian Museum Field Expedition to north-west Australia, and further brief trips to interesting ornithological areas were made by other members.

A Photo Exhibition, arranged as part of the R.A.O.U.'s jubilee celebrations, was on display at Kodak's Galleries for some weeks during November. Many members were amongst the good-sized audience that viewed the premiere screening of the Gould League film of its history and activities.

The section has been active in bird protection. A Conservation Committee of the R.A.O.U. has been formed, and Messrs. J. Palmer and J. Francis were appointed as representatives for New South Wales. A report on the Mallee Fowl Survey, carried out by the Fauna Protection Panel on the recommendation of the section, in conjunction with the State Branch of the R.A.O.U., was compiled early in 1952, and contained interesting data and figures. A further request has now been made for a similar survey in relation to the Bustard, or Plain Turkey, and the Brush Turkey. Although some months of the allotted period had already elapsed, it was disappointing that the twelve months' experimental total protection of the Wedge-tailed Eagle was quickly rescinded when the new Chief Secretary took office. Objections were made in the Press by Mr. Chisholm, with the support of members, to the misleading and untrue official report on the bird life of the Monte Bello Islands, when it was notified that they were to be used for atomic weapon experiments.

At the Annual Meeting the following officers were elected:—

Chairman: Mr. J. Francis.

Vice-Chairman: Lieut.-Colonel H. B. Burgh.

Secretary: Mr. A. R. McGill.

Assistant Secretary: Mr. J. A. Keast.

Committee (with power to co-opt): Messrs. N. C. Fearnley, K. A. Hindwood, E. S. Hoskin, J. A. Palmer and R. M. Virtue.

FIELD REPORT FOR 1951-1952

In the vicinity of capital cities of southern and south-western Australia, the summer and autumn of 1951-1952 was somewhat remarkable for the unusual number of "new" or rare avian visitors. From Perth, Adelaide and Melbourne reports have been received of interesting visitations by birds, sometimes in large numbers. It seems probable that it has been brought about by the dry conditions inland after the abnormal wet season of the previous year, when breeding apparently was most successful. Within the vicinity of Sydney this "irruption" was less noticeable. However, there are some records that are of more than ordinary interest.

During the period between November, 1951, and April, 1952, the Darter (*Anhinga novaehollandiae*) appeared in many places near Sydney. It is usually considered a rare bird in that area, but almost every swamp, lagoon, river, and even semi-permanent dams, was frequented by one or more birds during that time. The Royal Spoonbill (*Platalea regia*) and White Ibis (*Threskiornis molucca*), also, were in slightly larger numbers than usual,

and extended right to the coastal salt water swamps, but otherwise amongst the larger swamp-frequenting species generally, such as ducks and herons, there was no apparent influx. Amongst the smaller waders, the most interesting observation was that of a pair of Wood Sandpipers (*Tringa glareola*), which was seen on various occasions at Wheeny Lagoon during March, and also once in April (possibly the same two birds) at Pitt Town Bottoms. At the latter locality a pair of Double-banded Dotterels (*Charadrius bicinctus*) was observed. The Wood Sandpiper had not previously been recorded in the Sydney district, and the Double-banded Dotterel is rarely seen away from the shore line and salt water inlets.

Another unusual visitor was the Fork-tailed Kite (*Milvus migrans*). One bird was observed at Camden in April. This species, which is common in the far inland, reached southern Australia this year in good numbers, but this is the only known recent occurrence near Sydney. The Black-shouldered Kite (*Elanus notatus*) was reported from many localities. It is hard to judge whether it is quickly increasing in numbers around Sydney or that an unusual numerical visitation to Sydney took place. Whistling Eagles (*Haliastur sphenurus*) appeared in good numbers and nesting was reported at Mona Vale. From that locality, also, Musk Lorikeets (*Glossopsitta concinna*) and Scaly-breasted Lorikeets (*Trichoglossus chlorolepidotus*) were recorded, and a party of six Topknot Pigeons (*Lopholaimus antarcticus*).

A party of Grey-crowned Babblers (*Pomatostomus temporalis*) was seen at Beecroft. A small flock of Whitefaces (*Aphelocephala leucopsis*) occurred out of normal habitat at Pymble and late at Avondale. All three species of crakes, the Spotted (*Porzana fluminea*), Leadon (*P. tabuensis*) and Little (*P. pusilla*), were recorded from such favoured habitats as Eastlakes and Moorfield in the late winter and early spring months. The Greenshank (*Tringa nebularia*) occurred at Quibray Bay.

Detailed study of the nesting habits of the Fantail-Warbler (*Cisticola exilis*) was made by Mr. Chisholm and a number of nests were located during the season. Amongst some autumn nesting records reported might be mentioned those of the Banded Finch (*Steganopleura bichenovii*) and Peaceful Dove (*Geopelia placida*)—both with eggs in April.

One of the most interesting records of the season was the collecting of a few specimens of the Common Tern (*Sterna hirundo*) in the Newcastle area. This species was only recently added to the Australian list following the examination of earlier collected Australian material, wrongly labelled.

Bush fires caused severe damage during the summer and large tracts of heathland and timbered areas in the vicinity of Sydney were destroyed. Their effect on bird life must have been considerable. Favoured spots for bird observation soon became areas of desolation. It will be difficult for some time to assess the decrease in numbers they must have caused to certain sedentary species. Country areas also experienced similar devastation, but, as in previous years, few reports reach us because of few observers.

ARNOLD R. MCGILL,

Section Hon. Secretary.



SYLLABUS OF SECTIONAL MEETINGS FOR 1952-53

Visitors are welcome and members are invited to bring their friends to any or all of the Society's sectional meetings.

Avicultural Section.

Meets on the fourth Tuesday of each month. Lectures, films, etc.

Budgerigar Section.

Meets on the third Tuesday of each month.

General Section.

Meets on the second Tuesday of each month.

Marine Zoological Section.

Meets on the first Tuesday of each month. Syllabus:—

1952—

- July 1: "Torres Straits Islands," by Mr. Melbourne Ward.
August 5: "The Plymouth Laboratories" and "Ascidians," by Miss P. Kott.
September 2: Members' Lecturettes.
October 7: "Ancient Seas of Australia," by Mr. C. Laseron.
November 4: "Marine Reptiles," by Mr. J. R. Kinghorn.
December 2: Film Night. Mrs. Harford.

1953—

- January 6: "Marine Worms," by Miss B. Dew.
February 10: Specimen Night.
March 10: "Marine Mammals," by Mr. E. L. Troughton.
April 7: "Marine Plant Life."
May 5: "The Life Story of the Fish," by Mr. L. Walters.
June 2: Annual General Meeting.

Conchology Study Group.

Meets at 7.30 p.m. on the second Thursday in each month.

Ornithological Section. N.S.W. Branch, Royal Australasian Ornithologists' Union.

Combined meetings are held in the R.Z.S. Rooms, 6th Floor, Bull's Chambers, 28 Martin Place, on the third Thursday of each month at 7.45 p.m.

SYLLABUS FOR 1952-53

1952—

- July 17: "Bird Banding in America," by Professor J. Hough.
August 21: "Bird/Insect Relationships," by A. H. Chisholm.
September 18: "Birds of the Inland and North-west," by J. A. Keast.
October 16: General Discussion on Birds of the Rain-Forests.
November 20: Film Evening.
December 18: General Discussion on Bird-Calls, with recordings by Norman Chaffer.

1953—

- January 15: Address and Colour Slides, by Roy P. Cooper.
February 19: "Birds of the Swamps," by K. A. Hindwood.
March 19: Films by N. Chaffer.
April 16: General Discussion on Birds of the Seashore.
May 21: Address and Colour Slides, by W. R. Moore.
June 18: Annual Meeting. Chairman's Address.

THE AUSTRALIAN CROCODILES

By ERIC WORRELL

Order Loricata, Family Crocodylidae. Single Genus *Crocodylus* (Laurenti, 1768). Two species, *porosus* and *johnsoni*.

Length rarely exceeding eight feet, snout without ridges—*johnsoni*.

Length known to exceed twenty-five feet, ridge extending from each eye to premaxilla—*porosus*.

FEATURES OF ANATOMY.

Crocodylians are distinguished by a number of outstanding anatomical features, notably the four-chambered heart (the ventricle being entirely divided in the crocodile, but only partly so with other reptiles). The dorsal surface is protected by a layer of bony scutes to which the skin is attached, and on the ventral surface is a series of fine abdominal "ribs," or parasterna. The teeth are conical, slightly recurved and developed principally to grip their prey. Teeth are frequently broken or attacked by decay, but are regularly replaced by new teeth growing into the bases of the old teeth. Thus when an old tooth is lost a fairly well-developed new tooth is usually ready to function. The nasal passage extends well to the back of the throat and due to an efficient valve at the base of the tongue the crocodile is able to swallow beneath the surface and still breathe with the tip of the snout above water.

The tongue is entirely attached to the lower jaw and cannot be protruded, the anal cleft is longitudinal, nostrils and ears are valvular and a transparent nictitating membrane sheathes the elliptical eyes when the reptile submerges. Crocodiles can remain submerged for lengthy periods and when surfacing need only show the eyes, which are almost flush with the top of the skull and the nostril-mound. The remainder of the body hangs diagonally in the water.

The fore feet are feebly webbed, five-toed, the outside two clawless. The hind feet are strongly webbed, four-toed, the outside one clawless. The tail and hind limbs are used in casual swimming, but swimming at any speed the powerful tail alone is used, the limbs being stretched along the body.

The copulatory organ is single and sheathed within the body. "Musk" glands on the chin protrude when the reptile is excited. There is also a pair of cloacal glands. The precise function of these glands is unknown.

Crocodiles' stomachs always contain a quantity of gravel and stones as a digestive aid. Dissection and X-rays reveal the gravel in juveniles only a few weeks old.

Although many bush sounds are attributed to crocodiles, including the hoarse cry of the great heron (*Ardea sumatrana*), the only sounds they can utter are a long-drawn hiss, an almost inaudible gurgling sound and a somewhat high-pitched yelp. Adult crocodiles rarely emit sounds other than hissing.

CROCODYLUS JOHNSONI. Krefft.

JOHNSTON'S CROCODILE

Also known as Johnston's river crocodile, freshwater crocodile, fish crocodile. (The type was collected from the Herbert River, Queensland, by sub-inspector Johnston. The spelling of the specific name was Krefft's error.)



1. Aborigines skinning *Crocodilus porosus* for professional hunters.

DISTRIBUTION: The inland freshwater billabongs, lagoons and rivers of far northern Australia. Both species of crocodiles are never found together in numbers. Where either is in profusion the other is a rarity. Johnsoni does not descend to the saltwater, although I did once see a four-foot specimen in the Walker River, Blue Mud Bay.

DESCRIPTION: Snout narrow, without ridges; 19 teeth normally on each side in the upper jaw, 15 on each side of the lower jaw; a post-occipital shield of scutes and a nuchal shield. The upper surface is brown, sides mottled and ventral surface whitish.

FOOD: Actually the crocodile will eat anything it is large enough to swallow, but shows a preference for frogs, giant shrimps, crayfish, insects and small fish. In some dissected specimens I have found the remains of water rats, young *C. johnsoni*, snakes, goannas and spiders.

REPRODUCTION: During August or September the female scoops an ovoid hollow with her hind feet about six inches by twelve inches by twelve inches deep in a high, firm sandbank close to the water. She deposits from twelve to twenty-four white hard-shelled eggs and covers them with sand. The eggs are slightly elongate and the bigger the clutch the smaller the eggs. One measuring $2\frac{3}{4}$ inches in length could be considered a large one. The eggs hatch in November and not later than December, before the annual flood water rises to cover the nesting sites.

The female *johnsoni* stays near the nest, and there is evidence from the nests I have kept under observation that she returns periodically to inspect.

The newly-hatched young are about ten inches in length, and emitting tiny squeaking yelps, they make their way down the sandbank to the female in the water. They stay with the parent for a short indeterminate period and spend the first days of their lives feeding on insects in the shallows and among the pandanus roots.

GENERAL: *Crocodylus johnsoni* is harmless to man and too shy to be accidentally encountered. There are several records, however, of serious wounds resulting from handling wounded specimens. The skins are not considered suitable for first-grade leather, and in view of the inaccessibility of their haunts and the small average skins, cannot be considered commercially. There appears to be no reason why this harmless species cannot be protected.

