PROCEEDINGS

OF THE

Royal Zoological Society

OF

NEW SOUTH WALES

FOR THE YEARS 1967-68

PRICE: ONE DOLLAR

(Free to all Members and Associates)

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ROYAL ZOOLOGICAL SOCIETY OF NEW SOUTH WALES
Established 1879

Registered under the Companies Act, 1961.

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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.

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PROCEEDINGS OF THE
ROYAL ZOOLOGICAL SOCIETY OF NEW SOUTH WALES
for the years 1967-68 (published 1969)

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

The eighty-eighth Annual Meeting of the Society was held at Taronga Zoo, Mosman, on 21st September, 1968. In the absence of the President (Mr. Basil Marlow) overseas, the Chair was occupied by Mr. John Disney (Vice-President) who welcomed guests, members and visitors, and read the Annual Report (see below), which was adopted.

As there were no additional nominations, the six retiring councillors were declared re-elected.

The Honorary Treasurer's Report and Balance Sheet was read by Mr. McCamley and adopted.

Mr. Ellis Troughton introduced the Guest Speaker, Dr. A. G. Lyne, Principal Research Scientist, Division of Animal Physiology, C.S.I.R.O. who addressed the meeting on "Research on Australian Marsupials" (see page 7). Dr. J. R. Simons moved a cordial vote of thanks to Dr. Lyne, which was carried by acclamation.

88th ANNUAL REPORT (1967-68)

Ladies and Gentlemen,

Our President is, I am afraid, again away and I have been requested by council to chair the meeting and disclose the annual report of the Society. I will now read the annual report of the Society.

Membership

At the end of the Society's financial year on 30th June, 1968, membership consisted of:

1 Endowment Member
2 Associate Benefactors
7 Honorary Members
61 Life Members
558 Ordinary Members
16 Life Associate Members
4 Honorary Associates
55 Associates
32 Juniors

Making a total of 736.

Losses sustained by the society during the year were 12 members by resignation, 10 by death and 19 were removed from the register under Article 9. We therefore showed an increase of 77 members over the year. This is a most encouraging increase and very pleasing to have in view of our new Constitution and ideas on expansion.

Deaths

It is sad to report that deaths recorded during the year included:

Sir Eric Woodward*, who was our Patron during his term of office as Governor.

Mr. N. L. Roberts*, a past President and Councillor.

Mr. C. S. Murray, a Life Member.

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* See obituary notice on page 15.

Council

Twelve Council meetings were held during the year, with an average attendance of 13 councillors present. During the year Mr. A. I. Ormsby resigned from the council after many years of valuable service. Dr. John Simons was elected to council under Article 27 to fill the vacancy thus created.

The President, Mr. B. J. Marlow, was granted 6 months leave of absence, while overseas.

Vice-Presidents Dr. J. Yaldwyn and Mr. J. Disney have taken the chair during his absence.

Office Moved

As mentioned last year, 28 Martin Place was due to be pulled down on 1st January 1968, but by then all the Society's belongings had been successfully moved to a new office at Taronga Zoo. It is wished to thank all who helped in this move.

Delegates

The following acted as delegates or representatives of the Society:

Mr. C. N. Smithers to the Australian Entomological Society.

Mr. M. Gregg to the Nature Conservation Council of New South Wales.

Mr. J. Smail and Mrs. L. Harford on the Colong Caves.

Mr. Norman Chaffer to the International Committee for Bird Preservation.

Subcommittees

A subcommittee consisting of Mr. P. Roberts, Mrs. Harford, Mr. C. Smithers and Dr. Yaldwyn was formed to meet the Minister or his representative and in fact met Mr. S. Weems of National Parks and Wildlife Service to discuss the Wildlife Bill.

It will be remembered that last year in his address to the Society, Mr. R. Strahan, as the new Director of the Taronga Zoo, invited the Society to come back to the Zoo with an offer of accommodation and in return the Society would have to increase its lay membership to help the Zoo by fund-raising for it. In order to be able to follow up this offer it was necessary to examine and revise the Articles of Association and a subcommittee of Dr. J. Yaldwyn, Mr. J. M. Smail and Mrs. L. Harford was appointed. This subcommittee revised the Articles.

Special Meeting

A special general meeting was called to agree to the revised Articles as proposed by the subcommittee and agreed to by council. 45 members were present at Taronga Zoo on Saturday, 25th May, 1968 in response to the circular covering this matter. The Articles were discussed, amended and finally approved and have been registered and are the Articles under which the Society now works.

The Articles having been revised, the same subcommittee drafted an agreement between Taronga Zoological Park Trust and the Society. In principle this draft agreement has now been approved by your council and Taronga Park Trust. A legal agreement is now being prepared and should be in operation in the near future.

Legacy and Grants

The Education Department again kindly made a grant of $200 towards the Society's publication costs.

We were also very pleased to receive a legacy of $200 from the Estate of Elizabeth May Allan.

Honours

Mr. G. P. Whitley who has been a councillor for many years and Honorary Editor was awarded the Natural History Medallion for 1967 by the Field Naturalists' Club of Victoria.

Publications

Our Honorary Editor has, as usual, worked very hard. THE AUSTRALIAN ZOOLGIST, vol. XIV Part 2, was issued 2nd August, 1967. Two further parts have since been issued, but do not fall into the period covered by this report. PROCEEDINGS 1966-67 was printed and distributed in January this year.

I would like to give special thanks to Mr. Whitley for his work and to the printers, Surrey Beatty and Sons, for the excellent production of these publications.

Owing to the high cost of printing and postage, if any member does not want the *Australian Zoologist,* would they please let the Hon. Secretary know after this meeting so the records may be altered in this manner.

Section Meetings

The three active Sections have held monthly meetings in the Hallstrom Lecture Theatre in the Australian Museum. The Junior Group now meets in the new staff room, which is a much better arrangement for the young people as they now come in through the main door in College Street. The previous arrangement was a matter of concern to a number of parents.

It is possible that after a lapse of some years the Aviculture Section may again start holding meetings, probably on the fourth Thursday of the month, beginning in October.

We wish to thank the Trustees and Director of the Australian Museum for kindly giving us permission for these meetings to be held in the Museum.

We also thank all office bearers of the sections and special thanks to Mr. M. Gregg for compiling the syllabus for each six months.

Preservation

To help preserve the Hairy-Nosed Wombats of South Australia, this Society joined with many other groups and purchased land (our area 2 acres) to be set aside, as outlined by the Moorunde Trust to retain their habitat.

Centenarian Member

Our congratulations to our member Mr. E. Finckh of Lindfield, who attained the distinguished age of 100 years in March 1968.

Thanks

Finally, I would again like to thank on behalf of the Council all members, section officers and office bearers for all their work on behalf of the Society as it is only through all their efforts that the Society continues to flourish and will continue to grow in strength.

—H. J. Disney, *Vice-President.*

OFFICE-BEARERS FOR 1968-69

Elected after the 88th Annual General Meeting on 21st September, 1968.

President: Mr. H. J. Disney.

Vice-Presidents: Messrs. B. J. Marlow, C. N. Smithers, R. Strahan and G. P. Whitley.

Honorary 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.

ROYAL ZOOLOGICAL SOCIETY OF NEW SOUTH WALES

BALANCE SHEET AS AT 30th JUNE, 1968

1967			
	GENERAL FUND:-		
5,690	Balance at 1st July, 1967	3,533	
	Add Transfer of Funds provided by the		
20	Ladies Auxiliary	—	
5,710		3,533	
	Less Deficiency transferred from		
2,177	Revenue Account	440	
3,533			3,093
1,500	PUBLICATION RESERVE		1,500
	BUILDING FUND—		
3,445	Balance at 1st July, 1967	3,678	
233	*Add* Income Received during year	225	
3,678			3,903
8,711	TOTAL FUNDS:		8,496
	CURRENT LIABILITIES:-		
914	Subscriptions in Advance	108	
1,607	Accrued Expenditure	236	
2,521			344
$11,232			$8,840

1967			
	FIXED ASSETS:-		
1,279	Furniture and Equipment—cost	1,279	
1,085	*Less* Provision for Depreciation	1,213	
194		66	
1,018	Library—at cost	1,018	
1,000	Paintings—at valuation	1,000	
2,212			2,084
	INVESTMENTS:-		
	Commonwealth Treasury Bonds—at cost:-		
320	4¾% 1969 (Market Value 30th June, 1968—$324)	320	
1,000	Special—"O" Series	1,000	
	Australian Guarantee Corporation Limited:-		
2,000	Short Tterm Notes—at cost		
	5% Debentures due 23rd October, 1968—at cost	1,000	
—	Market Value 30th June, 1968—$1,000)		
3,320			2,320
	BUILDING FUND INVESTMENTS:-		
	Australian Guarantee Corporation Limited:-		
1,400	7% Debentures matured 26th September, 1967	—	
1,400	7% Debentures due 30th June, 1970 (Market Value 30th June, 1968—$1,358)	1,400	
—	5% Debentures due 23rd October, 1968 (Market Value 30th June, 1968—$1,000)	1,000	
—	Deposit at Call	400	
873	Commonwealth Savings Bank of Australia	1,055	
3,673			3,855
	CURRENT ASSETS:-		
1,000	Publications on Hand—at valuation	400	
1,025	Commonwealth Savings Bank of Australia	180	
2	Cash in Hand	1	
2,027			581
$11,232			$8,840

ROYAL ZOOLOGICAL SOCIETY OF NEW SOUTH WALES

PUBLICATION ACCOUNT FOR THE YEAR ENDED 30th JUNE, 1968

1967			1967		
400	Publications on Hand (at valuation) 1st July, 1967	1,000	238	Sales of Publications	223
	Printing Costs:-		200	Government Grant	200
3,642	"Zoologist"	1,091	60	Donations Received	223
642	"Proceedings"	620	1,000	Publications on Hand (at valuation) 30th June, 1968	400
			3,186	Deficiency transferred to Revenue Account	1,665
$4,684		$2,711	$4,684		$2,711

BUILDING FUND INCOME ACCOUNT FOR THE YEAR ENDED 30th JUNE, 1968

233	Transfer to Building Fund	225	11	Donations Received		—
				Interest Received:-		
			196	Investments	192	
			26	Bank	33	225
$ 233		$ 225	$ 233			$ 225

REVENUE ACCOUNT FOR THE YEAR ENDED 30th JUNE, 1968

3,186	Publication Deficiency	1,665		Subscriptions Received:-		
14	Donations and Subscriptions	31	84	Life Members	63	
28	Electricity and Telephone	26	2,085	Full Members	2,302	
6	General Expenses	45	99	Associate and Junior Members	141	
17	Insurance	18				2,506
523	Printing, Stationery and Stamps	828	248	Interest		182
791	Rent Paid	417		Premium on Redemption of Commonwealth		
128	Provision for Depreciation	128	—	Treasury Bonds—Special "D" Series		30
			2,177	Deficiency transferred against Accumulated Funds		440
$4,693		$3,158	$4,693			$3,158

DECLARATION BY THE SECRETARY

I, 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
13th day of September, 1968
before me: GEOFFREY HUNTER, J.P.
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, 1968 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 13th day of September, 1968.

Signed on behalf of the Council,
C. N. SMITHERS } *Vice-Presidents*
J. C. YALDWYN }

AUDITORS' 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, 1961-1966 and so as to give a true and fair view of the state of the Society's affairs as at 30th June, 1968 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.

SYDNEY, 11th September, 1968. PEAT, MARWICK, MITCHELL & CO.
Chartered Accountants

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

RESEARCH ON AUSTRALIAN MARSUPIALS*

by A. G. Lyne
Division of Animal Physiology, C.S.I.R.O., Prospect, N.S.W.

The fauna of Australia is one of the most distinctive and interesting in the world. This is particularly true of the egg-laying mammals or monotremes and the pouched mammals or marsupials. Although the marsupials are found in certain parts of America, they have their stronghold in Australia and New Guinea, where there is a great assortment of peculiar forms. About 120 species are recognised in Australia.

In all marsupials, the young are born in a rudimentary condition and they are usually, though not always, sheltered during their later development in a pouch. Such a pouch is not developed in other mammals except in the egg-laying echidnas or spiny ant-eaters. Other distinguishing features of marsupials are found in the structure of the skull, brain and reproductive system (Abbie, 1941). An inward bending of the lower jaw below where it meets the skull is a feature which is of almost universal occurrence among marsupials. In the brain there is no corpus callosum—the major connection between the cerebral hemispheres in higher mammals—so that marsupials might be said to have a split brain. In the female the ureters (the ducts from the kidneys to the bladder) split the vagina into three, and in both sexes there is no separate anus but a single urogenital opening.

The marsupials have been able to adapt themselves to a great variety of widely differing modes of life and they have exploited every available habitat. Thus there are terrestrial forms—the rat-kangaroos, wallabies, kangaroos, and bandicoots; burrowing forms—the marsupial mole, the wombats, and the rabbit-eared bandicoots; arboreal forms—the possums, the koala and tree-kangaroos; gliding forms—the feather-tail glider, sugar glider and greater glider; and in South America, even an aquatic species. Marsupials may be insectivorous, carnivorous, herbivorous, or omnivorous.

Many of the marsupials show specializations of structure and function which are similar to those found in higher mammals, though they are completely unrelated. Popular recognition of this fact is recorded in such names as "native bear", "native cat", "tiger cat", "Tasmanian tiger", and so on.

The marsupial mole (*Notoryctes typhlops*), the numbat or marsupial ant-eater (*Myrmecobius fasciatus*), and the pig-footed bandicoot (*Chaeropus ecaudatus*) are among the animals showing extreme specialization. The marsupial mole, which in almost every external feature resembles the true moles of Europe and Africa, is one of the most remarkable of the specialized marsupials. It has no eyes or ears and lives almost entirely underground. The numbat, besides being one of the few lacking the characteristic pouch, has a long tongue and other features specially adapted for gathering and swallowing ants. The pig-footed bandicoot has fore-feet which resemble those of the cloven-hoofed ungulates, such as deer, sheep and goats, and hind feet which show a rough similarity to solid-hoofed ungulates, such as the horse and zebra. Another highly specialized marsupial, the tree-kangaroo, has succeeded in adapting itself from a terrestrial to an arboreal existence.

Marsupials were discovered long before Captain Cook's first landing in 1770. Nearly 150 years earlier—in 1629—a Dutch merchant, Francis Pelsaert, shipwrecked on the west coast of Australia, furnished the earliest description of an Australian marsupial, the tammar or dama wallaby (*Macropus eugenii*). A second Western Australian wallaby,

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* Address delivered at the Annual Meeting of the Royal Zoological Society of New South Wales (September, 1968).

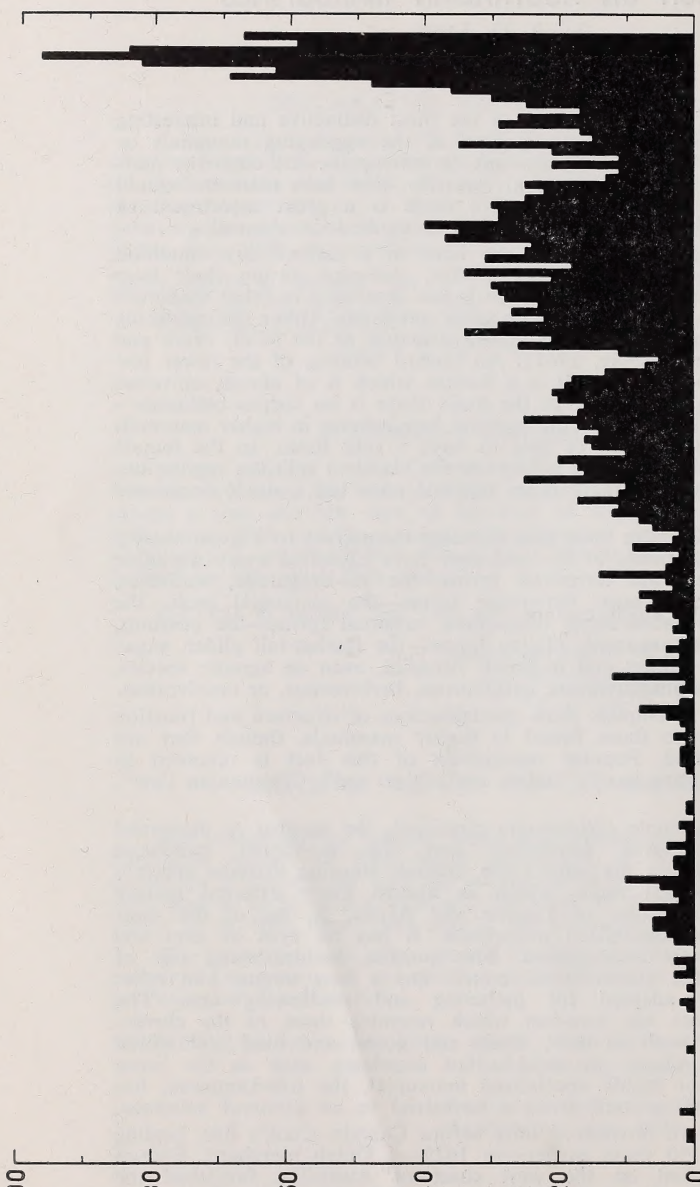

Fig. 1. Number of publications on Australian and American marsupials in scientific journals in each year from 1800 to 1967 inclusive (from author's list). The peak of activity around 1830 to 1850 is largely concerned with the description of new species. From 1860 to 1890 there is a continuous but not very high level of activity. Then, from the 1890's onwards, there is a continuously increasing number of publications, except for the periods of the World Wars (1914-18 and 1939-45) and the periods immediately following.

called the quokka (*Setonix brachyurus*), has the distinction of being the second marsupial recorded from Australia by another Dutchman, Samuel Volckersen, in 1658. Thus, Australian marsupials have been known to Europeans for over 300 years, and these animals have, therefore, been available for study since the origins of modern science. Despite this, there is still much less known about marsupials than many eutherian mammals, but more and more biologists are becoming actively interested in the Australian fauna. In this connection, the establishment of the Australian Mammal Society, which aims to encourage research on native mammals, has had considerable influence since it was formed 10 years ago. The membership of this Society has grown from 24 to over 200 during this period. The number of studies on marsupials (including American species) is now considerable. My own incomplete list of references to articles in scientific journals contains 2,186 titles, published between 1800 and the end of 1967 (Fig. 1). More than a quarter of these have been published during the last eight years. The tempo of marsupial research has certainly been stepped up, especially during the last five years, and it is not possible to give here a full list of all the studies on Australian marsupials.

The first phase of the research on marsupials consisted of description and classification. A very natural result of the occupation of Australia by Europeans was that the animals collected were sent overseas, mostly to museums, to be described and stored. Most of these studies were carried out during the last century and the early part of the present one. There has been no discovery of any new major group of marsupials since the end of the last century.

Fortunately, some of the early studies were made by very keen zoologists. Gerard Krefft, for example, who was appointed Curator of the Australian Museum in 1861, made important observations on many of the marsupials which disappeared from New South Wales with the spread of European settlement. Krefft's paper on the Vertebrates of the Lower Murray, published in the Trans. Phil. Soc. of N.S.W. in 1866, makes fascinating reading.

Referring to the pig-footed bandicoot *Chaeropus* he said that, "This singular animal which Sir Thomas Mitchell first discovered in his expedition to the Darling, June 16, 1836, is still found on the plains of the Murray; though it is exceedingly rare". The fact that the original specimen collected by Mitchell was described as having no tail led to a rather curious incident, for Krefft, in his anxiety to obtain specimens of the tail-less animal, offered high rewards to the aborigines of the Lower Murray. He said "I was in the habit of showing a copy of Sir Thomas Mitchell's tail-less specimen to the natives, urging them to procure animals of that description; of course, they did not recognize it as a "Landwang" (the native name for a pig-footed bandicoot), and I was furnished in consequence with a large number of the common Bandicoot (*Perameles obesula*) minus the tail, which, to please me, had been screwed clean out."

In the same article, when writing about a pig-footed bandicoot which escaped from a cage, he said, "At a quick pace it ran up one of the sandstone cliffs, followed by myself, all the black-fellows, men, women and children, and their dogs. Here was a splendid opportunity for observing the motions of the animal; and I availed myself of it. The *Chaeropus* progressed like a broken down hack in a canter, apparently dragging the hind quarters after it; we kept in sight of the fugitive. and, after a splendid run up and down the sand hills, our pointer, who had been let loose, brought it to bay in a salt bush". Among other observations, Krefft made some notes on the feeding behaviour of *Chaeropus* kept in cages, saying that they appeared to be mainly herbivorous. He also said that they were very good eating, and he was sorry to confess that his appetite more than once over-ruled his love for science.

Without these very brief, but fascinating observations, made over 100 years ago, we would know next to nothing about the pig-footed bandicoot as a living animal. The only remaining representatives of this species appear to be a few preserved but very dead specimens in museums. Some alarming facts were revealed by Marlow in his survey of the marsupials of New South Wales, published in 1958. Of the 52 species of marsupials recorded in this State, 42% were presumed extinct or rare.

About 50 years ago there was a revolt against pure descriptive studies. This led to all manner of functional studies on the living animal in place of studies on the dead animal, and, as a result, the research emphasis has, to a large extent, moved out of the museums. There is no doubt, of course, that the place of the museum in modern biology is still very important and many museum workers, often working with inadequate facilities, have made valuable contributions to biology. A good example is the book "Furred Animals of Australia", written by Troughton (1941) when he was at the Australian Museum. As a general introduction to the Australian marsupials, as well as to other Australian mammals, this book has remained, throughout the 27 years since the appearance of its first edition, the most useful single text available.

During the last few years the study of marsupials has become popular in several Australian universities. Considerable research has also been carried out in the C.S.I.R.O., State Departments and Museums. As a result, many important contributions have been made on both wild and captive animals.

A great many studies on reproduction have been carried out; nearly all on the female. Even in 1704, in the first paper (Cowper, 1704), on the anatomy of a male marsupial (an American species *Didelphis marsupialis*), the author chose the title, "Account of the Anatomy of those Parts of a Male Opossum that Differ from the Female", thereby demonstrating his preoccupation with the unusual features of the female. The emphasis which has been placed on the female was most apparent when I examined the titles of publications on marsupial reproduction. My list of references contains 155 papers which refer to the female, and only 40 papers which refer to the male. There are a number of unusual features about the reproductive organs of the male. For example, the end of the penis is usually divided and the scrotum is in front of the penis.

One aspect of reproduction which has attracted a lot of interest has been marsupial birth. The first account of the birth of an Australian marsupial (the tammar wallaby) was published nearly 150 years ago (Collie, 1835), and birth has now been observed in many species, for example in the brush-tailed possum (*Trichosurus vulpecula*) (Lyne, Pilton and Sharman, 1959), long-nosed bandicoot (*Perameles nasuta*) (Lyne, 1964) and red kangaroo (*Megaleia rufa*) (Sharman and Calaby, 1964).

The young marsupial is born in the same way as other mammals but in an immature state and very small. The newborn young of the largest species of kangaroo is only about an inch long and weighs about 1/30 of an ounce. A newborn marsupial mouse is less than ¼ inch long.

When born, the baby, without its mother's assistance, crawls through the fur and into the pouch, and when this is gained, attaches its mouth to a teat. The end of the teat swells inside the mouth of the young, thereby rendering it almost inseparable from its mother for the early part of its life. It is this firm attachment which is largely responsible for the false belief that the young is actually formed on the teat and not born in the usual manner. This belief was first advanced by Pelsaert, the Dutchman mentioned earlier, who was wrecked on the west coast of Australia in 1629, who suggested that the young of the wallaby he saw grew from a teat in the pouch.

A remarkable feature of some marsupials, for example the red kangaroo, is the ability of the female to produce milk of two different compositions from two mammary glands at the same time (Lemon and Barker, 1967). This happens when a new young is born to a female while she is still feeding a large young outside the pouch. The composition of the milk is adjusted to the needs of the growing animal and each has his own teat.

One of the interesting discoveries of recent years has been concerned with female kangaroos which mate again soon after a young is born. If fertilization takes place, the resulting embryo develops for only a few days and is then held in a dormant state—a state of suspended animation. This dormant embryo remains in the uterus during the time the pouch is occupied by a suckling young. When this young leaves the pouch, or if it is lost prematurely, the dormant embryo resumes development. Dormant embryos in the quokka (*Setonix brachyurus*) are known to remain capable of completing development for periods up to nearly 5 months (Sharman, 1955). The storage of a dormant embryo in the uterus of the tammar wallaby may last for up to 11 months, the longest period of delayed development known in any mammal (Berger, 1966).

Other aspects of marsupial research carried out in recent years include some interesting studies on the ecology of kangaroos and several other species. A lot of work has been done on the drinking and feeding habits of the euro or hill kangaroo, *Macropus robustus,* in the Pilbara district of the north-west of Western Australia (Ealey, 1967*a,* 1967*b*). In this area, which is near Marble Bar—the hottest place in Australia—the euro lives in rocky outcrops on the dry plains, where the average maximum daily temperature during summer may be as high as 107°F, and on some days may reach 120°F. The animal is able to survive under these hot and arid conditions because it avoids high air temperature by sheltering in caves during the day and feeding at night. The euro requires water to drink, although it may drink at infrequent intervals. Water is lost from the body in two main ways: by evaporation—regulating the body temperature (which means cooling the body in summer by panting, sweating and so on) and by the production of urine, in which waste products of the body are removed in solution. Euros are able to economize on water usage in at least two ways. Firstly, they minimize the need for water for cooling by not moving during the heat of the day, and by seeking shade in caves where temperatures may not exceed 90°F despite an outside air temperature of 115°F. Secondly, they are able to produce a highly concentrated urine, so that less water is needed to eliminate waste products.

Some very interesting studies have recently been made on the drinking habits of another member of the kangaroo family—the tammar wallaby (Kinnear, Purohit and Main, 1968). The tammars inhabiting the semi-arid Abrolhos Islands off the mainland coast of Western Australia, can drink sea water and maintain weight while eating dry food. To what extent sea water has played a part in the water economy and persistence of this island population of tammars is unknown at the present. All other mammals that have been shown to be able to live on sea water and dry food are very small rodents weighing perhaps 1/100th of the weight of the tammar.

The crest-tailed marsupial mouse or mulgara (*Dasycercus cristicauda*) inhabits areas of central Australia where the average rainfall is 5 to 10 inches a year, but obtains sufficient water from a purely carnivorous diet (Schmidt-Nielsen and Newsome, 1962). Captive animals can get all the water they require from a diet of fresh lean meat, if they do not have to evaporate water to cool themselves. This marsupial mouse has subterranean burrows and probably avoids the heat by remaining underground when the outside temperature is high.

No mammal can digest the fibre in food by its own digestive juices, but herbivores provide an enlargement of the gut containing a variety of microbes that can digest fibre. This enlargement can be in the caecum, as in horses and koalas, or at the anterior end of the stomach, as in ruminants and in kangaroos. The microbes, both the bacteria and the protozoa, in the stomach of the quokka, appear to be closely related to those of ruminants (Waring, Moir and Tyndale-Biscoe, 1966). This pre-gastric digestion, as found in ruminants and kangaroos, is particularly well adapted to feeding on poor pastures. The red kangaroo, for example, is well adapted to life on the open plains of Australia where much of the available food is of a fibrous nature. Kangaroos and wallabies, as well as bandicoots, and some other marsupials, regurgitate, chew and re-swallow their food in a manner somewhat analogous to ruminants; an observation first made on the kangaroo by Sir Joseph Banks (see Barker, Brown and Calaby, 1963).

So far only a small number of marsupial species have been studied in any detail. The emphasis has been on a few species of kangaroos and possums. About 22%, that is, almost a quarter of all marsupial publications, have been on kangaroos. About 13% of all publications have been on Australian possums; at least half of these articles refer to the brush-tailed possum, *Trichosurus vulpecula*. It is desirable, of course, to know as much as possible about each species, but it will be tragic if we do not learn more about many of the rarer species before it is too late. Already a number of marsupials, including the pig-footed bandicoot which I mentioned earlier, have disappeared and many other species are so rare that they will probably disappear before they can be studied.

