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PROCEEDINGS
OF THE
Royal Zoological
Society
OF
New South Wales

for the year 1948-49

Price, 1/-

(Free to all Members and Associates)

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May, 1950

ROYAL ZOOLOGICAL SOCIETY OF NEW SOUTH WALES

Established 1879

REGISTERED UNDER THE COMPANIES ACT 1899 (1917)

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Sir Philip Woolcott Game, G.B.E., K.C.B., D.S.O.

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Royal Zoological Society of New South Wales

The sixty-ninth Annual Meeting was held at Taronga Park on Saturday, 23rd July, 1949. One hundred and forty-two members and friends were present. The Hon. Secretary presented the sixty-ninth annual report.

SIXTY-NINTH ANNUAL REPORT

Membership at 1st July, 1949.—Total membership numbers 743, consisting of 1 Endowment Member, 4 Associate Benefactors, 10 Honorary Members, 49 Life Members, 503 Ordinary Members, 2 Honorary Associates, 22 Life Associates, 152 Associate Members.

Removals from the Register of Members: 42 in terms of Article 9, by Death 9, Resignations 9; Total 60.

Council.—Eleven meetings of Council were held during the year with an average attendance of 12. Mr. E. P. Lockie resigned and in his stead Major H. Burgh was appointed in terms of Article 26.

Sections.—The four sections continue with success and will publish their reports in the *Proceedings*. During the year attendances have been excellent and all members are urged to take an active interest in their particular Section.

Fellows.—Early this year the death of Gregory M. Mathews, C.B.E., F.R.Z.S., occurred, and Australian Ornithology loses its greatest worker.

Honorary Member.—Mr. P. Shipway, who for many years was Hon. Treasurer, was elected an Hon. Member in recognition of his services.

Publication.—The *Proceedings* for the year 1947-48 were issued in January, 1949, but to date, owing to the cost of printing, a further part of the *Australian Zoologist* has not been attempted.

THE HON. TREASURER'S REPORT

In presenting the Treasurer's report I am going to depart from the usual practice of reading a mass of meaningless figures and instead tell you the story behind these figures.

As you will recollect, I told you in these rooms last year that the year 1948-1949 would be a bad one, and that is the reason you passed a resolution increasing the membership fees. Although this was carried, under our Articles they could not be increased before the 1949-50 year and we were faced with the period in between. That is the period that this report covers. Knowing the difficulty of successfully negotiating the past year, I drew up a budget to cover the Revenue and Expenses for 1948-49 and this was agreed to by your Council.

Now we have heard a lot about budgets in recent years: budgets that usually forecast a deficit and which turn into millions of pounds profits. Profits to which we contribute. Unfortunately our own budget was not so elastic. By rigidly controlling our expenses and eliminating the publication of the *Zoologist* for the year, we forecast a slight excess

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of revenue over expenditure. We have kept faithfully to our budget and the year's results are in line with the forecast.

Financially the Society is in a sound position. To this we owe a debt to our predecessors and morally we are not entitled to whittle away the assets so painstakingly built up over the past 40 to 50 years. We are therefore obliged to live within our income. As you all know, to try to live on a 1939 income with an expenditure at 1949 rates is an impossibility. Yet this is what we have been trying to do. It is obvious, therefore, that many of our activities have had to be curtailed.

If we had faced up to our responsibilities some years ago, as other societies and clubs have done, we would have increased the subscriptions in 1945. Your Council was very reluctant to do this, but to-day's costs left them no alternative.

We had all looked forward to being able to resume the carrying out of the Society's aims in the 1949-50 year—the first year that the increased subscriptions were to operate. Alas for our hopes! The landlords obtained the Court's permission to increase our rent, and this increase will more than consume all the extra fees, even assuming that we retain the full membership as was standing on the books at June, 1949.

You will see that we are now, even with the increased subscriptions operating, in a similar position to the one we were in when we assembled here last year.

We are therefore faced with two alternatives:

(1) Eliminate the publication of the *Proceedings*, the popular part of our Society's publications, which are sent all over the world; relinquish part of our rooms and crowd ourselves into one room only, where we would scarcely be able to move and certainly not have room for any large meetings, and also to curtail the sectional meetings.

(2) The second alternative is to increase our fees again by a few shillings per annum.

There does not seem to be any doubt as to which alternative we should adopt. We have all subscribed so generously to that other budget to which I referred—the one that shows a profit of millions of pounds—that a few shillings for our Society will mean little to us individually but so much to the pleasures that we all obtain from being members of the Royal Zoological Society.

That, Mr. President, Ladies and Gentlemen, is the story of the accounts for the past year and a forecast of the year to come.

Major H. Burgh moved the adoption of the annual report, seconded by Mr. A. I. Ormsby and carried on the voices.

The following six retiring members of Council were declared elected as no other nominations were received: Dr. G. Halloran, Major H. Burgh, Messrs. T. C. Roughley, N. Chaffer, R. P. Cooper and A. S. Le Souef.

Upon the meeting being declared ready to deal with General Business, the only item on the Agenda was brought forward by Messrs. C. S. Laseron and T. A. Everitt.

It was resolved unanimously "That from the 1st July, 1950, Article 9 be amended to read: 'Every ordinary member of the Society shall pay an annual subscription of £1 11s. 6d. and every associate member of the Society shall pay an annual subscription of 15s.'

The Presidential Address was then delivered (see pages 7-15) and the meeting closed after a vote of thanks to the President had been moved by Mr. A. Halloran.

OFFICERS FOR THE YEAR 1949-1950

President: Mr. E. H. Zeck.

Vice-Presidents: Dr. G. Halloran, Mr. E. J. L. Hallstrom, Dr. F. Marshall
and Mr. A. S. Le Souef.

Honorary Secretary: Mr. T. A. Everitt.

Assistant Honorary Secretary: Miss B. Broderick.

Honorary Treasurer: Mr. R. P. Cooper.

Assistant Honorary Treasurer: Mr. W. R. Moore.

Honorary Editor: Mr. G. P. Whitley.

Honorary Librarian: Mrs. M. D. Scott-Sim.

Honorary Auditor: Mr. R. J. Stiffe.

IMPORTANT ANNOUNCEMENT

A general exhibition of live birds, of an extent hitherto unsurpassed, is planned for Sydney's Town Hall between 13th and 15th July, 1950. Further particulars will be advertised in the Press.

ROYAL ZOOLOGICAL SOCIETY OF NEW SOUTH WALES
REVENUE ACCOUNTS FOR THE YEAR ENDED 30th JUNE, 1949
GENERAL ACCOUNT

	£	s.	d.	£	s.	d.
To Office Rent	305	10	0			
" Office Stationery and Postages	80	6	4			
" Telephone	21	2	7			
" Electricity	13	9	1			
" Publication of Proceedings	146	9	9			
" Sundry Expenses	71	11	11			
" Surplus of Income over Expenditure for year ended 30th June, 1949	638	9	8			
	41	16	1			
	£680	5	9			
By Subscriptions	557	1	0			
" Rent—Subletting	105	7	6			
" Sale of Badges	5	19	3			
" Telephone Collections	7	5	1			
" Interest—Bank Account	7	11	0			
" Sales—Proceedings	9	5	0			
" Exchange	3	5	0			
" Insurance	680	5	9			
	£680	5	9			

PUBLICATION ACCOUNT

	£	s.	d.	£	s.	d.
To Publication of <i>Australian Zoologist</i> and various Handbooks, including Postages	113	18	0			
" Surplus of Income over Expenditure for year ended 30th June, 1949	178	9	5			
	£292	7	5			
By Sales— <i>Australian Zoologist</i>	71	8	4			
" Sales—Handbooks	123	14	11			
" Interest—Savings Bank	2	7	8			
" Interest—Investments	42	16	6			
	242	7	5			
" Government Grant	50	0	0			
	£292	7	5			

BUILDING FUND

	£	s.	d.	£	s.	d.
To Amount transferred to Building Fund	24	7	8			
	£24	7	8			
By Interest—Investments	22	15	0			
" Interest—Bank Account	1	12	8			
	£24	7	8			

ROYAL ZOOLOGICAL SOCIETY OF NEW SOUTH WALES
BALANCE SHEET AS AT 30th JUNE, 1949

LIABILITIES.			ASSETS.				
	£	s.	d.		£	s.	d.
Accumulated Funds—				Furniture and Equipment—			
Balance as at 30th June, 1948	2,871	14	8	Office and Lecture Room Furniture			
Add. Surplus for year ended 30th				and Equipment at Valuation, plus			
June, 1949—				Additions	515	7	11
General Fund	£41	16	1	Library Books, at Valuation plus	503	4	6
Publication Fund	178	9	5	"Parrot" Paintings at Valuation	500	0	0
Building Fund—				Investments (at face value)—			
Balance as at 30th June, 1948	3,092	0	2	Australian Commonwealth Inscribed	1,010	0	0
Add Interest received for year	772	15	10	Stock			
Subscriptions Paid in Advance	24	7	8	Australian Commonwealth Treasury	100	0	0
Sundry Creditors	797	3	6	Bonds			
	197	17	6	Metropolitan Water, Sewerage and	100	0	0
	16	0	0	Drainage Board—Inscribed Stock	100	0	0
				Publications on Hand	1,210	0	0
				Commonwealth Savings Bank—	5	4	8
				General Account	474	2	0
				Publication Fund Account	68	9	11
				Cash on Hand	542	11	11
				Building Fund Investments—	4	8	8
				Australian Commonwealth Treasury			
				Bonds	700	0	0
				Commonwealth Savings Bank	97	3	6
				Prepaid Expenses	25	0	0
					£4,103	1	2

E. H. ZECK, President.
 F. MARSHALL, Vice-President.
 R. P. COOPER, Hon. Treasurer.

Auditor's Report to the Members of the Royal Zoological Society of New South Wales.

I hereby report that I have audited the books and accounts of the Royal Zoological Society of New South Wales for the year ended 30th June, 1949, and have obtained all the information and explanations I have required, and in my opinion the above Balance Sheet exhibits a true and correct view of the state of the Society's affairs as at 30th June, 1949, according to the best of my information and the explanations given to me and as shown by the books of the Society.

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

Sydney, 20th March, 1950.

(Sgd.) ROBT. J. STIFFE, F.C.A. (Aust.),
 Hon. Auditor.

Presidential Address

SOME INSECT PESTS OF ANIMALS

By E. H. ZECK

The insects are members of the Phylum Arthropoda, one of the phyla or groups of animal organisms which have characters in common with each other, and are considered to have descended from a common ancestral form. They are also related in their internal structures. Insects in their adult stage have three pairs of legs and their bodies are divided into three main regions—head, thorax and abdomen. They may be either winged or wingless.

The Animal Kingdom, which contains, according to recent estimates, some 916,000 described species, falls naturally into a number of important groups or branches known as Phyla, and to indicate the differences between animals placed in the same phylum, such as the Arthropoda, secondary groupings known as Classes are used, and as it is necessary still further to maintain an orderly arrangement, these are again divided into superfamilies, families, genera and species.

This grouping is known as classification. The classification or sorting out and arrangement of objects or ideas is essential to efficient progress, whether it be in science, law or any other of man's spheres of activity, and the aim of systematic zoologists, ornithologists, entomologists and other workers in the field of biology has been to try to discover the ways along which each animal has developed, in order to arrive at what is believed to be a natural classification.

The Phylum Arthropoda is divided into a number of Classes, but in this address it is intended only to deal with the animals which are included in the Class Insecta or Hexapoda—the insects—and to confine consideration to a number of the more important ones which attack some of the mammals and birds.

It has been written that "Little fleas have lesser fleas upon their backs to bite them"; but this is only a very small part of the story if one considers the incidence of arthropod parasites of animals in general, and the many deadly results due to their attacks by their dispersal of "much lesser fleas".

In nature, in the animal world, there is a deadly struggle for survival that has been going on down through the ages, long before the dawn of civilization, a conflict of race against race, and individual against individual, and this has been described by one writer as "nature red in tooth and claw".

The reasons for the struggle for existence may be due to overpopulation of a species, or may be found in the pattern of the web of life. It may be due to a natural antipathy of one animal against another, such as carnivores against herbivores, or *vice versa*; the changefulness of physical environment in its widest sense; the self-assertiveness of a particular animal or the fight of like against like, which may mean war to the death. It is a survival of the fittest.

The insects that have adapted themselves to varying conditions down through the ages, and have eventually established themselves as parasites, either of their fellows or of the larger animals, are themselves preyed upon by others, and so the unrelenting struggle goes on.

Most members will recognize that amongst the important relationships of insects and other arthropods to man are their activities as enemies of various crops and their capacity to destroy the foodstuffs of nations, forest trees, or even man's habitations and his clothing. It is not with these forms, however, important as they are, but with the parasitic individuals that this address is concerned.

If one considers the various insects which are parasitic upon animals, it will be seen that these may be divided mainly into two groups—external and internal parasites, and also that a number of families are represented amongst them.

These insects may disseminate diseases from sick to healthy animals by transmitting bacteria and protozoa (minute unicellular animals) or by transferring parasitic worms. They may also transmit virus diseases and fungi, and these injurious organisms may be transferred from wild animals (known as "reservoirs") to man and other animals.

The method of this transference may be by inoculation, a hypodermal injection of the pathogen when the insect bites, or it may be deposited on the skin, in the insect's excreta, or by its crushed body, and the pathogen either entering through the wound of the bite or a scratch, or the unbroken skin. In some instances the disease causal organism may only cling to the body of the insect, or it may increase in numbers within its internal organs, or it may undergo a certain part of its life-cycle within the insect's body which cannot take place anywhere else.

