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PROCEEDINGS  
OF THE  
Royal Zoological  
Society  
OF  
NEW SOUTH WALES

for the years 1966-67

87<sup>th</sup>

PRICE: ONE DOLLAR

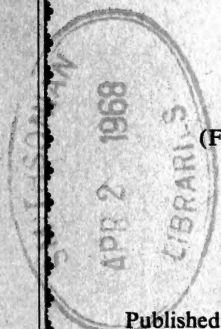
(Free to all Members and Associates)

SYDNEY

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ROYAL ZOOLOGICAL SOCIETY OF NEW SOUTH WALES  
Established 1879

Registered under the Companies Act, 1899 (1917).

*Patron:*

His Excellency the Governor of New South Wales, Sir Arthur Roden Cutler,  
V.C., K.C.M.G., C.B.E., Kt.St.J.

*Vice-Patron:*

Sir Edward Hallstrom, K.B., F.R.Z.S.

COUNCIL, 1967-68

*President:*

Basil Joseph Guy Marlow, B.Sc.

*Vice-Presidents:*

John Cameron Yaldwyn, M.Sc., Ph.D.  
Henry John de Suffren Disney, M.A.  
Courtney Neville Smithers, M.Sc.  
Ronald Strahan, M.Sc., F.L.S.

*Honorary Secretary:* Mrs. Leone Z. Harford, F.R.Z.S.

*Assistant Honorary Secretary:* Mrs. Olive Wills

*Honorary Treasurer:* Francis McCamley

*Honorary Editor:* Gilbert Percy Whitley, F.R.Z.S., R.A.O.U.

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Henry John de Suffren Disney	Courtney Neville Smithers
Ernest Jeffery Gadsden	Ronald Strahan
Maxwell Hall Gregg	Frank Hamilton Talbot, M.Sc., Ph.D., F.L.S.
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Francis McCamley	Mrs. Olive Wills
Basil Joseph Guy Marlow	John Cameron Yaldwyn
Anthony Irwin Ormsby, L.I.B.*	
Peter Edward Roberts, B.A.	

OFFICERS:

*Honorary Solicitor:* Mr. J. J. Francis

*Honorary Auditors:* Messrs. Peat, Marwick, Mitchell & Company,  
Tower Building, Australia Square, Sydney, 2000.

*Assistant Honorary Treasurer:* Mrs. Kathleen McCamley

*Honorary Librarian:* (Vacant)

*Entomological Section:*

Chairman: Mr. Rex Gilroy  
Hon. Secretary: Mrs. O. Thacker

*Conchological*

Chairman: Mr. F. McCamley  
Hon. Secretary: Mr. N. S. Gomersall

*Junior Group:*

Chairman: Mrs. L. Harford

*Ornithological Section:*

Chairman: Mr. P. E. Roberts  
Hon. Secretary: Mr. H. Battam

\* Resigned, Nov. 1967.

# EIGHTY-SEVENTH ANNUAL MEETING OF THE ROYAL ZOOLOGICAL SOCIETY OF NEW SOUTH WALES

The eighty-seventh Annual Meeting of the Society was held at Taronga Zoological Park, Mosman, on 23rd September, 1967. In the absence of the President (Mr. Basil Marlow) on field work off the coast of South Australia, the chair was occupied by Dr. J. C. Yaldwyn (immediate Past President) who welcomed guests, members and visitors, and read the 87th Annual Report (see below) which was adopted.

The Honorary Secretary (Mrs. L. Z. Harford) was presented with her Certificate of Fellowship by the Director of Taronga Zoological Park, Mr. R. Strahan. Mrs. Harford had joined the Society in 1942 and became Secretary of the Marine Section in 1947. Later she became a Councillor and the Society's Honorary Secretary in 1950. Except for a break in the years 1958-64, she remained our Secretary ever since, and the form and strength of the Society today are due in great part to her quiet and efficient work in this important post. She now joins a distinguished group of sixteen living Fellows who have been honoured by the Society for (in the words of our Articles of Association) "valuable service to the Society or to Australian Zoology." Although this is the Society's 87th year, only two other ladies, the late Joyce Allan and Miss Elizabeth Pope, have been awarded a Fellowship of the Royal Zoological Society of New South Wales (F.R.Z.S.). By courtesy of the *Sydney Morning Herald*, a photograph of Mrs. Harford, taken in 1956, is reproduced here on Plate I.

As there were no additional nominations, the six retiring Councillors were declared re-elected under the terms of Article 26.

In the absence of Mr. J. O. Campbell, the Honorary Treasurer's Report was read by Mr. E. J. Gadsden and adopted.

Mr. Peter Roberts introduced the Guest Speaker, Mr. Ronald Strahan, Director of Taronga Zoological Park, who addressed the meeting on "The Royal Zoological Society and the Zoo" (see page 9). A cordial vote of thanks to Mr. Strahan was moved by Mr. C. N. Smithers and carried by acclamation.

Mr. A. H. Chisholm made some comments on the Society's Annual Report and expressed satisfaction with certain proposed new arrangements at the Zoo.

Dr. Yaldwyn thanked the authorities and staff of Taronga Zoological Park for their contributions to the success of the afternoon's meeting.

## 87th ANNUAL REPORT (1966-67)

### MEMBERSHIP

As at the 30th June, 1967, the total membership of the Society was 659, consisting of 1 Endowment Member, 2 Associate Benefactors, 8 Honorary Members, 59 Life Members, 500 Ordinary Members, 6 Honorary Associate Members, 14 Life Associate Members, 48 Associate Members and 21 Junior Members.

During the year 72 new members were admitted, 66 being Ordinary Members and 12 Juniors. The Society lost 30 members by resignation and 20 names were removed from the register under Article 9. It is pleasing to see the slight increase of 4 in the overall number of members, especially as it is usual to lose quite a number of members when there is any rearrangement of meeting nights, or change of meeting place.

Since January of this year, our various sections have held their meetings in the Hallstrom Theatre, Australian Museum, College Street, and this arrangement has met with general approval. The staff room in the new wing of the Museum has proved very suitable for the Junior group.

## DEATHS

I regret to report that during the year the Society lost by death 1 Associate Benefactor—Mr. Leo Weingott; 2 Honorary Members—Miss Joyce Allan\* (the first lady to be elected a Fellow of our Society) and Mr. R. J. Stiffe (at one time the Society's Auditor); 3 Life Members—Dr. Aubrey Halloran\* (our first Honorary Secretary, a past President, a Vice Patron and our Honorary Solicitor), Melbourne Ward\* (a well known Fellow of our Society) and Dr. P. D. F. Murray\*\* (elected to Life Membership only in August, 1966, and one time Challis Professor of Zoology at the University of Sydney), and 8 Ordinary Members—Miss A. Allen, R. G. Brown, G. H. Hardy, Dr. E. Hopkinson, A. J. Keeling, G. O. Lewis, Sir John Northcott and A. H. Wheelwright.

Since the end of the Society's year being reported on, our guest speaker at the Annual Meeting two years ago, Professor "Jock" Marshall of Monash University, died suddenly. Although not a current member of the Society, he had been one in the past and was well known personally to many of our members. Another onetime member, past Councillor and active participant in the Ornithological Section, Lieutenant-Colonel H. B. K. Burgh\*\*, died in March of this year. Mr. B. C. Cotton, F.R.Z.S., died in Adelaide (see page 15).

## COUNCIL

Council held 12 meetings during the 1966-67 year, with an average attendance of 12 councillors per meeting. At the end of the financial year, Mr. J. E. Hallstrom indicated that he would not seek re-nomination for a further term as Councillor and his place was filled on Council by Mr. J. M. Smail, a Sydney Barrister, under Article 27.

## DELEGATES AND TRUSTEES

During the year one of our Councillors, Mr. R. Strahan, whom we successfully nominated for a vacancy on the Taronga Park Trust, was appointed Director of Taronga Zoological Park, and on your behalf we wished him well in the difficult and exacting task which lies ahead of him. Council nominated Dr. F. H. Talbot for the consequent vacancy on the Trust and he was appointed a Trustee in June of this year.

Mr. G. Whitley and Mr. E. Troughton attended the Eleventh Pacific Science Congress in Japan last August, and our representatives at the A.N.Z.A.A.S. Congress in Melbourne in January were Mr. C. N. Smithers and Mr. E. J. Gadsden.

## FELLOWSHIP

During the year Mrs. Leone Zoe Harford, Honorary Secretary of the Society, was elected a Fellow of the Royal Zoological Society of New South Wales for her outstanding work on behalf of the Society. She will be officially presented with the certificate of her Fellowship after the reading of this report.

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\* Obituary Notice published in the Society's *Proceedings* for 1965-66 (1967).

\*\* Obituary Notice published in *Australian Zoologist* XIV (2), 1967.

## SECTION MEETINGS

The Council thanks the Chairman and Secretaries of the Society's three active sections for the work they have done on the Society's behalf during the year. Thirty-six lectures or other programmes were given, and the Junior Group, under Mrs. Harford, met 11 times. Three sections held field trips. Mr. M. Gregg has our special thanks for his organisation and production of the two 1966-67 Syllabuses. The six-monthly format has been widely approved by the membership of the Society.

## ACCOMMODATION

At the end of this calendar year our lease of an office in Bull's Chambers, 28 Martin Place, will expire and the building will be demolished. Our office address from January, 1968, onwards will be care of Taronga Zoological Park.

## LIBRARY

The proposed indefinite loan of our library to the Biological and Medical Library of the University of N.S.W., outlined to you in the last Annual Report, has not in fact taken place. Your Council is very much aware that in the future our books and periodicals may be of use to research workers at Taronga Zoological Park and for the moment no decision has been taken on the future of the library.

## PUBLICATIONS

Since the end of the last financial year (1965-66) five journal issues have been published by the Royal Zoological Society, though only 4 of these appeared during the 1966-67 year under report. An *Australian Zoologist* (volume XIII, part 3) was published on the 6th July, 1966, and mentioned in the last Annual Report; another *Australian Zoologist* (volume XIII, part 4), a 100-page, 8 plate issue, was published on the 14th December, 1966, and completed volume XIII with an index. A third *Australian Zoologist*, a 145-page issue entirely devoted to "A Catalogue of the Psocoptera of the World" by C N. Smithers (volume XIV, part 1) appeared on the 31st January, 1967; the *Proceedings* for 1965-66 was published on the 24th February, a very interesting issue of 69 pages and 12 plates recording the various activities of the Society and its Members, and finally a fourth *Australian Zoologist* (volume XIV, part 2), an 81-page, 4 plate issue, appeared on the 2nd August, in the new financial year. Your Society has thus produced 477 pages and 32 plates of zoological research work and reports in the last 14 months—quite an achievement I assure you when compared with the publications of many other societies and institutes both inside and outside Australia. You can rest assured your subscriptions are being well spent for you in the publication of this basic zoological information, observation and knowledge.

A special resolution of your Council placed on record its profound appreciation of the work of the Honorary Editor, Mr. Gilbert Whitley, as represented by the flow of publications during the year, and stated that the standard of the Society's publications, since the resumption of his Editorship, had materially advanced the prestige of the Society, both locally and overseas.

## GRANTS

We wish to acknowledge with pleasure a further grant of \$200 from the N.S.W. Department of Education towards the Society's rising publication costs.

## LECTURE SERIES ON EVOLUTION

In conjunction with the Australian Museum, and beginning on Wednesday, 1st March, 1967, then on subsequent Wednesdays, Mr. Ronald Strahan delivered a series of 10 lectures on "Evolution" at the Hallstrom Theatre, Australian Museum. These lectures were open to the public and a fee of 25 cents per lecture was charged, this included supper in the roof-top cafeteria. These lectures were immensely popular, and on several evenings there was standing room only. We know it took many hours to prepare this series and we offer our sincere thanks to Mr. Strahan for his excellent work on the Society's behalf.

## CONSERVATION

A Council committee examined Ashton Park in September, 1966, and reported on the proposed "master plan" for the development of the Park. Our report, commending several aspects of the plan, but pointing out undesirable aspects in some detail, was sent to the Minister of Lands and published in our last *Proceedings*. Subsequently the "master plan" was pronounced unsuitable by the Department and withdrawn. I feel our report may have helped in retaining the Park in its present form for the moment.

The long awaited *National Parks and Wildlife Act* appeared in draft form in 1966, and your Council, along with many other bodies interested in conservation, was very disappointed with numerous aspects of it. The Society was represented on an *ad hoc* body called the "Halliday Committee", which drafted a single set of proposed amendments to the Bill, reflecting the views of most conservationists within the State. Later the Bill was amended in numerous aspects along the lines of the Halliday proposals and most sections became acceptable to us. Your Council still feels that the Section dealing with the altered boundaries of the existing National Parks should not have been included in the Bill as it was passed into law last month.

A Council Committee called on Mr. S. P. Weems, the Director of the National Parks and Wildlife Service, and talked our views over with him shortly before the second reading of the Bill in August. At the conclusion of this meeting we were still not able to give the Bill our full support while the boundary alterations were included. The Committee's recommendation to Council was "That the Royal Zoological Society of New South Wales supports that part of the Bill, in its amended form, that deals with the setting up of an administrative body, with an advisory council to direct the National Parks and Wildlife Service. But that the existing boundaries of National Parks should not be altered until the advisory committee has been consulted and that any reshuffling of boundaries should not be included in the Bill at this time." This recommendation was adopted by the Council and released to the newspapers. Our Committee was repeatedly assured by Mr. Weems, that over the years there would be many amendments and improvements in the Bill and further areas of land added to the National Parks system. With this in mind, the Council is concerned as to the reason for the haste in including the alterations of Park boundaries in this drafting of the Bill.

## THANKS

Once again I would like to thank personally, and on behalf of the Council, all the Society office-bearers, section officers and members for their work on behalf of the Society during the year. A Society

such as ours relies entirely on the time and energy of its individual members, without their interest and support there would be no reason for our continued existence.

Thanks are also expressed to our Honorary Auditors, Messrs. Peat, Marwick, Mitchell and Co., for their continuing work on behalf of the Society.

J. C. YALDWYN, Vice-President.

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## OFFICE BEARERS FOR 1967-68

Elected at the 87th Annual General Meeting on 23rd September, 1967.

*President:* Mr. B. J. Marlow.

*Vice-Presidents:* Dr. J. C. Yaldwyn, Mr. R. Strahan, Mr. H. J. Disney and Mr. C. N. Smithers.

*Hon. Secretary:* Mrs. L. Z. Harford.

*Assistant Honorary Secretary:* Mrs. O. Wills.

*Honorary Treasurer:* Mr. F. McCamley.

*Assistant Honorary Treasurer:* Mrs. K. McCamley.

*Honorary Editor:* Mr. G. P. Whitley.

*Honorary Solicitor:* Mr. J. J. Francis.

*Honorary Auditors:* Messrs. Peat, Marwick, Mitchell & Co.

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# ROYAL ZOOLOGICAL SOCIETY OF NEW SOUTH WALES

BALANCE SHEET AS AT 30th JUNE, 1967

<p>1966</p> <p>5,386 (304 Surplus)</p> <p>5,690</p> <p>1,500</p> <p>20</p> <p>506</p> <p>—</p> <p>526</p> <p>3,265</p> <p>180</p> <p>3,445</p>	<p><b>ACCUMULATED FUNDS:-</b></p> <p>Balance at 1st July, 1966 ..... 5,690</p> <p>Add transfer of funds provided by the Ladies' Auxiliary ..... 20</p> <p>Less Deficiency transferred from Revenue Account ..... 5,710</p> <p>..... 2,177</p> <p>..... 3,533</p> <p><b>PUBLICATION RESERVE</b> ..... 1,500</p> <p><b>CURRENT LIABILITIES:-</b></p> <p>Ladies' Auxiliary ..... 20</p> <p>Subscriptions in Advance ..... 914</p> <p>Accrued Expenditure ..... 1,607</p> <p><b>BUILDING FUND:-</b></p> <p>Balance at 1st July, 1966 ..... 3,445</p> <p>Add Income Received during year ..... 233</p> <p>..... 3,678</p>
<p>1966</p> <p>1,224</p> <p>55</p> <p>957</p> <p>322</p> <p>1,018</p> <p>1,000</p> <p>2,340</p> <p>320</p> <p>1,000</p> <p>2,800</p> <p>4,120</p> <p>1,400</p> <p>1,400</p> <p>595</p> <p>3,395</p> <p>400</p> <p>381</p> <p>525</p> <p>1,306</p> <p>11,161</p> <p>11,232</p>	<p><b>FIXED ASSETS:-</b></p> <p>Furniture and Equipment—cost ..... 1,279</p> <p>Additions during year ..... 1,085</p> <p>Less Provision for Depreciation ..... 1,279</p> <p>..... 194</p> <p>Library—cost ..... 1,018</p> <p>Paintings—cost ..... 1,000</p> <p>..... 2,212</p> <p><b>INVESTMENTS:-</b></p> <p>Australian Commonwealth Treasury Bonds—cost:-</p> <p>4<sup>3</sup>/<sub>4</sub>% 1969 (Market Value \$326) ..... 320</p> <p>Special "D" Bonds ..... 1,000</p> <p>Australian Guarantee Corporation Limited—</p> <p>Short Term Notes—cost ..... 2,000</p> <p>..... 3,320</p> <p><b>BUILDING FUND INVESTMENTS:-</b></p> <p>Australian Guarantee Corporation Limited:-</p> <p>7% Debentures 1967—cost (Market Value \$1,400) ..... 1,400</p> <p>7% Debentures 1970—cost (Market Value \$1,376) ..... 1,400</p> <p>Commonwealth Savings Bank of Australia ..... 873</p> <p>..... 3,673</p> <p><b>CURRENT ASSETS:-</b></p> <p>Publications on Hand (at valuation) ..... 1,000</p> <p>Commonwealth Savings Bank of Australia ..... 1,025</p> <p>Cash in Hand ..... 2</p> <p>..... 2,027</p> <p>..... 11,232</p>



# ROYAL ZOOLOGICAL SOCIETY OF NEW SOUTH WALES

## PUBLICATION ACCOUNT FOR THE YEAR ENDED 30th JUNE, 1967

1966		1966	
400	Publications on Hand (at valuation) 1st July, 1966	400	Sales of Publications
	Cost of printing "Zoologist" .....	3,642	Government Grant .....
754	Proceedings .....	642	Donation .....
			Publications on Hand (at valuation) 30th June, 1967
			Deficiency transferred to Revenue Account .....
<u>\$1,154</u>	<u>\$4,684</u>	<u>\$1,154</u>	<u>\$4,684</u>

## BUILDING FUND INCOME ACCOUNT FOR THE YEAR ENDED 30th JUNE, 1967

1966		1966	
180	Transfer to Building Fund .....	233	Donations .....
			Interest:-
			Investments .....
			Bank .....
<u>\$180</u>	<u>\$233</u>	<u>\$180</u>	<u>\$233</u>

## REVENUE ACCOUNT FOR THE YEAR ENDED 30th JUNE, 1967

329	Publication Deficiency .....	3,186	
48	Donations and Subscriptions .....	14	Subscriptions Received:-
8	Electricity and Telephone .....	28	Life Members .....
70	General Expenses .....	6	Full Members .....
	Insurance .....	17	Associate and Junior Members .....
777	Printing, Stationery and Stamps .....	523	Interest .....
790	Rent Paid .....	791	Surplus on Sale of Bonds .....
133	Provision for Depreciation .....	128	Sundry Income .....
			(304) Deficiency transferred to Accumulated Funds .....
			Surplus)
<u>\$2,155</u>	<u>\$4,693</u>	<u>\$2,155</u>	<u>\$4,693</u>

## DECLARATION BY THE SECRETARY

I, Mrs. Leone Harford, being the Secretary of the Royal Zoological Society of New South Wales, do solemnly and sincerely declare that to the best of my knowledge and belief, the accompanying balance sheet and revenue account are correct, and I make this solemn declaration conscientiously believing the same to be true and by virtue of the provisions of the Oaths Act, 1900, as amended. DECLARED at Sydney this 22nd day of September, 1967

before me: JOHN J. MOORE, *Justice of the Peace.*

L. HARFORD.

## STATEMENT BY DIRECTORS

In the opinion of the Council of the Royal Zoological Society of New South Wales, the accompanying balance sheet is drawn up so as to exhibit a true and fair view of the state of affairs of the Society as at 30th June, 1967 and the accompanying revenue account is drawn up so as to give a true and fair view of the results of the business of the Society for the year then ended.

DATED at Sydney this 22nd day of September, 1967.

SIGNED ON BEHALF OF THE COUNCIL.

J. C. YALDWYN  
E. J. GADSDEN

*Vice Presidents.*

## AUDITOR'S REPORT TO THE MEMBERS

The accompanying balance sheet and revenue account of the Royal Zoological Society of New South Wales are, in our opinion, properly drawn up in accordance with the provisions of the Companies Act, 1961-66, and so as to give a true and fair view of the state of the Society's affairs as at 30th June, 1967 and of its results for the year then ended.

The accounting and other records (including registers) of the company examined by us were, in our opinion, properly kept in accordance with the provisions of the said Act.

Australia Square,  
SYDNEY.

PEAT, MARWICK, MITCHELL & CO.  
*Chartered Accountants.*

Registered under the Public Accountants  
Registration Act, 1945, as amended.

# THE ROYAL ZOOLOGICAL SOCIETY AND THE ZOO

By R. STRAHAN

There are three kinds of zoo: the commercial, the academic, and the municipal.

The commercial zoo, which has affinities with travelling menageries and circuses exists to make a profit. Often, such zoos are cramped, unsanitary, and ugly but there are some which rank among the most beautiful in the world. Hagenbeck's Tierpark in Hamburg is a longstanding example of the compatibility of commerce with good zoo management.

What I choose to call the academic zoo is one founded by a scientific academy or learned society for primarily scientific motives. Notable among these are the zoos of Amsterdam, Frankfurt, London, New York, and others which rank as the finest in the world, whether judged by the extent and variety of their collections, the output of research and publications, excellence of animal management, or beauty of the exhibitions.

The municipal zoo is one founded by a city or state, often for no clear reason other than emulation. This category also includes many fine zoos such as Chicago's Lincoln Park, Los Angeles, and Milwaukee. Although not peculiarly American, this is the most common type of zoo in the U.S.A., functioning as a segment of the local civil service.

There are intergradations between the three categories mentioned above, but most zoos can be fitted into the classifications in terms of their financial structure and basic motivation. A further diagnostic test is to pose the hypothetical question: in what direction would the zoo develop if given the opportunity to do so?

For the commercial zoo, the line of optimal development is clearly the maximisation of profits. This can be achieved by reduction of overheads and concentration on a relatively small number of spectacular exhibits. Circus acts and other money-making entertainments are far from repugnant to the management of a commercial zoo.

Given the opportunity to expand, an academic zoo will choose to increase the variety of its animal stock (including non-spectacular animals) and to develop further its activities in education, research, and conservation.