CROCODYLUS POROSUS. Schnieder.

ESTAURINE CROCODILE

Also known as saltwater crocodile, sea-going crocodile, man-eating crocodile, 'gator.

DISTRIBUTION: Until recently could be seen in great numbers along the mangrove-fringed mudbanks of the estuaries and rivers of the far north. The largest specimens are found in the freshwater coastal billabongs and rivers connected with the sea. Also occurs in south-east Asia, Solomons and Fiji Is.

DESCRIPTION: Snout comparatively broad, a ridge extends from each eye to the premaxilla; normally 17 teeth on each side of the upper jaw, 15 on each side of the lower jaw; a shield of nuchal scutes present, but normally no post-occipital scutes. Upper surface variable from black to mottled brown and yellow, ventral surface whitish to yellow.

FOOD: Principally fish and crabs in the salt water, and fish, crayfish and water rats in the fresh water. Some dissected specimens yielded birds, turtles, smaller crocodiles, snakes and wallabies. Strangely enough, although captive crocodiles will only eat fresh or live meat, I have frequently seen crocodiles in their natural state eat the decaying flesh of other crocodiles a fortnight dead. Crocodiles frequently take up positions in a river beneath the nesting platforms of cormorants and snake-necked divers, and undoubtedly some of



2. (1) X-ray photograph showing pebbles in the stomach of a 14-inch *Crocodilus johnsoni*.
 (2) *C. porosus* emerging from eggs.

- (3) *C. porosus* ready to hatch.
 (4) Magnified study of the egg-tooth of *C. porosus*.

Photos.—Eric Worrell.

the young of these birds, when first venturing from the nests, fall prey to crocodiles. There is no evidence to support the story that crocodiles anchor newly-killed food with a stone to eat when it is putrid. Almost invariably crocodiles have catfish and stingray spines embedded in their tough palates.

REPRODUCTION: It was previously assumed that all estuarine crocodiles made their way to the fresh water to breed and returned to the salt water every dry season. Actually they will breed anywhere the banks are suitable along the salt water rivers, usually away from the mouth. Those breeding in the fresh-water billabongs are the "permanent residents." This is not to say that crocodiles do not wander from the salt water to the fresh water and vice versa, but that they are not in search of nesting sites. In any case, the wanderers are usually males.

Throughout the wet season to early in the dry season, between October and May the female deposits from forty to eighty or more white, hard-shelled eggs measuring up to $3\frac{1}{4}$ inches in length on a hard bank well protected by river scrub. The eggs incubate in a nest mound of leaf mould roughly six feet across by eighteen inches deep. The female regularly repairs damage to the nest inflicted by scratching rails, jungle fowl and wild pigs. The eggs normally hatch three months later, but under cooler conditions I have been able to extend the period to five months.

When the egg is about to hatch the young crocodile can be heard yelping inside. Movement bulges the inner membrane and causes part of the shell to flake off. The membrane is then ripped with a tiny two-pronged egg-tooth on the tip of the snout and the crocodile struggles from the shell still attached by the yolk sac, which it later scratches free with its hind feet. (The egg-tooth is lost several days later.)

The newly-hatched young then join their mother in the water, and it appears that they remain with her for only two or three days before dispersing. Growth rate is about a foot each year for the first five years and gradually less as the crocodile matures.

DANGEROUS TO MAN: In Australia cases of humans taken by crocodiles are rare. However, there is no doubt that a large crocodile will attack a human if given the opportunity. Natives are the principal victims, but every native I have interviewed who exhibited scars from crocodiles told the same story; the crocodile, wounded in the course of a hunt, fastened on the native's limb, held on for a while, then let go. Natives have a fatalistic approach to crocodiles, and although they do not unnecessarily leave themselves open to attack, they do not hesitate in groups to swim a river if it will shorten a journey. On the other hand, I once saw two natives camped for a week on a sandbank on which two crocodiles sunbaked every afternoon only fifty yards away.

Crocodiles do account for a certain amount of stock, and it is no rarity to see horses and cattle with scars from an encounter. Bushmen in the north believe the scars are caused by the crocodile's claws, but the wounds aer from the long raking teeth. The claws of a crocodile are not suitable as weapons, but are used only to assist the crocodile to climb steep banks, having the same effect as spiked shoes.

COMMERCIAL ASPECT: Crocodile hunting in the Northern Territory over the past five years has seriously depleted the crocodile population. Along the Wildman River, Northern Territory, where in 1945 I saw hundreds, it is now considered rare to see two or three in the course of a day. The skin of the estuarine crocodile is used in the manufacture of high quality fancy leather goods. White men in boats, with native assistants, shoot the crocodiles on the banks during the day, or approach them with a powerful spotlight at night, when they are harpooned by native spearmen. The crocodiles are then finished off with a bullet, rolled into the boat and hunting continued until dawn.

The crocodiles are skinned, taking all but the bony dorsal strip, and the skins fleshed, salted and stacked, then dried and folded two days later. These are then offered to hide agents at the ruling price per inch across the belly.

The aboriginal has now entered this commercial field on his own account, spearing the crocodiles and selling the skins through the church missions.

White men now consider crocodile hunting does not warrant the overhead.

GENERAL: Crocodiles are extremely shy, and although they will approach to within feet of a perfectly still observer, they immediately retreat at the slightest movement. When a surfacing crocodile dives it draws its head back diagonally with the minimum water disturbance. Disturbed on a bank, the reptile may reach the water by three methods of progression: If there appears to be no immediate danger the water is reached with a slow waddling gait, but when alarmed on a hard bank some distance from the river the body and tail are raised from the ground and with an amazing turn of speed the crocodile races for the water. Where the banks are soft mangrove mud, the mud is used as a slide.

Small crocodiles are occasionally seen stretched on limbs overhanging a river. This does not mean that crocodiles can climb trees. In parts of the north the tide may rise and fall twenty feet or more, with the result that small crocodiles resting on submerged limbs at high tide may be left dry when the tide drops.

Crocodile eggs and crocodile flesh is a staple diet with the aborigines.

Melville Island natives say the scutes are beautification scars, while other tribes say they are caused by mythological battles.

The Australian Crocodile Shooters' Club, a game shooting organisation, is now considering limiting the sizes of crocodiles shot in order to conserve the rapidly dwindling species.



FIGURES OF SOME AUSTRALIAN FISH TYPES

By GILBERT P. WHITLEY, F.R.Z.S.

(Contribution from The Australian Museum)

(Figures 1-8)

Practically all of the species dealt with in this paper have not been illustrated before, so figures have been prepared from typical specimens.

Family CARANGIDAE

DECAPTERUS LEPTOSOMUS Ogilby

(Figure 1)

Decapterus leptosomus Ogilby, Proc. Linn. Soc., N.S. Wales, xxii, 4, 1898, p. 760. Port Jackson, N.S. Wales. Cotypes in Australian Museum.

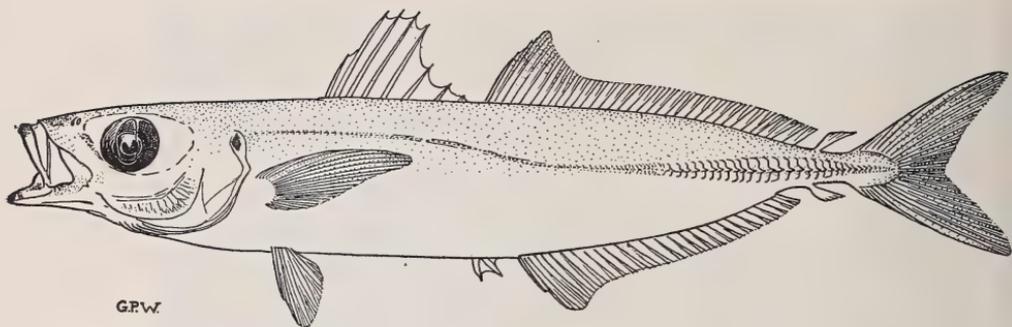


Figure 1.—Scad, *Decapterus leptosomus*. Lectotype, Australian Museum.

Here figured from the lectotype of the species, the larger of two cotypes, a specimen 152mm. in length to caudal fork. Austr. Mus., regd. no. 1.4362. It has D.viii/i, 34; A.ii/i, 27; P.23; L.Lat. circa 83 scales and 27 scutes.

Family LUTJANIDAE
 LUTJANUS CASTELNAUI Whitley
 (Figure 2)

Lutjanus castelnaui Whitley, Rec. Austr. Mus., xvi, 1928, p. 215. New name for *Genyoroge unicolor* Alleyne & Macleay, 1877, anticipated by *Neomesoprion unicolor* Castelnau, 1875, another species of *Lutjanus*.

Here illustrated from the lectotype of the species, a specimen 210mm. in standard length, from the Percy Islands, Queensland. It was kindly lent by the Curator of the Macleay Museum, University of Sydney, for this purpose.

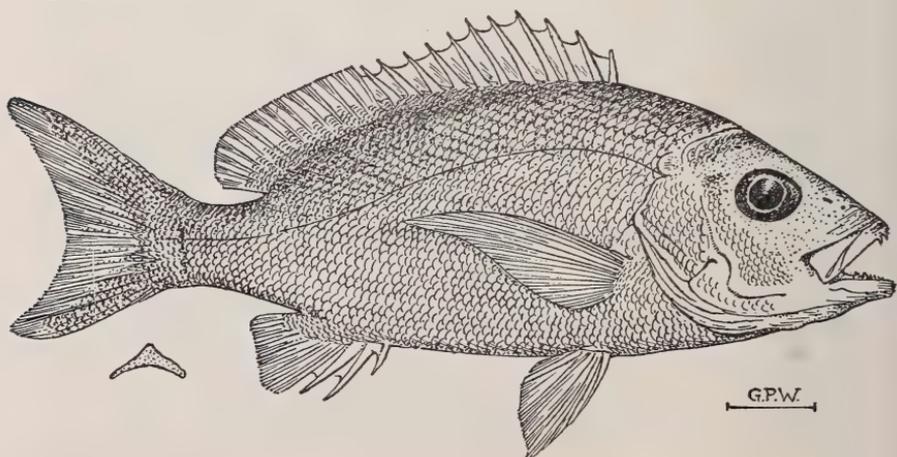


Figure 2.—Hussar, *Lutjanus castelnaui*. Lectotype of *Genyoroge unicolor*, Macleay Museum. Inset, vomerine teeth.

LUTJANUS LONGMANI Whitley

(Figure 3)

Lutjanus longmani Whitley, Rec. Austr. Mus., xx, 1937, p. 12. Off Lindeman Island, Queensland.

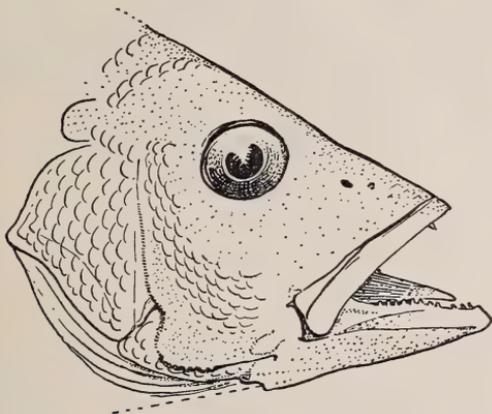


Figure 3.—Hussar, *Lutjanus longmani*. Head of holotype, Austr. Mus.

Figured here from the holotype in the Australian Museum; regd. no. IA.6584.

Family GOBIIDAE

INNOCULUS, gen. nov.

Orthotype, *Gobius nigroocellatus* Gunther, as identified here. D.vi/11; A.10; Sc. 26 to 28; Tr. 8.

Head bluntly rounded, longer than broad, and broader than deep.

Eyes fairly large, without cirrus above. Interorbital narrow.

Head with loose (especially around lower jaws) skin, crossed by some rows of minute sensory papillae. Chin without barbels. Cheeks and opercles naked. Nape and top of head scaly, without crests. Mouth extending to below middle of eye. Teeth villiform, in bands on jaws, some outer ones enlarged (but not canine), hook-like, erect, movable. None on lips, vomer or palatines. Tongue broadly convex, not notched, not adnate. Jaws subequal or upper slightly overhanging lower. Nostrils subcircular, before eyes. No occipital crest.

Few slender, weak gill-rakers. No pit above the opercle. Preopercle unarmed. Gill-openings little wider than depth of pectoral base; isthmus fairly broad.