It is only within the last sixty years or so that the role played by insects, ticks and mites in the transmission of various diseases from animal to animal has come to be realized, and this study of the spread and causation of diseases and sickness in man and animals is now known as the science of medical and veterinary entomology. The close investigation of arthropod populations, and their impact on various animals, has led medical men, entomologists and other scientific workers into the study of epidemics, and in that particular sphere they may be regarded as workers in the development of preventive medicine.

Patton and Evans, in their great work on medical and veterinary entomology some twenty years ago, dedicated it to many well-known medical men and scientists and other workers, of all nationalities, who died whilst investigating the aetiology of those diseases the causal organisms of which are transmitted by insects and mites.

Included in this group are: Drs. Jesse M. Lazear, yellow fever; Walter Myers, yellow fever; Joseph Everett Dutton, tick fever; Forbes Manson Grant Tulloch, sleeping sickness; Prof. Fritz Schaudum, amoebic dysentery; Dr. James Cragg, myocarditis following on yellow fever; Prof. Stanislaus von Prowazek, typhus; Arthur William Bacot, typhus; Dr. Francis William Cragg, typhus; Dr. Hideyo Noguchi, yellow fever; and Dr. William Alexander Young, yellow fever.

Before speaking about any particular parasites which occur under natural conditions, it may be well first to state that man, by his own habits, even in what are considered to be civilized communities, may encourage the development of insect and mite parasites, and may also encourage the development of various secondary or temporary parasites that may attack him or his animals, simply by his own neglect or lack of knowledge. By allowing the uncontrolled development of grain moths and grain beetles, for example, or the development of wood-borers or other small insects, man may be attacked by mites. The soft-bodied larvae of insects, such as these, are the natural hosts of very minute mites, which are known popularly as "hay itch mites" (*Pediculoides ventricosus*), and these may bite and cause intense irritation to both man and other animals. Instances of this were noted during the last war, where men working on various projects slept on palliasses in the straw of which were included many heads of grain that had become infested with grain moths.

Man may also assist in the development of large numbers of the biting stable fly (*Stomoxys calcitrans*), by leaving moist lawn cuttings lying in heaps. Some few years ago visitors to one of our well-known city parks were continually pestered by these blood-sucking flies, which appeared to have developed in lawn cuttings placed on gardens.

As a further instance of man assisting in the development of his own supply of pests may be mentioned the case of a suburban resident who found thousands upon thousands of minute greyish mites in a particular room of his house, crawling up and down the walls and over the furniture. He consulted an entomologist and was advised that the mites were a species which was not parasitic on animals and that they would probably not cause more than annoyance and irritation at their presence, as their food consisted mainly of cereal products. He was far from being convinced, and was emphatic that he did not keep food substances in his lounge room. However, he was advised to make a further search, and eventually he peered behind the fire-grate, in which region the mites were most numerous, and there discovered numbers of discarded lunch packages which his small son had systematically deposited there each morning before leaving for school. The boy preferred the "tuck shop".

As is well-known, man may also assist in the development of his own and his neighbour's supply of house mosquitoes by leaving water lying about in various receptacles, and may also develop others in improperly screened water tanks.

THE INSECTS

The Class Insecta or Hexapoda is one of the most important classes of the Phylum Arthropoda, and the number of described living insects included in it is variously estimated to be between 500,000 and 700,000. The insects constitute about 75% of all the known living animals of the world, and their degree of prolificness is exceeded only by the Protozoa amongst the smaller animals, and by the fishes amongst the larger animals.

More than forty years ago, one distinguished entomologist wrote that "If man were not the dominant animal of the world this would be the Age of Insects".

Insects belong to an exceedingly ancient group of animals, having left their remains in the fossils, and it is known that they flourished in great numbers in the carboniferous period—"The Age of Giant Insects".

If one considers the groups in which the parasitic species occur, it will be seen that these belong principally to a limited number of orders, the most dominant in numbers and importance being the *Diptera* or flies.

THE FLIES (DIPTERA)

Various families in this order contain parasitic species, but space will not permit of more than a brief survey being given. In writing of this group, one well-known entomologist stated that "Although flies, like the angels, have only two wings, some of them are regular demons".

The Moth-Midges (Psychodidae) are usually minute species and members of the genus *Phlebotomus* are important blood-sucking insects and are the proven vectors of three-day fever or *Phlebotomus* fever, and other fevers, kala-azar and oriental sore. The adults feed at night.

The Biting Midges or Sandflies (Ceratopogonidae). These are mainly minute species and the common sandflies (*Culicoides* spp.), of the coastal regions of this State are well known to most people by the painful bites they inflict. Some species are known vectors of filarial worms to man.

Black Sandflies (Simuliidae) are small hump-backed species which may attack man, domestic and other animals. They inhabit various countries and some are known to transmit the nematode worms, that are

the cause of onchocerciasis in man and other animals, and also protozoa that are pathogenic to birds. They commonly attack by day.

Mosquitoes (Culicidae). The painful bites which female mosquitoes inflict, and the annoyance they cause, are well known to most people, but these are only minor troubles when one considers the deadly disease organisms they may transmit. Among these are the various protozoans which cause malaria, and the filarial worms which cause filariasis or elephantiasis, and the filterable virus diseases, yellow fever, and dengue, all of which are directly inoculated into the blood of man exclusively by the bites of these insects.

The yellow fever mosquito, *Aedes aegypti*, is widely distributed in all tropical and subtropical zones, and has been found as far south as Rookwood in this State.

Malaria, as far as is known, is transmitted only by various species of *Anopheles*, and filariasis by a number of species of *Culex*, including the common house mosquito, *C. fatigans*, and *Mansonia*. Malaria occurs in a broad belt around the globe in the tropical regions, and filariasis in the southern United States, China, South Africa, West Indies, Samoa and Tahiti. Dengue is spread by *Aedes aegypti* and several other mosquitoes in tropical and subtropical regions.

It is considered possible that jungle yellow fever in South America may be maintained in the form of wandering epidemics in forested areas in which there are adequate populations of marmosets and cebus monkeys and an effective vector, such as *Aedes aegypti*.

In the Sudan some twelve species of mosquitoes are known to be able to transmit yellow fever by biting, and in Abyssinia malaria is widely but sporadically distributed by species of *Anopheles*.

It may be mentioned that the eggs of the yellow fever mosquito, *Aedes aegypti*, may be laid on wetted surfaces or water, but they can withstand desiccation for months.

March Flies or Horse Flies (Tabanidae). In this group of flies the females are blood-suckers, but the males all appear to be feeders on nectar. These flies are well known to those who frequent the bushland, as when once they commence to feed they are readily captured by hand.

Species of the genus *Chrysops* are proven vectors of filarial worms. Some species are known to act as mechanical transmitters of the bacteria of the disease known as tularemia from rodents to man. In the Oregon Valley in 1943, when most of the rabbits were destroyed by the disease, there were only six cases in man, and in 1944 there were none—presumably on account of the destruction of the rabbit "reservoir". They also transmit, mechanically, the trypanosome (protozoan) causing "surra", a disease of horses. They may also transmit other diseases.

Bot Flies and Warble Flies (Oestridae). In some species the larvae or maggots of these flies live naturally as parasites in the bodies of herbivorous animals and occur within the alimentary tracts of horses, mules, zebras, and others live within the nasopharynx and accessory sinuses of the pig, hippopotamus and some equidae, others again live under the hides of cattle, goats, deer and other game, and one develops in man. Others develop in small rodents and in birds.

Three species of bot flies are known to infest horses, and the eggs are laid on the hairs of the animals. The larva of *Gastrophilus veterinus* emerges from the egg about twelve days after being laid, penetrates the skin about the lower jaw and eventually makes its way to the stomach and from thence to the duodenum. The larva of *G. intestinalis* cannot emerge from the egg without the aid of moisture and friction, and is licked off by the horse and eventually finds its way to the stomach, and the larva of *G. haemorrhoidalis* emerges from the egg of its own accord, penetrates the lower lip, and eventually reaches the stomach. The sheep nasal fly (*Oestrus ovis*): the larvae live in the nasal cavities and cranial

sinuses of sheep, goats and game animals. The flies lay their eggs on the nostrils of the animals. They have been recorded to develop in man in a number of countries overseas. Other species develop in the nasopharynx of antelopes in Africa. The kangaroo bot fly (*Trachacomyia macrophi*), an indigenous species, lives in the tracheae of kangaroos. Ox warbles: the larvae of various species are well known as warble flies and their larvae live naturally under the hides of cattle, deer and other animals. The two common species, *Hypoderma bovis* and *H. lineata*, are found in most countries. Their larvae live at first in the deeper tissues, and later make their way up to the subcutaneous tissues of the back, where they cause boil-like swellings. In the centre of each is a hole through which the maggot breathes. These larvae have been recorded developing in man.

In the central and tropical parts of South America there is another species of warble fly, *Dermatobia hominis*, the larvae of which are frequently found in man. This fly is remarkable in that it usually lays its eggs on the bodies of other flies, in such a position that they will come into contact with the skin of their prospective host. Several mosquitoes, the biting stable fly, and other flies are used as carriers.

Stable Flies, Buffalo Flies, etc. (Muscidae). The biting stable fly or biting house fly (*Stomoxys calcitrans*) is a cosmopolitan species, which looks like the common house fly, but may be distinguished by the sharp-pointed proboscis which projects in front of the head. Both sexes are blood-suckers, and attack man and other animals. This fly is known to act as an intermediate host of several parasitic nematode worms that live in their adult stage in the stomach of the horse, and to transmit mechanically a trypanosome that causes "surra" in horses.

The buffalo fly (*Siphona exigua*) is a small, dark grey, blood-sucking fly about half the size of a house fly. It is found in various parts of the world and causes intense irritation and worry to cattle. It is stated to have been introduced into the Northern Territory with buffaloes from Timor in 1825. It remained in a limited area around Darwin, but later began to spread, crossed Queensland and reached the east coast. By about 1946 it had reached a point about 100 miles south of Rockhampton.

The Tsetse flies (*Glossina* spp.) are amongst the most important of the blood-sucking flies, as they are the sole transmitters of the trypanosomes that are the causal organisms of sleeping sickness (trypanosomiasis) in man and nagana in horses and other livestock and wild animals. They are confined to the tropical African regions, with the exception of one species that is also found in Arabia. As in the biting stable flies, these flies all have a prominent, sharp proboscis. They transmit a number of species of trypanosomes (protozoans) to man, but the only difference in the results of their infection appears to be that some species are more rapidly fatal, and in these there is rarely any final sleeping sickness stage. The regions in which these flies are prevalent are known as "fly belts". There is one point of interest in the life cycle of these flies that may be mentioned. The females are larviparous and produce fully-fed larvae or maggots at intervals. These larvae pupate immediately and are to be found in this resting stage in loose soil, moss or accumulations of debris in the bush. The adults of the next generation emerge later from these puparia. Not all species of *Glossina* are proven vectors of trypanosomes.

The Tumbu fly or skin maggot of Africa (*Cordylobia anthropophaga*). The eggs of this fly are laid in the sleeping places of man and various other animals, on the ground or on straw, etc., and the very active maggots hatch and penetrate the skin. An individual maggot produces a boil-like swelling, surrounded by an inflamed area, but there is a small opening in the centre through which the larva breathes. Where a number of these larvae are in close proximity, sloughing and gangrenous conditions may occur. After about eight to fourteen days the fully-fed

maggots, which are then about half an inch in length, crawl through the hole, fall to the ground and there enter their pupal condition before becoming adult flies. The natural hosts appear to be wild rodents, but dogs and monkeys as well as man may be attacked.

The Congo floor-maggot (*Auchmeromyia luteola*). The adult is somewhat larger than the tumbu fly, being about half an inch in length. The maggot or larva of this fly lives in the dirt in sleeping quarters and at night pierces the skin of the occupant whilst asleep and proceeds to feed. These larvae are able to survive for long periods without feeding.

There are flies (*Passeromyia longicornis*) in Australia the larvae of which are subcutaneous parasites of nestling birds, and a paper on these has been published by one of the members of this Society.⁽¹⁾

Various birds are attacked, including the lyre bird, several honey eaters, brush wattle-bird, the goldfinch and others. An allied species (*P. heterochaeta*) in Africa, China and India attacks nestling birds of various species in a similar manner. The blood-sucking larvae of other species of flies also attack nestling birds.

The Louse Flies and Forest Flies (Hippoboscidae). One of the commonest and widespread species of this group is the wingless "sheep ked" (*Melophagus ovinus*), which infests sheep. The larvae of these flies are deposited as fully-fed maggots, which then enter their pupal stage, either on the bodies of their hosts or on the ground. The forest fly (*Hippobosca equina*) attacks horses and cattle. Various species of the genus *Ornithomyia* are found on birds, and a number of these are indigenous. The wallaby louse fly (*Ortholfersia macleayi*) is found commonly on marsupials. The pigeon fly (*Pseudolynchia*) transmits protozoan blood parasites.

The Bat Flies (Streblidae). This group, which occurs throughout the tropics and warm regions, contains winged and wingless species. They are almost exclusively parasitic on bats.

