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# BIBLIOGRAPHIC INTRODUCTION TO ANTARCTIC-SUBANTARCTIC ENTOMOLOGY

By J. L. Gressitt[1] and N. A. Weber[2]

## ABSTRACT

The entomological fauna of Antarctica is extremely limited. Only 44 terrestrial species are known, representing Acarina, Collembola, Mallophaga, Anoplura and Diptera. Well over 700 species are known from Subantarctic islands, representing about 20 orders of terrestrial arthropods. Best represented are arachnids, springtails, lice, beetles, and flies, the last having the greatest number of species. Forms recorded from the Antarctic continent are listed, and numbers of species from Subantarctic islands are tabulated. Percentages of species which are wingless or short-winged are also tabulated. An annotated bibliography of 424 items is included.

## INTRODUCTION

This article is intended as introductory background material for use in connection with current studies in biology in the Antarctic area. These studies are being pursued by representatives of 12 nations, as arranged by the Special Committee on Antarctic Research (International Council of Scientific Unions), following on the work of the International Geophysical Year (1957–58). Under the United States Antarctic Research Program, during 1958–59, M. Pryor has been doing entomological work in the McMurdo and Hallett areas under the sponsorship of N. A. Weber. During 1959–60, R. E. Leech and C. W. O'Brien are each spending six months, and J. L. Greesitt three months, in the same, and other western coastal areas, as well as in the Ross and Bellingshausen seas, principally studying air dispersal, on a Bishop Museum project under the U. S. Antarctic Research Program (National Science Foundation).

This paper is also aimed to serve as a reference point and as background for zoogeographic studies in the general area. Until the faunae of the various Antarctic-Subantarctic areas, and relationships thereof, are better known, it is premature to draw conclusions as to the origin and distribution of the fauna. Only a few tentative observations are made now. Zoogeographical papers dealing with relationships of the other southern continents (S. America, Africa, Australia), and not primarily with Antarctic-Subantarctic areas, are not included in the bibliography. The treatment of areas considered in this report is somewhat uneven. It is intended to be complete for Antarctica proper, and reasonably complete for the true Subantarctic islands, whereas references to Tristan da Cunha, the Falkland Is., Tierra del Fuego and the Straits of Magellan are not intended to be complete.

1. Bishop Museum, Honolulu, Hawaii.
2. Swarthmore College. Swarthmore, Pensylvania.

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## ANTARCTICA

The scope of the present survey includes the Antarctic and the Subantarctic areas. The Antarctic, as a biological area, is here taken to include the land and waters south of the Antarctic Convergence. The Antarctic Convergence may be represented by an irrregular line (see map) running partly in the vicinity of 50° S. latitude and more southerly in the Pacific area. This line marks a sharp division in temperature, salinity and other marine conditions. The drop in temperature is very noticeable on crossing this line on the way south.

All of the islands within the area that are not closely associated with the Antarctic Continent are small and with a climate affected appreciably by the surrounding waters. They include such islands as South Georgia, South Sandwich, Scott, Balleny, Bouvet and Heard. Kerguelen, Crozet, Marion and Macquarie are close to the Convergence. Tierra del Fuego and the Falklands are distinctly outside of this area. Only South America, of all the continents, comes at all close to the line. The Subantarctic biological area includes this southern tip of South America, the islands of Falklands (Islas Malvinas), Gough, Campbell, Auckland, Antipodes, and Snares. The South Island of New Zealand is appreciably colder than the North Island and in a sense represents a transition to the Subantarctic. New Zealand proper and the Chatham Islands are not considered in thispaper, but the other areas are covered to some degree.

The Antarctic Continent itself is generally unfavorable for land arthropods because of the great thickness of the ice sheet and the rigorous climate. The continent may be divided into two areas, West Antarctica and East Antarctica. The latter is particularly unfavorable to terrestrial animals. West Antarctica is separated from South America by the stormy Drake Passage but is related geologically to it. The waters separating them are less than 4000 meters deep. The continent is large (equal to Australia plus western Europe) and has the highest average altitude of all the continents. It is also the most isolated of the continents. There is no land to speak of between 55° and 65° S. to interfere with east-west circulation of air and sea, with permanent currents to westward. There is very little interchange of warm and cool air. Temperatures are largely below freezing, and often colder than –60° C. In some areas the ice-cap is over 4,000 meters thick. Probably little more than 100 sq. km is free of ice. The rocks of Antarctica are old, and much of the land has been above sea since the Paleozoic.