Although the fauna of the world may now be studied in the field to a greater extent than ever before, there is an urgent need for more studies of captive animals. Many of the mysteries of zoology (for example, in physiology, nutrition and reproduction) can only be conveniently studied in the laboratory. Modern science makes use of almost any animal type available, if the type chosen shows any advantage over the experimental animals generally used.

It is surprising that, despite the availability of many marsupials, Australian scientists should have been satisfied for so long to obtain information on anatomy, physiology, behaviour, etc., mostly from rats, mice, rabbits and other common laboratory animals. No doubt this can be partly explained by the difficulty of acquiring marsupials and maintaining them in the laboratory. Whatever the reason for failing to use them, vast areas of marsupial biology remain open for exploration.

Several species of marsupials have already been shown to be useful in experimental studies. The following are some of the advantages of using marsupials in preference to the common laboratory mammals. The young are reared within a pouch after being born at a more embryonic stage than the young of higher mammals such as rats, mice and rabbits. This early birth is a most desirable feature for many experimental studies, as development in a pouch, unlike development in the uterus, lends itself to both observation and experiment (Lyne, 1957; Lyne and Verhagen, 1957). In studies on the embryology of hair, for example, it has been possible to follow all stages in pouch young. In higher mammals, the early stages of hair development occur before birth and this makes study difficult.

To date, very little attention has been given to the special advantages of using particular species of marsupials in laboratory investigations. One reason why the brush-tailed possum, and the quokka, have been popular for laboratory studies is because they breed fairly easily under captive conditions. However, they have the obvious disadvantage of normally having only one young a year. Another disadvantage which they

share with other marsupials, except the bandicoots, is the slow development of their pouch young. The bandicoots not only develop more rapidly than all other marsupials, but they also breed throughout the year (Lyne, 1964). Unfortunately, attempts to breed bandicoots in cages or in small enclosures have not been very successful, but one long-nosed species (*Perameles nasuta*) has been repeatedly bred in an enclosure ¼ acre in area (Stodart, 1966). A short-nosed species (*Isoodon macrourus*) has also been bred under captive conditions when a tranquillizer (reserpine) was added to the food (Mackerras and Smith, 1960). One female produced 8 litters in 17 months, totalling at least 32 young. More studies of bandicoots are needed if we are to understand why they are shy about breeding in the laboratory.

Among other marsupials which appear to have potentialities as laboratory animals are some of the marsupial mice. The fat-tailed marsupial mouse (*Sminthopsis crassicaudata*), for example, has been bred in the laboratory (Martin, 1965). This animal is prolific enough for many experimental studies in comparative physiology and genetics. It does not appear to have a fixed breeding season; the litter size is 6 to 8 and the interval between litters may be as short as 4 months.

The usefulness of marsupials as experimental material is only one of many reasons why these animals should be studied. There is an urgent need for a biological survey of the marsupials throughout Australia (Ride, 1968). Although precise information on the distribution of many marsupials is lacking, it is known that a number of species (mostly members of the kangaroo family) have become extinct within historical times (Calaby, 1960). Other species, including some interesting forms, like the Tasmanian tiger and the pig-footed bandicoot, have disappeared from their old haunts, and it may be too late to save them from extermination.

Scientific research will advance more rapidly if more information is collected by naturalists on the distribution and behaviour of the species they encounter, and on the animals' requirements for food, shelter, and so on.

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OBITUARY NOTICES

SIR ERIC WOODWARD

Lieutenant-General Sir Eric Winslow Woodward died at the age of 68 on 29th December, 1967. When he was Governor of New South Wales, His Excellency was Patron of the Royal Zoological Society of New South Wales and he honoured our eightieth Annual Meeting by declaring it open and addressing us concerning the state of zoological research at that time. Sir Eric was born at Hay, New South Wales, attended Toowoomba Grammar School and entered the Royal Military College, Duntroon. In World War II he served in the Western Desert, Greece, Syria and at El Alamein. He was appointed G.O.C. Eastern Command in 1953, and succeeded Sir John Northcott as Governor of New South Wales from 1957 to 1965. Sir Eric became a Knight Commander of the Order of St. Michael and St. George in the New Year Honours of 1958.

—G.P.W.

NOEL LEE ROBERTS

(Plate I)

Noel Lee Roberts, who died at Sydney on December 6, 1967, at the age of 77 years, was actively interested in many aspects of natural history with, perhaps, a leaning towards birds and spiders whose habits he studied with assiduity. His published observations are precise and informative with a sound background knowledge of the subjects treated.

Born in Napier, New Zealand, on August 29, 1890, of Welsh parents he was shortly afterwards taken by them back to their homeland where he was educated, first at Ruabon Grammar School and then at Grove Park Grammar School, Wrexham, North Wales. He was fond of recalling his happy school days and the quirks and idiosyncracies of some of his masters whose ranks he later joined, teaching at a small school near Wrexham for about two years. He then sought the Ministry of the Methodist Church and, at the age of 22, came to Brisbane, Queensland, as assistant to Dr. Rowe at the Albert Street Methodist Church.

Ill health, which also caused his rejection for active service in World War I, forced him to give up the Ministry though he remained faithful to his church throughout his life, taking an active part in its affairs. On recovery he entered journalism and edited various country papers in New South Wales and Queensland. His experiences in this field led to his appointment as manager of an advertising agency controlled by the Queensland Country Press Association. In 1929 he came to Sydney as advertising representative for the Newcastle *Morning Herald* and the Queensland Provincial Daily Newspaper Group, holding this position until his retirement in 1955. In his latter years he was associated with the K. G. Murray Publishing Company and the *Land* Newspaper on special part-time assignments. During his business career he held several important positions on committees of relevant associations and bureaux, including also the Presidency of the Inch Club of which he was a life member.

In his boyhood days, under the influence of his father, he developed an understanding of nature that remained with him throughout his life. Memories of the nests of blackbirds, throstles, linnets and other birds

that he discovered as a youth in the fields and hedges of Wales were frequently recalled in later years with pleasure and a certain Welsh romanticism. Though he became thoroughly Australian in outlook and spirit he never lost his love of Wales and its traditions.

He was an accomplished musician and, in his younger days, often gave organ recitals. An appreciation of good music was a dominant theme in his life and this trait was inherited by a daughter, Dorothy, who became a talented concert pianist in London, and by a son, John, now in charge of serious musical programmes for the Canadian Broadcasting Corporation and President of the Canadian Music Council, Toronto.

Noel Roberts was scholarly and widely-read and, with his early theological background and his philosophic outlook on life, was able to converse fluently and with authority on many subjects: as a public speaker he had outstanding ability in holding the interest and attention of his listeners. He joined the Royal Zoological Society of New South Wales in 1934 and was a member of council from 1937 to 1948 and President for the years 1943-4. He was also a member of the Royal Australasian Ornithologists' Union for more than thirty years, joining in 1933.

Another interest was the Kosciusko State Park Trust of which he was a member for some thirteen years until his statutory retirement in 1960. During his association with the Kosciusko Trust he was actively concerned with the problems of erosion caused by the development of the area, and also with the preservation of the natural features, especially those of the upper regions of the Park.

The tangible results of his researches in natural history are seen in his numerous contributions to scientific and popular journals: these papers are an indication of his broad outlook on many phases of nature and show him to have been a patient, careful and accurate observer. His writings on the nocturnal habits of spiders, mostly those found in his home garden, are outstanding, lively in presentation, and generally illustrated with his own first-class flashlight photographs. At his home in Beecroft, New South Wales, where he lived for many years before removing to Killara, he often reclined in an easy-chair under a huge gum and watched the habits of three common species of birds—restless flycatcher, magpie-lark, and willie-wagtail—all of them black-and-white, that were then nesting in the tree. The results of his detailed observations were later published in the *Emu* (1942) and are a valuable contribution to the study of bird behaviour. The naturalist he most admired was Gilbert White of Selborne whose methods influenced his own and whose writings he never tired of quoting.

Other interests included gardening and the study of Australian native plants; also photography in which field he was enthusiastic and accomplished.

He was a gentle man, thoughtful of others, considerate, kind and generous; firm in his principles and outspoken when the occasion arose. The devotion of his two sons, Mervyn and John, and his two daughters, Gwyneth (Mrs. F. Wardrop) and Dorothy (Mrs. P. Alexander) is, in effect, a tribute to his fine personal character. His wife Myrtle, whom he married in 1919, predeceased him by a few months.

My own friendship with Noel Roberts covered a period of almost forty years. He was a good companion on many field outings and camping trips, alert in mind, enquiring and knowledgeable and always looking ahead with that rather rare quality in a mature and intellectual man—youthful enthusiasm.

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In addition to the abovementioned contributions Noel Roberts revised the 1963 Edition of Keith C. McKeown's *Australian Spiders,* a book originally published in 1936 under the title *Spider Wonders of Australia.*

—K. A. Hindwood

ROY BELL
(1882-1966)

by Tom Iredale
(Plate II)

Although Roy Bell died about three years ago, his passing should not be allowed to go unnoticed in zoological circles, for he was a pioneer naturalist and collector in several parts of the South Pacific and of Australia.

Raoul (or "Roy") Sunday Bell was born on and named after Sunday or Raoul Island, in the Kermadec Group, on February 19th, 1882, and was of the greatest assistance to all the members of the Expedition to those islands in 1908, but more especially to myself, as I found he had an excellent knowledge of the larger shells and was keenly interested in molluscs. After I left Sunday Island, he made still larger collections, which were partly reported upon in a series of papers by W. R. B. Oliver. Owing to an unexpected disaster (a hurricane) which compelled all the settlers (the Bell family[1]) to leave the island, I was able to obtain his services for Gregory M. Mathews to investigate the bird life of Norfolk and Lord Howe Islands. While upon these islands he made large collections of molluscs for me, which have been partly reported upon elsewhere[2]. Then the first World War suspended all scientific work and publication. Bell volunteered, though not sound in health, and served four years. The accompanying photograph shows him in army uniform at that time. Upon his demobilisation, he returned from Europe to Australia.

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[1] An illustrated account of Roy Bell and the Bell family on the Kermadec Islands was written by Elsie K. Morton in *The Geographical Magazine,* Feb. 1955, pp. 533-542. See also her book, *Crusoes of Sunday Island* (London: Bell), 1957, pp. 1-190, illustr.

[2] Iredale, Proc. Malac Soc. London 10, 1912, pp. 217-228.

He landed at Melbourne and went to Port Fairy, Victoria, where he studied the Adelaidean fauna; he then travelled to Mallacoota, Victoria, where he found almost a pure Peronian mollusc fauna. This was all I had desired for comparison, but the influenza epidemic prohibiting his return to New Zealand, he travelled to Eden in Twofold Bay and stopped there until the outbreak was over. He employed himself in making a thorough survey of the molluscan fauna, shore collecting in every available place, dredging throughout the Bay in from five to twenty-five fathoms, and outside as far north as Merimbula, New South Wales, in water to the same depth, and in deeper water (from fifty to seventy fathoms) off Green Cape. Disaster Bay, the southernmost limit of New South Wales, was also visited by Bell who investigated mollusca from the shoreline there down to seventy fathoms. The results from these collections were studied at the British Museum and the Australian Museum and reported upon in *Proc. Linn. Soc. N.S.Wales* 49 (3), 1924, p. 179 by the present author. Twenty new genera and species of mollusca alone were named in honour of Roy Bell by Iredale or by Iredale & Hull.

The author has many letters, diaries and photographs of Roy Bell's, some dating back to over half a century. Seventeen folio sheets of Bell's photographs of plants, birds and views on Norfolk Island, Lord Howe Island, etc., probably taken about 1911, are in the Mitchell Library, Sydney (F.981.9/B), also a Lord Howe Island diary of 1913-1914 (Mitch. Lib. MSS. B.1417). Copies of other diaries are being made at the Australian Museum (1968).

Roy Bell contributed a paper, "Breeding Habits of White Tern (*Gygis alba*) on Kermadec Group" to *The Emu* 12, July 1912, pp. 26-30, pls. i-ii. Roy Bell's photograph of a Providence Petrel (*Pterodroma melanopus*) was the basis of a famous painting by Lilian Medland which was featured on the two shillings Norfolk Island stamp of 1961. A photograph of Roy Bell "calling" about sixteen of these birds appeared in *The Emu* 40, 1940, pl. 11, as did other Roy Bell photos to illustrate Hindwood's "Birds of Lord Howe Island", in which Bell's diary was freely quoted.

Roy Bell died at Norfolk Island hospital at the age of 84 on 28th March 1966. Dr. Hubert G. Davies of Norfolk Island, kindly wrote to this effect (in lit., 9 Oct. 1968) and stated—"In his last days . . . he was in and out of hospital a lot. He was a very good patient and the staff were very fond of him. His last days were quite pleasant and without suffering. He died suddenly one morning of heart failure."

Through the courtesy of Mrs. Merval Hoare, Secretary of the Norfolk Island Historical Society, I have received a copy of her "personality piece" about Roy Bell in *Pacific Islands Monthly,* July 1964, page 87, with portrait, also *The Norfolk Islander* 1(33), April 1, 1966 containing his Obituary. The notice in *The Norfolk Islander* was copied, more or less, I am informed, in *Pacific Islands Monthly,* May 1966. Mrs. Hoare states there is quite a good photo of Roy Bell climbing a tree in C. E. Lane-Poole, *Report on the Forests of Norfolk Island,* 1926, p. 28.

Mrs. Hoare states (*in lit.*, 26 Dec. 1968): "I have lived on Norfolk Island for nearly twenty years and when we first arrived my husband and I lived next door to Roy for about twelve months. Over the years we got to know him very well and he often visited our home. In appearance he was a tall, gangling man, very thin and very fair. He had been gassed in World War I and coughed a good deal. Roy was a great believer in spiritualism and in the life to come and I gathered from conversations with him that he had held these beliefs for a long time . . . He gave

up photography some years before his death; about 8 or 10 years previously. He is buried in the Kingston cemetery [Norfolk Island] and the inscription on his headstone reads:

4663-2 Air Mechanic R. Bell
Australian Flying Corps 28 March 1966
Age 84
"Lest We Forget."

Above the inscription is the A.I.F. Emblem and a Cross.

Roy's skill as a photographer was recognized in 1947 when one of his photos, a view of Norfolk's Ball Bay, was used as the design for Norfolk's first postage stamps. This design was, for many years, the only one used.

Roy served in World War I as an aerial photographer in the Royal Australian Flying Corps and in the last war as a telephonist on Norfolk [Island]."

The Norfolk Islander 1 (33), April 1, 1966, page 5 states: Norfolk News: Vale:

Last Monday, 28th March, 1966, Mr. Raoul Sunday Bell, aged 84, passed away peacefully in the Norfolk Island Hospital where he had been a patient for the previous week.

Mr. Bell came to Norfolk in 1910 . . . He has lived during the last few years, amongst his glorious Gerbera patch in Burnt Pine. He exported Gerbera seed but when they were in flower it was always a case of "Have you seen Roy Bell's Gerberas" around Burnt Pine.

Roy was a great lover of children and it was rarely that a "Good-day, Mr. Bell" didn't bring forth a sweet for the child who had addressed him.

It is to be hoped that some of Roy's valuable collection of photographs and other specimens will be retained on the Island. His outstanding studies of bird life would be a lasting memorial and record in the proposed Folk Museum on Norfolk Island.

Our most sincere sympathies are extended to Roy's relatives overseas and to his many friends on Norfolk.

Acknowledgements: Thanks are tendered to the Mitchell Library, Sydney, and to Dr. Hubert G. Davies of Norfolk Island for their helpful information also to Mrs. M. Hoare, Secretary of the Norfolk Island Historical Society.

BARBARA BLANCHE DEW

(Plate III.)

Barbara Dew died on 23rd December, 1968 after a painful illness of eight weeks. Its symptoms were first manifest during the last of her field trips, to Thursday Island, Queensland.

Barbara, the elder daughter of the late Sir Harold Dew and Lady Dew, was born in Sydney in 1927 and went to school at Ascham, Edgecliff. From there, she went on to the University of Sydney where she entered the Faculty of Arts and graduated with a B.A. degree, having studied, among other courses, Archaeology, Anthropology, and Zoology. In this last subject, she followed the full three-year course. Her extra-curricular activities all point to her intense interest in the natural sciences, for she was a member of the Biological Society, the Spelaeological Society and the Scientific Film Society at the University of Sydney. She joined the Royal Zoological Society of New South Wales in 1950, and became a Life Member in 1951.

After graduation, her first appointment was to the technical staff of the Fisheries and Oceanography Section of the C.S.I.R.O. at Cronulla, New South Wales, where she was attached to the laboratory dealing with marine fouling. It was during this period that she made a particular study of serpulid worms and began making detailed observations on certain of the benthic animals in Gunnamatta Bay. She made many collections for the Australian Museum.

In 1957 Barbara was appointed as Biologist in the School of Public Health and Tropical Medicine's Section of Parasitology and remained in this post until her death. Part of her duties in the School involved teaching both graduate and undergraduate students and she greatly enjoyed these contacts. She had the ability to identify herself with the students and one of her former students—now a practising doctor in the hospital at Balimo, Papua writes of her as follows:- "As a teacher of Practical Parasitology she was above all an enthusiast. Well informed, accurate in her work, meticulous in her preparation of teaching material, patient with those new to the subject, she imparted to her students not only knowledge but also something of her own enthusiasm. She thus won the respect and gratitude of many".

Barbara was never a mere spectator but was always very much a "doer" in anything she undertook and in any club or society to which she belonged she was always to be found among the very active members. Her wide interests in the natural sciences were shown in her continued cave explorations, during which she banded bats and collected data on their natural history. She kept up her interest in shore animals, focussing special attention on nudibranch molluscs. She was always active in schemes working to promote the conservation of the Australian flora and fauna. She had been a foundation member of the Scientific Film Society and in its early days was one of a team which made a film on shore zonation.

However, Barbara had wide interests besides those rooted in her work and in natural history. She was fond of good food and wine and liked to collect books and stamps. She was a member of the Philatelic Society, taking a special interest in stamps which carried animals or plants also used as badges by the Girl Guides and Boy Scouts. Throughout her life Barbara was an active Girl Guide, being first a humble member of a company and later rising to the office of Captain in the movement. She was for years the Leader of the Oatley Girl Guide Company and, no doubt, was able to instill her love of the Australian

landscape and wild life in many of the girls she led. During her career as a guider she received two coveted awards, rare in Australia—the Baden-Powell Star and the Oakleaf.

Within our own Royal Zoological Society of N.S.W. Barbara played an active role in several of the sections and the results of some of her researches appear in our publications. Her willingness to help others and serve the Society was also manifested in her interest in the Juniors and the active part she played there.

Barbara is survived by her mother, Lady Dew of Melbourne, and her sister, Libbie who often came to the Society's functions with her. We offer to them both our sincerest sympathy in their loss.

E.C.P.

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REPORTS OF SECTIONS

Ornithological Section Annual Report, 1967-68

Monthly Meetings combined with the N.S.W. Branch of the Royal Australasian Ornithologists' Union, were well attended by members and visitors. Average monthly attendance was 72.

Meetings were addressed on a wide range of subjects, which included: "Bird Photography" by Mr. L. Howes, "Bird Identification" by Mr. S. G. Lane, "National Parks" by Mr. S. P. Weems. Colour slides of many Australian bird species were exhibited by eminent photographers Mr. N. Chaffer and Mr. E. McNamara. Films screened included "Wild Wings" and "Wildlife in Danger" from the British Council and "Birds that Never Fly" by Mr. H. Pollock.

Among the many bird observations reported by members, the following were of particular interest: Eight Blue Winged Shovelers at Pitt Town. Twenty-seven Whimbrels at Quibray Bay in July-August 1967, the first New South Wales winter record for this species. Sixty Crested Grebes at Prospect. A Black Tern, an Arctic Tern, Mangrove Warblers and a Ringed Plover from Ash Island, near Newcastle. The first Australian Record for a Kermadec Petrel, a beach washed specimen from Tuggerah on 16th March, 1968. A Chestnut-breasted Shelduck at Bushell's Lagoon on the Upper Hawkesbury River.

Monthly Field Days were continued and were enthusiastically attended by members.

—H. BATTAM, Hon. Secretary.

Conchological Section Annual Report, 1967-68

It is pleasing to report that during the last twelve months several new members have joined the section. To the statistically minded the number of persons attending each meeting averaged 35 compared with 30 and 27 respectively for the two prior years. Members are encouraged to seek out further recruits.

Apart from numerous individual field excursions by members on holidays and weekends, four successful field days were held and were well attended. Venues were Long Reef (twice), Gibbon and Shark Island, transport to the latter being provided by courtesy of the Secretary, Maritime Services Board, to whom thanks are extended. Fate, however, decreed that once again bad weather was to wash out the field day to Sandon Point.

The unusual finds reported comprised:-

1. A live specimen of *Phenacovolva nectarea* Iredale, 1930, taken by the Underwater Research Group of the Australian Museum in 35 feet of water in Botany Bay on an unidentified species of soft coral (Alcyonacea). This extends the southern range of this particular shell to the locality stated.
2. Specimens of *Diminovula cavanaghi* Iredale, 1931, by Mr. N. Coleman in Botany Bay.
3. A specimen of *Ravitrona poraria theoreta* Iredale, 1939, at Iluka by Mr. R. Allgood.
4. Specimens of *Eratoena gemma* Bavay, 1917, at Iluka, New South Wales, by Mr. N. Gomersall and, subject to verification, a new record for Australia.
5. A specimen of the Pandoriidae by Miss G. Thornley off Yeppoon, Queensland. This is a new record for Australia and details are to be published shortly by the finder.

Lectures during the year were generally well attended. The family Nassaridae was presented by Mr. T. Garrard, Honorary Associate, The Australian Museum; Columbellidae by Miss G. Thornley and Cypraeidae by N. Gomersall. In addition Dr. J. Yaldwyn of the Australian Museum addressed members on "Shrimps and Crabs Living on Corals and Shells" and Mr. D. Boness of Taronga Park on the problems associated with transporting, caring for and training Dolphins. "History of Sea Shells" was the title of the remaining lecture. Where appropriate the above lectures were supported by excellent colour slides.

A film evening was also held, the film being the not to be forgotten "Carnival Under the Sea". Three evenings were devoted to displays of shells by members (who discussed the specimens they displayed) and the classification of shells brought along for that purpose.

And Oh! that Christmas party. It was delightful. as were the colour slides of Vienna shown at that function by Mr. and Mrs. P. Schwerin.

In retrospect I think it fair comment to say that the year has been a successful one. Memories that linger are those of colour slides of living molluscs, sea-anemones and other creatures of the sea, together with rare specimens brought along by members for others less fortunate to examine. All members are encouraged to bring any such slides and specimens to meetings.

Our thanks are extended to the lecturers, the chairman and others who gave of their time and energy during the year. In conclusion and on behalf of all members, I extend sincere thanks to the Trustees of The Australian Museum, to the Director, Dr. F. Talbot, and other members of the Museum staff for the courtesies they have extended to this section of the Society over the past twelve months.

—N. S. GOMERSALL, Hon. Secretary.

Entomological Section Annual Report, 1967-1968

During the past twelve months a variety of lectures have been given to an average of seventeen (17) members and visitors per meeting. Subjects and topics varied from a "Nature Walkabout" with Mr. V. Serventy, to an exploration of caves with Miss B. Dew, a talk on "Wild Life Refuges" by Mr. A. Panagakis, to "Instruction in the Gentle Art of Butterflying" by Mr. C. Haines.

Wood borers were made interesting by Mr. J. French; we learned about "Australian Stink Bugs" from Mr. F. McDonald and "Aphids" from Miss D. White. We were privileged to watch a unique time limit film showing the inside of a moth's egg, and saw the tiny embryo grow, finally to emerge as a larva; this by courtesy of Dr. D. T. Anderson.

Some of our members gave demonstrations of their favourite setting techniques.

One field day was held at North Wahroonga, in September 1967, and an effort was made to save this natural habitat of various species of butterflies from being made into a rubbish dump. This was partly successful.

Another field day was held off because of rain.

Great interest has been shown by various members in *Hypochrysops* and *Ogyris* species, beautiful specimens, some rare, have been exhibited.

A good few colour slides too, have been shown.

In August 1967, the Entomological Section had its eleventh anniversary. We wish it "Many Happy Returns" of the kind of lectures and lecturers reported on and hope attendances will be worthy of them.

—(Mrs.) O. THACKER, Hon. Sec.

Junior Section Third Annual Report

During the year 1967/68 eleven meetings were held with an average attendance of seventeen members and friends per meeting.

It was very gratifying to see the increased interest shown by the Juniors, proved by the constant attendance. Some of this added interest can be attributed to the brighter aspect of the new staff room and the use of the main front door to gain admittance, and we extend our thanks to the Director of the Australian Museum, Dr. F. H. Talbot, for the better facilities.

The large number of the Society's library books and periodicals in constant use by the Juniors is another item of satisfaction.

To our lecturers must go a vote of thanks, for it is due primarily to their high standard of lectures that the Juniors have had such a successful year.

Junior membership to the Society has doubled over the last twelve months.

—L. HARFORD, Chairman.

CHARLES HEDLEY

by Tom Iredale

Our first knowledge of Hedley as a conchologist is concerned in the recounting of one of those extraordinary coincidences which occur daily, and yet are inexplicable by the law of averages or chances. Invalided as a youth through asthmatic troubles, Hedley was living in the south of France, and there, searching for shells, observed another gentleman who appeared to be engaged in the same unusual pusuit. Such an unexpected occasion invited conversation so Hedley courteously inquired of the other, who appeared to be a dapper Frenchman by his attire, etc., if he were seeking shells. As Hedley had voiced his inquiry in French he was surprised to find himself misunderstood, so, venturing, repeated the question in English to which he got a ready affirmative. Cards were exchanged and the stranger turned out to be George French Angas, the great Australian conchologist, sometime previously Secretary of the Australian Museum. At that meeting, Hedley had no thought whatever of coming to Australia, still less of following the calling of conchologist, and had little or no knowledge of the Australian Museum. It was indeed a curious meeting of Elijah and Elisha, each absolutely unconscious of the future relationship, for fate willed it that Angas's *List of the Marine Mollusca of New South Wales* should be followed nearly fifty years later by Hedley's well-known *Check-List*. It may be emphasized that this meeting with Angas had absolutely no bearing upon Hedley's future movements.

We know little of Hedley's later conchological studies until he first appeared in print in the Proceedings of the Royal Society of Queensland when he contributed a botanical paper, but immediately followed it up with his first molluscan essay. In the meanwhile he had first landed in New Zealand in search of health, but finding little improvement there had come to Australia, first trying the hills of New South Wales, then the sea coast of Queensland.

