INSECTS FROM THE POOR KNIGHTS ISLANDS, NEW ZEALAND

K. G. SOMERFIELD

*Department of Zoology, University of Auckland**

SUMMARY: Insects are listed from the Poor Knights Islands of New Zealand. Few records have been previously published, and these are briefly reviewed. The list contains 27 species; 23 are new records. Dispersal mechanisms are discussed in relation to published information on insect and other invertebrate distribution on offshore islands of the east coast of the North Island.

INTRODUCTION

The Poor Knights Islands of north-eastern New Zealand were visited from 29 October to 3 November 1965. Present on the expedition were: Associate-Professor J. Robb (University of Auckland), Mr D. Merton (Wildlife Service, Department of Internal Affairs) and the author. Studies were made of the insect fauna, and of the birds, lizards and tuatara (*Sphenodon punctatus* Gray).

The islands are situated approximately 21 km from the mainland, in a north-easterly direction from Whangarei (Fig. 1). There are two main islands—Tawhiti Rahi (Northern Knight) and Aorangi (Southern Knight), as shown in Figure 2—and several smaller islands also occur in the area. Tawhiti Rahi is about 2.4 km long and 1.2 km in maximum width; Aorangi is about 1.6 km long and 1.3 km in width. The topography and other geological features of the islands are described by Sumich (1956). Fraser (1925) states that the area of Tawhiti Rahi is 318 acres (129

