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INSECTS OF CAMPBELL ISLAND. ECOLOGY[1]

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Abstract: The ecology of the Campbell Island land arthropod fauna is fairly simple, but not thoroughly understood. The majority of species are scavengers, with relatively small numbers of herbivores and predators and very few parasites of insects.

With the various obstacles and limitations during the period of field study (1961–63), it was not possible to gather a great deal of ecological information. For instance, Gressitt and Wise each spent only about 5 weeks on the island and were principally involved in the general survey of the land arthropod fauna. Gressitt also attempted to carry on an extensive dispersal experiment, and Wise went partly to advance his study of the Collembola and to fill gaps while consulting with Rennell on aspects of the general survey which had not been adequately pursued. Rennell, during his entire 18 months on the island, was occupied with a full-time assignment at the weather station, and did all the entomological work in his spare time. Also, as a rule the weather is inhospitable for field observations, with strong wind and mist predominating.

Because of the limited fauna, many of the ecological situations are rather simple. There is a general scarcity of predators and parasites of insects (see Table 1). There is a high proportion of insects and other arthropods which is associated with sea birds and their rookeries. Some of these are direct parasites of the birds, but many are scavengers. Then there are insects associated with the wallowing places of the elephant seals. Some flies breed in excrement left on land by the various seals. Much of the remainder of the fauna is associated with tussock grass, mosses and other mat and cushion plants, and to a lesser extent with the dominant *Bulbinella rossi* (*Chrysobactron*) lilies and the *Dracophyllum* scrub (see Arthropod environments, p. 20). Apparently because the fauna is so limited and therefore natural enemies and competitors so few in number, the range of habits of many of the species appears to be much wider than would be the case with a larger fauna. Thus ecologic niches are less restricted than usual.

The climate of Campbell I. (see p. 34 and next article) is such that insects may be active much of the year. Although temperatures are rarely high, they are also rarely very low. Thus adult insects of quite a few species may be found in mid winter. Rennell caught adults of a number of species in winter, and trapped 367 specimens of 9 species in the air nets during the winter months of June, July and August. However, the 1962 winter was unusually warm. In spite of the mild climate with adults of some groups found in winter, some species appear to be quite seasonal. Some have only been found in early or

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late summer, but others have only been seen in early spring (or late fall).

Predators: Some of the 10 or so introduced birds (all or most of the land birds) undoubtedly feed to a considerable extent on insects. These would particularly include *Turdus philomelos*, *T. merula*, *Anthus novaeseelandiae*, *Zosterops lateralis* and *Sturnus vulgaris* (see Vertebrate fauna, p. 31). However, some of these maintain low populations, and none of them are extremely abundant. Thus they probably do not play a very great role in keeping down arthropod populations, and probably have little selective evolutionary influence on the insect fauna. Sorensen (in Salmon 1956) made the statement that the only bird that might have preyed on the small brachypterous jumping moths was the pipit (*Anthus*), and that he did not feel that the pipit was ever abundant enough to have exerted any influence on the evolution of the moths. Sorensen (1951) felt that the pipit was not recently introduced. It is extremely rare (Bailey & Sorensen 1962). Sorensen never observed any of the introduced birds feeding on insects, nor did we.

Some of the sea birds feed on insects occasionally. On sunny days Gressitt observed the red-billed gulls catching a common syrphid-fly, probably *Syrphus flavofasciens* Miller, and sometimes blow flies (*Calliphora* spp.), in the sheltered area between the high peat bank and the hostel door, at Beeman. The gulls would run a few steps forward and catch the flies in their beaks as the flies hovered in the sunshine protected from the wind. Probably this gull, the black-backed gull and the skua feed occasionally on the large populations of the maggots and adults of the coelopid flies, particularly the larger flightless species (*Baeopterus*, fig. 2d, and *Icaridion*) which are massed in the rotting *Durvillea* kelp washed up on beaches. However, this was not observed.

The introduced Norway rat may be the most important predator of insects currently on the island. The rat is extremely abundant and ranges over the ground in the tussock in particular, and this is one of the richest general arthropod environments. Rennell found numerous remains of the largest weevil, *Oclandius cinereus* Bl., in clusters under tussock near the entrances to rat nests.

Predaceous arthropods are rather few in number. Some of the prostigmatic (trombidiform) mites are undoubtedly predaceous on certain minute or immature insects. The spiders may be the most important group. Some of the species are quite abundant and are frequently seen under rocks or cushion plants, or among dense tussock growth (fig. 1a).

Among the true insects there are no predaceous bugs. There are only a few flies which may be predaceous, such as the syrphids (fig. 1d) and empids. The former may feed in part on the mealy-bugs. Among the beetles the three species of carabids, the 12 staphylinids, the pselaphid, the orthopterid and the single coccinellid may be the only predators. The salpingid (fig. 3a) might be predaceous. Most of them undoubtedly feed upon larvae of flies and beetles in the protected environments such as under rocks and cushion plants and in rookeries and rotting *Durvillea* kelp. Great numbers of staphylinids were found in the rotting kelp where coelopid fly larvae were abundant. The coccinellid beetle very likely feeds on the native mealy-bugs, and perhaps also on the introduced aphids.

No predaceous wasps occur on the island. Therefore, the spiders and others appear to have rather few enemies except the carabids, staphylinids, symphylids, centipede and pseudoscorpions, which might eat their young. The Campbell phalangids might be predators or scavengers, or both. Several of the Campbell spiders have well-protected silken capsules forming the egg-cases, so the eggs are well-protected.

Parasites of arthropods: As with predators, there are very few insects parasitic upon insects of Campbell. Probably the arthropods which reached Campbell by oversea dispersal came without their parasites. It is unlikely that a parasitized individual could reach the island and become established, with all the severe obstacles. Only 10 species of Hymenoptera were found on the island. However, the only more southern Hymenoptera fauna known (other than in southernmost S. America) is that on Macquarie I., which consists of 1 or 2 species. No spider egg-parasites were detected, although some might occur. Most of the Campbell Hymenoptera probably parasitize Lepidoptera and Diptera. However, the wingless ichneumonid *Gelis campbellensis* Townes may parasitize the mealy-bugs. The common diapriid (*Antarctopria latigaster* Brues) and the cynipid (*Kleidotoma subantarcticana* Yoshimoto) definitely parasitize the coelopid kelp fly larvae. They are easily reared from the coelopid puparia collected from under rotten *Durvillea* kelp. Rennell wrote (27. XII. 1962):

"Wasps [cynipid]. I found at Shoal Point a species of small short-winged wasp. I think it cannot fly because I did not see one fly while catching 35 specimens with tweezers. I found that if I failed to catch them with the first attempt then they seemed to let go of their hold and usually managed to fall to a lower level in the kelp. I cannot see exactly how they are able to move from one patch of kelp to another.....

"The wingless wasps [diapriid] from among fly puparia on the beach I have also found under quite large stones. I found four specimens under one rock. These are adults which are running around when the rock is turned over. Where these wasps are there are also numbers of fly puparia. Of all the puparia which I have collected I have not hatched one fly, but I am getting wasps over a period of several weeks, which indicates I think that the time spent in the puparium is longer than the fly (more than a month).....This year has been unusually warm. The other day the highest temperature ever recorded, 19°C was recorded. This may, I feel, affect the numbers of *Bulbinella* weevils....."