## THE NATURE OF THE ANTARCTIC FAUNA

Few groups of terrestrial arthropods are known to exist on the actual Antarctic continent. Only Acarina, Collembola, Anoplura, Mallophaga and Diptera are recorded. Arranged in decreasing order of numbers of species reported, these are: 1) biting lice of sea birds; 2) mites on birds, mammals, primitive plants, rocks or soil; 3) springtails in

soil, on lichens, mosses and algae, and algal ponds of melted ice; 4) sucking lice on seals; 5) ticks on sea birds; 6) flies breeding in coastal waters. Those recorded are mentioned in the following list. The southernmost recorded occurrence of permanent inhabitants is at 77° south latitude, in the neighborhood of Granite Harbor, McMurdo Sound, on the

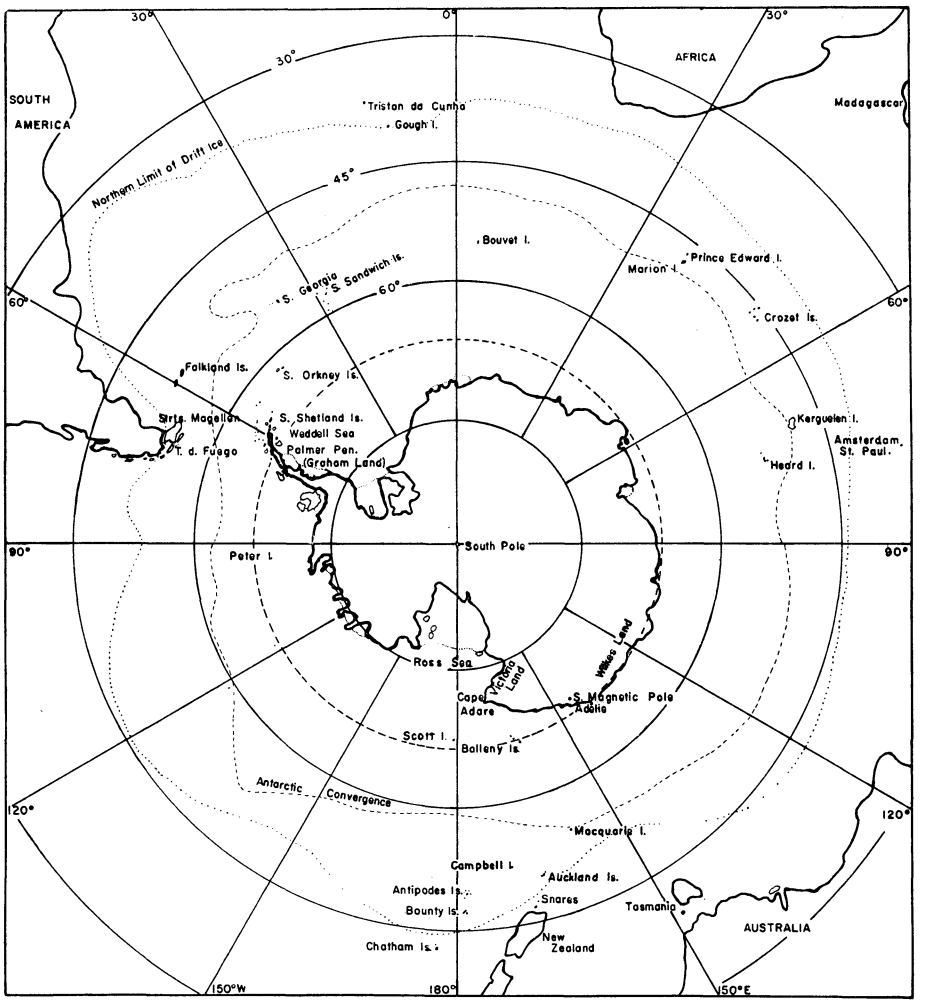


Fig. 1. Map of Antarctic-Subantarctic area, showing Subantarctic islands, "Antarctic Convergence", and northern limit of icebergs.

Victoria Land coast opposite Ross Island near the summer edge of the Ross Ice Shelf in the Ross Sea. These records include at least one springtail. Most of the recorded species, however, are from the Palmer Peninsula (Graham Land) or associated islands, which form the northernmost extention of the Antarctic continent.