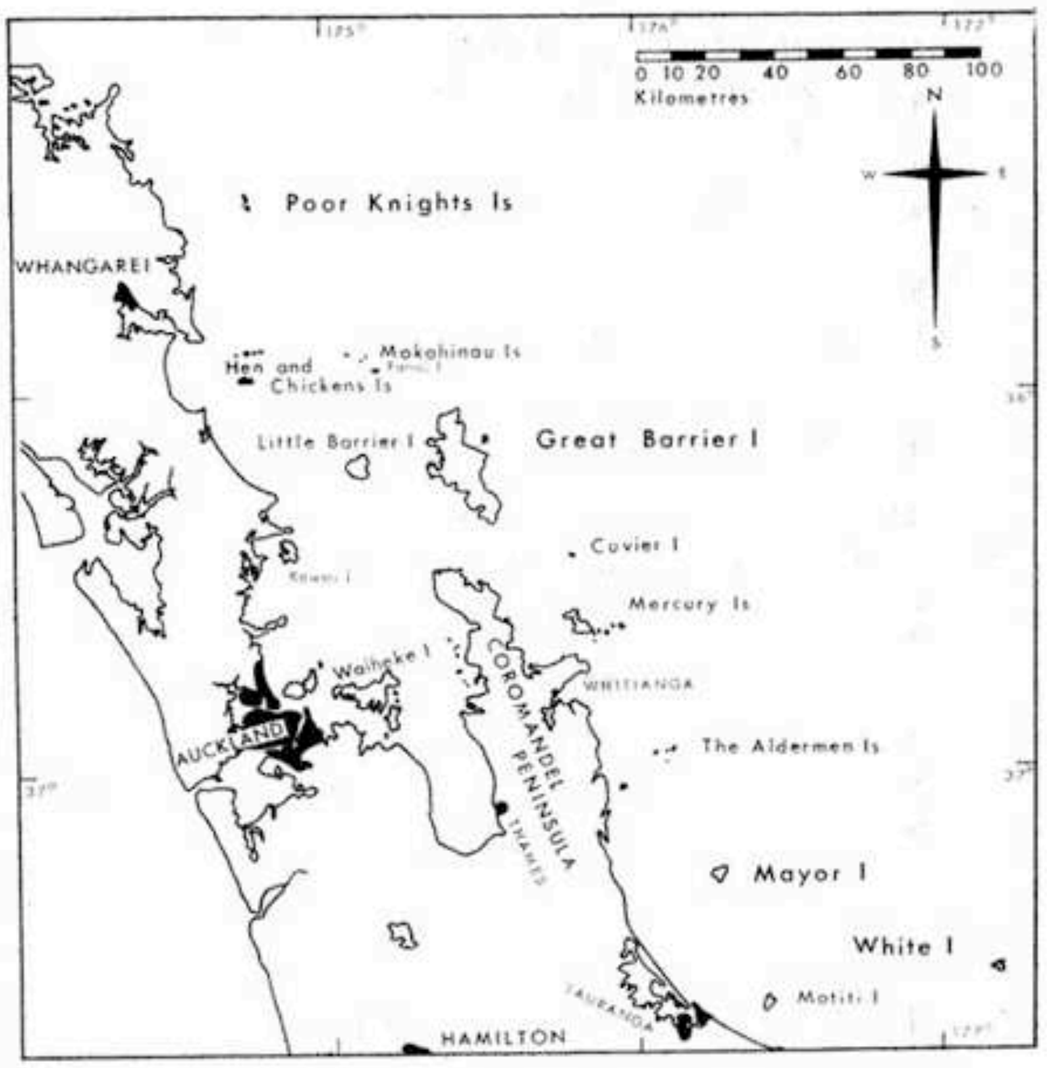

FIGURE 1. *Map of northern North Island showing locality of the Poor Knights and other areas referred to in the text.*