The municipal zoo, however, lacking a clear motivation, has no predictable line of development. It may move towards more pleasant enclosures, more spectacular animals, or a token involvement in primary education, but often there is a feeling that the zoo has served its purpose by merely coming into existence.

Taronga Zoo is unusual in that it is hard to classify. It partakes a little of each of the three categories.

The forerunner of the present zoo, the menagerie at Moore Park, was founded in 1880 by the Zoological Society of New South Wales, a body of citizens with mixed motives—entertainment, informal education, and scientific research.

Financial and demographic pressures led, in 1916, to a transfer of the Society's holdings to the present site, under the management of a Trust appointed by the State Governor. The Society retained its

scientific and educational functions and the Trust took over the ownership and management of the Zoo.

It might therefore seem that the Zoo changed from academic to municipal, but Taronga does not fit at all well into this latter category.

The typical municipal zoo has all salaries, wages and running costs borne by the city or state, and the zoo is essentially a part of the civil service. (his condition may be approximated in purely academic zoos, e.g. the New York Zoological Society receives all wages and costs of animal upkeep from the City of New York). This is far from the case at Taronga.

After the initial capital costs had been met, the Zoo was left very much on its own and the Trust had to function as a commercial enterprise. Four years after the foundation of the Zoo, the author of the guide book (1920) stated—

“With the exception of Taronga Park which is completely self-maintained, there is no Zoological Institution in the world which could remain open if dependant upon the income received from those who pay at its turnstiles, and this fact is the more surprising when the extensive free entree list to Taronga Park is taken into consideration.

“. . . Taronga Park also permits members of the Royal Zoological Society . . . to enter the gardens free, which virtually constitutes a direct subsidy of something like £300 per annum to this purely scientific Society.”

At this stage, as the author plaintively records, Melbourne Zoo was receiving an annual grant of £4,250, Adelaide Zoo £3,300, and Perth Zoo £3,125. When one considers the course of inflation since 1920, these grants are seen to have been quite substantial.

To state that the Taronga Zoological Park Trust has had to function on its own as a commercial enterprise is not to overlook or decry the irregular and often substantial capital grants which the Zoo has received from the N.S.W. Government. Nevertheless, it must be recognised that these have been miniscule in terms of the support which might have been expected for a quasi-governmental organisation and which, in fact, is usually given even to academic zoos which are completely independent of governments. Not to put too fine a point on it, Taronga Zoo has been starved of funds over the greater part of its existence. Even the generous benefactions of my predecessor, Sir Edward Hallstrom, have been insufficient to keep the Zoo up to the level of its major overseas counterparts.

This is not to imply that overseas zoos have no financial problems. All zoo directors say that they need more funds but, whereas their cry is that they need more money in order to develop at a sufficiently rapid rate, the problem of Taronga Zoo has been one of lack of funds to stave off deterioration. We have been concerned not so much with development as with retrenchment.

The public complains of neglected gardens and rusty, patched cage fronts. The staff of the Zoo complains of leaking roofs and gutters, broken drains, rusty water mains, overloaded sewers, collapsed foundations and falling walls, and of insufficient funds to purchase new vehicles, new equipment, and new animals. It is a magnificent tribute to the Trust and the staff of the Zoo that they have managed to survive into 1967 as a going concern and only \$90,000 in debt.

Meanwhile, what of the Society? As most members are aware, the Society moved to the Taronga site with the rest of the Zoo. It had accommodation for its secretary and its library and a meeting room in the present entrance building. Under the agreement covering the transfer of its assets to the Trust, this accommodation was guaranteed, as was the right of qualified members to undertake approved research, and the right of Council to recommend to the Minister for Lands, a proportion of nominations of the Trustees. Provided that membership of the Society was kept below a certain number, all members received (as they still do) an annual pass and a number of free tickets.

It would seem that the stage was set for fruitful collaboration between the Society and the Zoo but this can hardly be said to have eventuated. The Society vacated its free accommodation in the zoological centre of Sydney and took up expensive premises in the financial centre of the city. From these permanent headquarters it has since moved via nightly accommodation in Anzac House and is now temporarily housed in the Australian Museum.

The Society itself is difficult to recognise for, except on this annual occasion, it does not meet. Its sections (ornithological, entomological, conchological, etc.) meet as separate units and the Council meets once a month to lament the gradual erosion of its capital assets.

The Society still produces its two learned publications and, in return for these, a large number of journals from scientific societies in all parts of the world flows in to us. These journals are bundled and stored at the Zoo.

I do not know how many members of the Society would wish to have access to this wealth of scientific literature, but I assume that there would be very few. I fear, indeed, that only a small proportion of members reads any of the scientific papers in our own journals. Although all members approve of animals and take some interest in natural history, it must be recognised that there are very few who are prepared to accept the discipline of zoology as it has developed at this point in time. Very few of us are zoologists.

A zoological society can exist to promote the science of zoology or it can be a pleasant means of bringing together animal-lovers and amateur naturalists. It can, of course, be both but, if it does have such double aims (as appears to be our situation) I believe that these should be clearly recognised and reflected in an administrative division of the society's membership. This has been done by the Zoological Society of London, which now has two classes of membership, ordinary and scientific. The ordinary members receive all the time-honoured social and financial privileges and the scientific members (or fellows) are responsible for research and for production of the society's learned publications. Ordinary members receive the popular publications of the Society; scientific members obtain the serious scientific publications at a reduced rate.

I believe that the Royal Zoological Society of N.S.W. should seriously consider such an administrative division, and I shall later advance further reasons in support of this recommendation.

Before doing so, I wish to touch upon the confusion which exists concerning the significance of zoological societies, for two quite different types of organisation share this one name.

The archetypal zoological society is a body which owns and administers a zoo for primarily scientific and educational purposes. The zoological societies of London, New York, and Amsterdam are good examples of such bodies.

The second sort of zoological society is a supporting group of a pre-existing zoo. The zoological societies of Los Angeles, Lincoln Park, and Washington belong to this second category. The society usually has a number of prominent and wealthy patrons and a large membership. It engages in fund-raising activities for the zoo and special functions such as dinners, picnics, exhibitions, lectures, film-shows, etc. are provided for members. In a number of American municipal zoos (which, by their nature, cannot make a profit) the zoological society leases trading concessions within the zoo and makes considerable revenue which can be disbursed directly to the zoo rather than to the City Parks Department.

Our Society does not fit either of these categories. It no longer administers a zoo and it does nothing to support the existing zoo. Rather, the Zoo supports the Society through its issue of passes and free tickets.

The state government provided \$50,000 for the Zoo in the last financial year (some 30 times the previous annual subsidy) and this financial year it has provided salaries and wages for new appointments. I am confident that further funds will be forthcoming for recurrent and capital expenditure but there is a need for still more money.

The state government wishes to see more self-help and I have for some months been under gentle pressure to organise a widely-based supporting group including, if possible, prosperous and influential donors. I have held off until today because I felt it proper to offer the Society the opportunity to become that body.

The Zoo is at a turning point in its history. It has been criticised, as *all* zoos are, for its shortcomings. But zoos also come under criticism for their very existence. There is a case against the zoo—against *all* zoos—that it is improper to hold wild animals in captivity. This objection must be answered.

If it were possible for each inhabitant of Sydney, particularly the schoolchildren, to spend two years travelling over the world, watching wild animals and birds in their native environments, Taronga Zoo would have little reason for existence. It could be closed. But, since hardly any citizen has the slightest chance of seeing polar bears, penguins, giraffes, gorillas, the New World monkeys—or even wallabies, cuscuses and cassowaries—under natural conditions—there is some justification for bringing these animals to the city. However, this in itself, is not *sufficient* justification. A zoo must be more than a menagerie.

The founders of the Zoological Society of London were concerned to state in their constitution that their zoo must fulfil scientific and educational functions and that it was not "*merely for vulgar entertainment.*" I share this view for I believe that simple entertainment is insufficient reason for holding animals in captivity. A zoo can only justify itself if it exists primarily for education—by which I mean formal education linked to school and university syllabuses.

An educational zoo naturally develops research activities and the specialised knowledge and expertise accruing from such research makes possible the use of the zoo as a last resort in the conservation and

breeding of animals which, in their native environments, are faced with extinction.

Taronga Zoo, under my direction, and with the backing of the Trust, will justify its existence by a vigorous expansion of its activities in education, research, and conservation. This will not be at the expense of beautiful gardens, an inconspicuous shoreline, more pleasant enclosures, or peaceful recreation. On the contrary, these aspects of the Zoo will continue to be stressed. But the underlying aims of the Zoo will be the service which it can render to children (and, of course, interested adults) in zoological education; the service it can render to science in zoological research, and the service it can render to the community of the future in preservation of rare and endangered animal species.

I have little doubt that no member of the Society will object to these aims. The Society, as a whole, might well endorse them. But the harder-headed among you may well ask: what is involved in becoming the supporting group of such an enterprise? What is in it for the Society?

First, the Society would have to become much larger. Second, to preserve its long-established scientific functions in the face of a much larger lay membership, it would be necessary to institute—as I have suggested earlier—two grades of membership. Third, support means *financial* support, and I am therefore suggesting that the Society become a fund-raising body for the Zoo. There are problems here, involving radical changes in the Society's aims and constitution.

What can the Zoo offer in return? Speaking for the moment as your Vice-President, I suggest with the utmost seriousness that it offers the opportunity of rejuvenation, an escape from fragmentation, and a reason for existence. The Society is not in a very good state of health.

Reverting again to my role as zoo director, I can make some more specific suggestions. Given the relationship I am advocating, the Zoo could offer members of the Society a much more direct participation in its activities. I foresee regular members' days and special exhibits. I would like to see lectures, film shows and organised study groups within the Zoo. Naturalist members of the Society would be encouraged to design guided tours of the Zoo and I believe that much of the organisation of our projected children's zoo could be handled by interested members.

When a new entrance is built, probably within eighteen months, I hope that the old entrance building can be passed back to the Society, providing it with a permanent headquarters for its administration, meetings, and social functions.

I am already constructing a simple laboratory which can be made available for scientific members and I hope to be able to provide not only space but also shelving and cataloguing of the Society's valuable holdings of scientific books and journals. I should like to see a joint committee of the Society and the Trust planning the development of research within the Zoo and laying the foundations of a self-contained research institute. The Society has some financial difficulties in producing its journals but I believe that the Zoo could take up some of this burden and also provide a degree of secretarial assistance for the editor.

There are many other areas of fruitful co-operation which will become obvious if we can reach agreement on the main issues that I have raised. Let me sum up with the simple invitation: come back to your zoo!

RONALD STRAHAN  
23rd September, 1967.

## OBITUARY NOTICES

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PROFESSOR ALAN JOHN MARSHALL, D.Sc., Ph.D.

(Plate II).

The death of "Jock" Marshall in Melbourne on 20th July, 1967, after a long illness, removed from the Australian scene one of this country's most ardent sons, a zoologist of many talents, an implacable foe of humbug and pretentiousness, and a charming and amusing companion to his friends. It is impossible to do justice to his colourful character. Stories of him are legion, but those who attempt to describe this unique man have been baffled by his chameleonic character. Scientist, soldier, explorer, bushman, teacher, writer—he was all of these—yet unconventional in every role and delightfully, even outrageously, madcap withal.

Jock was born in Sydney, February 17, 1911, and when little more than a boy used to visit the Australian Museum and talk about birds and bush creatures with Iredale, Troughton, Kinghorn and others on the staff. He had lost an arm in a gunshot accident but surmounted that and other obstacles imposed upon him by his toughness and determination; at that time he even scorned to wear shoes and socks, deeming them "cissy", a form of rugged independence which was to last him through life. He joined the Royal Zoological Society of New South Wales in 1929, his first paper in the *Australian Zoologist* being "Notes on the Satin Bower-Bird" (vol. 6, 1931, p. 335). He assisted the Harvard University's collecting expedition in the 1930's.

Jock Marshall studied at Sydney and Oxford Universities and took part in the Oxford University Expedition to the New Hebrides in 1934, following this with more exploration in what was then Mandated and Dutch New Guinea two years later and in Spitzbergen in 1937. He was on the staff of the *Sun* newspaper, Sydney with the brilliant Thomas Dunbabin and Jock was for a while "Linnaeus" on the Argonauts' Radio session for children. About the time he was Subwarden of St. Paul's College at the University of Sydney he is said to have taken a leading part in a student prank to "kidnap" a distinguished but pompous English visitor who had been rude to the Vice-Chancellor.

Jock was a voluminous writer of books, scientific papers, newspaper articles and criticisms. He was so capable at dissection (with his one hand) that he demonstrated zoology and physiology at universities. For thirty years he was Honorary Ornithologist at the Australian Museum. He edited the Sydney University magazine *Hermes* in 1938 and later the revised edition of the great textbook on zoology by Parker and Haswell. During World War II, he became a Captain in the Australian Imperial Forces Intelligence Corps, serving in New Guinea and elsewhere, in charge of the picaresque "Jockforce" behind enemy lines. He led the Oxford University Expedition to Jan Mayen in 1947 and became a Demonstrator in Physiology at Oxford University; Reader in Zoology and Comparative Anatomy at St. Bartholomew's Medical College in the University of London; and foundation Professor of Zoology and Comparative Physiology at Monash University, Victoria. In the last-named position he strove to have none but Australian trees and other flora to adorn the campus and he was forcefully instrumental in getting a reserve of ten acres, "Snake Gully", set aside there for the study of



water fowl and native animal and plant life. There was also a dam for wildlife near his own home, for conservation was one of his dearest aims and he strongly criticized the forces threatening Australia with the "Great Extermination."

To his widow and children we offer our sympathy in their irreplaceable loss.

—G.P.W.

BERNARD CHARLES COTTON, F.R.Z.S.

The death occurred in 1966 of a Fellow of the Royal Zoological Society, Mr. Bernard Cotton, not long after his retirement as Curator of Molluscs at the South Australian Museum, Adelaide, a position he had held for many years. Mr. Cotton was the author of a number of books and papers on South Australian shells which have proved a great help to conchologists and collectors all over the world. He was awarded the Australian Natural History Medallion in 1950. A portrait of our late Fellow appeared in the *Journal* of the Malacological Society of Australia, no. 3, Nov. 1959, p. 3. Obituary notices appeared in the *Newsletter* of that Society 14(54) 1966, p. 4 and in *Trans. Roy. Soc. S. Austr.* 90, 1966, p. 179.

—G.P.W.

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# REPORTS OF SECTIONS

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## Ornithological Section Annual Report, 1966-67

This section continued to hold monthly meetings in association with N.S.W. Branch of R.A.O.U. Meetings were well attended by members and visitors, average attendance being 68.

Meetings were addressed by members and visitors and several films were screened. Mr. N. Chaffer, Mr. N. McNamara and Mr. J. Purnell, noted bird photographers, exhibited colour slides of between 200 and 300 species photographed between Victoria, and Cape York. Mr. H. Pollock screened his latest production, "Menura" and "Where the Pelican Builds Her Nest". Mr. Bill Horton from Mt. Isa and Major H. L. Bell of New Guinea showed colour slides of many species from these two localities.

During the year members took advantage of joining the Senior Section of the Gould League on Bird Watching Field Days in the Sydney region. These are always well attended and very popular.

Notable observations during the year among those recorded, are: A Greenshank at Long Reef in July 1966, 7 Brush Turkeys at Kurrajong (these birds have been recorded for 2 years by the landholder of their habitat, and have nested), two Lotus Birds and two Blue Winged Shovelers at Pitt Town in May 1967.

—H. BATTAM, Hon. Secretary.

## Ornithological Section Field Days, 1966-67

The Ornithological Section field days were held in conjunction with the recently formed "Gould League Bird Watchers' Club." Visits to areas of ornithological interest were organised by the section's chairman, Mr. Peter Roberts.

Ten field days were held during the Society's year 1966-67, and the following is a brief survey of the outings and of some of the birds observed:—

1. Malabar, N.S.W. 17th July, 1966. Leader, Mr. K. A. Hindwood. Attendance 35. Birds of interest:- Wandering Albatross; Black-browed Albatross; Giant Petrel; Crested Tern; Silver Gull and Reef Heron.

2. Royal National Park, N.S.W. 13th August, 1966. Leaders, Mr. and Mrs. Dibley. Attendance 50. Birds of interest:- Lyre-bird; Green Cat-bird; Brown Quail; White Cockatoo; Azure Kingfisher; Brown Warbler; Satin Bowerbird. Three bowers were discovered. A difference in ornamentation was noted, the first site showing a preference for blue rosella feathers and yellow-green Billiardiera flowers. The second one favoured blue bottle tops; while the third one had many blue feathers, one yellow feather (Cockatoo's crest), and a small piece of red paper.

3. Kuring-gai Chase, N.S.W. 25th September, 1966. Leader, J. D. Waterhouse. Attendance 12 (very cold, wet day). Birds of interest:- Grey Shrike-thrush with nest containing a clutch of 3 eggs. A list of 22 species observed.

4. Botany Bay, N.S.W. 15th October, 1966. Leader, A. R. McGill. Attendance 40. Birds of interest:- Sharp-tailed Sandpiper; Bar-tailed Godwit; Black-tailed Godwit, 2; Golden Plover; Curlew Sandpiper; Red-necked Stint; Lesser Knot; Turnstone; Crested Tern; Little Tern. Swamps adjoining

Botany Bay—Little Egret; Black Swan; Eastern Swamp Hen; Moor Hen; Coot; Black Duck; Hardhead; Little Black and Little Pied Cormorants and Black-fronted Dotterel.

5. Hawkesbury River Swamps, N.S.W. 4th December, 1966. Leader, Mr. Peter Roberts. Attendance 45. Birds observed:- Bushells Lagoon: Swan, Pelican; Musk Duck; Tailor Bird. Long-neck Lagoon: Lotus-bird with nest of 4 eggs. Dusky Moor-hen with nest containing 5 eggs. In a stand of Ironbarks, four species were observed nesting within a radius of 15 yards. They were Jacky Winter; Orange-winged Sittella; Rufous Whistler; White-throated Warbler. Pitt Town Lagoon: Jabiru; White-headed Stilt with nest of 3 eggs.

6. Warwick Farm, N.S.W. 22nd January, 1967. Leader, Mr. A. Colemane. Attendance 13. An extremely hot day. Birds observed:- Dollar Bird; Eastern Shrike-tit; Pipit; Jacky Winter; Mistle-toe Bird; Rufous Whistler; Reed Warbler; Tailor-bird; Little Grassbird; Sacred Kingfisher; Straw-necked and White Ibis.

7. Homebush Bay, N.S.W. 18th February, 1967. Leader, L. Courtney Haines. Attendance 50. Birds observed:- Fairy Martin; White Ibis; Royal Spoonbill; Eastern Swamphen; Dusky Moorhen; Whitefaced Heron; Spur-wing Plover; Maned Goose; Chestnut Teal; White-headed Stilt; White-fronted Chat; Japanese Snipe; Tailor-bird; Wood Sandpiper (1); Curlew and Sharp-tailed Sandpipers; Red-capped Dotterel; Red-kneed Dotterel (1); Red-necked Stint; Pipit; Blue Wren; Welcome Swallow; and Silver Eye.

8. Davidson Park, St. Ives, N.S.W. 29th April, 1967. Leader, Mr. S. G. Lane. Attendance 40. Bird-banding display. Species banded:- White-browed Scrub-Wren; New Holland; Yellow-tufted; White-cheeked; and White-eared Honeyeaters; Brown Thornbill; Eastern Spinebill; Little Wattle Bird. Mist nets were set up near Banksia bushes.

9. Royal National Park, N.S.W. 27th May, 1967. Leaders, Mr. & Mrs. Dibley. Attendance 32. Birds of interest:- Yellow-faced Honeyeater; Eastern Spinebill; Golden Whistler; White-throated Tree-creeper; Striated Thornbill; Rock Warbler; Lyre-bird; Wonga Pigeon; Brown Warbler; Rose Robin; Yellow-tailed Black Cockatoo; King Parrot; Eastern Shrike-tit; Large-billed Scrub-Wren; Tawny-crowned Honeyeater; Emu Wren.

10. Jerusalem Bay, N.S.W. 18th June, 1967. Leader, Mr. Peter Roberts. Attendance 17. Overcast, wet day. Birds observed:- Scarlet Robin; Mistle-toe Bird; White-cheeked, Yellow-faced and Lewin Honeyeaters; Buff-tailed, Brown and Striated Thornbills; Lyre-bird; Eastern Whipbird; Rock Warbler; Mangrove Heron and Silver Gull.

—L. COURTNEY HAINES

## Conchological Section Annual Report, 1966-67

Once again we come to the end of a successful year and have added to our membership list.

We are now meeting in the lecture hall at the Australian Museum in College Street, where we have some very enjoyable lectures.

The late Mr. Mel Ward gave the first talk of the year. His talks are always most interesting and enjoyable, especially this one in which he told us of his early years of collecting. We were all very sad to hear of his passing away. He will be missed by all who knew him.

Our second lecture was given by Mr. Garrard on "Mitras of Queensland". He had many mitras on display. He also named a number for the members.

After Mr. Gomersall's trip to Cooktown and back, he showed the transparencies he had taken, also related his experiences of collecting on the reef.

Messrs. Coleman and Dees, who are very keen skin-divers, told us of their experiences while skin-diving. They also had films and shells for members to view.

It was very interesting to hear Dr. D. F. McMichael talk on "The Life of a Coral Reef." He also had slides which showed the work they did and how they lived while on the expedition.

Mr. G. P. Whitley told us of the "Science Congress in Japan", which he attended. His slides of Guam, Japan and Bangkok were very beautiful.

The talk on "Corals and Other Marine Life" by Dr. J. Yaldwyn, is one we will remember for a long time. He conducted us into the Invertebrate Gallery of the Museum and explained all the corals and marine specimens. He then showed kodachromes of living corals.

We had two study nights. One was "Naticas" by Miss G. Thornley, the other "Turrids" by Mr. J. Laseron. They were much appreciated by the members.

As usual our Christmas Night was very well attended. It was very nice to see some of the old faces back again.

The annual display of shells caused much interest. Members look forward to bringing in shells for display, and seeing rare shells that other members have in their collections.

Field Days were well attended. New members benefited as old members could pass their finds over to them. By the courtesy of the Maritime Services Board we had our Annual Field Day at Shark Island, where everyone enjoyed themselves. Other places visited were Boat Harbour, Kurnell, Long Reef, Shellharbour and Gibbon.

The attendance is steadily growing. New members and visitors are always welcome. We had an average of 30 persons at the meetings, and look forward to increasing this next year.

During the year a number of members brought in shells to be distributed among other members. Many thanks to those people. This gives encouragement to new members.

Once again I would like to thank the lecturers who have made our nights so interesting. Also the Chairman and all members for their patience and co-operation during the year, without which I would not have been able to carry on my duties as Secretary.

Wishing the Section every success in the coming years.

(Mrs.) O. WILLS, Hon. Secretary.