The Spider Flies (Nycteribiidae). These wingless flies are mostly parasitic on bats. There is one species, *Cyclopodia pteropus*, which infests flying foxes. Papers on this group have been published by one of the members of this Society.⁽²⁾

THE BUGS (HEMIPTERA)

Bed-Bugs (Cimicidae). The common bed-bug (*Cimex lectularius*) infests houses and feeds at night on blood. It occurs mainly in temperate climates. The tropical bed-bug (*C. rotundatus*) occurs in tropical and sub-tropical regions. There are closely related species which attack birds, bats, and some rodents. Several species of other genera are also parasites of birds and bats.

The Assassin Bugs (Reduviidae). Most of the members of this group are predaceous and feed on the blood of insects, but some attack the higher animals.

Triatoma megista is a domestic insect which hides in cracks or holes in the walls by day. At night the immature bugs and the winged adults, which are powerful fliers, emerge from their hiding places, to feed on the blood of the occupants. This bug, which is widely distributed in Brazil, is the natural transmitter of the causal organism (protozoan) of a fatal form of human trypanosomiasis or Chagas' disease. Another species, *T. rubrofasciata*, which also sucks blood, is widely distributed in Asia and also occurs in Brazil.

⁽¹⁾ Hindwood, K. A., 1930: *The Emu*, xxx, pp. 131-137.

⁽²⁾ Musgrave, A., 1925: *Rec. Aust. Mus.*, xiv, pp. 289-300; 1927: *ibid.*, xv, pp. 263-276.

THE LICE (ANOPLURA)

These small wingless insects may be divided into two groups—the biting lice or bird lice and the sucking lice.

Bird Lice (Mallophaga). This group includes all the bird lice and some that infest mammals. They live on fragments of feathers, hair and parts of the epidermis, and where heavy infestations occur bare areas may appear, due to the falling out or destruction of the feathers. They may cause considerable irritation to the birds. Various cosmopolitan species belonging to the genera *Goniocotes*, *Lipeurus*, *Menopon* and others commonly occur on fowls; others infest ducks, turkeys, etc. Numbers of species have been described from our native birds. The biting louse of sheep (*Damalinia ovis*) and the biting cattle louse (*D. bovis*) are cosmopolitan species.

Sucking Lice (Siphunculata). In this group the mouth-parts are developed for piercing and sucking. Many cosmopolitan species occur on domestic animals. The short-nosed cattle louse (*Haematopinus eurysternus*), the long-nosed cattle louse (*Linognathus vituli*), the sheep foot louse (*L. pedalis*), the pig louse (*H. suis*), and many others.

One of the rat lice (*Polyplax spinulosa*) has been shown to be capable of transmitting some strains of relapsing fever from rat to rat.

The most important louse in relation to man is the human louse (*Pediculus humanus*), which is the sole transmitter of the bacterium *Rickettsia prowazeki*, which causes typhus fever in Europe and Mexico, and *R. quintana*, which causes trench fever in Europe. In Abyssinia this louse transmits the spirochaete of relapsing fever, *Spirochaeta recurrentis*, and also several other species of *Rickettsia*, including those which cause typhus.

The bacteria which cause typhus fever are deposited in the excreta of the lice and are either scratched into the skin or into bites. Those which cause trench fever are either found in the excreta or in the body fluids of the lice and are scratched into the skin, either with the excreta or by means of the broken bodies of the lice themselves.

THE FLEAS (SIPHONAPTERA).

The annoyance and irritation caused by fleas to man are well known, but in addition certain species are able to transmit various diseases and also to act as the intermediary hosts of certain worms that affect man.

Adult fleas depend upon the blood of mammals and birds for their food supply, and, as they may pass from animal to animal, the frequent insertions of their mouth-parts into their hosts render them particularly liable to act as vectors of pathogenic organisms from host to host.

Some species are the known important vectors of bubonic plague and endemic typhus fever.

The domestic flea (*Pulex irritans*), in addition to attacking man, also occurs commonly on pigs and goats and also on the fox and badger. It has been recorded infesting rats and has been shown to be able to transmit plague. The Indian rat flea (*Xenopsylla cheopis*) and several other species of rodent fleas, however, are known to be the principal vectors of bubonic plague. *X. cheopis* also transmits endemic typhus.

The cat flea (*Ctenocephalides felis*), which is considered to have come from Egypt with the cat, and the dog flea (*Ct. canis*), considered to be of European origin, occurring on the fox and wolf, are frequently found to develop in great numbers. Both species bite man, and one well-known authority has stated that fleas in better-class houses are usually one or both of these species.

The jigger or chigoe flea (*Tunga penetrans*) is a South American species which has spread over tropical Africa and Madagascar. The

female penetrates the skin of animals, including man, usually the feet, and there, due to the development of eggs, swells up to the size of a pea. The eggs fall to the ground through a small opening in the skin. Itching and ulceration have often severe results. A Chinese species forms swellings behind the ears of rats.

The sticktight fleas (*Echidnophaga* spp.) remain attached to their hosts in a similar manner to ticks and are not readily removed. Some seven species that appear usually to live on marsupials have been described from Australia. Other species of sticktight fleas are found in Africa.

The sticktight flea of poultry (*Echidnophaga gallinacea*). This flea may occur in large numbers around the eyes and on the combs and wattles of the birds. It has been found around the eyes and between the toes of dogs and cats, and it may attack man. This species is possibly native to India. It was first noted in Australia when it was found on poultry in Western Australia in 1920. In 1944 it was recorded for the first time in New South Wales, when an outbreak occurred at Broken Hill. Recent work in Hawaii has shown that this flea can transmit endemic typhus, and rats carrying several hundreds of individuals of this flea have been caught there.

Bat fleas (*Ischnopsylla*). Some groups of fleas are restricted to bats, but may be found at times in rooms in the vicinity of bat resting places.

Indigenous species of fleas are found on various marsupials and on birds.

In this address it has only been possible to give a brief survey of some of the more important insect parasites of animals, and to mention some of the dangers associated with them in the transmission of various diseases.

Quarantine legislation for the control of various pests is now an accepted fact in most countries of the world, and this legislation, although not by any means perfect, is an attempt, designed under the advice of various scientific authorities, to prevent, as far as possible, the entry of any particular pest into one country from another, and these measures have acted as barriers. Some unthinking persons, however, still endeavour to evade these regulations and to introduce various animals into this country.

The rapidity of modern travel, from country to country, could well ensure the safe arrival of exotic parasites, together with the causal organisms of various diseases.

Our fauna is unique and should be preserved at all costs. The introduction of any animal or bird into this country, unless under strict quarantine conditions and examination, may well produce far greater destruction of our native fauna than those caused by "the march of civilization", in which one may include the use of guns and traps and bushfires, together with the destruction of natural scrub and forest areas, and the draining of natural marshes which have their own particular fauna and flora.

Unfortunately we already have a large share of the commoner cosmopolitan pests, but there are still many that are not yet with us. Numbers of our own indigenous arthropods have been accidentally introduced into overseas countries without their natural or habitual parasites and predators, and have caused serious damage.

Although many of the parasites confine themselves to their natural or original host animal, nature, being in a continuous state of flux, brings about changes in the habits of animals, and an instance of this is to be found in the Australian kangaroo louse (*Heterodoxus longitarsus*), which normally is parasitic on marsupials. This insect has now succeeded

in establishing itself as a pest of domestic dogs (animals in which there is no close phylogenetic relationship), in several localities in North America, where it has been accidentally introduced.

It must not be thought that all arthropods are bad. In the relentless conflict that goes on in nature we find there are vast hordes of arthropods that, although working for their own benefit, act in favour of man and other animals and assist in the maintenance of an equilibrium in the arthropod population. Even amongst such notorious insects as mosquitoes there are numbers (*Megarhinus* spp.) whose larvae prey upon those of other mosquitoes and in their adult stage do not feed on blood.

One of the aims of this Society has always been to protect and to preserve for future generations our fast-disappearing fauna, and in conclusion, ladies and gentlemen, I would like to express the hope that I have contributed in a small way to an understanding of the dangers that can arise from the introduction of exotic parasites into this country and their possible menace to the fauna of this great land Australia.

OBITUARIES

GREGORY M. MATHEWS (1876-1949)

By TOM IREDALE

Just on forty years ago, while I was studying at the British Museum (Natural History) the birds from the Kermadec Islands, I was told that Mr. Mathews would like to see me. "Who is Mr. Mathews?" was my involuntary question. It transpired that he was writing a book on the Birds of Australia and was then figuring the Petrels, a group which was well represented at the Kermadecs. I then recalled that in passing through Sydney the name had been mentioned, and in such a manner that a middle-aged or even elderly man had been envisaged. To my surprise, I was confronted by a tall, keen-eyed, energetic young man, very little older than myself, and even more enthusiastic. I discussed the Petrels that I knew about and the matter was closed. I went on with my studies, meeting all the famous ornithologists of that period, and had almost forgotten the happening when I was again asked to meet him. I was more surprised when he invited me to assist him in his work, especially the bibliographic details. It happened that just previously his mentor, R. Bowdler Sharpe, Head of the Bird Department, who had assisted him in his earlier work, had died rather suddenly and Mathews had been thrown upon his own devices. Rothschild and Hartert had helped him, but their own work was onerous and he had undertaken a heavy task. Fortunately he was gifted with an enthusiasm that brooked no obstacles and he was determined to carry out his work. In these days of *laissez-faire* it is difficult to recall that at that time book publication worked to a very strict schedule. If a part were promised for the first of the month, it was in the post or at the bookseller's before that date. Mathews had contracted to publish a part every three months, and to this end the plates had to be prepared more than twelve months ahead and the MSS. at least six months in advance of the publication date. He explained all this before I agreed, as it was obviously no easy task to continue. The first job was to collate all the references to the birds and check them by means of the books in the British Museum, as previously he had depended upon Sharpe's assistance and the synonymy published in the British Museum Catalogue. His conferences with Rothschild and Hartert had shown him that the Catalogue was not infallible and he had determined to make his work as accurate as humanly possible. This preliminary note will indicate his thoroughness, a factor that caused him a lot of trouble with the easier-going older ornithologists. While I was working in London independently of Mathews, he was engaged at his home with his collection of birds, his library, his collectors and his numerous correspondents in Australia and also all over the world. He had accumulated quite a good collection of birds and a library covering all the main reference works, and was working to make both of these the very best in the world, an arduous pursuit. It was a labour of love, but still it was no sinecure, many hours every day being fully employed with the collection while evenings were spent with his books. Should it be thought that he had nothing else to do, it should be explained that he was working his farm and acting as Squire, taking a very full part in the latter duties. The work was going on smoothly when the first World War broke out and everything became chaotic

in the book world; but he continued with his war work and his book and managed to complete the work as projected. But one great blow fell. He had to part with his beloved collection and for a time was afraid his even more beloved library would have to follow. However, he managed to retain the library and was able to present it to the Australian nation; it is now housed in Canberra.

The value of his work and his library will be more fully recognized by succeeding generations, as at present most of us are too close to the facts and do not see them in perspective. It is probable that Mathews' work may shine as brightly as the pioneer work of Gould, as it is also doubtful when another ornithologist as gifted will arise and also have the opportunity of publishing such a magnificent memorial. For Mathews was a great ornithologist in that he loved his birds and bird books, and through that love gained a wonderful knowledge of bird structure and systematics. Again, in these days of bird psychologists, systematics are decried and the workers therein depreciated, but the systematists' labour is the basis of all good work, whether it be psychology, ecology, oology, bird-banding or any other branch which makes up the greater study of ornithology. Mathews realized this and was continually urging his correspondents, his co-workers and colleagues as he regarded them, to follow up points that displayed themselves through his study of specimens and literature. He always regarded his work as essentially basic, a basis for the greater tasks of field study, and to that end made it a complete work of reference, but always indicating the many new modes of approach. Today it is difficult to find any item to which no note has been given by him, and as regards his facts they are practically perfect. More than twenty years have passed since the *Birds of Australia* was completed, and very few errors have been recorded, and the majority of those by Mathews himself. Someone may object that his systematics have not been accepted fully, but that is only natural, and he knew this from his study of the literature. Recently again, a *new* vogue has arisen, cited as "large genera and comprehensive species", which is just one hundred years old, one of its great protagonists being the Dutch ornithologist Schlegel. It was then found wanting and his successors became "splitters", their successors "lumpers" again, then a series of splitting efforts, and now a slight vogue of lumping. Mathews passed through the lumping fashion, published a List in which the birds were grouped *exactly* as is being suggested today. Really the present-day lumpers could accept that early list with very little alteration, but it would be unwise to do so. As Mathews, working every day at his beloved birds and books, gained more knowledge, he concluded that better progress would be made by splitting and continued that plan throughout. The splitting plan has the value of more accurate definition and consequently approximates more to the truth in nature which should be the goal of every ornithologist. This work will be later judged and he was content with that outlook. While he was recently in Australia he was prevailed upon to publish a small autobiographical sketch (*Birds and Books*, Canberra, 1942) and from that can be learned all that is written here about the man and his work. At first, in England, his Australian brusqueness did not help him to make friends, but his absolute sincerity and enthusiasm soon overcame the preliminary distrust of the Englishman to any novelty, and he became well liked in every way, even by his friendly antagonists in ornithological science. Later his knowledge of bird systematics gained him a seat on the Special Committee concerned with the rectification of British bird systematics. This was a unique honour and it may be a very long time before it is rivalled, as he was not a student of British birds in any sense. Later he was invited to check the references in the revised *Handbook of British Birds*, a still more unexpected acknowledgement of his knowledge of literature and systematics. When a World Committee of Ornithologists was mooted to undertake the preparation of universal systematic lists, Mathews was elected to act as Australian representative

and at once he proved his energy and enthusiasm by being the first to issue his part. That was entitled the *Systema Avium Australasianarum* and was framed to include the birds of New Guinea and the Pacific Islands as well as those of Australia and New Zealand. He was thus dependent on others for knowledge of the former, and thus that work is somewhat unequal in quality, but nevertheless it is one of the most useful lists yet published. W. L. Sclater managed to get his section of Southern African birds prepared, but all the other members found the tasks beyond their abilities and none other was published. Mathews retained his enthusiasm to the end and was projecting more works still in the future. But his great work is quite sufficient memorial and he will ever live in his books. He has published his own bibliography in the *Birds of Australia* and has given a list of his more important works in his autobiographical sketch. While the *Birds of Australia* is the largest of its kind ever prepared and probably includes more novel information than any comparable work, his *Lists* constitute the greatest advance in systematic reference lists. No other country is so well provided with such a basic work on such a style so that many local works can be easily prepared, and such are now beginning to appear. That result was one of his greatest wishes, as the only works in existence for use when he began was the ancient Gould, Campbell's *Nests and Eggs*, which dealt only scantily with birds, North's similar work was then in progress, and there was the whole continent to cover. Littler's Tasmanian book was the only State effort, although Hall's *Key* must not be overlooked as a small item of considerable merit. The *Emu* was the great standby, full of local information which proved invaluable, and it may be added it has increased its value yearly. From now onwards, investigation in almost any direction can be undertaken with the security that there will be no trouble in connection with the systematics.