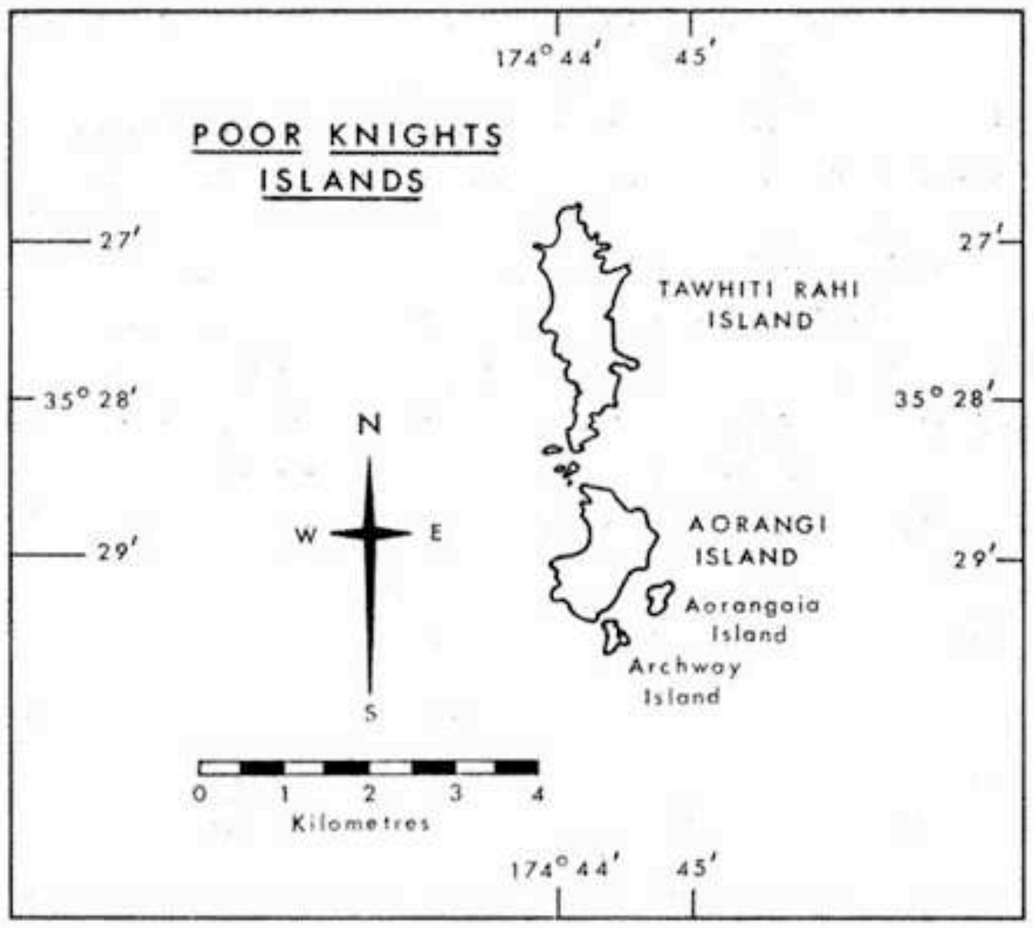

FIGURE 2. *The principal islands of the Poor Knights group, to an enlarged scale.*

* Present Address: Plant Health Diagnostic Station, Ministry of Agriculture and Fisheries, Private Bag, Christchurch.

ha), and the area of Aorangi is 163 acres (66 ha). Whitaker (1968) gives a short recent account of the geography and vegetation of the islands.

PREVIOUS RECORDS

Few published records exist of insects from the Poor Knights. Miller (1956) lists only one publication, that of Spiller (1942), for the period from 1775-1952. In this, Spiller describes a weevil (*Phaeophanus turbotti*) collected by Mr E. G. Turbott on Aorangi during a visit to the Poor Knights in November 1940. Richards (1962) describes a new species of raphidophorid, *Gymnoplectron giganteum,* from the Islands. Salmon (1950) gives the first published description of the giant tree weta (*Deinacrida fallai*) on the Poor Knights; Richards (1962) and Watt (1963) also mention this species. Watt (1962), in recording Coleoptera from Hen Island, Northland, mentions six species also occurring on the Poor Knights.

COLLECTING LOCALITIES

Collecting was mainly done by hand during the daytime and at night during birdbanding and other operations. Habitats which were examined included areas of grass and regenerating scrub and forest, areas of flax (*Phormium tenax*), the bark of woody shrubs and trees, branches of larger trees (particularly pohutukawa—*Metrosideros excelsa*), rotten logs and stumps, the underside of stones and the surface of bare earth in the vicinity of communal nesting areas of sea-birds (mainly Buller's shearwater—*Puffinus bulleri*).

SPECIES LIST

Six orders of insects and 19 families, represented by 25 genera and 27 species, are recorded in the list below. The distribution of the species within orders is as follows: Blattodea (1 species), Orthoptera (2 species), Hemiptera (2 species), Coleoptera (17 species), Diptera (3 species) and Hymenoptera (2 species). Emphasis in collecting was given to the Coleoptera: further species of all insect groups undoubtedly await collection and recording. *Deinacrida fallai* has been previously recorded (Salmon 1950, Richards 1962, Watt 1963), and Watt (1962) states that *Ctenognathus novaezelandiae, Chrysopeplus expolitus* and *Xylotoles griseus* occur on the Poor Knights.

The specimens have been deposited in the collections of Entomology Division, D.S.I.R., Nelson.

Specialists who made or confirmed identifications are named; other identifications are by the writer.

ORDER BLATTODEA
FAMILY BLATTIDAE

Platyzosteria novaeseelandiae (Brunn V. Watt.) (Det: P. M. Johns). Occurs among grasses and beneath rotten logs; three specimens.

ORDER ORTHOPTERA
FAMILY RHAPHIDOPHORIDAE

One unidentified species (examined by A. M. Richards) fairly prevalent, especially towards the northern end of Tawhiti Rahi.

FAMILY STENOPELMATIDAE

Deinacrida fallai Salmon.
Common on branches of low trees at night; less frequently on vegetation in swamp. No specimens were collected.

ORDER HEMIPTERA
FAMILY DELPHACIDAE

Ugyops rhadamanthus Fennah. (Det: A. C. Eyles).
On low vegetation; two specimens.