Selecting the Port Curtis district he attempted fruit farming with little success, and then an accident smashing his left elbow and making that arm unfit for heavy work ever after, diverted his attention to molluscan research. Again it is curious that a dangerous mishap should so change the destiny of a life, as, coming to Brisbane for medical treatment, he visited the Museum to work at his snails, and continued there as a voluntary assistant. Later he was engaged and there met Sir William Macgregor, who was preparing to return to New Guinea. Hedley suggested that he should go with him to investigate the attractive land-shell fauna of that inviting land. Macgregor's reply was short, "That land is no fit place for a sick mon," and Hedley, though disappointed, accepted the negation. Judge then, his astonishment and delight when some weeks later he received word from Macgregor that if he still wished to come to New Guinea he would be welcomed. Hedley at once packed up and was soon with Macgregor with whom he got on very well, but little collecting was done through the hurried and business-like methods of the Scotsman. When Macgregor was about to go on the round trip to the Lousiade Archipelago, Hedley asked for a couple of boys and tucker and to be allowed to stay at Milne Bay collecting. Macgregor demurred at first but Hedley's persistence, offering to stay alone, was rewarded by one man and food. Hedley made his collection and as the time drew near, walked overland to meet Macgregor at Port Moresby. So satisfied was Macgregor with Hedley's courage and learning that he offered him a magistracy in the new country. Hedley's bent was however now fixed on a scientific career so he refused this inviting offer. Hedley was however forced through malarial fever to return to Brisbane. His snail captures

proved so interesting that he found he could not do justice to his collection with the limited library and collections in that city. He therefore resigned his post in the Queensland Museum and came down to Sydney, at that time a city with several important conchologists and very fine collections. Dr. J. C. Cox, the chief Trustee of the Australian Museum, had a world-famed collection, while W. H. Hargraves, also a Trustee, was scarcely less famed. Brazier was Conchologist at the Museum, so that there was plenty of assistance to the younger student. Hedley thus wrote up his memorable account of the Land Shells of New Guinea, which was published in the Proceedings of the Linnean Society of New South Wales. His beautiful pen and ink drawings were here seen for the first time, but later these became a striking feature of his work, and were greeted with enthusiasm throughout the conchological world, as being drawn by a conchologist they showed the salient features of the species in a manner easily appreciated by fellow workers while at the same time they were admired as artistic delineations, a very happy combination. At this time he was appointed Assistant Conchologist at the Australian Museum, a great step forward in his scientific life. While he was awaiting the result of his application, Hedley wrote to his father, "If I am appointed I shall work to become the first conchologist in Australia." To us today, with his brilliant achievements before us, this seems a modest aim, but at that period, as noted above, there were three or more first rate conchologists in Sydney, and it must be remembered that up to now Hedley had been more interested in the anatomy of land shells than in conchology generally, and there was an immense field to cover. Further, Hedley was dependent on the traditional nomination of Angas, Brazier, Cox and others instead of the scientific determinations he was desirous of. To make his nomenclature certain it became necessary to accumulate literature and this Hedley did, mostly at his own expense, until, today, the library of conchological works relating to Australian mollusca in the Australian Museum is very complete, and contains many very rare books missing from most scientific libraries throughout the world. These were got together at no little expense by Hedley and presented to the Australian Museum. At the same time Hedley began the preparation of a card catalogue of all the references relating to the mollusca of Australia, and kept revising this until it remains a wondrous monument of his inexhaustible energy.

To refer to this catalogue, which, through the gift of Mrs. Hedley, is now permanently housed in the Australian Museum, is to become amazed that Hedley ever found time to do any other work. Yet this was only a feature developed in his hours after routine work. After twenty years service at the Museum, Hedley was granted long service leave, and visited the most important museums in the Northern Hemisphere and, taking his card catalogue with him, he reviewed in a very short time all the points he had been dubious upon throughout this twenty years. At the same time he took to London specimens of all the species whose traditional identification seemed at all doubtful, though superficially in agreement, and checked all with the type series in the British Museum. If this were all the scientific work Hedley had performed his claim to be one of the world's greatest conchologists could scarcely be denied, yet in reality this is only a small portion.

When the British expedition to Funafuti was promoted Sydney was utilised as a working base, and the Sydney Committee seized the opportunity for the attachment of an Australian scientist, and Hedley was selected. How he acquitted himself on that Expedition became history as the Australian Museum published a Memoir dealing with his collections. Hedley treated of the Ethnology himself, a study he had become interested in while in New Guinea, and also prepared the general account but his essay on the Mollusca has become a classic. In the introduction to

that group Hedley wrote his notable complaint of the manner in which British conchologists had handled collections from the Pacific Islands, so that it was with the greatest difficulty that any one outside London could understand their results. His plain speaking was commented upon with some feeling but its sincerity was accepted. His own report was somewhat weak because of the poor basis afforded by the British predecessors but nevertheless it was a great advance on anything previously offered, and to the thinking conchologists throughout the world Hedley's name became familiar as that of a serious worker worthy of recognition and acclamation. Though, owing to the manner in which the hands of the Australian Committee were tied in connection with the scientific results of the Expedition, Hedley was not allowed to publish his views of coral formation from his experience on Funafuti, he was not otherwise restricted, and began that series of philosophical essays on Zoogeography, mainly based on conchological research, that have made him famed wherever zoogeographical problems are approached. An original thinker, all his conclusions did not meet with instant acceptance but there can be no gainsaying that they furnish a brilliant page in connection with Australian zoology. In one essay he submitted a scheme and nomination for the exact subdivision of the marine zoological areas of Australia, and all recent research has completely justified his judgment. Here again we may say that sufficient originality was provided to merit worldwide recognition, but apparently Hedley was endowed with almost superhuman energy, as he now undertook the investigation of the Continental Shelf of Australia.

Devising new methods of attack he made a series of hauls of the greatest value. Apart from the "Challenger" expedition, no one had touched the bottom below 100 fathoms, and Hedley attempted to dredge in as much as 800 fathoms with some success. Accepting an unexpected opportunity he took his dredges and wire to New Zealand and there, with the co-operation of local conchologists, made the first hauls over the 100 fathom line in Dominion waters. Not content, he also dredged in Tasmanian waters below that limit, again the pioneer in this work, and then followed up by similar deepsea hauls in South Australia, being anticipated in this last State by his great friend, Sir Joseph C. Verco, who had earlier, at Hedley's instigation, followed Hedley's example.

Such a record of deepsea work stands to the credit of no other worker in the world and again be it recalled that these dredgings were carried out at great expense to himself. The collections of deepsea shells were reviewed by Hedley himself in great detail, and, since he forsook the field through lack of friendly cooperation in the enterprise, no further attempts to unravel the inviting mysteries of our deep were made for very many years.

The problems of Antarctic zoology always called Hedley, and many times over twenty years he approached the subject, applying accurately the analytical powers of his brain. Hedley's essays have always to be carefully considered by every writer upon this entrancing matter. His name lives in conjunction with one of the most widely accepted theories regarding that mysterious dead continent. Later on Hedley was afforded the opportunity of working out the mollusca collected by the Mawson Expedition of 1911-1914 and furnished an excellent report reviewing the extralimital accounts for the benefit of local students. So thoroughly did he perform this duty that he got together a series of papers on the subject, and, as before, these were secured at his own expense and presented to the Australian Museum.

Thus the tale runs, enthusiasm of the greatest order coupled with great ability and unsurpassable energy so scientifically applied that it becomes a marvel to his successors.

As a conchologist Hedley set up a standard equal to the world's best, and was acknowledged as a peer by those world famous conchologists,

Pilsbry, Dall, Smith, Crosse and Fischer, and of course stands alone unrivalled in Australian literature. He welded together into a scientific whole the labours of his predecessors, disentangling synonymy, rehabilitating species, figuring all unpictured species and preparing many papers elucidating obscure points. He established valid bases for further research by means of his Lists of Marine Mollusca of Queensland, New South Wales and Western Australia, assisting May with his Tasmanian List, and advising Pritchard, Gatliff and Gabriel in connection with their Victorian List, while he was always in correspondence with Verco with regard to South Australian mollusca. To particularise with regard to his own State, he found that the marine fauna had been well catalogued by Angas, and almost doubled by the great activity of that wonderful collector, Brazier, yet he managed to add half as many again and amassed a total of over 1,200 species, a faunula probably unequalled in any part of the world outside the tropics. He listed these 1,200 and saw that every species was recognisable by means of an excellent figure and that its scientific history was open reading. Very many of the species had depended upon traditional determinations alone, and all these he stabilised by means of figures, very many prepared by himself or by others at his own expense. This task he made a major labour of love, so that he once remarked, "Even if my conclusions should prove incorrect my figures will always be useful."

Though marine mollusca have been more noticed above, it must be remembered that Hedley's first love was the land snails, and all through his busy life he had before him the object of a complete illustrated catalogue of the land shells of Australia. To this end he collaborated with Pettard on the land shells of Tasmania, with Cox on those of Victoria, wrote some papers on those of Queensland (his first conchological paper was a list of the recorded land shells of Queensland) and was engaged in the discrimination of the minute forms at the time of his retirement as a conchologist, and almost his last paper on conchology was the description of some of these minutiae he had figured.

His early paper on the New Guinea Land Mollusca is still one of the most valuable contributions to that fauna and it may be mentioned that when Suter sent a Reference List of the Land Snails of New Zealand to Hedley for presentation to the Linnean Society of New South Wales with a request for assistance, Hedley so emended it that Suter demanded that Hedley's name must be added as collaborator and moreover take precedence, an act worthy of both these great conchologists. Altogether Hedley wrote some 200 papers, some of them of great length and all important, the bulkiest and one of the most valuable being his Monograph of the Australian Turridae, running into nearly 150 pages, with 15 text-figures and 15 plates with 198 beautiful illustrations. Hedley's enthusiasm, energy and industry indubitably indicated that he would gain the highest honours in the scientific world, and we now know that he achieved most that were available in Australia. At various times he was President of the Royal Society of New South Wales, President of the Linnean Society of New South Wales, President of the Royal Zoological Society of New South Wales, President of the Field Naturalists' Society, and President of the Biological Section of the Australasian Association for the Advancement of Science. He received the David Syme prize and later the Clarke Medal of the Royal Society of New South Wales, and just before his death was created a Fellow of the New Zealand Institute. For many years he was a Fellow of the Linnean Society of London, a Corresponding Member of the Academy of Sciences of Philadelphia, a Corresponding Member of the Zoological Society of London as well as an Honorary Member of the Royal Societies of Queensland, South Australia, &c. As a pioner in zoological research, Hedley stands unrivalled, as he initiated all our best known subjects,

such as local exploration of the Great Barrier Reef, deepsea dredging on the continental shelf, local investigation of coral reef problems, accurate lists, etc., and here must be made special mention of two of his original essays.

In 1907, with T. Griffith Taylor (one of the most famed geographers in the world), Hedley propounded a novel origin of the structure of Coral Reefs. This theory had been suggested to Hedley by his studies on Funafuti ten years previously, but had been withheld on account of opposition, and was therefore now declared in conjunction with Griffith Taylor from renewed investigations on the Great Barrier Reef in Queensland. Though not immediately accepted Hedley's views are now gaining recognition. In 1915 an Ecological Sketch of the Sydney Beaches was submitted which provides a delightful study of the personality of this gifted scientist, as, breaking ground on a new subject, the "Sketch" is so complete and painstaking that it causes all students to rank it as a classic at first study.

The man himself, what was he like? As a worker he felt very seriously and wrote very vigorously and fearlessly, at times causing feeling, but he never bore any personal rancour, and was the essence of courtesy in his personal treatment of every scientist. As instance, early in his career he had a paper controversy with Edgar Smith of the British Museum on account of the latter's misusage (so it appeared to Hedley) of his great opportunities. Some home truths hurt Smith, and some years later he inquired of me, "What was Hedley like?" Upon my response, Smith replied "H'm". A few year later Hedley met Smith; I had the pleasure of personally introducing them, and afterwards I asked Smith, "What was Hedley like?" He then agreed wholeheartedly with my encomiums, and for his part Hedley wrote a delightful account of his appreciation of Smith from his personal experience.

Full of enthusiasm to assist those younger, Hedley gave well of his time to all deserving, without care for his own work, making it up with midnight oil. Hedley was always fond of botany while ethnology had claimed attention, and much intensive reading made him a "full man" so that as a companion upon a bush walk he was incomparable. Nothing escaped his notice and about most natural history objects he would recall an anecdote and thus fix the desired items in the hearer's mind. Most of us who have had the opportunity of such acquaintanceship remember his well-told tales and the points they were intended to emphasize. This method of anecdote he carried into his public lectures which were always fully attended and enjoyed. It is so difficult to cover all his scientific enterprises that we almost overlook the fact that when the Taronga Park Zoological Gardens were opened Hedley provided a Guide, an extraordinary work of compilation and writing, and then we further recall that he was a prime mover in the acquirement of the Taronga site, and the designing of the Gardens themselves, being one of the old Zoological Society members retained on the New Trust.

The Bibliography of Hedley's writings, published elsewhere[1] if studied, will help to convey to the reader the many-sided nature of this great lover of natural science, whose life was wholly devoted to its study.

It would be difficult to suggest from so varied a list of subjects what was his greatest delight did we not know that the Great Barrier Reef was his own selection, and that he desired that his ashes be cast thereon, a wish fully carried out.

He had compiled a bibliography of papers dealing with the Reef, and was engaged on a monographic study of their corals, dealing with these in the same systematic manner as he had worked at the mollusca, getting together large collections and complete literature.

[1] Iredale, 1958, Proc. Roy. Zool. Soc. N.S.Wales, 1956-57, pp. 118-139.

Thus we remember that he was a born collector, one of those rare individuals whose eyes practically automatically (but really from experience and keen study) select the rare item out of the thousands lying on the strand wherever he landed. As a mechanical record, it may be pointed out that when he took charge of the Conchological Department of the Australian Museum the Register did not show 1,000 good localized sets of molluscs, and when he resigned a total of 52,000 had been reached, mostly collected by himself. Many times he collected on the Great Barrier Reef, but he also went into the Gulf of Carpentaria and visited New Caledonia and thrice or more times New Zealand, bringing back large collections each time. As one result the Australian Museum has the largest and most complete collection of Pacific Ocean and Australasian mollusca in the world.

Definite dates count for very little in such a full life as Hedley's, but it must be added for historical purposes that Charles Hedley was born at Masham, Yorkshire, on February 27, 1862 and died in Sydney on September 14, 1926. Through ill-health his school-life was broken and he had to winter in the South of France or Italy with such small success that he came out to New Zealand in 1881 but did not stay there long, coming over to Australia in 1882. In 1889 he became attached to the Queensland Museum, resigning in 1890, and receiving the appointment to the Australian Museum in 1891, from which he resigned in 1925, taking over the duties of Director of the Great Barrier Reef Investigation. It is somewhat bewildering to find that he admitted having any Recreation, but in an early "Who's Who" this is is listed as Yachting. He once pleaded guilty to being "mad on mountains", as he became a member of the Alpine Club, a great honour, in his 'teens. He investigated the fauna of Kosciusko, but greater heights called him and he visited Alaska to climb the Snow Mountains there, and travelled through South Africa after having reached the snow line of Kilimanjaro. He had climbed the New Zealand Alps and was planning to visit Fujiyama in Japan and afterwards the Himalayas.

To conclude this imperfect tribute I may be allowed to draw attention to the beauty of his prose, the selection of his words, so that the memory of them lingers, and to quote a peroration that delighted every listener in the London Linnean Society's Rooms:

"In the long perspective of past time Antarctica appears to fade and form like a summer cloud, now extending a limb, now shedding it, now resolving into a continent, now dissolving into an archipelago. At present it lies dead and cold under its white winding sheet of snow. By the light of the magician's lamp we watch the summer of the cycles dawn. The glow of life returns, the ice mask melts, green spreads a mantle. At last a vision comes of rippling brooks, of singing birds, of blossoming flowers and of forest glades in the heart of Antarctica."

CAPTAIN ABEL D. W. BEST (1816-1845), A SOLDIER-NATURALIST AND HIS DIARIES

by Tom Iredale & G. P. Whitley

Abel Dottin William Best was born in England on 16 July 1816. He was educated at Sandhurst from 1831 to 1835 and left England with the rank of Ensign in the 80th Regiment of Foot (Staffordshire Volunteers) in June 1837, arriving at Sydney in October 1837. Purely a professional soldier, Best was nevertheless interested in natural history, mainly collecting beetles and birds, yet he seems to have been quite overlooked by chroniclers of the history of Australian zoology. After spending some time in New South Wales, Best went to Norfolk Island in 1838 and 1839. He wrote a journal covering the period of these travels and continuing to relate his experiences in New Zealand from 1840 to 1843. In the North Island, he accompanied the famous Dr. E. Dieffenbach and Captain Symonds[1] of the 96th Regiment on their explorations. The journal ends suddenly on 8 February 1843.

A. D. W. Best had been promoted to Lieutenant on 4 October 1839 (*Army List,* 1840, p. 232) and Captain on 2 July 1841 (*Army List,* 1843, p. 277). He was the author of several works based on his journals and letters, mostly published posthumously (Best, 1842, 1935 and 1966). The *Sydney Morning Herald* of 10 August 1844 (page 3, column 7) stated that Captain Best was to leave Sydney on 12 August 1844 by the *Briton.* This ship was wrecked on the Andaman Islands so Best did not reach Calcutta until 18 January 1845. He had not long to live, for Captain A. D. Best was killed at the head of his men at the battle of Ferozeshah, in the Sikh War, on 21 December, 1845[2].

Best's Journal

The Sydney bookseller and bibliophile, Mr. Kenneth R. Stewart, showed the three volumes of Best's manuscript journal to the senior author some years ago, since when, its owner, Mr. J. W. Cooper of Harbord, New South Wales, sold it to the Alexander Turnbull Library, Wellington, New Zealand, the Trustees of which have since published it as a book (Best, 1966).

On his voyage from England to Australia, Best mentioned birds and fishes in a general way. The freshwater mullet, perch and herring of New South Wales; the whale attacked by "thrashers" at Norfolk Island in September 1838, various sharks, fishes (such as groupers and "trevalliers") of Norfolk Island are mentioned as are also the "kawai", hapuku and other New Zealand fishes. He does not give scientific names to his animals but many of these have been supplied in the book edition of his journal (Best, 1966). From this, for example, we learn that his "Wood Quest" was a Pigeon, *Hemiphaga novaeseelandiae.* Other noteworthy birds from Norfolk Island included the Parrot (now extinct), the "White Swallow" which was the White Tern and the "Black and White Swallows" which were Wideawakes. Modern scientific names for these appear in Turner, Smithers & Hoogland (1968).

One new species of beetle from Norfolk Island was named *Schizorhina bestii* by Westwood (1842).

The extracts from Best's Journal given below, and referring mainly to Australasian fauna, were copied from the original manuscript before it went to New Zealand.

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[1] Captain W. C. Symonds was killed by a shark, 23 November 1841 in New Zealand (see Best, 1842, p. 204).

[2] James P. Jones, 1923, *History of the South Staffordshire Regiment,* pp. 59 & 60.

Extracts from A. D. W. Best's Journal

June 26, 1837. [(Sublieutenant) Ensign only. Lieut. Bridge in command of Guard of the Convict Ship "James Pattison" left Chatham, reached Gravesend, lighted to ship at Deptford, no one there, slept on board anywhere]. Thus ended my first day of active duty.

July 15. Sailed.

July 16. Was my birthday.

October 25, 1837. Splash went the anchor in the water and my first voyage from London to Sydney was finished.

NEW SOUTH WALES—1837.

October 26. [To Parramatta by boat 16 miles in 2 hours.]

October 27. [Marched to Windsor.]

From October 28 to January 5, 1838, no write up. Being fairly settled I turned my attention to the zoology of the country.

Jan. 5, 1838. I was ordered to Berrima a distance of ninety eight miles hired a cart horse. At four o'clock I started with . . . a box in which I intended to put any beetles I might meet with by the way.

Jan. 14, 1838. (After return to Windsor.) I put to death a few beetles I had brought home with me.

Jan. 16. Went out caught beetles.

Jan. 23. Went out for beetles hunted without success.

Jan. 24. After breakfast called upon Mr. North where I got some beetles and whales teeth or tusks. Came home and arranged my new acquisitions.

Jan. 25. Went out and got a few beetles.

Jan. 26. Drew all the morning in the cool, caught beetles.

Feb. 5, 1838. Court martial at Parramatta ended at 2. Early dinner at ½ past three, then hunted beetles till six.

Feb. 6. The beetles occupied me until four o'clock.

March 12. Along the Sydney road . . . I fell in with a Pelican, which after much difficulty I got a shot at and killed. The Pelican was very heavy. I had carried him some distance when I fell in with a cart and agreed with the driver who was going to Windsor to bring it next morning.

March 13. My bird arrived and went immediately to be stuffed. My bird came home during the day.

March 15. Went to Sydney arrived at nine and breakfasted with Major Nunn and afterwards took a letter to Capt. Best 50th Regt.[3] who had just come up from Norfolk Island. Met and was introduced to him on the Parade; he invited me to stay with him during my sojourn in Sydney.

March 23. The Major came and congratulated me. I asked what for when he said that one of our Lieutenants had sent in his papers and that I being next for purchase he had hastened with the good news.

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[3] By a curious coincidence, A. D. W. Best was befriended in Sydney and at Norfolk Island by a huge, considerably older man with the same surname and rank, a much senior Captain Best. The latter was the Hon. John Charles Best of the 50th Regiment (The Queen's Own) Regiment of Foot. He had been an Ensign, 21 June 1827. Lieutenant, 29 October 1829; and Captain, 15 August 1834 (*Army List,* 1840). He was drowned at Norfolk Island in 1839 and his death is reported in the *Army List,* 1841, p. 521 and in Best, 1966, p. 165, footnote 55 and page 213. Their first meeting in Sydney was succinctly recorded in A. D. W. Best's journal as "Best, Best. *Shake paw.*"

March 25. We shall have to furnish one or both of the above mentioned stations, most probably Norfolk Island and these changes are the more consequence to me as I am the only Sub at present disposable.

March 27. Went out for some Quail. I had some talk with an old man who I found destroying one of their favourite haunts by clearing it of a kind of weedy underwood or scrub, he told me that the Quail had paired and that he had found several nests with eggs. I shall therefore give up shooting them for the season.

April 15. The first manuscript volume of my journal is now complete . . . I dedicate these my scribblings to my beloved sister R. E. B. Best requesting that they may be considered sacred from the *world* in general and preserved untill demanded in person by A. D. W. Best, the author.

Volume II.

April 18, 1838. Wallabi hunt . . . Upwards of a month elapsed without affording anything the description of which would entertain.

May 23. Levee in honor of Her Majesty's birthday tomorrow so I left for Sydney.

May 24. Sir G. Gipps the Governor. [From 25 May to August nothing.] On the 3rd August having received orders to hold myself in readiness to march on the following Friday for Norfolk Island I went to Sydney getting in between seven and eight I proceeded to Best's Quarters and there met Lieut. Lugard, R.E. to whom Best introduced me as the other "Poor Norfolk Island Devil"', from this we naturally inferred that we were to be fellow passengers on board the *Governor Phillip.*

August 18. Weighed anchor.

August 25. [Reached Norfolk Island.]

NORFOLK ISLAND—1838.

Sept. 17, 1838. After breakfast went to Long Ridge with Lugard to shoot pigeons. We killed a few and determined to come again with plenty of powder and shot the next day.

Sept. 18. After breakfast went down to the Bay to shoot plover and curlew. We killed about ten brace and then came home to Luncheon. Lugard and I then went up to Longridge and shot 25 (twentyfive) pigeons.

Sept. 21. Went out with Hill to shoot Lowries. We shot five or six.

Sept. 22. Got up at six to skin my birds, found them all too much shot about the body, so cut off the wings and tail.

Sept. 24. Went to Phillip Island. We shot about a couple of rabbits, saw plenty of tracks of Pigs and Goats but not the substance.

Sept. 28. We shot plover in Emily Bay. We only killed a very few.

Sept. 29. At ten we started with our four dogs to hunt wild cats you must know that the reason I am so inveterate against them is that they destroy Quail and we intend introducing them again. It was tried once but the cats soon cleared them off.

Oct. 5. About twelve went to Longridge to hunt Cats and shoot pigeons. One cat I shot I measured. It was 32 inches long and 13 high.

Oct. 6. I took my gun and killed a few pigeons.

Oct. 12. Went to Phillip Island, having killed between the four who shot at least fifty couple of Rabbits of which we brought upwards of forty couple away with us. One of the men saw ten wild goats and we all heard the crowing of the wild fowls but only one cock was seen.

Oct. 13 to 24. Went fishing one day, rode another, shot pigeons a third.

Oct. 31. Took my gun up to Longridge to shoot Pigeons, only killed two.

Nov. 1. We went first to Steele's Point for White Swallows they were too wild however to allow themselves to be knocked down and out of four I shot only one was fit for stuffing. A man we met offered to show me a pair of fine Wood Quests. We went with him, found them, and I killed one the other flew away. Giving up the chase of the truant we descended the cliffs to a small bay off which there was an Island abounding with sea birds. Storey and the other man swam off to it but the birds were so wild that they only took three black and white Swallows, a pair of Mutton Birds and a slate colored bird. I shot a pair of slate colored birds and a Mutton bird. Ascending the cliffs . . . in another attempt I killed the Wood Quest.

Nov. 2. Went to Duncombes Bay where we cliffed to the bottom by a way where it is said no Officer had ever passed before. Here was the Island where we hoped to get many birds. Storey and myself swam over; the distance was not great but the current was very strong. We remained hunting the birds about two hours but they had done hatching and were so wild that we only got three black and white Swallows, a pair of Mutton Birds and a young Gannet. We then swam back. Storey went to catch some Boatswains. In an hour or more he returned with three.

(N.B. For a very long time I have not written a line. The first thing put into my hands was a box of papers which I was requested to take care of and give to Mr. Best. I opened the box and to my great delight found it full of letters and papers).

Jan. 31, 1839. I now resume my journal.

March 19. I went back to the Barracks and procured permission to shoot in the Settlement. In course of the afternon I killed eleven [pigeons] and might have got more had I not become tired.

March 20. Fell to slaying pigeons and Tyssen and myself bagged nineteen.

March 21. I made one of a party who went in search of Wood Quests. We left the Settlement with Storey for our guide about eleven and went first to Cascade, from hence I went along the road to Mount Pitt (Lugard and Storey keeping in the Gullies to the right) and reached the summit without seeing a bird in the Wood Quest shape. I knocked down several small birds with a long stick. Lugard soon joined us without any game although his guide had seen four. On our road homeward the order of march was changed, Tyssen and I going with Storey while the others kept the road. We had not gone far when up in a tree which the other two had passed I heard a Wood Quest's cry and it was killed. This was the only one we found.

[*April 4.* Mr. Thoms of the Commissariat Dept., a Treasury Clerk landed on the 4th.]

April 7, 1839. By the bye Mr. Thoms is an Entymologist and has some good works on the subject.

April 9. I am grown quite a farmer and then returning employed the greater part of the afternoon in applying preservative to my beetles. [Not mentioned before on Norfolk Island.]

April 11. Here ends the journal or log which was written by me actually on Norfolk Island. I do not now remember the reason for my not continuing it, in fact I do not think I had one. I now add some remarks.

NORFOLK ISLAND NOTES—1839.

The Mutiny of the troops on the 1st July . . . in consequence of it the detacht was relieved, the *Alligator* Sloop of War and the *Cornwall* taken up as a transport bringing down a detacht. of the 50th Regt. for that purpose.

Major Ryan assumed the command and we returned to Sydney in the *Cornwall.* Major Ryan remained in command for some seven months

during which time Capt. Best 50th Regt. was lost in crossing the Bar on his return from a shooting party at Phillip Island. Capt. Maconochie, R.N. now assumed the command.

NEW ZEALAND—1840.

[*April, 1840*:] It having been determined that the New Zealanders were to be blessed with all the accompanyments of British Govt., on the 4th April a Detachment of the 80th Regiment, consisting of one Major, one Capt., one Lieut., one Ensign, three Sergeants, and 80 rank and file embarked on the *Buffalo* Store Ship in order to do duty there, that is in New Zealand.

Nov. 29. Port Nicholson. Went for a walk in the bush and picked up some fine specimens of the beetle tribe. In the evening amused myself by assorting them.

[The Journal for the period *March 31 to June 30, 1841* when Best was in the North Island of New Zealand was printed in Best, 1842. Natural history items were as follows:]

April 7 [*1841*]. Captured some beetles.

April 9. Dieffenbach got a Native Rat and I procured a few beetles.

April 10. We procured specimens of the Katipo a spider held in great awe by the Mauries it is an ugly insect with a round black body about the size of a pea. Its bite is said to be venomous producing a total prostration of strength frequently terminating in death. I secured half a dozen in a tin box.

