https://doi.org/10.26749/rstpp.107.145

Papers and Proceedings of the Royal Society of Tasmania, Volume 107

NATURAL HISTORY OF CURTIS ISLAND, BASS STRAIT

3. ENTOMOLOGY

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ABSTRACT

The insects collected on Curtis Island during a survey in February 1971 are enumerated and discussed. Representatives of 16 orders are identified to family. Notes on the relative abundance and habitats of these groups are provided, and the ecological characteristics of the fauna briefly discussed.

INTRODUCTION

This paper is a general account of the insects collected on Curtis Island from 9th to 14th February, 1971. Little information has been published on the entomology of the Bass Strait Islands, and many groups of insects have not been adequately collected on them or on adjacent areas of Tasmania or Victoria. It is, therefore, difficult to evaluate the affinities of the insects of any one island, and only a limited synthesis is possible from collections made solely during one part of the year, as no account can be taken of phenological and other differences influencing the spectrum of insects captured.

Two features are particularly important in determining the insect fauna of Curtis Island. Firstly, there is no permanent fresh water on the island, although some seepage channels are present which run into brackish rockpools that flood with seawater only at very high tides. These are confined to a small length of the northern coast, and most of the remaining coastline is precipitous. There are thus no permanent breeding areas for most groups of insects with aquatic larvae. Secondly, the range of vascular vegetation is limited. Lichens are numerous and diverse, but only about 30 species of higher plants occur on the island (Kirkpatrick *et al.* 1973). About half of these are common. At the lower elevations these are predominantly succulents (mainly *Carpobrotus rossii* (Haw.) Schwantes and *Disphyma blackii* R.J. Chinnock, with smaller amounts of *Salicornia quinqueflora* Bunge ex Ung. Sternb.). Two species of tussock-forming grasses (*Poa poiformis* (Labill.) Druce and *Stipa teretifolia* Steud.) are abundant, the former at most elevations and the latter forming a low elevation coastal fringe. Several other species (*Senecio lautus* G. Forst ex Willd. s.l., *Helichrysum bracteatum* (Vent.) Andrews, *Solanum vescum* F. Muell.) are widely distributed, but the only common arboreal plant on the island, *Melaleuca armillaris* Sm., was found mainly at higher altitudes. Some of these trees, which reached only 5-6 m in height, showed evidence of recent burning, many were dead, and others appeared senescent. The narrow vegetation spectrum greatly limits the range of phytophagous insects which could breed on the island.

Collections of insects were made by beating and sweeping the different kinds of vegetation, by shaking out tussocks over a sheet, by individual collecting from flowers (*Helichrysum, Solanum*) and from under bark. Specimens were also collected under stones, in the brackish pools, and casually by other members of the expedition. No detailed survey was undertaken of the soil fauna or of the inhabitants of mutton bird or penguin burrows, but is believed that a representative collection of the insects present in the other habitats was made. Altogether some 2000 specimens representing 16 orders were collected. Most larger specimens were dried after capture, but smaller specimens were preserved in alcohol. The insects found, segregated

by family, are listed in Table 1, together with the numbers of species found in each of the main habitats studied. With the exception of the Psocoptera (New 1971), identification beyond the family level has not yet been undertaken, except in a few cases.

SYSTEMATIC ACCOUNT

Archaeognatha. A single specimen of a Meinertellid, *Allomachilis froggatti* Silv. was found in a *Stipa* tussock at an elevation of about 50 m. This is a widely-distributed coastal species in southern Australia, but another species, *Machiloides hickmani* Wom. is known from beach tussocks in Tasmania (Watson, 1970).

Collembola. Collembola were common on the island, but few species were found, and as no detailed soil or litter investigation was undertaken, more species are probably on the island. Those found were present in three situations:- a) A small sminthurid was fairly common when sweeping grass and other low vegetation and was found on all parts of the island from which samples were taken. b) Teasing out tussocks yielded the same sminthurid (in numbers of 1-20/tussock) and also an isotomid (usually common - up to 150 specimens/tussock counted) and an entomobryid (rarely, one or two in many tussocks). c) A second, larger entomobryid was found in small numbers under bark of dead *Melaleuca*. None were found on the bark surface or on living branches.