FAMILY PENTATOMIDAE

Rhopalimorpha lineolaris Pendergrast. (Det: A. C. Eyles).
On low vegetation; one specimen.

ORDER COLEOPTERA
FAMILY CARABIDAE

Mecodema sp. (Det: P. M. Johns).
Beneath rotten logs, particularly in the vicinity of Buller's shearwater burrows; two specimens.
Ctenognathus novaezelandiae (Fairmaire). (Det: J. C. Watt).
Mainly taken from tree branches at night. Thirteen specimens.

FAMILY MELYRIDAE (Det: J. C. Watt)

Dasytes sp.
On low vegetation and inside tent; five specimens.
Halyles sp.
One specimen.

FAMILY SILVANIDAE
Cryptamorpha brevicornis (White) (Det: J. C. Watt).
One specimen.

FAMILY COCCINELLIDAE
Coccinella leonina (Fabricius).
On low vegetation and in tent; two specimens.

FAMILY TENEBRIONIDAE (Det: J. C. Watt)
Mimopeus elongatus (Brême).
In and under logs, and on bare ground at night, often near the entrance of shearwater burrows. Also on islets between Tawhiti Rahi and Aorangi; 15 specimens.
Mimopeus sp. nov. near *opaculus*.
A large undescribed species. In rotten logs and stumps; 13 specimens.
Chrysopeplus expolitus (Broun).
Mainly collected on branches of trees at night; also found in tent, and on islets between Tawhiti Rahi and Aorangi; 16 specimens.
Omedes nitidus (Broun).
One specimen.
Artystona sp.
Probably a geographical form of *A. erichsoni* (J. C. Watt, pers. comm.). Taken from branches of trees at night; nine specimens.

FAMILY OEDEMERIDAE
Thelyphassa sp. (Det: J. C. Watt).
One specimen.

FAMILY CERAMBYCIDAE (Det: J. C. Watt)
Hybolasius sp.
One specimen.
Xylotoles sp. near *parvulus*.
Three specimens.
Xylotoles griseus (Fabricius).
The Poor Knights specimens are probably a geographical form of *X. griseus*. The patches of yellow pubescence on the elytra are bigger than in any mainland population (J. C. Watt, pers. comm.). Three specimens.

FAMILY CHRYSOMELIDAE
Eucolaspis sp. nov. near *brunneus* (Det: J. C. Watt).
The microsculpture of Poor Knights specimens is much stronger than in any other known population of *E. brunneus* (J. C. Watt, pers. comm.). On vegetation; also common on walls of tents; 13 specimens.

FAMILY CURCULIONIDAE
Aneuma rubricalis (Broun). (Det: G. Kuschel).
One specimen.

ORDER DIPTERA
FAMILY CULICIDAE
Opifex fuscus (Hutton).
The identity of this species was confirmed by the Commonwealth Institute of Entomology. Larvae very common in high tidal saltwater pools; adults common in vicinity.

FAMILY ASILIDAE
Neoitamus varius (Walker). (Det: H. Oldroyd).
On larger vegetation of ground cover; also in tent. Two specimens.

FAMILY LAUXANIIDAE
Sapromyza neozelandica (Tonnoir and Malloch). (Det: B. H. Cogan). On vegetation, and walls of tent; three specimens.

ORDER HYMENOPTERA
FAMILY ICHNEUMONIDAE
Diadegma sp. (Det: E. W. Valentine).
E. W. Valentine (pers. comm.) states that the genus *Diadegma* is parasitic on a variety of leaf mining or similarly internally feeding caterpillars.
One specimen.
A second species of an undetermined genus of Ichneumonid was collected.

FAMILY VESPIDAE
Polistes tasmaniensis (Saussure).
Fairly common in sunny situations. A nest 2.5 cm in diameter, attached to a flax leaf, was found by D. Merton. Three specimens.