April 20. Te Warra amused us with accounts of the Kakapo a species of Kiwi Kiwi as large as a Turkey and of the Moia a species of Ostrich supposed to be extinct. Both these birds are said by some to exist in the Middle Island. The Mauri who carried the box in which was the bottle containing all our insects and reptiles let it go by the run smashed it all to bits and lost both spirits and insects.

Sept. 6. Fine day wandered about the country and collected a few beetles.

Sept. 15 & 16. Tremendous gales with heavy rain. Read Yates's New Zealand. d - - - d trash.

Oct. 1. Prepared a case for England to go by the Planter and wrote letters.

Oct. 7. During the day repaired Insect cases.

Oct. 8. Dieffenbach left in the Kate to go to England in the Planter.

Oct. 15. Collected Beetles.

Oct. 19. Rain untill noon arranged beetles.

Oct. 26. Beautiful weather. I have from good authority that the bite of the Katipo is as severe as the Mauris describe. Persons bitten break out into blotches and are in a high fever. Bleeding and emetics are most effectual remedies. From the same source I learn that we were altogether mistaken in the Idea we had formed of the Kakapo unless the Bird so named in the Northern Island differs greatly from that on the Middle. Mr. Morant, a person whom I have before spoken of, an old settler and a good authority assures me that the Kakapo is incapable of flight that he has often killed and eaten them but has never seen them in the Northern Island. Again a chief at Taupo presented Dieffenbach with some feathers of the Kakapo from which he (Dr. Dieffenbach) concluded that it was allied to the Pheasant. These feathers were very old and much valued they had been handed down as an heirloom. Kakapo the name would imply a relation to the Kaka a bird well known.

My collection of beetles gets on slowly. Tomaté brought me in some large grubs which he cut out of the Puridi tree. I endeavoured to preserve them with a view to ascertaining what they are the Larvae of. However they have all died but one.

Jan. 22, 1843. Hearing that Farrow had a Kiwi I went over to Otu Moetai to see it. My friend . . . described the Kakapo[4] as having formerly been plentiful in the woods between Tauronga and Rotorua. It was a bird like a green Kaka but larger in its bill only did it differ and that resembled that of a Kiwi. Its wings were almost useless it could not fly.

Acknowledgments

For biographical information on, and literary references to Best, we are indebted to the Mitchell Library, and the Public Library of New South Wales, Sydney.

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[4] G. R. Gray, 1844-45, "Birds" of the "Erebus" & "Terror", p. 9, says of the "Kakapo": Mr. Hughes, a whaling master at Moiraki, ... had had a living specimen in his possession some years ago. Mr. H. said that it had a long tail; the bill was hooked like a hawk or a parrot's; and that it was very strong on the wing, and would attack other birds, even the *Nestor meridionalis,* to which it was little inferior in size.

GERARD KREFFT (1830-1881) AND HIS BIBLIOGRAPHY

by G. P. Whitley

(Plate X)

In these *Proceedings* for 1958-59, I published (Whitley, 1961) an account of the life and work of the naturalist, Gerard Krefft (1830-1881) and provided a bibliography of his writings. Since an account of him is to be prepared for the *Australian Dictionary of Biography*, it seems worth while to print here a fresh portrait of him, as a young man, and some additions to or elaborations of his bibliography. Appreciation of Krefft is growing in zoological and palaeontological circles and we shall soon be celebrating the centenary of his discovery—perhaps his most important discovery,—of the Queensland Lungfish.

On the lighter side, I have published elsewhere (Whitley, 1966, pl. xviii) a cartoon of Krefft with a joke which, like the following item, has now lost its point:

In "Parliamentary Pickings" (*Illustrated Sydney News,* Aug. 19, 1876, p. 6), the "Museum-cum-Krefft nuisance" is noted as settled and there is part of a cartoon on page 5 of a man sitting on a flounder, captioned "The great Museum Cura - - - - osity is floundered."

This refers to the dispute between the Curator, Krefft, and the trustees of the Australian Museum (see Whitley, 1961, p. 24).

An obituary notice of Krefft appeared in the *Australian Town and Country Journal,* Feb. 26, 1881, p. 407.

Apparently one of Gerard Krefft's grandchildren, Gerard Alfred Krefft (late 35/36 Battalion, 1st. A.I.F. and 7th Garrison Battalion, 2nd. A.I.F.), died in Sydney on 25th January, 1965.

I have also seen, in the Mitchell Library, Sydney, some manuscripts of Krefft's, bound in J. S. Bray's book of newscuttings concerning the natural history of the North Shore of Sydney (Mitchell Lib. MSS., A.199). These dealt with insects and with a new bat from Wilson River, Central Queensland, referred to as *Desmodus campbelli* in *Krefft's Nature in Australia,* i, 1877, p. 3. Also in the Mitchell Library are some Krefft drawings[1] painted on Blandowski's expedition (MSS., D.9, showing mammals, aborigines and scenery) and some notebooks by Krefft's son, Hermann (MSS., B.136-139). All these manuscripts are additional to those mentioned in my 1961 paper.

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[1] Krefft had exhibited some of his drawings at the Victorian Industrial Society's Exhibition in Melbourne in February, 1858, because we read in *The Illustrated Journal of Australasia* (Melbourne: Slater), vol. 4, 1858, p. 105:-

"Mr. Krefft's drawings have a special interest, as they are illustrations from the life of some of the more curious animals, &c. . . ., of the country, taken during the late expedition to the Murray, with Mr. Blandowski. The most striking is that of a native corroboree, at Gall Gall, and of the rare animal, the chaeropus, about which there has of late been so much controversy."

A drawing by Krefft of the pig-footed bandicoot, *Chaeropus ecaudatus,* is to be found amongst the James Stuart paintings on loan to the Mitchell Library from the Linnean Society of New South Wales.

Acknowledgments

I am grateful to the Mitchell Library, Sydney, for access to books, manuscripts, drawings and newspapers relating to Krefft, and to the Director of the Australian Museum for the photograph reproduced here from a portrait in the Museum's old photograph albums.

ADDITIONS AND MODIFICATIONS TO THE BIBLIOGRAPHY OF GERARD KREFFT WITH ANNOTATIONS

1862. Snakes and snake-bites.
Sydney Morning Herald (newspaper), Oct. 3, 1862, p. 3.

1862. The vertebrated animals of the Lower Murray and Darling.
Sydney Morning Herald, October 24, 1862, p. 2 (five columns). [Observations on mammals, some date as far back as 1852, but mostly at Gol Gol with Williams and natives. Species mentioned are those of Gould, Gray, Leach etc. However:- The Dusky Mouse or Pettrack of the Natives, "apparently an undescribed species (for which I would propose the name of *Mus subrufus Murrayensis*), is found in large numbers between Gol Gol Creek and the Darling . . . . "]
[Krefft mentions too a *Phascogale penicillata,* a name not in Iredale & Troughton's 1934 Check-list of mammals (Austr. Mus. Mem. vi, 1934), also *Antechinus albipes*].

1864. [By G. Krefft?] "List of Donations to the Australian Museum during May 1864."
Empire (newspaper, Sydney), June 13, 1864, p. 5.
[Includes, inter alia,]
"Six new species of Australian land shells—Helix nitida, Helix Morti, Helix sericatula, Helix Strangei, Helix Belli and Bulimus Jacksonensis. By Mr. John MacGillivray, F.R.G.S.
"Three species of freshwater fishes, Therapon mipticus, Oligorus Macquariensis, and Plotosus tandanus . . .
"A collection of reptiles . . . . Presented by Mr. Gerard Krefft.
[Many scientific names are given including (nude) new genera of Frogs: Neobatrachus pictus (g.n.)
Camariolius varius (g.n.)
Hyperiolius bicolor (g.n.)
Mixophyes fasciolatus (g.n.)]
"Three new species of Australian frogs from the Clarence River, (Litoria Wilcoxi, Cryptotis Crevis, and Mixophyes Fasciolatus). By Mr. James F. Wilcox."

1864. [A paper on Australian Reptiles]
Petermann's Mittheilungen, 1864, p. 152—*fide* a letter to Krefft from A. Lomonossoff, Siberia, Jan. 1867 (Original in Mitchell Library, Krefft MSS, A.262).

1867. Mr. Krefft's Report on the Fossil Remains found in the Caves of Wellington Valley. *Illustrated Sydney News,* July 16, 1867, pp. 204-205. [Krefft visited Wellington Caves in November 1866—G.P.W.].

1869. Rock snakes. *The Australasian* (newspaper, Melbourne), 6 (149), Feb. 6, 1869, p. 187 [python and eggs].

[1871] [Letter in reply to W. S. Wall's letter concerning Sunfish.]
Sydney Morning Herald, Dec. 18, [1871], also Dec. 20 and 22.

1872. Natural History. The Natural History of New South Wales. Entomology—(Continued). *Sydney Mail,* Jan. 6, 1872, p. 9; Jan. 13, p. 51; Jan. 20, p. 88. Jan. 27, p. 104; Feb. 3, p. 137; Feb. 10, pp. 168-169; March 9, p. 296; March 16, p. 338; March 30, p. 411.

1872. The Wombats. *Sydney Mail,* April 6, p. 426. [Includes *Phascolomys assimilis,* sp.n., later publ. in 1873.]

1872. The Phalanger Tribe . . . [2]*Sydney Mail,* April 13, p. 455; April 20, p. 488. April 27, p. 520; May 25, p. 649, figs. 1-14 [of *Thylacoleo* by E. Mason, including *T. robustus,* sp.n., fig. 3]; June 1, p. 681, figs. 1-9 [by Krefft of *Phascolomys* spp.]; June 8, p. 713, figs. 1-5 [skull, teeth and reconstruction of *Zygomaturus*]; June 22, p. 777; June 29, p. 821 [*Phalangista* spp., including *P. rufescens,* sp.n., Port Denison, not in Iredale & Troughton, 1934—G.P.W.]; July 6, p. 9, figs. 1-10 [Text: *Tarsipes,* figures: *Diprotodon* spp.]

1872. A Cuvierian Principle in Palaeontology . . . By Professor Owen . . . Reviewed by Gerard Krefft. *Sydney Mail,* May 18, 1872, pp. 626-627. [Mentions, in passing . . . "this plate, lithographed by Mrs. Forde, was printed at the Government Printing Office in 1870 with seventeen other plates of fossil remains (by Miss Scott and Mrs. Forde), which, however, for want of funds, have never been published. I was desired to give Professor Owen all the information I could, and I kept nothing back . . ." Also long discussion on dentition of Thylacoleo. Then Krefft's smaller, duly-established genus *Plectodon* (p. 626)[3] with at least three species. On p. 627, a Postscript refers to Krefft's drawing teeth of *Thylacoleo* for a future issue.]

1872. The Kangaroo Tribe. *Sydney Mail,* July 13, p. 40. (see also below).

1872. Natural History. *Sydney Mail,* July 20, p. 73, figs. 1-2 [*Tarsipes rostratus* and *Dactylopsila trivirgata* figured; brief note on *Gymnobelideus.*]

1872. The Kangaroo Tribe—(Continued). *Sydney Mail,* July 27, p. 104 [*Lagorchestes* spp.]; Aug. 3, p. 137; Aug. 10, p. 169; Aug. 17, p. 201 & figure [of flying squirrel with young clinging to its neck]; Aug. 24, p. 248. Sept. 7, p. 310; Sept. 14, p. 327 [*Pachygnathus,* gen. nov., fossil, and *Halmaturotherium,* gen. nov., fossil, both caelebs, marsupials. The first is preocc. by Swainson, 1839, in fishes—G.P.W.]

1872. The Bandicoot Tribe. *Sydney Mail* Sept. 21, p. 374; Sept. 28, p. 406; and Oct. 5, p. 422.

1872. Letter to the Editor. *Sydney Mail,* Oct. 5, 1872, p. 422 [Re bunyips, salmon, "Tigers" of north Queensland, etc. and *Zygomaturus.*]

1872. The Native Cat Family, or Dasyuridae. *Sydney Mail,* Oct. 12, 1872, p. 461; Oct. 19, p. 494; Oct. 26, p. 534. Nov. 2, p. 554 [Includes *Antechinus allanii,* sp.n., from Manning River, N.S.W.]; Nov. 9, p. 598 [*Podabrus albocaudatus,* sp.n., *mitchelli,* sp.n. (i.e. Krefft, 1867) and *Chaetocercus christicauda*]; Nov. 16, p. 630 [*Myrmecobius fasciatus*] and Nov. 30, p. 682.

1872. American and Asian Marsupials. *Sydney Mail,* Dec. 7, p. 714.

1872. Section Monotremata. *Sydney Mail,* Dec. 14, 1872, p. 745 and Dec. 28, p. 808, fig. [The figure showing *Choetocercus christicauda.*]

1873. Discovery of the missing bones of the Diprotodon. *Syd. Morn. Herald,* August 19, 1873.

1873. The Whale Tribe—(Concluded). *Sydney Mail,* Oct. 11, 1873, p. 466 [Includes *Meganeuron krefftii* [Gray, 1865].]

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[2] I have part of "The Phalanger Tribe—(continued)" as 1873 in my 1961 bibliography of Krefft, following an undated proof in Krefft's MSS, A.267 in Mitchell Lib. The correct citations are under 1872, above—G.P.W.

[3] Krefft's preoccupied genus *Plectodon* was published in 1870, Wellington Caves Correspondence, pp. 5 & 6; see also N.S.Wales Votes & Proc., 5, 1882, pl. xii, fig. 8.

1873. The Bats or Cheiroptera. Introduction. *Sydney Mail,* Oct. 18, 1873, p. 498.

1873. The Bat Tribe continued. *Sydney Mail,* Oct. 25, 1873, p. 542. (see also below).

1873. Mammals of Australia and their Classification. Part I. Ornithodelphia and Didelphia. *Sydney Mail,* Nov. 8, 1873, pp. 594-595, pls. i-ii [This is the "undated *Supplement to Sydney Mail,*" mentioned by Whitley, 1961, p. 29. It figures new species of fossil marsupials.—G.P.W.]

1873. Mammals of Australia and their Classification. Part II. Monodelphia. *Sydney Mail,* Nov. 15, 1873, p. 638.

1873. The Bat Tribe continued. *Sydney Mail,* Nov. 22, 1873, p. 659; and Nov. 29.

1873. Remarks on Australian Crocodiles.
Sydney Mail, Jan. 4, 1873, p. 8. [*Crocodilus porosus, Tomistoma schlegelii, T.* (?) *Krefftii,* and *Crocodilus Johnsonii,* sp.n.]

1873. Section Monotremata—(Continued.)
Sydney Mail, Jan. 11, 1873, p. 40 and Jan. 18, p. 74.

1873. Mammals without a Pouch.
Sydney Mail, Jan. 25, 1873, p. 111. [Rats.]

1873. Australian Pouchless Mammals.
Sydney Mail, Feb. 1, 1873, p. 137 [rodents]. Feb. 8, p. 169 [rats]; and Feb. 15, p. 202 [*Hapalotis* spp.]

1873. Ground Rats.
Sydney Mail, Feb. 22, p. 234; March 1, p. 277 [*Mus* spp. and introductory remarks on *Ovis.*]

1873. "The Goats" and "The Bovine Tribe, or Oxen".
Sydney Mail, March 8, 1873, p. 298.

1873. The Ruminants.
Sydney Mail, March 15, p. 343.

1873. The Horse Tribe (Concluded).
Sydney Mail, April 19, 1873, p. 503.

1873. The Hog Tribe—(Continued).
Sydney Mail, April 26, 1873, p. 532.

1873. The Felidae, or the Cat Tribe.
Sydney Mail, May 3, 1873, p. 555.

1873. The Dog Tribe (Canidae).
Sydney Mail, May 3, 1873, p. 555; May 10, p. 596 [habits of dingos]; May 17, p. 618; and May 24, p. 660.

1873. The Seal Tribe, or Carnivorous Amphibians.
Sydney Mail, May 31, 1873, p. 687. June 7, p. 728; and June 14, p. 746.

1873. Birds with teeth and numerous tail vertebrae, and thoughts on modern classification. *Sydney Mail,* June 21, 1873, p. 778.

1873. Remarks on some new additions to the Fauna of Australia.
Sydney Mail, June 28, 1873, p. 814.
["There is not at present a single periodical in this country which records general discoveries in natural history . . ." Krefft relates how he classified the *Ceratodus forsteri* . . . Mr. Masters has caught the greatest number ever obtained . . .]

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CHESNON'S "ESSAI SUR L'HISTOIRE NATURELLE", 1835

by Tom Iredale and G. P. Whitley

Many years ago, the senior author said to Charles Davies Sherborn, who was then struggling to complete his *Index Animalium* at the British Museum, "In time to come anyone who finds a book overlooked by Sherborn will write a paper about it." The prophecy has come true. So meticulous was our late friend Sherborn as a scholar and bibliographer that we have found practically nothing which had not been covered in his monumental *Index*. A note on the thirteenth edition of Linné's *Systema Naturae*[1] and some overlooked, obscurely introduced new generic and trivial names are all that we have been able to contribute over the years.

Now, however, we have before us, in the senior author's library, a rare French book which had not come before Sherborn's notice, and it contains a couple of new names. *"Nomina oblita!"* We seem to hear the bleat of some modern taxonomists, anxious not to be disturbed by anything which may rouse some dust around them. *"Noblesse oblige"*, we might reply, fairness compels us to record as a historical item (though its names may not be revived) this rare book with its old ideas and its then new names. Mammals and birds are the only animals dealt with in it, but as they are those of Normandy, faint repercussions may be felt on the other side of the English Channel and affect the British fauna. Without fear of precipitating another Norman Conquest, we now turn to the book itself.

It is an octavo volume, with leaves 7.9 by 4.8 inches. The half-title is "Essai sur l'Histoire Naturelle". The title-page reads:

ESSAI / SUR L'HISTOIRE / NATURELLE, / par / C.-G. CHESNON, / Principal du Collége de Bayeux, Officier de l'Université, Membre / de l'Académie des Sciences, Arts et Belles-Lettres de Caen, de / Rouen, des Sociétés Linnéene et des Antiquaires de Normandie. / *Ouvrage adopté par le Conseil royal de l'Université.* / [line] Nosce patriam, postea viator eris. / [line, and device with monogram G C] A BAYEUX, / Imprimerie de C. GROULT, libraire; / SE VEND / Chez MM. PERISSE, frères, imprimeurs-libraires: /

A LYON, Grande rue Mercière, No. 35.

A PARIS, Rue du Pot-de-Fer-St.-Sulpice, No. 8.

The date of publication (1835) appears on page 408. The pagination is i – viii + 1 – 408, followed by seven folding plates. The latter represent the skeleton of man, nervous system of man, skulls of mammals, muscles of human arm and hand, the human heart, skeleton of horse, and feet of birds. Page 402 is misprinted 102 and pages 403 to 406 of the index are missing from our copy.

This essay on the natural history of Normandy was written for his pupils by Chesnon, who had in his collection the greater part of the native species. The book was written simply and succinctly for young people. The first chapters briefly define Nature, method in natural history, anatomy, physiology, etc. Occasionally a poem (by Rousseau, Delille or Racine for example) is quoted to elaborate upon the contents of a chapter. In the analysis of Classes, Orders, etc., Chesnon, using surprisingly modern 'keys', followed the analytic method which Lamarck had employed in Botany; the basis for animal species he found in Cuvier, "Temming" [= Temminck] and the Dictionnaire classique d'histoire naturelle. Chesnon also frequently quoted Buffon. On page 97, Chesnon

[1] Iredale, Proc. Roy. Zool. Soc. N.S.Wales 1956-57 (1958), pp. 61-62.

refers in passing to the flying phalanger and kanguroos, but, concerning marsupials, he added solemnly, "Nous n'avons aucune espèce de cette famille en Normandie."

As we remarked earlier, only mammals and birds are dealt with. There are no generic or trivial names in the earlier chapters on the races of man, on monkeys and quadrupeds, but from bats onwards (p. 72) specific names occur. Chesnon thus catalogued some 25 genera and 43 species of mammals and about 81 genera and 267 species of birds, a considerable fauna for a province of France. These 414 or so scientific names have been checked with C. D. Sherborn's *Index Animalium* and, as would have been expected, are mostly attributable to classical early authors such as Linnaeus, Gmelin, Lacépède, Temminck, Cuvier, Desmarest and others. But there are a couple of new names, some variant spellings and new combinations for which Chesnon must assume responsibility, the more important of which are noted below. Chesnon evidently tried to classify Linnean species into post-Linnean genera or subgenera. On page 377, Chesnon pointed out that *Anas fraenata* is the female of *Anas marila.*

The generic name *Calidrus* is used twice for two different birds (pp. 309 & 320), neither valid.

Cycnus Chesnon (p. 365) is an obvious misprint for *Cygnus,* to which it is corrected in his index (p. 400). Sherborn quotes an earlier *Cycnus* Brookes, Catal. Mus. Brookes (2), July 1828, p. 102 = *Cygnus,* from C. W. Richmond, MS. In any case *Cycnus* is preoccupied by *Cycnus* Huebner, 1820, a genus of insects. Other obvious misprints are *Sorex effodiens* (p. 75) [for *fodiens*], *Fingilla* (225) for *Fringilla, Muscipa* (p. 177) for *Muscicapa, Sita* (p. 232, indexed, p. 407, as Sitelle, its vernacular name) for *Sitta,* and *Uppupa* (p. 240) for *Upupa.*

Chesnon's new combinations appear to be as follows:
(A) Mammals: *Meles ursus* (p. 80), *Putorius mustela*[2] (94), *Sus domesticus* (111) and *Phocoena delphinus* (p. 133), apparently a new name for *Delphinus delphis* Linnaeus, 1758, curiously echoed about a century later by H. L. Kesteven as *Delphinus delphinus* (Rec. Austr. Mus. 21 (1), 1941, p. 59).

(B) Birds: *Sylvia accentor* (p. 194), *Cycnus anas* (366), *Uria atte* (390), *Anser leucopsis* (384), *Sylvia trochilus major* (196), *Tringa melanogaster* (281), *Labbe parasiticus* and *L. pomarinus* (355) and *Occa mollissima* (380).

This brings us to two new generic names of Chesnon's for birds: *Labbe* for the Skua and *Occa* for the Eider Duck.

Labbe is still the French vernacular name for a Skua. Mathews & Iredale in 1913 referred to the pre-Linnean "Labbe Buffon" and there is a nomen nudum, *Labbus* Rafinesque (Analyse, 1815, p. 72) in Aves, *fide* Sherborn (*Index Animalium* ii, p. 3330). *Labbe* is used as a true generic name by Chesnon (Essai, 1835, p. 354, indexed on p. "102", *recte* 402, as Labe). We hereby designate Le Stercoraire, *Labbe parasiticus* Chesnon, 1835 = *Larus parasiticus* Linnaeus, 1758, as type-species (logotype) of *Labbe,* because Chesnon mentioned a second species, *Labbe pomarinus,* not nowadays considered congeneric. So *Labbe* becomes a synonym of *Stercorarius* Brisson, 1760.

Occa is a new generic name introduced by Chesnon (p. 380) for a single species (type-species by monotypy), *O. mollissima,* the Eider Duck originally named *Anas mollissima* by Linnaeus, 1758. *Occa* falls as a synonym of *Somateria* Leach (Ann. Phil. 13 (73), 1819, p. 61, *fide* Neave, Nomencl. Zool.).

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[2] Sherborn's *Index Animalium* gives as author of the combination *Putorius mustela,* Boitard, Jardin d. Plantes, 1842 [i.e. 1841], p. 174, but Chesnon's combination is six years earlier.

A genus of fishes in the family Agonidae was named *Occa* by Jordan & Evermann (Bull. U.S. Nat. Mus. 47 (2), 1898, p. 2043) but this is preoccupied by *Occa* Chesnon, 1835. We propose the new name

CHESNONIA, gen. nov.

with *Brachyopsis verrucosus* Lockington [= *Chesnonia verrucosa,* comb. nov.] as type-species (orthotype), Jordan & Evermann's description serving as the diagnosis for the new genus. Other species, figuring in works on Japanese fishes, are *Chesnonia dodecaedron* (Tilesius) and *Chesnonia iburia* (Jordan & Starks), comb. nov. The typical Warty Sea Poacher, *Chesnonia verrucosa,* was illustrated by Clemens & Wilby (Fisher. Res. Board Canada Bull. 68, 1946, p. 283, fig. 205).

Of Chesnon's life, we know nothing. On page 388 of his *Essai* he recorded that a former pupil, now a man of property, collected a bird for him, so Chesnon was no doubt middle-aged or older when his book was published for his scholars. There is another copy of his *Essai* (dated as 1834) in the Zoological Society of London's library[3]. G. C. Chesnon is not mentioned in Swainson's *Taxidermy,* Casey Wood's *Introduction to the Literature of vertebrate zoology* (McGill Univ. Publ. xi, Zool., 24, 1931), in the *Catalogue of the Library of the British Museum* or the Royal Society's *Catalogue,* or in Zimmer's Catalogue of the Ayer Ornithological Library (*Field Mus. Nat. Hist. Publ.* 239, Zool. Ser. xvi, 1926).

We cannot blame Sherborn for missing Chesnon.

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[3] *Catalogue of the Library of the Zoological Society of London,* fifth edition, 1902, p. 118.

THE BIRDS OF MONTAGU ISLAND, NEW SOUTH WALES

by K. A. Hindwood

(Plates IV-VI)

Montagu (sometimes written Montague) Island lies some four miles off the coast of New South Wales about 180 miles south of Sydney, in latitude 36°15'S; longitude 150°14'E. The nearest settlement is Narooma, six miles away, from which township supplies are taken to the three lighthouse keepers and their families living on the Island.

James Cook sailed past Montagu in 1770 thinking it was part of the mainland. Twenty years later, in 1790, the convict ship *Surprise* discovered it to be an island. It was named after George Montagu Dunk, Earl of Halifax. The aboriginal name is Barunguba, said to mean "off the coast".

In 1953 the Island was declared a wild-life sanctuary under the control of the National Trust of Australia (N.S.W.); it is about a mile long in a north-south direction and less than half a mile wide at its greatest width. A chasm, or gulch, through which seas may break in very rough weather, divides the Island into two fairly equal sections known locally as the North and the South Island respectively. Both are hummock-shaped, the former having considerable areas of broken, rocky ground and the latter huge, rounded granite outcrops and some large elevated boulders.

A sombre grey lighthouse, built in 1880 from granite quarried on the Island, rises some 260 feet above sea-level on the highest part of the South Island which is about 200 feet in height. The North Island has a slightly lower elevation. Montagu Island granite was used for the bases of the columns of the Pitt Street frontage of the General Post Office, Sydney. Geologically the Island is composed of igneous rocks which have their exact counterparts on the nearby mainland close to Mount Dromedary (1930).

Extensive areas of bracken, tussocks, rushes, creepers and other low vegetation bind the soil and provide both shelter and suitable nesting-sites for burrowing penguins and shearwaters. The very few trees present are windblown and mostly dwarfed into the form of low shrubs. Grassy areas adjoin the lighthouse buildings and the fowl pens. The feral goats that roam both sections are not in sufficient numbers to destroy the vegetation. Tasmanian Fur-Seals have a rockery at the extreme northern end of the Island. The large rabbit population, among which black examples are not uncommon, is preyed upon by Swamp Harriers and, to a lesser extent, by Sea-Eagles. Albatrosses, petrels, skuas, gulls and terns seem to find abundant food in the surrounding waters.

An early, if not the earliest, published report on the bird-life of Montagu is that by A. F. Basset Hull who visited the Island with his son for several days in September, 1907. In his interesting notes (1908) Hull records Little Penguins, Silver Gulls, Crested Terns, Tailor-birds, Pipits and Willie Wagtails. He makes no mention of shearwaters or their burrows. Had these birds been breeding on the Island prior to 1907 there should have been some evidence of their burrows, even though the birds themselves may not have been present at the time of his visit in September. Egg-laying in the three species of shearwaters now known to bred on Montagu Island usually takes place towards the end of November or early in December, though courting birds may attend their burrows for some weeks prior to actual breeding.