Form rather elongate, compressed. Body opaque with large ctenoid scales which extend over breast, pectoral base and top of head. Exposed edge of shoulder-girdle without fleshy lobes.

Dorsal fins separate: sixth dorsal spine rather remote from others; middle spines longest. No produced spines or rays. Soft dorsal and anal fins, free from caudal, the latter rounded.

Ventrals united, not adnate to belly, fifth rays longest.

Infundibulum moderate. Upper pectoral rays free, silk-like; the fin rather pointed and about as long as head.

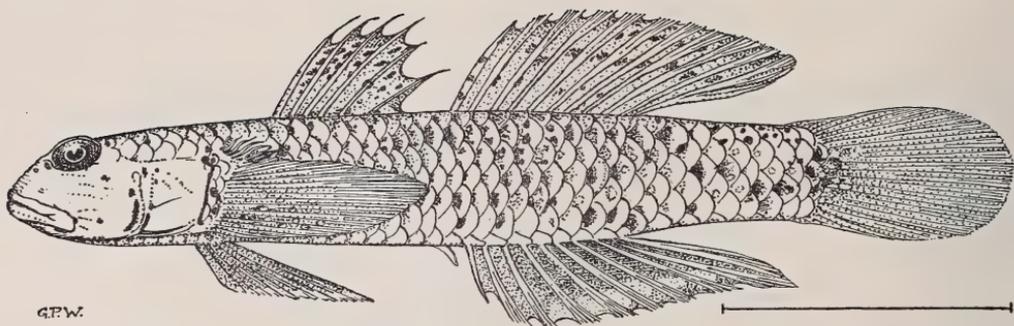


Figure 4.—Goby, *Innoculus nigroocellatus*. Pleisotype, Austr. Mus.

Colour dark brown with blackish spots on body. Length to about $3\frac{1}{2}$ inches.

Allied to the genus *Gobius* of authors in the broadest sense, but differs from *Gobius (niger)* Linne, in the strict sense, in being smaller, in having much longer body, yet fewer dorsal and anal rays, and larger scales with longer, more converging radii and granular rather than striated field.

European and Australian specimens of the two genotypes compared.

The word *innoculus* has no meaning (see Savory, *Browsing Among Words of Science*, 1951, the last word in his book). Then let it at least mean this harmless, innocent little goby, black-spotted though it be.

INNOCULUS NIGROOCELLATUS (Gunther)

(Figure 4)

Gobius nigroocellatus Gunther, Journ. Mus. Godeffroy, i, 2, 1873, p. 101. Bowen, Queensland. Type in British Museum (Nat. Hist.). Seen in 1937. *Id.* Macleay, Proc. Linn. Soc., N.S. Wales, v, 1881, p. 603, and Cat. Austr. Fish., i, 1881, p. 238 (English trans. of original German description). *Id.* McCulloch and Ogilby, Rec. Austr. Mus., xii, 1919, p. 230. *Id.* McCulloch and Whitley, Mem. Qld. Mus., viii, 1925, p. 171.

Here figured from one of several specimens collected by Rev. W. S. Chaseling in 1939 from the Melville Bay and Cape Arnhem areas (Austr. Mus., regd. no. IB.422). New record for the Northern Territory of Australia. Hitherto known only from Gunther's type from Bowen, Queensland.

Genus NESOGOBIUS Whitley, 1929

Nesogobius Whitley, Proc. Roy. Soc. Tas., 1928 (1929), p. 62. Orthotype, *Gobius hinsbyi* McCulloch and Ogilby. *Id.* Scott, *ibid.*, 1934 (1935), pp. 47 and 60; *et ibid.*, 1938 (1939), p. 157.

NESOGOBIUS PULCHELLUS (Castelnaud)

(Figure 5)

Gobius pulchellus Castelnaud, Proc. Zool. Acclim. Soc., Vict., i, 1872, p. 125. Westernport, Victoria. And of later Australian lists. *Id.* Koumans, Zool. Med., xxii, 1940, p. 162, but not the species on p. 171.

General characters as described for the genotype, *hinsbyi*, by McCulloch and Ogilby (Rec. Austr. Mus., xii, 1919, p. 215, pl. 33, fig. 1), but scales

fewer, lacking on head, form less slender, spinous dorsal elevated and dark anteriorly, body not barred, and differing in various other details as described below.

Br. 7. D. vii/i, 10; A. 2, 8; P. 17; V. i, 5; C. 12 branched rays.

About 25 rows of scales between operculum or axil and hypural joint, and 7 between anterior dorsal and anal rays. Tr. 7 or 8. Predorsal 0. Head (13mm.) 3, depth (8) 5 in standard length (40).

Eye (4) 3.2, snout (3) and depth of caudal peduncle (3) 4.3 in head. Breadth (7) 1.1 in depth.

Head subconic, naked. Rows of papillae around chin and preoperculum, along interorbital, on sides of head and in scattered groups (resembling microscopic chimneys) on the naked vertex and nape to near spinous dorsal fin. Eyes very close together. Snout convex. Nostrils not far from eye, the anterior in a short, flap-like tube, the posterior a slightly raised opening. Mouth slightly oblique, mandible projecting a trifle, maxilla reaching below front of orbit. Bands of fine, subequal, backwardly directed teeth in jaws. Tongue truncate, free. Gill-openings extending well forward below, separated by narrow isthmus.

Body robust, subcylindrical in front, compressed behind. Scales large, deciduous, ctenoid with radii converging posteriorly. They extend over the breast, but not on nape, and not always on pectoral bases.

Caudal peduncle slightly more than twice as long as deep. Genital papilla large, probably finger-like in male and broad and leaf-shaped in females.

First dorsal origin slightly behind level of pectoral and ventral origins, the fin is elevated, reaching second dorsal when adpressed, seven-spined, with the fourth longest. Second dorsal and anal fins with the rays more or less than the depth of the body between them. Pectorals rounded reaching about 7th body-scale or to below notch between dorsal fins. Ventrals larger than pectoral, with broad infundibulum, and reaching genital papilla. Caudal rounded.

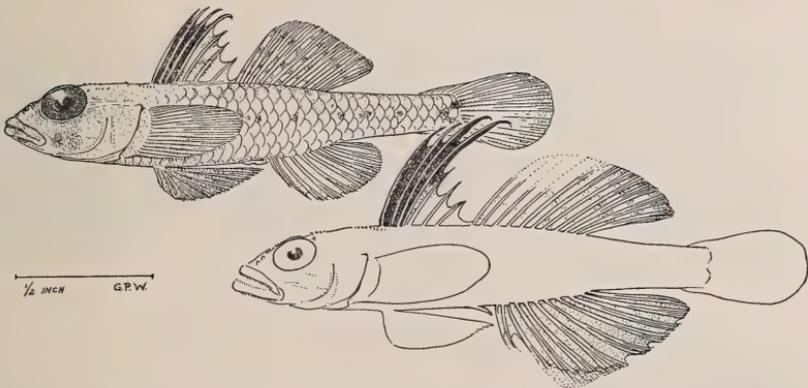


Figure 5.—Goby, *Nesogobius pulchellus*. Two Port Jackson specimens, Austr. Mus.

Colour, in alcohol, pale brown, finely punctulated with dark brown, punctae larger on snout and sides of head. About seven brown blotches along middle of side, with (behind the last) one above and one below on the scales before the caudal fin. First dorsal fin dark brown (perhaps blackish in life) anteriorly, becoming spotted and then white posteriorly. Soft dorsal yellowish with three or four irregular rows of rosettes of reddish-

brown dots and with a brown margin. Anal plain with narrow brown margin. Pectorals and ventrals yellowish, infuscated with brown. Caudal yellowish, plain. No vertical bars as in *hinsbyi*.

Described and figured from a specimen 40mm. in standard length or 2 inches overall, in comparison with smaller specimens.

Localities: Rose Bay, Port Jackson, New South Wales (described example, Austr. Mus., regd. no. I.9736); collected in 1908 by Messrs. Dene B. Fry and C. Ross. New record for New South Wales.

Port Jackson, 10th July, 1886; old collection (I.6750), four specimens; and another numbered I.9010.

Westernport, Victoria; six specimens collected by J. Gabriel in 1906 and in May, 1915 (Nos. I.7616 and IA.1319).

Genus MARS Jordan and Seale, 1906

Mars Jordan and Seale, Bull. U.S. Fish. Comm., xxv, 1905 (1906), pp. 382, 399 and 408. Orthotype, *M. strigilliceptus* Jordan and Seale.

Id. Fowler, Mem. Bishop Mus., x, 1928, p. 414 (as subgenus of *Cryptocentrus*).

Id. Koumans, Prelim. Rev. Gen. Gobioid Fishes, 1931, pp. 36 and 98.

Id. Herre, Copeia, 1933, i, 1933, p. 22.

Id. Herre, Fish Herre Exped., 1934, pp. 84 and 87.

Id. Herre, Journ. Pan-Pacif. Res. Inst., x, 2, 1935, p. 166.

Id. Herre, Philip Journ. Sci., lix, 1936, p. 363.

Id. Herre, Proc. Biol. Soc., Washington, lviii, 1945, pp. 12 and 79.

MARS STRIGILLICEPTUS Jordan and Seale

One specimen from Murray Island, Queensland (Austr. Mus., regd. no. I.11829), agrees in detail with Jordan and Seale's description (Bull. U.S. Bur. Fisher., xxv, 1905 (1906), p. 408, fig. 95), only differing in having no elevated spine in first dorsal fin, and no perceptible palatine teeth. This species is new to the Australian list.

Cryptocentrus octofasciatus Regan (Trans. Linn. Soc., London (2), xii, 1908, p. 241, pl. 29, fig. 2), from Chagos Archipelago and more especially as figured from Hiroshima by Tomiyama (Jap. Journ. Zool., vii, 1936, p. 80, fig. 30) looks very like my example, but has smaller scales and these extend over breast and belly and some at least are cycloid, whilst the suboperculum is said to be produced into a spine.

Genus STIGMATOGOBIUS Bleeker, 1874

Stigmatogobius Bleeker, Arch. Neerl. Sci. Nat., ix, 1874, pp. 298 and 323. Orthotype, *Gobius pleurostigma* Bleeker.

Id. Bleeker, Versl. Akad. Amsterd. (2), xii, 1878, pp. 199-208 (*vide* Weber and Beaufort, Fish. Indo-Austr. Archip., i, 1911, p. 376).

Id. Weber, Siboga Exped., lvii, 1931, Fische, p. 475.

I have not seen Bleeker's "Description des especes insulindiennes du genre *Stigmatogobius*" (*loc. cit.*, 1878), so follow Koumans in placing *Gobius johnstoniensis* De Vis, MS. in the genus *Stigmatogobius*.

STIGMATOGOBIUS JOHNSTONIENSIS (Koumans)

(Figure 6)

Gobius johnstoniensis Koumans, Zool. Med., xxii, 1940, p. 166. Ex De Vis, MS. Johnston R., Queensland.

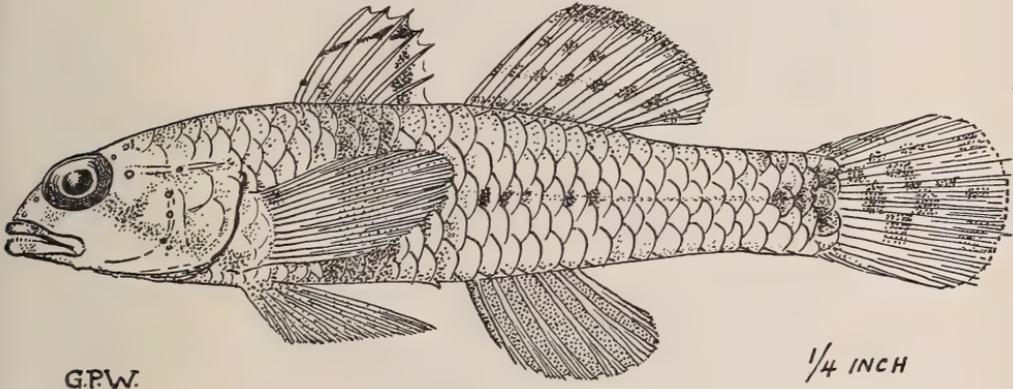


Figure 6.—Goby, *Stigmatogobius johnstoniensis*. Lectotype, Austr. Mus.

