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(Homoptera, Coleorrhyncha)

By

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THE PELORIDIIDAE OF LORD HOWE ISLAND

(Homoptera, Coleorrhyncha)

BY J. W. EVANS

Australian Museum

(Figures 1-5)

(Manuscript received 1.6.59)

For a considerable time it has been known that a representative of the archaic Homopterous family, the Peloridiidae, occurred on Lord Howe Island since a single nymph has been recorded from there (Bergroth, 1924). This had been collected by A. M. Lea.

Although during the intervening years several entomologists have visited the island, so far as is known no additional specimens have been collected. This is not surprising, as the insects are seldom found unless specially sought.

Because of their particular interest and because of their significance from the point of view of zoogeography, a visit was paid to the island during March, 1959, specially to search for these insects.

Lord Howe Island, which has a total area of approximately 5 square miles and is 7 miles long, is situated in the south-west Pacific, 300 miles east of Port Macquarie on the Australian coast. Port Macquarie is 100 miles north of Sydney. There are several islets adjacent to the island, one group in particular, the Admiralty Islands, being well known as the breeding place of numerous sea birds. About 18 miles to the south of Lord Howe Island is a remarkable pinnacle-shaped rock, 1,816 ft. in height, known as Ball's Pyramid.

The island is approximately crescentic in shape, the apices of the crescent being linked by a coral reef which encloses a shallow lagoon. This is the most southerly occurrence of reef coral in the world.

There are three groups of basaltic hills, linked together by sandy lowlands. The group at the southern end of the island consists of two precipitous mountains which rise to a height of 2,840 ft. (Mt. Gower) and 2,504 ft. (Mt. Lidgbird). The two other groups consist of hills ranging between 400 and 700 feet in height.

As is well known, the Peloridiidae occur only in moss which is permanently wet, and as the only place on the island where moss is known to occur in such a condition is on the top of Mt. Gower the search was narrowed to a restricted area.

The top of Mt. Lidgbird, like that of Mt. Gower, is frequently concealed by cloud and hence might be supposed capable of supporting vegetation with high moisture requirements, but while the summit of Mt. Gower consists of an undulating plateau several acres in extent, that of Mt. Lidgbird is a narrow crest.

In order to ascend Mt. Gower not only is fine weather necessary but also the services of a guide, as there is no readily recognisable track. Moreover, without an experienced guide it would be difficult to find one's way to the top in a morning's climb, since much of the mountain is precipitous.

Three attempts were made at an ascent, but the two first had to be abandoned because of bad weather. The third, which was made on the last day spent on the island, was successful.

The vegetation on the top of Mt. Gower, which is considerably different from that growing on the rest of the island, includes tree ferns, two of the four species of endemic palms, *Dracophyllum fitzgeraldi*, and various small trees and shrubs. Oliver (1916) has described how "almost every available space, whether on standing or prostrate stems and branches of trees, tree ferns and palms, appears to be thickly covered with ferns, mosses and lichens".

Three hours were spent on the top of Mt. Gower, and a search of moss made by my wife, our guide, Mr. R. Payten, and myself yielded a total of 24 adult Peloridiids and seven nymphs.

These, on examination, proved to represent what appear to be two species which, though having affinities with *Hemiodoecus leai* China and *H. veitchi* Hacker, are nevertheless sufficiently distinctive to merit the creation of a new genus for their reception.

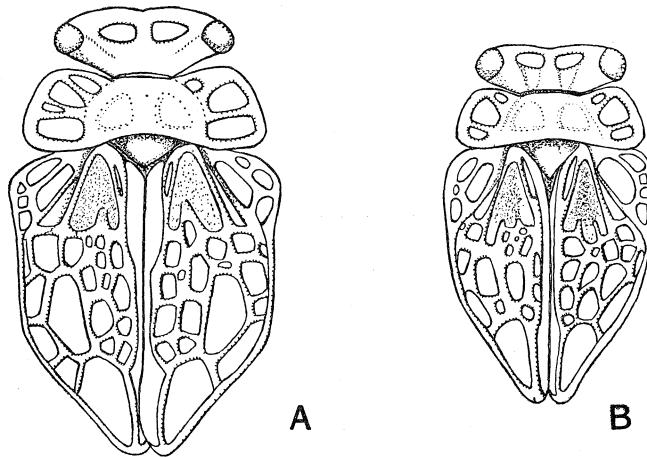


Figure 1.—A. *Howeria kingsmilli*. B. *H. payteni*.