The groups represented on Antarctica are the same as those known from the southernmost islands with insect records, which are near the Palmer Peninsula. Some of the species on the continent are also known from several of the Subantarctic islands, and this is particularly true in the mites. In the case of the lice, distribution is of course dependent on the occurrence of the hosts. As most of the bird hosts are rather wide ranging, those lice known only from Antarctica to date may later be found elsewhere within the range of the hosts. Records of lice from penguins are rather scarce. One of the pressing problems is to examine the systematics of all groups on a circumpolar basis to determine actual relationships.

## LIST OF TERRESTRIAL ARTHROPODS OF THE ANTARCTIC CONTINENT (INCL. S. SHETLAND IS.)

### ARACHNIDA: ACARINA

#### MESOSTIGMATA

##### Gamasides

##### Ascaidae

| | | |
|---|---|---|
| Gamasellus racovitzai (Trouessart), 1903 (Gamasus); Trägårdh 1908; Ewing 1945 | Penguin rookery | Palmer Pen. 65°; S. Shetlands |

##### Neoparasitidae

| | | |
|---|---|---|
| Hydrogamasus antarcticus Trägårdh, 1908 | ? Moss | Paulet I., Gerlache 65° |

##### Laelaptidae

| | | |
|---|---|---|
| Laelaps (Eulaelaps) grahamensis Trägårdh, 1908 | | Graham Land |

##### Zerconina

| | | |
|---|---|---|
| Zercon tuberculatus Trägårdh, 1908 | | Graham Land; Gerlache 65° |

#### IXODIDES

##### Ixodidae

| | | |
|---|---|---|
| Ixodes auritulus Neumann, 1904; 1907; Johnston | Penguins | Palmer Pen. 65°; also Macquarie, etc. |
| I. (Ceratixodes) putus (Cambridge), 1876; Johnston | Phalacrocorax, Diomedea, penguins, etc. | Port Lockroy, Palmer Pen.; also Kerguelen, etc. |

#### TROMBIDIFORMES

##### Eupodidae

| | | |
|---|---|---|
| Penthaleus belli Trouessart, 1903 | ? Lichens or algae | Cape Adare 71° |

##### Penthalodidae

| | | |
|---|---|---|
| Stereotydeus (Tectopenthalodes) villosus (Trouessart), 1903 (Penthaleus); Bryant 1945; Ewing 1945 | Moss | Palmer Pen. 65–68 |
| | Rhagidiidae | |
| Nörneria gigas gerlachei Trouessart, 1903; Trägårdh 1907 (Rhagidia) | Moss | Palmer Pen.: Wandel 65° |
| | SARCOPTIFORMES | |
| | Glycyphagidae | |
| Chaetodactylus antarcticus (Trägårdh), 1907 (Trichotarsus) | | Gerlache 65° |
| | ORIBATEI | |
| | Eremaeidae | |
| Halozetes antarctica (Michael), 1903 (Notaspis); Dalenius & Wilson | Moss, lichens, tussocks, F. W., rookery | Wiencke I., Gerlache 65°–68°; Hallett 72°; S. Shetlands |
| Pertorgunia belgicae (Michael), 1903 (Notaspis); Ewing 1945; Bryant 1945; Dalenius & Wilson | Moss, lichens, stones | Palmer Pen. 65°–68°; Gerlache; Hallett 72° |
| | Oribatulidae | |
| Maudheimia wilsoni Dalenius, 1958; Pryor 1959 | Under stones, to –55°C | Maud Land 72°; Hallett 72° |
| Oribatula nordenskjoeldi Trägårdh, 1908 | | S. Shetlands, Falklands, T. d. Fuego |
| | INSECTA | |
| | COLLEMBOLA | |
| | Poduridae | |
| Friesea grisea (Schäffer) Type loc.: S. Georgia; Wahlgren; (Syn.: Achorutoides antarcticus Willem; Carl; Denis; Salmon) | Moss | Palmer Pen.: de Gerlach: Harry I.; S. Shetlands |
| Hypogastrura viatica (Tullberg); (Achorutoides, Hack, 1949) | | Palmer Pen. |
| Gomphiocephalus hodgsoni Carpenter, 1908. | Algal ponds | Granite Harbor, McMurdo 77° |
| Tullbergia mixta Wahlgren, 1906 | Ponds | Graham Land 65°; S. Shetlands |
| | Isotomidae | |
| Cryptopygus antarcticus Willem 1902; Wahlgren; (C. crassus, Ewing 1945) | Penguin rookery | Palmer Pen.: Harry I., Auguste I.; S. Shetlands; |