## Entomological Section Annual Report, 1966-67

There was an average monthly attendance of seventeen (17) members and visitors. A larger one is to be desired and the lecturers who so kindly gave of their time and knowledge would appreciate this.

More, and varied lectures are being arranged for next year's syllabus.

During the year one field trip was held, in February at Tapstone. Again, disappointing as regards attendance, but a fair number of specimens were collected and a colony of *Danaus plexippus* (L.), Wanderer butterflies observed.

A kodachrome night was very popular, as were two lectures on spiders, one by Mr. G. Holloway in September, and the other by Mrs. V. Gregg in November. Mr. R. Broughtwood's lecture on Entomology and Photography was most enjoyable.

In February 1967, Mr. C. N. Smithers' "Notes on Butterfly Migration" lecture, was very interesting and informative and Mr. D. McAlpine, speaking on the Ornithoptera of Papua and New Guinea, made one wish it were possible to go on a field day excursion there. At the May Meeting, Mr. E. O. Edwards spoke on the "Distinction Between Similar Butterflies", this was most helpful besides being interesting. We say "thank you" to all who have helped the Section in any way and hope our numbers will increase.

(Mrs.) O. THACKER, Hon. Sec.

## Junior Group Annual Report, 1966-67

It has been pleasing to note that the number of interested juniors (and parents) has grown over the past twelve months. The average attendance is now 13 per meeting. Ten meetings were held during the year. It was never anticipated that this group would ever exceed 25 active members, as it was intended that as juniors channelled their interest to one particular field, they would then attend the Section dealing with that subject.

The new year, 1967, found us meeting in the small staff room at the back of the Australian Museum, with entrance from Park Street.

Two major factors have been responsible for increased interest shown by juniors: (1) a printed syllabus of lectures, and (2) the very high standard of lectures delivered by the speakers, who illustrated their talks with colour slides, or specimens (many alive).

A field day "Bat Banding" has been planned by Miss B. Dew to take place during the Christmas school holidays.

We would like to express our thanks to the speakers, also members of the Museum staff, who stayed back on these evenings to keep the rooms open and thus save the Society added expense.

—L. HARFORD.

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# BROOM'S PYGMY POSSUM

By ELLIS TROUGHTON

(Plate III; text-figure 1).

Scientific names are sometimes a source of tribulation for the taxonomist, but the improvising of popular names for unique fauna may prove equally troublesome for the author-naturalist. For instance, the discovery in 1966 of a living example of Broom's Pygmy Possum, previously known from sub-fossil jawbones, might well have justified the title "Phoenix Phalanger" but for its soft grey-brown fur instead of the feathers of the mythical bird.

However, the name of Professor Robert Broom is appropriately linked with his discovery of skeletal remains of the unique pygmy possum, in the vicinity of the Wombeyan Caves on the Great Dividing Range in New South Wales. A discovery ranking in phylogenetic significance with that of the Marsupial Mole (*Notoryctes*), and the Musky Rat-Kangaroo of the Atherton Tableland.

According to Broom's description (1896a), his original discovery included six "moderately good" lower jaws and three upper fragments taken from calcareous deposits (Pleistocene?) on a hill-top above the present caves; in what is "evidently the remains of the floor of a cave, whose roof and sides have long since been weathered away." Because he regarded the much enlarged 4th premolars or "sector" teeth as quite unlike those of any known marsupial, Broom established the genus *Burramys* for its sub-fossil reception.

The name is derived from the aboriginal "burra-burra" for the Wombeyan locality, its plurality meaning the "place of very many large stones"; and with the terminal "mys" literally means the mouse from there (Palmer, 1904). While the name aptly describes the rugged nature of the Wombeyan habitat, some confusion arose from Broom's reference to the calcareous deposits being "in the neighbourhood of Taralga, N.S.W.", actually a small town in more open country about 22 miles from the Caves site.

Sixty-four years later cranial remains of *Burramys* were collected in Victoria from the Pyramid Cave at Murrindal in the Buchan district of East Gippsland, by N. A. Wakefield (1960) in association with J. K. Dempster and R. M. Warnecke of the Victorian Department of Fisheries and Wildlife. Some 20 odd adult jawbones of at least 11 individuals were found at Murrindal; not as one might imagine in continuity with the Great Dividing Range, but in rugged country within 35 miles of the coast at Lakes Entrance!

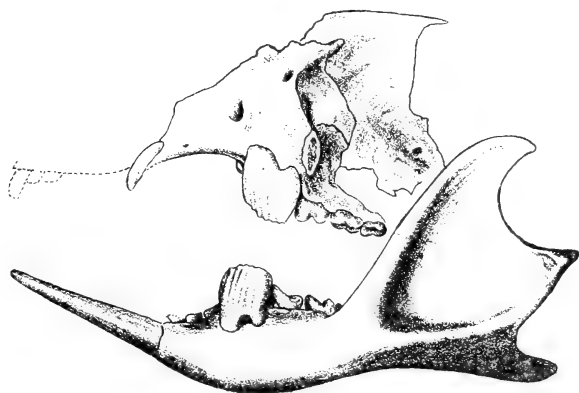
In August 1966 came the crowning discovery of a rat-sized possum caught in a ski hut on Mt. Hotham, Victoria, and taken alive to the Fisheries and Wildlife Department in Melbourne by Dr. K. Shortman of the Walter and Eliza Hall Institute. Subsequent examination under light anaesthetic revealed the long piercing incisors, and enlarged sectorial premolars typical of *Burramys parvus*, indicating also that it is a rather large and quite distinct genus of pygmy phalanger.

In the *Bulletin* of the Australian Mammal Society for January 1967, for membership circulation, R. M. Warnecke describes the body as relatively stout and short-limbed, with a very long thin tail without any trace of fattening or a prehensile tip. The very fine dense fur extends onto the basal half inch of the tail, the remainder being sheathed in scales to the tip, with a sparse covering of short hairs. At the Mammal Society meeting at Monash University last January one's personal handling

of the gentle creature showed no sign of prehensile tail-tip, but it was observed by Mr. Dempster that the tail "can be curled ventrally around quite small branches and assists in balancing as the animal climbs."

However, the remarkable climbing ability is mainly dependent on the prehensile development of the hands and feet which, with their widely separable digits are almost exactly comparable with those of the "typical" pygmy possum (*Cercartetus nanus*). There is some variation in the form and serration of the palm and sole pads, probably compensating for the lack of the prehensility of tail of *Cercartetus*. The nails of the fingers and toes are quite delicate and not suggestive of a special climbing or digging function.

According to Warnecke, the head of *Burramys* strongly resembles Leadbeater's Possum (*Gymnobelideus*) in shape but lacks well-defined facial markings or a median stripe. The back is a soft brownish-grey, darker along the mid-line, especially on the head; the underparts are creamy-white with faintly yellowish tonings. The specimen was a male, with the scrotum enclosed by the abdominal wall as in other pygmy possums, and the Feather-tail Glider (*Acrobates*). The total length (mm.) was 275; head & body 122; tail 135; ear 20; foot 18; and weight 55 grm.



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Figure 1.—Side view of skull of *Burramys parvus* (x3.4). The lower jaw is shown somewhat obliquely to represent its true side view when placed with the skull. After Broom.

The unique generic character of Broom's *Burramys parvus* is provided by the greatly enlarged and remarkably grooved 4th premolars or "sectorial" teeth. These upper and lower rear premolars are raised well above, and inflected outward, from the normal dental line. Apparently, the grooved or serrated edges of the premolars have a shearing action on certain food when it is manoeuvred into position.

In the original description Broom regarded *Burramys* as intermediate in cranial and mandibular characters between the phalangers and kangaroos,

finding in the large grooved premolars a relationship with the rat-kangaroos. In a following paper (1896, b) however, Broom regarded the skull as being "apparently sharp-snouted as in *Petaurus* and *Dromicia*" and the arrangement of the dentition to be in marked agreement with some smaller phalangers, notably the pygmy possum, *Cercartetus* (ex *Dromicia*).

This phalanger relationship was finally demonstrated by W. D. L. Ride (1956) in his comprehensive review of "The Affinities of *Burramys parvus*", concluding that it belonged in the subfamily Phalangerinae, having a number of characters in common with *Cercartetus*, *Eudromicia*, and *Petaurus* for which *Acrobates* should now be substituted. Further examination of Broom's original "fossil" collection also provided convincing evidence that *Burramys* "does not belong with the Macropodidae, nor is it ancestral to them."

According to the observations of John Seebeck, the captive *Burramys* had soon settled-in and accepted the "standard" small possum diet of mealworms, fruits, and honey-water. Most insects were eaten with relish; fresh chopped steak provided a good substitute when insects were scarce. Food was tested by nose, picked up by mouth, transferred to the hands and eaten quite slowly, with the possum squatting on its haunches. Mealworms and other soft larvae were eaten entire, moth wings and brittle beetle parts being discarded.

Evidently, location of the ski-hut on Mt. Hotham (6,100 ft.), in the zone of year-round snowfall in the Victorian Alps, would not provide adequate supplies of insects and native fruits or nectar for the pygmy possum. It is now assumed that the captive *Burramys* had been transported somehow from lower on the mountain in the floristic zone ranging from Alpine Ash to the Snow Gums. It seems probable, according to John Seebeck, that *Burramys* nests in the plentiful hollow limbs about the slopes of Mt. Hotham, so that the small possum may have been carried to the ski-hut in a knot-hole in firewood, in a somnolent or terrified state.

However, no mystery surrounds the deposits of skulls of small mammals in cave locations. There is the known habit of the pouched "native-cats" or dasyures of leaving excess marsupial prey and partly eaten remains in their cave haunts. Owls are also prolific depositors of rodent and marsupial remains, contained in regurgitated castings or "pellets" from which even complete fur-wrapped skulls may be collected. Examination of these owl-castings probably provides the simplest non-lethal method for estimating local populations of small mammals.

In pursuit of the rare *Burramys*, however, a thorough knowledge of its natural diet becomes essential, both as evidence of its existence and for choice of bait, because the use of other than cage traps would be utterly indefensible. On a recent visit to the Wombeyan Caves site, with Mr. Robert Proctor, observations were made concerning the potential food-resources for *Burramys*. According to the hospitable and very conservation-minded Superintendent, Mr. Clyde Stiff, infestations of larvae resulting in the destruction and replacement of wattle trees would provide a perennial supply of insect-food which, together with fruits of the Port Jackson Fig, could form the basis of a diet in the rugged country in which *Burramys* may still exist.

It is notable that vegetable matter given the Mt. Hotham captive was not generally acceptable; sunflower seeds were always eaten, apple, orange, and sultanas occasionally, but never eucalypt blossoms. Fresh grapes were greatly enjoyed, and Keith Dempster observed that the



possum cut a small hole in each grape and extracted about half the contents "presumably with the incisors." A similar means may be used in feeding on the native figs, while the grooved sectorial 4th premolars may function in slicing tougher-bodied insects and their larvae.

Coincidentally, it was the serrated premolars of the Musky Rat-Kangaroo (*Hypsiprymnodon*) which influenced Broom's original suggestion of a macropod relationship. Could one, however, find a mutual denominator of diet between the terrestrial rat-kangaroos and the arboreal *Burramys*, its living range might be more hopefully traced. An encouraging prospect for such an ecological survey is derived from N. A. Wakefield's comment on his discovery of numerous cranial remains in Pyramid Cave, along with those of the rare Leadbeater's Possum and the tiny pygmy possum, *Cercartetus lepidus*:- "We now have *Burramys*, not as a fossil perhaps ten thousand years old, but as a free skeletal material contemporary with our possums and our marsupial mice."

The lone Mt. Hotham "pygmy", after continuing in apparently perfect health for eight and a half months, under the devoted care of John Seebeck and colleagues of the Victorian Department of Fisheries and Wildlife, died in May 1967. To secure the maximum of scientific information from the sole representative, samples of the blood and internal organs were promptly preserved, along with the skin and skeleton, for study by specialists at Universities and Research Institutes.

Already, I have been informed in personal communication with Mr. J. A. W. Kirsch that his serological comparisons of the blood, at the McMaster Laboratory of the C.S.I.R.O., have demonstrated that *Burramys*, with the Pygmy Possum *Cercartetus* and the Feather-tail Glider *Acrobates*, constitute a group of phalangers entirely to themselves. This grouping is exclusive of the Sugar-Glider *Petaurus*, thus confirming the view that the gliding equipment of several genera of phalangers has been independently evolved.

However, despite the amazing emergence of Broom's Pygmy Possum from its post-fossil bed of calcareous dust, the "phoenix" allusion may yet prove tragically apt when recalling that the mythical bird "fabled to be the only one of its kind . . . burnt to ashes on a funeral pyre of aromatic twigs ignited by the sun". When one considers that the recurrent bushfires ravaging the forests of New South Wales and Victoria may envelop the rugged haunts of *Burramys*, as with the recent disastrous bushfires in the Warrumbungles National Park, the imperative need for the adequate control and expansion of our existing faunal reservations becomes tragically obvious.

Finally and by way of acknowledgment, as one having only a "fondling" acquaintance with the gentle *Burramys*, when shown along with five living *Gymnobelideus*, to members of the Australian Mammals Society at Monash University, some diffidence in preparing an article so much dependent upon others was overcome in the general interests of conservation. Science is especially indebted to Dr. K. Shortman for the exciting discovery in bringing the live possum from Mt. Hotham to the Department of Fisheries and Wildlife in Melbourne. And equally so, to the Director of that Department, Mr. A. Dunbavin Butcher, and his scientific colleagues who cared for and studied the unique marsupial.

My sincere personal acknowledgments go to the Director for permission to publish the delightful photograph of *Burramys* by Mr. J. Cooper of his Department; to Mr. Keith Dempster for his most interesting observations; to Mr. R. M. Warneke and to Mr. John R. Seebeck who specially cared for the possum, for quotations from their articles

in the January number of the Australian Mammal Society *Bulletin*. Acknowledgments are also due to Dr. David Ride, Director of the Western Australian Museum, and Mr. N. A. Wakefield of Monash Teachers' College, for significant references drawn from their contributions.

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#### Explanation of Plate iii

Broom's Pygmy Possum, *Burramys parvus*. Photo J. Cooper.

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# THE NATURALIST'S POCKET MAGAZINE, 1798-1803

By K. A. HINDWOOD

(Plate IV).

The *Naturalist's Pocket Magazine; or Compleat Cabinet of the Curiosities and Beauties of Nature* was published in parts in London between 1798 and 1803. It is an example of a popular illustrated natural history magazine of that period. In format it differs from present-day natural history journals, and its hand-set type and hand-coloured copperplate engravings bring to mind cluttered composing rooms, engravers cutting designs on metal, and colourists filling in the printed outlines. Such refinements as high-speed rotary presses, mechanical type-setting, photographic methods of reproduction and coated papers were then of the future.

The subjects treated in the *Magazine* are birds and other animals, flowers, shells and insects, from various parts of the world. The presentation of the material is simple and entirely without scientific profundity.

More than thirty years ago, when writing about the *Naturalist's Pocket Magazine*, I stated<sup>1</sup> that it "apparently" ceased publication after the issue of the 140th. part in June, 1802. I have since examined two sets of what is now known to be the complete issue. Both of these sets (one in the Mitchell Library, Sydney; the other in the Library of Mr. W. Russell, of Parramatta), while still in seven volumes, contain an extra four parts bound in with volume seven. The dates of publication of these four parts, as given on the plates in series of three, are 21.6.1802; 31.7.1802; 1.10.1802 and 1.4.1803. Each of the four parts contains an illustration of an Australian flower copied from a collection of original drawings frequently mentioned in the various volumes.

The seven volumes in the Mitchell Library are wanting title-pages to the parts which, in a complete issue, are numbered consecutively. In the index to volume seven there is no mention of any of the subjects treated in the four additional parts bound therein. Such is also the case with Mr. W. Russell's set, a fact showing that these extra parts are the early numbers of an uncompleted eighth volume. The last six parts of volume seven in the Mitchell Library set have been inadvertently bound in reverse order.

It may be noted that W. Russell's set of the *Naturalist's Pocket Magazine* was listed in Francis Edwards' catalogue of 1966 (item 693) as "An important work of the natural history of Australia . . . This little known work was issued originally in 144 parts and most recorded copies are incomplete. All the reference works seem to have overlooked the four parts of volume 8."

The total number of plates in a complete set is 432; of that number 47 are of Australian subjects (plants 36, insects 6, quadrupeds 3 and birds 2). Most of the illustrations of Australian flowers have been copied from a collection of original drawings which belonged to a "gentleman who resided for many years in a highly respectable official capacity at the British settlement in New South Wales (Preface, vol 1). Elsewhere (vol. 2, part 25) his period of residence is stated to have been ten years.

Some of the plates in the *Naturalist's Pocket Magazine* are very similar to drawings in the "Watling" series in the British Museum

(Natural History). It is known that Surgeon-General John White assembled the "Watling" drawings, many, though by no means all, of which are by the convict Thomas Watling. White remained in the Colony for almost seven years (January 1788 to December 1794). Whether he was the official who resided there for "ten years" is a matter for speculation, though a significant point is the statement in the *Magazine* that "... the draughtsman of our New South Wales plants in general, was sent out into the woods of that country, by the friend who has favoured us with the original drawings, to sketch whatever he might find new and beautiful" (vol. 5, part 96). In a like manner White directed Watling to paint the "non-descript productions of the country" <sup>2</sup>.

Duplicates or close copies, of contemporary origin, exist of many of the natural history drawings made at Sydney during the early years of settlement; thus, despite the similarity between some of the illustrations in the *Naturalist's Pocket Magazine* and the "Watling" drawings, it may be that the collection then in the possession of the un-named official, and which was being used by the editors of the *Magazine*, was a contemporary set and not the true "Watling" series.

On the basis of the plates, the extreme dates of publication of the 144 parts of the *Naturalist's Pocket Magazine* are January 1, 1798 and April 1, 1803. The early numbers of volume 1, up to the thirteenth part, were completed at intervals of one month; thereafter, with few exceptions, every week until the tenth part of the seventh volume, or the 130th. part of the whole. From that date, January 8, 1801, there was a lapse of ten months, then four weekly parts appeared in November, 1801, with a fifth part on December 5, 1801 (the plates in this part are wrongly dated "1800"). Following an interval of three months two more parts were issued in March, 1802 and one each in April and May, two in June, one in July and one in October. Six months later, on April 1, 1803, the *Magazine* ceased publication on the issue of the 144th. part. All of the seven volumes are made up of twenty parts each of three plates and accompanying text. The four additional parts of the uncompleted eighth volume are usually bound in with volume seven.

A run of the *Naturalist's Pocket Magazine* was listed in *Bibliotheca Zoologica Oatesiana* (Catalogue, 1933, item 949) as being bound in nine volumes. Enquiry at the time revealed that this set was incomplete and irregularly bound, and that the volumes lacked title-pages and indices, the total number of plates therein being only 411, instead of the 432 in a full set.

I have in my library, through the generosity of Mr. Tom Iredale, an incomplete set of five volumes (1, 2, 3, 5 and 6) of the *Naturalist's Pocket Magazine* bound in order of issue, with title-pages to the parts and title-pages and indices to each of the five volumes.

Except for its smaller size, i.e. 5½ x 3½ inches and less scientific approach to the subjects discussed, the *Naturalist's Pocket Magazine* seems to have been an imitation of the *Naturalist's Miscellany*, which work comprises some 287 parts, each of either three or four plates, issued between 1789 and 1813, the whole comprising twenty-four volumes. Sherborn <sup>3</sup> attributed, with a question-mark, the authorship of the *Naturalist's Pocket Magazine* to George Shaw, who was the author of the *Naturalist's Miscellany*.

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<sup>1</sup> Hindwood, K. A., 1933.—An Early Natural History Magazine, *The Emu*, vol. 32, pp. 198-204, pls. 27-29.

<sup>2</sup> Watling, Thomas [1794]. *Letters from an Exile at Botany Bay to his Aunt in Dumfries*, n.d., p. 20.

<sup>3</sup> Sherborn, C. D., 1932.—*Index Animalium* (2)29, p. cxliii.

Musgrave in his *Bibliography of Australian Entomology* (1932, p. 236) identified as many of the Australian insects as possible. The modern names of the mammals illustrated here were kindly provided by Mr. E. Troughton.

#### Explanation of Plate IV

- (1) The aculeated Ant-eater. From the *Naturalist's Pocket Magazine*, vol. 5, no. LXXXIX, plate 1 (1800). Modern name: Spiny Ant-eater, *Tachyglossus aculeatus*.
  - (2) The Spotted Opossum. From the *Naturalist's Pocket Magazine*, vol. 6, no. CXII, plate 1 (1800). Modern name: the blackish form of the Eastern Native Cat, *Dasyurus viverrinus*.
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## THE WHITE-WINGED WIDOW-BIRD

By K. A. HINDWOOD

(Plates V-VI).

In the 1860's and 1870's Acclimatization Societies in various parts of Australia, and elsewhere, were actively engaged in importing and liberating birds from other countries. The two main reasons for these introductions seem to have been the aesthetic appeal of certain species and the possible economic value, as destroyers of insects, of other kinds.

Many of the birds liberated failed to establish themselves; others, such as the House Sparrow, Tree Sparrow, Starling, Blackbird, Song-Thrush, Turtle-Dove, Greenfinch, Goldfinch and the Skylark, found environments to their liking and have since become accepted, though "exotic", components of the Australian avifauna.

Prior to the restrictions on the import of cage-birds large numbers of finches and finch-like birds, parrots and other species were brought into Australia from India, Africa and the East. Inevitably some of these birds escaped from aviaries: others were given their freedom, but only a few kinds were able to propagate in the wild. One such species was the Spice Finch, *Lonchura punctulata*, which now occurs commonly in eastern Australia from mid-coastal New South Wales to coastal northern Queensland.

The case of another species, the White-winged Widow-bird, *Coliuspasser albonotatus*, an African Weaver-Finch, is rather obscure. This bird was first noted in the early 1930's frequenting the rank vegetation bordering swamps and creeks, and also corn and sorghum fields, in the Hawkesbury district some 30 miles west of Sydney. Breeding was recorded during the spring and summer months, while in the autumn and winter, flocks comprising 100 or more individuals were observed. Sometime after 1950 there appeared to be a falling away in their numbers and, until recently, none was seen after 1953; the assumption being, at the time, that the species had died out.

However, in March, 1967, Mr. Tony Lucas reported seeing several males in breeding plumage, and numbers of females, near the junction of Cattai Creek and the Hawkesbury River, New South Wales. The owner of the property on which the birds were found had observed the Widow-birds in the locality for at least the past two years. Several naturalists who visited the spot on April 1, saw five or six males in breeding plumage and a flock of at least fifty females in an extensive area of smart-weed, white water-grass, noogoora burr and other vegetation bordering a lagoon.