Vale, Gregory Mathews! But only in the flesh, as his spirit will remain present as long as ornithology as a hobby or a subject of research will continue.

When Mathews took up his task of bringing down to date the portraiture and elucidation of Australian birds he had not the best of vehicles for the former object, as the day of the great bird artists had passed and he had to be content with the best available, which unfortunately was not the peer of the earlier age. His endeavour was to portray the bird, not as an artistic picture, but as a figure recognizable and able to be checked with bird skins anywhere. The text explained the origin and state of the bird skin figured, and this has been commonly overlooked by recent critics, who make comparison with different specimens not exactly comparable.

North had pointed out in his classic work dealing with the Nests and Eggs of Australian birds the variation seen in birds from various parts of this extensive continent (extensive when contrasted with the small area of European critics), but it was left to Mathews to work out the differentiation of the bird species into geographical variation or races, now called subspecies. At the time he began, the word subspecies was almost "taboo" in some conservative ornithological circles, and this applied also to the older school of Australian bird workers. Consequently he was assailed vigorously as a heretic, iconoclast, and even worse terms were applied. But, being Australian-born, criticism only made him more determined to stick to his last (the recognition of subspecies), and it is pleasing to record that he completed his task and today every Australian recognizes his excellent pioneer work.

When he undertook his review of subspeciation under Australian conditions he had more material at hand than any of his critics, and his conclusions were sound, as he had an excellent grounding in the study of bird skins from nestling to adult. In the course of his examination, an examination so minutely careful that it has not been equalled by any

modern student, he discovered many peculiarities which had been overlooked, and upon his determination of these novel factors a great deal of the future value of his work will depend. He understood that the differentiation of subspecies was merely the first step, and of very little value in itself, in the bird knowledge of Australia. It was very necessary to recognize all such geographical variations as distinct from individual growth or sexual variation, and to this end he continually and carefully studied all the material available, not being content with his own vast collection, but studying every other collection available, such as the British Museum (Natural History), the Rothschild (Tring) collection, and seeing most if not all the Australian collections, as well as visiting America and the European collections. Nothing had been done by any other worker on such a stage and every point was examined. It may be interposed that the study of subspeciation in Australia has not yet begun, as there are no collections in this country wherewith it may be undertaken, so that Mathews' work will ever be a boon to the oncoming Australian ornithologists of the future. Mathews' motto was "Facts; let the theories look after themselves", and he always worked to the facts, ignoring the preconceived notions and fancies that overflow much of present-day work. So that it is upon his relation of facts that he must be judged, and no one can resist the absolute accuracy of the facts recorded.

Having determined the subspecies as shown by the material available, Mathews then attempted to limit the species and separate these into natural groups. In doing this he showed the distinctions and named them, in this following the advice of the father of genetics, William Bateson, who maintained that the existence of names for such differences assisted him in the more accurate recognition of his genetic problems. The



Tom Iredale and Gregory M. Mathews at the time of their collaboration on the *Birds of Australia*.

Photo.—Reginald Haines.

ignoring of these small distinctions had led to most of the grosser errors now seen in the work of his contemporaries and which some of their successors are still repeating. It has been well said that contemporary criticism is at most only tentative and that it must be confirmed by later, less prejudiced, workers. So we can look forward for a clear view of Mathews' work in the next half-century.

As an imperishable monument Mathews' volumes are at first sight incomparable, but in Australia an equally if not more perpetual monument will be the Mathewsian Library of Ornithological Literature now housed in the Commonwealth Library at Canberra, having been presented to the nation by Mathews in his lifetime. He returned to his native land at that time, only a few years ago, when most Australian ornithologists met him, and these will remember the genial, elderly, still enthusiastic man, somewhat Englishized but very Australian at heart.

His principal writings were:

1910-27.—*Birds of Australia*. Thirteen quarto volumes with coloured plates, including Supplements, Check List and Bibliography.

1927-30.—*Systema Avium Australasianarum*.

1912 onwards.—*Austral Avian Record*.

Many articles in all the leading ornithological journals.

He was honoured by many ornithological bodies and was President of the Royal Zoological Society of New South Wales, President of the Royal Australasian Ornithologists' Union, Vice-President of the British Ornithologists' Union, Chairman of the British Ornithologists' Club, and held many other scientific and public positions.

NEVILLE W. CAYLEY

It was with great regret that we learned of the death on March 17, 1950, of our old friend and member Neville William Cayley, at the age of 63. World famous as an ornithologist and painter of birds, Cayley followed his father as a bird-artist. He illustrated not only his own books and articles, but also the birds and eggs in the *Australian Encyclopædia*, Waterhouse's *What Butterfly is That?* and Troughton's *Furred Animals*. His series of parrot paintings adorns the Society's rooms. His writings dealt with many Australian birds, notably the finches, parrots and fairy wrens, and his best-known book, *What Bird is That?*, has run into numerous editions.

He was one of the founders and most energetic members of the Ornithological, Budgerigar, Avicultural, and Biological Survey Sections of our Society, being active in them for many years. He was the first Secretary (in 1922) of the Ornithological Section, and a Councillor from 1926. He was elected a Fellow in 1931 and was President a year later.

As well as an aviculturist, Cayley was a great champion for conservation of the Australian fauna and flora; he was long a diligent member of the National Park Trust and prime mover in the Gould League of Bird Lovers.

He was a man of great ideas and his services to the Royal Zoological Society of New South Wales were of inestimable value.



Neville W. Cayley.

PROFESSOR W. J. DAKIN, D.Sc., C.M.Z.S.

The death occurred on April 2, 1950, at Turrumurra, near Sydney, of Professor William John Dakin, after a long and painful illness, within a month of his sixty-seventh birthday, for he was born at Liverpool in England on April 23, 1883. He had a distinguished university career, both as student, teacher of biology, and research worker, in England, Germany, Italy, Norway and Ireland before he occupied the Chair of Biology in the University of Western Australia from 1913 to 1920. His account of the Abrolhos Islands is classic. In the 1920's he was Professor of Zoology first at Liverpool, England, and then at Sydney. For years he was a Councillor of this Society and was our President in 1931. He was a Trustee of The Australian Museum, and, in 1934, President of the Linnean Society of New South Wales. On Lindeman Island, before the war, he proved a good companion and a keen worker amongst a party of naturalists on the Great Barrier Reef. From 1941 to 1944 Dakin was Technical Director of Camouflage for the Commonwealth Government and wrote a book, "The Art of Camouflage". He became a Councillor of the C.S.I.R.O. and was awarded the Mueller Medal at the Hobart Science Congress of 1949.

His research work covered a varied field: the cranial nerves of Ghost Sharks, osmosis, experimental biology, fish eggs, oceanography, marine biology (especially plankton and the life histories of prawns), pearls, animal coloration, and so on. He wrote a text-book of Zoology and many other books, papers and articles. His radio broadcasts, with their cheery "Hello, everybody!" as their introduction, were extremely popular throughout the Commonwealth, and dealt with science in an explicit manner, tinged with his own optimism and idealism. He retained his youthful enthusiasm and zest for his biological work and was a linguist and musician of distinction, being an excellent pianist. Photography, drawing, and yachting were other accomplishments, and he used his auxiliary yacht *Thistle* as a research vessel for the original studies on the plankton of New South Wales for which he is deservedly famous.

Professor Dakin is survived by his widow and a son, Dr. Harvey Dakin, to whom our sympathies are extended.

G.P.W.

Reports of Sections

AVICULTURAL AND BUDGERIGAR SECTIONS

[No annual reports from these Sections had been received up to time of going to press.]

MARINE ZOOLOGICAL SECTION

The year just ended has been a very successful and encouraging one for the Marine and General Section, enthusiasm and interest being maintained at the previous high level and membership showing a steady and pleasing increase.

Work on the shell cabinet continues steadily and sufficient funds are now in hand for the purchase of a glass-fronted showcase. Finance for this has been raised mostly by members' contributions and from the proceeds of an auction sale of Mexican shells donated by Miss Elizabeth Pope, of the Australian Museum. It is felt that this will prove an interesting and artistic contribution to the Society's rooms, as well as an incentive for still more effort.

The Field Day Committee arranged many interesting excursions during the year, which were well attended, even in inclement weather, but collecting for the most part was somewhat disappointing.

It is felt that special mention should here be made of the excellent work being done by Mr. C. McLauchlan, who is pursuing a lonely path in the field of Land Mollusca, and adding considerably to our knowledge in that direction.

Congratulations are also extended to Mr. C. F. Laseron for a very fine publication dealing with the identification of the Family Marginellidae, generously and beautifully illustrated with sketches by the author. This is a very valuable contribution to marine records and will be a very useful guide to collectors everywhere.

A high standard of lectures was maintained throughout the year, which were appreciated not only by members but by the general public, and on more than one occasion the seating accommodation of the auditorium was taxed to its utmost.

I would like to thank the following lecturers on behalf of all members.

July 5, 1948: "Wonders of the Barrier Reef", Mr. Roy Cooper.

August 2, 1948: "Aboriginal Child Art", Miss Ella McFadyen.

September 6, 1948: "An Insect Calendar", Mr. A. Musgrave, F.R.Z.S., F.R.E.S.

October 4, 1948: "Invertebrate Ways of Life", Mr. M. L. G. Sheldon, B.Sc.Agr.

November 1, 1948: "Chemistry and Biology of Sea Water", Mr. M. D. Fry.

February 7, 1949: "Famous Shell Collectors", Mr. Tom Iredale.

March 7, 1949: "Aboriginal Art", Miss Ella McFadyen.

April 4, 1949: "Fish Doctor in Papua", Mr. Gilbert Whitley, F.R.Z.S.

May 2, 1949: "Jim Bailey's Trip through Mexico", Miss Elizabeth Pope, M.Sc.

At the Annual General Meeting the following officers were elected for the ensuing year:

Chairman: Mr. E. F. Holland.
Vice-Chairman: Mrs. L. H. Woolacott.
Hon. Secretary: Mrs. L. Harford.
Field Day Committee: Mrs. J. Kerslake.
Mrs. K. Rutland.
David McAlpine.

(MISS) WINIFRED CROFTS,
Hon. Secretary.

ORNITHOLOGICAL SECTION

ANNUAL REPORT, 1948-1949

The Section is pleased to report a satisfactory and encouraging year's activities. Continued enthusiasm, a slight increase in average attendance and interesting observations all contributed towards a successful year.

Regular monthly meetings were held during the period. Four general discussion nights were held, and each proved interesting and helpful. Most of the participants in the discussions impressed with ability, careful research and keen observation. Museum specimens were used to illustrate and for the loan of these the Section expresses its thanks to the Director and ornithological staff of the Australian Museum, especially Mr. J. A. Keast. Three film screenings proved enjoyable. Two were given by Mr. Norman Chaffer, who continues to augment his already excellent records of coloured photography of birds. The room was filled to capacity on each occasion. Lectures were given on each of the other nights. The thanks of the Section are hereby extended to everyone who materially helped to make the year a successful one. The average attendance for the twelve months was 43, a slight advance on the previous year's figures.

Details of meetings, lectures and discussions are as follows:

July 16, 1948: "Birds of the Furneaux Islands", by A. R. McGill.

August 20, 1948: General discussion on Migratory Groups.

September 17, 1948: Films by Norman Chaffer.

October 15, 1948: "Some Birds I Have Known", by K. A. Hindwood.

November 19, 1948: Films by Government Documentary Film Council.

December 17, 1948: General discussion on Birds of the Mountain Areas.

January 21, 1949: Observation Night.

February 18, 1949: General discussion on Sea Birds.

March 18, 1949: Films by Norman Chaffer.

April 8, 1949: "Literature and Birds", by J. E. Roberts.

May 20, 1949: General discussion on Pigeons.

June 17, 1949: Annual Meeting. "The Western Australian R.A.O.U. Camp-Out", by W. R. Moore (Chairman).

Although four organized outings were held during the year, the attendance at each was disappointing. These were respectively to Vineyard (September 19), Lower Blue Mountains (November 21), Hawkesbury Swamps (January 23), and Cook's River Estuary (February 26). Despite only a few participating, interesting observations were made on each occasion. Outings during the next year will be left to individual members to arrange.