| | | |
|---|---|---|
| | | S. Georgia, Kerguelen, etc. |
| Isotoma octo-oculata Willem 1902; Carl; Enderlein | Moss | Palmer P. 65°; S. Shetlands, Macquarie, etc. |
| I. octo-oculata kerguelenensis Enderlein, 1903 | | Graham L., S. Shetlands, Kerguelen |
| I. klovstadi Carpenter 1902 (I. besselsi Enderlein, 1912) | | Giekie Land, Macquarie, T. d. Fuego |
| I. sp. Carl, 1907 | | Palmer P. 65° |
| | MALLOPHAGA | |
| | Amblycera | |
| | Meneponidae | |
| Austromenopon sp. (Menopon sp. Thompson, 1938) | Diomedea exulans | 69° |
| Piagetiella caputincisa Eichler, 1950 (Tetrophthalmus sp. Clay, 1940) | Phalacrocorax atriceps | Argentine I., Graham L. |
| | Ischnocera | |
| | Philopteridae | |
| Austrogonoides antarcticus Harrison, 1937 | Pygoscelus adeliae | King George V Land |
| A. mawsoni Harrison, 1937 | Aptenodytes forsteri | ? King George V L. |
| Saemundssonia cephalus (Denny), 1842 (Phil. pustulosus Nitzsch; Harrison 1937) | Catharacta skua maccormacki | C. Royds 77° |
| S. bicolor (Rudow), 1870; Clay, 1940 | Priocella antarctica | S. Shetlands |
| S. lockleyi Clay, 1949 | Sterna vittata georgiae and paradisaea | Wiencke I. 65°, also Campbell I., Arctic, etc. |
| S. stammeri Timmermann, 1959 | Daption capense | Antarctic seas |
| ? S. antarcticus Wood in Harrison 1937 (probably a synonym, Clay *in litt.*) | Pagodroma nivea | King George V Land |
| Docophoroides simplex Waterston; Harrisson 1937 | Macronectes giganteus | King George V L. |
| D. hunteri Harrison, 1937 | Macronectes g. | King George V L. |
| Pseudonirmus charcoti (Neumann), 1907; Harr. 1937 | Pagodroma nivea | Palmer Pen. 65° |
| P. gurlti (Tasch.), 1882; Neumann 1907; Clay 1940 | Daption capense | 70° |
| Plugubris lugubris (Tasch.), 1882 (=antarcticus Harrison, 1937) | Thalassoica antarctica | King George V Land |
| Perineus obscurus (Rudow), 1869; Harr., 1937 | Macronectes giganteus | King George V L. |
| P. nigrolimbatus (Giebel), 1874 | Priocella antarctica | S. Shetlands |
| Naubates robertsi Clay, 1940 | Oceanites oc. exasperatus | Argentine I. |

ANOPLURA

| | | |
|---|---|---|
| Antarctophthirus ogmorhini Enderlein, 1906 | Hydrurga leptonyx, Lobodon carcinophagus | Palmer 65°; Victoria Land |
| A. lobodontis Enderlein, 1907 | Lobodon c. | Gerlache: Booth-Wandel; Argentine I. |
| A. mawsoni Harrison, 1937 | Ommatophoca rossi | King George V Land |
| A. sp. Harrison, 1937 | Leptonychotes weddelli | King George V L. |
| A. sp. Clay, 1940 | Leptonychotes W. | Argentine I. |
| Echinophthirus ? horridus (Olfers), 1816 (E. setosus Lucas; Rothschild ? *phocae*, Enderlein, 1909) | Hydrurga leptonyx | no./loc |

DIPTERA

Chironomidae

Clunioninae

| | | |
|---|---|---|
| Belgica antarctica Jacobs, 1900; Rübsaamen, 1906; Enderlein, 1909 c; Keilin, 1912, 1913; Edwards, 1926, 1931; Wirth, 1949; Torres, 1953. | Marine shores | de Gerlache Strts. and Arch. Melchior, Palmer Pen. 65° |

Podonominae

| | | |
|---|---|---|
| Podonomus steineni (Gercke), 1889; (*Tanypus*); Enderlein, 1912, 1930 a; Edwards, 1931; Torres, 1956. | Marine algal flats | King George I., S. Shetlands 62°; also S. Georgia |

Note: Marine Acarina are not included. Two species of Psocoptera and one of Collembola taken by the German South Polar expedition were considered by Enderlein (1909c) to have come off of the expedition's ship.