Possibly the eulophid (*Ardalus campbellensis* Kerrich & Yoshimoto) also parasitizes coelopid larvae, or it may have been an additional species of minute wasp which emerged from a coelopid puparium and was later lost. Other species of *Ardalus* are known to parasitize tortricid moths. Probably the flightless encyrtid, *Antipodencyrtus procellosus* Kerrich, parasitizes some of the mealy-bugs. This leaves only the one or two braconids *Rogas gressitti* Muesebeck and the questionable *Apanteles* sp., the two winged ichneumonids, *Campoplex disjunctus* Townes and *Diadegma agens* Townes, and perhaps the *Ardalus*, to parasitize the 29 species of moths. In spite of attempts to rear several kinds caterpillars, including both free-living species and leaf-miners, few rearings of moths, and none of their parasites, were successful. The *Apanteles* was taken only in trap nets.

Parasites of vertebrates: These include the ticks, certain mites, the Phthiraptera and the Siphonaptera. They are associated primarily with the sea birds. The ticks are found around nests in rookeries and feed primarily on the birds when on the nests. Some of the laelaptine mites, the feather mites and other mites spend much of their time on the bodies or feathers of the birds. Of the Phthiraptera, the Mallophaga spend all their lives among feathers of birds, and the Anoplura are associated with rats, sheep and seals. The fleas are associated with albatrosses, some other birds, and rats. A host-parasite list follows below.

Herbivores: This group presumably includes all the moths, about 1/3 of the beetles, a

Table 1. Summary of food habit type and abundance, by orders

	No. Spp.	Scavenging	Parasitic	Phytophagous	Predaceous
Amphipoda	6	C*			
Isopoda	21	B			
Araneida	16				B-C
Opiliones	2	?			A, B
Pseudoscorpionida	2				A
Mesostigmata	23	A-C	B	?	
Metastigmata	2		B-C		
Cryptostigmata	24+	B, C			
Astigmata	2	B	B		
Prostigmata	20	?		?	A-C
Chilopoda	1				A
Diplopoda	2	A			
Symphyla	2				B
Collembola	46	B, C			
Plecoptera	3	A-C			
Orthoptera	1			A	
Mallophaga	23		B		
Anoplura	3		B		
Psocoptera	3	B			
Thysanoptera	1			A	
Homoptera	11			B-C	
Trichoptera	1	B			
Lepidoptera	29			B-C	
Diptera	81	A-C	B	B	C
Siphonaptera	3		B-C		
Coleoptera	43	A-C		A-C	B-C
Hymenoptera	10		A-C		
No. of species	381	197	46	67	65

* Relative abundance: A-rare; B-intermediate; C-abundant.

very few of the flies, the single orthopteran, the single thrips, the aphids and the mealybugs. Thus about 67 species are probably involved. The orthopteran is a nocturnal feeder, possibly on lichens on *Dracophyllum*. The thrips may feed on introduced plants, the aphids probably feed largely on introduced plants. Some were found on *Cotula plumosa*. The mealy-bugs feed on bases of stems, and roots, of tussock grass. The brachypterous moths probably feed largely on tussock grass, sedges, mat plants and lichens. *Euproteodes* (fig. 1f) is probably a leaf-miner in sedge. *Tinearupa sorenseni* Salm. & Brad. (fig. 1 g–i) probably feeds on lichens on rock surfaces in the upper splash zone. Larvae of some of the geometrids (fig. 1 b, c) apparently feed on *Dracophyllum*.

The byrrhid *Liochoria sorenseni* Brks. may feed on roots of mat plants. The tenebrionid *Pseudhelops tuberculatus posticalis* Brn. (fig. 2 f, g) is found in the same environment.

Two of the weevils, *Oclandius cinereus* Blanch. (fig. 3 d–f) and *Gromilus veneris setarius* (Brn.) (fig. 3 b, c), feed on leaves of *Bulbinella rossi* as adults and larvae of the former feed on the roots. Feeding marks of the two species are shown in fig. 4. Rennell states (19. X. 1962)

"The small weevil eats only the edge of the leaf and is usually in the remains of leaves around the *Bulbinella* shoots, but at Monument Harbor, Six-foot Lake area..... every plant has been chewed and I found about 10 specimens in one tussock. The large weevil found around the NW slopes of Mt. Dumas has a different form of feeding on *Bulbinella*. The feeding marks are deeper and occasionally a hole is eaten through in the center of the