***Howeria* gen. nov.**

The anterior margin of the head is slightly medially emarginate and either slightly rounded anterior to the eyes or else transverse. Small paired cephalic areolae are present, which in length are approximately equal to one-third or one-quarter of the total length of the crown. The eyes are not globose prominent, but form part of the curve of the head. The pronotum is slightly elevated medially, and laterally depressed. The prothoracic paranota are quadrilateral in shape and have the anterior and posterior corners rounded. Each has from two to four wide veins, any one of which may be branched apically. The tegmina, which are convex, may have the costal margin sinuate immediately behind the sub-costal expansion, or straight. The sub-costal expansion, which lies at a lower level than the rest of the tegmen, has a single large or two smaller cells posterior to Sc (for an interpretation of the venation of Peloridiids, see Evans, 1939) and three or more smaller cells between Sc and the costal margin.

The proximal part of the tegmen between M and the anal area is depressed, smooth and shiny, and the base of Cu1 is entirely obliterated. R lies along the costal margin of the tegmen, and the venation between M and the hind margin, except apically, is profusely reticulate. The margins of the cells, and sometimes also the cells themselves, are punctate.

Type species—*Howeria kingsmilli* sp.n.

Howeria spp are more closely related to certain species in the genus *Hemiodoecus* China than to species in any other genus of the Peloridiidae. In particular, they resemble *H. lei* China, the Type species, in the shape of the hind margin of the genital capsule, and *H. veitchi* in having R coinciding with the costal margin of the tegmen; thus the row of cells, which in most Peloridiids lie between the costal margin and R, are absent.

They differ from *Hemiodoecus* in having R and M distinct basally and not fused into a single vein; in the obliteration of the base of Cu1, and in the reticulate condition of the venation in the convex median part of the tegmen.

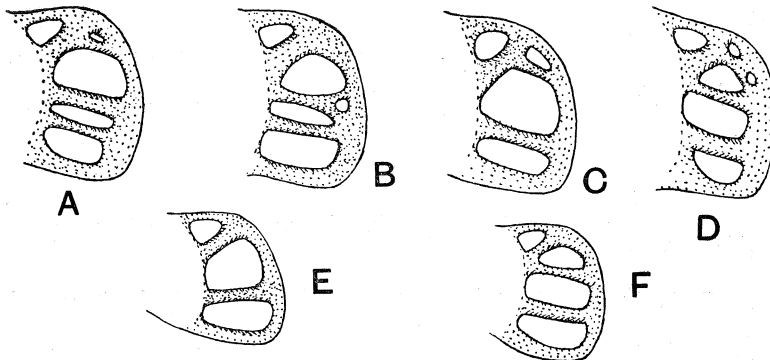


Figure 2.—A—D. Pronotal paranota of *Howeria kingsmilli*. E, F. Those of *H. payteni*.

***Howeria kingsmilli* sp.n.**

Dimensions: ♂ length, 3 mm; width of head, 1 mm; width across paranota, 1.6 mm; width across tegmina at their widest part, 1.7 mm. Corresponding measurements of ♀, 3.1, 1.15, 1.7, 1.8 mm.

Crown of head anterior to and between the areoleae, pale chestnut brown; posteriorly dark brown; eyes, dark reddish brown. Anterior margin of crown of head, slightly rounded in front of the eyes and slightly medially emarginate.