Returning to the mainland in the lighthouse boat, Hull, his son and two assistant keepers were wrecked on the Narooma Bar, a near disaster resulting in the loss of a considerable amount of gear, including a camera and unexposed photographic plates.

During a subsequent visit of a few days in mid-October, 1911, Basset Hull found burrows excavated in some black sandy soil on the North Island and after digging out one burrow, discovered a pair of Wedge-tailed Shearwaters therein, but no egg, it being too early in the season. He remarked (1912, p. 206) that "This is probably a new site [i.e. breeding island] for this species as it certainly did not breed there in 1907, and the burrows I found were all apparently new ones, no sign of a previous year's occupation being visible".

Birds noted on this visit and not previously listed by Hull were the Wedge-tailed Shearwater, Banded Landrail, White-shafted Fantail, a *"Ptilotis"* [*Meliphaga*], a "somewhat mummified *Puffinus assimilis*" [Little Shearwater], Sea-Eagle, Raven and Swamp Harrier.

In recent years members of the Division of Wildlife Research, C.S.I.R.O., Canberra, have visited the Island a number of times principally for the purpose of banding nesting Silver Gulls, Crested Terns and Shearwaters; their incidental notes on other birds seen have been incorporated in the following list prepared from all available sources, including observations by S. G. Lane, C. Humphries and the Author during a visit extending from December 8 to December 13, 1967.

NOTES ON BIRDS

LITTLE PENGUIN, *Eudyptula minor*. A common breeding bird especially on the southern section of the Island. Hull's notes (1912) indicate that breeding may take place "practically all the year round".

STUBBLE QUAIL, *Coturnix pectoralis*. Late in March, 1963, Mr. Walter Allan caught an exhausted quail in the fowl yard on the Island; from his description it was a Stubble Quail (John McKean, *in lit.*, 28.12.1967).

RED-CROWNED FRUIT-PIGEON, *Ptilinopus regina*. The sun-dried remains of one of these small colourful fruit-pigeons were found near the old landing jetty in December 1967: this bird was probably a wind-blown vagrant. The species is not uncommon on well-wooded Cabbage-tree Island, off Port Stephens, central coastal N.S.Wales, but further south it appears to be a rare straggler on the basis of the few available records of its occurrence in southern N.S.Wales, Victoria and Tasmania (one record).

BANDED LANDRAIL, *Hypotaenidia philippensis*. Hull (1912) received a set of eggs of this wide-ranging species that were collected in 1908. Landrails have been frequently seen by the lighthouse keepers and by visiting naturalists and generally singly. The thick ground cover and the skulking habits of the species precludes any estimate of the numbers living on the Island.

WHITE-FACED STORM-PETREL, *Pelagodroma marina*. One of these dainty petrels was reported to have been captured at night by a member of a banding party (John McKean, *in lit.*). The species has also been observed by Robert Dyball, one of the lighthouse keepers, but it is not known to breed on the Island, the nearest breeding station being the Tollgates some 40 miles to the north: it breeds, or has bred, on several coastal islands of N.S.Wales as far north as Broughton Island.

LITTLE SHEARWATER, *Puffinus assimilis*. When on Montagu Island in 1911 Basset Hull examined the dried body of a bird he determined (1912, p. 207) as that of the Little Shearwater; at the same time he noted two of these birds at sea nearby.

The Little Shearwater is rarely recorded from the coastal waters of N.S.Wales whereas the similar-looking, though larger, Fluttering Shearwater, *P. gavia*, is known to be relatively common. Thus, there is a possibility that the two birds seen at sea and recorded as Little Shearwaters by Hull were Fluttering Shearwaters. Neither species is known to breed within Australian limits. The nearest breeding place of the Little Shearwater is Lord Howe Island and that of the Fluttering Shearwater,

New Zealand. The fact that Basset Hull subsequently described (1916, p. 205) specimens of the Fluttering Shearwater from near Brush Island, N.S.Wales, as belonging to a new genus and species introduces an element of doubt into the matter of the "Little Shearwaters" he reported from and near Montagu Island.

It should be noted that he later recorded (1916, p. 214) the Little Shearwater as being very numerous at times in the coastal waters of N.S.Wales. Such a statement is applicable to the Fluttering Shearwater but certainly not the Little Shearwater, as Basset Hull himself agreed when I discussed the matter with him some thirty years ago.

WEDGE-TAILED SHEARWATER, *Puffinus pacificus*. When Basset Hull first visited Montagu Island in September, 1907 he found no evidence of Shearwaters. Had any of these birds nested on the Island their burrows should have been obvious, though the birds themselves may not have been present as September is too early for egg-laying. Three shearwaters, the Short-tailed, the Wedge-tailed and the Sooty, are now known to breed on Montagu and in considerable numbers in two of the species. Hull visited the Island again for several days in October, 1911 and on that occasion found burrows on the North Island; after digging out one of these burrows he discovered a pair of Wedge-tailed Shearwaters, but no egg. He also saw, in the waters nearby, ". . . . vast flocks of this Shearwater feeding in company with the Gulls on the shoals of small fish or on 'brit'" and, one morning, just after daylight, he watched the birds flying "north" and estimated their numbers in millions (1912, p. 206).

During September and October large numbers of migrating Short-tailed Shearwaters frequent the coastal waters of N.S.Wales. Such birds are, in the main, then making for their chief breeding grounds on the islands of Bass Strait. Possibly some are non-breeders or else birds feeding away from the Bass Strait area: again, at the present time anyway, many could be individuals of the three species, all much alike at sea, that breed on local islands such as Montagu.

Both Short-tailed and Sooty Shearwaters migrate to the northern hemisphere after the breeding season, but the Wedge-tailed species does not, as far as is known, undertake extensive and regular migrations. It seems from Hull's observations and present-day knowledge that, within the past forty or fifty years, Short-tailed and Sooty Shearwaters have been actively colonising a number of offshore islands, including Montagu, in N.S.Wales as far north as Broughton Island. The Wedge-tailed Shearwater is considered to be a "resident" species breeding on many islands along the eastern coast of Australia and elsewhere.

On Montagu, Wedge-tailed Shearwaters nest in sandy soil, principally on the higher parts of both sections of the Island and their burrows are many on the slopes facing the central gulch. Birds were on eggs in December, 1967 and 35 adults were banded.

SOOTY SHEARWATER, *Puffinus griseus*. First recorded from Montagu Island in March, 1962 (1964, p. 305) when F. N. Robinson ringed two young birds in burrows among a mixed colony of Wedge-tailed and Short-tailed Shearwaters. Since that time others, both adults and young, have been banded, including two birds on eggs in December, 1967.

SHORT-TAILED SHEARWATER, *Puffinus tenuirostris*. Presumably the most numerous of the three species of shearwaters breeding on the Island, an assumption based on the number banded (172) in December, 1967 as against the Wedge-tailed Shearwater (35) and the Sooty Shearwater (2), the three species breeding in mixed colonies. The burrows of this species are from two to four feet or more in length in sandy soil well bound by the roots of tussocks and other vegetation.

Egg-laying commences towards the end of November, the eggs hatch in January and the young leave the Island at the end of April or early

in May as is the case with Wedge-tailed and Sooty Shearwaters. The main nesting grounds of the Short-tailed Shearwater are on islands in Bass Strait, with colonies extending up the east coast of Australia as far as Broughton Island, and westward to the Nuyts Archipelago, South Australia.

BULLER'S SHEARWATER, *Puffinus bulleri*. Buller's, or the Grey-backed, Shearwater is a New Zealand breeding species that migrates to the North Pacific at the close of the season. On October 10, 1960, F. N. Robinson discovered one of these birds in a burrow at dusk on the Island but it had left sometime before 3 a.m. the following morning. Two months later, on December 11, 1960 Athel D'Ombrain and Albert Gwynne found another Buller's Shearwater in a burrow some ten feet in length on Cabbage Tree Island, off Port Stephens; in this instance, also, no egg was in the burrow (1962, p. 274). The question arises whether these two birds were attempting to breed or were merely disorientated individuals that had strayed from the main body of their fellow migrants.

Four examples of Buller's Shearwater have been found on beaches within thirty miles of Sydney during the months of October and November, over the period 1954 to 1963.

CAPE PETREL, *Daption capense*. The dried remains of two Cape Petrels were found on the Island in December, 1967. This conspicuously-marked bird would soon attract the attention of a predator such as the Sea-Eagle. The species breeds in Antarctica and on sub-Antarctic Islands. In the off-season many individuals move north of the breeding range but not commonly into N.S.Wales waters.

FAIRY PRION, *Pachyptila turtur*. On December 1, 1967, a leg of a sea-bird with a band attached, was found by Robert Dyball below the eyrie of a Peregrine Falcon on the northern face of the gulch. The leg was from an adult Fairy Prion ringed on Stephen's Island, Cook Strait, New Zealand, on September 7, 1966, by B. D. Bell.

BLACK CORMORANT, *Phalacrocorax carbo*. Doubtless a fairly regular visitor to the Island, feeding in the surrounding waters. John McKean noted up to five birds at any one time during April, 1963 and in December, 1967 about 25 birds were frequently seen on a rounded, sheltered rock just off shore near the old landing jetty on the south-western part of the South Island.

BLACK-FACED CORMORANT, *Phalacrocorax fuscescens*. A single bird was seen associating with Black Cormorants on their well-used resting rock on each of the four days of December 8 to December 11, 1967.

Most, if not all, of the earlier records for this species in N.S.Wales waters are open to doubt, either because of misidentification or through confusion in the nomenclature. The usual range of this truly pelagic species includes the southern coasts of Australia and associated islands, the islands of Bass Strait, and coastal Tasmania.

PIED CORMORANT, *Phalacrocorax varius*. In April, 1965, P. J. Fullagar noted approximately six Pied Cormorants frequenting the rocky shoreline or feeding in the surrounding waters of the Island.

AUSTRALIAN GANNET, *Sula serrator*. Many of the gannets seen in the coastal waters of south-eastern Australia are migrants from New Zealand; others no doubt come from breeding grounds on Victorian and Tasmanian islands. Most of the recoveries in south-eastern Australia of banded gannets are of immature birds from New Zealand. The species has frequently been observed near Montagu and a ringed bird, from New Zealand, was found dead on the Island. It was banded as a nestling on Mahuki Island on November 25, 1961, and found dead on Montagu Island on November 29, 1962.

WHITE-FRONTED TERN, *Sterna striata*. The White-fronted Tern is a regular migrant to south-eastern Australia from its breeding grounds

in New Zealand. When in Australian waters it is largely a sea-tern frequenting rock-flats and reefs and also harbours and bays, principally during the period of May to October or November. Individuals of this species, banded in New Zealand, have been recovered on a number of occasions in coastal N.S.Wales and Victoria. One such ringed bird was found on Montagu Island by Mrs. W. Allen. It was ringed as a nestling on the Kaikoura Peninsula on November 26, 1961, and recovered dead (apparently killed by a bird of prey) on the Island on November 13, 1962.

CRESTED TERN, *Sterna bergii*. When Basset Hull was on the Island in September, 1907 only a few Crested Terns were present. He was informed later that the main body, about 3,000 birds, arrived and commenced to lay during the following month, that is, in October. Hull again visited Montagu in October, 1911 and remarked (1912, p. 205) that the birds had commenced laying on September 21, on a different site from that used in 1907; he noted some 20 or 30 eggs indicating that only a few birds bred that season. In recent years banding has shown that, at the close of the breeding season, Crested Terns disperse to coastal localities both north and south of the Island (1957).

Only a few adults and two runners were seen in December, 1967. Crested Terns often form a fairly compact nesting group within a colony of Silver Gulls, generally after the Gulls have commenced breeding.

SILVER GULL, *Larus novaehollandiae* Very numerous during the breeding season which may commence towards the end of August or in September and continue until January by the end of which month most birds have left the Island. Post-breeding dispersal of Montagu Island birds takes place along the coast, both to the north and south, and occasionally to inland areas (1964).

SOOTY OYSTER-CATCHER, *Haematopus unicolor*. A resident breeding species. Several were observed in December, 1967, and an addled egg and a recently-hatched, but dead, chick were examined on a patch of shingle twenty feet or so above the water-line on the western side of the North Island; two agitated adults were nearby.

WHITE-FACED HERON, *Notophoyx novaehollandiae*. A rare straggler, or visitor, to the Island.

REEF HERON, *Demigretta sacra*. The Reef Heron is sparsely distributed along the adjacent mainland coast line and occasionally visits Montagu Island where one was seen in April, 1965, by P. J. Fullagar.

SWAMP HARRIER, *Circus approximans*. Basset Hull recorded (1912, p. 205) seeing one Harrier on the Island in 1911. The species has since been noted by other observers. Two pairs were present in December, 1967, one pair occupying the northern section and the other the southern section of the Island where a fully-feathered young bird, with some down still adhering to the feathers of its head, was captured and photographed, then banded and released.

WHITE-BREASTED SEA-EAGLE, *Haliaeetus leucogaster*. The prolific fish and sea-bird life in the waters surrounding Montagu Island attracts Sea-Eagles from the nearby mainland. In April, 1963, John McKean watched two Sea-Eagles regularly attacking Gannets and Black-browed Albatrosses, presumably with the intention of making them disgorge their food, in which objective they were unsuccessful. The Eagles capture petrels, gulls, terns, penguins, rabbits and fish whose remains are to be seen strewn about several feeding places, generally grassy knolls, on the Island. Kids, the progeny of feral goats, are also seized when quite young and eaten.

PEREGRINE FALCON, *Falco peregrinus*. A pair of Peregrine Falcons breed on the Island, their eyrie being on the steep northern cliff face of the central gulch. Small sea-birds, vagrant land-birds and doubtless racing pigeons moving up the coast fall prey to the Falcons. Breeding has been noted by R. Dyball who examined a clutch of eggs on a ledge on the cliff face. He also recovered the leg of a Fairy Prion, with a New Zealand ring affixed, from near the eyrie, as noted earlier.

NANKEEN KESTREL, *Falco cenchroides*. Several observers have recorded the Kestrel on Montagu Island where it has been found nesting by R. Dyball.

KOOKABURRA, *Dacelo gigas*. One, obviously a straggler, was seen on the Island by Keeper J. Crooks in September, 1963.

SACRED KINGFISHER, *Halcyon sanctus*. The only available record is that for a single bird seen resting on top of a large rounded boulder on the South Island on December 11, 1967.

SPINE-TAILED SWIFT, *Hirundapus caudacutus*. Some thirty or so Spine-tailed Swifts, a migrant species from the northern hemisphere, were seen hawking above the Island at 7 a.m. on December 13, 1967.

WELCOME SWALLOW, *Hirundo neoxena*. Several pairs frequent the Island and the species has nested in sheltered positions on the light-house buildings and, doubtless, in suitable cavities in the cliffs.

TREE MARTIN, *Hylochelidon nigricans*. A Tree Martin was seen hawking above the Island on December 10, 1967.

WHITE-SHAFTED FANTAIL, *Rhipidura fuliginosa*. A rare straggler. Observed by Basset Hull in October, 1911 (1912, p. 207), and noted recently by R. Dyball.

WILLIE WAGTAIL, *Rhipidura leucophrys*. Noted by Basset Hull in September, 1907 and in October 1911; also within the past year or two, by R. Dyball. A straggler to the Island.

LEADEN FLYCATCHER, *Myiagra rubecula*. The Leaden Flycatcher is an annual summer breeding migrant to south-eastern Australia. The return migration to north-eastern Australia takes place during the autumn months. John McKean observed a female Leaden Flycatcher, which seemed to be tired, on the Island on April 4, 1963. When on the Tollgates, off Bateman's Bay, forty miles north of Montagu, I saw what I took to be a female Leaden Flycatcher (the female Satin Flycatcher is very similar) flitting about low shrubbery. The date was also April 4, but the year 1959.

WHITE-WINGED TRILLER, *Lalage tricolor*. A male of this species hit the lighthouse at 2 a.m. one night during the spring of 1965 and was captured and sketched by R. Dyball and its identity later confirmed. It was placed in a box until daylight and was then able to fly away. The Triller is a spring migrant to south-eastern Australia, its numbers varying from year to year, presumably according to seasonal conditions elsewhere within its range.

TAILOR-BIRD, *Cisticola exilis*. A common breeding species and resident throughout the year. The lighthouse keepers call these diminutive birds "Tussock-Wrens".

DUSKY WOOD-SWALLOW, *Artamus cyanopterus*. During gale force weather late in April, 1963 one of these birds crashed into the lighthouse and two into nearby buildings; they were identified by John McKean from a sketch and description sent to him by keeper J. Crooks (1963, p. 60).

EASTERN SILVEREYE, *Zosterops lateralis*. Large numbers of Silvereyes undertake regular seasonal movements and, during the autumn particularly, are to be observed in considerable flocks or else heard calling at night in flight. When on Montagu early in April, 1963 John McKean noted groups of up to thirty birds passing directly over the Island or else landing to feed. A gathering of some sixty birds, observed at dusk on April 8, 1963 appeared to be settling down for the night in low shrubbery. Individuals seen at close quarters by McKean had the grey throats and bright chestnut flanks of the Tasmanian race of the species which is known, from banding recoveries, to migrate between Tasmania and eastern Australia.

YELLOW-FACED HONEYEATER, *Meliphaga chrysops*. Basset Hull noted (1912, p. 207) a *"Ptilotis"* [*Meliphaga*] on the Island in October, 1911, and this bird could have been a Yellow-faced Honeyeater, a

species that undertakes extensive annual migrations from south-eastern Australia to south-eastern Queensland in the autumn and a return movement in the spring. The only definite records for Montagu are for a bird seen on the Island by John McKean on April 6, 1963, and for one that flew through the open window of the laundry of No. 3 quarters on November 14, 1965: the latter bird was captured and then released unharmed by Robert Dyball.

PIPIT, *Anthus novaeseelandiae*. The few Pipits resident on the Island frequent the grassy areas and other open parts, both of which habitats are of limited extent.

RAVEN, *Corvus coronoides*. This species is an occasional visitor to the Island. A few birds were seen by Basset Hull in October, 1911 and others have been seen since that time. Examination of a specimen from the Island is desirable in view of the possible presence of the Little Raven, *Corvus mellori*.

STARLING, *Sturnus vulgaris*. The Starling has been observed several times on the Island by D. Dyball and one was seen on December 12, 1967.

ROCK DOVE (Domestic Pigeon), *Columba livia*. Several were seen around the fowl runs in April, 1963 by John McKean who was told by W. Allen that the species was self-introduced and that it had bred on the Island. None was seen in December, 1967.

SUMMARY

The following is a summary of the birds recorded from Montagu Island: nesting sea-birds, 6; casual and accidental sea-birds, 12; nesting land-birds, 8, casual and accidental land-birds, 17; total, 43 species.

ACKNOWLEDGEMENTS

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BIRDS OPENING MILK BOTTLES

by K A. Hindwood

The opening of milk bottle caps was first recorded in Titmice near Southampton, England, in 1921. The practice spread widely in that country and by 1949 James Fisher and R. A. Hinde were able to report (*British Birds,* Vol. 42, 1949, p. 347) the habit in at least eleven species of birds. A recent "Milk Bottle Survey" (*Bird Life,* Vol. 4, 1968, p. 45) by more than 1,200 members of the Young Ornithologists' Club of England revealed that as many as twenty species of wild birds, in addition to guinea fowls, chickens, a peacock and a tame magpie were observed stealing milk from sealed bottles.

Carl Welty, in his book *The Life of Birds* (1964, p. 168), when discussing the subject, remarked that there were even reports of troops of tits following milk carts and opening the bottle tops while the milkmen were busy with their deliveries.

A recent note in the *Sydney Morning Herald* (13.5.1968) stated that Currawongs at Blackheath, on the Blue Mountains, were making such concerted onslaughts on delivered bottled milk that residents were leaving small tins and plastic cups for the milkmen to place over the tops of the bottles: this appears to be the first published account of the pilfering of milk by birds in Australia, though the habit has been known for at least a couple of years.

Mrs. Marguerite Barter of Narrabeen, a northern suburb of Sydney, recently sent me the following notes of interest:-

> About two years ago I heard that people up the road had six milk bottles opened but not spilt, and a tiny amount of cream taken. They thought at first of boys but were later told that a big black bird was doing it. Then at odd times we found our bottles done the same way—a hole in the seal and about ¼ in. of milk taken—by currawongs. Other people have told me they have had the same experience (*in lit.* 19.5.1968).

Another report is from Avalon, a few miles north of Narrabeen. A friend, Max Bristow, told me in March, 1968 that Pied Currawongs were perforating the foil tops of a neighbour's milk bottles left at the front gate by the milkman early in the morning. At Lindfield, another northern suburb, Currawongs were also seen opening milk bottle tops at a home in Owen Street.

Subsequently other reports appeared in the press. Mrs. M. Paul of North Rocks, near Parramatta, wrote Vincent Serventy and remarked that "Golden Mynahs [Indian Mynas] . . . have taken to opening my milk bottles, either making a hole in the bottle top or taking the top right off" (*Daily Telegraph,* June 3, 1968, p. 20). Another correspondent remarked, "I take back ALL I have been thinking about our local milkman. Lately the aluminium foil tops of our milk bottles have been broken—depressed, as if by a thumb. Very careless, very unhygienic, I thought. On Saturday I complained and the whole fanciful story came out. The Black Currawongs [Pied Currawongs] now making their annual visit to the North Shore go around plunging their long beaks into the bottles. Sorry Milko" (*Daily Mirror,* June 17, 1968, p. 21).

Photographs of a pet Sulphur-crested Cockatoo removing the foil caps from milk bottles and then drinking the milk appeared in the *Australian Women's Weekly* (April, 24, 1968).

In the Sydney metropolitan area the inside diameter of a pint-size milk bottle is 1 in., and that of a cream bottle (both quarter and half-pint sizes) is 1¼ in. The depth of the closed bill of a Pied Currawong at its base is approximately 7/8 in. At the present time it is not known just how

currawongs and other birds extract the milk or cream: it could either be by suction or by the use of the tongue. With currawongs it is unlikely that they would thrust their 2 in. long bills entirely into the neck of the bottle because such a position would allow but little play for the opening of the bill. Whatever the species, the amount of milk stolen would be largely governed by the length and thickness of the bill and by the size of the head of a particular species of bird.

Reports so far indicate that Pied Currawongs are the chief stealers of milk: they are intelligent birds and in the autumn and winter months gather in considerable and noisy flocks which wander about a good deal in search of food, especially berries of many kinds often to be found in suburban gardens. With such a sociable species the habit of opening milk bottles could be learned quickly by many individuals over a relatively wide area.

The other species, the Indian Myna, recorded as opening milk bottle tops is likewise a sociable bird and now quite numerous in cities and towns of the eastern States. "Magpies" have also been mentioned in at least one of the reports, but, here, the term may apply to the Pied Currawong, sometimes called the Bell-Magpie.

Thanks are extended to Mrs. W. Goater of Chandlers Ford, Hampshire, England, and to Gilbert P. Whitley of Sydney, for references and literature supplied during the preparation of these notes.

INCREASE IN BIRD RESIDENTS IN THE LOWER HUNTER VALLEY, NEW SOUTH WALES

by Athel D'Ombrain

(Plate VII)

The appearance of unusual birds from time to time in any locality is quite a normal state of affairs as stragglers from distant parts may make their appearance through your district. This may take the form of a single individual or possibly one or two in nearby localities. These stragglers come from very long distances just the same as tropical species of fish often appear in more southern waters. The reason for this is not always clear but the records are valuable when taken over a long period.

I came to Maitland in the Lower Hunter Valley in October 1929, and since that time have been in most parts of the Hunter Valley and coastal areas, keeping a regular check on the birds commonly found in each district.

It has now become quite evident that several species which were previously only listed as visitors, have taken up permanent residence in this area.

The most noticeable of these is the Galah, *Kakatoe roseicapilla,* which apart from an odd bird, probably an escapee from a cage or aviary, in the 1930's, is now spread out over quite a wide area in the district. Flocks of from ten to twenty are quite common in many parts of this district, and I have a number of reports of the birds nesting on farmland around Maitland. This increase seems to date back to just over twenty years ago when I noticed odd pairs appearing at different places. About this time much wheat was being transported in large semi-trailers from the north-west and it was a common sight to see Galahs and parrots feeding along the highway on grain which had spilled out from the loads carried by the semi-trailers taking it to the big bulk wheat silos in Newcastle.

This could be purely a coincidence but it appears that from about this time the galahs commenced to take up residence in a number of places along the Lower Hunter Valley, and farmers who had never seen them before other than as visiting birds, remarked on their presence.

With them another bird became very prominent in the area and this was the pretty little Crested Pigeon, *Ocyphaps lophotes.*

The Crested Pigeon is now widespread throughout much of the valley and is nesting freely. Last month while on my way back from Red Hill, a high mountain above the town of Paterson, I pased twenty five of them all sun-baking in the warm sand out of the wind on the side of the road. A resident of that part remarked that he had not seen them before but that they were becoming plentiful now.

I have recorded these pigeons from Pokolbin near Cessnock to Branxton, and on the road between Wollombi and Broke.

The Red-rumped grass parrakeet, *Psophotus haematonotus,* a common bird of the inland and western districts, is another species to take up residence in many parts of the district. Some years ago my next-door neighbour who had an aviary, got in a rage with a pair of these birds which so bullied the rest of the parrots that one day he caught them and let them go, glad to be rid of the trouble-makers. The birds lost no time in nesting in a few old dead cedar trees near the river bank and reared many broods over the next few years. However they appeared at many more distant parts and I feel sure that they did

not come from any progeny of those released from the aviary. They are now well spread out on much of the farmland in the Maitland area.

The Barred-shouldered Dove, *Geopelia humeralis,* essentially a more northern species was becoming more in evidence about this time but not in such numbers as the red-rumped parrakeets. However I have listed them from as near to the coast as Tea Gardens at Port Stephens, to various spots along the Williams, Paterson and Hunter Rivers.

The Striped honey-eater, *Plectorhynchus lanceolata,* though a rare breeding bird in these parts is becoming increasingly common and I have found it nesting from Raymond Terrace, through Maitland, Kurri Kurri, to Broke and places at the back of Branxton.

The White-breasted Wood Swallow, *Artamus leucorhynchus,* normally a more northern species, has been recorded quite often in different parts of the district, again going as far coastward as Port Stephens, and inland to Dungog and the Putty Road from Singleton. As is the case with most of the wood swallows they are subject to seasonal appearances, appearing before very dry and hot summers as a rule.

The latest bird to appear here in large numbers is the Little Friar Bird, *Philemon citreogularis.* In 1968 particularly it has been spread out over a very wide range and I have recorded it from Peats Ridge, Mulbring, Lochinvar, Greta, Maitland, East Maitland, Tenambit, Paterson, and Nelson Bay at Port Stephens. They appear to be following the flowering eucalyptus and callistemons. The mahogany has been one of its favoured trees but several made their home in our back garden for a month feeding daily on the callistemon blooms. They came down readily to a mixture of honey and water placed under the tree. In the past this bird has only been seen as an odd visitor, and it will be interesting to see if they too remain in the district rather than going back into the western districts where they are so common.

While the appearance of these and no doubt other species of birds from inland areas is quite interesting, I believe that most of them may originally have been well distributed throughout this area before the opening up of the country by settlement may have forced many to move back inland. John Gould for instance recorded the White-breasted Wood Swallow in large numbers on Moschito Island at the Mouth of the Hunter River, but since that time it appears to have made its home mainly in much more northerly parts.

With great reclamation schemes being carried out on this very spot, and on many others, the outlook for many of our waders and swamp loving birds is not at all encouraging, and the future of their existence may even be in jeopardy.

The Banded Plover, *Zonifer tricolor,* a common bird about the farmlands of Maitland, has even in the last twenty years become an almost unseen bird, but the reason for this is not very clear, unless it is due to modern deadly sprays being used over most of the farmlands.