## THE FAUNA OF THE SUBANTARCTIC ISLANDS

In general, the terrestrial arthropod fauna of the Subantarctic islands is similar to that of Antarctica, but with more groups represented (see Table 1.). The main contrast is dominance of flies, beetles and spiders, except in the most southerly isles. This corresponds to a considerable degree with the situation in the Arctic fauna (Weber, 1950, 1954).

There is a wide range of latitude in the islands treated in Table 1, and some are well outside the "Antarctic convergence". However, there is a general similarity in faunal make-up relating to the isolation, rigors of the environment, and other factors. All the islands are small, and are subjected to extreme conditions of strong winds and low temperatures. The South Sandwich Islands (56° – 60° S. latitude) are not included in the table, and apparently no insects have been recorded from them. They are volcanic and largely covered with glaciers.

In comparing faunae of Subantarctic isles with oceanic isles of similar size in the tropical Pacific, a number of contrasts are evident in terms of relative representation. Most conspicuous is the scarcity of homopterans and heteropterans on the Subantarctic islands,

as compared with their great abundance on the tropical oceanic islands. On the latter, they comprise about 10 % of the insect fauna, while on the Subantarctic isles they constitute only about 1 %. Likewise the Hymenoptera on the tropical isles seem to make up between 5 and 10 % of the insect fauna, whereas on the Subantarctic isles they seem to constitute only about 1 %. Ants are apparently particularly scarce on the Subantarctic isles, whereas many have been distributed by man to tropical isles. The Orthoptera and Psocoptera also appear to be very poorly represented on the Subantarctic islands, each comprising only about 1 % of the total fauna.

## LOSS OF FLIGHT

An important characteristic of the pterygote fauna of the general area is loss of flight potential. This has been cited in many evolutionary works, and often attributed to positive selection for individuals which do not take flight, and those with smaller wings. This relates to the fact that those insects taking flight are more likely to be blown off into the ocean and not reproduce. Although loss of flight potential in some groups of pterygote insects is common on small islands in general, it appears to be more conspicuous on the more southern islands where severe winds are more general (Hudson 1909a; Jeannel, 1940c; Salmon & Bradley).

In treating flightless moths of Campbell Island, Salmon (in Salmon and Bradley, 1956) states: "In discussing these moths with me and in his notes, Mr. Sorensen has laid great stress on their ability to leap and their superficial resemblance to small grasshoppers. When touched or otherwise disturbed, nearly all of these brachypterous species fall to the ground and sham death. If left, they 'revive' after a moment or two and begin to crawl about quickly; when amongst the tussock they are very difficult to see. This habit seems worthy of note as, according to Sorensen, the only natural enemy they could have had in the past was the pipit, *Anthus novaeselandiae*, and it is doubtful whether this bird was ever sufficiently abundant on Campbell Island to have caused the develoment of this habit. Of the introduced passerine birds, Sorensen says: 'I cannot say that I have ever seen them taking these moths'....When leaping, these flightless moths are apparently assisted to some extent by the abbreviated wings, for Sorensen has told me that after landing on a tussock or fern they almost invariably fold their wings and drop down amongst the dead leaves or fern beneath the tussock. During the leap the wings are held outstretched and possibly have a gliding function".

Apparently many of the winged insects do very little flying and are sluggish, whereas brachypterous or apterous species may be very active. Of a winged tineid moth, *Proterodesma byrsopola*, on Auckland Island, Hudson (1909a) stated: "This insect is extremely sluggish, and the female must be almost, if not entirely, incapable of flight". Of one fully winged fly, *Polytocus spinicosta*, on Auckland Island, Hudson (1909a) wrote: "No specimens were observed on the wing, and all those found were very sluggish, and never attempted to use their wings for flight." Of a wingless fly, *Zaluscodes aucklandicus*, on the same island, Hudson also wrote: "This remarkable species was common in damp places in forest, Carnley Harbour. It runs rapidly over the ground, like a small harvestman spider".