Pronotum concolorous with the posterior part of the head, the lateral medial depressions and the posterior third of the paranota, darker in colour than the remainder. Lateral expansions with a variable number of veins, up to four in number, but usually with two only, of which one, on either or on both sides, may be apically branched. Tegmina extending laterally beyond the paranota; costal margins sinuate posterior to the sub-costal expansions, marked with a variable pattern of light and dark brown; the sub-costal expansions, the costal margins and the apices, usually paler than the greater part of the rest of the tegmina.

Male genitalia: Ventral posterior margin of genital capsule medially narrowly acute, with a pair of small lateral triangular processes. Harpogones bent inwards, apically narrowly spoon-shaped.

Female genitalia: First and second valvifers and valvulae as in Figures 5, A, B.

Holotype, sub-brachypterous ♂, and *Allotype* sub-brachypterous ♀, from Mt. Gower (2,800 ft.), Lord Howe Island; in the Australian Museum (Registered numbers K67934, K67935); two *Paratypes* in the British Museum. Described from a total of 9 ♂♂ and 8 ♀♀.

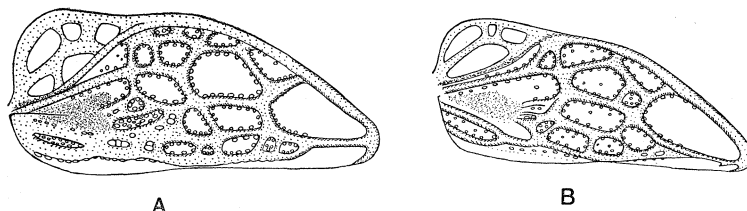


Figure 3.—A. Forewing of *Howeria kingsmilli*. B. That of *H. payteni*.

***Howeria payteni* sp.n.**

Dimensions: ♂ length, 2.6 mm; width of head, .9 mm; width across paranota, 1.35 mm; width across tegmina at their widest part, 1.35 mm. Corresponding measurements of ♀, 2.55—2.7 mm; .85—.95 mm; 1.20—1.30 mm; 1.40—1.60 mm.

Differs from the Type species in its smaller size; in the smaller degree of variability of the venation of the pronotal paranota; in having the costal margin of the tegmen anteriorly straight and not sinuate; in having a greater development of punctures in the tegminal cells additional to the marginal ones, and in the generally darker coloration.

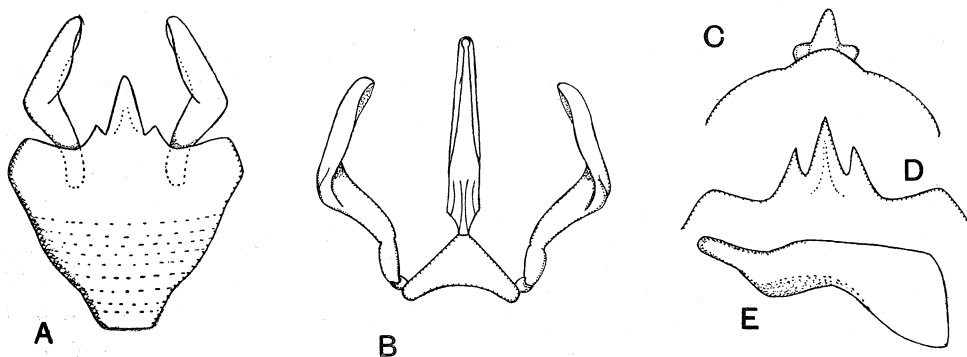


Figure 4.—A. Male genital capsule and harpogones of *Howeria kingsmilli* in ventral aspect. B. basal plate, harpogones and aedeagus of *H. kingsmilli*. C. hind margin of genital capsule of *Hemiadoecus veitchi*. D. hind margin of genital capsule of *H. leai*. E. harpogone of *H. leai*.