The settlement of these more inland birds in this district is very encouraging, especially when there is the fear of modern highly toxic pesticides drastically reducing the numbers of many of our commoner species.

However the Galah and the Red-rumped parrakeet may have to be watched closely for heavy breeding may cause some concern to farmers in the case of the former, while the parrakeets with their known pugnacious behaviour could take over nesting-sites of other species; but this I think is not a great threat.

A CATALOGUE OF NEVILLE CAYLEY'S PAINTINGS OF AUSTRALIAN COCKATOOS AND PARROTS IN THE POSSESSION OF THE ROYAL ZOOLOGICAL SOCIETY OF NEW SOUTH WALES

by L. Courtney Haines

On the 29th October, 1941, Mr. (now Sir) Edward Hallstrom generously presented to the Royal Zoological Society of New South Wales a complete series of framed paintings by Neville W. Cayley of the Australian Cockatoos and Parrots. The paintings, 29 in all, were formally handed over by the Honourable Clive R. Evatt, M.L.A., then Minister for Education.

A similar series of parrot paintings was also presented by Sir Edward to the National Library, Canberra, A.C.T. According to the *Check list to the Mathews Ornithological Collection of the National Library of Australia,* published in 1966, the collection of parrot paintings in the National Library numbers fifty.

The writer has not been able to trace painting no. 29 which depicts the very rare Night Parrot and the unique Ground Parrot. The Council Members of the Royal Zoological Society of New South Wales would be most grateful to anyone for information regarding the whereabouts of this painting.

Eighteen paintings are at present stored in the Society's room at Taronga Zoo, the remaining ten paintings being housed in the Bird Room of the Australian Museum. The paintings are to be exhibited from time to time in sets of two on the walls of the Sir Edward Hallstrom Lecture Theatre in the Australian Museum.

The following is the first published list of the paintings, and the picture frames have been numbered by the author as far as it is possible to do so, according to the arrangement of parrot-like birds in the Royal Australasian Ornithologists' Union official *Checklist,* published 1926. The technical names may differ somewhat from the names inscribed on the paintings and are those used in *What Bird is That?* by Neville W. Cayley, third edition, 1965.

CATALOGUE

Frame numbers.	Subjects.
1.	Rainbow Lorikeet, *Trichoglossus moluccanus* (Gmelin).
	Red-collared Lorikeet, *Trichoglossus rubritorquis* Vigors & Horsfield.
	Scaly-breasted Lorikeet, *Trichoglossus chlorolepidotus* (Kuhl).
2.	Varied Lorikeet, *Psitteuteles versicolor* Lear.
	Musk Lorikeet, *Glossopsitta concinna* (Shaw).
	Purple-crowned Lorikeet, *Glossopsitta porphyrocephala* Dietrichsen.
	Little Lorikeet, *Glossopsitta pusilla* (Shaw).
3.	Blue-browed Lorilet, *Opopsitta coxeni* (Gould).
	Red-browed Lorilet, *Opopsitta macleayana* (Ramsay).
4.	Palm Cockatoo, *Probosciger aterrimus* (Gmelin).
5.	Red-tailed Black Cockatoo, *Calyptorhynchus banksi* (Latham).
6.	Glossy Black Cockatoo, *Calyptorhynchus lathami* (Temminck).
7.	White-tailed Black Cockatoo, *Calyptorhynchus baudini* Lear.
8.	Yellow-tailed Black Cockatoo, *Calyptorhynchus funereus* (Shaw).
9.	Gang Gang Cockatoo, *Callocephalon fimbriatum* (Grant).
10.	White Cockatoo, *Kakatoe galerita* (Latham).
	Pink Cockatoo, *Kakatoe leadbeateri* (Vigors).

11. Little Corella, *Kakatoe sanguinea* (Gould).
    Galah, *Kakatoe roseicapilla* (Viellot).
12. Long-billed Corella, *Kakatoe tenuirostris* (Kuhl).
13. Cockatiel, *Leptolophus hollandicus* (Kerr).
14. Red-sided Parrot, *Lorius pectoralis* (Muller).
    Red-cheeked Parrot, *Geoffroyus geoffroyi* (Bechstein).
15. Superb Parrot, *Polytelis swainsoni* (Desmarest).
    Regent Parrot, *Polytelis anthopeplus* (Lear).
16. Princess Parrot, *Polytelis alexandrae* Gould.
    Paradise Parrot, *Psephotus pulcherrimus* (Gould).
17. Red-winged Parrot, *Aprosmictus erythropterus* (Gmelin).
    King Parrot, *Aprosmictus scapularis* (Lichtenstein).
18. Crimson Rosella, *Platycercus elegans* (Gmelin).
    Adelaide Rosella, *Platycercus adelaidae* Gould.
    Green Rosella, *Platycercus caledonicus* (Gmelin).
    Eastern Rosella, *Platycercus eximius* (Shaw).
19. Western Rosella, *Platycercus icterotis* (Kuhl).
    Pale-headed Rosella, *Platycercus adscitus* (Latham).
    Yellow Rosella, *Platycercus flaveolus* Gould.
    Northern Rosella, *Platycercus venustus* (Kuhl).
20. Ringneck (Mallee) Parrot, *Barnardius barnardi* (Vigors & Horsfield).
    Cloncurry Parrot, *Barnardius macgillivrayi* (North).
    Red-capped Parrot, *Purpureicephalus spurius* (Kuhl).
21. Port Lincoln Parrot, *Barnardius zonarius* (Shaw).
    Twenty-eight Parrot, *Barnardius semitorquatus* (Quoy & Gaimard).
    Western Ringneck, *Barnardius occidentalis* (North).
22. Mulga Parrot, *Psephotus varius* Clark.
    Red-backed Parrot, *Psephotus haematonotus* (Gould).
23. Blue Bonnet, *Psephotus haematogaster* (Gould).
    Red-vented Blue Bonnet, *Psephotus haematorrhous* Gould.
    Yellow-vented Blue Bonnet, *Psephotus pallescens* Salvadori.
    Little Blue Bonnet, *Psephotus narethae* White.
24. Golden-shouldered Parrot, *Psephotus chrysopterygius* Gould.
    Hooded Parrot, *Psephotus dissimilis* Collett.
25. Turquoise Parrot, *Neophema pulchella* (Shaw).
    Scarlet-chested Parrot, *Neophema splendida* (Gould).
26. Orange-breasted Parrot, *Neophema chrysogaster* (Latham).
    Blue-winged Parrot, *Neophema chrysostoma* (Kuhl).
    Elegant Parrot, *Neophema elegans* (Gould).
    Rock Parrot, *Neophema petrophila* (Gould).
27. Bourke Parrot, *Neophema bourki* (Gould).
    Swift Parrot, *Lathamus discolor* (Shaw).
28. Budgerigar, *Melopsittacus undulatus* (Shaw & Nodder).
29. Swamp Parrot, *Pezoporus wallicus* (Kerr).
    Night Parrot, *Geopsittacus occidentalis* Gould.

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THE TIGER MOTHS OF THE COUNTY OF CUMBERLAND, NEW SOUTH WALES

by L. Courtney Haines, Hon. Associate (*Lepidoptera*), Australian Museum, Sydney

(Plates VIII-IX.)

The family Arctiidae is divided into two sub-families; the Arctiinae and the Lithosiinae. The moths of the former sub-family with their banded bodies and creamy-white to red wings adorned with various motifs of black, crimson and gold are the Tiger and Ermine Moths; while the latter sub-family embraces the smaller and more delicate species known to collectors as Footmen Moths.

Our ancient "Brethren of the Net" apparently gave to the Lithosiinae the extraordinary name of Footmen, because, with their brightly marked bodies and wings they seemed to bear a resemblance to the Coach Footmen of the day, many of whom we are told, for the pleasure of their masters, were attired in the most bizarre livery.

Although many species of Lithosiinae inhabit the County of Cumberland, of which the day-flying Speckled Footman, *Utetheisa pulchelloides* Hamps.; Wood Footman, *Asura cervicalis* Walk.; Marsh Footman, *A. structa* (Walk.), together with the night-flying Common Footman, *Manulca replana* (Lewin) are perhaps the best known, only five species of the Arctiinae appear to occur within the county. They are the Common Tiger Moth, *Spilosoma glatignyi;* the Crimson Tiger, *S. curvata;* the Gold-marked Ermine, *Diacrisia canescens;* the Marginated Ermine, *Amsacta marginata* and Croker's Tiger Moth, *Rhodogastria crokeri.* The first four species mentioned are rather common moths, but the fifth species, *crokeri,* is a very great rarity.

The caterpillars of at least four are known as "woolly bears" and feed upon plants such as dandelions, and the pupae are enclosed within soft silky cocoons.

1. The Common Tiger Moth, *Spilosoma glatignyi* (Le Guillot), 1841, plate viii, figs. 1, 2.

The typical *glatignyi* has a bright yellow abdomen; however, those usually taken within the County of Cumberland possess a red abdomen and are known as ab. *pallida* Dbl. Another aberration sometimes taken is known as *suffusa.* The wings in this aberration have such extensive blackish-brown markings that the white only appears as spots.

The last captures I made of the Common Tiger Moth were as long ago as the year 1947 and I have not observed a living specimen since that year. Prior to 1947 the Common Tiger Moth lived up to its vernacular name.

During warm summer nights, moths would be found "resting up" on most lamp-posts in the district in which I then resided. At the height of the collecting season a series of 20 or more could be taken on any night provided that there was a north-easterly movement in the air.

Crepuscular in habits, Common Tiger Moths are on the wing when the sky is aglow with the setting sun. I remember how the male moths after having sought out and impregnated the virgin females would frolic along and over the various hedges and vine-covered fences. The females, however, had no desire to dance in the evening breeze, but instead sought low-growing herbs in quiet corners of the garden on which to lay their many eggs.

First stars appearing in the sky would herald the end of courtship and egg-laying and the moths then repaired to various hiding places. As previously mentioned, many would be attracted to street lamps and

there they would cling, becoming more torpid as the night progressed. At midnight I would "go the rounds" of the lamps, for, at that late hour one had only to touch the resting moths gently with a long bamboo pole, whereupon they would fall quietly to earth and with the least possible trouble could be either pill-boxed or bottled.

2. The Crimson Tiger Moth, *Spilosoma curvata* Donovan, 1805, plate ix figs. 7, 8, 9, 10, 11, 12.

The Crimson Tiger Moth is an extremely variable species, ranging from very heavily marked specimens to moths almost devoid of markings. I have specimens in my collection which approach the well known aberrations *nigriceps* Btlr., *notatum* Btlr., *nexa* Btlr., *lacteatum* Btlr., and recently I have been taking a very dark form indeed of this interesting moth.

The Crimson Tiger is readily attracted to light and I have taken specimens in bus-shelters, railway station waiting-rooms and also on well lit shop-windows, the latter being one of my happiest hunting "grounds" for this species. It would almost seem that *curvata* likes to be captured, for the moment a resting moth is covered with a glass-bottomed pill-box, it throws itself backwards and after lying quietly for a while, takes up a position on the side of the box, where it remains until home is reached and the killing-jar. With a species co-operating in such a manner, it is really remarkable the number of Crimson Tigers one may collect in public places without drawing the least attention to oneself.

The caterpillars when fully grown, measure about 1¼ inches in length and are covered with soft silky black hairs. They are very active little beasts and always appear to be in a tremendous hurry.

The moth is on the wing every month of the year, but more commonly so during the warmer months. I have noted that *S. curvata* is a species that is becoming increasingly more common.

3. The Gold-marked Ermine, *Diacresia canescens* (Butler), 1875, plate viii, fig. 3.

As will be observed in the accompanying plate, *canescens* bears a superficial resemblance to *S. glatignyi;* however, the two species may be instantly separated one from the other. The thorax of *canescens* is plain white, while that of *glatignyi* has two black shoulder stripes and a central black thoracic crestal stripe.

The habits of the Gold-marked Ermine are very similar to those of the Common Tiger Moth. It is readily attracted to light and most of the specimens in my collection have been taken on lamps late at night.

4. The Marginated Ermine, *Amsacta marginata* (Don.) 1805, plate viii, figs. 4, 5, 6.

I have had very little field experience with this attractive species, the only capture made within the County of Cumberland being a single deformed example taken at Camden on 21st December, 1947.

The species ranges in colour from white with few black markings to pink with large areas of black. The abdomen is usually red, but in some specimens the red is replaced by yellow.

In the Australian Museum reference collection of moths, there is a tremendously exciting aberration of this species in which the hindwings are remarkably dark. This very unusual specimen was attracted to Mr. L. Willan's mercury vapour lamp whilst he was collecting moths at Green Valley, New South Wales, on the night of December 30th, 1960 (fig. 5).

While I was mothing at Bandon Grove in the Dungog District, New South Wales, on 9th February, 1961, *marginata* literally swarmed to my lamps which I had set up on the border of an open grassy meadow.

Flying in company with *marginata* on that particular night was a plain creamy-white Rush Moth of the family Schoenobiidae. This species also occurred in great numbers.

5. Croker's Tiger Moth, *Rhodogastria* (*Euprepia*) *crokeri* (W. S. Macleay) 1826, plate ix fig. 13.

A single specimen of this moth in excellent condition was collected by Mr. Roy Kinghorn aboard a Lane Cove ferry boat in May, 1925. In view of the fact that the type and paratype of *R. crokeri* were taken aboard a ship at sea it is singularly remarkable that the only Sydney specimen of which I am aware was also taken aboard a boat.

The following note is from the *Narrative of a Survey of the Inter-tropical and Western Coasts of Australia performed between the years 1818 and 1822,* by Capt. Phillip P. King, Vol. ii, "1827", publ. 1826, pages 465-466.

Euprepia Crokeri Capt. P. P. King, MSS. "This lovely insect, of which two specimens were taken at sea, has been named by Captain King after John Wilson Croker, Esq., M.P., and First Secretary of the Admiralty."

R. (*E.*) *crokeri* occurs from Sydney northwards. When the moth is handled it is said to curl up as if dead and to produce from special glands at the base of the wings, a quantity of frothy yellow liquid.

ACKNOWLEDGEMENTS

I would like to thank the Trustees of the Australian Museum for kindly making available museum specimens and also for granting me permission to have them photographed

Thanks are also due to Mr. C. V. Turner, Assistant Photographer, Australian Museum, and to Mr. J. V. Peters for assisting in checking references.

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EXPLANATION OF PLATES

Plate viii.—
Spilosoma glatignyi (Le Guill.,) figs. 1 and 2.
Diacresia canescens (Butler.) fig. 3.
Amsacta marginata (Don.) figs. 4, 5 and 6.

—photo: C. V. Turner.

Plate ix.—
Spilosoma curvata Don. figs. 7, 8, 9, 10, 11 and 12.
Rhodogastria crokeri Macleay, fig. 13.

—photo: C. V. Turner.

Moths Illustrated (Plates viii-ix)
Figures: 2, 4, 5, 6, 7, 8, 10, 11, 12, 13 ..... Australian Museum collection
Figures: 1, 3, 6, 9 ..... Courtney Haines collection

THE OCCURRENCE OF **DANIS HYMETUS TAYGETUS** (FELDER) AT BAYVIEW, NEW SOUTH WALES

by L. Courtney Haines, Hon. Associate (Lepidoptera), Australian Museum, Sydney.

The small Green-Banded Blue, *Danis* (*Thysonotis*) *hymetus taygetus* (Felder), 1865, is a northern butterfly common from the Manning River to Mackay (Waterhouse, 1932). Three specimens however, are known to have been collected at Lake Macquarie, New South Wales, and in the Australian Museum collection of butterfliflies is a female of *D. hymetus taygetus* taken as far south as Narrabeen, New South Wales. This specimen was collected by Dr. G. A. Waterhouse on 18th December, 1921.

I now wish to place on record the capture of three females and the observing of one male and four females at Bayview, a sheltered rustic district adjoining Pittwater, approximately three miles north of Narrabeen and fifteen miles north of Sydney.

All specimens appeared in my garden on sunny, cool days and were attracted to the Poinsettia flowers and to flowering weeds. One specimen was attracted to a Peach Tree.

Although this butterfly has quick wing beats, it moves through the air in a soft and gentle manner, quite unlike any other Lycaenid of which I have had field experience. Its flight resembles very much indeed, the flight pulse of the Lesser Glasswing, *Acraea andromacha* Fabricius.

Data of Specimens collected and observed.

1. 4th April, 1968: worn specimen observed.
2. 5th April, 1968: female taken at flowering weeds; fresh, but slightly damaged.
3. 6th April, 1968: perfect male observed. I could easily have captured this very fine specimen if my butterfly net had been at hand.
4. 7th April, 1968: female observed, flying rather high.
5. 26th April, 1968: perfectly fresh female captured.
6. 2nd June, 1968: damaged female netted at Poinsettia flowers.
7. 16th June, 1968: female observed.
8. 17th June, 1968: female observed.

Coloured illustrations of *D. hymetus taygetus* are to be found in *What Butterfly is That,* plate xix, figs. 14, 14B and 14A (female).

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THE BUTTERFLIES OF LORD HOWE ISLAND

by John V. Peters

Waterhouse (1897) recorded eighteen species of butterfly from Lord Howe Island and in 1920 described two of these as subspecies. These papers are the most recent dealing with the butterfly fauna of the island. However, there are in the collections of the Australian Museum five species of butterfly previously unrecorded from the island and also, additional specimens of recorded species which are worthy of note. This is a complete list of the species recorded as occurring on Lord Howe Island, new records being indicated by an asterisk. Specimens in the Australian Museum collection are shown by the abbreviation A.M. together with label data.

Superfamily Hesperioidea
Family Hesperiidae
Subfamily Hesperiinae

Taractrocera papyria (Boisduval). One specimen taken by Mr. E. H. Saunders in 1888. (Waterhouse 1897, as *Apaustis agraulia* Hewitson).

Superfamily Papilionoidea
Family Papilionidae
Subfamily Papilioninae

Graphium macleayanus insulana (Waterhouse). ♀ Holotype no other data, 1 ♂ no data; 1 ♀ 15.iii.1915; 1 ♀ April 1922, R. Baxter; 1 ♂ December 1921, A. Musgrave; (A.M.).

Papilio aegeus aegeus Donovan. 1 ♂ March 1883. E. H. Saunders; 1 ♂ 13.ii.1904; 2 ♂ 1 ♀ December 1921, A Musgrave; 3 ♂ 6.iii.1922, A. R. McCulloch; 1 ♂ 11-20.ii.1946, 1 ♂ no data, (A.M.).

**Papilio demoleus sthenelus* Macleay. 1 ♀ 20.i.1925, R. Baxter (A.M.).

Family Pieridae
Subfamily Coliadinae

Catopsilia pyranthe (Linnaeus). Waterhouse (1897) says, "one specimen in my collection".

**Eurema drona australis* (Wallace). 1 ♀ 11.ii.1904; 3 ♂ 1 ♀ March and April 1922, R. Baxter (A.M.).

Eurema similax (Donovan). 1 ♂ 1.ii.1922 A. R. McCulloch (A.M.). Recorded as being abundant at times (Waterhouse 1897).

Subfamily Pierinae

**Appias paulina ega* (Boisduval). 1 ♀ December 1921, A. Musgrave; 1 ♀ 19.i.1922 A. R. McCulloch; 7 ♂ 7 ♀ 10.ii.6.iii.1922, A. R. McCulloch; 1 ♀ 7.iii.1922, R. Baxter; 2 ♂ April 1922, R. Baxter. 1 ♂ 12.xii.1922, A. R. McCulloch; 1 ♂ 28.i.1923, A. R. McCulloch; 1 ♂ 11.v.1925, A. R. McCulloch; 1 ♀ no date A. R. McCulloch; (A.M.).

Family Nymphalidae
Subfamily Danainae

Danaus plexippus (Linnaeus). 2 ♀ April 1922, R. Baxter. This species was first recorded on the island in 1870 (Olliff 1890).

Danaus chrysippus petilia (Stoll). 1 ♀ 1.iii.1922, A. R. McCulloch. 1 ♀ no data (A.M.).

Danaus hamata (Macleay). The only record of this species is a specimen collected by Miss E. Nichols (Waterhouse 1897).

**Euploea core corinna* (Macleay). 3 ♂ 2 ♀ 15.ii-24.ii.1922, A. R. McCulloch; 1 ♂ 2 ♀ March 1922, R. Baxter; 1 ♂ no date, A. R. McCulloch (A.M.).

Subfamily Satyrinae

Waterhouse (1897) comments on, "the absence of any form of this subfamily", however the subsequent discovery of the following species is not surprising.

**Melanitis leda bankia* (Fabricius). 1 ♂ 1922, R. Baxter; 1 ♀ January 1933, A. Livingstone; 1 ♂ June 1966, H. G. Cogger (A.M.).

Subfamily Charaxinae

Polyura pyrrhus tiberius (Waterhouse). Holotype ♀ 6.ii.1915, J. B. Waterhouse; 2 ♂ 21.ii.1922, A. R. McCulloch; 1 ♂ 30.iii.1922, R. Baxter; 1 ♀ December 1922, R. Baxter; 1 ♂ April 1932, A. Livingstone (A.M.). Waterhouse (1920) described this subspecies from, what was then, the only known specimen, although the species had been previously recorded by Olliff (1889).

Subfamily Nymphalinae

Hypolimnas bolina nerina (Fabricius). 1 ♂ 28.xii.1921, A. Musgrave; 1 ♀ 20.ii.1922, A. R. McCulloch; 1 ♀ 7.iii.1922 R. Baxter (A.M.).

Vanessa kershawi (McCoy). Although there are no specimens from the island in the Australian Museum collection, this species is recorded as being common. (Waterhouse 1897).

Vanessa itea (Fabricius). 1 ♀ 21.iii.1922; 1 ♂ 1922, A. R. McCulloch (A.M.).

Precis villida calybe (Godart). 3 ♂ 1 ♀ 22-25.ii.1904; 1 ♂ March 1922, R. Baxter; 1 ♂ 2 ♀ April 1932, A. Livingstone (A.M.). Waterhouse (1897) says, 'this is certainly the commonest butterfly on the island".

Family Lycaenidae

Subfamily Lycaeninae

Lampides boeticus (Linnaeus). 1 ♂ no date (A.M.). Recorded as being common by Waterhouse (1897).

Everes lacturnus (Godart). One specimen recorded by Waterhouse (1897 as *Lampides argiades* Pallas).

Lucia limbaria Swainson. One specimen taken by Mr. E. H. Saunders in 1888 (Waterhouse 1897, as *Lucia lucanus* (Fabricius)).

Zizeeria otis labradus (Godart). 4 ♂ December 1921, A. Musgrave (A.M.). Waterhouse (1897) records this species as being very common.

Candalides xanthospilos (Hubner). One specimen taken by Mr. E. H. Saunders in 1888 (Waterhouse 1897).

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BOOK REVIEWS

"A Portfolio of Australian Birds". Plates by William T. Cooper, text by K. A. Hindwood (A. H. & A. W. Reed, Sydney, Wellington, Auckland), 1 Dec., 1968, pp. 1-62, pls. i-xxv. Price $9.95.

In these days the first edition of any bird book will rapidly be sold, so that it is with great pleasure that one finds a new book in which the paintings are not only beautiful but accurate. Not only the birds but the foliage by which they sit stands out and it is often said that to paint plants is very difficult.

The artist is obviously a naturalist and was this first before he became a painter, I think this is the opposite way round to many people who paint birds in Australia.

In some of the plates there is too much blue, but this is the fault of the printers and not the original pictures.

One looks forward to more paintings by this artist, who has finally shown that Australia can produce artists capable of illustrating here the interesting flora and fauna.

The text by Keith Hindwood is most suitable for a book of this type, being easy to read with interesting historical details and information on behaviour and habits, which are not readily obtained elsewhere.

This book should be on the bookshelf of all interested in Australia.

— H. J. de S. D.

"Normal table of *Xenopus laevis* (Daudin) . . . ," edited by P. D. Nieuwkoop and J. Faber. Second edition (Amsterdam: North-Holland Publishing Co.), 1967, 252 pages, 10 plates. Price 40 guilders.

In 1958, when the first edition of "Normal Table of *Xenopus laevis* (Daudin)" was published, P. D. Nieuwkoop and J. Faber of the Hubrecht Laboratory made a major contribution to the experimental study of amphibian embryos. Various species of Amphibia have been used for studies of development, and comparison of results is complicated, even within one species, because different authors stage development in different ways. This situation is not resolved until a single normal table, with many readily-separable stages, becomes accepted for a particular species. Since its appearance, Nieuwkoop and Faber's Table has been the standard reference for the development of *X. laevis* and thus, because this animal has been used extensively in studies of development, it has been a most important contribution to the literature.

There are two major sections in the book. In the first, invited experts have given a detailed account of the development of the tissue with which they are especially familiar. in the second the editors describe the general pattern of development. The pre-adult period is divided into sixty-six stages and a detailed description of the specific characters of each stage is present in text and figures. A comparison between various normal tables, both of *X. laevis* and other anurans, is included, and short chapters describe the taxonomic position and geographic distribution of the genus. Methods for breeding and maintaining the toad in the laboratory are provided and there is an extensive bibliography.

Many will recognise this as a description of the first edition which went out of print in 1965. The second edition is little more than a reprint, the only additional material consisting of nine pages of bibliography, containing references which have appeared since 1958. Typographic errors, present in the first edition, remain, and it seems a great pity that the illustrations have not been improved. The existing figures would have benefited greatly from labelling, and additional figures, illustrating the internal anatomy of certain developmental stages, would be desirable. This was my sole criticism of the first edition and I find it regrettable that no change has occurred here. Nevertheless, the book remains outstanding in its usefulness and practicality and one only wishes that such guides existed for other species.

— P. A. Janssens

"Fish Tales", by Athel D'Ombrain, Adelaide: Rigby, 1968, pp. 1-178, illustrated.

Our member, Mr. Athel D'Ombrain, author of *Game Fishing off the Australian Coast,* relates some of his experiences as an angler and a naturalist in this new book of *Fish Tales,* illustrated by his own excellent photographs. Well written, with engaging humour, this book has about it the feel of clean, fresh air. A first-rate present for one's angler friend.

"Six-legged Science", by Brian Hocking (Cambridge, Mass.: Schenkman), 1968, pp. i - vi + 1 - 200, illustrated. Price, $US. 4.50.

The white squiggles on the brown end-papers of this book were written by insects, using their feet and wings, and give a hint of the original and delightful treatment of modern entomology in the intervening pages. Professor Hocking entertains while he instructs his readers. Illustrated by amusing sketches, "Six-legged Science" is written with wit as well as learning and much of it has been recast from radio and television talks in Canada. In addition to quoting poets' writings on insects, Hocking bursts into verse on his own account with some extraordinary rhymings concerning silverfish, collembola and other lowly groups. Even psocoptera are presented in verse. Despite the fun, the book contains some serious thinking and its author tells us much about the physiology of insects, their flight, senses, habits and their still evolving relationships with man in the world we share with them.

— G.P.W.

"Physiological Approach to the Lower Animals", by J. A. Ramsay, 2nd Ed. Paperback. Price 12/- sterling. Cambridge University Press, Cambridge, U.K. 1968, pp. i-x and 150. Illustrated by graphs and line drawings. Also available in cloth binding at 40/- sterling.

New tools like the electron microscope and paper chromatography seem to have awakened renewed interest in the lower animals and great advances have been made in the understanding of their fine anatomy and in the fields of physiology and behaviour. However, much of this material is mostly still widely scattered through various scientific journals which makes it difficult for teachers or students in junior years at universities, with limited time available, to follow these new trends. The present book aims to set before its readers some of the findings of this recent work and to show the changes that have occurred in our thinking about the invertebrates since the revolutionary findings of molecular biologists caused us to look at them in a new light. This the book does very well.