A number of interesting journeys were made by some members. The Section Chairman and Mr. Virtue attended the R.A.O.U. Annual Congress and Camp-Out in Western Australia, Messrs. Chaffer, Cooper and Ramsay paid a visit to the Macquarie Marshes, Mr. Hindwood assisted in the "Mutton-bird" research of the C.S.I.R. on Flinders Island, Mr. Keast was a member of a University expedition to Brampton Island,

central Queensland, Messrs. Mackay and Goddard spent a few weeks in the Cape York region, Mr. and Mrs. Gadsden journeyed to Mt. Buffalo, Mr. and Mrs. Acworth paid a visit to Brisbane, whilst many members reported on birds from less distant areas.

Amongst the visitors welcomed were Messrs. H. G. Deignan (U.S. National Museum), Don. Lamm (U.S. Embassy, Canberra), Hugh Innes (Bundaberg, Queensland), Jack Jones (Melbourne) and E. H. Zeck (President, R.Z.S.).

Hope is held that the Fauna Bill, recently passed by the Legislative Assembly, but which, at time of writing, is still unperused by a number of members, will be a noted step in the right direction towards the protection of rare and valuable species of birds. The Government is to be congratulated on drafting such a Bill, but the policing of such a law will be the real test of its hoped-for success and efficiency. Many instances of indiscriminate shooting and destruction have been reported, even in sanctuaries, and the feral cat remains a continued menace. Mr. Palmer was elected as Section representative to meetings held by interested organizations to discuss the control of The National Park.

At the Annual Meeting all retiring officers were re-elected, the Committee personnel being increased to five. Officers of the Section for 1949-1950 are as follows:

Chairman: Mr. W. R. Moore.

Vice-Chairman: Mr. J. Waterhouse.

Secretary: Mr. A. R. McGill.

Assistant Secretary: Mr. J. A. Keast.

Committee: Messrs. Norman Chaffer, Roy P. Cooper, K. A. Hindwood, E. Hoskin and R. M. Virtue.

ARNOLD R. MCGILL,

Section Hon. Secretary.

FIELD REPORT, 1948-1949

Practically all records of note during the year, included under observations in the minutes of the Section, centre within the County of Cumberland. This is certainly the best "worked" area in New South Wales, but, because primarily of a great variety of habitats, bird-life is most varied and the interests of Sydney's ornithologists have not relaxed.

The Hawkesbury swamps continue to attract migratory and nomadic water-frequenting birds, which seldom reach the County's boundaries. The Australian Pratincole (*Stiltia isabella*) was seen on a few occasions by Messrs. Fearnley and Schraeder in November-December. No previous occurrence of this species in the Sydney district is known. Other birds recorded in the Hawkesbury area include the Jabiru (*Xenorhynchus asiaticus*), Pink-eared Duck (*Malacorhynchus membranaceus*), Red-kneed Dotterel (*Erythronyctes albus*) and Little Egret (*Egretta garzetta*). Only a few previous occurrences within the County of these four species are known. The Plumed Egret (*E. intermedia*) also was observed in small numbers as well as one or two birds which remained at the Botany waterworks for several months.

One of the most interesting "discoveries" of the year was, following Mr. Hindwood's original observation, five or more pairs of the Tawny Grassbird (*Megalurus timoriensis*) inhabiting a swampy area near Dee Why. Before 1900 Masters obtained skins of this bird at Long Bay and Rope's Creek, but there had been no known record of it within the County since that time. Three occupied nests were found in the low swamp growth, two in the spring and one in the autumn months. Nests of the Chestnut-breasted Finch (*Donacola castaneo-thorax*) were also located in the same locality, also in the spring and summer. Successful photographs were obtained.

Migratory waders have been watched carefully on tidal flats and reef. A solitary Large Sand-Dotterel (*Charadrius leschenaultii*) was seen at Botany by a small party of observers. A partial-breeding plumaged Grey Plover (*Squatarola squatarola*) was met with in October at the same locality (McGill). The Black-tailed Godwit (*Limosa limosa*) was again recorded—a solitary bird. A small number of Whimbrels (*Numenius phaeopus*) was seen on a few occasions at Long Reef and a few Greenshanks (*Tringa nebularia*) noted at Quibray Bay (Francis).

A number of patrols was undertaken along the sea-shore and some interesting records made with derelict sea-birds. Four species of Prions were found on the one trip (July)—the Broad-billed (*Pachyptila vittata*), Medium-billed (*P. salvini*), Dove Prion (*P. desolata*) and Fairy Prion (*P. turtur*). This patrol followed a few days' heavy wind and rain. The remains of eight Short-tailed Shearwaters (*Puffinus tenuirostris*) were picked up on the same day. This might constitute the only known winter occurrence of this bird in eastern Australia. In January the dried remains of a Grey Noddy (*Procelsterna cerulea*) were found by Messrs. Hindwood and Everitt. This is the second known specimen for Australia.

A Glossy Ibis (*Plegadis falcinellus*) was seen at Eastlakes (Hoskin). A solitary Drongo (*Chibia bracteata*) was recorded at Dee Why in October—an unusual time of the year. The Southern Figbird (*Sphecotheres vicilloti*) was seen on different occasions spread over most of the year at the Botanical Gardens. A pair of Little Cuckoo-Shrikes (*Coracina robusta*) was found nesting at Doonside in September (Cooper). The White-plumed Honeyeater (*Meliphaga penicillata*) was noted many times within the County and appears to be acquiring at last a liking for Sydney. It was found feeding well-grown young on one occasion (Hoskin). Scaly-breasted Lorikeets (*Trichoglossus chlorolepidotus*) were reported from a few localities, whilst the Rainbow Lorikeet (*T. moluccanus*) again nested at Lindfield. Two unusual observations were made depicting Cuckoo-introduced bird combinations. Three eggs of the Red-whiskered Bulbul (*Otocompsa emeria*) and one of the Pallid Cuckoo (*Cuculus pallidus*) were found in the same nest (Fearnley), whilst Mr. Virtue found a Starling (*Sturnus vulgaris*) feeding a young Cuckoo. To illustrate the reason for the Bulbul's phenomenal spread and increase Mr. Cooper reported that one pair of these birds under observation built and laid in five nests in one season.

The autumn was possibly an unusual one, for, apart from those already mentioned, a number of other birds were recorded breeding. Some species, usually regular in migration, were found occasionally during the winter months. These included the Rufous Whistler (*Pachycephala rufiventris*) and Olive-backed Oriole (*Oriolus sagittatus*).

Some inland observations proved interesting, but generally conditions there showed little activity, apart from water-frequenting birds, in comparison with the previous year. A party, organized by Mr. Chaffer, met with each of the three species of Ibis breeding in good numbers in the Macquarie Marshes. Other species found nesting in the vicinity included the Crimson Chat (*Epthianura tricolor*) and Australian Pratincole. The Orange Chat (*E. aurifrons*) and Plumed Tree-Duck (*Dendrocygna eytoni*) were seen in good numbers and the Little Crow (*Corvus bennettii*) was identified. Further reports on conditions inland and some of the birds met with were given by Messrs. Leithhead, Bourke, Francis and McGill.

It is difficult to select from amongst long lists of birds tabled and numerous observations given verbally what one might consider the most important to record in a general annual résumé. Some notes given in the foregoing might be considered actually of little importance, whilst some omitted might arouse attention if the matter be sifted by another compiler. Safe it may be to assume that the accumulation of notes

contained herein represents a balanced summary of much interesting information and, if it be compared with that of former years, depicts a most interesting year's ornithological activities.

ARNOLD R. MCGILL.

SYLLABUS OF SECTIONAL MEETINGS FOR 1949-1950

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

1949—

- July 15: "Nesting Habits of the Lyrebird", by K. A. Hindwood.
August 18: General discussion on Introduced Birds, led by Messrs. Everitt, Haines, Virtue and Fearnley.
September 15: Films in colour, by Norman Chaffer.
October 20: "Fairy Wrens", by Major H. Burgh.
November 17: General discussion on Birds of the Grasslands, led by Messrs. Leithhead, Boughtwood, Francis and Givens.
December 15: "Plumage Changes and the Reproductive Cycle", by J. A. Keast.

1950—

- January 19: General discussion on Cuckoos, led by Messrs. Hoskin, Gannon, Gadsden and Todd.
February 16: "An Introduction to the Ecology of Birds", by P. A. Gilbert.
March 16: Films in colour, by Norman Chaffer.
April 20: "Birds of the Swamps", by Roy P. Cooper.
May 17: General discussion on Ducks, led by Messrs. McGill, Miller, Roberts and Turnidge.
June 15: Annual Meeting. Chairman's Address.

Note: Please note that, commencing in August, the regular monthly meetings will be held on the Third Thursday in each month, instead of the Third Friday as previously. Commencement time, 7.45 p.m.

Marine Zoological Section

Meets on the first Monday of the month. When the first Monday is a declared public holiday, is held on the Tuesday following. The subject for each monthly meeting will be advertised in the "Lectures" column of *The Sydney Morning Herald*.

Conchology Group

Meets on the second Monday of the month.

Avicultural Section

Meets on the second Tuesday of the month.

Budgerigar Section

Meets on the third Tuesday of the month.

General Zoology Section

Meets on the second Monday of the month.

1950—

- July 10: "Furred Animals of Australia", by Ellis Troughton.
August 14: "Sharks", by G. P. Whitley.
September 11: "Spiders", by Miss Levitt.
October 9: "Animal Behaviour" (general discussion).
November 13: "Insects", by E. H. Zeck.
December 11: Question night (questions to be handed in at November meeting).

- January 8: "The Species Concept" (general discussion).
 February 12: "Amphibia", by J. R. Kinghorn.
 March 12: "Evolution of Man", by J. A. Keast.
 April 9: "Zoogeography" (general discussion).
 May 14: Question night (questions to be handed in at April meeting).
 June 14: Annual Meeting and Chairman's Address.

DEVELOPMENT OF A PORT JACKSON SHARK

By G. P. WHITLEY

(Contribution from The Australian Museum, Sydney.)

The size at which sharks commence to breed varies according to species. Few observations on this subject have been made because of the difficulty in obtaining material and the years of work involved before conclusive results can be obtained. I have given some notes on viviparous species in the *Australian Zoologist*, xi, 1945, p. 1, and have some manuscript field notes awaiting further data. It is now possible to record something of an egg-laying species, the Crested Port Jackson Shark, *Molochophrys galeatus* (Gunther), a specimen of which has been under observation at Taronga Park Aquarium, Sydney, from its pre-natal existence to first maturity. This specimen, hatched from an egg in the Aquarium in April, 1938, after 11 $\frac{3}{4}$ years, has itself laid eggs, though these are unfortunately infertile because the shark has been isolated in a tank. Observations on the shark were commenced by an attendant at the Aquarium (Jacups, *Proc. Roy. Zool. Soc. N.S. Wales*, 1942-3 (1943), p. 11) and in recent years the Curator and Secretary have kindly sent me an annual account of its growth.

The history of the shark is as follows:

Egg thought to have been laid in July, 1937.

Egg received at Taronga Park Aquarium, August 15, 1937.

Length of embryo in egg on December 18, 1937, about 2 $\frac{1}{2}$ inches.

Length of embryo in egg on January 15, 1938, about 4 inches.

Shark hatched, April 5, 1938. Length 6 $\frac{3}{4}$ inches.

April 30, 1939: Length 8 $\frac{3}{4}$ inches. Not weighed.

April 21, 1940: Length 10 $\frac{3}{4}$ inches.

April 6, 1941: Length 13 $\frac{3}{4}$ inches.

1942: Not measured.

June, 1943: Length 18 inches.

1944: Not measured.

March 15, 1945: Length 22 $\frac{1}{4}$ inches. Weight 6 pounds.

January, 1946: Length 23 inches.

April 16, 1947: Length 24 $\frac{1}{2}$ inches. Weight 6 pounds.

April 2, 1948: Length 26 $\frac{1}{4}$ inches. Weight 5 pounds 12 ounces.

April 28, 1949: Length 27 inches. Too lively to weigh.

December 16, 1949: Laid one egg.

December 18, 1949: Laid two eggs.

December 26, 1949: Laid three eggs.

February 9, 1950: Length 28 $\frac{1}{2}$ inches. Weight about 8 $\frac{1}{2}$ pounds.

Molochophrys galeatus is known to reach about four feet in length and (even allowing for slight differences of conditions in captivity and free in the sea) must live to a considerable age. However, the slow growth rate would tardily replace the species if it were depleted, say by over-fishing. As far as I know, the above is the first record of growth to maturity in any member of the Heterodontidae.

THE MARSH SNAKE (*DENISONIA SIGNATA*)

By A. I. ORMSBY

The family Elapidae is the largest Australian family of snakes and may be distinguished from other families in having grooved fangs at the front of the jaw. Some writers classify family Elapidae as a sub-family of the Colubridae. Ditmars followed the former method, whereas Kinghorn describes the Elapine group as family Colubridae, sub-family Elapinae.

The genus *Denisonia* has, speaking generally, the following characteristics. Head distinct from neck, being slightly wider, body elongate, scales smooth, 1-5 teeth behind fang, subcaudals single, internasals present, scales short and not oblique. All members of the genus are viviparous.