DISCUSSION

The species listed represent only a small fraction of the total fauna of the Poor Knights. Because of this, detailed consideration of the relative abundance and other statistics of species in the various habitats would be premature. Most of the insects are from families which frequently occur in the type of habitats sampled, with some mobile forms occurring in several habitats.

A number of species are unique to the islands. The giant weta (*Deinacrida fallai*) is endemic to the Poor Knights (Richards 1962, Watt 1963). A giant Rhaphidophorid, *Gymnoplectron giganteum,* is recorded only from there (Richards 1962). Richards states that *G. giganteum* is the largest representative of the Macropathinae she has examined, and considers that ". . . this increase in size is possibly due to isolation, and the absence of predators and competitors". She also states that the largest specimens of *Gymnoplectron edwardsii,* a common cave weta in the Nelson and Wellington districts, occur on the adjacent Trio Island and Stephens Island. The giant weevil (*Phaeophanus turbotti*) is known only from the Poor Knights Islands (Spiller 1942). A large undescribed species of *Mimopeus* exists there, and is probably endemic (J. C. Watt pers. comm.). The tendency for individuals of island populations to average larger in size than their mainland relatives is also evident on the Poor Knights, and is shown by the species mentioned above. Dr Watt has informed me that he considers ". . . that favourable climate and abundant food are more likely reasons [than other factors] for the large size of insects" on some of the northern islands.

Referring to the Coleoptera, Dr J. C. Watt (a New Zealand authority on this group) has informed me that ". . . the status of many Poor Knights populations is in doubt. Some (e.g. the new *Mimopeus*) are obviously good species, but others are probably no more than distinct geographical forms of mainland species. The status of these doubtful forms needs to be decided by specialists in the course of detailed revisions of the various groups". This statement probably also applies to species from other orders.

At the time the islands were visited, a large area of the southern part of Tawhiti Rahi was regenerating after fire damage. Grasses and small bushes were present in this area. Future collections from this region will probably reflect changes which have occurred in the composition of the flora.

Some species on the Poor Knights (e.g. *Platyzosteria novaeseelandiae, Cryptamorpha brevicornis, Coccinella leonina, Neoitamus varius, Sapromyza neozelandica,* and *Polistes tasmaniensis*) also occur over relatively large areas of the mainland. Dispersal of aerial species to the islands by prevailing westerly winds probably accounts for their occurrence. In discussing the origins of the White Island fauna, Wise (1970) states that the west-wind drift over New Zealand was probably important in the derivation of the fauna of that island from the mainland. In recent times some species may also have been transported to the Poor Knights by man.

The presence of flightless species (e.g. the carabs *Ctenognathus novaezelandiae* and *Mecodema* sp.) is of interest, particularly as the islands are, as Sumich (1956) says, ". . . steep to precipitous with cliffs from 50 ft [15m] to 400 ft [122m] high". These cliffs, being adjacent to the sea, provide a barrier to the establishment of terrestrial species arriving via the ocean. Apart from autochthonous species (species evolved on the islands), various mechanisms may have been involved in establishing flightless species; transport of eggs or other stages on the feet or other body parts of avian species is one hypothesis. Watt (1962) describes some methods by which terrestrial animals may disperse to offshore islands. Discussing the coleopteran faunas of Great Barrier and Mayor Islands (Fig. 1), Watt (1956) states that the only carab found by him on Mayor Island was a flying species, *Agonochila binotata.* He records several species of ground-dwelling carabidae from Great Barrier Island.

The Poor Knights differ from other northern islands in one biogeographically important respect. They were apparently not connected to the mainland during the last glaciation, when sea-level was about 100 m lower than now. This provides an explanation why there are endemic species of insects on the Poor Knights but not on the other northern islands (with the possible exception of the Mokohinau group). Migration of insects to the Poor Knights would have occurred earlier in the Pleistocene than to most other northern islands.