Where did the original stock of wild Widow-birds, now frequenting the Hawkesbury district, come from? One story is that they were purposely released from cages on board the S.S. *Malabar* when the ship was wrecked at Long Bay (now Malabar) early on the morning of April 3, 1931. The *Sydney Morning Herald* of April 4 stated that "One of the last men to revisit the ship liberated a number of finches which immediately flew off towards the cliffs. Many spectators and scores of children attempted to capture the little birds which fluttered nervously from rock to rock." At the time of the wreck, the *Malabar*, bound for Darwin and Singapore, had on board numerous African finches that had been transhipped at Melbourne. Perhaps Widow-birds were among this consignment of birds.

Another possible explanation, told me by E. Hargreaves, at the time head bird-keeper at Taronga Zoological Park, concerns a dealer named McPherson who brought back from Africa a large consignment of birds, among which were many White-winged Widow-birds. Mr. Hargreaves thought that possible escapees from that source may have formed the nucleus of the existing colony, or colonies, in the Hawkesbury district. He also said that, about the year 1938 he had seen a flock of at least 500 Widow-birds in the Cattai (Hawkesbury) area and that at a later date bird dealers were active in catching the birds. Some that were in cages at Taronga in 1950-1951 had earlier been confiscated from trappers, according to Mr. Hargreaves.

When the species was studied in the Hawkesbury district some thirty years ago it was found that male birds were in breeding plumage from about the end of September to about mid-April. Nesting was recorded from October to late March (eggs). Mixed non-breeding flocks were seen from late March to September.

In the nesting season the polygamous males maintain a domain from which they will chase rivals. Several occupied nests may be found within a restricted area. Breeding males have the habit of flying into the air directly above their territories, fluttering about for a few seconds, and then descending to an exposed perch. They also flick their wings and spread their tails when perched. In this way they advertise their presence, both to interested hens and to possible contenders, both of which they will pursue in swift, often erratic, and at times extended flights high in the air. Other males sometimes join in such chases. Females also indulge in wing-flicking. A feeding flock will often rise and wheel like a gathering of starlings and with as much precision.

Males in breeding plumage are black (including the somewhat elongated and rather broad tail, some four inches in length) and have a golden-yellow wing-shoulder, below which is a white patch: the heavy finch-like bill is bluish-grey. Males in eclipse plumage are not unlike females but they retain the yellow and white markings on the wing. Females are about the size of a sparrow, being some six inches in length, and are streaked blackish and warm brown above, with lighter underparts.

Nests are built in thick vegetation and are generally within three or four feet of the ground; they are composed of grasses woven together and are lined with fine grasses. In shape they vary from globular to upright oval, having a side entrance sometimes overhung with the seeding heads of grass stems. An average nest measures some 5" from top to bottom, somewhat less in diameter, with a side entrance about 1½" across.

Two or three eggs form a normal clutch: they are bluish-green in ground colour, thickly spotted with brownish-black, more so towards the

larger end, and have finer and less pronounced underlying markings of grey and mauve. In size they vary from 19 mm x 13 mm to 21 mm x 14 mm.

Food consists of grass seeds of various kinds and some insects.

The name "Widow-bird" applied to a number of weaver finches, is based on the predominantly black plumage and long "train" (tail-feathers) of breeding males of certain species.

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## SNAKES IN COMBAT

By A. B. BAKER

(Plate VII).

This article is to report a further sighting in the wild of "combat" between two male red-bellied black snakes (*Pseudechis porphyriacus*).

The first recorded "courtship dances" were by Millett (1909), Beadon (1910), Wall (1921) and Davis (1936) and were regarded as being between a male and a female snake as a prelude to copulation. McCann (1935) was the first closely to examine snakes in this attitude when he dissected two snakes sent to him entwined together; he found them to be two males of the same species (*Ptyas mucosus*—rat snake of Bombay). Since this time there have been scattered recordings of sightings of "combat", the first Australian sighting was recorded by Fleay (1937) on captive *Pseudechis porphyriacus* and in the same article he reports a wild sighting by Jack Clark.

The present sighting occurred at 4.30 p.m. on a fine hot October day in 1966 on a disused track near Running Creek in the south-west corner of Lamington National Park, Queensland. These two magnificent specimens (5-6 feet long) were engaged in "combat" and with 2 feet of them raised off the ground were easily visible from a distance of 200 feet. These particular snakes were observed for a period of ten minutes during which they gyrated around in the open but never once became disentangled nor horizontal. Also they were quite silent with no evidence of hissing, and took no notice of proximity (4 feet) nor of movements nor noise. They were finally disturbed when a loose rock rolled very close to them, and they immediately became distressed and attempted to flee (but not in the direction of the rock). They made off into the scrub gradually disengaging themselves over a period of about thirty seconds. Unfortunately these snakes were not closely examined as to their sex but from the world's literature such behaviour has always occurred between males (with one exception in *Crotalus atrox* as quoted by Whisenhunt 1949). Despite a search there was no female snake close by, however owing to the thick nature of the undergrowth and the slope it would be impossible to claim complete thoroughness. The only other Australian snake to be observed in "combat" is *Demansia textilis* (brown snake), which has been reported as leaving the forepart of the body free with subsequent greater freedom of movement (Fleay 1951).

Copulation in all snakes would appear to be a rather passive affair with the female lying quietly uncoiled and with the male sliding alongside. See figure 188 in *The Improbable Kangaroo* (Poignant, 1965). In some species the male early grips the female's neck, but

later during copulation releases it and lies quietly alongside usually for some hours. In "combat" the variations are extreme from the nearly horizontal entwinings of the North American crotalids to the extreme rearings of the European colubrids especially the Aesculapian snake (*Elaphe longissima*) (Shaw, 1951). These "combat" snakes are always very active moving quickly from position to position and usually do not remain entwined for very long—the present sighting appears to be noteworthy with respect to the time of "combat". They also bite one another (Hansen 1950) and are reported as hissing often (Fleay 1937); other reports particularly Shaw (1948) state that they are quite sensitive to movements and will often move and strike in the direction of movements. The significance of "combat" is still unknown, be it sexual, social or territorial (Lowe 1948 and Lowe & Norris 1950); Ramona and Desmond Morris state, "All we can say at the present stage is that any ceremony as obtrusive and conspicuous as the combat dance must play an important role in the social life of snakes, whatever this role may be, if it is to compensate for the dangers (from exposure to predators) to which it subjects the performers." However, Klauber (1956), and Bogert & Roth (1966) argue strongly that "combat" has a sexual origin with the victor retaining rights to the female. Since writing the above I have discovered that Reuss (1926) was actually the first to attribute the "combat" pose to two males of the same species, and that the most recent wild sighting was of two prairie kingsnakes (*Lampropeltis*) by Moehn (1967).

An interesting aside is that according to one of the classical myths the caduceus of Hermes was originally a winged wand without snakes (given to Hermes by Apollo in exchange for the lyre), and on entering Arcadia Hermes saw two snakes "fighting" whereupon he threw his wand between them and they immediately embraced it. The snakes would have been *Elaphe longissima* which were regarded as being of good omen and which have been well described as very erect when in "combat". Thus it is seen that the Greeks had early noticed this behaviour and had correctly attributed the male sex to the snakes.

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## The Earliest Case of Australian "Salmon" Poisoning

In the *Australian Zoologist* 13 (4), 1966, p. 354, I recorded as the earliest case of poisoning from eating the "Salmon" (*Arripis*) the 1838 reference from Thomas Lempriere's manuscript Journal. I have since traced, in the Mitchell Library, Sydney, an even earlier account. This was in the *True Colonist* newspaper of Hobart Town, January 12, 1835 [p. 2, column 4], an anonymous article entitled "Alarming effects of eating fish".

On Saturday, 10th January 1835, several persons (Mrs. Burn, one of her children and Mr. Peats' son) suffered severely from eating salmon at Pittwater, Tasmania. In those days before refrigeration was practised and when allergies were unknown, fish probably deteriorated before being eaten, especially in that hot time of the year. However, the poisonous properties were ascribed to the effects of moonlight in those days and fishermen were cautioned to cover fish from the rays of the moon.

In the *True Colonist*, January 16, 1835, p. [3, columns 1-2], there is a quotation of Dr. Thomas on tropical poison fish, taken from Lempriere's *Lectures*.

—G. P. WHITLEY.

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## Polish Article on William Blandowski

A review of Mr. L. Paszkowski's paper on Blandowski (which appeared in the last *Australian Zoologist*) by Mr. Jerzy Dobrostański appeared in the Polish Weekly, *Tygodnik Polski*, published in Melbourne on 21st October, 1967. This is possibly the first review of the *Zoologist* to appear in the Polish language.

# SOME FISHES FROM NEW SOUTH WALES

By G. P. WHITLEY

(Plates VIII-IX)

What is New South Wales? A glance at the maps of the territorial divisions of Australia in the *Australian Encyclopaedia* (8, 1958, pp. 272-273) will show that the limits of this State have altered very considerably since the times of Captain Cook. Once, New South Wales embraced not only more than half of the mainland of Australia but Van Diemen's Land and New Zealand as well! The modern *land* boundaries are defined in the *Australian Encyclopaedia* (6, 1958, p. 277), but what of extensions out to sea? In the *Sydney Morning Herald* of 6th & 7th October 1966, it was pointed out that the Government of New South Wales is the legal owner of scores of islands, reefs and atolls from 60 miles east of the Queensland coast to a line between some 300 miles east of Brisbane and 1,000 miles east of Cape York, and the transfer of ownership of this territory to the Commonwealth of Australia is under discussion. Marine zoologists usually regard anything eastward of the Great Barrier Reef and the Swain Reefs as extra-Australian and certainly not pertaining to New South Wales. I do not propose to accept more than the conventionally recognized limits of the New South Wales coastline as extending from Port Danger in the north to Cape Howe in the south; to do otherwise would involve a most intemperate (in more than one sense of the word) flooding of the lists of marine animals from this State with a great influx of tropical species. Lord Howe Island (with its endemics and mainly tropical species) should also be excluded from Australian faunal catalogues, even though it comes within the electorate of East Sydney. How far out into the Tasman Sea should marine biologists consider New South Wales to extend? In view of the rapidity with which submarine exploration and oil research are progressing, a biological definition of the marine extent of New South Wales, not necessarily the same as a legal one, might well be resolved urgently. The conventional "three-mile limit" of a cannon ball's range is useless. The waters over the Continental Shelf offer a reasonable alternative, but the shelf is very near the shore in places, and guyots and seamounts are worthy of inclusion. I am inclined to suggest as the eastern limit the 159° East meridian of longitude, so as to take in the rich plankton (yet to be explored) and such animals as flying fishes captured on voyages between Australia and New Zealand.

New South Wales, as commonly understood, has a luxuriant fish-fauna because tropical species come down from Queensland and cold water species penetrate from the south, often to inhabit much deeper water as they go north. There are probably few or no endemic species, the State being a political rather than a natural area. Every year unrecorded fishes are discovered and it is the purpose of this paper to mention a few of them; taxonomic notes on certain fishes previously known from New South Wales are also included. The fishes of this State have not been dealt with overall since McCulloch's "Check-list of the Fish and fish-like animals of New South Wales" was published between 1919 and 1922 by the Royal Zoological Society of New South Wales. In that fine work (long out of print) 588 species were keyed and most of them were illustrated. A modern (1967) list would consist of 840 species for the State, but many more will have to be added as specimens, so far incompletely studied, are identified.

The serial numbers before the species mentioned below refer to those in my Presidential Address to the Linnean Society of New South Wales,

1964 (Proc. Linn. Soc. N.S.Wales 89, pp. 11-127), wherein will also be found references to literature. Numbers in the text, preceded by the letters I or IB, refer to specimens in the Australian Museum, Sydney.

I express gratitude to the Trustees and the Director (Dr. F. H. Talbot) of the Australian Museum for access to specimens and for library and laboratory facilities; to Mr. Howard Hughes and Mr. C. V. Turner for photographs and Misses Helen Ashton and Sondra Beresford, assistants in the Dept. of Fishes, for their line-drawings.

#### Family GALEIDAE.

##### 63. *Longmania calamaria* Whitley.

*Longmania calamaria* Whitley, 1944, Austr. Zool. 10 (3), p. 257, fig. 4 *et ibid.*, 11, 1945, p. 6, fig. 4. *Id.* Whitley & Payne, 1947, Austr. Zool. 11, p. 153. Western Australia.

An adult male of the Inkytail Shark, 233 cm. (7 ft. 9 in.) in total length was caught off Sydney and presented by the Sydney Game Fishing Club to the Australian Museum where it was registered no. IB.7458. It had the following characters:

Predorsal profile sloping, not gibbous. Eighteen pores from below eye to behind rictus. The small eyes and long snout were distinctive. Labial folds very small. Third gill-slit longest; fourth and fifth over pectoral base. Vent in posterior half of shark. Nictitating membrane present. Interorbital broad, convex. Postorbital less than length of pectoral. Lateral line fairly conspicuous. No interdorsal ridge. Anterior margin of second dorsal fin very trenchant, not flattened. Origin of second dorsal fin behind level of that of anal; end of second dorsal base above that of anal. Upper and lower caudal pit present; no caudal keel.

Colour, after death, grey above, cream below; junction of these colours halfway down eye anteriorly and at lower level of eye posteriorly. Black tips to first and second dorsal fins, pectorals and anal fin, and lower caudal lobe.

New record for New South Wales.

#### Family ENGRAULIDAE.

##### 215. *Thrissina nasuta* (Castelnaud).

This anchovy comes south into northern New South Wales at least to Grafton.

New record for New South Wales.

#### Family MURAENIDAE.

##### Genus LYCODONTIS McLelland, 1844.

*Lycodontis* McLelland, 1844, Calcutta J. Nat. Hist. 5 (18), July, pp. 158 & 173; altered to *Strophidon* on p. 202.

Type-species, *L. literata* McLelland, by later designation (Jordan & Evermann, 1896).

##### 409A. *Lycodontis woolienseis*, sp. nov.

(Pl. VIII and text-figure 1).

Head (95 mm.) 7.7, depth (60) 12.3 in total length (740). Interorbital, 13 mm.; eye, 10; snout, 22; cleft of mouth, 47 mm. Head and body, 350 mm., shorter than tail, 390.

Top of head swollen. Anterior nostril a short, simple tube at end of snout. Posterior nostril porelike, above front of eye, without tentacle. Five pores above upper lip. Lower jaw projecting. The mouth can be closed. Teeth small, entire canines; 2 median nasals; a few anterior teeth in each jaw on each side slightly enlarged and more spaced than posterior ones. About 15 to 20 outer teeth on each side of jaws,

with a few in an inner row in upper jaw. Uniserial fangs along vomer; no molars. Throat slightly furrowed.

Body elongate, subcylindrical, compressed posteriorly. Skin smooth. Dorsal fin originating over posterior part of head, only moderately elevated posteriorly, lower than body beneath it. Caudal truncate. Anal fin low, originating just behind vent.

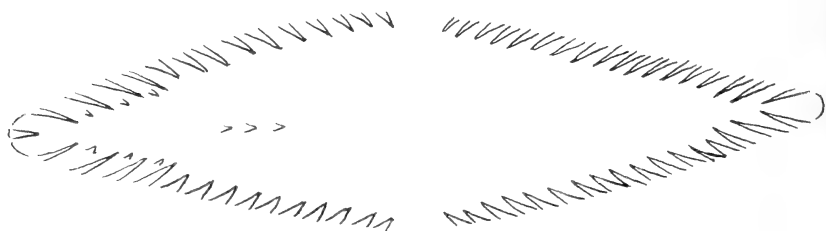


Figure 1.—Moray Eel, *Lycodontis wooliensis*. Dentition of holotype. New South Wales. Sondra Beresford del.

Colour, in alcohol: Liver brown with numerous white markings: these form small spots on the head, become large spots on fins, fused mottlings on belly and rosettes along sides (about 40 to 43 of these rosettes or spots along sides and in 3 to 5 rows between head and tail). The ground colour of the dorsal, anal and caudal fins is of the darkest brown; that of the thorax is lighter and has fine reticulations of darker brown. Inside of mouth dark grey; rictus plum brown. Eye blue. Gill-opening in a bruise-like brown patch. About 8 subhorizontal dark brown stripes along throat and over posterior part of head. Vent cream, surrounded by short brown radii. Four brown horizontal streaks on anal base anteriorly. Extreme margin of tail cream. Dorsal not continuously margined with cream.

Described and figured from the unique holotype, 740 mm. or 29½ inches in total length, in the Australian Museum, Sydney. Registered no. IB.7941.

Locality.—Twenty miles off Wooli, northern New South Wales, trapped in deep water, July 1967. Presented by Mr. K. Knox per G. Biddle.

Nearest *Gymnothorax leucostigma* Jordan & Richardson (199, Mem. Carneg.Mus. 4 (4), p.174, pl.68) from Taiwan, but teeth differ (see Chen & Weng, 1967, Biol. Bull. Tunghai Univ. 32, p.34, fig. 24).

#### Family HEMIRAMPHIDAE.

##### 572. *Ardeapiscis welsbyi* (Ogilby).

One specimen of the Flat-sided or "Four by Two" Garfish (No. IB.7112) was obtained from Yamba in May 1964 by Mr. J. A. Garven. New record for New South Wales.

#### Family LOPHOTIDAE.

##### 780. *Regilophotes guntheri* (Johnston).

(Plate IX).

*Lophotes guntheri* Johnston, 1883, Proc. Roy. Soc. Tas. 1882, pp. 142 & 177. Near Emu Bay, Tasmania.

*Regilophotes guntheri* Whitley, 1933, Rec. Austr. Mus. 19, p. 72 (q.v. for refs. & synon.). *Id.* Scott, 1934, Proc. Roy. Soc. Tas. 1933, p. 31 (Near Burnie, Tasmania; 23 Sept. 1931).

*Lophotus guntheri* Griffin, 1934, Rec. Auckl. Inst. Mus. 1 (5), p. 241, pl. 53. *Id.* Anon., 1935, "Star" (newspaper, Auckland, N.Z.), 3rd. Oct. 1935 (Coromandel Coast, New Zealand). *Id.* Parrott, 1960, Queer Rare Fish. N. Zeal., p. 90, fig. 30.

A fine specimen was foul-hooked on Redhead Beach, near Newcastle, and presented by Mr. R. Rich. Austr. Mus. regd. no. IB.7440. New record for New South Wales.

#### Family EPINEPHELIDAE.

789. *Polyprionum oxygeneois* (Bloch & Schneider).

Although the Hapuku, a famous fish in New Zealand, has been recently recorded from off Sydney by Gorman (1967, The Fisherman, Spring 1967, p. 7, fig.), it seems worthy of notice that it had been taken east of Beecroft Head, southern New South Wales, in 60 to 80 fathoms on 19 Aug. 1953 (IB.3134); off Austinmer, Jan. 1955 (IB.3275) and off Sydney (IB.7621).

#### Family LABRACOGLOSSIDAE.

994A. *Labracoglossa nitida* McCulloch & Waite.

*Labracoglossa nitida* McCulloch & Waite, 1916, Trans. Roy. Soc. S. Austr. 40, p. 439, pl. 41, fig. 2. Lord Howe and Norfolk Islands.

One from off Dover Heights, near Sydney; 4th March 1967 (IB.7665). New record for New South Wales and for Australia. The type-locality is Lord Howe Island.

#### Family LUTJANIDAE.

1099. *Aprion virescens* Cuv. & Val.

Off North Solitary Island and Woolli, Christmas 1966.

New record for New South Wales.

#### Family PEMPHERIDAE.

1271. *Parapriacanthus elongatus* (McCulloch).

Trawled off Disaster Bay, southernmost New South Wales (I.10187). New record for New South Wales.

#### Family CHAETODONTIDAE.

1325. *Chaetodon vagabundus* Linnaeus.

Long Reef, February 1958; Mr. H. Cogger (IB.3926) and two from Manly; Mr. D. Stuckey (IB.6462).

New record for New South Wales.

#### Family ISTIOPHORIDAE.

1431. *Tetrapturus brevirostris* (Playfair).

*Histiophorus brevirostris* Playfair, 1866, Fish. Zanzibar, pp. 53 & 145, 2 figs. Zanzibar.

*Tetrapturus brevirostris* Whitley, 1955, Proc. Roy. Zool. Soc. N.S.Wales 1953-54, p. 52 (q.v. for refs. & synon.) and Austr. Mus. Mag. 11, 1955, p. 295 & fig. *Id.* Lamonte, 1955, Bull. Amer. Mus. Nat. Hist. 107 (3), pp. 336, 348 etc. *Id.* D'Ombrain, 1957, Game Fishing, p. 76. *Id.* Whitley, 1964, Sympos. Scombroid Fish. 1, pp. 240, 244 & 247, fig. 5a (map).

The New South Wales marlin described below is similar to the Indian fish I illustrated in 1955, but has broader interorbital, more elevated predorsal profile, and differing second dorsal and anal fin-base relationship. This species may be restored to the New South Wales list; Weber & Beaufort (1951) mentioned it from this State.

Br.7. D.  $x1\frac{1}{7}$ ; A.ii,  $11\frac{7}{7}$ ; P.i, 19; V.2; C. 15 main rays. Sc.c.100. General facies as usual in marlins; sword (incomplete in this specimen but probably about 13 inches long originally) probably about 4.8 in length to caudal fork and about  $9\frac{1}{2}$  times diameter of eye. Depth about 7 in total length, or 6.2 in L.C.F.

Dimensions in inches: Total length, circa 70. Length to caudal fork,  $62\frac{1}{4}$ . Girth, 25. Snout to tail-base, 58. Breadth of sword above lower jaw,  $0\frac{7}{8}$ . Tip of snout to ant. border of eye, 13? Tip of snout to tip of mandible,  $6\frac{1}{2}$ ? Tip of snout to maxillary border, 15? Body depth, below first dorsal, 10; above first anal fin, 9. Head,  $19\frac{1}{2}$ ? Eye,  $1\frac{3}{8}$ . Interorbital  $3\frac{5}{8}$ . Postorbital,  $5\frac{1}{2}$ . Lower jaw,  $8\frac{7}{8}$ . Maxillary fold,  $2\frac{7}{8}$ . Eye to preopercular margin,  $3\frac{1}{2}$ . Spread of tail, 18. Level of second dorsal and anal origins to end of middle caudal rays, 13. Upper caudal lobe, 15; lower caudal lobe, 14. Caudal keels,  $1\frac{3}{8}$ - $2\frac{1}{8}$ . Minimum depth of caudal peduncle, 2. Length of caudal peduncle, 6. Height of 1st dorsal,  $7\frac{3}{4}$ ; of second dorsal,  $2\frac{1}{4}$ . Last ray of 2nd. dorsal,  $2\frac{3}{4}$ . Median dorsal spines,  $4\frac{1}{2}$ . Height of 1st anal,  $5\frac{1}{2}$ . Origin of pectoral to that of anal, 20. Pectoral, length, 9; base,  $1\frac{1}{4}$ . Width between origins of pectorals,  $4\frac{3}{8}$ . Base of first dorsal fin, 30; of 2nd dorsal fin, 3; of 1st anal fin,  $7\frac{1}{2}$ ; of second anal fin, 3. Length of ventral fin,  $11\frac{1}{4}$ .