There are sixteen species of *Denisonia* listed in Kinghorn's book "The Snakes of Australia" as well as several varieties or local race forms. The genus *Denisonia* has therefore the largest number of species of the fifteen genera of family Elapidae found in Australia. Unlike most of the Australian genera of family Elapidae which are confined to this continent and New Guinea, *Denisonia* extends to the Solomon Islands, three species being recorded from that island. Also two of the three Tasmanian snakes are members of the genus *Denisonia*, including the Copperhead (*Denisonia superba*), which is the largest member of the genus, and on account of its size it is the only one that can be regarded as dangerous.

From the foregoing it can be readily seen that the Marsh Snake, *Denisonia signata*, being a member of the largest genus, may well be described as typical of Australian Elapine snakes, and for the following reasons I have selected this species for special study and observation:

- (a) There is never any difficulty in obtaining specimens locally.
- (b) It is a good liver in captivity, requiring no special attention or heating.
- (c) It is easy to obtain food supplies.
- (d) Being viviparous, no difficulty is experienced in obtaining young at birth.
- (e) The species is comparatively equable in temperament, can be handled freely, bites being rarely experienced, and then without serious ill effects.
- (f) Its size is most suitable for the home vivarium.
- (g) Both diurnal and nocturnal observations of its habits are a relatively simple matter.

Denisonia signata may be distinguished from other species of the genus by its very dark, usually black, undersurface. The upper parts vary from light olive to almost jet black with a yellowish stripe behind the eye varying in size with the individual. Sometimes the yellowish markings extend to the upper lip.

Scalation: Frontal long and narrow but still broader than supra-oculars. Scales in 17 rows, ventrals 150-170, anal scale divided, subcaudals 41-56 single.

Size: Thirty inches is an outsize specimen, but I have seen a specimen 36 inches long. This was obtained by Mr. George Cann at La Perouse and shown to Mr. Kinghorn at the Australian Museum, who had hitherto believed that the species did not attain a length of more than 30 inches. Actually, although I have handled perhaps nearly 100 examples

of this species at one time or another, I have never had a specimen more than 24 inches, apart from the record just mentioned, which unfortunately "disappeared" from my car. No doubt the thief got a shock when he discovered his prize "a three-feet brown snake". The smallest female I had which produced living young was just under 15 inches in length.

Food: Mr. J. R. Kinghorn states small lizards and large insects. In my own experience I have never known this species to take insects, and even tiny youngsters evince no interest in slaters or worms. Tiny lizards are eaten avidly by the newly born snakes, and adults also eat frogs.

Distribution: From Darwin and Cape York to New South Wales. Probably restricted to coastal areas unless the snakes can follow a watercourse inland. There is a racial variety on Dunk Island.

Localities: Along the fringe of marshes, streams or ponds. I have never collected this species more than 100 yards from water, but as the snake likes a dry place in which to lie up, it seldom rests in damp places on the very edge of the water, and in winter no doubt ventures even further afield in its search for a dry place in which to hibernate. Eastlakes golf links has always been a happy hunting ground that seems to hold an inexhaustible supply. I would look under tins in the afternoons as the species comes out to sun itself in the mornings. I believe that most of its night wanderings are in search of food.

An apparently ideal spot in similar country to Eastlakes golf links at Woy Woy was most disappointing, yielding three specimens only after a number of excursions, which in all yielded about 20 Black Snakes (*Pseudechis porphyriacus*). I think the presence of Black Snakes, which are eaters of smaller snakes accounts for the very few Marsh Snakes found in such an ideal locality. Harbord, Narrabeen Lakes, Kurnell, Maroubra and La Perouse are all localities in the vicinity of Sydney in which to collect Marsh Snakes, and even their enemies the golfers cannot clean out this snake locally as they have succeeded with the larger species.

Vivarium Notes: This species, as with other small species, does very well in an old fish tank with fly-wire top. The essentials are a dry earth bottom, a few pieces of bark for the snakes to crawl under, and a dish of fresh water. Some herpetologists favour a stone or two, as the bark may not offer sufficient resistance for the snakes to shed their skins. Others also favour a tray of damp earth in the summer months. If the vivarium is placed in the sun occasionally this species will take the opportunity to sun itself, but the other Sydney species of this genus, *Denisonia nigrescens*, is entirely nocturnal. It is only fair to say, however, that I have kept Marsh Snakes entirely without sun for over a year without apparent ill effects.

Life History: The young are born usually in February. Of seven females which produced young for me in captivity only one went into March before finally delivering young on the 9th March. The largest number produced on two separate occasions at one birth was 12. In both these cases the mother was 21 inches in length. My smallest recorded number was four by a female 14½ inches; a female 15½ inches long produced three, but others may have been produced and disappeared, as I had her in a large vivarium with a number of other snakes. A female 17 inches long had eight young.

From this we can say that the species is mature at 14½ inches and I think we can safely assume that the larger the female, the more young she can produce at a birth.

Males can of course be distinguished from females by the tails. The tail of the male is longer and tapers gradually to the tip, whereas the female has a shorter tail with a sharp division from the body at the anus.

The following life history of a youngster born in my vivarium in February, 1947, is of interest. In that month I had two lots of youngsters totalling 16. Half of these were divided with a friend. One only survived the winter in my own largest vivarium, but as no special care was taken the youngster had to fend for itself. It was just under six inches at birth, on 18th February, 1948, it was 8½ inches, on 11th April, 1948, it was 9¾ inches, on 1st January, 1949, it was 12 inches, and on 5th April, 1949, it was 14¾ inches.

At the time of writing the snake is now in hibernation, and from the above records it can safely be stated that the species is sexually mature three springs after the date of birth, that is at the age of approximately 2½ years, but of course growth continues thereafter for an indefinite period, probably at a much slower rate. With this specimen hibernation in 1948 was between April and September or October, the last meal being taken before Anzac Day that year. In 1949 the young snake fasted for quite a period after shedding its skin on 4th April, 1949, and then took a lizard on 17th May. Approximate dates on which the snake shed its skin in 1949 were 1st January, 13th February and 4th April. In all cases the snake ceased eating and in one case where it had taken a frog on the 26th December, 1948, disgorged it the following day, when its eyes turned blue. This condition of the eyes invariably occurs about a week before shedding and lasts approximately 24 hours.

Accurate observation of feeding habits being impossible, I would estimate that the snake took at least one frog or lizard weekly, occasionally two, missing two weeks every six weeks at the time of shedding its skin and about five months during the winter. Its method of feeding is as is usual with most Elapine snakes, namely, to seize its prey (usually by the leg) and hang on until it is dead, then to swallow it head first. Of the Elapine snakes I have only noticed members of the genus *Demansia* throwing coils around the victim prior to swallowing.

Effect of a Bite: Although I have handled so many of this species quite freely, including freshly caught specimens, and have received half-hearted bites from a couple about a foot long without ill effects, the following notes have been recorded by me: On 18th February, 1948, at 8.45 p.m., I was bitten efficiently just below the joint of the index finger by a gravid female 17 inches long. There were no effects for five minutes. Then a sting similar in intensity to that of a bee persisted for about half an hour followed by a numb feeling. About a quarter of an hour after receiving the bite, swelling started. There was some itching on the knuckle and below the bite with stiffness after about 35 minutes. After three-quarters of an hour the swelling spread to the index knuckle. There was some swelling on the knuckle the next day, but no discomfort, and the swelling had disappeared the following day. There were no further ill effects. I did not, of course, treat this bite, which I regarded as a trivial matter.

SOME RARE AUSTRALIAN FISHES

By G. P. WHITLEY

(Contribution from The Australian Museum, Sydney)

Since it may be a long time before my "Fishes of Australia" appears, this opportunity is taken to publish a few figures of some rare and interesting species which had been prepared for the larger work. The five shown here belong to the families (1) Bothidae, (2) Gobiidae, (3) Teuthidae, (4) Aluteridae, and (5) Holocentridae respectively.

Figure 1. Flounder, *Arnoglossus aspiolos praeteritus*, subsp. nov. From the true *A. aspiolos* (Bleeker, 1851), to which this comes closest in Norman's Monograph of Flatfishes (1934, pp. 174 and 187), this new subspecies is distinguished by having eye 4:2 in head, lower eye more in advance of upper, scales cycloid on ocular side, height of dorsal fin about one-quarter of body depth, and coloration spotted. The holotype (Austr. Mus. regd. no. IA.4142), shown here, is full-grown at 2½ inches and was dredged off Western Australia between Cape Jaubert and Wallal; this subspecies has also been taken off Darwin, Northern Territory.

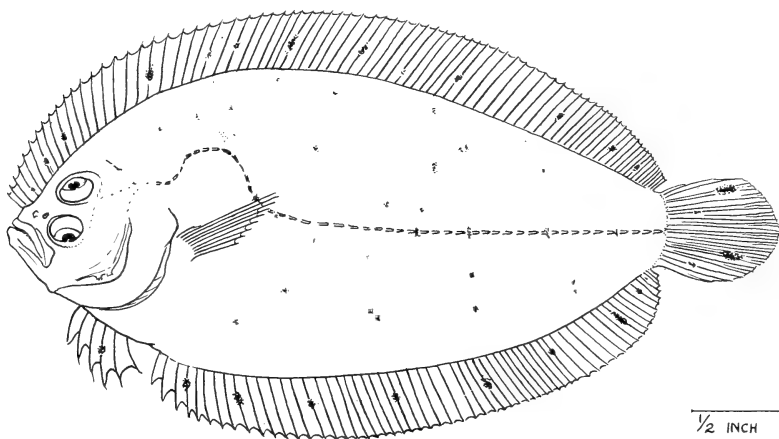


Figure 1. *Arnoglossus*.

Figure 2. The Exquisite Goby, *Favonigobius exquisitus*, sp. nov. The type of this beautiful little fish (Austr. Mus. no. IB.1413), 2⅜ inches overall, came from Toukley, and a smaller one was caught at Narrabeen, showing that we still have much to learn about the smaller fishes of New South Wales. It differs from the described species in fin and scale counts and in its ornate colouring, as follows. The ground colour is straw-yellowish. A dark brown smudge from eye to mouth. No bands on cheeks. Upper half of head and body with pale greyish-brown spots; four or five pairs of larger blotches along median line of each side. Eye opalescent. Dorsal fins white to cream with blackish ocelli. Anal fin dusky; other fins plain or with blotches as figured. D. vi/i, 8; A. i, 8; P. 15; C. 12. Sc. 26. Tr. 8. Predorsal sc. 9.

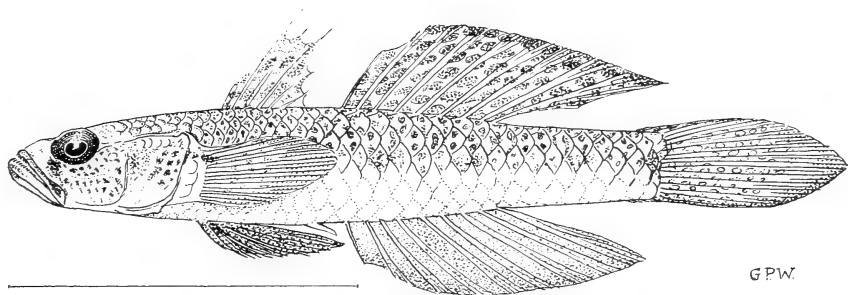


Figure 2. *Favonigobius*.

Figure 3. Surgeon Fish, *Burobulla maculata* (Ogilby, 1887). This yellow-spotted fish, with the three characteristic bucklers on each side of the tail, is known from a very few specimens, up to 17 inches in length, from New South Wales and Lord Howe Island. The figure is drawn from Ogilby's Port Jackson holotype, with the bucklers and a tooth shown separately. A counterpart in the Galapagos Islands, *B. laticlavia* (Val.), is stated by William Beebe to be abundant there; it has recently been generically named *Triacanthurodes* by Fowler (1944), but his name appears to be synonymous with my *Burobulla* (Austr. Zool., vi, 1931, p. 321).

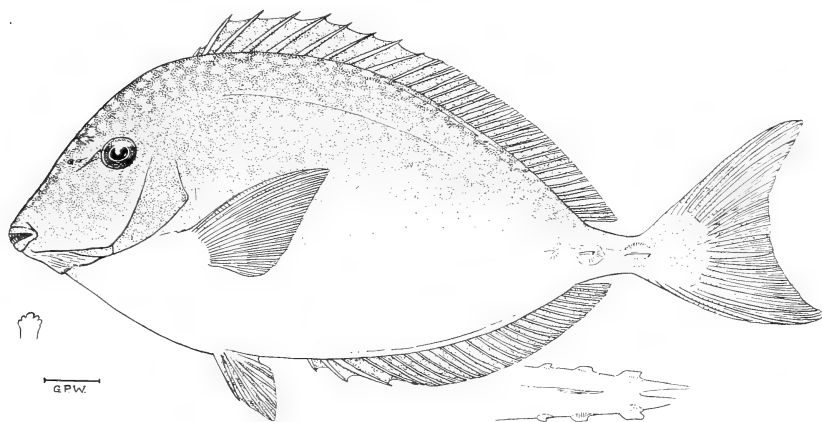


Figure 3. *Burobulla*.

Figure 4. Leatherjacket, *Tantalisor pauciradiatus* Whitley, 1947.

This Western Australian genus and species was only recently named (Austr. Zool., xi, 1947, p. 146) and is here illustrated for the first time from the unique holotype. Lower left: dermal denticles.