Here figured from the lectotype, being the largest of four cotypes in the Australian Museum, from the Johnstone River at "Geraldton," now Innisfail, north Queensland, Austr. Mus., regd. no. I.447.

Allied to *Vaimosa balteata* Herre (Field Mus. Publ., 335, Zool., xviii, 12, 1935, p. 419, and xxi, 1936, p. 359, fig. 21) from Waigiu.

Family ALEUTERIDAE

OSBECKIA SCRIPTA (Forster)

(Figure 7)

Balistes scriptus Forster, Voy. China (Osbeck), ii, 1771, Faunula Sinensis, p. 331. Based on Osbeck, 1765, a non-binomial translation of a pre-Linnean work. China and Bahamas.

Balistes laevis Bloch, 1795; *B. liturosus* Shaw, 1804; *B. ornatus* Proce, 1822; *Aluterus personatus* and *pareva* Lesson, 1830; and *Aluterus venosus* Hollard, 1854.

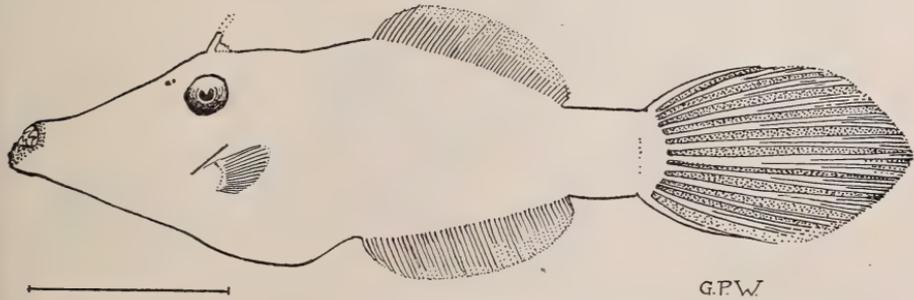


Figure 7.—Leatherjacket, *Osbeckia scripta*. Pleisotype of *Monacanthus macrurus* — *maculicauda*, Macleay Museum.

Monacanthus macrurus Macleay, Proc. Linn. Soc., N.S. Wales, vi, 1881, p. 330. Port Jackson, N.S. Wales. Name preocc. by Bleeker, 1856, now a *Pseudomonacanthus*.

Monacanthus maculicauda Ogilby, Cat. Fish. N.S. Wales, 1886, p. 64. New name for *M. macrurus* Macleay, preocc.

The Curator of the Macleay Museum kindly lent me a type of *M. macrurus* Macleay (non Bleeker) — *maculicauda* Ogilby for figuring here. The colour-markings have disappeared, but it proves to be a small *Osbeckia scripta*.

The West Indian congener should evidently be called *O. picturata* (Poey), because Poey (Proc. Acad. Nat. Sci., Philad., xv, 1863, p. 183) restricted Bloch's *laevis* to the East Indian species, now *scripta*.

Family SOLENICHTHYIDAE, nov.

Genus SOLENICHTHYS Bleeker, 1865

Solenostomus Lacepede, Hist. Nat. Poiss., v, 1803, p. 360. Haplotype, *Fistularia paradoxa* Pallas, Spicil. Zool., viii, 1770, p. 32, pl. iv, fig. 6, from Amboina. Preocc. by *Solenostomus* Meuschen, Index Zoophy. Gronow, 1781, ex Gronow, p. 119, no. 365, non-binomial, another genus of fishes equal to *Fistularia*. Spelt *Solenostoma* by some authors, but preocc. by Dumeril, 1805, equals *Fistularia*.

Solenichthys Bleeker, Ned. Tijdschr. Dierk., ii, 1865, p. 183. New name for *Solenostomus* Lac., preocc. Later emended to *Solenostomichthys* and *Solenostomatichthys* by Bleeker in 1873 and 1875 respectively.

There are nine nominal species: *Solenichthys armatus* (Weber, 1913), *S. bleekeri* (Dumeril, 1870), *S. brachyurus* (Bleeker, 1855), *S. cyanopterus* (Bleeker, 1855), *S. laciniatus* (Willey, 1909), *S. leptosomus* (Tanaka, 1908), *S. paegnius* (Jordan and Thompson, 1914), *S. paradoxus* (Pallas, 1770), and *S. phantasticus* (Herre, 1933). The new family name proposed above replaces Solenostomidae of authors, preoccupied.

SOLENICHTHYS LEPTOSOMUS (Tanaka)

(Figure 8)

Solenostomus leptosoma Tanaka, Annot. Zool. Jap., vi, 4, 1908, p. 29, fig. Sagami Sea, Japan. *Id.* Jordan and Thompson, Mem. Carneg. Mus., vi, 4, 1914, p. 236.

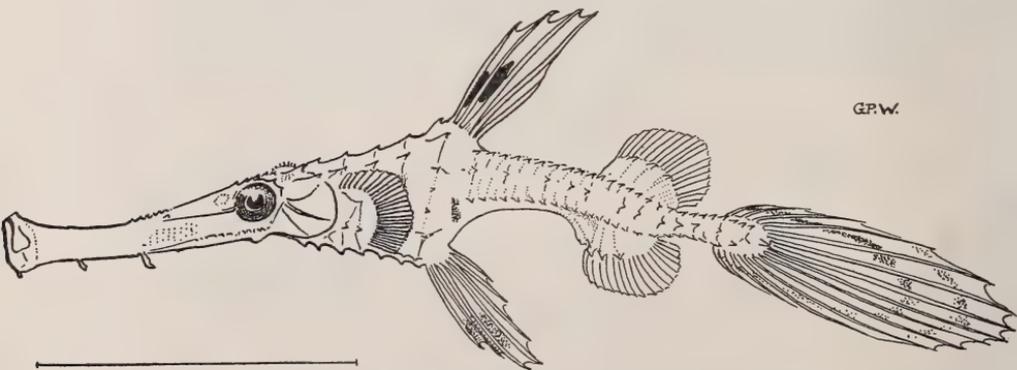


Figure 8.—Ghost Pipefish, *Solenichthys leptosomus*. A specimen from New South Wales.

Weber and Beaufort place this species in the synonymy of *paradoxus*, of which it is probably the male. A specimen agreeing well with Tanaka's description and figure was trawled off Newcastle, New South Wales, a new record for Australia.

D. v/19; A. 18; P. 27; V. 7; C. 16. Head (27mm.) 2.2, height of body (11) 5.5, of caud. ped. (2) 30 in total length without caudal (61). Eye (3) 9, interorbital (2.3) 1.2, snout (18) 1.5 in head. Depth of snout (2) 9 in its length. Has more pectoral and anal fin-rays and slightly different proportions from Tanaka's type. Height of body before anal greater than eye. Length of caud. ped. (4mm.) shorter than base of second dorsal (6). Maxillary (3.5) exceeds interorbital. No median ridge on belly behind anal fin. First dorsal fin just reaching second when adpressed, 13.5mm. in height; second dorsal little higher than eye-diameter. Ventrals (12mm.) free of body. Caudal (21) shorter than distance from eye to anal origin. Total length, 82mm. or 3¼ ins.

Colour pale yellow. Eyes and ends of ventral fins brick red. Black blotches between first and second and second and third dorsal spines. One or two curved rows of dark grey blotches along caudal fin. A blue mark inside belly behind viscera.



A WANDERER IN WAX

By TARLTON RAYMENT, F.R.Z.S.

(Honorary Hymenopterist, National Museum, Melbourne)

A naturalist's life is full of surprises. That is one of its compensations. "Do you know of a curious sort of wasp that breeds in wet wax-cappings?" That is the question posed by an observant correspondent, a commercial bee-farmer, Robert E. Martin, of Denman, in the fertile valley of the Hunter River in New South Wales.

The apiarist's technical term, "wet wax-cappings," may appear somewhat strange to you, so bear with me a moment while I clear the ground a trifle before we jump into the actual story of the insect itself.

The apiarist first cuts off the thin wax "cap," or sealing, of "ripe" honey-comb with a heavy, but sharp and hot decapping knife, before he places the combs in a mechanical honey-extractor. Generally, these cappings are rendered down into beeswax as fast as they are shaved from the combs, but there are times when the cappings are stored in tanks, awaiting a less busy period. Since a small amount of honey is usually sliced off with the wax, such cappings are known as "wet," but when they have been thoroughly drained off, or even pressed, they are then referred to as "dry" cappings.

The bee-farmer hastens to explain that a small amount of rain had splashed into the tank through a faulty cover, so that the cappings contained more moisture than is normally the case. Of course, honey being hygroscopic, absorbs moisture from the air, and so becomes thinner, and this is an interesting point, because certain diptera in the Family Syrphidae, drone-flies, are known to breed in damp places.

Well, in due course, the postman delivers to me a small tin containing a mass of wet cappings, among which I discern several wriggling larvae, drab-white in colour. They arrive on a day when I am hard-pressed with work, and for the moment, I can do no more than note the presence of the squirming "grubs" before I have to put the package aside. You see, I am so accustomed to receiving the disgusting larvae of the ubiquitous wax-moth, *Galleria mellonella*, in honey-capping, that I give the creatures no more than a casual glance, and close the tin again. I resume my interrupted studies.

When the press of work eases, I reopen the tin to make a closer examination, and lift a larva from its sticky bed. Yes, the size is right, so is the colour, for moth babies—but no, the movements of the creatures are different. Under the microscope, the “head” and the “tail” are strange, different from any other insect babies in my collection. I recall the apiarist’s words: “A curious sort of wasp.”

Well, well! I am too familiar with grubs of the Hymenoptera to mistake them for anything else, but no matter, I will soon establish the identity of the strangers, for I shall rear them to maturity. Plainly, these babies belong to neither wasps nor bees. I admit I am somewhat surprised that any insect is able to breed successfully in “wet” cappings, because while there is an abundance of carbohydrates—honey to provide fuel for energy—there is little, if any, nitrogenous-protein for forming the “bricks” of the body.

The wax-moth succeeds because, in its wanderings over the combs, the larva is somehow able to obtain sufficient pollen—debris, protein—to build the cells of the body. I conclude, then, that the strange larvae are also successful in obtaining an adequate supply of nitrogenous protein, for no insect could grow on a diet of pure beeswax. Frankly, I find so little pollen among the cappings that I am sceptical of its adequacy. Let us keep an open mind on this matter, and continue our observations on the larvae.

On my reopening the tin container, the larvae wriggle vigorously to seek cover; obviously, they do not enjoy being exposed—but neither do the babies of the wax-moth. However, I select a large well-grown one, and put it under the microscope. The date is 5th October, 1951. It is a drab-white “grub,” say, 10-11 mm. in length, with a diameter of 4.5 mm. I had already noted six pairs of hair-like “feet,” but under magnification, I can see that what I had taken to be hairs, prove to be groups of strong brown hooklets, twenty-four of which, disposed in two rows, may be large and strong, with several additional much smaller ones.