Milligan (1956) considers it likely that some land molluscs migrated to the Poor Knights and Hen Islands from the east via Coromandel-Great

Barrier and Little Barrier, partly over a discontinuous land route when sea levels were rising due to the post-glacial Flandrian Transgression. However, the bathymetric data does not support the hypothesis of a direct land connection between the Poor Knights and Great Barrier-Coromandel. The 50 fathom (approximately 100 m) bathymetric contour gives no indication of a connection, and the North Auckland area was relatively stable in late Pliocene and Pleistocene times.

The statement of Watt (1956) in relation to the origins of Great Barrier and Mayor Island faunas also applies to the Poor Knights at present, viz. "Definite conclusions cannot be made regarding the relationships of these island faunas without further collecting, both on the mainland directly opposite and the islands themselves".

A second difficulty in assessing affinities is that a number of insects cannot at present be identified to species. Thirdly, a variety of habitats have been sampled, some with more emphasis than others. Species so obtained have been incorporated into a single list. Although it is possible to make comparisons among islands on this basis, more meaningful results could be obtained by comparing faunas from similar or comparable habitats on different islands.

Future geographic studies of insects on the Poor Knights should be made with reference to studies on other terrestrial groups (e.g. Mollusca) as well as the geological history of the area.

ACKNOWLEDGMENTS

The assistance of the following specialists in identifying insects is gratefully acknowledged: Mr P. M. Johns, University of Canterbury; Dr A. M. Richards, University of Sydney; Dr R. G. Fennah, Dr H. Oldroyd and Dr B. H. Cogan, Commonwealth Institute of Entomology, London; Dr A. C. Eyles, Mr E. W. Valentine and Dr G. Kuschel, Entomology Division, Nelson. Dr J. C. Watt, of Entomology Division, identified Coleoptera and provided helpful criticism of the discussion. Associate-Professor J. Robb and Mr D. Merton assisted with collecting specimens, and my wife provided technical services.

REFERENCES

FRASER, W. M. 1925. The Poor Knights Islands. A brief account of the Maori occupation. *New Zealand Journal of Science and Technology* 8: 8-14.

MILLER, D. 1956. Bibliography of New Zealand Entomology 1775-1952. *New Zealand Department of Scientific and Industrial Research Bulletin* 120. 492 pp.

MILLIGAN, E. N. 1956. Land mollusca of some off-shore islands. *Tane* 7:56-57.

RICHARDS, A. M. 1962. Revision of the Rhaphidophoridae (Orthoptera) of New Zealand. Part XI—A new species belonging to the genus *Gymnoplectron* Hutton, 1897, from the Poor Knights Islands. *Transactions of the Royal Society of New Zealand (Zoology)* 2: 203-207.

SALMON, J. T. 1950. A revision of the New Zealand wetas. *Dominion Museum Records in Entomology* 1: 121-177.

SPILLER, D. 1942. A giant weevil *Phaeophanus turbotti* n. sp. from the Poor Knights Islands. *Records of the Auckland Institute and Museum* 2: 265-267.

SUMICH, J. J. 1956. Notes on the geology of the Poor Knights Islands. *Tane* 7: 64-65.

WATT, J. C. 1956. Coleoptera from Great Barrier Island and Mayor Island. *Tane* 7: 58-63.

WATT, J. C. 1962. Coleoptera from Hen Island (Taranga), Northland, New Zealand. *Records of the Auckland Institute and Museum* 5: 255-269.

WATT, J. C. 1963. The re-discovery of a giant weta, *Deinacrida heteracantha*, on the North Island mainland. *The New Zealand Entomologist* 3 (2): 9-13.

WHITAKER, A. H. 1968. The lizards of the Poor Knights Islands, New Zealand. *New Zealand Journal of Science* 11: 623-651.

WISE, K. A. J. 1970. On the terrestrial invertebrate fauna of White Island, New Zealand. *Records of the Auckland Institute and Museum* 7: 217-252.