In Table 2 some figures are presented to indicate degree of loss of power of flight of pterygote insects on various islands. Although flightless beetles are abundant in many

areas among some of the groups (Carabidae, Staphylinidae, Tenebrionidae, Curculionidae) which are dominant on southern islands, such a high proportion of wingless or brachypterous moths and flies (exclusive of Phoridae) is not met with on most small tropical oceanic islands. Other pterygote groups with brachypterous or apterous representatives include Orthoptera, Hemiptera and Hymenoptera, as well as Psocoptera or others which are frequently wingless. Among the families with brachypterous or apterous species (exclusive of Coleoptera) are Delphacidae, Enicocephalidae (Hemiptera); Tineidae, Hyponomeutidae, Cosmopterygidae, Elachistidae, Tortricidae (Lepidoptera); Limnobiidae, Chironomidae, Dolichopodidae, Coelopidae, Cypselidae, Ephydridae, Anthomyidae (Diptera); Diapridae and Ichneumonidae (Hymenoptera).

Table 2. Percentage of brachypterous or apterous insects of winged orders

| | Orthoptera | Hemiptera | Lepidoptera | Coleoptera | Diptera | Hymenoptera |
|---|---|---|---|---|---|---|
| Antarctica | | | | | 100 | |
| S. Shetland | | | | | 0 | |
| S. Georgia | | | 100? | 100 | | 0 |
| Falkland | 100? | ? | ? | 70 | 35 | ? |
| Tristan da Cunha | | | | 90 | ? | |
| Marion | | | 100 | 100 | 100 | |
| Crozet | | 100 | 100 | 100 | 43 | |
| Kerguelen | | | 100 | 100 | 42 | |
| Heard | | | 100 | | | |
| St. Paul | | 100 | 50 | 100 | | |
| Amsterdam | | | 29 | 100 | | |
| Macquarie | | | 0 | 100 | 37 | 100 |
| Campbell | 100 | | 33 | 90 | 10? | |
| Auckland | 100 | | 6? | 80 | 4? | 75* |
| Antipodes | | | 20 | | 15 | |
| Bounty | 100 | | 0 | 50 | 33 | |

* Males are winged.

Note: Species probably introduced by man are excluded from consideration. Some of the figures are estimates. A "O" indicates order is represented by one or more winged species only (see Table 1).

## ZOOGEOGRAPHY

Many references have been made to faunal relationships of insects of the southern continents (Wittmann 1934), but this matter will not be dealt with here. We may simply state that in some groups extremely close relationships appear to exist between faunal elements of the southern continents. Such relationships appear to be conspicuous particularly in the New Zealand fauna, where there are many ties with southern South America.

Some workers have attributed these relationships to a former Antarctic connection, while others feel that spread was by means of more or less continuous indirect connections which have existed in the past, by way of Asia, the "Bering bridge" and North America (Gressitt, 1958).

It is well known that the climate of Antarctica was once much warmer than it is today. Plant fossils, including extensive coal deposits, have been found on the Antarctic continent. The ancient Glossopteris flora which characterized the supposed ancient land mass ("Gondwanaland"), has been found in the fossil record in various southern areas. Besides the ancient relationships, there are many contemporary similarities of the southern continents, such as the extensive Nothofagus forests, and the range of the genus Araucaria, and others. These relationships are also invoked as evidence for the theory of continental drift. Before long, evidence may be forthcoming to settle the dispute as to whether continental drift occurred or not, and if so, whether or not it took place after the emergence of higher animals and plants.

Among the mammals, whose fossil history is rather well known, the picture is different. Some mammalogists show by extensive evidence that even though there are southern relationships, as with the marsupials, the route of dispersal was most likely across the past land bridges of the Bering Arc between Siberia and Alaska (Darlington, 1957). The historical picture for the insects, however, is much less clear and less complete than with plants and mammals. The fossil record is relatively meager, particularly considering the relative numbers of existing species. To date no fossil insects have been reported from Antarctica, and only one has been recorded from a Subantarctic island (Holm, 1912). Thus there is little to supplement deductions based on current representation, which is of course meager.

Various lines of evidence suggest that the present deeper ocean bottoms are quite ancient. Likewise, it appears that the Subantarctic islands are mostly of great age, and that some have not been very much larger than at present. That those must have been somewhat larger is obvious from erosion patterns, and that they once had milder climates seems inevitable. It has been stated (Jeannel, 1940) that the islands near South America and New Zealand are of continental origin, with old sedimentary rocks, whereas those from Tristan da Cunha to Amsterdam I. are oceanic. If no general southern land mass existed after evolution of insects, the Subantarctic isles may have served as "stepping stones" for dispersal, particularly during more favorable climatic periods.