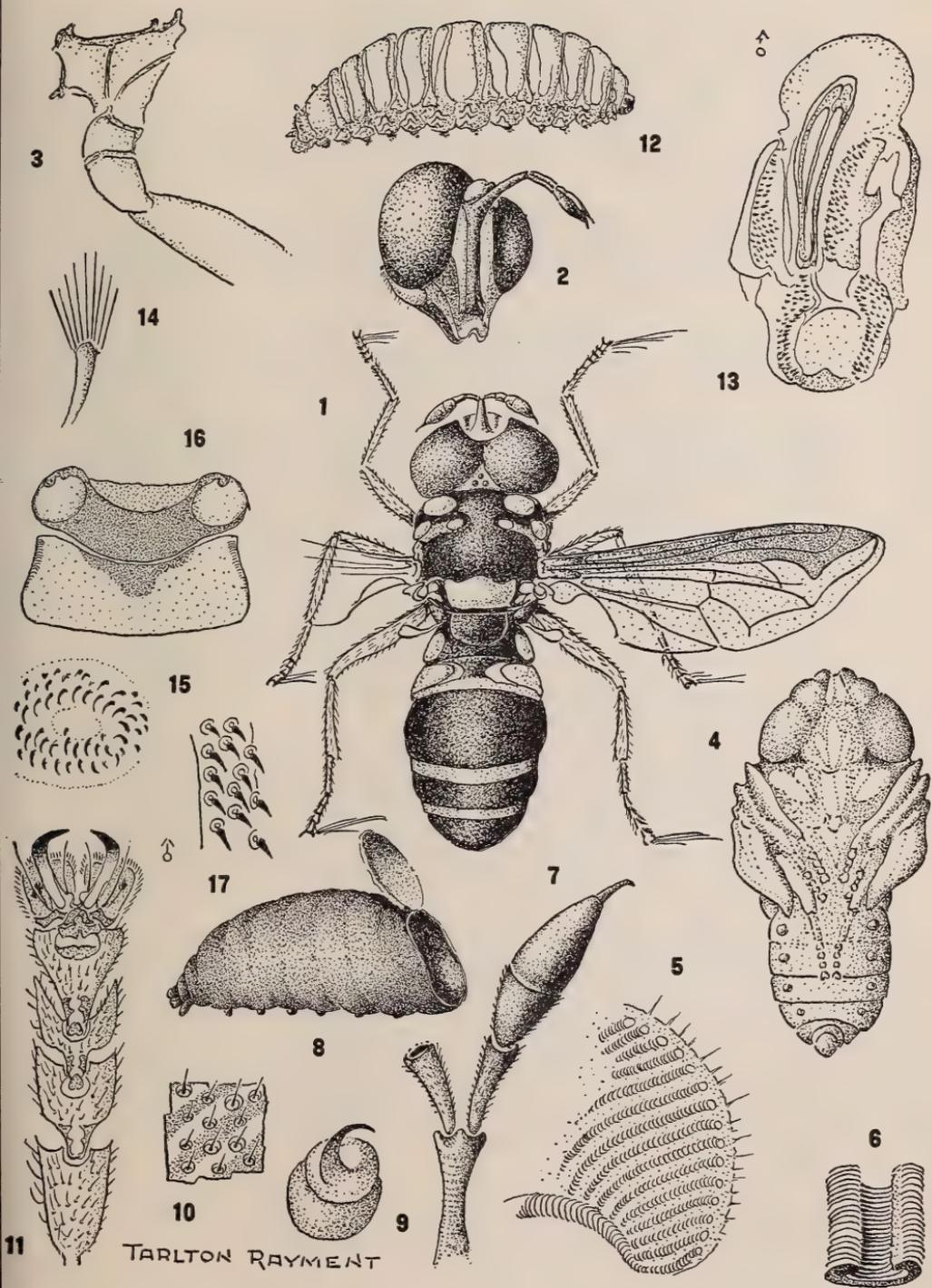
A cherry-red tubercle distinguishes the head end, where there are two small lateral “arms” not altogether unlike those of the reed-bees, *Exoneura*. There are several groups of the small hooklets disposed about the anal segments. The grubs began to shrink a little on the following day, and it was evidence that they were preparing to pupate.

Twenty-two days later, on the 27th October, one larva had encased itself in a smooth skin covering, the puparium, of a burnt sienna-colour, and which showed faint traces of the developing form within. Of course, I now no longer expect to rear either a moth or a wasp.

The cradles of baby flies are not true cocoons, such as one finds in the wasps, and which are spun separately of silken materials by the larva itself. The barrel-shaped puparium of flies reveals the faintest outline of the creature within, and this is due to the fact that the dry brown case was originally the outer skin of the larva.

On the 10th November, I deemed it advisable to open the case to investigate the contents. The pupa is stout and broad, drab-white in colour, 10 mm. in length, and 5 mm. in diameter. The thorax is somewhat browner, and the large eyes are pinkish-red in colour; there are two black triangles on the frons, and immediately below them, two club-shaped black marks. We do not have to guess just what these represent—they will surely be the antennae.

The second segment of the abdomen is light-brownish in colour, and there are, of course, the “pads” of the embryonic wings. At the end of the fifth tarsal segment of each leg is a strong curved hooklet. Oh, I almost overlooked the developing glossa. The whole pupa is enveloped in a wet film-like milky membrane.



TARLTON RAYMENT

For Explanation of Plate, see page 35.

On the 22nd November, the end of another case was thrust open, with the lid hinged like a coffee-pot. A moist black and reddish insect emerges to the light of day, and begins to groom itself in a leisurely manner, during which the crinkled wings are extended out straight.

Now, I am indeed surprised, and I can perceive at once just how my correspondent was misled, for the insects have only two large deeply-fuliginous or smoky wings. A novice could easily mistake them for wasps, and since these insects are not so well known, permit me to sketch a portrait in some detail.

Say, 12 mm. in length, and 5 mm. across the "shoulders"; the head and the thorax are opaque or dull-black, so is the larger portion of the abdomen, which is banded with reddish-orange colour as though imitating a Eumenid mud wasp; the "face," too, is of a somewhat similar pale-yellow colour.

The antennae are certainly peculiar, for they are not articulated with the frons, but rise from a solid horn-like base, and terminate in a pointed club-like segment. On each side of the "waist" are two tiny pale "balancers."

They are not quite like the typical form, being somewhat smaller and blacker, and they lack a yellow line continuing round over the top of the head-capsule, and the apical segments of the abdomen are blacker. The Denman insects may be more than a variety, but their true relationships must be left until more evidence is to hand.

The insects are not altogether unlike the well-known hover-flies, in the Family Syrphidae, the larvae of which are known to be insectivorous, feeding or aphids, and thus are beneficial species. Their rat-tailed larvae are well known, and are always developed in moist situations. In a sub-family there is a subgenus of wasp-like flies, which closely resemble Eumenid mud wasps, and these wasp-flies have the vena spuria in the wings, and lack the frontal lunule of the face. My friend, Keith McKeown, of the Australian Museum, Sydney, tells me that the wasp-like flies are *Tenthredomyia* (*Pterygophoromyia*) *ornata* (Saunders).^{*} A really terrible name, but a later one appears to be *Ceriodes variabilis* Ferg.

The "books" assure us that other species in the family are commensal in the nests of bees and wasps. That is not entirely satisfactory, for the apiarist was confident that our flies had bred in the moist cappings, and they most certainly pupated there, and no Hymenopteron was present to serve as the host. Moreover, the cappings had been stored in closed tanks for several weeks, so that there was little chance of the flies being parasites on the honey-bee. Several of the larvae were very young, and I have no doubt that the eggs had been deposited in the wax.

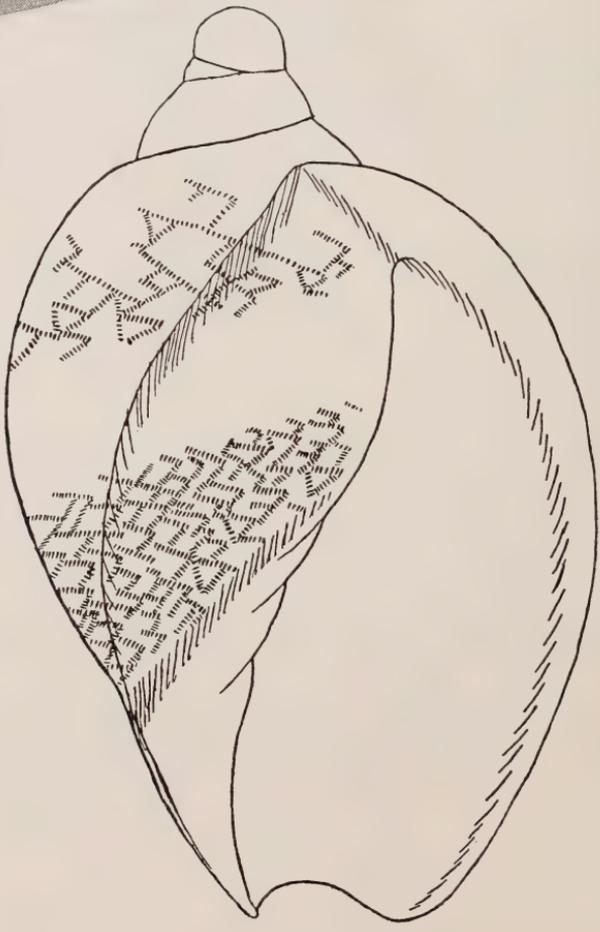
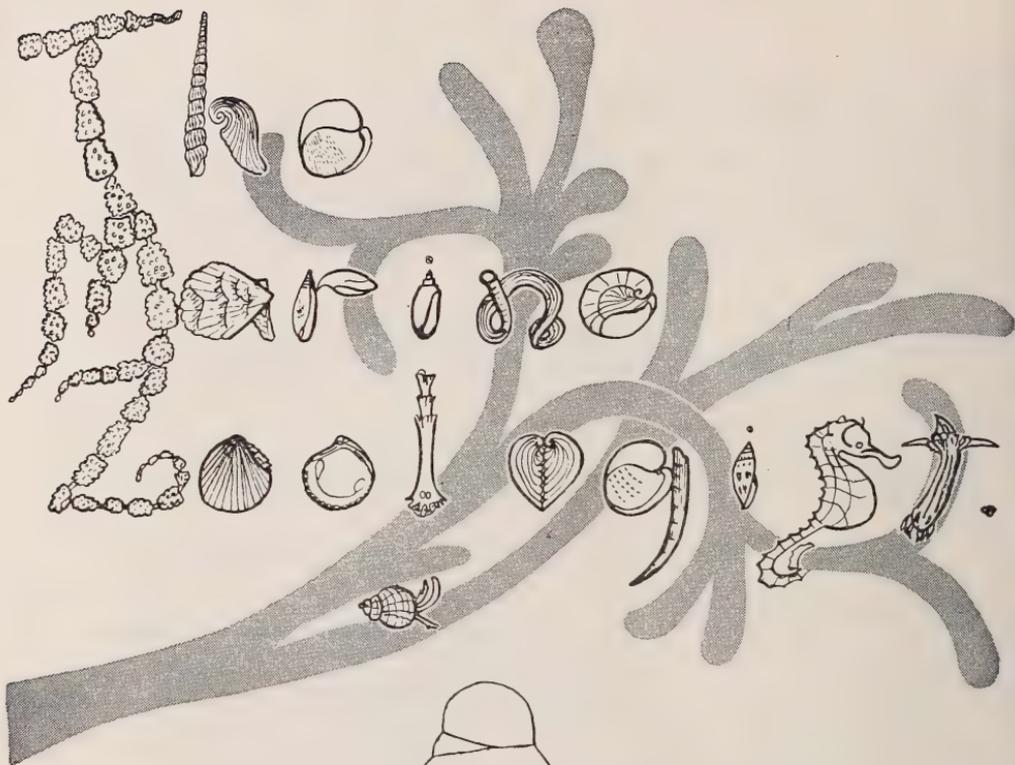
The resemblance to the mud-wasps is certainly remarkable, but is there anything to be gained by such arresting camouflage? Is the likeness merely accidental? The camouflage could possibly bestow certain advantages, such as immunity from attack by insectivorous birds. Should a bird capture a mud-wasp, and then find it unpalatable, then a fly of similar size and colours would probably escape attention. Cinnabar red is regarded by many naturalists as a "warning colour," consequently, although the fly may be quite flavoursome, yet it escapes because it exhibits the "keep clear" sign. "But is that true?" you may well ask. I confess I do not know, and I can give only the opinions of other observers. Careful counts of insects consumed, in certain feeding experiments, proved conclusively that birds reject the prey showing "warning colours."

^{*} Originally *Ceria ornata* Saunders, Trans. Ent. Soc., London, iv, 1, April 7, 1845, p. 64, pl. iv, fig. 3. North-west coast of New Holland.

EXPLANATION OF PLATE

1. Adult wasp-fly *Tenthredomyia* (*Pterygophoromyia*) *ornata* (Saunders).
2. Oblique view of the front of the head-capsule.
3. Coxa and trochanter of anterior leg.
4. Ventral view of the pupa.
5. Portion of the glossa showing suctorial tubes.
6. Graphic section of one of the tubes.
7. The club-shaped antennae.
8. The brown puparium with the "cap" still attached.
9. One of the pupal hooklets of the tarsal segments.
10. Portion of the under surface of the glossa.
11. Four tarsal segments of the "foot."
12. Larva of the fly.
13. Oblique view of the genitalia of the male. (Allowance must be made for distortion due to pressure from the cover-glass.)
14. Comb of the apical tarsal segment highly magnified.
15. The group of hooklets of the larval pseudopodia.
16. Sternal plates of abdomen.
17. Some of the sensory peg-hairs of the femora.





"THE MARINE ZOOLOGIST"

INTRODUCTION

This is the first issue of the "Marine Zoologist," a dream which has come true at last for us, for we have desired a paper of our own for many years. We must thank the Council of the Royal Zoological Society for the realisation of this project and for their keen interest in our venture.