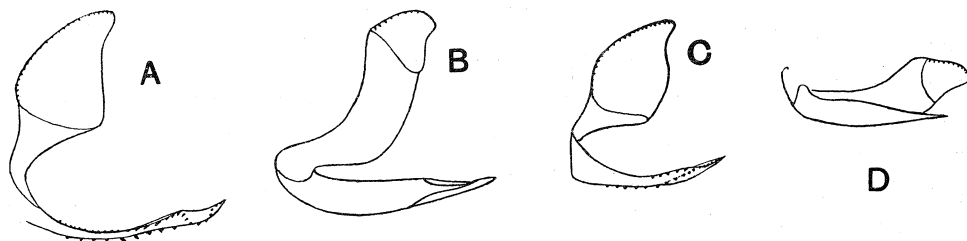


Figure 5.—A. First valvifer and valvula of *Howeria kingsmilli*. B. Second valvifer and valvula of *H. kingsmilli*. C. First valvifer and valvula of *H. paynteni*. D. Second valvifer and valvula of *H. paynteni*.

Female genitalia as in Figures 5, A, B. It is not possible at present to figure the male genitalia, since those of the two available specimens were lost, due to a mishap, in the course of preparation for examination.

Holotype, sub-brachypterous ♀, and *Allotype* sub-brachypterous ♂, from Mt. Gower (2,800 ft.), Lord Howe Island; in the Australian Museum; 1, ♀, (Registered numbers K67936, K67937). Paratype in the British Museum. Described from a total of 5 ♀♀ and 2 ♂♂.

DISCUSSION

The two species of Peloridiidae described above bring the total of the known species of this family to fifteen. Of the previously described ones, two (*Peloridium hammoniorum* Breddin and *Peloridora kuscheli* China) occur in cool temperate South America; six (*Xenophyes cascus* Bergroth, *X. stewartensis* Woodward, *Oiophysa ablusa* Drake and Salmon, *O. fuscata* Drake and Salmon, *O. distincta* Woodward, *O. cumberi* Woodward) in New Zealand; and five (*Hemiodoecus leai* China, *H. veitchi* Hacker, *H. wilsoni* Evans, *H. fidelis* Evans and *H. donnae* Woodward) in Eastern Australia.

In deciding how best to place the Lord Howe Island specimens, two decisions needed to be taken. First, whether to regard them as representatives of two, or of a single, species, and second, whether to include them in the genus *Hemiodoecus* or to create a new genus for their reception.

Dimorphism is known to occur among the Peloridiidae, since more than one form of *Peloridium hammoniorum* is known. The differences between these forms, however, are not so much ones of size as in their state of wing development.

In the relict New Zealand ulopid genus *Myerslophia* Evans (Cicadellidae), two groups of individuals occur which differ principally from each other in overall size. These have been regarded as separate species, though it is not known whether this represents correctly their true status. (Evans, 1947.)

As the difference in size of the two forms of *Howeria* is constant and as it is accompanied by others of a structural nature, it was decided to recognise each form as representing a distinct species. The fact that they were collected together in an identical environment might be regarded as a reason for doubting whether they were specifically distinct, but, as in Tasmania *Hemiodoecus leai* and *H. fidelis* have been found in the same piece of moss, this fact would not seem to preclude species separation.

The problem of generic placement is equally difficult. China (1924) has suggested that the Lord Howe Island Peloridiid probably belonged to the genus *Hemiodoecus*. Doubtless his suggestion was based more on the geographical situation of the island than on its actual faunal and floral associations. It has already been mentioned that *Howeria* spp. show particular affinity with two species of *Hemiodoecus*, *H. leai* and *H. veitchi*. The ventral posterior margin of the genital capsule of *H. leai* (Figure 4, D) resembles that of *Howeria kingsmilli* (Figure 4, A), although the harpogones of the former (Figure 4, E) are very different from those of the latter. The resemblance of *H. veitchi* to *H. kingsmilli* is associated with a venational and not with a genitalia character, and the hind ventral margin of the genital capsule of *H. veitchi* (Figure 4, C) does not closely resemble that of *H. kingsmilli*.

Howeria spp. have also certain similarities with the South American Peloridiids, since, like these, they possess only a few cells in the pronotal paranota. They differ in this characteristic from all the New Zealand species and from certain of the Australian ones.