Figure 5. Squirrel Fish, *Holotrachys major*, sp. nov. A red, rough-scaled fish from 106 fathoms off New South Wales. D. xii, 13; A. iv, 11; L. Lat. 28 to hypural; tr. 4/1/7½. Length 11 inches. Weight 1½ pounds. Differs from most species in having larger and fewer scales and almost vertical preopercular margin. From *H. oligolepis* Whitley (Austr. Zool., x, 1941, p. 28, pl. i, fig. 19) it differs in being less rough, has snout less than eye, nasalia diverging, lower jaw more prominent and head more rounded. Holotype (no. IB.2166) in Australian Museum.

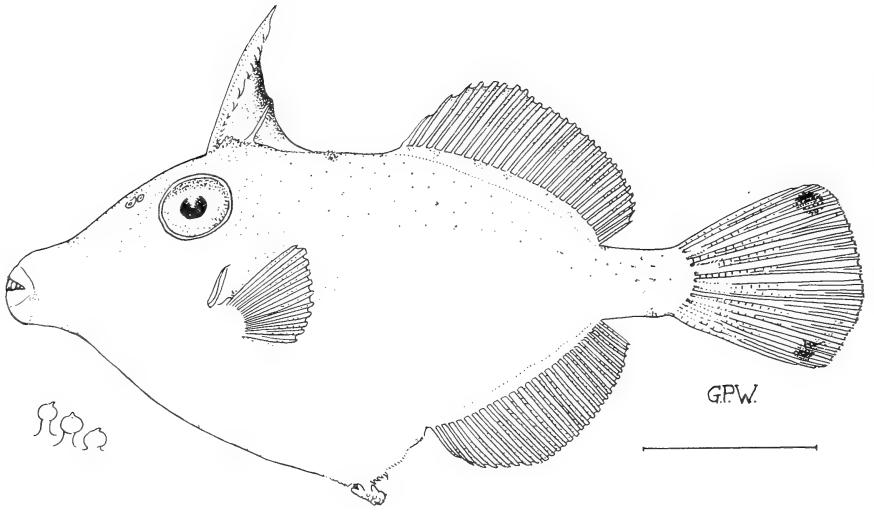


Figure 4. *Tantalisor*.

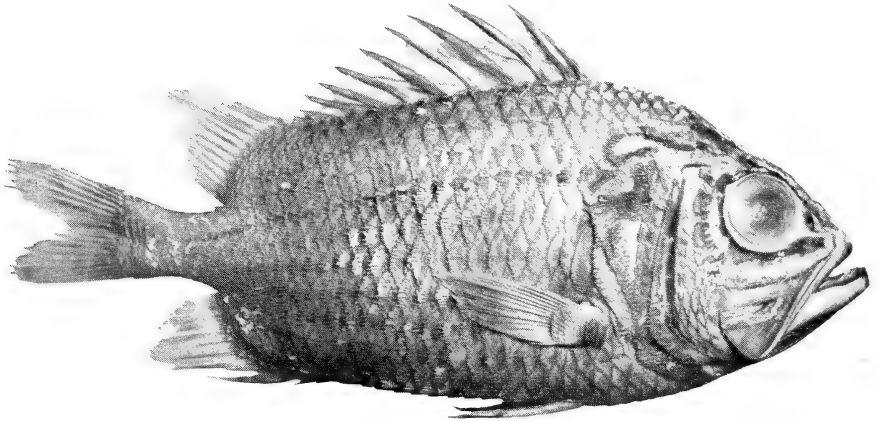


Figure 5. *Holotrachys*.

NOTES ON THE DIAMOND SNAKE AND CARPET SNAKE (*MORELIA ARGUS* AND *MORELIA ARGUS VARIEGATA*)

By R. MACKAY

Cadet Preparator, Australian Museum.

The Diamond Snake is often called the Carpet Snake and *vice versa*. The name Diamond Snake was first given to the New South Wales yellow-spotted, dark green snake which often shows its yellow spots in small clumps shaped like a diamond. The Carpet Snake is patterned and coloured entirely differently and grows considerably longer. Quite often snakes are found with a coloration intermediate between that of the Diamond and Carpet Snakes. These are usually found where the ranges of the two varieties overlap.

All of the Diamond Snakes I have captured have been found on the ground, and most of those captured by other collectors were caught in the same position. They will not hesitate to climb a tree if they are pursued, but they chiefly like to hide in rabbit burrows or in rat-holes under large boulders. They are sometimes found in hollow logs and in hollow trees where they are hard to get out. The Carpet Snake is more arboreal and is found more in the trees than on the ground. It takes refuge in rabbit burrows also, but prefers a hollow log or hollow tree-trunk. Both these snakes have elliptical eyes, showing that they should be nocturnal, but the Diamond Snake is as much a day prowler as a night prowler. The Carpet Snake is found mostly at night, but an occasional snake is found in the day sunning itself or hunting for food.

The diet of both snakes is composed of any warm-blooded animal, such as birds, rats, mice, rabbits and small possums. Being pythons, these snakes have no fangs and kill their prey by suffocation. The snake first seizes the animal with its mouth and almost simultaneously puts a few coils around it and squeezes, contracting its muscles until the animal cannot breathe. Bones are seldom broken, as it is not the aim of the snake to crush its prey to a pulp.

The authentic record size for the Diamond Snake is 9 feet 6 inches. This snake was killed at Moss Vale, New South Wales. The largest Carpet Snake is somewhere near 12 feet.

Both the Carpet and Diamond Snakes are oviparous, laying up to 35 almost spherical eggs, which are brought together into a bundle and kept warm by the snake, which coils around them.

The Diamond Snake is found in the coastal districts of New South Wales from the north coast to the Victorian border and a little beyond. The Carpet Snake is found from north-east Queensland, southward to the north-east highlands of New South Wales. It ranges westward to the Northern Territory, thence south to western Victoria and South Australia, then across to southern Western Australia.



The Diamond Snake.

Photo.—Margaret Lovett.

GIANT FRESHWATER TURTLE FROM PAPUA

By LAWRENCE JONES

Early this year (1949) I captured in a muddy backwater of the Laloki River, inland from Port Moresby, a large specimen of the rare Papuan turtle *Pelochelys cantorii*. I was fortunate in being able to capture this turtle alive and unharmed, and in being able to keep him under observation for some months in an earth tank near my home.

The genus is not represented in Australia and Papua is the most southerly point to which it has migrated from its northern range. It is many times larger than the largest of our Australian freshwater turtles, and as the accompanying photograph shows, is considerably different in appearance. The first and most striking feature of the turtle is its size and weight. My captive was almost exactly three feet long and two feet wide, and, it is estimated, weighed somewhere between 55 and 60 pounds. Unlike the freshwater turtles in Australia, whose skeleton is covered with epidermal shields, the bony structure of *Pelochelys* is enclosed in a leathery skin. The carapace is surrounded by a wide flange of tough flesh, and the massive head terminates in a short, soft snout. The front



Head, showing pointed snout, and forequarters of Papuan turtle.

and back limbs are powerful, the feet are strongly webbed and equipped with broad claws—in fact the animal is perfectly suited for its life in the soft mud of quiet pools. Despite its rather inoffensive appearance, however, *P. cantorii* is possessed of amazing strength and ferocity. An ample demonstration of its power was given when I recaptured it after it made an attempt to escape from its enclosure. In order to stop its flight I dropped knees first onto its back, took a grip on the undersurface of the carapace, and dug my booted toes into the ground. He carried my 224 pounds for 12 yards before he slowed down sufficiently to be turned over and cautiously worked into a copra sack. His powers were again demonstrated when I fed him for the first time. As soon as his meal, a half-pound river fish, dangling from a piece of thread, came within striking distance, he emitted a harsh hissing sound, his jaws gaped, his

long neck shot out like a striking snake, and the fish was snapped clean in two. The force and power behind this action has to be seen to be appreciated. It is certain that such a bite could remove a large part of a man's hand with ease.

Unlike the turtles of the family Chelydidae, which protect their heads wholly or partially by bending their long necks sideways under the margin of the carapace, the Trionychidae, which lack a projecting carapace, attain protection by withdrawing their necks straight back into thick folds of skin. The head is not totally concealed, as the illustration shows, but the vulnerable soft neck is protected and the head is in a favourable position to strike.

Little is known about the habits and life history of this turtle, but from my own observations and from information supplied by natives of the Papuan river tribes, the following facts have been collected.

Most records concerning the distribution of *P. cantorii* in Papua referred to specimens from the Western Division, and evidence of its occurrence in the Central Division is based on only two or three specimens. As far as is known, it has never been recorded from any point further east than Port Moresby. That the reptile is rare is attested by the fact that many men of the Laloki River tribes know of its existence but had never seen one.

Its main food seems to consist of crustaceans, fish and smaller turtles. Apart from man, its chief, and perhaps only, enemies are the two species of crocodiles which share its backwater haunts.

Eggs are deposited in a shallow excavation on dry land, usually gravel banks, not far from the water's edge. The exact number is not known, but many are said to be deposited at the one time. The eggs are apparently similar in size and appearance to those of *Chelonia mydas*. One old village man claimed that eggs were deposited by individual females in the same spot every year, but this seems extremely unlikely, as every wet season brings some change in the contour and disposition of the banks and gravel deposits of the river.

Unfortunately *Pelochelys* was killed in a fire which destroyed my home. However, the entire skeleton was saved and is being prepared for study.

CAUTION URGED IN OUTDOOR USE OF INSECTICIDES TO PREVENT WIDESPREAD ANIMAL MORTALITY

Result of Audubon Society Survey

Far too little attention has been paid to repeated warnings by the U.S. Fish and Wildlife Service and the Department of Agriculture on the danger of employing certain new insecticides in heavy concentrations in outdoor areas. With the expanding use of such poisons, increasingly serious damage can be expected unless great care is taken in dusting and spraying. These new insecticides include DDT, DDD, TEPP and chlorinated camphene.

These toxic agents in heavy applications not only kill birds and fish, but lead to heavy destruction of bees and other insects valued by farmers and fruit-growers. Land fertility may also be affected. With the spring spraying season at hand the problem is urgent. It concerns human welfare as well as wild life.

Surveys and experiments conducted by the U.S. Fish and Wildlife Service have demonstrated how and in what concentrations DDT may safely be used. Other organics have not yet been fully tested. Some of them are more deadly than DDT to warm-blooded animals. Wild life mortality has been cited by scores of observers after checking the results of local insecticide spraying and dusting. Such evidence confirms the hazards of drenching outdoor areas with the new insecticides.

Fifty Per Cent. Bird Mortality from Insecticide

Among specific examples of destruction of wild life was a reduction of 50% or more in the bird population in six days in a test plot in Texas, dusted with 4.36 pounds of DDT to the acre. A reduction of 65% took place in six days among common bird species in a Maryland woodland tract, following aerial treatment with a similar amount. Quail fed on diets containing low percentages of various new insecticides did not begin to succumb until the eighth day. Deaths continued among them up to the thirty-fourth day of the experiment.

Heavy kills of fish and crabs occurred after aerial applications where as little as half a pound of DDT to the acre of water was employed, the poison being fatal to aquatic life in much lower concentrations than to land animals.

Where lighter woodland applications of DDT than 2 pounds per acre have been used, little or no animal mortality has apparently resulted. Even in such cases, however, the destruction of all types of insects by this toxic agent has occasionally been followed by aphid or mite outbreaks resulting from loss of natural control by other insects.

A great deal more research is clearly needed to establish the value and limitations of organic insecticides and their safe employment out of doors. There is no question but that certain crops have benefited by the proper use of these poisons, but every precaution should be taken in their application at this early stage of their development.

Slow Action Fatal to Birds

The peril of the new insecticides to birds lies in the fact that these organic poisons act slowly. Some of them have residual, cumulative effects. Birds usually devour only living insects, but poisoned and poison-laden insects which have not yet succumbed can provide a fatal diet

for adult birds and their young. A nest brought to the Audubon Society's offices contained four dead nestling robins, surrounded by dead carrion beetles which had in turn been poisoned.

Adult birds may fly many miles from a sprayed area before they are seized by the convulsions which precede death from DDT. It should be also borne in mind that insectivorous birds avoid or abandon any territory in which insect life has been practically exterminated. This explains the disappearance of birds from many areas subjected to repeated heavy spraying. Practically all our land birds are insectivorous in the nesting season.

The opinions of many qualified officials who have generously co-operated in our survey emphasize that rigorous measures should be taken by farmers, municipal authorities, golf-course officials and other private property owners to avoid damage from using excessive amounts of these poisons. The experience of the U.S. Fish and Wildlife Service in treating many types of land should serve as a dependable guide to safe, effective concentration for various purposes. Most important of its findings is the conclusion that such poisons should be used only when and where they are needed, and in the minimum necessary to control the specific insect target.

Concentrations for Use over Land and Water

With regard to DDT, the U.S. Fish and Wildlife Service recommends the use of less than one-fifth of a pound per acre over water or marsh, in oil solution, not in dust, to avoid kills of fish, crabs and crayfish. Less than two pounds of DDT per acre should be used even in forest areas, to prevent death or injury to birds, frogs and mammals. On turf and lawns heavily infested by Japanese beetles, effective larva control can only be carried out by concentrations as high as 20 or 25 pounds of actual DDT per acre. This can be expected to take a moderate to severe toll of bird life.

DDT should be applied in early spring for early insects and not again until after the bird-nesting period, to control late-appearing insects. The extreme sensitivity of fish and crabs to this poison makes its direct application inadvisable on streams, lakes and coastal bays where injury would be inflicted on commercial or sport fishing, and on ducks, shore birds and other species which feed on aquatic animals.