Distance from tip of rostrum to tip of mandible nearly equal to that of tip of mandible from eye. Sword straight, slightly flattened above, rounded and granular below, horizontal. Profile notched above hinder orbital margin and hunched at the shoulders. Very small teeth on jaws and finer ones on tongue; vomer and palatines not toothed. Free end of tongue convex. Maxillary reaching less than an eye-diameter behind eye. Scales on top of head, temples, cheeks and sides of lower jaw. Nostrils simple, posterior the larger.

Form elongate, gently tapering, compressed. No rugose area behind operculum. Interdorsal space less than two eye-diameters, without upstanding spines. Anterior dorsal spines not enveloped in thick skin. A groove from ventral fins to behind anus, almost to anal fin, but no interdorsal or interanal grooves. Scales elongate, lanceolate, slender, close-set or imbricate. Lateral line indistinct, simple, arched above pectoral fin to below 16th dorsal spine thence straight along middle of flanks. Caudal peduncle compressed elliptical in cross-section, with two fleshy keels on each side.

First dorsal fin lower than body, its margin concave anteriorly and convex posteriorly, median spines fairly long, more than half the dorsal lobe and not concealable in a sheath. Fifth to twelfth dorsal spines branched and fourth to tenth anal. First anal lobe acute. Insertion and end of second dorsal fin slightly behind levels of those of second anal. Pectorals falciform, adpressible after death, not reaching half way to level of anus, but ending below 19th dorsal spine, its insertion low, level with lower jaw. According to its donor, the fish's "pectoral fin had no groove or sheath to fold into on the side. It did not fold in flat but had more movement than a D'Ombra's Marlin." Ventrals narrow, tapering, each with two rays and a flaplike membrane.

Colour: According to the donor, the fish had well-marked stripes as in the Striped Marlin but the general colour "was just a shimmering mass of opal patches, interspaced with dark bronze green as the general colouring". The sixteen narrow stripes of opal blue terminated one-third

of the way down the body and did not extend right down as in the Striped Marlin. The slightly wider interspacing areas were bronze green. The belly and lower half of body were silvery blue to silvery white. Dorsal fin darker blue. Pupil of eye dark blue, almost black, rest of eye silvery with part of edge opal blue. Red under spear. Tail opal blue. Nearly a month after death, the colour had become greyish, without stripes, the junction of light ventral and dark dorsal areas became well defined, running from the lower caudal keel to the angle of the mouth and top of lower jaw. No spots on fins; spinous dorsal uniform dark greyish.

Described from a specimen about 70 inches in total length and 45 $\frac{3}{4}$  lb in weight after death (56 lb when fresh). Australian Museum regd. no. IB.3912.

Locality.—Off Little Island, Port Stephens, New South Wales; 26th December, 1957. Taken by Mrs. R. Duncan on 44lb. nylon and presented by Mr. Athel D'Ombraïn. It had been feeding on pilchards or herrings (Clupeidae) about ten inches long, and yellowtail (*Trachurus*); it spat out three very fresh ones when landed.

#### Family POMACENTRIDAE.

1610. *Glyphisodon sordidus* (Bonnaterre).

*Chetodon sordidus* Bonnaterre, 1788, Tabl. Encycl. Meth., Ichth., p. 90. Red Sea (Forskål).

One (No. IB.87) from Thompson's Bay, near Sydney (the late A. K. Carter) is a new record for New South Wales.

#### Family BLENNIIDAE.

1870. *Aspidontus taeniatus* (Quoy & Gaimard).

Two from Manly (IB.5749-50); Mr. L. de Coster, 1962. New record for New South Wales.

1871. *Runula tapeinosoma* (Bleeker).

Manly (Mr. L. de Coster, 1962). New record for New South Wales.

#### Family GOBIOMORIDAE.

2014. *Mogurnda striata* (Steindachner).

*Eleotris striata* Steindachner, 1866, Sitzb. Akad. Wiss. Wien 53, p. 452. Port Jackson, New South Wales.

*Eleotris pallida* Castelnau, 1875, Res. Fish. Austr. (Vict. Offic. Rec. Philad. Exhib.), p. 24. Cape York, Queensland.

*Eleotris adspersa* Castelnau, 1878, Proc. Linn. Soc. N.S.Wales 3, p. 142. Fitzroy River, Queensland.

*Mogurnda striata* Whitley, 1961, Austr. Mus. Mag. 13, p. 333, fig. *Id.* Scott, 1962, Fish. S. Austr., p. 244 and Whitley, 1964, Freshwater Fishes Austr., ed. 2, p. 116.

*Eleotris striata* Steindachner has priority over *E. pallida* and *E. adspersa* for the Purple-spotted Gudgeon. *E. striata* has sometimes been regarded as a synonym of *E. australis* Krefft, 1863, the Striped Gudgeon, but Steindachner's species was named *striata* because of the striae on its scales, not because of stripes on the body, and its fin-counts and colours show that his name applies to the Purple-spotted Gudgeon, for which I used it in recent writings.

2024. *Butis butis* (Hamilton-Buchanan).

One from two miles up river from Yamba, May 1963; Mr. J. A. Garven (IB.7113). New record for New South Wales.

Family GOBIIDAE.

2085. *Bathygobius fuscus* (Rüppell).

One from Narrabeen (No. I.8097); others from Woody Head, northern New South Wales, 16th June and 28th July 1962, one from an empty turban shell (IB.5756 & 5829) from Mr. A. A. Cameron.

New record from New South Wales.

Family SCORPAENIDAE.

Subfamily SEBASTINAE.

2158. *Maxillicosta scabriceps* Whitley.

*Maxillicosta scabriceps* Whitley, 1935, Rec. Austr. Mus. 19 (4), p. 246, pl. 18, figs. 4 & 5 (South Australian localities). *Id.* Whitley, 1938, Rec. Austr. Mus. 20, p. 199 (Fremantle, W. Australia). *Id.* Serventy, 1938, Emu 38, p. 299 (eaten by cormorants). *Id.* Whitley, 1961, Proc. Roy. Zool. Soc. N.S.Wales 1958-59, p. 66 (Southport, Queensland).

*Neosebastes scabriceps* T. D. Scott, 1962, Fish. S. Austr., p. 156 & fig. *Id.* Mees, 1964, Fisher. Bull. W. Austr. 9 (4), p. 46.

One specimen, trawled off Port Stephens by Mr. Barry Mitchell (Austr. Mus. regd. no. IB.7023). New record for New South Wales.

Subfamily PTEROINAE.

2179. *Pteropterus antennatus* (Bloch).

This small Butterfly Cod is represented in the Australian Museum by a specimen from Darnley Island, Queensland and one from New South Wales (IB.7617). Mr. Keith Gillett has photographed another at One Tree Island, Queensland.

New records for Queensland and New South Wales.

Subfamily SYNANCEJINAE.

2188. *Erosa fratrum* Ogilby.

One, found in a fish-trap off Maclean (IB.7942), constitutes a new record for New South Wales.

Family ANTENNARIIDAE.

2267. *Pterophrynoides histrio* (Linnaeus).  
(Figure 2)

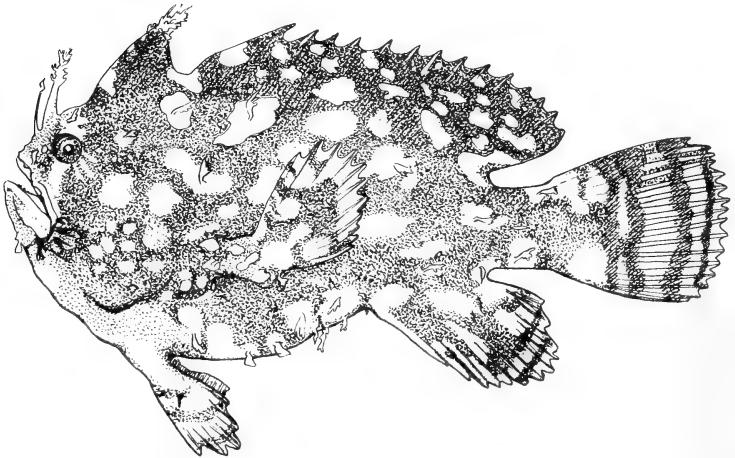


Figure 2.—Sargasso Fish, *Pterophrynoides histrio*. New South Wales.  
Helen Ashton del.



*Lophius histrio* Linnaeus, 1758, Syst. Nat., ed. 10, p. 237. Sargasso Sea, etc.  
*Histrio histrio* Beaufort, 1962, Fish. Indo-Austr. Archip. 11, p. 197,  
fig. 47 (q.v. for refs. & synon.).

A specimen (IB.4545), 127 mm. or 5 inches long, is here shown. It was found at Warrah, Broken Bay, New South Wales on 31st January 1960. A number of these Sargasso Fish were cast ashore along the coast of New South Wales about that time.

If the Australian form be distinct from the Atlantic, the earliest name for it seems to be *marmoratus* Shaw & Nodder (1794, Nat. Miscell. 5, pl. 176, lower fig.) which is earlier than *marmoratus* Bloch & Schneider, 1802, as ascribed by Beaufort (1962).

2278. *Antennarius pictus* (Shaw & Nodder).  
(Figure 3)

*Lophius pictus* Shaw & Nodder, 1794, Nat. Miscell. 5, pl. 176, upper fig. "Coast of New Holland", i.e. Botany Bay, N.S.Wales.

*Antennarius pictus* Whitley, 1957, Proc. Roy. Zool. Soc. N.S.Wales 1955-56, p. 69 (q.v. for refs.).

Here figured from the specimen (no. IB.548) from Ballina, New South Wales, noticed by me in 1957. It is  $2\frac{1}{2}$  inches long or 71 mm. in standard length. D.i/i/i/12;A.6;P.11;V.5;C.7.

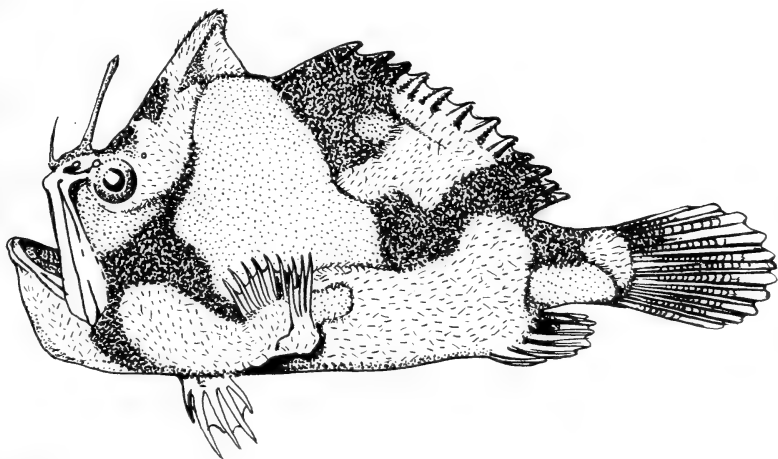


Figure 3.—Angler Fish, *Antennarius pictus*. New South Wales.  
Helen Ashton del.

Unfortunately the dorsal spines are abraded so that it is difficult to compare it with the species in the key given by Schultz (1957, Proc. U.S. Nat. Mus. 107, p. 53—Shaw & Nodder's figure shows a trifold esca suggesting that *pictus* belongs to Schultz's subgenus *Triantennatus*). The first spine measures 7 mm., the second 10. The second dorsal spine looks like two rays side by side and diverging distally before tapering to the tip; there is a distal ridge between the two lateral "rays" and the whole spine is compressed dorso-ventrally. The third dorsal spine is covered by prickly skin and is movable. Base of soft dorsal fin, 32 mm., posterior rays branched; all anal rays divided. Pectoral rays all simple, except uppermost which has incipient division. Gill-opening at pectoral elbow. Caudal peduncle distinct.

Family BALISTIDAE.

2320. *Balistioides viridescens* (Bloch & Schneider).

One from Seal Rocks, July 1966 (Mr. R. Hannan). Though noticed by Hannan, *Outdoors*, Jan. 1967, p. 12, this is the first record of this Filefish from New South Wales in a scientific publication.

Family OSTRACIIDAE.

2384. *Paracanthostracion pentacanthus* (Bleeker).

Specimens of this Boxfish from Lake Macquarie (IB.2623) and trawled in 28-30 fathoms off Ballina (IB.6259).

New record for New South Wales.

2385. *Ostracion meleagris* Shaw & Nodder.

One, 2 inches long, from northern New South Wales (Mr. W. Gale; Austr. Mus. regd. no. IB.1177).

New record for New South Wales.

2398. *Acarana aurita* (Shaw & Nodder).

Trawled off southern New South Wales (IB.2852, 2853); one from Eden in 1941 and a juvenile from as far north as Woolgoola.

New record for New South Wales.

Family TETRAODONTIDAE.

2423. *Gastrophysus perlevis* (Ogilby).

Several specimens of the Smooth Toado were obtained by an Australian Museum party from a trawler which had taken them in 28-30 fathoms off Ballina (IB.6295-97).

New record for New South Wales.

2434. *Canthigaster callisternus* (Ogilby).

A Port Jackson specimen is in a private collection and I found another one washed ashore on Dee Why Beach, near Sydney, in 1966 (IB.7752). New record for New South Wales.

The type-locality was Lord Howe Island but the species is known from the Kermadecs and New Zealand for *Canthigaster callisternus* is also the "unidentified fish" of K. Tarlton, *Dive 5* (4), Handbook of N. Zeal. Skindiving, 196-?, p. 9, fig., the "Canthigasteris" of Moreland, *Dive 5* (6), 1966, p. 6, from Poor Knights Islands, Whangarei, New Zealand.

Explanation of Plates.

Plate VIII.—Moray Eel, *Lycodontis woolienseis*. Holotype. New South Wales. Photo by H. Hughes, Australian Museum.

Plate IX.—Crested Ribbon Fish, *Regilophotes guntheri*. New South Wales. Photo by C. V. Turner, Australian Museum.

# EVOLUTION OF THE HYMENOPTEROUS COMB

By (the late) TARLTON RAYMENT

(Figures 1-8).

Nothing could be more crude than a hole in the ground, yet I suggest that the hymenopterous cradles are no more primitive than the first essays of man to establish himself in his rude stone cave. There is an interesting parallel in the digging and the hunting of the predatory wasps. The architecture, I repeat, is of the simplest type, yet a solitary builder, *Sphex suspiciosus*<sup>1</sup>, provides me with an astonishing demonstration of insect perspicacity, and since she can measure accurately, I must award the palm for her splendid achievements.

But today I am more concerned with the evolution of the comb, rather than that intriguing subject, the Psychic Life of Insects, and must confine myself to structures. The Order HYMENOPTERA is comprised of Ants, Wasps and Bees, and for the moment, I regret my inability to study the mind. Permit me, then, to return to the builders.

The cave, I say, should represent the earliest home, not only for man himself, but also for the hymenopteron, and a criterion for his progress could be measured by a kind of evolutionary ladder, the rungs on which I ascend are strong, but unfortunately, spaced not at regular intervals, but rather by a series of uneven steps, some short, others longer.

Everybody has observed the leaves of a gum tree, and the squirming gregarious mass of larvae of sawflies, *Perga dorsalis*. They stand at the base of the Hymenoptera series, with their caterpillar-like form and disgustingly pungent secretion. When fully fed, each larva will descend to the ground by a thread of silk, and there reassemble. I have known them to cross a wide road to burrow in company into a bank to pupate.

Since the sawfly larvae must inevitably inherit the genes for gregariousness, the cocoons are all built in close proximity, and they ultimately bear a close resemblance to the high conical cells of the drones of the hive-bee, *Apis mellifica*. I scrape away a little of the soil, and reveal a cluster of cocoons formed like a primitive comb, but I must refrain from entering the intriguing realm of psychic behaviour.

Permit me, then, to examine the symmetrical cluster of cradles of a fossorial bee. She is indeed handsome, with a long but not unmusical name, *Callomelitta anomala*<sup>2</sup>. She has no common one, or I would have resorted to a vernacular. The vertical divisions between the seventeen or so cylindrical cells average paper-thickness, and surely I have here under my hand the element of a comb.

You will observe, too, that earth is the basic material for building cells, and I cannot select either mud or concrete without impinging on the arts of the builder. Once more I have no common designation for the bee, but let us not boggle over her scientific one, *Nomia australica*<sup>3</sup>, for it is short and euphonious. Moreover, the bee herself is a beauty; a rich metallic-blue banded with reddish-gold. Yet I can ascend another rung, albeit a short one, for the cluster of cells is not always a simple one; there is often a second cluster, one over the other. The general design is evident, and the surface finely trowelled, yet, if the truth be told, the cradles are mud, refined, if you will, but still mud.

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<sup>1</sup> A wasp, known also as *Ammophila*.

<sup>2</sup> See Rayment, *A Cluster of Bees*, p. 100, 1935.

<sup>3</sup> Australian Zoologist, *Nomia*, Vol. xii, pp. 176-200, 1956.

I am enthralled by the artistry of Mother Nature. The iridescent electric-blue fasciae and black body of the anthophorid<sup>4</sup> bees are handsome. They are powerful excavators of mortar, and in one case, they drill the hard sandstone of the cliffs of Sydney, nevertheless, they are gregarious in habit, building in close association with their fellows, but each preserving its own individuality.

The large oval cells are more or less grouped together, but the cradles are smoothed with several trowellings of snowy porcellain, but the "interior decoration", I say, is draped with an immaculate white gown of elemental wax, secreted on the dorsal plates of the abdomen. The finished cradles of the potters therefore, are tiny white urns of truly aesthetic proportions. How is this remarkable substance allied, as it is, to fat spread over the interior? Well, there is a tiny plate, a trowel, on the tip of the abdomen, but that is a story for another day.

The builder, I repeat, cannot utilize her materials unless she invoke the craft of the trowel, and so, whether or not she prefer it, the artisan is compelled to labour in the company of her fellows. Here, then, are the elementals of the coöperative efforts of the furrow-bees, *Halictus*. True, in the hymenopteron world, the females are the staunch labourers, and the sisters possess all the crafts and skills, but these things involve the mind. Did I promise to eschew the thinker? The males are exceedingly active on the wing, but they lack all constructive ability; they are content to dally in the amatory sunlight of the day.

Yet there is tremendous progress for the furrow-bees. One of them, *Halictus peraustralis*, has ascended to a home *above the ground*. To be sure, the building material is little better than mud, for it is pure punk, so decayed that the wood has now collapsed until it has lost all semblance of its real nature. The texture is bland, somewhat like cheese, that is, it cuts readily and cleanly; carrying moisture for a long period. The punk remains warm and secure from interference. As you will appreciate, all these conditions are conducive to the welfare of the bees.

The several sisters "enjoy" the benefits of coöperative labour, and companionship. I have demonstrated that the several sisters of *Exoneura*<sup>5</sup> will "suckle" the other babies without discrimination. There is no crude admixture of nectar and pollen, but a fine super-food, a secretion of the glands of the head, pointing the way, as it seems, to the "royal jelly" of the workers of the hive-bee.

Lest the surprising example of *Halictus* be regarded as a mere aberrant foible, I should point out that the habit is duplicated in another bee, *Parasphecodes wellingtoni*. True, the genus is different, but the two genera are closely related, for both are in the Family Halictidae. There is a like coöperation of sisters; the site is similar, i.e. a decayed stump above the ground level, so that the transposition from wood to punk is readily accomplished.

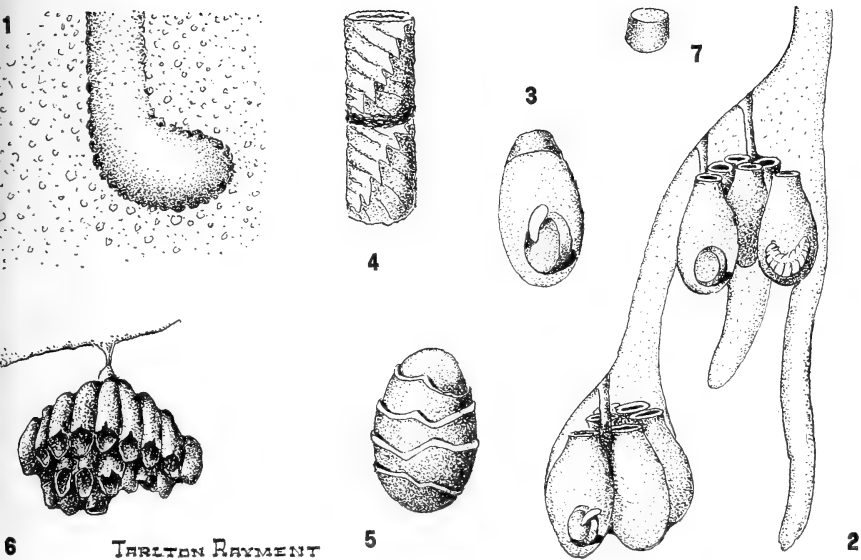
Having risen from the cave, so to speak, the advantage of having a wooden house is very evident. It is, therefore, not a far cry from the boring of solid redgum timber by the large carpenter bees, *Xylocopa bryorum*<sup>6</sup>, and the modelling of cells from sawdust long before man arrived with his synthetic boards.

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<sup>4</sup> Critical Revision of Anthophora, *Treubia*, Vol. 19, Parts I and II, Japanese Edition, 1942.

<sup>5</sup> Australian Zoologist, *Exoneura*, Vol. 11, Part 4, pp. 285-313, July, 1951.

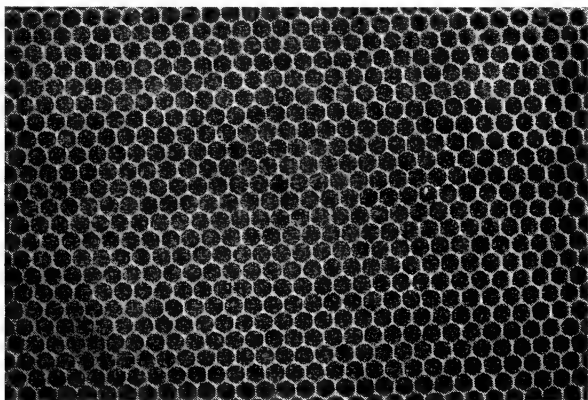
<sup>6</sup> Rayment, *A Cluster of Bees*, p. 465, 1935.



TARLTON RAYMENT

### Explanation of Figures

1. The crude cave of the wasp, *Sphex suspiciosus*.
2. The double group of cells of the bee, *Nomia australica*. Graphic view.
3. Cell of *Nomia* with its pollen-ball and egg.
4. Two cells of the leaf-cutting bee, *Megachile cetera*.
5. The many drapings of the blue-banded bee, *Anthophora cingulata*.
6. The small paper comb of the wasp, *Polistes*.
7. The mud plug closing the cell of *Nomia*.