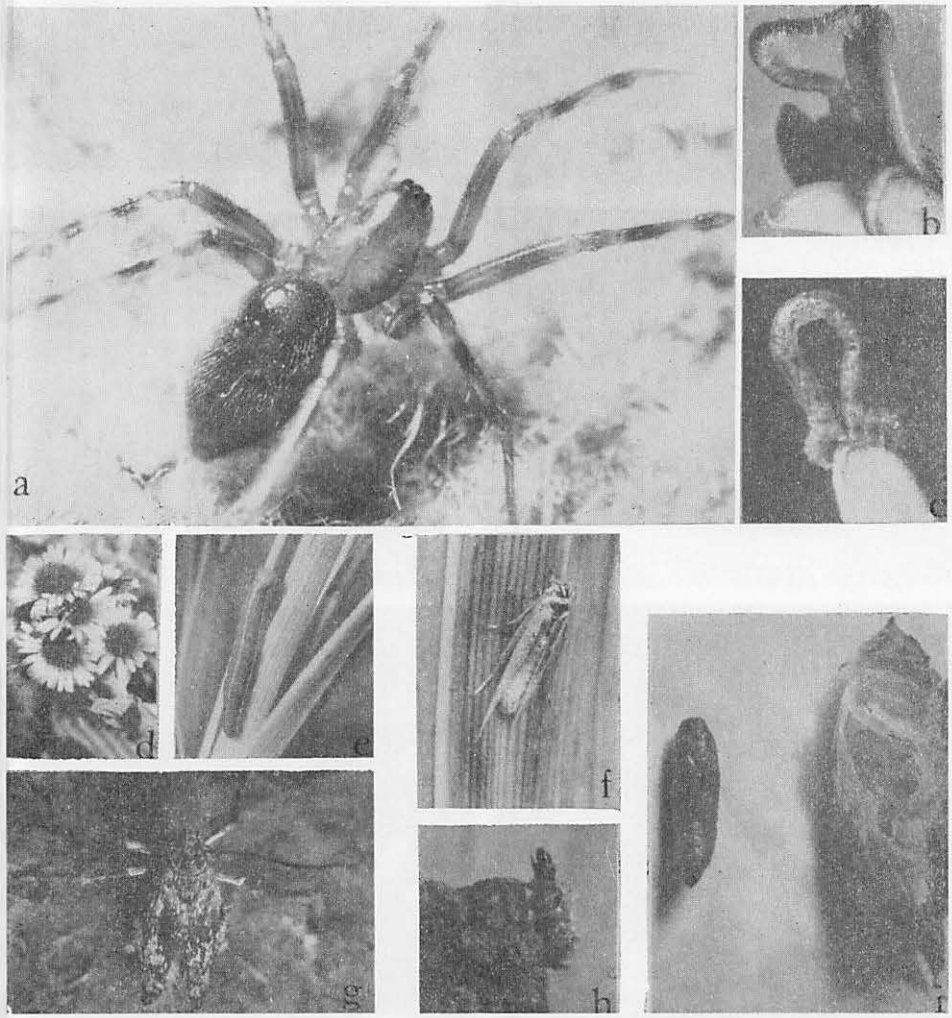

Fig. 1. a, *Mynoglenes marrineri* Hogg, Beeman Hill; b, lepidopterous (geometrid) larva on *Coprosma*, St. Col Ridge; c, same; d, syrphid flies, *Helophilus campbellicus* Hutt., center, and *Syrphus novaezealandiae* Macq., right, on flowers of *Pleurophyllum speciosum* Hook. f.; e, lepidopterous larva on *Dracophyllum scoparium*, Beeman Pt.; f, brachypterous moth (?*Euproteodes*) on sedge, Tucker Cove; g, brachypterous moth, *Tinearupa sorenseni* Salm & Brad., on rock surface in upper splash zone, Monument Hrbr.; h, larva of same, in case on rock; i, chrysalis and cocoon, probably of same, Courrejolles Pen. (mostly by Rennell, partly by Gressitt, XII. 1961; d by Dr. E. J. Godley).

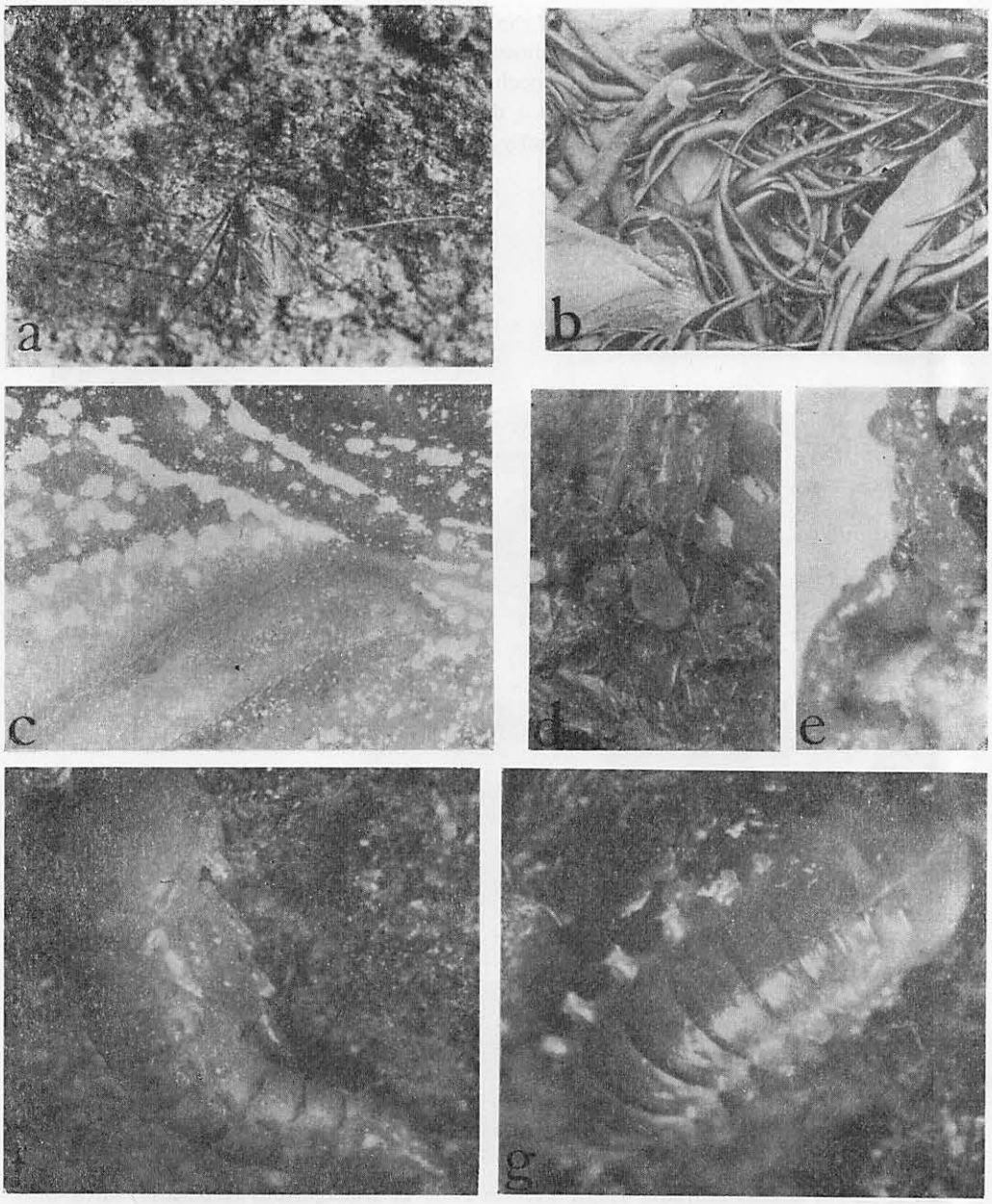

Fig. 2. a, crane-fly *Limonia* (*D.*) *kronei* (Mik) under overhanging boulder in upper splash zone, Rocky Bay; b, *Durvillea* kelp on upper rocky beach, Rocky Bay, with masses of eggs of coelopid flies in lower left; c, close-up of same egg masses; d, adult ♀ coelopid, *Baeopterus robustus* Lamb, same environment; e, adult staphylinid beetle, same environment; f, pupa, probably of tenebrionid beetle *Pseudhelops tuberculatus posticalis* Broun, under moss; St. Col Ridge; g, dorsal view of same (Gressitt and Rennell, XII. 1961).