Odonata. No Odonata breed on Curtis Island, but two species were found commonly during the survey. A small coenagrionid, *Ischnura heterosticta* (Burm.) was found on the sheltered low north-east coastal region, and a large strong-flying aeschnid was frequently seen on all parts of the island. It is likely that both these species were migrating and, although only small distances are involved in crossing the Bass Strait, Curtis and other islands may act as 'stepping stones' on a regular migratory route. Strong winds occurred shortly before this survey, and it is likely that these aided the passage of *Ischnura* and other weak-flying insects.

Blattodea. Both species found (*Cosmozosteira* sp., and a blatellid) were apparently confined to low rocky areas of the island, where they were found under stones. The apterous species of *Cosmozosteira* and allied genera are often found in arid situations. Only nymphs of the blatellid were found, especially in and around the camp site.

Dermaptera. A labidurid, represented mainly by late instar nymphs, was fairly common in tussocks, and was also beaten from dead *Melaleuca*.

Orthoptera. Representatives of three widely distributed families were found on the lower parts of the island.

Mole crickets, *Gryllotalpa* sp., were found burrowing in a mutton-bird rookery, and the three specimens collected were all adult. A widely distributed south east Australian cricket *Teleogryllus commodus* (Walker) was also collected. Two species of Acrididae were swept from grass and observed basking on rocks. All Orthoptera were scarce: few individual grasshoppers were seen, and only one cricket.

Phasmatodea. Three individuals of a small phasmatid were collected in *Poa* tussocks at about 100 m, and one was found crawling on *Solanum*.

Psocoptera. The nine species found are discussed by New (1971).

Hemiptera. Representatives of this large order were surprisingly scarce, but individuals were found on all types of vegetation examined. Homoptera were particularly rare. A few nymphal and adult specimens of Delphacidae and Cicadellidae (one species each of Ulopinae and Cephalenini) were found in tussocks, and a single membracid and a few small psyllids on *Melaleuca*. The single aphid found, a winged *Aphis craccivora* Koch, has a very wide host range, and is commonly found in the aerial plankton over south-eastern Australia (Hughes *et al.*, 1964).

The two species of Miridae (representing Mirinae and Deraeocorinae) were fairly common on grass (about one specimen per 40 x 1 m sweeps), and a lygaeid occurred in the bases of tussocks. These, and the other Heteroptera found, were predominantly adult. The commoner reduviid, an emesine, was found on many kinds of low vegetation, and the two Pentatomidae were taken singly on *Helichrysum* and *Solanum*.

Thysanoptera. Three species of Phlaeothripidae were found in very small numbers, one on grasses and herbs, one under *Melaleuca* bark, and one under stones.

Neuroptera. The single specimen found, in a tussock, was an adult *Micromus tasmaniae* (Walker), a species common in many parts of Australia (Riek 1970).

Coleoptera. All specimens collected were adults, and no larvae were seen during the survey. Although only 18 species were collected, these included representatives of 12 families, and many widely distributed groups of Coleoptera appear to be scarce or absent from the Island. Thus, no Carabidae were collected, and Staphylinidae were surprisingly scarce other than one tachyporine which was common in tussocks. A single silphid, *Ptomaphila lachrymosa* Schreib., is widely distributed in south east Australia and may be a dung or carrion feeder. A large scarabaeid was frequently found around mutton bird rookeries and is almost certainly a dung feeder.

Two species of wood-boring Cerambycidae were captured at light, including three specimens of the large *Eurynassa australis* Boisd.. The only possible habitat for these on the island is old *Melaleuca*, but no traces of cerambycid boring were found. The other groups of wood-boring beetles found, Lyctidae and Scolytidae, were beaten from *Melaleuca* and old tussocks: slight traces of small galleries were found on dead *Melaleuca*. Other beetles found were in tussocks or (Chrysomelidae) on flowers. A single coccinellid, *Coccinella repanda*, was captured on *Helichrysum*.

Siphonaptera. A single pulicid was captured in the act of biting. It is likely that both mutton bird and penguin burrows harbour a variety of flea species.