8. The perfection of the structure of the comb of the honey bee.

The beautiful cradles of the leaf-cutting bees, *Megachile cetera*<sup>7</sup> are marvels of leafy construction, but there are other species that model in resin, and one that moulds its cells in a vegetable kino, which is a sap of trees and resembles resin, but is not.

Bees are not the immutable creatures that certain naturalists would have us believe. I once received a flat cluster of cells that had been fashioned from the refined white wax of comb foundation manufactured in a modern bee-farm. The species is *Megachile deanii*<sup>8</sup>.

I have been obstructed by a very long interval between the rungs of my ladder. There are wasps building in resin, for the material is entirely waterproof, durable, and withal ductile. Yet the architecture of the wasps, I say, has gone far beyond the simple earthen cell, for they have evolved a true comb of paper.

The comb of *Polistes* may be fashioned from only a few horizontal cells suspended by a slender thread, but the Vespid wasps, the hornet, *Vespa crabro*<sup>9</sup>, form numerous and aggressive colonies in the truest sense. They contain females and males, and the general principles of Vespid architecture contain a close parallel with those of the Stingless bees, *Trigona*, of Australia. There are similar "plates" of horizontal comb surrounded by struts and braces to fasten them in position.

The combs of the Stingless bees, *Trigona carbonaria* are built of a dark, hard wax, almost chocolate in colour, but it undoubtedly is wax, albeit not so ductile. The little combs are composed of minature cells, with a few larger "queen"-cells and spherical ones for the storage of the pollen and honey. The most conspicuous feature is the veritable maze of struts, toms, braces and stays that surround the combs.

I have collected many examples of the stingless bees' attempts to experiment with hexagons; those of the brood-cells are the most regular, but the storage cells are often quite separate, so that they resemble pretty urns shaped like the cap of an acorn seed. Later, the sealed storage cells are more or less buried under a misshaped glob of wax.

Did you know that the typical cell of all bees is cylindrical or oval, and the "queen-cell" is the only true one? It is the mutual pressure of many cylinders that results in the hexagonal pattern. Over the ages, the honey-bee has perfected so many cells that their building has now become instinctive.

Many experiments with the building of other types of cells have demonstrated to me that honey-bees can change hexagons to cylinders, and cylinders to hexagons, so that the workers will build whatever kind that is most in request according to the exigencies of the colony.

Having dissected certain insects, the several ocelli show that they are separate entities, with hair growing between them on the integument. The honey-bee has crowded so many lenses together that this feature of the compound eye is that of multiple hexagons. Despite the gradual evolution of the eye, considerable numbers of hairs are still retained between the facets; a vestige, as it were, to remind us of their evolution.

I say, then, that honey-comb is a magnificent achievement for the bee, for its perfect hexagonal pattern, based on three rhombs, has never

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<sup>7</sup> Rayment, *A Cluster of Bees, Megachile*, p. 432, 1935.

<sup>8</sup> See *A Cluster of Bees, Megachile deanii*, p. 450, 1935.

<sup>9</sup> Wasps, *A Cluster of Bees*, p. 102, 1935.

been excelled, and man has yet to learn how to duplicate its fragile beauty. I do not have the leisure to stress the value of comb in the economy of mankind, so content myself with this resume of its excellencies.

There is no point in computing the several angles of the rhombs; it is sufficient to tell you that five worker-cells approximate one lineal inch. Beeswax is almost indestructible in the "weather"; bees control sex; they can measure accurately; they have a geometry that does not require either compass or rule. Reaumur, with his sound science, proposed to found a measure of length based on five cells of comb. The beauty of the completed building, and the unbelievable regularity of the cells, excites the admiration of all men.

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## OBSERVATIONS IN THE FIELD

By FRANCIS McCAMLEY

Visiting Long Reef N.S.W., on July 23rd, 1967, I observed and photographed a Cone Shell, *Conus papilliferus* (Sowerby 1834) on an egg mass.

This specimen was 33 mm. in length and the mass consisted of approximately 79 white capsules each 5x6 mm., laid on the underside of a rock on the reef, in a somewhat straggling formation.

Revisiting Long Reef on August 19th, 1967, I observed that the capsules were opening at the upper edge and upon examination of one of the capsules, found that the small cones were hatching and were on the move.

I then removed about one dozen capsules for inspection under the microscope and later was able to view these tiny baby shells, just 2 mm. in length. Each capsule contained an average of 26 shells, that made a total of approximately 2054 specimens for the complete mass.

The tiny shells were very shiny, flesh coloured, obtuse at the protoconch, somewhat resembling a tiny *Melo* in structure, with long narrow aperture and very much alive. Later they moved quite freely about in a small glass tube.

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## BOOK REVIEW

"Birds of Canada", by N. Earl Godfrey. Colour Illustrations by John A. Crosby. Line Drawings by S. P. MacDonald. Published by National Museum of Canada, Bulletin No. 203 Biological Series 73. No price stated.

This is a first class book and a pleasure to examine after seeing some of the recent books published on Australian birds, which despite much publicity are inaccurate and a credit to no-one.

Besides giving diagnostic differences, breeding distribution maps, habitat, nesting etc., the author gives each Order with names of characteristic birds in the Order and often a short note. This shows how various well known birds are related, such as the Order Coraciiformes—Kingfisher, Motmots, Rollers and allies. Then under each family there is a short paragraph giving the main characteristics of each family. Very few modern bird books do this. The introduction explains the system of classification and the authority for the scientific names used in the book.

The coloured plates giving adult and immature plumages are good and one looks forward to a book on Australian birds able to do this. There are also many line-drawings giving diagnostic features. One criticism is that the plates and text are not readily linked and it would have helped if they had been cross-referenced by page-numbers.

There is a good glossary and useful bibliography at the back. The book is a good introduction to ornithology and could usefully be placed in the library of Australian Ornithologists particularly for information on water birds and Northern Hemisphere Waders which reach Australia.

—H. J. DE S. DISNEY

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## BOOK REVIEWS

(By the Hon. Editor)

"Nature Walkabout", by Vincent Serventy, (published by A. H. & A. W. Reed Pty. Ltd., 51, Whiting Street, Artarmon, N.S.W. 2064), 1967, pp. 1-138, coloured illustrations.

Mr. Vincent Serventy is a fairly new member of the Royal Zoological Society of New South Wales. He came to us from Western Australia, but not by any of the usual direct routes. With his family, he chose to take his time and trail his caravan from south-western Australia to Wyndham and Darwin, down to the Centre and across to Cairns, then south to Sydney, camping, observing the wildlife and aborigines and photographing them and the scenery. As a result, we have this popularly written and beautifully illustrated "Nature Walkabout" which is a delightful addition to any naturalist's library. The author is a life-long field worker, a staunch conservationist, and is well known as a schoolteacher, lecturer and television cameraman. His book is therefore reliable; it captures the highlights of his odyssey, and reinforces the arguments for the cause of conservation in a way easily assimilated by readers of all ages. Scientific names are not given, except for a few of the flowers. The book was printed and bound in Tokyo and is of a high standard of production; there are very few misprints.



Here and there a surprising statement occurs, each fully explained by the context. Examples: "A woman wearing spike heels exerts a much greater pressure than does an elephant", and, "As the raindrops fell the geese tried to weave them into a nesting platform." Mr. Serventy's theory concerning the "magnetic" termites' nests near Darwin is that they may be a realization of the science fiction dream of huge air-conditioned cities, only on a small scale. These are lively conceptions of a teacher's mind, stimulating to his students.

One feels rather envious of the author who was able to observe so many wonderful things but grateful to him for recording them for our pleasure.

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"Journal of the Australian Entomological Society".

This periodical, replacing the Journal of the Entomological Society of Queensland, is the first Australia-wide publication devoted to the science of entomology with the resources necessary to cater for the publishing needs of Australian entomologists. It is sponsored by the Australian Entomological Society, of which the Royal Zoological Society of New South Wales is an affiliated member, so that members of the latter society are entitled to offer papers for publication by the former. The Journal (vol. 6, 1967) continues the volume sequence of the Journal of the Entomological Society of Queensland.

The new Society's first Handbook, "Methods of Collection and Preservation of Insects", by K. R. Norris, was reviewed in the *Australian Zoologist* 14 (2), 1967, p. 198.

The Australian Entomological Society's address is c/- Department of Entomology, University of Queensland, St. Lucia, Brisbane, Queensland, 4067. The Editor of its Journal is Dr. B. R. Champ, Department of Primary Industries, Brisbane, 4000.

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"National Museum of Canada 1966. Yearbook Number 1". Ottawa, 1967, 32 pages, illustrated in colour and in black and white.

Mr. Keith A. Stead of the National Museum of Canada, Ottawa, brings to our attention this first "Annual Review" which is one of a number of publicity projects to inform the public on the Museum's work. Attractively produced and beautifully illustrated, this Yearbook reviews the activities, research projects and major acquisitions of the National Museum. It does not replace the statutory annual report to Parliament but illustrates the varied activities of the various divisions of the Museum: Archaeology, Ethnology, Folklore and music, Canadian and Museum History (the National Museum dates from 1842), the Canadian War Museum, Aviation, Geology and Palaeontology, Education, Zoology and Botany.

As Mr. Stead writes, "Hopefully, the booklet gives a taste of the diversity of the wonders of nature and man on display to Museum visitors." This admirable and succinct Yearbook succeeds in its task.

"The Melody Lingers On", by Lynette Young. (Melbourne: The Hawthorn Press, 1967, pp. 1-124, illustr.) Price \$5.00.

Admirers of the late Tarlton Rayment, former member and a Fellow of the Royal Zoological Society of New South Wales, will appreciate this sensitively written biography of him. Artist, naturalist, author and poet, Tarlton Rayment graced the pages of the *Australian Zoologist* and our *Proceedings* with a number of articles on bees and other insects. This valuable biography enlightens us on many interesting facets of his versatile nature. He was born in 1882 and died in 1964. A valiant attempt is made by Miss Young to compile a bibliography of the voluminous writings of her subject, but a complete one is impossible of achievement owing to the destruction, in the terrible Gippsland fires some years ago, of some early references. The vicissitudes of some of Rayment's papers, published in Asia, are patiently unravelled. This reviewer may add in a footnote <sup>1</sup> a few more items to the foundation so well laid in Miss Young's bibliography. Most of these were illustrated in Tarlton's characteristic style. A further contribution from his pen appears posthumously in the present *Proceedings*, through the courtesy of Miss Young.

An index to Tarlton Rayment's many new generic and specific names is still apparently a desideratum for hymenopterists. It is understood that a card-index went with his collection of bees to Canberra, so perhaps a list of his described novelties could be prepared from that, plus perhaps his papers in Cornell University, U.S.A.

Apart from personal sorrows, Rayment's last years were saddened by changes in publication procedures: not all of the editors to whom he submitted articles seemed able to derive inspiration and pleasure from his writings and drawings, which were not always to the taste of his anonymous "referees". There is a tendency among some modern scientists to regard his writings as whimsical (quite overlooking their charm, glow and innocent love of Nature), and they prefer to publish cold descriptions, graphs and dry tabulations, only a step, it seems, from the outpourings of uninspired computing machines. As a corrective, such persons might read "The Melody Lingers On", with its doubly appropriate suggestion of honey and haunting harmony.

—G.P.W.

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Members or their friends having duplicate or unwanted back numbers of the *Australian Zoologist* or our *Proceedings* are urgently requested to inform the Honorary Secretary (Mrs. L. Harford, telephone 55-1397), as stocks of some issues are at a low level and it becoming difficult for the Society to fill orders for sets or to maintain exchanges.

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<sup>1</sup>) *Australian Zoologist* 9 (3), 1939, pp. 263-294 (quotes 2 German papers of 1936 & 1937); *ibid.* 12 (2), 1955, pp. 132-141 & 142-153; 12 (3), 1956, pp. 176-200; and 12 (4), 1959, pp. 324-329, 330-333 & 334-336. *Walkabout* 9 (10), 1943, pp. 37-38 (under pseudonym). *Austr. Junior Encyclop.* (Melbourne, 1951), pp. 738-742; Sydney ed., 1956. *Austr. Mus. Mag.* 10 (12), 1952, p. 408. *Proc. Roy. Zool. Soc. N.S.Wales* 1954-55 (1956), pp. 50-54 & 55-59; 1955-56 (1957), pp. 83-86 & 87-90; 1956-57 (1958), pp. 78-79; and 1958-59 (1961), pp. 96-97, 98-101 & 102-107. *Vict. Nat. Nov.* 1956, pp. 101-104. *Austr. Encycl.* 1, 1958, pp. 475-476.

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 Crosby, D. F., 7 Russell St., Toorak, Vic. 3142.  
 Cruickshank, D. L., 2 Washington St., Bexley, N.S.W. 2207.  
 Cullen, C. F. C., 7 Pretoria Avenue, Mosman, N.S.W. 2088.  
 Cullen-Ward, Mrs. J. K., 62 Bower St., Manly, N.S.W. 2095.  
 Cunningham, W. A., 23 Bayview Place, Bayview, N.S.W. 2104.  
 D'Apice, J. W. C., 5 Telegraph Rd., Pymble, N.S.W. 2073.  
 Darrell, H., "Bushlands", Acres Rd., Kellyville, N.S.W. 2153.  
 Darrell, Mrs. M. K., "Bushlands", Acres Rd., Kellyville, N.S.W. 2153.  
 Dash, B. M., 20 Boulevard Gardens, The Boulevard, Strathfield, N.S.W. 2135.  
 Dash, Mrs. B. M., 20 Boulevard Gardens, The Boulevard, Strathfield, N.S.W. 2135.  
 Davis, C. D., 4 Prince Albert St., Mosman, N.S.W. 2088.  
 Davis, Mrs. H. G., 15 Edgar St., Strathfield, N.S.W. 2135.  
 Davis, L. A., 15 Edgar St., Strathfield, N.S.W. 2135.  
 Davis, R. S. L., "Emu Vale", Jones Rd., Kenthurst, N.S.W. 2154.  
 Day, C. S. D., 47 Gordon Rd., Long Jetty, N.S.W. 2262.  
 Dendy, Miss M., 16 Bennett St., Harbord, N.S.W. 2096.  
 de Valence, R. L., 19A Kardinia Rd., Clifton Gardens, N.S.W. 2088.  
 Dewhurst, N., "Yantara", 2 St. Elmo St., Mosman, N.S.W. 2088.  
 Dibley, G. E., 18 Russell St., Oatley, N.S.W. 2223.  
 Dibley, Mrs. M., 18 Russell St., Oatley, N.S.W. 2223.  
 Disney, H. J., Australian Museum, P.O. Box A285, Sydney South, N.S.W. 2001.  
 Doswell, K. F., 7 Redan St., Mosman, N.S.W. 2088.  
 Dougall, A., 20 James St., Chatswood, N.S.W. 2067.  
 Downing, The Hon. R. R., 117 Henley Marine Drive, Drummoyne, N.S.W. 2047.  
 Doyle, F. J., 1 Union St., Mosman, N.S.W. 2088.  
 Doyle, Mrs. M. L., 175 Boundary St., East Roseville, N.S.W. 2069.  
 Drabble, C., 6a David St., Clifton Gardens, N.S.W. 2088.  
 Drummond, Mrs. M., 45 Albert Drive, West Killara, N.S.W. 2071.  
 Ducan, A. Grantley, Box 2, P.O., Terrey Hills, N.S.W. 2084.  
 Duff, Miss M. A., 37 Rosemont St., South Punchbowl, N.S.W. 2196.  
 Dunn, H. W., 177 Raglan St., Mosman, N.S.W. 2088.  
 Eastway, A. C., 16 Ruby St., Mosman, N.S.W. 2088.  
 Edwards, E. D., "Myimbarr", Cummins Rd., Menangle Park, N.S.W. 2691.

Edwards, E. O, Cummins Rd., Menangle Park, N.S.W. 2691.  
 Edye, J. D., 5 Union St., Mosman, N.S.W. 2088.  
 Elliot, H., Flat 3, 8 Wood St., Manly, N.S.W. 2095.  
 Ellis, E. J., 28 Tennant Pde., Dulwich Hill, N.S.W. 2203.  
 Ellison, Miss D. J., 45 Victoria St., Roseville, N.S.W. 2069.  
 Ensor, E. G., 1 Gundimaine Ave., Neutral Bay, N.S.W. 2089.  
 Evelyn, G. E., 8 Hargraves Ave., Punchbowl, N.S.W. 2196.  
 Eyre, Mrs. M. R., 74 Noble St., Hurstville, N.S.W. 2220.  
 Fairfax, John & Sons, Broadway, Sydney, N.S.W. 2007.  
 Farnsworth, Mrs. M., 1 Beach Rd., Double Bay, N.S.W. 2028.  
 Farrell, A. S., 277 Cleveland St., Redfern, N.S.W. 2016.  
 Ferguson, G. A., c/- Angus & Robertson, 89 Castlereagh St., Sydney, N.S.W. 2000.  
 Finckh, Dr. E. S., 15 Riddles Lane, Pymble, N.S.W. 2073.  
 Fischer, Dr. P. H., Unit 18, 55 Prince Albert St., Mosman, N.S.W. 2088.  
 Fischer, Mrs. L., Unit 18, 55 Prince Albert St., Mosman, N.S.W. 2088.  
 Fisk, N., 335 Young St., Annandale, N.S.W. 2038.  
 Fleming, Miss M. J., 1 Dwyer Avenue, Blakehurst, N.S.W. 2221.  
 Foat, J. C., 103 Abingdon Rd., Roseville West, N.S.W. 2069.  
 Ford, R. B., 1 Nalya Rd., Dee Why West, N.S.W. 2099.  
 Foster, K. N., 51 Eldon St., Riverwood, N.S.W. 2210.  
 Foster, M. L., 19 Ruby St., Mosman, N.S.W. 2088.  
 Francis, Mr. J. J., P.O. Box 35, Gymea, N.S.W. 2227.  
 Francois, Dr. D. D., 31 View St., Chatswood, N.S.W. 2067.  
 Freestone, C. E., 6 Roma St., Wagga Wagga, N.S.W. 2650.  
 Gadsden, E. J., 7 Greenknowe Ave., Potts Point, N.S.W. 2011.  
 Gale, Miss J. E., 3 Oswald St., Cremorne, N.S.W. 2090.  
 Galvin, P. F., 17 Castlereagh St., Sydney, N.S.W. 2000.  
 Garrard, T. A., 3 The Circle, Dundas, N.S.W. 2117.  
 Gates, A. C., 31 Midlothian Ave., Beverly Hills, N.S.W. 2209.  
 George, Mrs. E. I. S., 2 Edwards Bay Rd., Mosman, N.S.W. 2088.  
 Gillett, K., 252 Birrell St., Waverley, N.S.W. 2024.  
 Gillham, T. M., 42 Norma Rd., Palm Beach, N.S.W. 2108.  
 Gilroy, R. G. F., 15 Victoria St., Katoomba, N.S.W. 2780.  
 Glovasky, Mrs. A. C., 11 Reynolds St., Cremorne, N.S.W. 2090.  
 Goff, Miss C. M. M., Flat 4, 7 Ballantyne St., Mosman, N.S.W. 2088.  
 Goldrick, J. B., 3 Clifton St., Clifton Gardens, N.S.W. 2088.  
 Gomersall, N. S., 66 Glover St., Mosman, N.S.W. 2088.  
 Gomersall, Mrs. V. E., 66 Glover St., Mosman, N.S.W. 2088.  
 Gould, G., 47b Raglan St., Mosman, N.S.W. 2088.  
 Graham, F. A., 41 Neerim Rd., Castlecove-Roseville, N.S.W. 2069.  
 Grant, Dr. B. R., 38 Serpentine Rd., Kirrawee, N.S.W. 2232.  
 Grant, Mrs. J. H., 38 Serpentine Rd., Kirrawee, N.S.W. 2232.  
 Gray, Mrs. S. E., 163 George St., Rockhampton, Qld. 4700.  
 Greenup, L. R., 462 Princes Highway, Kirrawee, N.S.W. 2232.  
 Griffin, Dr. D. J. G., c/- Australian Museum, P.O. Box A285, Sydney South, N.S.W. 2001.  
 Hackett, H., 109 Birchgrove Rd., Balmain, N.S.W. 2041.  
 Hackett, T. P., 150 New Barrenjoey Rd., Avalon Beach, N.S.W. 2107.  
 Haines, L. C., 10 Loquat Valley Rd., Bayview, N.S.W. 2104.  
 Halpin, Miss P., 4 Lilli Pilli Rd., Lilli Pilli, N.S.W. 2229.  
 Halpin\*, Mrs. P., 4 Lilli Pilli Rd., Lilli Pilli, N.S.W. 2229.  
 Hartnett, Dr. B. S., 29 Shinfield Ave., St. Ives, N.S.W. 2075.  
 Healy, A., 42 Bristol St., Merrylands, N.S.W. 2160.  
 Heath, W., 24 Kardinia Rd., Clifton Gardens, N.S.W. 2088.  
 Hely, P. C., 8 Duke St., Gosford, N.S.W. 2250.  
 Herford, W. F., 22 Woodlands Rd., Lindfield, N.S.W. 2070.

\* Since deceased.