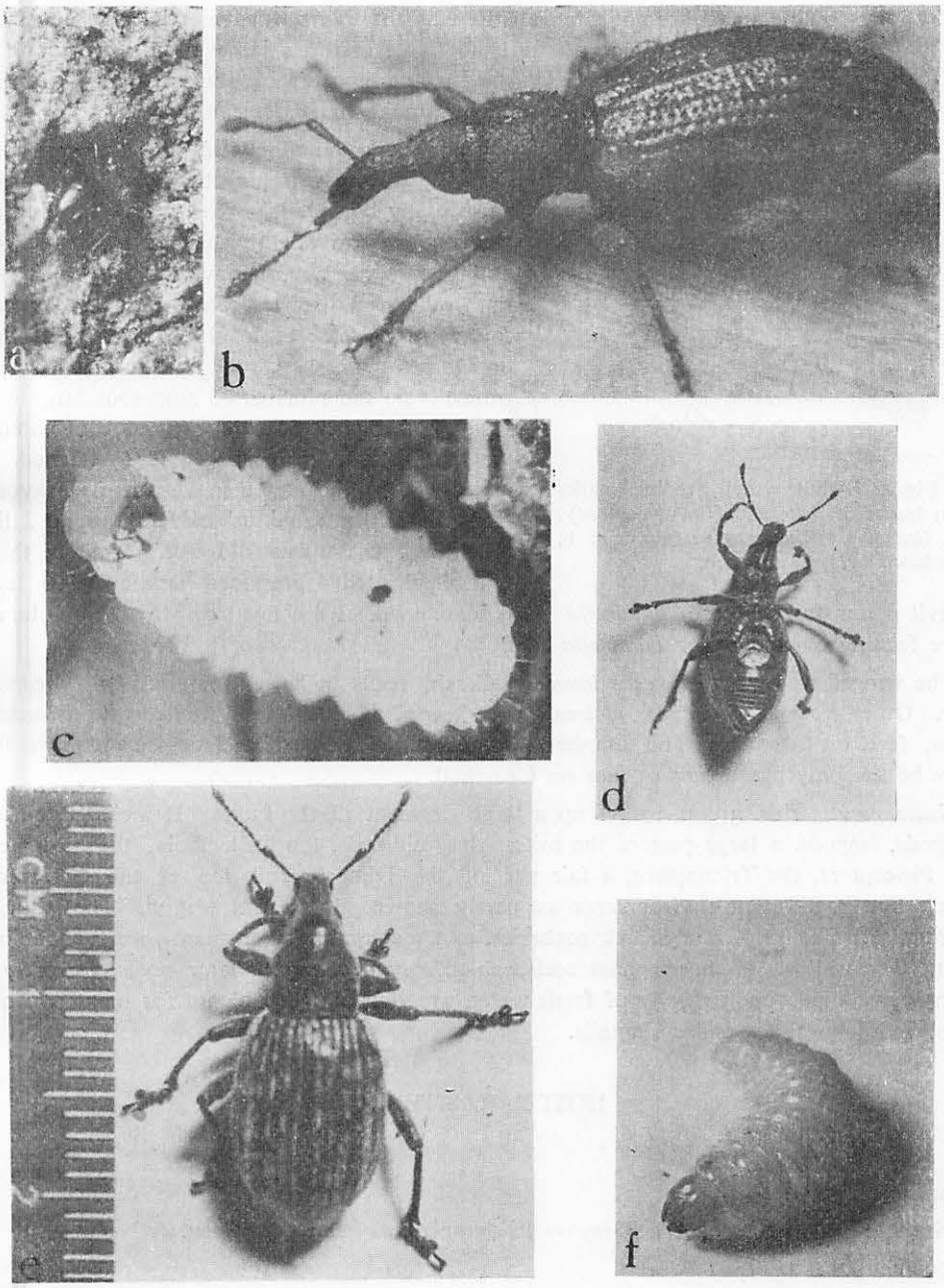

Fig. 3. a, salpingid beetle *Antarcticodomus fallai* Brookes in cavity on underside of rock in inter-tidal zone, Tucker Cove; b, weevil *Gromilus veneris setarius* (Broun), under moss on rocks, St. Col Ridge; c, larva, probably of same; d, *Oclandius cinereus* Blanch., underside; e, same, dorsal view, from *Bulbinella*, Shoal Pt.; f, larva, probably of same, from among adjacent roots of *Bulbinella* and *Poa*, Shoal Pt. (photos by Rennell and Gressitt).

leaf. Some feeding marks are not eaten all the way through the leaves (fig. 4). The feeding is done from the undersurface of the leaf. Most of these large weevils are found in the surrounding tussock, but occasionally one is found among the *Bulbinella* debris.

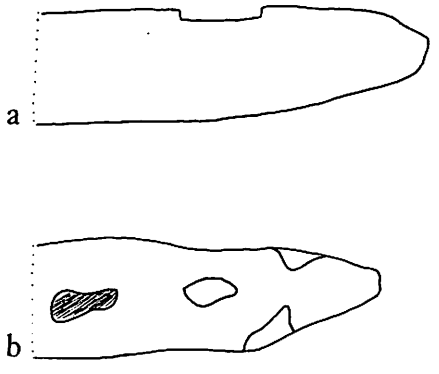

Fig. 4. Adult weevil feeding marks on leaves of *Bulbinella* (*Chrysobactron*): a, *Gromilus veneris setarius* (Broun); b, *Oclandius cinereus* Blanch.

"The marks on the *Bulbinella* leaves are most obvious, and by searching the weevil responsible can usually be found. Some weevils from near Courrejolles are slightly blacker than the NW Dumas specimens, but I have found some blacker than others on Dumas. The different colors are found in the same bush. I also found a rat hole on Dumas under a tussock and around the entrance were the remains of numerous large weevils. Probably 20–30 wing covers and about 5 or 6 foreparts with parts of legs attached. It appeared that the abdomen was the most favored portion. In the same tussock I still found 2 live specimens, so the rats did not get all of them. I also collected 4 presumed larvae of the large weevil under tussock and *Bulbinella* roots combined. I am not sure whether the larvae were feeding on tussock or *Bulbinella* roots."

The winged weevil, *Peristoreus innocens* Kirsch, feeds in flowers or seeds of *Dracophyllum*. Other weevils, *Notacalles piciventris*, *N. kronei*, *N. suillus* and *Pactolotypus subantarcticus*, feed on *Coprosma*, and another *Notacalles* on *Hebe*. The 3 or 4 cecidomyid flies may be the only phytophagous flies on Campbell.

Scavengers: This group makes up a large segment of the fauna. It includes the amphipods, isopods, a large part of the mites, the millipeds, the Collembola, the Plecoptera, the Psocoptera, the Trichoptera, a fair part of the Diptera, and 1/3 of the Coleoptera. These live in different environments as partly shown in the next section. The strata of rotting *Durvillea* kelp, mollymawk rookeries, and mat and cushion plants, are very important. The wallows of the elephant seals, which may be small or large pools, generally of rich soupy mud, andgenerally of fresh water, are rich breeding places for many kinds of flies, and some mites and springtails.

HOST-PARASITE LIST

MAMMALIA

Otariidae

Neophoca [Otaria] hookeri (Gray)—*Antarctophthirus microchir* (Trou. & Neum.)

Phocidae

Mirounga leonina (L).—*Lepidophthirus macrorhini* End.

Muridae

Rattus norvegicus (Berk.)—*Polyplax spinulosa* (Burm.); *Nosopsyllus* (*N.*) *fasciatus* (Bosc)

Bovidae

Ovis aries L.—*Damalinia ovis* (Schr.); *Melophagus ovinus* L.

AVES

Spheniscidae

Eudyptes c. crestatus Mill.—*Ixodes uriae* Wh.; *Austrogonoides cristati* Kel.

Eudyptes pachyrhynchus sclateri Bull.—*Austrogonoides concii* (Kél.)

Diomedeidae

Diomedea ex. exulans L.—*Docophoroides* sp.

Diomedea ep. epomophora Less.—*Ixodes uriae* Wh.; *Austromenopon affine* (Piag.); *Harrisoniella hopkinsi* Eichler; *Perineus* sp.; *Docophoroides brevis* (Duf.); *Nosopsyllus* (*N.*) *fasciatus* (Bosc)

Diomedea melanophris impavida (Math.)—*Perineus diomedeae* (J. C. Fabr.); *Parapsyllus longicornis* (End.)

Diomedea chrysostoma Forst.—*Ixodes uriae* Wh.; *Perineus* spp. (2); *Parapsyllus longicornis* (End.)

Phoebetria palpebrata (Forst.)—*Ixodes uriae* Wh.; *Perineus diomedeae* (J. C. Fabr.)