Diptera. Many species of flies were found in only small numbers but others, including a biting tabanid and species of *Musca* and *Fannia* (Muscidae), were common. Stratiomyidae (*Odontomyia* sp.) and Syrphidae (a single *Syrphus* sp.) were fairly common on flowers, and two species of Tephritidae were found respectively on *Helichrysum* and *Solanum*. Bombyliidae were captured on flowers and basking on rocks, but most other flies were caught by sweeping. No large Nematocera were seen, and many of the species caught were widely distributed on different kinds of vegetation. Some, however, were found predominantly in grass tussocks, and these included several grass-frequenting forms such as Chloropidae (*Meromyza* sp.). Several Tachinidae were captured but some other parasitic families, such as Pipunculidae, appear to be absent.

Larvae of a species of culicine mosquito were abundant in some of the brackish pools polluted by penguin faeces, but adults were only rarely seen.

Lepidoptera. Representatives of this order were scarce and formed a combination of migratory species which could not breed on the island, and residents. Six butterflies were found, of which two (*Danaus chrysippus*, *Pieris rapae*) are known migrants, two of probable casual origin (*Heteronympha merope*, *Delias* sp.) and the other two (Lycaenidae) likely residents. Papilionaceae and other common lycaenid food-plants are absent, and the larvae may be tended by ants.

The moths were mainly small, although a single large Hepialid was captured at rest on *Melaleuca* and several Noctuidae were attracted to light. Crambinae were fairly common on grasses, but several other small moths appeared to be more closely associated with succulents (possibly feeding on exudates). Others, including larvae of Geometridae and adults of a micropterygid (*Sabatinca* sp.) were found in dry grass tussocks.

Hymenoptera. Most of the Hymenoptera captured are parasites: no Symphyta were seen, and Aculeata were scarce. A few individuals of a sphecid were captured on *Helichrysum* flowers, but even ants were not conspicuously common. Ichneumonoidea, Proctotrupoidea and especially Chalcidoidea, were more numerous. Several large Cryptinae and Pimplinae were taken in flight and Ophioninae in flight and at light. Many Proctotrupoidea (especially Diapriidae) were taken by sweeping low vegetation, and others were confined to grass tussocks. These included several species of Scelionidae: Baeinae with apterous females, and which probably parasitised eggs of the numerous small spiders often found in the tussocks. Other egg parasites, such as *Trichogramma* and Telenominae, were found in small numbers. Single species of several Chalcidoid families were found to be common.

TABLE 1

NUMBERS OF SPECIES OF FAMILIES OF INSECTS COLLECTED IN

MAIN HABITATS ON CURTIS ISLAND, FEBRUARY 1971.

Order:Family	No. species found in Tussocks	Succulents	Other herbs	*Melaleuca*	Others	Total species
Archaeognatha:						
Meinertellidae	1	-	-	-	-	1
Collembola:						
Sminthuridae	1	1	1	-	1	1
Isotomidae	1	-	1	1	1	1
Entomobryidae	1	-	-	1	-	2
Odonata:						
Coenagriidae	-	-	-	-	1	1
Aeshnidae	-	-	-	-	1	1
Blattodea:						
Blattidae	1	-	-	-	1	1
Blatellidae	-	-	-	-	1	1
Dermaptera:						
Labiduridae	1	-	-	1	-	1
Orthoptera:						
Gryllotalpidae	-	-	1	-	1	1
Gryllidae	-	-	1	-	-	1
Acrididae	-	-	1	-	1	2
Phasmatodea:						
Phasmatidae	1	-	1	-	-	1
Psocoptera:						
Liposcelidae	-	-	-	1	-	1
Trogiidae	1	-	-	1	-	2
Caeciliidae	-	-	-	1	-	1
Peripsocidae	-	-	-	1	-	1
Elipsocidae	1	-	-	1	-	2
Psocidae	-	-	-	2	-	2
Hemiptera:						
Aphidae	-	-	1	-	-	1
Psyllidae	-	-	-	2	-	2
Delphacidae	1	1	3	-	-	3
Membracidae	-	-	-	1	-	1
Cicadellidae	2	-	2	-	-	2
Reduviidae	1	1	2	1	1	2
Miridae	2	1	2	-	-	2
Lygaeidae	1	-	-	-	1	1
Pentatomidae	-	-	2	-	-	2
Thysanoptera:						
Phlaeothripidae	1	-	2	1	2	3