The "Marine Zoologist" is incorporated with the "Proceedings of the Royal Zoological Society." The reprints of this part will then be bound under our own cover and become our own magazine. We hope that the infant will become in time so lusty that it may walk alone. In these first hesitant steps we present to you some of the results of our field collecting and study. Most of us are interested in the various forms of conchology and malacology.

The sub-editors have asked Mrs. Woolacott, one of our senior members, to write an introductory article entitled "Outlines," which defines the fields of study which we hope to follow in future issues of this magazine.

We must thank Miss Joyce Allan, Conchologist of the Australian Museum, Mr. T. Iredale, and Mr. Bernard Cotton for their support and for the articles they have so kindly promised to contribute to our magazine.

(Signed) MISS G. THORNLEY,
MR. D. McALPINE,
Sub-Editors.



OUTLINES

By MRS. L. WOOLLACOTT

It is the aim and purpose of members of the marine group of the Royal Zoological Society of New South Wales to collect marine specimens, living and dead, to study them in every manner possible, using available literature as well as observations in the field; and to publish their findings and conclusions in this small journal once a year.

Naturally, we hope to expand considerably as the years go by, and, in due course, to produce a small magazine that will be of great benefit to later students in our chosen field, especially in view of the fact that material readily available to-day may be difficult or even impossible to obtain a few years from now.

Members of the Marine Section of the Royal Zoological Society are asked to contribute towards the cost of production of this journal and to pay a reasonable amount for each copy, in order that we may have blocks made and to raise funds for future publications.

We wish to acknowledge the fine gesture made by the Royal Zoological Society in permitting us to include our notes and records in the Annual Proceedings of the Society. Without this assistance and encouragement it would not have been possible to make a beginning for a long time to come, and certainly not under such favourable circumstances.

Up to date, most of the work done has been in the molluscan fauna, as the bulk of the members are shell collectors, but, as time goes on, we hope to acquire students in other branches of marine work and so round out our studies to give a more comprehensive picture of the marine life of New South Wales. The main reason for selecting New South Wales as our field of operations is obvious, as we are all members of that State, but a greater and more significant factor is that Australia as a whole presents such a vast and bewildering number of marine species that it is quite beyond the ability of a small group, such as this, to do justice to in a lifetime; nevertheless, occasional excursions into other States will be made, from time to time, for studies of particular interest.

The Australian marine fauna has suffered the fate of much erroneous nomenclature, owing, in part, to the fact that the early naturalists visiting our shores gave European names to the material collected. These names are in constant process of alteration, and much painstaking and exhaustive study of literature is necessary to unravel the names of some of the commonest of our sea shells and other marine fauna. This study is termed taxonomy.

Taking a section of the animal kingdom, such as the marine molluscan fauna of any given country, or part thereof, and listing the names in the approved scientific method, with the species name being followed by the name of the authority for such species, is termed systematics, and is a very necessary foundation for any subsequent study of that particular fauna. It has been said that systematics is the lowest form of science, but granting that there may be a modicum of truth in this assertion, it is still the Sound Rock on which all the rest is built.

Having sound and authoritative lists of the marine creatures to be found in a given area, a student may branch out from that point and take up any one of several interesting aspects of marine life such as Mollusca (shells). He, or she, may work hard to collect every species mentioned on the list, or find the greatest joy in adding entirely new species to that list. Then, again, there is the study of the living animal and all its soft parts; how it breathes, eats, moves and mates, and the shape and structure of all the organs. This study of the living animal is termed melecology, and, by a sound knowledge of the difference in the animals, many otherwise difficult problems may be solved and a new species established or an old one discarded.

Next we have investigation into the habits of the creature, its seasonal migration, the area in which it prefers to live, what particular association of other marine flora or fauna is necessary to its well-being, the degree of salinity, the amount of muddy silt which it can tolerate (or even prefer), the food on which it lives, the temperature which it can endure, the mating habits and seasons, and the type and form in which the eggs are laid. All these factors, and many more as well, constitute one of the most fascinating of all the studies, ecology. All collectors know that certain marine species are found only within a very narrow, restricted belt between high and low watermarks, sometimes a matter of a mere band of a few inches, and that it would be futile to look for such species either above or below these special living quarters. Other species have a limited coastal range, being found only on a strip 200 or so miles in extent; and yet there are other species which have a most remarkable range, living in New South Wales and extending through Queensland to Darwin, showing an adaptability of the most amazing kind. Many marine creatures live in deep water only, show a very close affinity with other deep-water species many hundreds of miles apart. If all the knowledge obtained by various collectors could be competently tabulated, it would not be long before a very comprehensive scheme of the marine ecology of Australia could be worked out and published.

Most of the students' findings can be fairly well conveyed by the written word, but that is not now sufficient for the ultimate designation of a particular species, and illustrations are imperative to finalise the matter for all time, so we find that the artist is necessary to give the final touch to all our observations.

Some of our members are interested in taxonomy and systematics and have prepared and are preparing illustrated papers on these subjects. Others are interested in malacology and ecology and are studying the living animal and its ways, and recording these for future generations. One member is well advanced in the study of our land snails from all possible aspects and has carried out some very fine experiments in breeding and in recording the results of special foods. I am sure that all this worthwhile work will be carried on, and this publication will be the means of encouraging our members to continue to investigate, study and experiment, in the knowledge that their efforts will be appreciated and their results published.



A SHELL THAT BUILDS A HOUSE

By C. F. and J. LASERON

A new record for New South Wales is the extraordinary little bivalve *Gastrochaena*. When examining material brought up by the harbour dredge Triton from 6-9 fathoms in the West Channel of the Sow and Pigs Reef in Port Jackson, our attention was attracted by small blisters on worn fragments of larger shells. When broken open each of these was seen to contain a small bivalve. The shell itself is undistinguished, thin, white, elongated and very inequilateral, the umbones terminally placed, and the united valves gaping widely along the whole of the ventral margin. From comparison with figures of the Tasmanian species, *G. tasmanica* Ten. Woods, no essential differences could be detected, and the New South Wales shell may be tentatively taken as identical. *G. tasmanica* has also been recorded from South Australia, but the South Australian shells have a slightly different shape and may be a different species.

The main interest in *Gastrochaena* lies in its habit of constructing a flask or house, in which the shell remains hidden throughout its life. As the size of the flask is adapted to the size of the shell, the problem arises how the flask is enlarged from the inside. There would seem to be only one solution. Examination of the surface of the flask with a lens shows that it is covered with a number of small, rounded, bubble-like protuberances. Each of these evidently marks where the wall has been dissolved away from the inside and a small annex secreted. In this way the size of the flask increases as the shell within grows.

Further examination shows that in the larval stage the bivalve actually bores just below the surface into the dead shell, emerging some distance away, where it begins to construct the flask. A tube is thus left through which the elongated siphons protrude, and thus the animal, though apparently completely enclosed, is able to find microscopic life for its sustenance.

There is in Queensland an allied species which shows rather a different habit. In this the larval shell bores completely through a piece of dead shell and emerges always on the opposite side. The flask, instead of being covered with small bubbles, is perfectly smooth, but is divided into regular segments, each showing where the end of the flask has been dissolved out, and a larger addition made.

Specimens of the flasks and shells have been placed in the Marine Section's Collection.

NOTES ON SOME SIPHONARIIDAE

(CLASS GASTROPODA)

By DAVID McALPINE

The commonest member of the *Siphonariidae* living in the vicinity of Sydney has been known as *Siphonaria scabra* Reeve for many years. Examination of Reeve's description and figure (Conch. Icon., Vol. lx, *Siphonaria*, pl. 1, fig. and sp. 2, March, 1856) shows that this is based on Quoy and Gaimard's *Siphonaria diemenensis*, the differences pointed out by Reeve being merely individual, not geographical, though races may be separated at a later date when very many series are available.

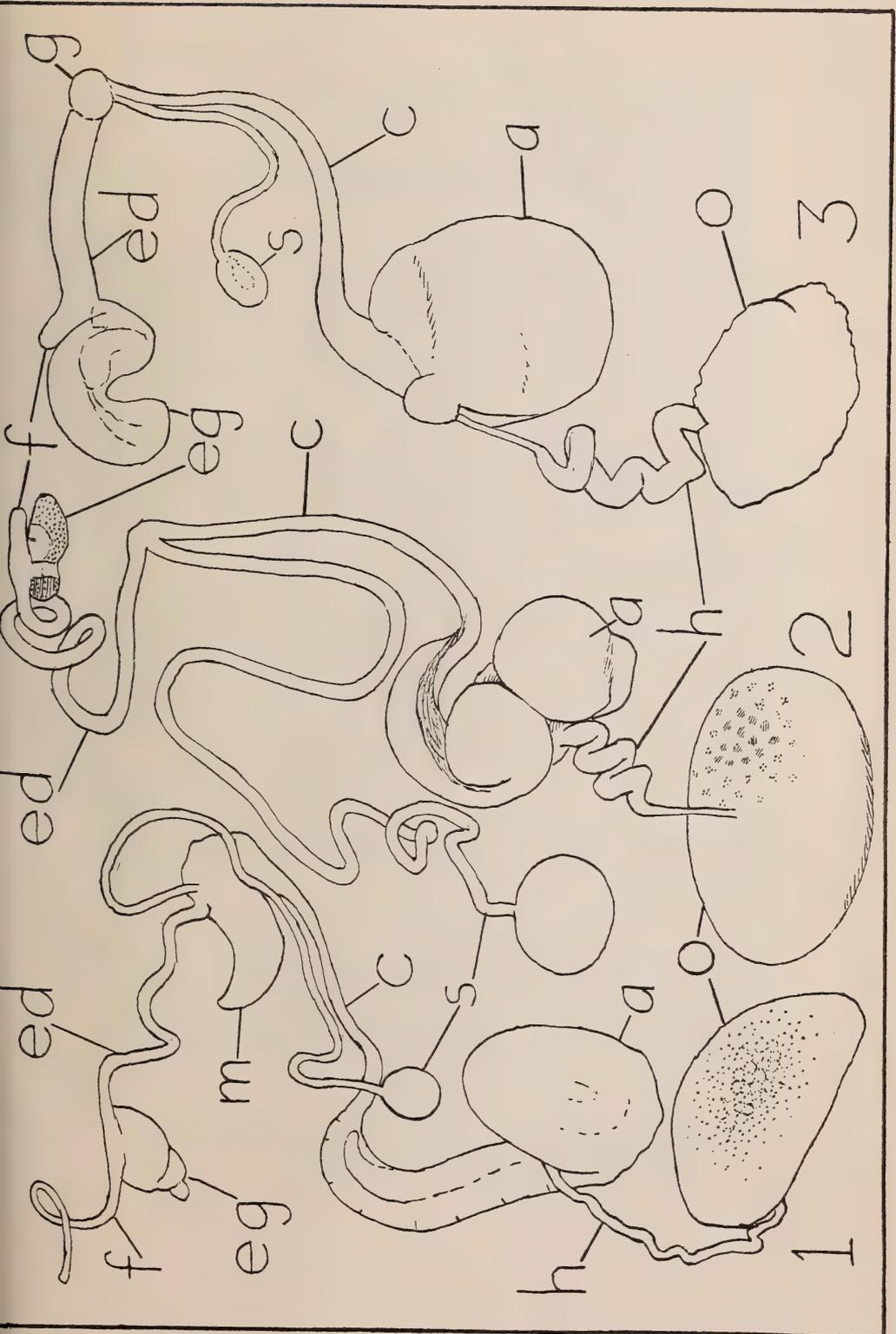
Quoy and Gaimard's species, *Siphonaria denticulata*, was described from Western Port, Victoria (Voy. Astrolabe, Zool., vol. ii, p. 340, pl. 25, figs. 19-20, 1833) and has been confused with *S. diemenensis* Q. and G. (*op. cit.*, p. 327, pl. 25, figs. 1-12, 1833) by some recent authors, but is a very different species. Most Victorian specimens determined as *denticulata* in the Australian Museum collection are not that species at all, but are *diemenensis*. In one case the correct name *diemenensis* has been crossed out and *denticulata* has been substituted. The true *denticulata* appears to be rare in Victoria except perhaps within bays.