Procellariidae

Macronectes giganteus (Gmelin)—*Austromenopon ossifragae* Eichl.; *Perineus obscurus* (Rud.); *Docophoroides murphyi* (Kell.)

Pachyptila desolata alter (Math.)—*Ixodes pterodromae* Arth.; *Notiopsylla kerguelensis* (Tasch.)

Puffinus griseus (Gmel.)—*Ixodes pterodromae* Arth.; *Halipeurus* sp.; *Trabeculus hexacon* (Water.); *Notiopsylla kerguelensis* (Tasch.)

Hydrobatidae

Garrodia nereis (Gould)—*Notiopsylla kerguelensis* (Tasch.); *Philoceanus garrodiae* (Clay)

Pelecanoides urinatrix exsul Salvin—*Austromenopon elliotti* Timm.; *Pelmatocerandra setosa* (Gieb.); *Notiopsylla kerguelensis* (Tasch.)

Phalacrocoracidae

Phalacrocorax c. campbelli (Filhol)—*Pectinopygus* sp.

Stercorariidae

Stercorarius [Catharacta] skua lonnbergi Math.—*Harrisoniella grandis* (Piag.); *Saemundssonia stresemanni* Timm.

Laridae

Larus dominicanus Licht.—*Saemundssonia lari* (O. Fabr.); *Quadraceps fuscolaminulatus* (End.); *Notiopsylla kerguelensis* (Tasch.)

Larus novaehollandiae scopulinus Forst.—*Saemundssonia lari* (O. Fabr.); *Quadraceps lingulatus* (Water.)

Sterna vittata bethunei Bull.—*Saemundssonia* sp.

ARTHROPOD COMMUNITIES

The following represents an arbitrary classification of the principal communities and strata for arthropods on Campbell I. Some of the species listed for the various niches may not be truly associated therewith, but with the information available it is difficult to prove or disprove this. Many collection records believed to be accidental are not included. Nevertheless many species appear below under several categories.

Littoral-Supralittoral

Inter-tidal: *Orchestia bollonsi* Chilt.; *Oramia hoggi* Forst.; *Amaurobioides maritima* Cambr.; oribatid mites; *Bdellodes* (*H.*) *petila* Aty.; *Hanseniella campbellensis* Jub.-Jup.; *Papillomurus ochraceus* Salm.; *Parisotoma picea* Salm.; *Limonia* (*D.*) *kronei* (Mik); *Kenodactylus capito* Broun; *Baeostethus chiltoni* Brn.; *Pselaphotheseus hippolytae* Park; *Antarcticodomus fallai* Brookes.

High-water line: *Triacanthella alba* Carp.; *T. sorenseni* Salm.; *Subantarctica flava* Salm.; *Colonavis litoralis* Wise; *Sorensia subflava* Salm.; *Pseudokatianna triclavata* Salm.; *Leptocera* spp.; *Macrocanace australis* (Hutt.); *Hydrellia enderbii* (Hutt.); *Scatella* spp.; *Limnophora* spp.; *Arpediomimus kronei* (Kies.); *Nesomalium campbellensis* Steel; *Halmaeusa nesiotes* Steel; *Antarcticodomus fallai* Brks.; *Orchesia rennelli* Gr. & Sam.

Durvillea kelp: *Chiltonia minuta* Bous.; *Orchestia aucklandiae* Bate; *O. bollonsi* Chilt.; *Laestrygones albiceres* Urq.; *Amaurobioides maritima* Cambr.; *Triacanthella sorenseni* Salm.; *Hypogastrura armata* (Nic.); *Subantarctica flava* Salm.; *Colonavis litoralis* Wise; *Entomobrya nivalis* (L.); *Pseudokatianna triclavata* Salm.; all Coelopidae; *Macrocanace australis* (Hutt.); *Paralimnophora antipoda* Harr.; *P. depressa* Lamb; *Limnophora* spp.; *Omaliomimus venator* (Brn.); *Nesomalium campbellensis* Steel; *Halmaeusa sparsepunctata* Steel; *Antarctopria latigaster* Brues; *Kleidotoma subantarcticana* Yoshimoto.

Rocky upper splash zone: *Oramia hoggi* Forster; *Rhagidia mildredae* Str.; *Subantarctica flava* Salm.; *Parafolsomia litorea* Salm.; *P. decemoculata* Salm.; *Colonavis litoralis* Wise; *Tinearupa sorenseni* Salmon & Bradley; *Musotima nitidalis* (Walk.); *Limonia* (*D.*) *kronei* (Mik); *Empidadelpha stigmosa* Sm.; *Orchesia rennelli* Gr. & Sam.; *Antarcticodomus fallai* Brks.

Protected shores with Hebe & tussock: *Mynoglenes marrineri* Hogg; *Clynotis barresi* Hogg. *Hebe*: *Spilopsocus avius* Sm., *Notacalles planidorsis* (Kirsch).

Aquatic Communities

Streams: *Oxyethira albiceps* (McL.); Chironomidae; *Austrosimulium vexans* (Mik).

Under stones in streams: *Aucklandobius complementarius* End.; *Apteryoperla longicauda* Ill.; *Acanthomurus rivalis* Wise; *Tomocerura colonavia* Salm.; *Pseudokatianna triclavata* Salm.

Polluted stream (*chicken yard*): *Ayersacarus plumapilus* Hunt.; *Psychoda severini* Tonn.; *Atheta amicula* (Steph.).

Ponds (FW Pool near beach): *Allorchestes compressus* Dana; *Hypogastrura armata* (Nic.); *H. pseudopurpurascens* Wom.; *Lepidophorella australis* Carp.; *Lepidobrya violacea* Salm.; *Smittia* spp.

Elephant seal wallows: *Psychoda pulchrima* Satch.; *P. spatulata* Satch.; *Hydrellia ender-*

bii (Hutt.); *Helophilus antipodus* Sch.; *Coelopa debilis* Lamb; *Leptocera* spp.; *Macrocanace australis* (Hutt.); *Australimyza anisotomae* Harr.; *Limnophora* spp.

Under rocks near water: *Macrocanace australis* (Hutt.); *Selonomus linearis* Steel; *Gromilus insularis robustus* (Brks.).

TUSSOCK GRASSLAND

Tussock grass: *Parorchestia insularis* Chilt.; *Pounamua gressitti* Forst.; *Laestrygones albiceres* Urq.; *Icona alba* Forst.; *Mynoglenes marrineri* Hogg; *Clynotis barresi* Hogg; *Pantopsalis rennelli* Forst.; *Apatochernes antarcticus* Beier; *Stereotydeus undulatus* Str.; *S. nudisetatus* Str.; *Rhagidia mildredae* Str.; *Microtrombidium karriensis* Wom.; *Colonavis grandis* Salm.; *Lepidophorella australis* Carp.; *L. brachycephala* (Mon.); *Entomobrya nivalis* (L.); *Lepidiaphanus eudyptidus* Salm.; *Lepidobrya thalassarchia* Salm.; *L. violacea* Salm.; *Longkingia salmoni* Wise; *Aulacorthum solani* (Kalt.); *Myzus ascalonicus* Donc.; *Proterodesma byrsopola* Meyr.; *Sorensenata agilitata* Salm. & Brad.; *Exsilirarcha graminea* Salm. & Brad.; *Witlesia gressitti* Munr.; *Erioptera* (*T.*) *pilipes campbellicola* Alex.; *Psychoda pulchrima* Satch.; *P. campbellica* Q.; *P. eremita* Q.; *P. spatulata* Satch.; *Mycetophila campbellensis* Harr.; *Bradysia rubra* (Harr.); *Leptocera* spp.; *Hydrellia enderbii* (Hutt.); *Australimyza anisotomae* Harr.; *Coenosia filipennis* Lamb; *Limnophora* spp.; *Pseudoopterus marrineri* (Brn.); *P. tarsalis* (Brn.); *Acrotrichis subantarctica* Gr. & Sam.; *Paracatops campbellicus* (Brks.); Staphylinidae; *Veronicobius aucklandiae* (Kirsch); *Gelis campbellensis* Townes; *Antipodencyrtus procellosus* Kerr.; *Antarctopria latigaster campbellana* Yoshm.