The various functions of the lower animals such as nutrition, circulation, respiration, excretion, chemical co-ordination and nervous control are examined and contrasted and related to the animals' morphological structures in a series of short chapters, in a way that helps the reader to appreciate their basic features and to look with new eyes at some of the anatomical structures. The reader is also brought to appreciate the variety of ways in which these functions can be achieved.

Ramsay then goes on to discuss muscles, nerves, sense organs and the co-ordination of their functioning to produce behaviour patterns. This last section of the book is perhaps the most fascinating part of the story. Throughout the book the author frequently contrasts structures and physiological processes in invertebrates with those of the better-known vertebrates and one is left with a sense of admiration for the lower animals which manage to get by and carry out the various bodily functions while being much less perfectly organised and having much less complex physiological processes than the vertebrates.

As an instance of the new interest aroused in some of the finer structures of invertebrates we can consider the role now attributed to the insignificant holes that occur in each of the septa that divide the annelid's body into segments. It is now realized that they allow for local differences in pressure in adjacent segments and thus serve to instigate the stretch stimuli which are part of the co-ordinating mechanism governing the waves of muscular contraction that bring about locomotion. Many similar interesting new facts are brought out in the various chapters that show the lower animals to be fascinating in themselves and also emphasise thir possibilities as subjects for experimental research or for class demonstrations.

Though the author modestly regards his account as a mere "approach" to the physiological study of invertebrates, he makes the point that a wide field of investigation remains and he presents his matter so interestingly and lucidly—albeit in a most bright and breezy way—that his book is likely to stimulate many young scientists to follow up this field of study and later on take up research in related areas of study. It is a book that can be recommended alike to teachers and pupils in the senior years at high schools and to university students in their junior years.

E.C.P.

APPEAL FOR BACK NUMBERS OF THE SOCIETY'S PUBLICATIONS

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 is becoming difficult for the Society to fill orders for sets or to maintain exchanges.

Mr. N. S. Gomersall, 66 Glover Street, Mosman, 2088, is seeking literature on the Superfamily CYPRAEOIDEA. In particular he is desirous of obtaining:

(a) Australian Cowries, Part 2, Iredale (Aust. Zool., 9:297-323, pls. 27-29, Dec. 12, 1939).

(b) Any literature on the allied Cowry families, viz. AMPHIPERATIDAE, ERATOIDAE, TRIVIIDAE, PEDICULARIIDAE and OVULIDAE.

Would any person who could be of assistance please write to the address given.

Authors alone are responsible for the opinions expressed and for the accuracy of the facts in their contributions.

ROYAL ZOOLOGICAL SOCIETY OF NEW SOUTH WALES

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Smith, W. F., 43 Bannockburn Rd., Pymble, 2073.
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Street, The Hon. Sir Kenneth, K.C.M.G., Chief Justice of N.S.W., 2 Greenoaks Ave., Edgecliff, 2027.
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Waterhouse, J. D., 4 Lightcliff Ave., Lindfield, 2070.
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Whitley, G. P., F.R.Z.S., c/- Australian Museum, P.O. Box A.285, Sydney South, 2001.
Wiley, Dr. C. J. 88 Wolseley Rd., Point Piper, 2027.
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Abraham, R. D., 16 Sutherland Rd., Chatswood, 2067.
Acland, G., 20 Fleming St., Beverley Hills, 2209.
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Aitken, J. L., 82 Mimosa Rd., Greenacre, 2190.
Aitken, Mrs. M., 82 Mimosa Rd., Greenacre, 2190.
Aldous, L. J., 24 Bluegum Crescent, Frenchs Forest, 2086.
Alexander, T. R., 13 Silex Road, Mosman, 2088.
Allen, Mrs. H. A., 12 Audrey St., Balgowlah, 2093.
Allen, H. R. A., 12 Audrey St., Balgowlah, 2093.
Allen, J. B., 1a Hopetoun Ave., Mosman, 2088.
Allen, K. W., 4 Cross St., Mosman, 2088.
Allen, W. B., 1 Richmond St., Ryde, 2112.
Andrews, Miss E., 18 Wentworth Place, Point Piper, 2027.
Anstey, Mrs. E. F., 6 Bradley Head Rd., Mosman, 2088.
Armstrong, W. R., 70 Wolseley Rd., Mosman, 2088.
Ashford, D., 17 High St., Willoughby, 2068.
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Bale, L. J., 93 Main St., Wooli, 2462.
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Battam, H., 6 Portsmouth St., Cronulla, 2230.
Baur, G. N., 3 Mary St., Beecroft, 2119.
Baverstock, W. B., 5 Silex Rd., Mosman, 2088.
Beardsall, Mrs. L., c/o Busy B. Salon, Shop 3, M.L.C. Building, Miller St., North Sydney, 2060.
Beattie, Miss L. S., 24 Myers St., Sans Souci, 2219.
Beechey, Miss B., 306 Malton Rd., North Epping, 2121.
Bell, Dr. H. F., 30 Plunkett Rd., Mosman, 2088.
Bell, Mrs. J. G., 12 Kardinia Rd., Clifton Gardens, 2088.
Bell, Mrs. J., 20 Boyce Ave., Austinmer, 2514.
Bell, K. W., 12 Kardinia Rd., Clifton Gardens, 2088.
Bentley, D. L., 50 Innes Rd., Mona Vale, 2093.
Berry, E. G., 15 Ruby St., Mosman, 2088.
Beswick, G. H., Ll.B., Asbestos House, York St., Sydney, 2000.
Bigg, E. K., 12 Wills Ave., Castle Hill, 2154.
Biggers, G. C., 32 Plunkett Rd., Mosman, 2088.
Bissett, Mrs. E. V., 12 Carawatha St., Beecroft, 2119.
Blackhall, G. W., 38a Herbert St., Dulwich Hill, 2203.
Blair, Mrs. E. M., 23 Fleming St., Northwood, 2066.
Blair, Miss L., 23 Fleming St., Northwood, 2066.
Blair, L. R., 23 Fleming St., Northwood, 2066.
Blaxland, Mrs. F. J., 16 Iloura Rd., Wahroonga, 2076.
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Bollinger, G. J., 32 Denison St., Hornsby, 2077.
Boness, D. E. H., 78 Kirkwood St., Seaforth, 2092.
Bouchier, R. W., 141 Nicholson Pde., Cronulla, 2230.
Bowen, B. L., 23 David St., Clifton Gardens, 2088.
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Bowman, R. E., 6 Chapala Close, St. Ives, 2075.
Boyle, P. J., 9 Silex Rd., Clifton Gardens, 2088.
Boyle, R. M., 15 Whiting Beach Rd., Mosman, 2088.
Bradley, Miss E. B., 46 Iluka Rd., Mosman, 2088.
Bradley, Miss J. B., 46 Iluka Rd., Mosman, 2088.
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Brown, E. B., 186 Nicholson Parade, Cronulla, 2230.
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Buckingham, L. A., 50 Kendall St., Pymble, 2073.
Bucksath, K. A., 11 Morris Ave., Kingsgrove, 2208.
Bunce, Mrs. D., 13 Burne Ave., Dee Why, 2099.
Burge, G. B., 55 New St., Balgowlah Heights, 2093.
Burns, J., 127 Plateau Rd., Bilgola Heights, Avalon Beach, 2107.
Butler, Miss J. E., 94 Cabramatta Rd., Mosman, 2088.
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Canning, M. V., 4 Burrawong Ave., Clifton Gardens, 2088.
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Carter, A. P. B., 5 Ruby St., Mosman, 2088.
Carthew, E. L., 6 Carson St., Pymble, 2073.
Chaffer, N., F.R.Z.S., 1 Roslyn Ave., Roseville, 2069.
Chambers, W., 7 Rutland Ave., Castlecrag, 2068.
Chaplain, V., 27 Drummoyne Ave., Drummoyne, 2047.
Chapman, Miss C. V., 77 Cambrai Ave., Engadine, 2233.
Chapman, W. S., David St., Old Bar, via Taree, N.S.W. 2430.
Chisholm, A. H., O.B.E., F.R.Z.S., "Nenagh", Milson Rd., Cremorne, 2090.
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Cole, A. H., 1 Bank Lane, North Sydney, 2060.
Cole, Mrs. V. M., 1 Bank Lane, North Sydney, 2060.
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Constable, M. K., 28 Dan Crescent, Castle Hill, 2154.
Conway, H. P., 10 Prince Albert St., Mosman, 2088.
Cook, J. E., 12 Wisteria St., Caringbah, 2229.
Cook, S., 21 Milburn Rd., Gymea, 2227.
Cooke, Mrs. F., 14 Cantor St., Croydon, 2132.
Cooper, M. V., 30 Suttie Rd., Double Bay, 2028.
Copland, S. J., 15 Chiltern Pde., Warrawee, 2074.
Corbett, C. C., O.B.E., 18 Angle St., Balgowlah, 2093.
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Crosby, D. F., 7 Russell St., Toorak, Vic. 3142.
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Cullen, C. F. C., 7 Pretoria Ave., Mosman, 2088.
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Dagg, Dr. I. R., 16 Bradleys Head Road, Mosman, 2088.
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Darrell, H., "Bushlands", Acres Rd., Kellyville, 2153.
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de Valence, R. L., 19a Kardinia Rd., Clifton Gardens, 2088.
Dewhurst, N., "Yantara", 2 St. Elmo St., Mosman, 2088.
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Doswell, R., 12 Burrawong Ave., Mosman, 2088.
Dougall, A., 20 James St., Chatswood, 2067.
Dowe, C. F., 26 Prince Albert St., Mosman, 2088.
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Doyle, Miss M. L., 175 Boundary Rd., East Roseville, 2069.
Drabble, C., 6a David St., Clifton Gardens, 2088.
Drummond, Mrs. M., 45 Albert Drive, West Killara, 2071.
Duff, J. G. Snr., 7 Cross St., Mosman, 2088.
Duncan, G. A., Box 2 P.O., Terrey Hills, 2084.
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Edwards, E. O., Cummins Rd., Menangle Park, 2691.
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Ellison, Miss D. J., 45 Victoria St., Roseville, 2069.
Ellison, N., 13a Whiting Beach Rd., Mosman, 2088.
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Farrell, A. S., 277 Cleveland St., Redfern, 2016.
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Finckh, Dr. E. S., 15 Riddles Lane, Pymble, 2073.
Finckh, E. V., 1 Valley Rd., Lindfield, 2070.
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Foat, J. C., 18 Treatts Rd., Lindfield, 2070.
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Gillett, K., 252 Birrell St., Waverley, 2024.
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Heath, W., 24 Kardinia Rd., Clifton Gardens, 2088.
Henderson, E., 24 Prince Albert St., Mosman, 2088.
Herford, W. F., 22 Woodlands Rd., Lindfield, 2070.
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Hill, Mrs. G. M., c/- Stanwell Tops Kiosk, Stanwell Tops via Helensburgh, 2508.
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Hill, Miss J. E., 117 Wellington St., Bondi Beach, 2026.
Hill, P., 18 Prince Albert St., Mosman, 2088.
Hinde, Mrs. M., 3/11 Rangers Rd., Cremorne, 2090.
Hinder, Dr. D. C. C., 497 Pacific Highway, Killara, 2071.
Hinder, F. H. C., 36 Nelson St., Gordon, 2072.
Hindwood, K. A., 105 Middle Harbour Rd., Lindfield, 2070.
Hirst, B. C., Pine Ridge, Castle Hill, 2154.
Hirst, Mrs. M. F., 5/168 Kurraba Rd., Neutral Bay, 2089.
Hodgens, E. H., 162 Lambeth St., Picnic Point, 2213.
Hoffmann, G. F., 344 Moore Park Rd., Paddington, 2021.
Holgate, W. E. M., 8 St. Elmo St., Clifton Gardens, 2088.
Holmes, A., 24 Attunga St., Woollahra, 2025.

Hood, M. A., 57 Chester St., Epping, 2121.
Hordern, A., 7 Holt St., Double Bay, 2028.
Hordern, S. C., "Cinnabar", Copmanhurst, 2466.
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Hotchkiss, R. E., 225 Macquarie St., Sydney, 2000.
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Hughes, J., 7/49 Beach Rd., Collaroy, 2097.
Humphrey, R. G., 2/23 Prince Albert St., Mosman, 2088.
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Hutchison, W. L. J., 4/184 Raglan St., Mosman, 2088.
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Inglis, E., 57 Nickson St., Surry Hills, 2010.
Inglis, Mrs. J. F., 404 Princes Highway, Blakehurst, 2221.
Inglis, Mrs. J. R., 39 Dominic St., Cronulla, 2230.
Innes, J., 18 Kirkoswald Ave., Mosman, 2088.
Innes, Mrs. S. A., 18 Kirkoswald Ave., Mosman, 2088.
Irvine, T. W., 41 Farnell St., Gladesville, 2111.
Ivey, Miss L., 15 Gladswood Gardens, Double Bay, 2028.
Jarvis, Mrs. A. E., 3/205 Walker St., North Sydney, 2060.
Jervis, T. H., 74 Roseville Ave., Roseville, 2069.
Jessop, B. L., 31 Glenview St., Paddington, 2021.
Jex, Mrs. C. B., 23 Prince Albert St., Mosman, 2088.
Jex, W. H., 23 Prince Albert St., Mosman, 2088.
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Johnson, Miss R. A., 3/40 Coonanbarra Rd., Wahroonga, 2076.
Jones, Mrs. G. I., 21 Hilltop Cres., Fairlight, 2094.
Jones, R. G. M., 129 Queen St., Woollahra, 2025.
Judd, W. J., 94 Hargrave St., Paddington, 2021.
Kalman, J. R., 21 Morotai Crescent, Castlecrag, 2068.
Kamper, Mrs. K., 21 Horderns Lane, Bundeena, 2230.
Kamper, N., 21 Horderns Lane, Bundeena, 2230.
Kavanagh, F. J., 18 David St., Clifton Gardens, 2088.
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Kennedy, B. F., 189 Edinburgh Rd., Castlecrag, 2068.
Kennedy, C. S., 96 Villiers Rd., Padstow, 2211.
Kennedy, Miss G. E. F., 80 Warrane Rd., Willoughby North, 2068.
Kennedy, Mrs. J. E., 189 Edinburgh Rd., Castlecrag, 2068.
Kenny, J. P., 11 Thompson St., Clifton Gardens, 2088.
Kienhuize, Mrs. M., 14 Derby St., Vaucluse, 2030.
Killen, D. W., 7 Milton Ave., Mosman, 2088.
King, A., 116 Croydon Rd., Croydon, 2132.
King, R. C., Public School, Menangle, 2568.
King, Miss V. A., 8 Simmons St., Enmore, 2042.
Kinghorn, J. R., 8 Arabella St., Northwood, 2066.
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Knights, Miss E. A., 2/74 William St., North Sydney, 2060.
Kuiter, R. H., 12 Queen St., Chippendale, 2008.
Lanceley, E. J., 36 Station St., Naremburn, 2065.
Lane, S. G., 65 Wood St., Lane Cove, 2066.

Langmuir, R. J., 26 Strickland St., Rose Bay, 2029.
Laseron, J., 53 Pozieres Pde., North Manly, 2095.
Laubscher, C. C., 25/14 Royston St., Kings Cross, 2011.
Lawler, C. J., 11 Edward St., Oatley, 2223.
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Lind, Mrs. J., 33 Campbell St., Glebe, 2037.
Lindsay, Mrs. B., 48 Swan St., Gladesville, 2111.
Littlejohn, Dr. M. J., Ph.D., Dept. of Zoology, University of Melbourne, Parkville, Vic. 3052.
McArtney, I. B., 16 Esrom Street, Bathurst, 2795.
McDougall, Dr. W. A., Dept. of Agriculture & Stock, Brisbane, Qld. 4000.
Mann, J. S., F.R.Z.S., 10 Dunella St., Sherwood, Qld. 4075.
Mew, R. H., 48 Jamieson St., Broken Hill South, 2880.
Middleton, Mrs. J. C., 1a Clarke Rd., Waitara, 2077.
Moore, K. M., Cutrock Road, Lisarow, 2251.
Morgan, Mrs. J. E., "Giligul", Ocean Heights, Yeppoon, Qld. 4703.
Morrison, E. M., 61 Anzac Ave., Engadine, 2233.
Nicholson, E. A., Box 199 P.O., Grafton, 2460.
Nock, Miss O. E., 58 Stanhope Rd., Killara, 2071.
Orrell, J., "Warrakoo", Cook Highway, Smithfield, Qld. 4870.
Pols, Mrs. R., "Carramar", 28 Finlay Rd., Turramurra, 2074.
Russell, Mrs. M. B., 75 Narrabeen Park Pde., Mona Vale, 2103.
Schwerin, Mrs. K. R., 1/12 McDougall St., Milsons Point, 2061.
Smith, Gregory E., 6 Coleman Ave., Regents Park, 2143.
Thomas, D. E., c/- Taronga Zoo, Mosman, 2088.
Turnidge, F., 33 Day Rd., Cheltenham, 2119.
Waite Agricultural Institute, University of Adelaide, Private Mail Bag, Adelaide, S. Austr. 5000.
Wareham, Miss V., 11 Walsh Ave., Maroubra, 2035.
Wilson, J. O., 42 Wilson Terrace, Glenelg East, S. Austr. 5045.

Junior Members:

Bishop, Master Lawrence, 54 Tobruk Ave., Cremorne, 2090.
Bishop, Miss Rosemary, 54 Tobruk Ave., Cremorne, 2090.
Brown, Miss Lee, 1/18 Blandford Ave., Bronte, 2024.
Butcher, Master R. A., 6 Skillcorn Ave., Jannali, 2226.
Cam, Master G. R., 59 Magdala Rd., North Ryde, 2113.
Canny, Master D. J. J., 2/8a Wylde St., Potts Point, 2011.
Chidgey, Mr. Phillip, 122 Darvall Rd., West Ryde, 2114.
Cornwell, Miss Narelle, 198 Stanmore Rd., Stanmore, 2048.
Cornwell, Master Philip, 198 Stanmore Rd., Stanmore, 2048.
Cuthbert, Master G. J., 145 Como Parade, Como, 2226.
d'Apice, Master M. J., 5 Telegraph Rd., Pymble, 2073.
Deeble, Master T. W., 11 The Crescent, Hurstville, 2220.
Doyle, Master Michael, 163 Adelaide St., St. Marys, 2760.
Driscoll, Master Christopher, 80 Lane Cove Rd., Ryde, 2112.
Driscoll, Master Dean, 80 Lane Cove Rd., Ryde, 2112.
Eyre, Master E. D., 74 Noble St., Hurstville, 2220.
Fahey, Master A. J., 8 Bain Place, Dundas, 2117.

Foster, Master Gary Alan, 4 Coolangatta Ave., Elanora Heights, 2101.
Hosking, Miss S., 67 Anglesea St., Bondi, 2026.
Jackson, Master M., 224 Barrenjoey Rd., Newport, 2106.
Lindsay, Master Alan, 48 Swan St., Gladesville, 2111.
Lindsay, Master Geoffrey, 48 Swan St., Gladesville, 2111.
Lucey, Master D. J., 14 McKinnon Ave., Padstow, 2211.
Ludowici, Master D. C., 8 Kilpa Place, St. Ives, 2075.
Ludowici, Master P. A., 8 Kilpa Place, St. Ives, 2075.
McCarron, Master G. J., 93 Weston St., Panania, 2213.
McCarron, Miss J. E., 93 Weston St., Panania, 2213.
McCarron, Miss Susan, 93 Weston St., Panania, 2213.
Moore, Miss C. E., 17 Bain Place, Dundas, 2117.
Moore, Master P. L., 17 Bain Place, Dundas, 2117.
Moores, Master G. J., 12 Beaconsfield Rd., Mortdale Heights, 2223.
Moorhouse, Master W. E., 6 Maher St., Hurstville, 2220.
Morris, Master M., 71 Arabella St., Longueville, 2066.
Morrison, Miss D. L., 1 Lewis St., Dee Why, 2099.
Pecar, Master M. A., Lot 6, Wilga St., Elanora, 2101.
Scarr, Master B. J., 16 Dickson Ave., West Ryde, 2114.
Sinclair, Master J. R., 8 Wall Ave., Cootamundra, 2590.
Thompson, Miss L. M., 34 Delves St., Mortdale, 2223.
Thompson, Master R. J., 34 Delves St., Mortdale, 2223.
Tichon, Master M., 113 Picnic Point Rd., Picnic Point, 2213.
Turner, Master Martin, 225 Dunbar St., Stockton, 2295.
Whyte, Master Mark, 5/122 Francis St., Bondi, 2026.
Wray, Miss Elwyn, 69 Eddy Rd., Chatswood, 2067.
Wray, Miss Sally, 69 Eddy Rd., Chatswood, 2067.
Wright, Master Peter, 20 Berryman St., North Ryde, 2113.

Members are requested to inform the Honorary Secretary (Mrs. L. Z. Harford, F.R.Z.S.—telephone 55-1397) of any change of address.

MEMORANDUM, ARTICLES OF ASSOCIATION AND RULES

OF THE

ROYAL ZOOLOGICAL SOCIETY

OF

NEW SOUTH WALES

SYDNEY

SURREY BEATTY & SONS
Rickard Rd., Chipping Norton

1969

ROYAL ZOOLOGICAL SOCIETY OF NEW SOUTH WALES

(Copy.)
NEW SOUTH WALES.

CERTIFICATE OF INCORPORATION.
No. 58443.

The Companies Act 1899.

I CERTIFY that an Association styled "ROYAL ZOOLOGICAL SOCIETY OF NEW SOUTH WALES" has been registered this day as a limited company, the Governor-in-Council having directed such Association to be registered with limited liability without the addition of the word "limited" to its name, pursuant to the provisions of Section 52 of the Companies Act, 1899.

GIVEN under my hand at Sydney this Seventeenth day of August, One thousand, nine hundred and seventeen.

(Signed) J. W. CROKER,
Assistant Registrar of Joint Stock Companies.

The Companies Act, 1899, No. 40

Association not for Profit.

MEMORANDUM OF ASSOCIATION

OF THE

ROYAL ZOOLOGICAL SOCIETY OF NEW SOUTH WALES

1. The name of the Association is the "ROYAL ZOOLOGICAL SOCIETY OF NEW SOUTH WALES" and it is hereinafter referred to as the Society.

2. The registered office of the Society shall be situate in such place in the City of Sydney or its suburbs as the Council of the Society may from time to time determine.

3. The objects of the Society are:
   (*a*) To promote and advance the Science of Zoology.
   (*b*) To protect preserve and study the indigenous and introduced animals of Australia.
   (*c*) To introduce and acclimatise desirable and suitable animals from abroad.

(*d*) To establish equip and maintain or assist in the establishment equipment and maintenance of biological stations in suitable localities within the State of New South Wales for the purpose of investigation observation and record of the life histories of the indigenous Fauna.

(*e*) To promote hold and/or convene any congress of societies or individuals for the purpose of discussing zoological subjects and of taking such action in relation to Zoology as may be determined upon at any such congress.

(*f*) To care for maintain treat and observe wild animals in captivity or otherwise.

(*g*) To join with any other Society either within or outside of Australia in promoting the study of Zoology in all its branches.

(*h*) To provide and maintain such premises libraries museums scientific collections laboratories and other scientific accessories and conveniences as may be deemed necessary or requisite for the information entertainment demonstration education convenience and use of the members of the Society.

(*i*) To furnish and equip all and every such premises libraries museums laboratories accessories and conveniences.

(*j*) To take over the assets and liabilities of any Society or Corporation having objects wholly or in part similar to the Society and in particular of the unincorporated Society known as the Royal Zoological Society of New South Wales.

(*k*) To print publish and distribute or cause to be printed published and distributed any magazines pamphlets periodicals books or leaflets which the Society may think desirable for the diffusion of useful knowledge with respect to the animal kingdom and for the promotion and achievement of its objects.

(*l*) Subject to the provisions of the Companies Act 1899 Section 53 to purchase take on lease (including building or improving lease) or in exchange hire or otherwise acquire any real and personal estate which may be necessary or convenient for any of the purposes of the Society.

(*m*) To construct maintain demolish repair renew replace and alter any houses improvements buildings fixtures fittings or works necessary or convenient for the purposes of the Society.

(*n*) To take or accept any gift whether subject to any special trust or not for all or any of the objects of the Society.

(*o*) To sell manage lease mortgage dispose of or otherwise deal with all or any part of the property of the Society.

(*p*) To borrow and raise money in such manner as the Society may think fit.

(*q*) To invest any moneys of the Society not immediately required for any of its objects in such manner as may from time to time be determined.

(*r*) To promote establish subsidise and support and to aid in the promotion establishment and support of any branch or affiliated associations and to inaugurate and carry out any scheme or system of affiliation.

(*s*) To promote the passing of or enforcing or to join with any other Society or any body or persons in having passed or enforced any legislation having for its object the preservation or protection of the Fauna of New South Wales or elsewhere in Australia or any other object in connection with Zoology.

(*t*) To offer give or contribute towards any scholarship prize medal or award for any research literary contribution article essay or effort connected with Zoology or any kindred or interdependent study.

(*u*) To apply the profits (if any) or other income of the Society for the promoting of the above objects.

(*v*) To do all such other lawful things as are incidental or conducive to the entertainment of the above objects.

4. The income and property of the Society whencesoever derived shall be applied solely towards the promotion of the objects of the Society as set forth in this Memorandum of Association and no portion thereof shall be paid or transferred directly or indirectly by way of dividend or bonus or otherwise howsoever by way of profit to the persons who at any time are or have been members of the Society or to any of them or to any person claiming through them or any of them. Provided that nothing herein contained shall prevent the payment in good faith of remuneration to any officers or servants of the Society or to any member of the Society or other person in return for any services actually rendered to the Society.

5. The fourth paragraph of this Memorandum of Association is a condition upon which a license is granted by the Governor to the Society in pursuance of section fifty-two of the Companies Act 1899.

6. If any member of the Society pays or receives any dividend bonus or other profit in contravention of the terms of the fourth paragraph of this Memorandum his liability shall be unlimited.

7. Every member of the Society undertakes to contribute to the assets of the Society in the event of the same being wound up during the time that he is a member or within one year afterwards for payment of the debts and liabilities of the Society contracted before the time at which he ceases to be a member and of the costs charges and expenses of winding up the same and for the adjustment of the rights of the contributories amongst themselves such amount as may be required not exceeding two dollars or in case of his liability becoming unlimited such other amount as may be required in pursuance of the last preceding paragraph of this Memorandum.

8. If upon the winding up or dissolution of the Society there remains after satisfaction of all its debts and liabilities any property whatsoever the same shall not be paid to or be distributed among the members of the Society but shall be given or transferred to the Taronga Zoological Park Trust or to such other body or institution as shall be directed or approved by the Chief Secretary for the State of New South Wales for the time being holding office.

ARTICLES OF ASSOCIATION

OF THE

ROYAL ZOOLOGICAL SOCIETY OF NEW SOUTH WALES

INTRODUCTORY

1. None of the regulations contained in the Table marked B in the Fourth Schedule to the Companies Act 1961 shall be the Regulations of this Society.

2. These Articles shall be construed with reference to the provisions of the said Companies Act 1961 and any Act amending the same and terms used in these Articles shall be taken as having the same respective meanings as they have when used in those Acts.

3. The expression "the Society" hereinafter used shall mean this Society and the expression "the unincorporated Society" hereinafter used shall mean the present unincorporated body or association of persons known as the Royal Zoological Society of New South Wales and the expression "the Council" shall have the meaning given to it by Article 16 hereof.

4. The Society for the purpose of registration is declared to consist of twenty members but the Council of the Society may from time to time register an increase of members.

MEMBERS

5. The Society shall consist of (a) ordinary members, (b) associate members, (c) honorary members.

6. (1) The qualifications for ordinary members shall be:
   (a) status as an ordinary member at the date of the extraordinary general meeting passing the resolution inserting this Article; or
   (b) a degree or diploma conferred by a University, teaching college or similar institution in Australia, or, with the approval of Council, outside Australia, the requirements for which degree or diploma include a systematic study of zoology, biology or such important aspects thereof as may be approved by Council; or
   (c) serious interest either amateur or professional in some aspect of ecology, zoology or biology approved by Council
   (d) and submission of an application for such membership and approval by a majority of council.