Herrmain, R. A., 15 Cambridge St., Enmore, N.S.W. 2042.  
 Hersey, F. K., 9 Telopia St., Mt. Colah, N.S.W. 2079.  
 Hewitt, Dr. G. H., Park St., Bellingen, N.S.W. 2454.  
 Hicks, H. T., 102 Prince Albert St., Mosman, N.S.W. 2088.  
 Hill, F. C., 37 Iluka Rd., Clifton Gardens, N.S.W. 2088.  
 Hill, Miss J. E., 117 Wellington St, Bondi Beach, N.S.W. 2026.  
 Hill, Miss J. R., 4B St. Elmo St., Clifton Gardens, N.S.W. 2088.  
 Hill, P., 18 Prince Albert St., Mosman, N.S.W. 2088.  
 Hill, Mrs. J., 18 Prince Albert St., Mosman, N.S.W. 2088.  
 Hinde, Mrs. M., 11 Rangers Rd., Cremorne, N.S.W. 2090.  
 Hinder, Dr. D. C. C., 497 Pacific Highway, Killara, N.S.W. 2071.  
 Hinder, F. H. C., 36 Nelson St., Gordon, N.S.W. 2072.  
 Hindwood, K. A., 105 Middle Harbour Rd., Lindfield, N.S.W. 2070.  
 Hirst, B., Pine Ridge, Castle Hill, N.S.W. 2154.  
 Hirst, Mrs. M. F., 5/168 Kurraba Rd., Neutral Bay, N.S.W. 2089.  
 Hodgens, E. H., 162 Lambeth St., Picnic Point, N.S.W. 2213.  
 Hoffman, G. F., P.O. Box 14, Cammeray, N.S.W. 2062.  
 Holgate, W. E. M., 8 St. Elmo St., Clifton Gardens, N.S.W. 2088.  
 Holmes, A., 24 Attunga St., Woollahra, N.S.W. 2025.  
 Hood, M. A., 52 Chester St., Epping, N.S.W. 2121.  
 Hordern, Anthony, 7 Holt St., Double Bay, N.S.W. 2028.  
 Hordern, S. C., "Cinnabar", Copmanhurst, N.S.W. 2460.  
 Howard, A. M., 32 Kardinia Rd., Clifton Gardens, N.S.W. 2088.  
 Howe, Mrs. R., 5 Rosedale Rd., Gordon, N.S.W. 2072.  
 Hrdina, Miss F. C., Flat 6, 47 Bent St., Paddington, N.S.W. 2021.  
 Hughes, J., 7/49 Beach Rd., Collaroy, N.S.W. 2097.  
 Hughes, J., S.S. Caltex Manchester, c/- Howard Smith Ltd., George St.,  
 Sydney, N.S.W. 2000.  
 Humphrey, R. G., Flat 2, 23 Prince Albert St., Mosman, N.S.W. 2088.  
 Humphris, Mrs. R. M., 140 Warringah Rd., Narrabeena, N.S.W. 2099.  
 Hunt, A. C., Murrumbidgee Station, Charters Towers, Qld. 4820.  
 Hunt, Dr. S., 19 Bangalow Ave., Beecroft, N.S.W. 2119.  
 Hutchison, W. L. J., 4/184 Raglan St., Mosman, N.S.W. 2088.  
 Hutchison, Mrs. R. E., 4/184 Raglan St., Mosman, N.S.W. 2088.  
 Inder, R. C., 1 Cross St., Mosman, N.S.W. 2088.  
 Inglis, Mrs. J. R., 39 Walker St., Sans Souci, N.S.W. 2219.  
 Innes, Mrs. J., 18 Kirkoswald Ave., Mosman, N.S.W. 2088.  
 Irvine, T. W., 41 Farnell St., Gladesville, N.S.W. 2111.  
 Ivey, Miss L., 15 Gladswood Gardens, Double Bay, N.S.W. 2028.  
 Jarvis, Mrs. A. E., Flat 3, 205 Walker St., North Sydney, N.S.W. 2060.  
 Joel, A. D., 14 Belmont Ave., Dolls Point, N.S.W. 2219.  
 Johnson, G. A., M.B.E., G.P.O. Box 3853, Sydney, N.S.W. 2001.  
 Johnson, M. M., 34 Heydon Ave., Warrawee, N.S.W. 2074.  
 Johnson, Mrs. G. A., Flat 3, 40 Coonanbarra Rd., Wahroonga, N.S.W. 2076.  
 Johnson, Miss R. A., Flat 3, 40 Coonanbarra Rd., Wahroonga, N.S.W. 2076.  
 Johnston, Miss J. L., 14 Buena Vista Ave., Mosman, N.S.W. 2088.  
 Jones, Mrs. G. I., 21 Hilltop Crescent, Fairlight, N.S.W. 2094.  
 Jones, R. G. M., 129 Queen St., Woollahra, N.S.W. 2025.  
 Judd, W. J., 94 Hargrave St., Paddington, N.S.W. 2021.  
 Kalman, J. R., 21 Morotai Crescent, Castlecrag, N.S.W. 2068.  
 Kamper, K., 21 Hordern's Lane, Bundeena, N.S.W. 2230.  
 Kamper, Mrs. K., 21 Hordern's Lane, Bundeena, N.S.W. 2230.  
 Kavanagh, F. J., 18 David St., Clifton Gardens, N.S.W. 2088.  
 Kellner, S., 72 Carrington Rd., Waverley, N.S.W. 2024.  
 Keans, R. J., 7 Baker St., Oatley, N.S.W. 2223.  
 Kennedy, B. F., 189 Edinburgh Rd., Castlecrag, N.S.W. 2068.  
 Kennedy, C. S., 96 Villiers Rd., Padstow, N.S.W. 2211.  
 Kennedy, Mrs. J. E., 189 Edinburgh Rd., Castlecrag, N.S.W. 2068.  
 Kenny, J. P., 11 Thompson St., Clifton Gardens, N.S.W. 2088.



- Kent, Miss P. M., c/- R. Mason, "Errington", 1 Rosemead Rd., Hornsby, N.S.W. 2077.
- Kienhuize, Mrs. M., 14 Derby St., Vaucluse, N.S.W. 2030.
- Killen, D. W., 7 Milton St., Mosman, N.S.W. 2088.
- King, A., 116 Croydon Rd., Croydon, N.S.W. 2132.
- King, R. C., Public School, Menangle, N.S.W. 2568.
- Kinghorn, J. R., F.R.Z.S., 8 Arabella St., Northwood, N.S.W. 2066.
- Kirkpatric, J. F., 17 Allambie Rd., North Manly, N.S.W. 2100.
- Knight, B. J., Henzel Rd., Green Point via Gosford, N.S.W. 2250.
- Knights, Miss E. A., Flat 2, 74 William St., North Sydney, N.S.W. 2060.
- Kuiter, R. H., 27 Buckingham St., Sydney, N.S.W. 2000.
- Lanceley, E. J., 36 Station St., Naremburn, N.S.W. 2065.
- Lane, S. G., 65 Wood St., Lane Cove, N.S.W. 2066.
- Langmuir, R. J., 26 Strickland St., Rose Bay, N.S.W. 2029.
- Laseron, J., 53 Pozieres Pde., North Manly, N.S.W. 2100.
- Laubscher, C. C., 25/14 Royston St., Kings Cross, N.S.W. 2011.
- Lawson, A. A., 3 Harden Rd., Artarmon, N.S.W. 2064.
- Lee, J., 57 Central Ave., Como, N.S.W. 2226.
- Lee, Miss J. H., 59 Robey St., Maroubra Junction, N.S.W. 2035.
- Leeds, R. A., Warana, W. Yandra, W'Line, Qld. 4489.
- Lewis, Miss R. M., 31 Undercliffe St., Dee Why, N.S.W. 2099.
- Liddle, N., 31 Whiting Beach Rd., Mosman, N.S.W. 2088.
- Lilley, Mrs. B., 5 Fernhill St., Hurlstone Park, N.S.W. 2193.
- Lindsay, K., 48 Swan St., Gladesville, N.S.W. 2111.
- Linklater, D., 81 Ramsgate Ave., North Bondi, N.S.W. 2026.
- Lions, Mrs. F., 160 Alt St., Haberfield, N.S.W. 2045.
- Lippman, H. M., 14 Buena Vista Ave., Mosman, N.S.W. 2088.
- Lipscombe, Miss R., 98 Shirley Rd., Wollstonecraft, N.S.W. 2065.
- Littauer, M. D., 345 Malabar Rd., Maroubra, N.S.W. 2035.
- Llewelyn, A. S., 7 Florence Ave., Collaroy, N.S.W. 2097.
- Long, Miss M. R., 50 Thornleigh St., Thornleigh, N.S.W. 2120.
- Lunnon, F. G., 1 Fox Crescent, Padstow, N.S.W. 2211.
- Lyne, Dr. A. G., c/- C.S.I.R.O., Ian Clumies Animal Research Laboratory, P.O. Box 144, Parramatta, N.S.W. 2150.
- McArtney, I. B., 16 Esrom St., Bathurst, N.S.W. 2795.
- McCarron, Miss S., 93 Weston St., Panania, N.S.W. 2213.
- McColl, W. W., G.P.O. Box 5003, Sydney, N.S.W. 2001.
- McDonald, A., 4 Holt St., North Ryde, N.S.W. 2113.
- McDonald, R. W., 24/45 Walker St., Redfern, N.S.W. 2016.
- McEvoy, R. J., 140 Arden St., Coogee, N.S.W. 2034.
- McFayden, F. E. S., 25 Central Rd., Ashfield, N.S.W. 2131.
- McGill, A. R., 119 Wollongong Rd., Arncliffe, N.S.W. 2205.
- McGonigal, C., 23 Louie St., Padstow, N.S.W. 2211.
- McGregor, C. J., 6 Burrawong Ave., Clifton Gardens, N.S.W. 2088.
- McGregor, D. G. P., 180 Phillip St., Sydney, N.S.W. 2000.
- McHugh, L. J. F., c/- Bank of N.S.W., Box 2722 G.P.O., Sydney, N.S.W. 2001.
- McIntosh, Miss C. C., 38 Glenhaven Rd., Glenhaven, N.S.W. 2154.
- MacIntosh, Prof. N. W. G., Dept. of Anatomy, University of Sydney, Sydney, 2006.
- McKay, Mrs. M. A., 9/32 Alt St., Ashfield, N.S.W. 2131.
- MacKillop, Major J. A., 9 Clytha House, Thrupp St., Neutral Bay, N.S.W. 2089.
- McMichael, Mrs. H. E., 137 Middle Harbour Rd., Lindfield, N.S.W. 2070.
- McNeill, F. A., c/- Australian Museum, P.O. Box A285, Sydney South, N.S.W. 2001.
- McPhail, N. A., 37 Upper Avenue Road, Mosman, N.S.W. 2088.
- Mahoney, J. A., Dept. of Geology & Geophysics, University of Sydney, Sydney, 2006.

Maloney, Mrs. B. F., 18 Hurdis Ave., French's Forest, N.S.W. 2086.  
 Manchester, Dr. E. G. H., 4 George's Rd., Vacluse, N.S.W. 2030.  
 Maresso, P., 27A George St., Sydney, N.S.W. 2000.  
 Marlow, B., Australian Museum, P.O. Box A285, Sydney South, N.S.W. 2001.  
 Marlow, H. J., 5 George St., Marrickville, N.S.W. 2204.  
 Marsh, P. J., 74 Delman Pde., Dee Why, N.S.W. 2099.  
 Martensz, P. S., 25 Illiliwa St., Cremorne, N.S.W. 2090.  
 Martin, J. T., 1A Mistral Avenue, Mosman, N.S.W. 2088.  
 Mason, Dr. R. M., 1 Rosemead Rd., Hornsby, N.S.W. 2077.  
 Mellor, A. W., 36 Railway Pde., Penshurst, N.S.W. 2222.  
 Meyer, Matron E., 179 Pacific Highway, Roseville, N.S.W. 2069.  
 Micholson, Miss S. F., 9 Whiting Beach Rd., Mosman, N.S.W. 2088.  
 Millen, Mrs. J. A., 22 Hume St., Wollstonecraft, N.S.W. 2065.  
 Milne, J. W., 17 Ferry St., Hunters Hill, N.S.W. 2110.  
 Mitsos, Miss H., 164 Arden St., Coogee, N.S.W. 2034.  
 Mitsos, Miss S., 164 Arden St., Coogee, N.S.W. 2034.  
 Montague, Miss S. V., 18 Thornton St., Five Dock, N.S.W. 2046.  
 Moore, H. H., 6 Mudies Rd., St. Ives, N.S.W. 2075.  
 Moore, L. I., 27a George St., Sydney, N.S.W. 2000.  
 Moore, R., 17 Bain Place, Dundas, N.S.W. 2117.  
 Moorhouse, P. B., 11 Simpson St., Mosman, N.S.W. 2088.  
 Morgan, N. J. H., Snow Elliott Pty. Ltd., G.P.O. Box 3512, Sydney, N.S.W. 2001.  
 Moriarty, Mrs. B. I., Flat 4, 7 Ballantyne St., Mosman, N.S.W. 2088.  
 Morley, W. A., 2 Wade St., Ryde, N.S.W. 2112.  
 Morris, R. J., 71 Arabella St., Longueville, N.S.W. 2066.  
 Morrissey, D. M., 8 Redan St., Mosman, N.S.W. 2088.  
 Mosse-Robinson, I. DeLisle, R.M.B. 11, Somersby via Gosford, N.S.W. 2251.  
 Moulds, M. S., 14 Chisholm St., Greenwich, N.S.W. 2065.  
 Mulder, R. H., Box 31 P.O., Kogarah, N.S.W. 2217.  
 Munn, R. H. P., 69 Sherwood St., Revesby, N.S.W. 2212.  
 Nardi, Miss L. A., 62 Fitzroy Place, 204 Jersey Rd., Woollahra, N.S.W. 2025.  
 Newbould, H. G., 7 Douglas Haig St., Oatley, N.S.W. 2223.  
 Newman, P. J., 6 Clanalpine St., Mosman, N.S.W. 2088.  
 Newman, R. O. M., 41 Redan St., Mosman, N.S.W. 2088.  
 Niblett, N., 20 Mountbatten St., Oatley, N.S.W. 2223.  
 Niblett, Mrs. M., 20 Mountbatten St., Oatley, N.S.W. 2223.  
 Niblett, R. L., 20 Mountbatten St., Oatley, N.S.W. 2223.  
 Niblett, Mrs. R. L., 20 Mountbatten St., Oatley, N.S.W. 2223.  
 Noffz, E. K., 6 Church St., North Sydney, N.S.W. 2060.  
 North, Mrs. J. D., 9 Balmoral Ave., Mosman, N.S.W. 2088.  
 Norton, Miss G. E., "Redleaf", McLeod St., Mosman, N.S.W. 2088.  
 Norton, Mrs. G. M. P., "Redleaf", McLeod St., Mosman, N.S.W. 2088.  
 O'Farrell, Prof. A. F. L., Zoology Dept., University of New England, Armidale, N.S.W. 2350.  
 O'Keefe, B. S. J., 4 David St., Clifton Gardens, N.S.W. 2088.  
 O'Malley, Mrs. D. T., 100 Hargrave St., Paddington, N.S.W. 2021.  
 Onyett, G. G., 7 Charles St., Fairlight, N.S.W. 2094.  
 Osborne, E. E., c/- Mrs. I. S. Hollibone, 4/47 Charlotta Rd., Double Bay, N.S.W. 2028.  
 Overton, Mrs. L., 13 Bradley's Head Rd., Mosman, N.S.W. 2088.  
 Paine, A. A., 11 Boorea St., Lidcombe, N.S.W. 2141.  
 Palmer, K. J., 8 Union St., Mosman, N.S.W. 2088.  
 Parkes, K. W., 51 Iliffe St., Bexley, N.S.W. 2207.  
 Parrott, A. W., "Lochiel", Wakapuaka Rd., Hira R.D. Nelson, New Zealand.

Paszkowski, L. K., 28 Darling Rd., Malvern East, Victoria, 3145.  
 Pearce, D. C., 5 St. Elmo St., Clifton Gardens, N.S.W. 2088.  
 Pembery, J. A., Iarowari Sogeri High School, Sogeri, Papua.  
 Penson, R. M. J., 109 Warwick Rd., Merrylands, N.S.W. 2160.  
 Percy, Dr. C. E., Flat 2, 4 Thompson St., Mosman, N.S.W. 2088.  
 Perkins, R. W., 22 The Avenue, Linley Point, N.S.W. 2066.  
 Perrignon, His Hon. Judge W. B., 22 Northcote Rd., Lindfield, N.S.W. 2070.  
 Physick, R. E., 22 The Avenue, Linley Point, N.S.W. 2066.  
 Pilcher, Judge J. E. H., 13 Morella Rd., Clifton Gardens, N.S.W. 2088.  
 Pittaway, Mrs. R. M., 52 Centennial Ave., Lane Cove, N.S.W. 2066.  
 Playoust, Maurice, Flat 1, 47 Bradley's Head Rd., Mosman, N.S.W. 2088.  
 Polin, H. J., 28A Beaconsfield Rd., Mosman, N.S.W. 2088.  
 Pollak, Mrs. J. D., 33 Marshall St., Manly, N.S.W. 2095.  
 Pollock, H. J., c/- Travel Dept., Bank of New South Wales, George St., Sydney, N.S.W. 2000.  
 Pols, R. C., "Carramar", 28 Finlay Rd., Turrumurra, N.S.W. 2074.  
 Porteus, Mrs. V. M., Flat 2/222 Pacific Highway, Gore Hill, N.S.W. 2065.  
 Prichard, R. S., 110 Collins Rd., St. Ives, N.S.W. 2075.  
 Purse, Mrs. B., P.O. Box 36, Paddington, N.S.W. 2021.  
 Pyke, G. H., 13 Havilah St., Chatswood, N.S.W. 2067.  
 Ramsay, J. S. P., "Kalia", Gale St., Woolwich, N.S.W. 2110.  
 Rawlinson, Miss D., 43 Kalinda Rd., Bullaburra, N.S.W. 2784.  
 Reeves, D. M., 100 Belmore St., Gulgong, N.S.W. 2852.  
 Reilly, C. W., 15 Burrawong Ave., Clifton Gardens, N.S.W. 2088.  
 Rice, R. A., 90 Marlborough St., Surry Hills, N.S.W. 2010.  
 Rice, Mrs. U., 90 Marlborough St., Surry Hills, N.S.W. 2010.  
 Richardson, Dr. L. R., 4 Bacon St., Grafton, N.S.W. 2460.  
 Riddell, T. L., 19 Rickard Ave., Mosman, N.S.W. 2088.  
 Ridley, D. M., 79 Innes Rd., Balgowlah, N.S.W. 2093.  
 Rixon, M. J., 485 Pittwater Rd., Brookvale, N.S.W. 2100.  
 Roberts, Miss J. R., 27 Bay St., Mosman, N.S.W. 2088.  
 Roberts, N. L., 10 Kardella Ave., Killara, N.S.W. 2071.  
 Roberts, K. S., "Myalia", 19 Richmond Ave., Cremorne, N.S.W. 2090.  
 Roberts, P. E., 26 Bayview St., Mount Kuring-gai, N.S.W. 2080.  
 Robertson, Mrs. J., 14 Nymboida Cres., Sylvania Waters, N.S.W. 2224.  
 Robertson, W. J., 134 Awaba St., Mosman, N.S.W. 2088.  
 Robinson, Dr. E. S., 50 Monteith St., Turrumurra, N.S.W. 2074.  
 Rodd, N. W., 204 Beecroft Rd., Cheltenham, N.S.W. 2119.  
 Rogers, Miss A. J., 15/216 Blues Pt. Rd., North Sydney, N.S.W. 2060.  
 Roorda, M., 15 Ridge St., North Sydney, N.S.W. 2060.  
 Rowe, D. K., 5 Karuah Rd., Turrumurra, N.S.W. 2074.  
 Rumsey, Mrs. R. H., P.O. Box 1, Dural, N.S.W. 2158.  
 Russell, M., 75 Narrabeen Park Parade, Mona Vale, N.S.W. 2103.  
 Rutland, Mrs. K., 17 Riley St., North Sydney, N.S.W. 2060.  
 Sachisthal, N. A., 62 Dowling St., Turrella, N.S.W. 2205.  
 Salkilld, B. W., 6 Brighton St., Croydon Park, N.S.W. 2133.  
 Sands, D. P., 39 Herbert Ave., Newport, N.S.W. 2106.  
 Saunderson, M., 362 Kent St., Sydney, N.S.W. 2000.  
 Scammell, G. V., 7 David St., Clifton Gardens, N.S.W. 2088.  
 Schagen, S. A., 28 Carlton St., Harbord, N.S.W. 2096.  
 Schwerin, P. E., Flat 1, 12 McDougall St., Milsons Point, N.S.W. 2061.  
 Scotchmer, S., 1 Aubreen St., Collaroy Plateau, N.S.W. 2098.  
 Secombe, B. V., P.O. Box 103, Moree, N.S.W. 2400.  
 Sefton, A. R., 15 Station St., Thirroul, N.S.W. 2515.  
 Serventy, V. N., 8 Reiby Rd., Hunters Hill, N.S.W. 2110.  
 Sharland, M. S. R., 1 Erina Place, Hobart, Tas. 7000.  
 Sharp, R. I., 4 Redan St., Mosman, N.S.W. 2088.

- Sharpe, J. R., 5/5 Griffin St., Manly, N.S.W. 2095.  
 Shaw, C. V., c/- A. H. McDonald, 19 Davidson St., Concord, N.S.W. 2137.  
 Shipway, B., 8 Elizabeth St., South Perth, Western Australia, 6151.  
 Sibatani, Dr. A., 11 Cudgee St., Turrumurra, N.S.W. 2074.  
 Simons, Dr. J. R., 242 Kissing Point Rd., Turrumurra, N.S.W. 2074.  
 Simpson, Mrs. P., 56 Fairfax Rd., Bellevue Hill, N.S.W. 2023.  
 Sims, Mrs. G. I., 14 Woombara Crescent, Caringbah, N.S.W. 2229.  
 Sindel, S. R., 127 Sackville St., Fairfield, N.S.W. 2165.  
 Skinner, R. A., Unit 9, 65 Bradley's Head Rd., Mosman, N.S.W. 2088.  
 Small, J. M., 174 Phillip St., Sydney, N.S.W. 2000.  
 Small, J. G., 21 Gordon St., Mosman, N.S.W. 2088.  
 Smith, C., J.P., 22 Torrens St., Matraville, N.S.W. 2036.  
 Smith, F. R., 23 Rickard Ave., Mosman, N.S.W. 2088.  
 Smithers, C. N., Australian Museum, P.O. Box A285, Sydney South, N.S.W. 2001.  
 Sommerlad, Miss E., 14 David St., Clifton Gardens, N.S.W. 2088.  
 Sommerlad, E. L., 14 David St., Clifton Gardens, N.S.W. 2088.  
 Spencer, G. D., 28 Somerset St., Epping, N.S.W. 2121.  
 Spencer, J. L., 21 David St., Clifton Gardens, N.S.W. 2088.  
 Speight, S. C., 1 Lennox St., Mosman, N.S.W. 2088.  
 Spooner, Dr. E. C. R., Suite 5, 7th Floor, 291 George St., Sydney, N.S.W. 2000.  
 Stark, Dr. F., 5 Ocean St., Woollahra, N.S.W. 2025.  
 Staton, P., 23 O'Sullivan Ave., Maroubra, N.S.W. 2035.  
 Stebbing, J. G., 40 Botanic Rd., Balmoral Beach, N.S.W. 2088.  
 Stephens, H. J., 41 Lords Ave., Asquith, N.S.W. 2078.  
 Stokes, A. J., 18 Lucerne Grove, Findon, South Australia, 5023.  
 Stokes, A. R., 85 Grandview Drive, Newport, N.S.W. 2106.  
 Stokes, Mrs. D. P., 5 Smith St., Parramatta, N.S.W. 2150.  
 Stoney, Miss E. M., 29 St. Albans St., Abbotsford, N.S.W. 2046.  
 Storie, I. C., 32 Burrawong Ave., Clifton Gardens, N.S.W. 2088.  
 Stott, S. G., 2 David St., Clifton Gardens, N.S.W. 2088.  
 Stowar, A., 51 Lucas Rd., East Hills, N.S.W. 2213.  
 Strahan, R., Director Taronga Zoological Park, Mosman, N.S.W. 2088.  
 Suthers, W. D., 5 David St., Clifton Gardens, N.S.W. 2088.  
 Swan, Mrs. V. B., 285 Livingstone Rd., Marrickville, N.S.W. 2204.  
 Talbot, Miss M., 19 Jugiong St., Pymble West, N.S.W. 2073.  
 Talbot, Dr. F. H., Director, Australian Museum, P.O. Box A285, Sydney South, N.S.W. 2001.  
 Tennent, T. S., 4 Bradley's Head Rd., Mosman, N.S.W. 2088.  
 Thacker, Mrs. O., 11 Darcy Rd., Wentworthville, N.S.W. 2145.  
 Thellefsen, E. S., c/- Royal Danish Consulate, 115 Pitt St., Sydney, N.S.W. 2000.  
 Thomson, C. N., 20 Young St., Sydney, N.S.W. 2000.  
 Thomson, Dr. J. M., Dept. of Zoology, University of Queensland, St. Lucia, Queensland. 4067.  
 Thornley, Miss G., 37 Auburn Rd., Lidcombe, N.S.W. 2141.  
 Tiley, R. C. F., 14 Thompson St., Clifton Gardens, N.S.W. 2088.  
 Trebitsch, Professor F., I.F. Kirkoswald Ave., Mosman, N.S.W. 2088.  
 Trebitsch, Mrs. M., I.F. Kirkoswald Ave., Mosman, N.S.W. 2088.  
 Trenerry, Mrs. M., 7 St. Paul's Rd., Balgowlah, N.S.W. 2093.  
 Trenerry, W. A., 7 St. Paul's Rd., Balgowlah, N.S.W. 2093.  
 Trenerry, W. L., 3/48 Middle Head Rd., Mosman, N.S.W. 2088.  
 Trevor-Jones, T. E., 12 Greenfield Avenue, Middle Cove, N.S.W. 2068.  
 Ulm, Mrs. V. L., 25 Iluka Rd., Clifton Gardens, N.S.W. 2088.  
 Van De Wiel, Mrs. Y., 3/13 Manion Avenue, Rose Bay, N.S.W. 2029.  
 Van Der Straaten, M., 4 Alison St., Eastwood, N.S.W. 2122.  
 Van Raalte, Miss B., 37 St. George's Pde., Hurstville, N.S.W., 2220.  
 Van Raalte, L. C., 37 St. George's Pde., Hurstville, N.S.W. 2220.