Other grass: *Penthaleus major* Duges.

Sedges: *Euproteodes galathea* Vtte; *Campbellana attenuata* Salm. & Brad.; *Poecilohetaerella bilineata* (Hutt.); *Leptocera* spp.; *Hydrellia enderbii* (Hutt); *Australimyza anisotomae* Harr.; *Coenosia filipennis* Lamb; *Limnophora brunneinota* Harr.; (leaf mold): *Orchestia bollonsi* Chilt.

Bulbinella: *Parorchestia insularis* Chilt.; *Ayersacarus plumapilus* Hunt.; *Leptolaelaps reticulatus campbellensis* Hunt.; *Tullbergia subantarctica* Salm.; *Aulacorthum circumflexum* (Buck.); *Zygomyia similis* Tonn.; *Hydrellia enderbii* (Hutt.); *Australimyza anisotomae* Harr.; *Poecilohetaerella bilineata* (Hutt.); *Acropsilus borboroides* Oldr.; *Syrphus novaezealandiae* Macq.; *Halophilus campbellicus* Hutt.; *Calliphora viridiventris* Swed.; *Coenosia filipennis* Lamb; *Limnophora* spp.; *Melanophthalma globipennis* (Rttr); *Heterexis seticostatus* (Brks.); *Oclandius cinereus* Bl.

Tussock leafmold or roots: *Leptolaelaps reticulatus campbellensis* Hunt.; *Androlaelaps pachyptilae* (Z. & T.); *Symphylella essigi* Michelb.; *Tulbergia scalpellata* Salm.; *T. subantarctica* Salm.; *Hypogastrura armata* (Nic.); *Colonavis grandis* Salm.; *Parafolsomia litorea* Salm.; *P. decemoculata* Salm.; *Sorensia minuta* Salm.; *Papillomurus ochraceus* Salm.; *Parisotoma octooculata ovata* Salm.; *Lepidophorella nigra* Salm.; *Lepidobrya violacea* Salm.; *Nipaecoccus campbellensis* Beard.; *N. longispinus* Beard.; *Trionymus danthoniae* Morr.; *Limonia* (*D.*) *arthuriana* (Alex.); *Erioptera* (*T.*) *pilipes campbellicola* Alex.; *Corynoptera subantarctica* Steff.; *Selonomus linearis* Steel; *Allodrepa decipiens* Stl.; *Colle campbellensis* Stl.; *Acrotrichis subantarctica* Gr. & Sam.; *Melanophthalma globipennis* (Rttr.); *Holopsis nitidus* Endr.-Y.; *Veronicobius aucklandiae* (Kirsch); *Catadryobiolus antipodus* Brks.; *Antipodencyrtus procellosus* Kerr.; *Antarctopria latigaster campbellana* Yoshm.

Moss, Mat and Cushion Plants

Moss on rocks: *Gohia clarki* Forst.; *G. wenhami* (Forst.); *Hina delli* (Forst.); *Pholcomma hickmani* Forst.; *Clynotis barresi* Hogg; *Apatochernes antarcticus* Beier; *Systellochernes zonatus* Beier; *Leptolaelaps reticulatus campbellensis* Hunt.; *Eupodes longisetatus* Str.; *Stereotydeus undulatus* Str.; *S. nudisetatus* Str.; *S. pulcher* Str.; *Rhagidia mildredae* Str.; *Microtrombidium karriensis* Wom.; *Bdellodes* (*H.*) *multicia* Aty.; *Hanseniella campbellensis* Jub.-Jup.; *Xenylla novazealandia* Salm.; *Hypogastrura armata* (Nic.); *Parafolsomia litorea* Salm.; *P. decemoculata* Salm.; *Tomocerura colonavia* Salm.; *Parisotoma octooculata ovata* Salm.; *Sminthurinus discordipes* Salm.; *Nipaecoccus longispinus* Beard.; *Corynoptera subantarctica* Steff.; *Meropathus campbellensis* Brks.; *Selonomus linearis* Steel; *Halmaeusa nesiotes* Stl.; *Pseudhelops tuberculatus posticalis* Brn.; *Gromilus insularis robustus* (Brks.); *G. exiguus* (Brks.).

Moss on ground: *Ayersacarus plumapilus* Hunt.; *A. gressitti* Hunt.; *Globoppia gressitti* Wall.; *G. campbellensis* Wall.; *Oppia diaphora* Wall.; *O. beemanensis* Wall.; *O. disjuncta* Wall.; *Leptolaelaps reticulatus campbellensis* Hunt.; *Androlaelaps pachyptilae* (Z. & T.); *Eupodes longisetatus* Str.; *Stereotydeus pulcher* Str.; *Rhagidia mildredae* Str.; *Nanorchestes antarcticus* Str.; *Microtrombidium karriensis* Wom.; *Bdellodes* (*H.*) *multicia* Aty.; *B.* (*H.*) *gressitti* Aty.; *Tullbergia subantarctica* Salm.; *Colonavis grandis* Salm.; *Parafolsomia litorea* Salm.; *P. decemoculata* Salm.; *Sorensia subflava* Salm.; *Papillomurus ochraceus* Salm.; *Lepidophorella australis* Carp.; *Entomobrya nivalis* (L.); *Pseudhelops tuberculatus posticalis* Brn.

Mat-cushion plants: *Ayersacarus plumapilus* Hunt.; *A. gressitti* Hunt.; *Rhagidia mildredae* Str.; *Lorryia* sp.; *Nanorchestes antarcticus* Str.; *Tullbergia subantarctica* Salm.; *Nipaecoccus longispinus* Beard.; *Megaselia* (*M.*) *insulana* Brues; *Pseudoopterus marrineri* (Brn.); *P. tarsalis* (Brn.); *Selonomus linearis* Stl.; *Halmaeusa nesiotes* Stl.; *Colle campbellensis* Stl.; *Liochoria sorenseni* Brks.; *Orchesia rennelli* Gr. & Sam.; *Pseudhelops tuberculatus posticalis* Brn.; *?Notacalles* spp.; *Gromilus* spp.; *Heterexis seticostatus* (Brks.); *Gelis campbellensis* Townes.

Lichens: *Stereotydeus nudisetatus* Str.; *S. pulcher* Str.; *Rhagidia mildredae* Str.; *Bdellodes* (*H.*) *multicia* Aty.; *Xenylla novazealandia* Salm.; *Hypogastrura morbillata* (Salm.).