Two factors of particular significance in Antarctic zoogeography are winds and birds that may bring the land arthropods to the Antarctic continent. The region is well known to be one of the windiest parts of the earth and the gales of Cape Horn were notorious in sailing ship days before the Panama Canal was built. Mites and Collembola, the most characteristic of the non-parasitic land arthropods here, are among those regularly taken in aerial surveys in other parts of the world. Spiders are apparently not able to stand the most rigorous climates although they, too, are carried by the winds. Suspended by strands of silk, a ballooning effect is produced that has enabled them to be widely dispersed in Arctic areas, and some Subantarctic islands.

Extensive bird banding in recent years has been highly successful in tracing extensive movements of birds in South Polar regions. A circumpolar distribution of some species has been proven. Giant petrels, banded extensively in South Orkney, have been recovered over the width of Australia, in Tasmania, New Zealand, South Africa and Peru (Sladen

and Tickell, 1958). This and other species are clearly circumpolar as species if not as individuals. While these birds harbor Mallophaga and in some cases ticks, they should be investigated as accidental carriers of other arthropods. When they arrive at their rookeries after a long flight, a more favorable opportunity for establishment is presented than if they merely alight at a site inhospitable to arthropods. The fauna of the rookeries should therefore warrant close investigation.

The present fauna of the Subantarctic islands seems to contain some ancient relics of former southern-dispersed forms. But other elements suggest that the islands have an oceanic type of disharmonic faunal make-up, largely the result of waif dispersal over ocean. Thus the fauna of some of the islands may be the result of accidental over-water dispersal from distant continental areas during considerable periods of time after the islands were elevated from sea bottom by volcanic action. Further light on the geological histories of the various islands, together with better understanding of the fauna and its relationships, will help answer the question of the origin, dispersal and evolution of the Antarctic-Subantarctic terrestrial arthropod fauna.

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Table of the distribution of the insects

| | Species | Endemic | % | Genera | Endemic | % |
|---|---|---|---|---|---|---|
| Collembola | 10 | 4 | 40 | 7 | — | — |
| Orthoptera | 1 | 1 | 100 | 1 | 1 | 100 |
| Psocoptera | 1 | 1 | 100 | 1 | — | — |
| Hemiptera | 1 | — | — | 1 | — | — |
| Lepidoptera | 16 | 8 | 50 | 12 | — | — |
| Coleoptera | 44 | 34 | 77.2 | 30 | 9 | 30 |
| Diptera | 18 | 8 | 53 | 13 | 2 | 15 |
| Hymenoptera | 1 | 1 | 100 | 1 | — | — |
| Totals | 92 | 57 | 61 | 66 | 12 | 17.6 |

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Zimmermann, A. 1924. Revision der Colymbetinen-Gattung Lancets Sharp (Col.). Wiener Ent. Ztg. **41**: 89–99. (1 sp. Falkland Is.; genus in Australia, Tasmania, New Zealand, southern Neotropics, Juan Fernandez, Tierra del Fuego and S. Georgia).

Zumpt, F. 1952. The ticks of sea birds. Australian Nat. Antarctic Res. Exped. Repts. (B) **1**(Zool.): 12–20. (9 spp. of Ceratixodes, Ixodes and Ornithodorus: Heard, Macquarie, and Kerguelen).

## Addendum

Clay, Theresa. 1958. A note on some antarctic Mallophaga. Ann. Mag. Nat. Hist. ser. 13, **1**: 250–56. (Kerguelen, Heard, S. Georgia).

Timmermann, G. 1956. Quadraceps niethammeri n. sp. und andere neue Federlinge aus Gattungen Quadraceps, Saemundssonia und Austromenopon. Bonn Zool. Beitr. **7**: 186–92. (Kidney I., S. Georgia, etc.).

———— 1959. Drei neue Sturmvogelfederlinge. Zool. Anz. **162**: 148–53. (Mallophaga; Antarctic seas, etc.).

## Note

Holm's *Paleodictyopteron* from the Falkland Islands is *Permagrion falklandicum* Tillyard, 1928, Ent. Soc. Lond., Trans. **76** (1): 55–63, according to Dr. F. M. Carpenter (*in litt.*). It is thus a damsel-fly.

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