- van't Hoff, Mrs. M. R., 13a Whiting Beach Rd., Mosman, N.S.W. 2088.  
 Vellenga, Mrs. R. E., "Melody Cottage", Coniston Rd., Leura, N.S.W. 2781.  
 Vellenga, S. L., "Melody Cottage", Coniston Rd., Leura, N.S.W. 2781.  
 Vicars, R. J., Victoria Rd., Marrickville, N.S.W. 2204.  
 Volkhardt, Miss H., "Kalmar", 10 Marion St., Leichhardt, N.S.W. 2040.  
 Voorwinde, J., 2nd Floor, 386 George St., Sydney, N.S.W. 2000.  
 Waite, M. L., 37 Iluka Rd., Clifton Gardens, N.S.W. 2088.  
 Waldron-Hooke, R., 94 Greville St., Chatswood, N.S.W. 2067.  
 Walters, L. A., 10 Eastview Ave., North Ryde, N.S.W. 2113.  
 Ward, R. A., 42 Daunt St., Matraville, N.S.W. 2036.  
 Warland, L. K., 77 Amalfi Drive, Isle of Capri, Surfers Paradise, Qld. 4217.  
 Warre, J. W., Flat 2, 5 Milton Ave., Mosman, N.S.W. 2088.  
 Warry, R. B., School Residence, Euabalong, N.S.W. 2877.  
 Warry, Mrs. R. B., School Residence, Euabalong, N.S.W. 2877.  
 Water, Miss J. A., 5 Wanganella St., Balgowlah, N.S.W. 2093.  
 Watman, R., 34 Ewart St., Marrickville, N.S.W. 2204.  
 Weakley, Miss C. E., 44 Hopetoun Ave., Vaucluse, N.S.W. 2030.  
 Webster, Sir Robert, 2 Buena Vista Ave., Mosman, N.S.W. 2088.  
 Weingott, Lieut. P., 1st Royal Australian Regiment, Holdsworth, N.S.W. 2173.  
 West, B. E., 22 Headland Rd., Dee Why, N.S.W. 2099.  
 West, C. F., c/- Kia-Lama Private Hotel, 7 Bradley's Head Rd., Mosman, N.S.W. 2088.  
 Whelan, M. J., 35 Bradley's Head Rd., Mosman, N.S.W. 2088.  
 White, W. F., 98 Staples St., Kingsgrove, N.S.W. 2208.  
 Whittle, B., 13 Buena Vista Ave., Mosman, N.S.W. 2088.  
 Wighton, Mrs. U. G., 21 Edward St., Narrabeena, N.S.W. 2099.  
 Wilkinson, J. W., 24 Middlemiss St., Mascot, N.S.W. 2020.  
 Wilkinson, N. A., 53 Karilla Avenue, Lane Cove, N.S.W. 2066.  
 Wilkinson, R. F., P.O. Box 91, Brookvale, N.S.W. 2100.  
 Willan, L. S., 147 Worona Crescent, Jannali, N.S.W. 2226.  
 Williams, A. E., "Wyoming", Berridale, N.S.W. 2628.  
 Wills, Mrs. O., 6 Skillcorn Ave., Jannali, N.S.W. 2226.  
 Wilson, D. E., 17 Lennore St., Five Dock, N.S.W. 2046.  
 Wilson, H. H., 3 Warrawidgie Rd., Villawood, N.S.W. 2163.  
 Wilson, J. D., 11 Boorara Ave., Oatley, N.S.W. 2223.  
 Wilson, Mrs. M. G., 17 Lennore St., Five Dock, N.S.W. 2046.  
 Winter-Irving, Mrs. C. A., 62 Wolseley Rd., Point Piper, N.S.W. 2027.  
 Wiseman, W. A., 10 Effingham St., Mosman, N.S.W. 2088.  
 Wolfenden, A. V., 5 Harrington St., Marrickville, N.S.W. 2204.  
 Woolacott, R. C., 11A Everview Ave., Mosman, N.S.W. 2088.  
 Wray, Mrs. M., 69 Eddy Rd., Chatswood, N.S.W. 2067.  
 Wright, Mrs. B., 20 Berryman St., North Ryde, N.S.W. 2113.  
 Wyatt, W. S., 34 Bent St., Lindfield, N.S.W. 2070.  
 Yaldwyn, Dr. J. C., Australian Museum, P.O. Box A285, Sydney South, N.S.W. 2001.  
 Young, D., 4 Jason Place, North Rocks, Sydney, N.S.W. 2151.  
 Zeiner, W., Lot 1, Flat 6, Templeman Crescent, Hillsdale, N.S.W. 2036.  
 Zeiner, Mrs. W., Lot 1, Flat 6, Templeman Crescent, Hillsdale, N.S.W. 2036.

*Honorary Associate Members:*

- Cleland, Sir John, 1 Dashwood Rd., Beaumont, Adelaide, South Australia, 5066.  
 Hough, Prof. J., 1515 Mariposa, Boulder, Colorado, U.S.A.  
 Moore, Prof. J., Dept. of Zoology, Columbia University, New York 27, N.Y., U.S.A.  
 Pattison, G., 68 Partridge St., Glenelg, South Australia, 5045.

*Life Associate Members:*

- Chadwick, C. E., Entomological Branch, Dept. of Agriculture, Farrer Place, Sydney, N.S.W. 2000.  
Colliver, F. S., c/o Geological Dept., University of Qld., St. Lucia, Brisbane, Qld. 4067.  
The Director, The Dominion Museum, Wellington, New Zealand.  
Kershaw, R. C., 45 West Tamar Rd., Launceston, Tas. 7250.  
MacKay, Mrs. R. D., c/o Museum, P.O. Box 635, Port Moresby, Papua, T.P.N.G.  
MacDonald, Miss P., 33 Holdsworth St., Neutral Bay, N.S.W. 2089.  
McMichael, Dr. D. F., 137 Middle Harbour Rd., Lindfield, N.S.W. 2070.  
Thackaway, A. E. J., 6/27 Masons Pde., Point Frederick, Gosford, N.S.W. 2250.  
Thom, L. A., 6 Begg St., Lakemba, N.S.W. 2195.  
Thomas, A. D., 45 Greengate Rd., Killara, N.S.W. 2071.  
Wettenhall, Dr. H. N. B., M.D., M.R.C.P., F.R.A.C.P., 41 Spring St., Melbourne, Vic. 3000.  
Wright, P. A., Wallamundi, Armidale, N.S.W. 2350.

*Associate Members:*

- Dept. of Agriculture, (Library), Jarrah Rd., South Perth, Western Australia, 6151.  
Bouchier, Mrs. R. W., 141 Nicholson Parade, Cronulla, N.S.W. 2230.  
Burn, R. F., 3 Nantes St., Geelong, Vic. 3220.  
Burns, W. J., 495 Main Road, Upper Hutt City, Trentham, New Zealand.  
Calaby, J. H., c/o C.S.I.R.O., P.O. Box 109, City, Canberra, A.C.T. 2601.  
Carlile, E., 53 Councillor Lane, Cheadle, Cheshire, England.  
D'Ombraïn, A. F., 7 Nillo St., Lorn, Maitland, N.S.W. 2320.  
Director of Fisheries & Wildlife, 605 Flinders St. Extension, Melbourne, Vic. 3000.  
Fraser, A. J., Chief Inspector of Fisheries, 108 Adelaide Terrace, Perth, Western Australia, 6000.  
Frewer, Mrs. M. C., 789 Victoria Rd., Ryde, N.S.W. 2112.  
Frewer, Miss P., 789 Victoria Rd., Ryde, N.S.W. 2112.  
Halstead, Dr. B. W., Director, World Life Research Institute, 23000 Grand Terrace, Colton, California. 92324, U.S.A.  
Dept. of Harbours & Marine, Edward St., Brisbane, Qld. 4000.  
Herriott, S. T., 38 Eleventh St., Mascot, N.S.W. 2020.  
Hoskin, E. S., 44 Patricia Rd., Eastwood, N.S.W. 2122.  
Kingham, Mrs. J. R., 8 Arabella St., Northwood, N.S.W. 2066.  
Le Souef, J. C., c/o P.O., Blairgowrie, Vic. 3942.  
Lindsay, Mrs. K., 48 Swan St., Gladesville, N.S.W. 2111.  
McDougal, Dr. W. A., Dept. of Agriculture & Stock, Brisbane, Qld. 4000.  
Mann, J. S., 10 Dunella St., Sherwood, Brisbane, Qld. 4075.  
Mew, R. H., 48 Jameison St., Broken Hill South, N.S.W. 2880.  
Middleton, Mrs. J. C., 1A Clarke Rd., Waitara, N.S.W. 2077.  
Moore, K. M., Cutrock Rd., Lisarow, N.S.W. 2251.  
Morgan, Mrs. J. E., "Gilligul", Ocean Heights, Yeppoon, Qld. 4703.  
Morrison, E. M., 61 Anzac Ave., Engadine, N.S.W. 2233.  
Nicholson, E. A., P.O. Box 199, Grafton, N.S.W. 2460.  
Nock, Miss E. O., 58 Stanthorpe Rd., Killara, N.S.W. 2071.  
Orrell, J., "Warrakoo", Cook Highway, Smithfield, Qld. 4870.  
Pols, Mrs. R. C., "Carramar", 28 Finlay Rd., Turramurra, N.S.W. 2074.  
Schwerin, Mrs. P. E., Flat 1, 12 McDougall St., Milsons Point, N.S.W. 2061.  
Turnidge, F., 33 Day St., Cheltenham, N.S.W. 3192.  
Waite Agricultural Institute, University of Adelaide, P.M.B. Adelaide, South Australia, 5000.

Wareham, Miss V., 11 Walsh Ave., Maroubra, N.S.W. 2035.  
Wilson, J. O., 42 Wilson Terrace, Da Costa Park, Glenelg, South Australia,  
5045.  
Zoological Board of Victoria, Royal Park, Parkville, Melbourne, Vic. 3052.

i

*Junior Members:*

Bishop, Master Lawrence, 54 Tobruk Avenue, Cremorne, N.S.W. 2090.  
Bishop, Miss Rosemary, 54 Tobruk Avenue, Cremorne, N.S.W. 2090.  
Blair, Master Lyle R., 23 Fleming St., Northwood, N.S.W. 2066.  
Brown, Miss Lee, 1/18 Blandford Ave., Bronte, N.S.W. 2024.  
Cam, Master G. R., 59 Magdala Rd., North Ryde, N.S.W. 2113.  
Canny, Master D. J. J., 2/8A Wylde St., Potts Point, N.S.W. 2011.  
Chidley, Master P., 122 Darvall Road, West Ryde, N.S.W. 2114.  
d'Apice, Master M. J., 5 Telegraph Rd., Pymble, N.S.W. 2073.  
Eyre, Master E. D., 74 Noble St., Hurstville, N.S.W. 2220.  
Fahey, Master A. J., 8 Bain Place, Dundas, N.S.W. 2117.  
Jackson, Master Michael, 224 Barranjoey Rd., Newport, N.S.W. 2106.  
Lucey, Master David John, 14 McKinnon Avenue, Padstow, N.S.W. 2211.  
McCarron, Miss Susan, 93 Weston St., Panania, N.S.W. 2213.  
Moore, Miss C. E., 17 Bain Place, Dundas, N.S.W. 2117.  
Moore, Master P. L., 17 Bain Place, Dundas, N.S.W. 2117.  
Moorhouse, Master W. E., 6 Maher St., Hurstville, N.S.W. 2220.  
Morris, Master, 71 Arabella St., Longueville, N.S.W. 2066.  
Scarr, Master B. J., 16 Dickson Ave., West Ryde, N.S.W. 2114.  
Sinclair, Master J. R., 428 Howick St., Bathurst, N.S.W. 2795.  
van't Hoff, Master N. H., 13A Whiting Beach Road, Mosman, N.S.W. 2088.  
Wright, Master Peter, 20 Berryman St., North Ryde, N.S.W. 2113.

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Mrs. L. Z. Harford, F.R.Z.S., Honorary Secretary of the Royal Zoological Society of New South Wales. A photograph, taken in 1956, and reproduced by courtesy of the *Sydney Morning Herald*.





Jock Marshall



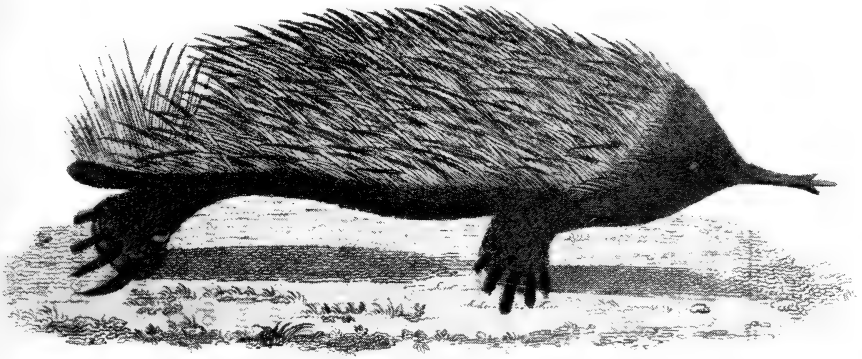


Broom's Pygmy Possum, *Burrmys parvus*.

Photo.—J. Cooper.







1. Spiny Ant-eater, from the *Naturalist's Pocket Magazine*.



2. Eastern Native Cat, from the *Naturalist's Pocket Magazine*.  
(See page 27 for explanation).





1. Haunt of White-winged Widow-bird, Longneck Swamp, near Pitt Town, N.S.W., February 1949.



2. Nest, in situ, of White-winged Widow-bird. Longneck Swamp, near Pitt Town. February 1949.

Photos.—K. A. Hindwood.





3. Haunt of White-winged Widow-bird, Cattai, N.S.W., April 1967.



4. Nest, in situ, and egg of White-winged Widow-bird, Cattai, April 1967.

Photos.—K. A. Hindwood.



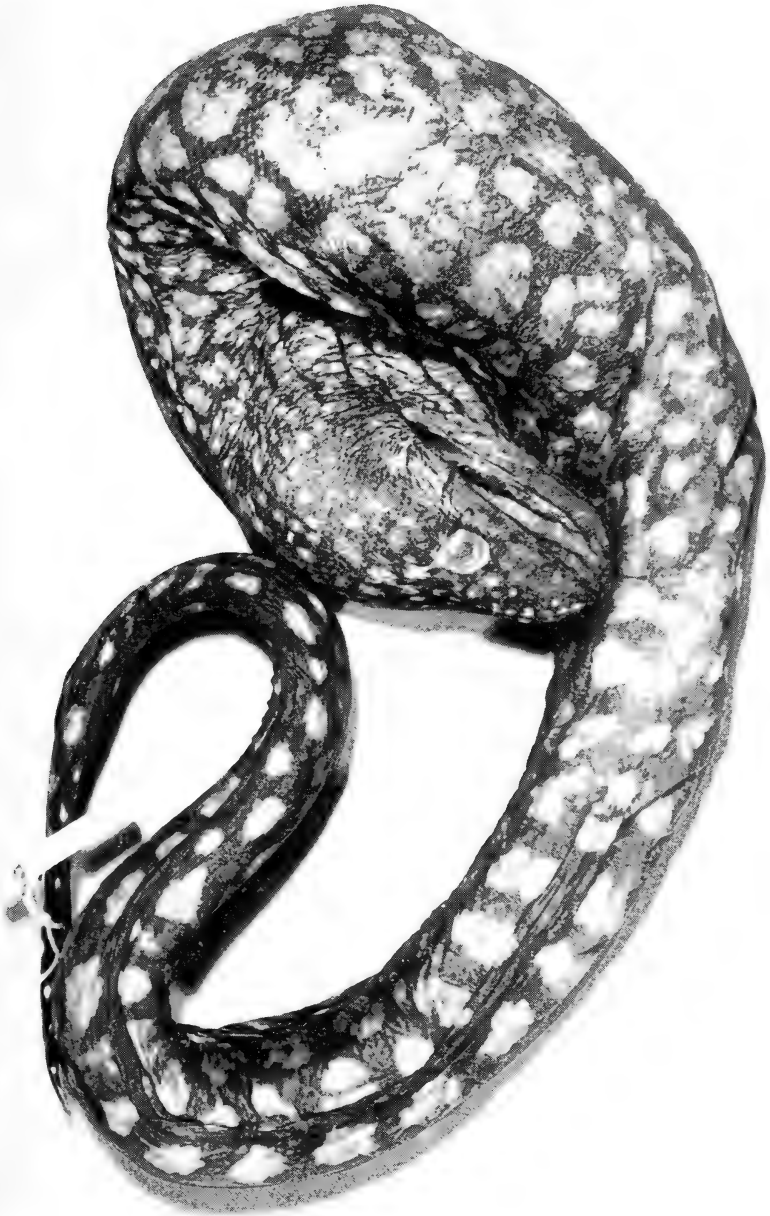


Snakes in combat.

Photo.—A. B. Baker.

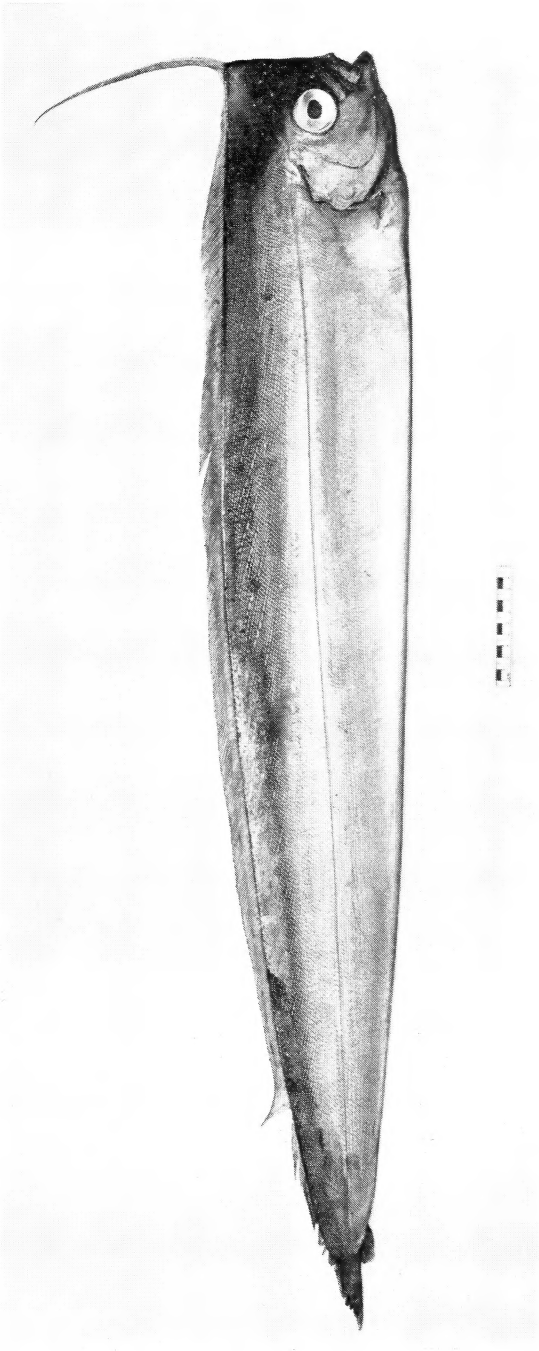






Moray Eel, *Lycodontis wooliienis*.  
Photo.—H. Hughes, Australian Museum.





Crested Ribbonfish, *Regilophotes guntheri*.

Photo.—C. V. Turner, Australian Museum.



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should be addressed to the Honorary Secretary, Royal Zoological Society of New South Wales, c/o Taronga Zoological Park, Mosman, New South Wales, 2088.

**PUBLICATIONS**

*The Australian Zoologist*, published at irregular intervals since 1914.  
*Proceedings*, published since 1933-34.

**AUSTRALIAN ZOOLOGICAL HANDBOOKS AND  
SPECIAL REPRINTS.**

- "Bibliography of Australian Entomology, 1775-1930", by A. Musgrave, 1932.
- "A Check List of the Birds of Paradise and Bower Birds", by T. Iredale, 1948.
- "Revision of the New South Wales Turridae", by C. F. Laseron, 1954.
- "The Published Writing of Tom Iredale, with an Index of his new Scientific Names", by D. F. McMichael & G. P. Whitley, 1956.
- "A Reclassification of the Order Odonata", by F. C. Fraser, 1957.
- "Dragonflies of Australia", by F. C. Fraser, 1960.

Orders and enquiries should be sent to the Honorary Secretary, Royal Zoological Society of New South Wales, c/o Taronga Zoological Park, Mosman, New South Wales, 2088.

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