Order:Family	No. species found in Tussocks	Succulents	Other herbs	*Melaleuca*	Others	Total species
Neuroptera:						
Hemerobiidae	1	-	-	-	-	1
Coleoptera:						
Silphidae	-	-	-	-	1	1
Staphylinidae	2	-	1	-	1	3
Scarabaeidae	-	-	1	-	1	1
Lyctidae	1	-	-	1	-	1
Coccinellidae	-	-	-	-	1	1
Tenebrionidae	-	-	-	-	1	1
Melandryidae	-	-	1	-	-	1
Anthicidae	-	-	1	-	-	1
Cerambycidae	-	-	-	-	2	2
Chrysomelidae	-	-	1	-	1	1
Curculionidae	1	1	1	2	-	2
Scolytidae	-	-	-	-	1	1
Siphonaptera:						
Pulicidae	-	-	-	-	1	1
Diptera:						
Tanyderidae	-	-	1	-	1	1
Psychodidae	-	-	-	-	1	1
Culicidae	-	-	-	-	1	1
Chironomidae	-	-	1	-	2	2
Simuliidae	-	-	1	-	-	1
Cecidiomyiidae	1	-	1	-	-	1
Mycetophilidae	1	-	1	-	-	2
Tabanidae	-	-	-	-	1	1
Stratiomyidae	-	-	1	-	1	2
Asilidae	-	1	1	1	-	1
Bombyliidae	-	-	1	-	1	1
Dolichopodidae	1	-	-	-	-	1
Syrphidae	-	-	1	-	1	1
Tephritidae	-	-	2	-	2	2
Coelopidae	1	-	-	-	-	1
Lonchaeidae	1	-	-	-	-	1
Chloropidae	2	1	2	-	1	3
Anthomyiidae	-	-	1	-	1	-
Muscidae	1	1	2	-	2	4
Calliphoridae	-	-	1	-	2	2
Tachinidae	-	1	-	1	2	3
Lepidoptera:						
Micropterygidae	1	1	-	-	-	1
Hepialidae	-	-	-	1	-	1
Nepticulidae	-	1	-	-	-	1
Gracillariidae	-	1	-	-	-	1
Oecophoridae	1	-	-	-	-	1
Pyralidae	1	2	-	-	-	3
Pieridae	-	-	-	-	2	2
Danaidae	-	-	-	-	1	1
Satyridae	-	-	1	-	-	1
Lycaenidae	-	1	2	-	-	2
Geometridae	-	-	-	1	2	2
Noctuidae	1	-	-	-	3	3
Hymenoptera:						
Ichneumonidae	4	2	-	1	2	6
Braconidae	2	1	-	1	-	4
Scelionidae	3	-	-	1	-	3
Trichogrammatidae	1	-	-	-	-	1

Order: Family	No. species found in Tussocks	Succulents	Other herbs	*Melaleuca*	Others	Total species
Diapriidae	2	1	1	-	-	2
Eulophidae	-	1	-	-	-	1
Chalcididae	1	-	-	1	-	2
Eurytomidae	-	1	-	-	-	1
Pteromalidae	1	-	-	-	-	1
Encyrtidae	1	-	-	-	-	1
Bethylidae	-	-	-	-	1	1
Sphecidae	-	-	-	-	1	1
Formicidae	2	-	1	1	2	3

DISCUSSION

The above notes are sufficient to indicate that Curtis Island has a considerable range of insect species but, because of the greatly decreased diversity of habitats when compared with adjacent mainland areas, the fauna is correspondingly impoverished. In particular, the absence of eucalypts and scarcity of acacias, to which many mainland species are linked by either feeding or shelter requirements, markedly influences the number of species found. Several orders which are found in adjacent areas of Victoria are absent from the island, and these also can be associated with the lack of suitable habitats. It is likely that some groups besides those collected during this survey may be present on Curtis Island. These include parasitic forms such as Strepsiptera and inconspicuous or dormant stages of such groups as Coccoidea.