The National Audubon Society would welcome specific reports of insecticide experience from entomologists and other qualified individuals or organizations. Such observers should carefully determine the concentrations and amounts employed, as well as the specific mortality or reduction in bird or other animal population that may result in a given area.

JOHN H. BAKER,
President.

National Audubon Society,
1000 Fifth Avenue, New York.
April, 1949.

SEVENTY YEARS AGO

"The Zoological Society of New South Wales has now almost completed its first year of existence, and from the committee's report, to be presented at the annual meeting on the 23rd instant, it would appear that the Society has a fair prospect of progressing to a position of both usefulness and importance. It now numbers 377 members, 33 of whom are life members. The balance sheet shows that the sum of £1002 6s. had been placed to the credit of the Society; and £563 3s. 4d. had been paid for birds, and in other expenses. We make the following extracts from the report: During the year the following birds have been received and distributed: Common pheasants, Californian quail, skylarks, goldfinches, yellow hammers, blackbirds, starlings, brown linnets, bulfinches, Chinese quail, bul-buls, and two Chinese horned owls. The first consignments of these birds were distributed in small lots to individual members; but as it was believed that more good would arise from sending out larger numbers together, skylarks and starlings were forwarded to the Mayors of Bathurst, Goulburn, Parramatta, West Maitland and Penrith, to be turned out in the neighbourhood of those towns. The skylarks and Californian quail are believed to be doing well everywhere, large bevvies of young birds having been seen in several different places; and, no doubt, the common pheasant can be successfully acclimatised, if a little care be taken in raising a stock in suitable places. Goldfinches and starlings also do very well; but the blackbirds are difficult to rear and do not appear to take to the country as well as the other birds. Arrangements are in progress for procuring a large number of Californian quail and skylarks from New Zealand during the next four months, as there is a large demand for both; and the committee believe the former to be better suited to the colony than any other description of game that can be imported. They are, besides, very strong, and good travellers, fewer deaths occurring among them than among any other birds that have been imported. An experiment was made in the winter with 5000 ova of the brown trout from Tasmania, at a cost of about £45; but owing to a very heavy flood, the hatching was only partly successful. Mr. A. Brown of Coerwull, however, reports that some of the parcel he took charge of came out all right, and the young fry are now swimming about as healthy as possible. Mr. J. Stuart of Marrickville, has visited the neighbourhood of Bowenfels within the last few weeks, and speaks confidently of a great measure of success in that direction; and the honorary secretary of the Society is certain that the rivers in the Bega district are splendidly adapted for both brown trout and salmon. The committee report having received permission from the Mayor and Aldermen of Sydney to erect buildings for the use of the Society in the Billy Goat Swamp enclosure in Moore Park, but as yet nothing has been done. A depot being, however, urgently required, it is suggested to the incoming committee to place aviaries and a cottage on this portion of land without delay."

—*Town and Country Journal*, Sydney, xxi, March 13, 1880, p. 493.

LIST OF MEMBERS

The Council of the Society has decided not to issue the usual annual list this year. Members will oblige by notifying the Honorary Secretary of any changes of address in the list published in the *Proceedings* for 1946-47.

BOOK REVIEWS

"The Fairy Wrens of Australia." By Neville W. Cayley, F.R.Z.S. Published by Angus and Robertson Ltd., 1949; obtainable at all booksellers. Price 15s.

"The Fairy Wrens of Australia", written and illustrated by the well-known artist and ornithologist Neville W. Cayley, is a popular account of this colourful group of birds. A special feature of the publication is the beautiful colour plates, the male and female of each of the thirteen species of Fairy Wrens and of the three Emu Wrens being illustrated. A background of flowers from the areas frequented by the birds gives an added touch of colour to the plates. Distribution maps in colour and carrying a miniature drawing of each bird in its particular habitat are a valuable feature. A concise and adequate account of the history and habits of the various species is given and the various subspecies briefly described. Photographs of many of the birds and their nests are also featured.

In the check-list of the Royal Australasian Ornithologists' Union *Malurus assimilis* was given specific rank, but in the present book it is shown as a subspecies of *M. (Leggeornis) lamberti*. In this I am in full agreement, as I have had considerable experience with both races. Their habits and song are very much alike and the slight colour differences do not warrant full specific rank.

The area inhabited by the Blue Fairy Wren (*Malurus cyaneus*) should be extended further westward. I found it not uncommon along the Barwon River at Collarenebri, where it overlaps the territory of the Black-backed species (*Malurus melanotus*). In the distribution map these two species are shown separated by an appreciable tract of country. The introduction states that no area contains more than three species of Fairy Wrens, but the Collarenebri district is favoured by four. In addition to the two above mentioned are also found the White-winged Wren, *M. (Hallornis) leuconotus*, and the Purple-backed Wren, *M. (Leggeornis) lamberti assimilis*.

NORMAN CHAFFER.

List of Birds Occurring in North Queensland (prepared with the assistance of Major H. M. Whittell). North Queensland Naturalists' Club Publication No. 5, Cairns, March, 1949. Price 2s.

The present publication is the fifth of its series, the previous ones covering in turn the orchids, marketable fish, ferns, and edible plants of North Queensland. It is a list of the birds recorded in the Pastoral Districts of Cook, Burke, North Kennedy, and that portion of Mitchell north of the twenty-second parallel, and has been compiled from both published works and the field observations of Naturalists' Club members.

It is noted that three species of swiftlets are included: *Collocalia francica*, *C. esculenta* and *C. vanikorensis*; also the swallows *Hirundo neoxena*, *H. rustica*, and *H. javanica*. A couple of these are only provisionally on the Australian list on the basis of single specimens, and if the present work has a fault it is in not drawing attention to this.

This publication should give an impetus to bird study in North Queensland—the outstanding impression with which it leaves the reader is how little is actually known of most of the species named. The North Queensland Naturalists' Club is to be commended on its enterprise in publishing the work.

J. A. KEAST.

"Field Guide to the Hawks of Australia." By H. T. Condon, Ornithologist, South Australian Museum. Published by The Bird Observers' Club of Victoria, 1949. Price 2s. 6d.

This 16-page booklet contains large black and white flight sketches of 24 Australian hawks, all excepting one of which are under-wing patterns.

The deficiencies of the popular bird books with respect to hawk identification are well known. Condon's work, which is to be "regarded as supplementary" to Leach and Cayley, has as its object "to supply information on distinguishing marks and impressions rather than feather by feather descriptions which are useful to the collector". Nevertheless a short description accompanies each plate, included in which is the length, wing-span, habit, type of flight, call, and distribution of the species. A short section discusses alternative names and another the points to be kept in mind when making identifications.

Mr. Condon's work may not prove to be the complete answer to the problem of the identification of hawks, for they are a notoriously variable group (*e.g.* Brown Hawk) and no two observers regard the same characters as the most important. Some sketches immediately strike one as being typical; others do not seem to be quite the bird concerned. It must be realized that this is not the fault of the author, who is one of the very few Australians qualified to present such a work. But our knowledge will develop at a much faster rate if workers using the book write to Mr. Condon, giving their observations and views.

No field worker can afford to be without this guide, which is an outstanding contribution to Australian field ornithology.

J. A. KEAST.

"The Journal of a Disappointed Man." By W. N. P. Barbellion. Penguin Books 674, 1948.

The reprinting of this masterpiece by "Barbellion"—the *nom de plume* of Bruce Frederick Cummings (1880-1919), the ill-fated British Museum entomologist—in the "Penguin" series is welcome, as everyone is now in a position to secure it. The Journal originally published by Chatto and Windus is reproduced, the only apparent difference being minor alterations in footnotes and the correction of a French particle from *Un* to *Une*. The Introduction by H. G. Wells in the original is replaced in the "Penguin" edition by a Memoir on the Life and Character of Barbellion by A. J. Cummings, and there is a portrait of the author on the back cover.

"A Pictorial Guide to South African Fishes, Marine and Freshwater."

By K. H. Barnard. Maskew Miller Ltd., Cape Town, 1947. Pp. xvii + 226, pls. i-xxv. Retail price in Sydney 28s.

As claimed, this is a handy pictorial guide to South African fishes, many of which are similar to Australian ones. The text gives essential data in remarkably simple terms concerning the important South African species, and 400 or so of the thousand odd species are well shown in the small line figures. A map or two might have been included, and there is no formal arrangement of orders and families, unrelated forms at times following one another with curious irrelevancy. On page x we read that "Australians are distinctly nationalistic, maintaining that their fishes are different from anyone else's fishes and deserve to have their own special names". Maybe Dr. Barnard is right, and maybe the Australians are right too. His book will certainly be a boon to local importers who have difficulty with the Dutch names of fishes sent here from South Africa. On p. 198 the origin of the fish name Jacopever is supposed to be from Jacob Evertson, a fisherman with red face and large eyes, but Van der Hoeven, nearly a century ago, stated the Jacob Evertsen was so-called because of the pimply and spotty countenance of

that Admiral. South African ichthyologists all seem to have overlooked the Cape species in H. Lichtenstein's *Verzeichniss der Doubletten zool. Mus. Berlin*, published in 1823. It is pleasant to note that the spread of introduced Carp is prohibited, and it will be interesting to see whether the introduction of the American Black Bass may not, in time, prove to be a pest.

"Fishing on the Barrier Reef." By George Coates. [1950.] T. Willmet & Sons, Townsville, Queensland. Price 4s. plus postage.

An excellent booklet, beautifully illustrated by its author, and concerned mainly with first-hand observations on North Queensland fishes and fishing grounds. The species are not dealt with in any particular order and the following appear to be new records for Queensland: Trigger Fish, *Balistapus rectangularis* [= *Rhinecanthus echarpe*] and Broadbill Swordfish [*Xiphias estera*].

"Nomenclator Zoologicus", Vol. v. By S. A. Neave, 1950. Zoological Society of London. Pp. 1-308. Price 3½ guineas stg.

This volume lists references to more than 18,000 generic names of animals published between 1936 and 1945 inclusive. A fund has been created which it is hoped will, if sufficiently supported, provide enough to publish a further volume of this invaluable work every ten years. Such arduous compilation commands our admiration and thanks, and deserves support. The names of animals are so numerous now that such a key to them as this is imperative, yet, carefully as it has been compiled, it would be possible to add a few hundred more names overlooked in this and earlier volumes.

NEW FISH NAMES.

In a review of Neave's earlier volume (*Austr. Nat.*, x, 1940, p. 241) I proposed some new names for preoccupied ones. Here are a few more propounded according to the same method, but many more cases of preoccupation have been set aside for future study.

Deuterophysa Rendahl, 1933, and *Diplophysa* Kessler, 1874 = *Didymophysa*, gen. nov. (Cobitidae).

Dimichthys Kaup, 1872 = *Marubecula*, nov. (Triglidae). Genotype, *Prionotus horrens* Richardson.

Diplurus Newberry, 1878 = *Holophagoides*, nov. (Undinidae).

Dollfusina Chabanaud, 1933 = *Dollfusetta*, nov. (Bothidae).

Eomyrus Eastman, Mem. Soc. geol. Paris, xiii, 1905, p. 15, ex Agassiz, MS., preocc. = *Eomyrophis*, nov. (Echelidae).

Eucalia Jordan, 1876 = *Culaca*, nov. (Gasterosteidae).

Euryaspis Bryant, 1932 = *Euryaspidichthys*, nov. (Acanthaspida).

Eurystethus Sauvage, 1877 = *Eurystichthys*, nov. (Leptolepidae).

Glyphodes Guichenot, 1862 = *Guichenotia*, nov. (Girellidae).

Glyptognathus Woodward, 1891 = *Pennagnathus*, nov. (Osteolepidae).

Heterotilapia Regan, 1920 = *Reganotilapia*, nov. (Cichlidae).

Labeo Bowdich, 1825 = *Labeova*, nov. (Sparidae).

Lesucuria Duncker, 1928 = *Lesucurigobius*, nov. (Gobiidae).

Rhynchognathus Jaekel, 1929 = *Ringinia*, nov. (Arthrodira).

Scaldia Le Hon, 1871, and *Thaumas* Münster, 1842 = *Scaldiraja*, nov. (Squatinae).

Scripphia Ayres, 1857 and 1860, not *Scripha* Walker, 1854 = *Kroseriphus*, nov. (Sciaenidae).

Stappersia Boulenger, 1914 = *Stappersetta*, nov. (Cichlidae).

Stelgis Jordan and Starks, 1896 = *Ganoideus*, nov. (Agonidae).

Syletor Jordan, 1918 = *Syletophis*, nov. (Ophichthyidae).

G. P. WHITLEY.

ROYAL ZOOLOGICAL SOCIETY OF NEW SOUTH WALES

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APPLICATION FOR MEMBERSHIP

should be addressed to the Honorary Secretary, Box 2399, G.P.O., Sydney, accompanied by a remittance of the amount of subscription.

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"A Monograph of the Australian Loricates (Chitons)", by Tom Iredale and A. F. Basset Hull. 168+xiii pp., 21 plates and portrait. Price, 5s. Postage: Australia, 5½d.; British Empire, 9½d.; Foreign, 1s. 6½d.

"Bibliography of Australian Entomology, 1775-1930", by Anthony Musgrave, F.E.S. 380+vii pp. Price, 10s. Postage: Australia, 6½d.; British Possessions, 9½d.; Foreign, 1s. 6½d.

"The Bees of Australia", by Professor T. D. A. Cockerell. Reprints, six parts, 5s., post free.

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