Lichens on rocks: *Brachycaudus helichrysi* (Kalt.).

Tillaea on rocks: *Parisotoma octooculata ovata* Salm.; *Pseudokatianna campbellensis* Salm.; *Brachycaudus helichrysi* (Kalt.); *Myzus ascalonicus* Donc.

Native Herbs

Pleurophyllum speciosum: *Parorchestia insularis* Chilt.; *Linyphia setosa* Forst.; *Oramia hoggi* Forst.; *Mynoglenes marrineri* Hogg.; *Pantopsalus rennelli* Forst.; *Papillomurus ochraceus* Salm.; *Parisotoma octooculata ovata* Salm.; *Lepidiaphanus eudyptidus* Salm.; *Lepidobrya thalassarchia* Salm.; *Jacksonia papillata* Theo.; *Myzus ascalonicus* Donc.; *Holoneurus aliculatus* Yuk. (leaf mold); *Gelis campbellensis* Townes.

Pleurophyllum criniferum: *Proisotoma octojuga* Salm.; *Lepidophorella australis* Carp.; *Lepidiaphanus eudyptidus* Salm.

Stilbocarpa polaris: *Microtrombidium karriensis* Wom.; *Lepidophorella communis* Salm.;

Myzus ascalonicus Donc.; *Rhopalosiphoninus staphyleae* (Koch); *Psychoda spatulata* Satch.; *Nesomalium imitator* Stl. (leaf mold); *Gromilus insularis robustus* (Brks.).

Anisotome: *Oramia hoggi* Forst.; *Mynoglenes marrineri* Hogg.; *Australimyza anisotomae* Harr.; *Limnophora* spp.; *Allodrepa decipiens* Stl.

Pittosporum: *Pactolotypus subantarcticus* Kohl.

Peat

Peat bank: *Oramia charybdis* (Hogg.); *Lepidophorella australis* Carp.; *L. nigra* Salm.

Coprosma-Myrsine Scrub

Coprosma: *Laestrygones albiceres* Urq.; *Icona alba* Forst.; *Longkingia salmoni* Wise; *Notoplectron campbellensis* Rich.; *Spilopsocus avius* Sms.; *Austropsocus insularis* Sms.; *Hydriomena similata* Walk.; *Notacalles piciventris* (Brn.); *N. kronei* (Kirsch); *N. suillus* Kschl.; *Pactolotypus subantarcticus* Kschl.

Myrsine: *Notacalles multisetosus* (Broun). *Myrsine leaf mold*: *Rhopalosiphoninus staphyleae* (Koch).

Dracophyllum Scrub

Dracophyllum: *Parorchestia insularis* Chilt.; *Pantopsalis rennelli* Forst.; *Entomobrya nivalis* (L.); *Lepidiaphanus eudyptidus* Salm.; *Longkingia salmoni* Wise; *Spilopsocus avius* Sms.; *Epiphryne charidema* (Meyr.) (on *D. longifolium* Forst.); *Australimyza anisotomae* Harr.; *Notacalles piciventris* (Brn.); *Peristoreus innocens* Kirsch; *Rogas gressitti* Mues.; *Campoplex disjunctus* Townes; *Ardalus campbellensis* Kerr. & Yoshm.

Drac. leaf mold: *Textricella wisei* Forst.; *Apatochernes antarcticus* Beier; *Ayersacarus gressitti* Hunt.; *Eupodes longisetatus* Str.; *Ereynetes* sp.; *Leptolaelaps reticulatus campbellensis* Hunt.; sphaerotrichopid; *Schedotrigona* sp.; *Tullbergia subantarctica* Salm.; *Lepidophorella australis* Carp.; *Lepidophorella communis* Salm.; *Aulacorthum circumflexum* (Buck.); *Myzus ascalonicus* Donc.; *Notiopsylla kerguelensis* (Tasch.); *Colle campbellensis* Steel.

Moss on Dracophyllum: *Systellochernes zonatus* Beier; *Stereotydeus pulcher* Str.; *Xenylla novazealandia* Salm.; *Sminthurinus discordipes* Salm.; *Notoplectron campbellensis* Rich.

Lichens on Dracophyllum: *Oramia charybdis* (Hogg.); *Hina delli* (Forst.); *Clynotis barresi* Hogg.; *Systellochernes zonatus* Beier; *Eupodes longisetatus* Str.; *Xenylla novazealandia* Salm.; *Hypogastrura obliqua* (Salm.); *Parafolsomia decemoculata* Salm.; *Papillomurus ochraceus* Salm.; *Parisotoma octooculata ovata* Salm.; *Lepidophorella communis* Salm.; *Lepidobrya violacea* Salm.; *Sminthurinus discordipes* Salm.; *Longkingia salmoni* Wise; *Notoplectron campbellensis* Rich.; *Aulacorthum solani* (Kalt.); *Capua plagiatana* Walk.; *Bradysia rubra* (Harr.).

Rocks on Hilltops

Sorensia subflava Salm.; *Tomocerura colonavia* Salm.; *Apteryoperla campbelli* Ill.; *Pseudoopterus marrineri* (Brn.); *P. tarsalis* (Brn.); *Pselaphotheseus hippolytae* Park; *Pseudhelops tuberculatus posticalis* Brn.; *Gromilus exiguus* (Brks.); *G. veneris setarius* (Brn.).

BLOODSUCKERS (For parasites of known hosts see Host-parasite list.)

Austrosimulium vexans (Mik).

EXCREMENT (seals, sheep, cattle)

Paralimnophora spp.; *Limnophora* spp.; Staphylinidae.

CARRION

Psychodidae; *Heloclusia* (*H.*) *antipoda* Harr.; *Leptocera* sp.; *Scatella* sp.; Calliphoridae; *Meropathus campbellensis* Brks.; *Nesomalium campbellensis* Steel.

ROOKERIES

Mollymawk nests: *Parorchestia campbellana* Bousf.; *Orchestia bollonsi* Chilt.; *Oramia hoggi* Forst.; *Gohia clarki* Forst.; *G. wenhami* (Forst.); *Pounamua gressitti* Forst.; *Mynoglenes insolens* Simon; *Clynotis barresi* Hogg.; *Apatochernes antarcticus* Beier; *Ayersacarus plumapilus* Hunt.; *Leptolaelaps reticulatus campbellensis* Hunt.; *Androlaelaps pachyptilae* (Z. & T.); *Ixodes uriae* Wh.; *Rhagidia mildredae* Str.; *Microtrombidium karriensis* Wom.; *Bdellodes* (*H.*) *gressitti* Aty.; *Tullbergia subantarctica* Salm.; *Hypogastrura armata* (Nic.); *Parafolsomia decemoculata* Salm.; *Sorensia subflava* Salm.; *Papillomurus ochraceus* Salm.; *Parisotoma octooculata ovata* Salm.; *Longkingia salmoni* Wise; *Nipaecoccus campbellensis* Beard.; *Trionymus danthoniae* Morr.; *Erioptera* (*T.*) *brachyptera* Alex.; *Psychoda eremita* Q.; *P. spatulata* Satch.; *Corynoptera subantarctica* Steff.; *Australimyza anisotomae* Harr.; *Parapsyllus longicornis* (End.); *Nesomalium campbellensis* Steel; *Pseudhelops tuberculatus posticalis* Brn.