(2) Any person other than those applying for and admitted as ordinary members may be admitted as associate members on application and approval by majority of Council.

(3) Subject to Article 13 honorary membership may be granted to such persons as Council may designate from time to time and subject to such conditions as it may determine.

7. In these Articles whenever the word "member" is used without qualifications it shall be deemed to include members of all categories.

8. Every ordinary member of the Society shall pay an annual subscription of $4.20 and every associate member of the Society shall pay an annual subscription of $3.00 or such other sums as may be determined in each case, from time to time by Council. Such subscriptions shall be payable on admission and thereafter on the first day of July in each year. Provided that any ordinary or associate member admitted between the first day of January and the thirtieth day of June in any year shall be required to pay one-half of the annual subscription only for that year. The Council shall have power to remove from the Register of Members the name of any ordinary or associate member whose subscription is more than six months in arrears.

9. The Council shall have power until otherwise determined by ordinary resolution of a General Meeting to accept the amount of ten annual subscriptions at any time in one sum from any ordinary or associate member as a life composition for the annual subscription in the category of membership for which such composition is accepted. Provided that any ordinary member of the unincorporated Society who had compounded his annual subscription under the rules of the said unincorporated Society and who shall become a member of the Society shall not be required to make any further payment.

10. Members shall have the right to be present and to vote at all meetings of the Society and to propose candidates for admission as members and subject to these Articles to have such rights of access to the Taronga Zoo as the Council may from time to time determine and to the Library and other establishments of the Society and to receive such publications of the Society at such prices or rates of subscription as the Council may from time to time determine.

11. Associate members shall be entitled to receive a copy of the "Proceedings" of the Society, or such publications as may incorporate or replace the "Proceedings" of the Society, free of cost and shall have such other privileges as the Council may from time to time determine.

12. No member whose subscription is in arrears shall be entitled to claim any right or privilege in the Society.

13. Honorary members shall be persons who have rendered distinguished service to the Society and shall be proposed by a member of the Council and elected by a majority of the Council present at a meeting thereof: Provided that no less than three weeks' notice in writing of the intention to propose such honorary member shall have been given at a meeting of the Council.

14. Every member having paid all arrears of subscriptions due to the Society and every honorary member of the Society shall be at liberty to withdraw therefrom upon giving notice of such withdrawal to the Council in writing on or before the thirty-first day of May in any year.

15. No member retiring from the Society or ceasing from any cause to be a member shall be entitled to or have any claim upon any portion whatever of the property of the Society.

COUNCIL AND OFFICERS

16. The affairs and undertakings of the Society shall be managed by a Council which shall consist of 18 members, 15 of whom must be ordinary members of the Society. They shall act in an honorary capacity.

17. The Council shall have power to confer the following titles:

(a) Upon any person corporation or trust who or which has contributed to the funds of the Society:
   (i) A sum of not less than two thousand dollars the title "Endowment Member";
   (ii) A sum of not less than one thousand dollars the title "Benefactor";
   (iii) A sum of not less than two hundred dollars the title "Associate Benefactor".

(b) Upon any ordinary or associate member who has rendered valuable service to the Society or to Australian Zoology the title "Fellow".

18. The Council may appoint any patrons and vice-patrons of the Society who need not be members thereof and may also appoint any temporary substitute for the honorary secretary or honorary treasurer and any additional secretaries or assistant secretaries or other officers for special duties.

19. The Council may at any time remunerate by fixed salary or otherwise any of the honorary officers of the Society whereupon the honorary office filled by such officer shall *ipso facto* become suspended while such officer is receiving remuneration and he shall cease to be a member of the Council during such period.

20. The Council may appoint committees and sub-committees for any special object and may delegate to any such committee or sub-committee the functions and powers of the Council relating thereto. All proceedings of a committee or sub-committee shall be reported to the Council. Any member of the Society may be so appointed.

ELECTION OF COUNCIL

21. Each candidate for membership of the Council shall be nominated by two members of the Society and the names of all such candidates together with the names of their nominators shall be delivered or posted to the President in sufficient time to reach him at least seven days before the Annual General Meeting. Each such nomination shall be accompanied by the consent in writing of the candidate proposed or such other evidence of consent as may be accepted by the President.

22. Not less than six of the existing or elected members of the Council shall retire from office each year and the vacancies thus created shall be filled up at the Annual General Meeting by election by ballot from among the members of the Society nominated as provided by Article 24 and retiring members of the Council shall be eligible for re-election.

23. The retiring members of the Council shall include all who during the preceding year have been elected by the Council to fill vacancies as provided by Article 26 and whenever less than six vacancies shall be thus created the number of vacancies shall be increased to six by the retirement of those members who shall have been longest in office. In the event of there being more members of equal service than the number required to make up the number of vacancies to six the members to retire shall be determined by lot at a meeting of the Council held prior to the Annual Meeting.

24. At a meeting of the Council held before the 30th day of June in each financial year a list of members of the Council shall be prepared indicating those whose seats are to be vacated in accordance with the provisions of Article 23 and a copy of such list shall be sent to each ordinary member of the Society by posting the same to his address as contained in the Society's Register of Members fourteen days before the Annual General Meeting.

25. In the event of no candidates being nominated as hereinbefore provided or of the nomination falling short of the full number required or being void through any informality or through want of qualification on the part of the candidates or their nominators all such deficiencies may be supplied by election by ballot of qualified candidates then and there proposed at the Annual General Meeting.

26. Subject to Article 16, if between two Annual General Meetings a vacancy in the Council occurs the Council may appoint a member of the Society to fill such vacancy.

27. The seat of a member of the Council shall become vacant if he shall become insolvent if he shall be convicted of any misdemeanour or felony or if he shall become from any cause incapacitated from attending to his duties.

28. Subject to Article 16, if any member of the Council absents himself from all meetings of the Council for three consecutive months without the leave of the Council or without written explanation tendered within fourteen days after the third of such meetings the Council may declare the seat vacant and elect a member to fill such vacancy.

MEETINGS OF COUNCIL

29. The Council shall meet as often as they shall deem it expedient but at least once in every three months and seven members present shall form a quorum. A meeting of the Council may be summoned at any time by the Secretary by direction of the President or by the honorary secretary on the written request of at least three members of the Council. In the absence of the President from any meeting the chair shall be taken by one of the Vice-Presidents who shall be elected if more than one are present and in the absence of the President and all the Vice-Presidents the members present shall elect one of their number to the chair.

ELECTION OF OFFICERS

30. The officers of the Society shall be elected annually by the Council from among their number at a meeting of Council to be held within fourteen days of the Annual General Meeting. The following officers shall be so elected: President four Vice-Presidents Honorary Secretary Honorary Treasurer Honorary Editor and Honorary Librarian.

AUDITOR

31. A professional Accountant shall be appointed by the Council as Auditor at such remuneration and for such term as the Council may determine. No member of the Council shall be eligible for such appointment. The annual accounts of the Society shall be examined and the correctness of the balance sheet certified by the Auditor.

DUTIES OF OFFICERS

32. The duties of the President shall be to preside at all meetings of the Society and Council to regulate all the proceedings thereat and generally to execute or see to the execution and proper carrying out of these Articles and the resolutions of the Society or Council.

33. The Honorary Treasurer or his representative duly authorised or appointed by the Council shall demand and receive for the use of the Society all moneys due or payable to the Society and shall keep full and particular accounts of all sums so received. An account or accounts in the name of the Society shall be kept in such bank and operated on in such manner as the Council may direct. The Honorary Treasurer shall pay all accounts and require receipts for the same and shall lay before the Council at each meeting a statement of the moneys expended according to warrant since the preceding meeting with vouchers for the same. He shall prepare and produce balance sheets whenever required by the Council so to do and shall keep separate accounts of the moneys voted for separate purposes and a general account of all moneys received and expended by the Society. The accounts shall be made up to the end of June in each year and be audited in the month of July following by the Auditor and the Honorary Treasurer shall lay the account so audited before the next Annual General Meeting.

34. The Honorary Secretary shall attend all meetings of the Society and Council and any committee or sub-committee thereof if and when required so to do. He shall keep the minutes of all such meetings conduct all correspondence issue notices of meetings keep proper books and generally perform all such duties as are usually performed by any officer in the like position. He shall keep and maintain thoroughly and efficiently a register to be called the Register of Members.

35. The Honorary Editor shall have charge under the direction of the Council or a sub-committee thereof of the printing and publishing of the reports transactions proceedings and papers of the Society including the journal or magazine known as the *Australian Zoologist.*

36. The Honorary Librarian shall have control and custody of the books records manuscripts scientific apparatus and accessories belonging to the Society and shall be responsible for the due cataloguing care and arrangement of the same.

COMMON SEAL

37. The Common Seal of the Society shall be in the custody of the Honorary Secretary. It shall not be affixed to any document except by order of the Council and any document to which the Seal is affixed shall be attested by five members of the Council including the Honorary Secretary or Acting Secretary.

VALIDATION OF ACTS OF COUNCIL

38. All acts done by any meeting of the Council or of a committee or sub-committee thereof shall notwithstanding that there was some irregularity in the appointment of any person or persons constituting the Council committee or sub-committee be as valid and effectual as if such person or persons had been duly appointed.

POWERS VESTED IN THE COUNCIL

39. The general management of the Society shall be vested in the Council who may exercise all such powers and do all such things as may be exercised or done by the Society save such as are by these Articles or by any Statute for the time being in force required to be exercised or done by the Society in General Meeting subject nevertheless to these Articles to the provisions of the Companies Act 1961 and to such resolutions not being inconsistent therewith as may be adopted by the Society in General Meeting but no such resolution shall invalidate any prior act of the Council which would have been valid if such resolution had not been adopted.

40. The Council shall have power from time to time to make alter and repeal all such rules not being inconsistent with or contrary to anything contained in the memorandum of association of these Articles as they may deem necessary for the proper conduct and management of the Society and in particular but not exclusively they may by such rules regulate:

(a) The admission of persons of both sexes under the age of twenty-one years to the privileges and benefits of the Society.
(b) The admission of visitors to the premises and benefits of the Society and the rates of subscription to or the prices of the official journal and other publications of the Society.
(c) The times of opening and closing any rooms or buildings belonging to the Society or any part thereof.
(d) The conduct of members of the Society in relation to one another and to the servants of the Society.
(e) The setting apart of any part or parts of the Society's premises for particular purposes.
(f) The duties and functions not defined by these Articles of any honorary officer.
(g) Generally all such matters as are not provided in these Articles or contrary to the Memorandum of Association or these Articles.

The Council shall adopt such means as they deem sufficient to bring to the notice of members of the Society all such rules and any amendments alterations and repeals thereof and all such rules so long as they shall be in force shall be binding upon all members of the Society.

MEETINGS

41. An Annual General Meeting of the Society shall be held on a day in the month of September to be fixed by the Council. General Meetings of the Society other than the Annual General Meeting may be called by the Council at any time. A Special General Meeting shall be called by notice issued within seven days after the receipt by the President of a requisition signed by not less than twenty-five ordinary members. Such requisition shall contain a statement of the business to be transacted at such meeting and no other business shall be transacted at such meeting. Every Annual General, General and Special Meeting be

shall be called by notice containing the time and place of such meeting and the particulars of the business to be transacted thereat. Such notice shall be sent by post to all Ordinary members of the Society at the address as contained in the Society's Register of members not less than fourteen days before the date appointed for such meeting or in the case of a General Meeting by advertisement in at least two of the daily papers published in Sydney.

42. At every Annual General, General or Special Meeting of the Society twenty Ordinary members shall form a quorum.

43. In every case of a General Meeting of members if on the lapse of half an hour after the time appointed a quorum shall not be present the meeting shall thereupon stand adjourned until the corresponding day and hour the following week provided the same do not fall on any public holiday in which latter case the meeting shall stand adjourned to the day after such holiday. All meetings shall have power to adjourn their proceedings from time to time to any date to be fixed by such meeting.

44. In the case of any adjournment of any General Meeting whether for want of a quorum or otherwise the date hour place of and business to be transacted at the adjourned meeting shall be advertised in one of the daily newspapers circulating in Sydney not more than five or less than three clear days before the date to which such meeting shall be adjourned.

45. Any member who is desirous of bringing forward any business for consideration at any Annual General Meeting shall forward to the Honorary Secretary not later than one month prior to the date of the Annual General Meeting a notice in writing signed by himself and one other member as seconder stating in concise terms the motion or motions he wishes to move and the Council shall cause such notice of motion or motions together with the names of the proposer and seconder to be included in the notice summoning the meeting.

46. At the Annual General Meeting and at all Special General Meetings when questions of order procedure or interpretation of the Articles shall arise the ruling of the Chairman shall be accepted as final.

47. The Chairman of a meeting of the Council or of the Society shall in case of an equality of votes (whether by ballot or otherwise) have a casting vote in addition to his original vote.

48. If any member shall have violated any of these Articles or any rules of the Society or in any way have acted in opposition to the fundamental rules principles or objects upon or for which the Society has been established or in any other manner which would make it undesirable in the opinion of the Council that he should continue to be a member he may be expelled from the Society and if a resolution that he be expelled shall be carried by three-fourths of the Council present at a meeting duly summoned to consider the case or by a majority of members entitled to vote present at a General Meeting the member so expelled shall thenceforth cease to be a member of the Society as if he had resigned in the usual course and shall not be entitled to have any part of his annual subscription for the current year returned to him.

PROPERTY OF THE SOCIETY

49. The Council may appoint members of the Society to act as Trustees of such property of the Society as cannot be conveniently vested in the Society itself. The Council may also jointly with any donor or with the approbation or sanction of such donor appoint members of the Society to act as Trustees of any donation gift or other property (conditional or unconditional) which may be made to the Society for

any specific object purpose or benefit of or for the Society or in aid of its objects. The Council may from time to time remove or discharge any Trustee and supply any vacancy in the office and decide on the mode of investing or dealing with the moneys and investments of the Society.

NOTICES

50. All notices in these Articles directed to be given may be served personally or by sending the same through the post in a prepaid letter addressed to such person at his address as entered in the Register of Members or at his last known place of abode but the non-receipt of such notice shall not invalidate the proceedings of a meeting held in pursuance of such notice.

ALTERATION OF ARTICLES

51. No alteration shall be made in these Articles except by resolution carried by a majority of not less than three-fourths of ordinary members present at an Annual or Special General Meeting called in accordance with the provisions of Article 41.

J. C. YALDWYN, *Acting-President*
H. de S. DISNEY, C. N. SMITHERS, R. STRAHAN } *Vice-Presidents*
L. Z. HARFORD, *Hon. Secretary.*

Registered 4 September, 1968.

ROYAL ZOOLOGICAL SOCIETY OF NEW SOUTH WALES

RULES MADE UNDER ARTICLE 41* AND IN FORCE FROM 1st JULY, 1965.

1. GENERAL FUND—

In order to carry out the objects of the Society, a General Fund is established, and the following moneys shall be paid into such Fund:-

(*a*) All unconditional cash donations and benefactions.
(*b*) The subscriptions of all Life Members.
(*c*) Such sums as the Council may from time to time appropriate from the balance standing to the credit of the Annual Income Account.

2. ANNUAL INCOME—

The Annual Income shall consist of:-

(*a*) All annual subscriptions paid by members and associates.
(*b*) Interest and dividends derived from investment of the General Fund.
(*c*) Payments for use of the Society's rooms.
(*d*) Such other income as the Council may from time to time determine.

3. PUBLICATION FUND—

A Publication Fund is established for the purpose of providing for the preparation, printing and publication of Handbooks to Australian Zoology, "The Australian Zoologist", the "Proceedings" and other publications of the Society. This fund shall consist of:-

(*a*) Such sums as are expressly donated to the Fund.
(*b*) Any amounts received by the Society by way of Government grant.
(*c*) The net proceeds of sales of publications.
(*d*) Interest and dividends derived from any investments of the Fund.
(*e*) Such sums as the Council may from time to time appropriate from the balance standing to the credit of the General Fund.

4. BUILDING FUND—

(*a*) A Building Fund is established for the purpose of purchasing a building, or a site and the erection of a building, designed to accommodate the Society, its members and associates, and such other kindred institutions as may desire to occupy such part of the premises as may be available.
(*b*) The Building Fund shall consist of:-
  (i) Such sums as are expressly donated to the Fund.
  (ii) Any amounts that may be raised by the issue and sale of Debentures secured upon the income and property of the Society.
  (iii) The interest derived from any investment of the Fund.
  (iv) Such sums as may from time to time be transferred from the annual income.

5. SECTIONS—

(*a*) Sections shall consist of not less than three members, one of whom shall act as Chairman and one as Honorary Secretary.
(*b*) Meetings of Sections may be held in the Society's office on such dates as may be fixed by the Chairman and Secretary, in consultation with the Executive Officers of the Society.

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* Article 41 of the old Articles became Article 40 of the new ones, published above.—Hon. Ed.

(*c*) Notices and reports of proceedings of Sections may be published in *The Australian Zoologist* or the *Proceedings* subject to the approval of the Publication Committee. All such notices and reports must be handed to the Honorary Secretary of the Society.

(*d*) Postage on Sectional notices required to be sent by post will be defrayed by the Society, and the necessary stationery will be provided, but any other expenses incidental to the work of the Sections must be met by the members of such Sections.

(*e*) During the month of June, Sections shall report to the Council on their operations for the current year.

6. "THE AUSTRALIAN ZOOLOGIST"—

This journal will be supplied free of cost to all Life Members, Life Associate Members, Honorary Members, Honorary Associate Members and Ordinary Members unless otherwise requested. The yearly rate for the *Australian Zoologist* for Associate Members shall be twenty-five cents.

7. ELECTION OF FELLOWS—

(*a*) Nominations of ordinary or associate members for the title of "Fellow" must be made on a form provided for the purpose, signed by the nominator and seconded by another person, both of whom must be members of the Society. A statement of the services to Australian Zoology relied upon as qualifying the nominee for the title must be added.

(*b*) A Qualifications Committee shall be appointed by the Council, and shall consist of those members of Council who are Fellows, who may co-opt any noted zoologist, not being a member of the Council, as they may think fit.

(*c*) Each nomination must be addressed to the Honorary Secretary, by whom it shall be referred to the Qualifications Committee for examination and report.

(*d*) The report of the Qualifications Committee shall be submitted to the Council at an ordinary meeting, and the nominations shall then be dealt with.

8. AWARDS FOR NOTABLE ACHIEVEMENTS IN ZOOLOGY—

(*a*) The rules governing the award of Fellowship of the Society remain unaltered.

(*b*) In the case of each Section of the Society an "Awards Sub-Committee", consisting of three members, may be appointed annually by each Section, and these members shall not necessarily be members of Council.

(*c*) Each Awards Sub-Committee shall furnish a report to the Council annually in the month of June, stating whether any outstanding work suitable for award has been carried out. Such report shall indicate the order of merit of any achievement, placing it first, second, third, etc., on the list.

(*d*) If considered by the Council to be of sufficient merit, a medallion may be awarded to the first on such list, and thereafter diplomas may be issued.

(*e*) No awards shall be made to residents outside the State of New South Wales.

(*f*) In the case of the Avicultural and Budgerigar Sections the award may be given to the member first reporting his successful breeding in captivity of any species of bird not included in the list of birds "not eligible". Any member wishing to obtain an award must send a detailed account to the honorary secretary of the Section within a week of young birds leaving the nest, and furnish such evidence of the facts as the Executive Committee may require. The award will be made only in cases where the young shall live to be old enough to feed themselves and to be

independent of their parents. Birds must be reared by their natural parents. On notification a member of the Committee will inspect. The account of the breeding must be reasonably full so as to afford instruction to members of the Society; it should describe the plumage of the young and be of value as a permanent record of the nesting and general habits of the species, and must be forwarded within eight weeks to the Secretary of the Society for publication in the Society's Journal before it is published or notified elsewhere.

(*g*) The list of species which are "not eligible" for awards shall be declared annually in June by each Awards Sub-Committee.

(*h*) Hybrids and sub-species of species may be included in the list for which awards may be given.

Noel Roberts

Roy Bell

Barbara Dew

The Mainland and Mount Dromedary from Montagu Island.

Photo.—K. A. Hindwood.

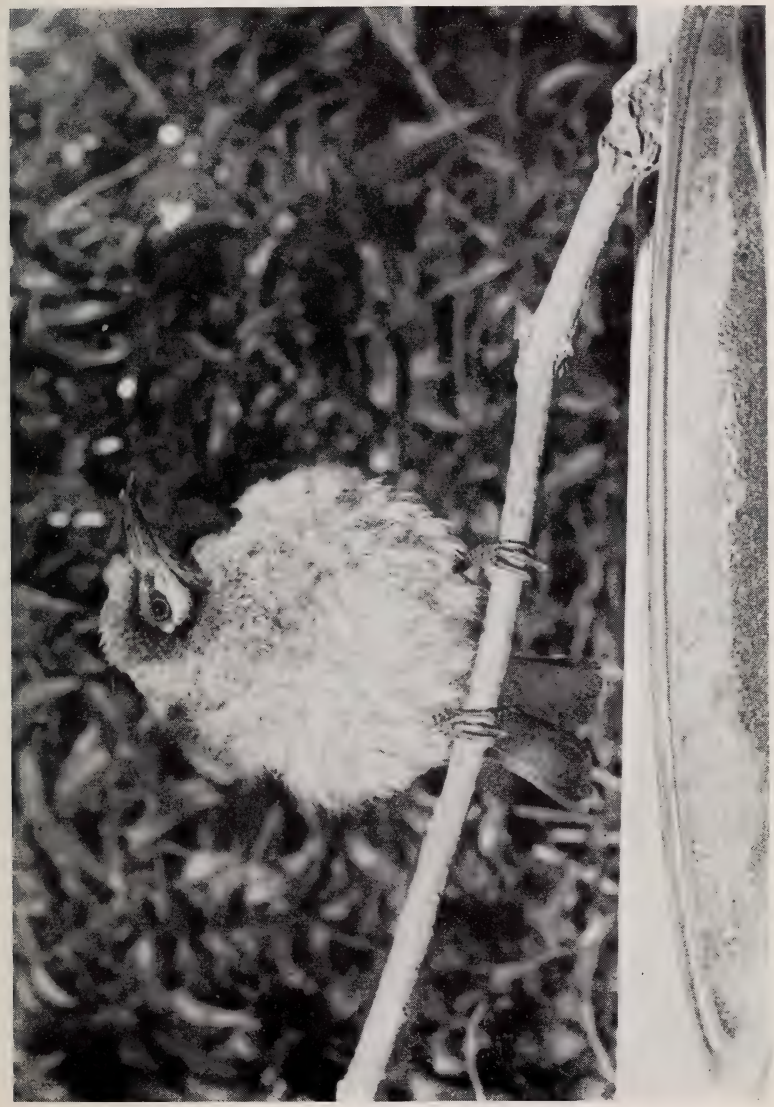
Nesting area of three species of Shearwaters, looking towards 'North' Island, Montagu Island.

Photo.—K. A. Hindwood.

Immature Swamp Harrier,
Montagu Island.

Nest and eggs of Swamp Harrier,
Montagu Island.

Photos.—Robert Dyball.

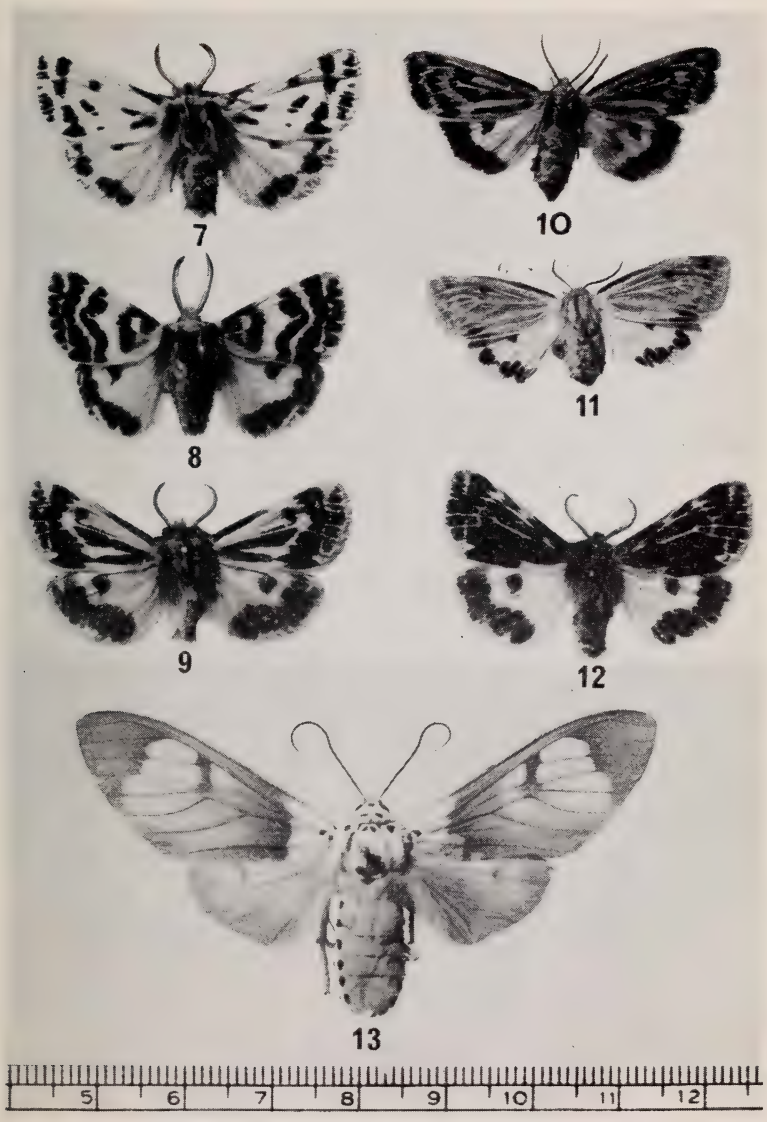


Young Friar-bird

Photo.—Athel D'Ombrain.

Tiger Moths
(See page 61 for explanation).

Photo.—C. V. Turner, Australian Museum



Tiger Moths

(See page 61 for explanation).

Photo.—C. V. Turner, Australian Museum

Gerard Krefft as a young man.

From a photograph in the Australian Museum.

ROYAL ZOOLOGICAL SOCIETY OF NEW SOUTH WALES
MEMBERSHIP

(The Society's year commences on 1st July)

Fees are as follows:—

Class	*Amount of Subscription*
Associate Member	$ 3.00 per annum
Ordinary Member	$ 4.20 „ „
(Members joining after 1st January in any year pay one-half subscription).	
Life Associate Member	$21.00 in one sum
Life Member	$42.00 „ „ „
Honorary Member	Elected for services to Australian Zoology or to the Society
Honorary Associate Member	
Junior Members (aged 16 or under)	50 cents per annum

TITLES
(Conferred by the Council)

Fellow	For valuable services to the Society or to Australian Zoology
Associate Benefactor	For contribution of $200.00 to the Society's Funds
Benefactor	„ „ $1,000.00 „ „ „ „
Endowment Member	„ „ $2,000.00 „ „ „ „

PRIVILEGES:

Members of all classes may attend all meetings of the Society and its various sections. Every Ordinary Member receives a free pass to Taronga Zoo and Aquarium and twelve tickets each year, admitting 12 adults or 24 children to the Zoo only. Every Associate Member receives a free pass to Taronga Zoo and eight (half-price admission) concession tickets to the Zoo. Ordinary and Associate Members receive free parking facilities in the Zoo car park.

APPLICATION FOR MEMBERSHIP

should be addressed to the Honorary Secretary, Royal Zoological Society of New South Wales, Taronga Zoo, 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.
"A Catalogue of the Psocoptera of the World", by C. N. Smithers, 1967.

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

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