Many families of insects appear to be less diverse in Tasmania than in Victoria. This is undoubtedly due in part to insufficient collecting, but it is of interest that this trend is to some extent reflected in the Curtis fauna. The single hemerobiid found is of the only species of this family found in Tasmania, and the absence of Carabidae may reflect the paucity of some groups of the family in Tasmania.

A number of the stronger-flying species found, such as Odonata and the larger butterflies, may regularly migrate across the Bass Strait, and be present purely casually on Curtis Island. It is likely that many other insects, such as aphids, are dispersed passively across the Bass Strait by wind, and the possible establishment of many of these in fresh areas is largely dependent on the presence of a suitable food plant. The low diversity of plant species on Curtis Island may tend to stabilise the number of phytophagous insect species.

Grass tussocks, prevalent in wind-swept areas, provide shelter for many insects which are present casually, and tend to act as concentration points for predators (Pearce 1948; Luff 1966a, 1966b). Many of the smaller species of Curtis were found only in tussocks, and some of the Diptera and parasitic Hymenoptera may not be established on the island. Others appear to form part of a regular association - the spider - parasitising Baeinae, for instance, which were not found elsewhere. Similarly the psocid, *Propsocus pulchripennis* (Perkins) is normally associated with tussocks (Edwards 1950; New 1971). *Stipa* and *Poa* tussocks have a similar structure, and were sampled indiscriminately at approximately 30 m height intervals to about 250 m above sea level. The numbers and diversity of insects collected in them showed little relationship to altitude. Most species for which more than a few individuals were found were present in tussocks at all heights sampled, and the total numbers of species found at each height ranged only from 28 to 39, with the standard deviations of numbers of species in 25 tussocks at each height showing an almost total overlap. Total numbers of insects beaten from tussocks appeared to depend to some extent on the degree of exposure of the tussock (more sheltered tussocks having more individuals and probably representing a more permanent population, and exposed tussocks having fewer individuals and slightly more species), but no consistent differences were found.

The *Melaleuca* harboured several phytophagous species likely to be host-specific, such as the Psyllidae, but these were found in only low numbers. The most abundant insects beaten from *Melaleuca* were Psocoptera and parasitic Hymenoptera. The sub-cortical fauna was not well-developed but included insects feeding on the plant (Collembola, Coleoptera) and others present casually. Most of the herbaceous plants had few insect species closely associated with them; none were found definitely feeding on the succulents, for example, and those insects found on them were mostly sheltering under the plants. This habitat appeared to be permanently wet, and many Diptera and Coleoptera were present. Similarly, no larvae were found feeding on *Solanum* or *Helichrysum:* most insects found on these were flower-visitors or predators.

The highly developed lichen flora growing on *Melaleuca* and on rock surfaces appears to have few insects associated with it. With the exception of a few specimens of the psocid *Cerobasis guestfalica* (Kolbe) which occasionally feeds on lichens, no lichen-ophilous insects were found on the island, and mites were also scarce. No great concentrations of decaying organic matter, other than bird faeces, were found, and the capture of a coelopid, a family of flies normally associated with large amounts of decaying seaweed, was surprising. It is likely that a number of the beetles captured (Silphidae, Scarabaeidae) are dependent on the dung of the Cape Barren Geese for breeding, as no mammals inhabit the island.

The insects found during this short survey are sufficient to show that Curtis Island supports a wide range of species. It is likely that more and different species would be in evidence at other times of the year but perhaps unlikely that other non-parasitic orders will be found to breed on the island. Populations of hosts for some of the parasitic groups (for example of Homoptera for Strepsiptera and Pipunculidae) are themselves small, and such parasites would be expected to be rare. However, it is likely that collecting at other times of the year will considerably extend the number of Diptera, Coleoptera, Lepidoptera and Hymenoptera recorded, and more detailed examination of litter add several Collembola. The peculiarities and limitations of the Curtis Island insect fauna would be demonstrated by detailed comparative collecting on the nearby island, Rodondo, which supports *Eucalyptus* aff. *globulus* Labill. on its upper slopes and is the probable source of many of the insects casually present on Curtis.

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