Tillaea in mollymawk rookery: *Lepidiaphanus eudyptidus* Salm.

Under stones in mollymawk rookery: *Subantarctica flava* Salm.; *Colonavis grandis* Salm.; *Parafolsomia litorea* Salm.; *Tomocerura colonavia* Salm.; *Lepidiaphanus eudyptidus* Salm.; *Lepidobrya thalassarchia* Salm.; *L. violacea* Salm.; *Pseudokatianna triclavata* Salm.; *Phenacoleachia australis* Beard.; *Witlesia psammitis campbellensis* Munr.; *Schoenophilus pedestris campbellensis* Harr.; *Hydrellia enderbii* (Hutt.); *Scatella brevis* Harr.; *S. acutipennis* Harr.; *Meropathus campbellensis* Brks.; *Orchesia rennelli* Gr. & Sam.; *Gromilus exiguus* (Brks.).

On rock in mollymawk rookery: *Erioptera brachyptera* Alex.; *Tinearupa sorenseni* Salm. & Brad.; *Gromilus exiguus* (Brks.); *Gelis campbellensis* Townes.

Sooty albatross nest: *Apatochernes antarcticus* Beier; *Androlaelaps pachyptilae* (Z. & T.); *Ixodes uriae* Wh.; *Hypogastrura armata* (Nic.); *Parafolsomia litorea* Salm.; *P. decemoculata* Salm.; *Papillomurus ochraceus* Salm.; *Parisotoma octooculata ovata* Salm.; *Megaselia* (*M.*) *scalaris* (Loew); *Meropathus campbellensis* Brks.; *Halmaeusa sparsepunctata* Stl.; *Kleidotoma* (*P.*) *subantarcticana* Yoshm.

Royal albatross nest: *Psychoda spatulata* Satch.; *Scatella* sp. (under dead chick).

Penguin (*Megadyptes antipodes*) *nest*: *Apatochernes antarcticus* Beier.

Penguin (*Eudyptes c. crestatus*) *nests*: *Orchestia bollonsi* Chilt.; *Microtrombidium karriensis* Wom.; *Ayersacarus plumapilus* Hunt.; *A. gressitti* Hunt.; *Ixodes uriae* Wh.; *Parisotoma octooculata ovata* Salm.; *Psychoda brachyptera* Q.; *Meropathus campbellensis* Brks.; *Acrotrichis subantarctica* Gr. & Sam.; *Paracatops campbellensis* (Brks.).

Under stones in penguin (E. crestatus) rookery: *Nesomalium campbellensis* Steel; *Halmaeusa nesiotes* Stl.

Shag (Phalacrocorax c. campbelli) nest: *Mynoglenes insolens* Simon.

Dove prion (Pachyptila desolata) nest: *Androlaelaps pachyptilae* (Z. & T.).

Sooty shearwater (Puffinus griseus) nest: *Ayersacarus gressitti* Hunt.; *Androlaelaps pachyptilae* (Z. & T.); *Ixodes uriae* Wh.; *Notiopsylla kerguelensis* (Tasch.); *Paracatops campbellensis* (Brks.).

Black-backed gull nest: *Tullbergia subantarctica* Salm.; *Brachycaudus helichrysi* (Kalt.); *Myzus ascalonicus* Donc.; *Psychoda spatulata* Satch.

On rocks in penguin rookery: *Erioptera (T.) pilipes campbellensis* Alex.; *Macrocanace australis* (Hutt.); *Scatella brevis* Harr.; *Limnophora* spp.; *Gromilus insularis robustus* (Brks.); *G. exiguus* (Brks.).

Mat plants in rookeries: *Ixodes uriae* Wh.; *Tullbergia subantarctica* Salm.; *Xenylla novazealandia* Salm.; *Papillomurus ochraceus* Salm.; *Parisotoma octooculata ovata* Salm.; *Erioptera brachyptera* Alex.; *Scatella* sp.; *Paracatops campbellensis* (Brks.); *Halmaeusa nesiotes* Stl.; *H. sparsepunctata* Stl.; *Pseudhelops tuberculatus posticalis* Brn.

Tillaea in penguin rookery: *Xenylla novazealandia* Salm.; *Parasinella castanea* Salm.; *Cryptopygus campbellensis* Wise; *Pselaphotheseus hippolytae* Park; *Gromilus insularis robustus* (Brks).

In Cave, Courrejolles

Agrotis ipsilon (Hufn.)

Introduced Plants

Stellaria: *Bdellodes (H.) flexuosa* Aty.; *Myzus ascalonicus* Donc.; *Australimyza anisotomae* Harr.

Weeds: *Stereotydeus undulatus* Str.; *Bdellodes (H.) multicia* Aty.; *Henicops maculatus* Newp.; *Hypogastrura armata* (Nic.); *Parafolsomia litorea* Salm.; *P. decemoculata* Salm.; *Taeniothrips hawaiiensis* (Morg.).

Pelargonium: *Aulacorthum malvae* (Mosl.).

Debris

Surface debris (incl. stones in camp area): *Henicops maculatus* Newp.; *Onychiurus subantarcticus* Salm.; *Triacanthella sorenseni* Salm.; *Hypogastrura armata* (Nic.); *H. pseudopurpurascens* Wom.; *Anurida granaria* (Nic.); *Neanura radiata* Salm.; *N. hirtella schotti* (Wom.); *Parafolsomia litorea* Salm.; *Folsomia* sp.; *Proisotomurus lapidosus* Salm.; *Sorensia subflava* Salm.; *Papillomurus ochraceus* Salm.; *Parisotoma octooculata ovata* Salm.; *Lepidophorella australis* Carp.; *L. communis* Salm.; *L. nigra* Salm.; *Tomocerus setoserratus* Salm.; *Entomobrya nivalis* (L.); *Lepidiaphanus eudyptidus* Salm.; *Lepidocyrtus cyaneus cinereus* Fols.; *Lepidobrya mawsoni* (Tilly.); *L. thalassarchia* Salm.; *L. violacea* Salm.; *Pseudokatianna campbellensis* Salm.; *Nipaecoccus campbellensis* Beard.; *Nesomalium campbellensis* Stl.; *N. imitator* Stl.; *Gromilus veneris setarius* (Brn.).

Chicken yard debris: *Stereotydeus undulatus* Str.; *Eulaelaps stabularis* (Koch); *Hypogast-*

rura armata (Nic.); *Proisotoma xanthella* Salm.; *Papillomurus ochraceus* Salm.; *Entomobrya nivalis* L.; *Psychoda severini* Tonn.; *Acrotrichis subantarctica* Gr. & Sam.; *Atheta amicula* (Steph.).

Malaise Trap Only

Tortrix melanosperma Meyr.; *Scoparia triscelis* Meyr.; *Xylosciara brevipes* Steff.; *Cordylomyia gressitti* Yuk.; *Clinocera gressitti* Sm.

In Buildings

Trogium pulsatorium (L.); *Platyptilia aeolodes* Meyr.; *Agrotis ipsilon* (Hufn.); *Ptinus tectus* Bld.