Miss E. Pope, of the Australian Museum, has kindly collected many specimens of *Siphonariidae* from the open coast in a number of localities in Victoria, and though always searching for *denticulata*, failed to find it even at Mallacoota in the extreme east of the State. Western Port, the type locality, is much further west, but is not on the open coast. The only Victorian specimens I have seen which agree with the figure of *denticulata* are from Red Bluff, Gippsland, and are specifically identical with the Sydney species erroneously called *scabra* by Hedley and by most workers since. Angas's record of *denticulata* from New South Wales (Proc. Zool. Soc., London, 1867, p. 232) must now be accepted as correct.

Reeve described *S. scabra* as coming from Port Jackson and this localisation probably caused later workers to use his name incorrectly for the commonest species living there (i.e., *denticulata* Quoy and Gaimard, Reeve and Angas, but not of recent authors). The true *scabra*, whose correct name is *diemenensis*, really occurs in Port Jackson, but is quite scarce, and has not previously been recorded under its correct name from this locality, although known as *diemenensis* in Southern Australia.

Iredale introduced a new generic name, *Ellsiphon* (Aust. Zool., vol. ix, pt. 4, p. 437, Dec., 1940) with type (by monotypy) the Queensland *E. marza* Iredale, which I regard as doubtfully distinct from *denticulata*. As it differs anatomically from *Siphonaria* s.str. the species listed by Hedley as *Siphonaria scabra* must bear the name *Ellsiphon denticulatus* Quoy and Gaimard. An account of the features of the genital organs of *Ellsiphon* is given below because of their importance in the classification of this group.

Spermatheca normal, the duct moderately long; epiphallus duct long, slender, terminating in a small gland and rather long flagellum; muscular sac of genital atrium present, but small. The epiphallus seems to separate this genus from Hubendick's section *Sacculosiphonaria*. The shell in that group is said to have reticulate sculpture, while in *Ellsiphon* the sculpture is radial only.



The generic position of *diemenensis* is not so easy to determine. Hubendick (*op. cit.*, p. 58, 1945) gave the sectional name *Ductosiphonaria* to his "Bifurcatagruppe," which included *Siphonaria bifurcata* Rve. and *S. diemenensis* Quoy and Gaimard. An examination of the genitalia of these two species shows that although they have certain similarities they are not closely related. Though the former species was designed as type species, the latter agrees much better with his description of the group. I therefore introduce the new generic name *Hubendickula* with *Siphonaria diemenensis* Q. and G. as type.

The genus *Planesiphon* was described by Iredale (*op. cit.*, p. 437, 1940), but no genotype was given. A few pages later (p. 441) he placed in it the two newly described species *elegans* and *soranus*. Hubendick (*op. cit.*, figs. 44 and 47, 1945) shows the genital system of "*Siphonaria elegans*" differing very greatly from that of *bifurcata*. Iredale's *elegans*, however, closely resembles *bifurcata* conchologically and there is no doubt that the two are congeneric, or possibly only subspecifically separable. Hubendick's *elegans* cannot be the same as Iredale's, but as only the genital system was figured by the former, we do not know to what species it refers.

The International Rules of zoological nomenclature state quite justly that all generic names published after 1930 are to be considered invalid unless a genotype is designated. Under this ruling *Ductosiphonaria* will replace *Planesiphon* for which a genotype has not yet been designated. I designate *Planesiphon elegans* Iredale as type of *Planesiphon* in order to give it a definite position in the synonymy of *Ductosiphonaria*.

The chief characteristics of *Ductosiphonaria* and *Hubendickula* are summarised below.

Ductosiphonaria: Shell rather thin, depressed, sculptured with few, coarse, depressedly rounded ribs, the wide, flat interstices containing up to four or five fine, weak riblets, seldom rivalling the primary ribs in size; coloration pallid, interstitial riblets separated by fine, brown lines or sometimes the whole of the primary interstices blackish; interior greenish buff to light brown centrally, white marginally with small, variable black marks. Animal pale, without dark markings. Cutting points of lateral radula teeth entire. The epiphallus has a short, stout, straight duct with a large, elongate accessory gland and very short flagellum. Genital atrium swollen; spermathecal duct short and very slender, the terminal vesicle very small.

Hubendickula: Shell solid, elevated, sculptured with strong, coarse, rounded, white ribs having narrow, black, unsculptured interstices. Animal usually dark coloured externally. Cutting points of innermost lateral teeth bifid. Epiphallus duct long, curved and looped so that the small accessory gland and short flagellum lie normally against the small genital atrium. Spermathecal duct very long and twisted, terminating in a large vesicle.

SUMMARY OF SYNONYMY

Hubendickula diemensis Quoy and Gaimard + *Siphonaria diemenensis* Quoy and Gaimard and Reeve equals *S. scabra* of Reeve (not of Hedley) equals *Siphonaria denticulata* in Australian Museum collection.

Ellsiphon denticulatus Quoy and Gaimard: *Siphonaria denticulata* Quoy and Gaimard of Reeve, and Angas equals *S. scabra* of Hedley (not Reeve).

ILLUSTRATIONS

1. *Ellsiphon denticulatus* (Q. & G.) *Genitalia*.
2. *Hubendickula diemenensis* (Q. & G.) *Genitalia*.
3. *Ductosiphonaria bifurcata* (Reeve) *Genitalia*.

Delin. D. McAlpine.

A NEW THAIS FOUND ON A LOG AT PORT STEPHENS

By GERTRUDE THORNLEY

One sunny day towards the end of August, 1950, Mrs. Jackson and I paused to rest after collecting at Hawkesnest Beach on the northern side of the port. Hawkesnest is a double beach, inner and outer, shaped like a "V," the two beaches separated by sandhills, but converging at the point to a sandspit which connects it with the mountainous Yacoaba, which towers over the entrance. We had the sea on one side, the bay on the other.

Nearby was a log, covered with barnacles, and there I saw a *Thais* shell that was new to me. We searched carefully and found several more each, and a few weeks later I found seven more adults and several sub-adult.

With it were *Mytilus obscurus* Dunk. and a new *Agnewia*, which is more ventricose than *Agnewia tritoniformis* (Blain). It is of a deep bluish tinge throughout, marked with splashes of brown, and the ribbing is more widely spaced. It is also smoother than *tritoniformis*.

My first problem was to determine, if possible, the habitat of the new *Thais*. A floating log might have come from anywhere. No similar *Thais* could be found in the bay or along the foreshores. The shell it most resembles is *Dicathais scalaris* (Menke), found in New Zealand. It is certainly very different in appearance to our common cartrut shell, *Dicathais orbita* (Gmelin). This log might have drifted even from New Zealand, as both the other shells are generically or specifically represented there. So I first obtained from Mr. Powell specimens of *Neothais smithii*, and from Mr. Brookes specimens of some rarer forms of *Dicathais scalaris* (Menke), examination of which proved that this shell could be neither of these species. I must thank these gentlemen for their kindly assistance.

The barnacles proved to be a common variety found in all tropical and subtropical waters. Miss Pope, of the Australian Museum, was very interested in the problem, and helped me to identify it.

I then sent samples of the wood to the Forestry Commission, who informed me that it was scrub beefwood, sometimes referred to as silky oak. "Its distribution is from Milton on the South Coast of N.S.W. to Southern Queensland."

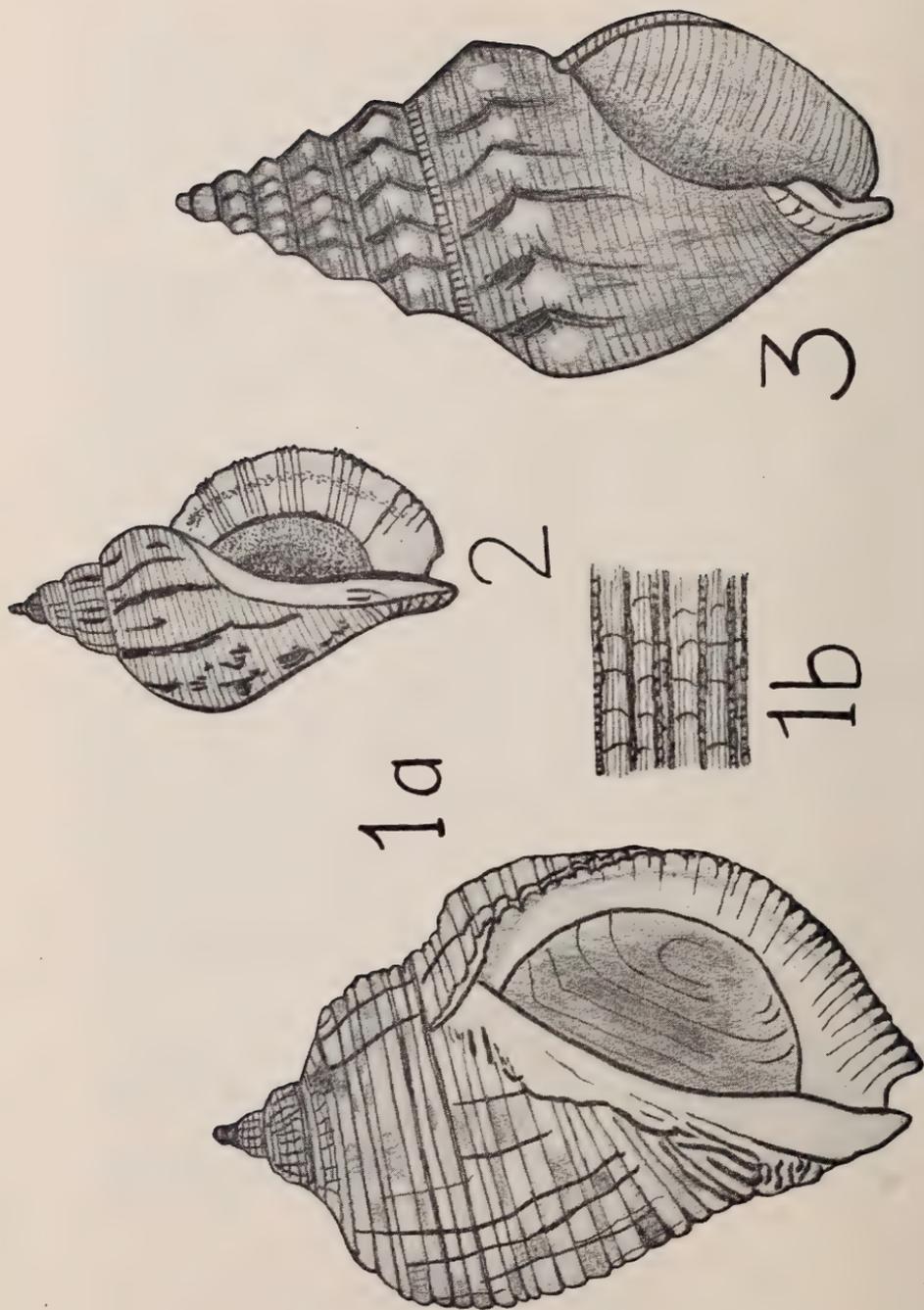
A few weeks before record floods had carried many logs to sea from all the river mouths of Northern N.S.W. Fishermen told me that for weeks the sea was full of them, all drifting south on the Notonectian current. Since the barnacles and shells on this log were only just dead, it seems to me to be fairly well established that it came south during these floods from some location on the mid-north coast of N.S.W.

So our new *Thais* went to sea like a stowaway riding on a log for his ship. Therefore, I am going to call the species "*vector*," meaning "one who is carried," or "a passenger." His little companion may be called *Agnewia nautica*, the sailor.

The type description is as follows:—

Genus DICATHAIS Iredale, 1936

DICATHAIS VECTOR, sp. nov.



1. *Dicathais vector*, sp. nov.
 2. *Agnewia nautica*, sp. nov.

3. *Cominella eburnea* Reeve.

Delin. Gertrude Thornley.

Shell ovate, ventricose, protoconch pale horn colour, of 3 whorls; four other whorls in the adult, somewhat shouldered, with small oblique lamellae at the sutures, which are closely conjoined; flat superficial ribs throughout on the body whorl. At the top they occur in groups of three, a wide rib, then a less wide, then a narrow rib; about half-way down they alternate wide and narrow in pairs. The interstices are somewhat punctate. With a lens it is possible to see fine revolving striae on each rib. These ribs are crossed by growth lines, giving a somewhat cancellate appearance to the apical whorls. The aperture is wide, of a pale brownish white. Young specimens show brown radiating lines; adults have brown in the interstices at the edge only. Columella white; the shell being a drab light brown with dull brown irregular maculations. The upper whorls are bluish in colour.

This shell cannot be confused with *D. textiliosa* (Lam.) (a form of which seems also to occur in N.S.W.), though they are related species, but it resembles more closely the smooth form of *bicostalis* Lam., illustrated by Tryon, pl. 50, fig. 91. It is fairly similar to *D. scalaris* (Menke), of New Zealand, which may perhaps be its closest relation, though this shell seems also to have some affinities with the more tropical Indo-Pacific forms, such as *D. bicostalis* and *D. persica*.

This paper may serve to show how, in the pursuit of knowledge, the shell collector must often turn detective. The story of this shell is rather an unusual and fascinating one and still further work remains to be done before the mystery of its origin is fully solved. I must thank all the people who helped me with this somewhat unusual problem, Mrs. Jackson, Miss Pope, Miss Allan, who allowed me to compare the shells with those in the Australian Museum collections. Mr. Powell and Mr. Brookes, who so kindly forwarded me shells for comparison, and the Forestry Commission, who identified the wood for me.

The type specimens have been donated to the Australian Museum, and specimens also to the Royal Zoological Society.

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COMINELLA EBURNEA Reeve

By R. SWAN

A specimen was found on the 8th January, 1951, on the sandflat to the east of the bridge crossing the Wagonga Inlet, Narooma. It was crawling on open sand between oyster beds, below low water. Search failed to locate more than the one specimen, but in May several *Cominella lineolata* were found in a dead state, and one more *C. eburnea*.

I believe this to be the first specimen of *C. eburnea* to be found in N.S.W.

DESCRIPTION: Colour, orange brown or chestnut, with irregular cream spots and blotches. Shape fusiform, spire sharp, turreted, whorls sharply angled and nodulose. Sculpture: Broad ribs, crossed by spiral grooves. Aperture, ovate, light brown, lined within; lip sharp, canal broad and short. Operculum horny, dark brown. Size: 25 mm.



A VISIT TO PORT STEPHENS

By T. GARRARD

A fortnight's holiday spent at Nelson's Bay, Port Stephens, yielded a very varied assortment of shells. Beach collecting was poor at Nelson's Bay or Shoal Bay, but on the northern side, at Hawkesnest Beach, many specimens were found, including pairs of a number of bivalves, the most noteworthy being *Mactra eximia*. Beach collecting was also very good at Fingal Bay, mostly small varieties, although several *Voluta zebra* were found, and also numbers of *Janthina violacea*. The most valuable discovery at this spot was a good specimen of the rare *Laciniorbis morti*, and a number of *Cavolina* spp.

Dredging was carried out for a period of about three hours within 300 yards of Nelson's Bay trawler wharf, but yielded over 100 species of small shells, from a bottom of sandy mud and short ribbon weed, and included 12 species of *Marginella*, some alive, and also three live specimens of *Trigonostoma vinnulum*, a Cancellaria which is fairly uncommon, and somewhat resembles the Queensland *Cancellaria costifera*.

Practically the only shells found on the rocks west of Nelson Bay were three fairly good specimens of *Dinassovica militaris*, which I was rather surprised to find so far south.

Unfortunately, both the crayfish season and also a phenomenal run of prawns came to an end about three days after arriving, consequently the number of shells obtained from the trawlermen was not as good as hoped for. However, many bivalves were obtained alive, which are normally very scarce, including *Glycymeris flammeus*, *Glycymeris holoserica* and *Chlamys caroli*, as well as *Phalium insperatum* and several live *Ancilla velesiana*, the largest being a shade over 4 inches in length.

Most of the shells from the crayfish pots were poor specimens inhabited by hermit crabs, but those obtained included a few *Livonia mamilla*, good *Cymbiolena magnifica* and *Ericusa sowerbyi*, and one specimen of *Charonia euclia instructa*.

The most prized specimen from deep water was one *Ericusa sericata*, the new *Volute* recently discovered and described by Miss G. Thornley.

From the number of species obtained and broken pieces of other varieties noticed on the beaches and elsewhere, I am convinced that over a fairly long period it might be quite possible to obtain over 1,000 species of shells of all sizes from Port Stephens and its environs.

DULCERANA VERSIGRANULATA Iredale

This shell, known for many years as *Bursa granifera* (Lamarck) was first recorded in N.S.W. by G. F. Angas (Proceedings of the Scientific Meetings of the Zoological Society of London, 1877). He mentions that it was found at the Macleay River. Later he records that it was taken alive at the Bottle and Glass Rocks by Mr. Rossiter.

Bursa granifera (Lam.) is found in the Red Sea, Natal, throughout the islands and the north-east coast of Australia.

Mr. Iredale renamed the local shell, which is darker, broader and somewhat more prominently tuberculated than the typical form.

The animal of *Dulcerana versigranulata* Iredale has not previously been described. I have found two specimens alive at the south side of Long Reef, the first one on the 28th April, 1946, and the second one on 17th September, 1950. The description of the animal is as follows:—

Foot: Greyish white with minute mottling of cinnamon colour, more pronounced in the centre. Tentacles: Five stripes alternately white and black. The two small projections from near tail are also striped black and white. The small siphon under magnifying lens is whitish cream with very minute black mottling almost in lines round the edges. The eyes are black. The body of the animal was of light pinkish beige with extremely minute bright orange spots (only discernable with the aid of a magnifying glass) and mottled in dark cinnamon brown. The operculum is thin and horny, of light yellowish brown.

N. JACKSON.



SOCIAL NOTES

One of the best (worst) aspects of becoming interested in conchology is that concurrently one develops a wanderlust. Most of us go places and perhaps the shells are an excuse.

One of our members, Mrs. K. Rutland, has been away now for over 18 months on a tour of England and the Continent. That is indeed a grand tour.

Most of us, however, have to content ourselves with trips in and around Australia.

Mr. Frank McCamley has been to Perth and Darwin, though on each trip he could only stay six or seven days, yet he managed to bring back some prizes from each location.

Mrs. Kerslake was lucky in being able to spend the winter of 1950 in Noumea, so is now busily attending classes in French. Evidently a second visit is being contemplated.

Mrs. Woolacott spent some weeks in Woolgoolga, N.S.W. She reported that collecting there was not of the best, but came back with a *Cypraea chinensis*, the only one so far recorded from N.S.W.

Miss Thornley and Mrs. Jackson spent a very delightful holiday at Ballina and Wooli.

Mr. and Mrs. Swann seem to make for Bermagui and the South Coast as well as trips to Queensland.

Mr. Garrard struck some collecting at Eden, which was surely a collector's dream come true—a beach covered with shells—volutes, bivalves and many others.

Mr. C. Laseron does not get around so much, as he is too busy writing his scientific papers; but son John gets to Queensland and is now planning a trip to Bowen.

Miss Thornley, who is perhaps the greatest gipsy of us all, has been to Adelaide, where she was warmly received by the Conchological Club of S.A. and by the members of the Adelaide Museum.
So we do get around!



BOOK REVIEWS

"Australian Spiders: Their Lives and Habits." By K. C. McKeown. Angus & Robertson, Sydney and London, May 16, 1952, 274 pp., 43 half-tone and 16 line figures. Price 21/-.

Stranger even than some of the "scientific" fiction and crime thrillers of the popular bookstalls are the true stories told in *Australian Spiders* about their monstrous and mysterious instincts and the wonders of their webs. The intimate life of the Wolf Spider (chap. vi) reads like a whodunit. Who murdered whom? Did Sweeny Todd bump off Sibyl, and was Lazy Lena (who lived with a bug) a male or a female? Amongst the dramatis personae, besides those mentioned, is a company of females, ranging from murderous amazons to ardent feminists, and some lesser lights in the form of chalcid wasps and beetle or two. Then there is *Nephila*, who polishes off her husband like a cocktail sausage if he makes a single false step.

In this underworld of spidery spivs with their hypodermic weapons, however, virtuous maternity is still triumphant over murder most foul, as demonstrated by a rising generation of bright young spiderlings parachuting off to a brave new web. Another chapter describes the charming little acrobatic ballet of the Jumping Spiders, whilst those of us who thought bird-catching spiders were confined to South America, learn that many birds are captured by Australian spiders, some of which eat, besides fishes, mammals and lizards. What an amazing world is opened to our vision, not only from the stories in the text, but illustrated in the marvellous plates. There is, according to McKeown, no really complete life of any one spider known to us, but his book tells what is known and will inspire naturalists to fill in the gaps in our knowledge. This is not a text book, but a real natural history, and the only criticism that can be levelled at it is that one would like more of it, more stories and still more pictures. The purple patches in arachnids' lives are treated throughout with tact and good taste, so that the book may be recommended not only to naturalists and those with a relish for the ghoulish, but to the most innocent child. Final chapters deal with scorpions and ticks and hints on the treatment of spider bite are given.

"Anatomy of the Chordates." By Charles K. Weichert, Professor of Zoology, University of Cincinnati. McGraw-Hill Book Co. Inc., New York, etc. 1st Edition, 1951, pp. vii and 921, 506 figures. Price, American, 8 dollars; Australian, £4/6/-.

Only a little new material has been added to this, one of several recent textbooks of chordate anatomy, but Professor Weichert has presented in a clear, modern, interesting manner a difficult subject which is so often drudgery to the student. His book is set out in four sections. The reader is first given a very comprehensive introduction to the various chordate types, and to their natural history, as well as the chief features of chordate embryology. The major portion of the book deals with the detailed functional anatomy of the following organ systems:—Integumentary, Digestive, Respiratory, Excretory, Reproductive, Endocrine, Skeletal, Muscular, Circulatory, Nervous and Receptor Organs.

There is something to be said, both for and against the "Comparative Method" used in this book (i.e., treatment of each individual organ system throughout the phylum, as opposed to dealing with each systematic group as a whole), but few could find fault with Professor Weichert's presentation. The chapters follow a natural sequence, and each includes functional and physiological aspects. It is pleasing to note the inclusion of a chapter on the endocrine glands, a subject on which much recent work has been done.

The third section deals with the anatomy of four representative types—the Lamprey, the Dogfish, the Salamander and the Cat—as an aid to students in laboratory work. The inclusion of a representative of the Reptiles and the Birds would have been an advantage. Australian students will find the chapters on the Dogfish and the Cat very useful, as they are clearly described and well illustrated, although thirty pages of description of the musculature of the latter are scarcely warranted.

Finally, a summary of the characteristics and evolutionary advances of the various groups is given, using a modern system of classification. An exhaustive index is included, and an excellent summary is found at the end of each chapter. There are several points of interest and criticism. The figures are for the greater part, excellent, being well drawn and adequately labelled. Professor Weichert is to be commended for avoiding the use of abbreviated labelling on the figures, with a key to the abbreviations elsewhere. Unfortunately, there was insufficient space for a thorough treatment of fossil types, which are particularly useful in obtaining a picture of the evolution of the chordates, especially with reference to the skeletal system. The main characteristics of more of the fossil groups could also have been included in the final table of characters, particularly in the Amphibia and Reptiles.

"Anatomy of the Chordates" should prove to be a useful, although not an essential, addition to text-books of this nature.

D. F. McMICHAEL.

"Flower and Feather at Mt. Buffalo National Park, Victoria, Australia." By H. E. Stewart, R.A.O.U. Public Relations and Betterment Board, Melbourne. Victorian Railways Print, 1952. 8½ x 5½ ins., 20 pages, 4 figs. On sale at The Chalet, Mt. Buffalo. Price 1/-.

An admirable handbook to the botany and birds of the famed tourist resort by a naturalist who knows the region well. Scientific names are given, and there is a good deal of useful information, such as we should like to have in such a handy form for many other parts of Australia. There are no introduced, only native birds in the "champagne air of over 4,000 feet," and ornithologists will welcome the list of these, arranged in accordance with the revised R.A.O.U. check-list.

G.P.W.

LIST OF MEMBERS OF THE ROYAL ZOOLOGICAL SOCIETY OF NEW SOUTH WALES AS AT 1st JULY, 1952

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Hallstrom, Sir E. J. L., F.R.Z.S., 462 Willoughby Rd., Willoughby.

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Kingshorn, J. R., Australian Museum, Sydney.
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Zeck, E. H., F.R.Z.S., Entomological Branch, Dept. of Agriculture, Box 36,
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Stiffe, R. J., 350 George St., Sydney.

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