Because of the remarkable stability in form of the Peloridiidae, combined with their high degree of individual variability; because of the occurrence of the few readily apparent distinctive characters in various combinations in the different species, and because of the fact that the two Lord Howe Island species are considerably more closely related to each other than they are to any of the species in the genus *Hemiodoecus*, it was decided that, rather than include them in this existing genus, it was preferable to create a new one.

Although *Howeria* spp. show affinity with some *Hemiodoecus* spp. they are not closely related to all species in this genus.

Woodward (1956), in a discussion of the inter-relationship of Australian and New Zealand genera of the Peloridiidae, has pointed out that the species comprised in the genus *Hemiodoecus* can be separated into two species groups. In one, containing *H. leai*, *H. veitchi* and *H. wilsoni*, the pronotal paranota contain two or three cells and the harpogones in the male genitalia are simple. In the other, containing *H. fidelis* and *H. donnae*, the paranota contain numerous small cells and the harpogones are forked.

As *Howeria* spp. are undoubtedly more closely related to the species in the first group than are those in the latter to the species in the second group, it becomes necessary, in order properly to express interrelationships, to create a new genus to contain *Hemiodoecus fidelis* and *H. donnae*, and this is done below.

Hemiodoecellus gen.nov.

The anterior margin of the head is slightly rounded in front of the eyes, or transverse, and the cephalic areoleae are reticulate. The pronotal paranota are likewise reticulate and the venation is highly variable. The costal margin of the tegmen is anteriorly straight; R is separated from the costal margin by a row of regularly spaced cells and the remaining cells in the tegmen are marginally punctate.

In the male genitalia, the posterior ventral margin of the genital capsule has a single lobe-shaped median process and the harpogones are branched.

Type species—*Hemiodoecus fidelis* Evans.

Hemiodoecellus differs from all other genera of the Peloridiidae, of which the male genitalia have been illustrated, in having bifurcate harpogones. It resembles *Xenophyes* and *Oiophysa* in having the venation of the pronotal paranota reticulate, and in this respect differs from *Hemiodoecus*, *Peloridium*, *Peloridora* and *Howeria*.

In addition to the Type species, *Hemiodoecus donnae* Woodward is transferred to the genus *Hemiodoecellus*.

THE ZOOGEOGRAPHICAL SIGNIFICANCE OF THE OCCURRENCE OF PELORIDIIDS ON LORD HOWE ISLAND

The problem of the origin of the fauna and flora of Lord Howe Island has been discussed by many authors. In a recent paper entitled "Lord Howe Island, A Riddle of the Pacific" (1958), Paramanov has pointed out that the basic flora is quite unlike Australia's and that typical elements of the New Zealand flora are practically absent. Hindwood (1940), in an article on the birds of the island, mentions that the strongest association of the fauna and flora is with New Caledonia, and this fact has been noted by many previous authors.

The southern beech *Nothofagus*, with the distribution of which Peloridiids are associated in Chile, New Zealand, Tasmania and Australia, grows also in New Caledonia, and because of this the author visited this island in 1957 to search for Peloridiids. None was found, nor was an environment discovered which would be favourable for their existence. *Nothofagus* is absent from Lord Howe Island. Nevertheless, there are several elements in the island's fauna and flora with southern associations. Thus, remains of fossil extinct horned turtles belonging to the genus *Meiolania* are abundant. Elsewhere, they have been recorded from Walpole Island, near New Caledonia, Queensland and Patagonia. Paramanov states that these turtles were probably marine, but whether they were so or not is uncertain.

Among plants, *Sophora tetraptera* and *Lobelia anceps* have been recorded from Lord Howe Island, New Zealand and South America, and *Apium prostratum* from Norfolk Island, the Kermadecs, New Zealand, Tasmania, Australia, southern South America and South Africa. A plant belonging to a genus with an interesting discontinuous distribution is *Moraea robinsoniana*, which grows on Lord Howe Island, all other representatives of the genus being confined to Africa (Oliver, 1916).

The presence of Peloridiids on the island strengthens the supposition which has been advanced by many previous authors that it was formerly part of a larger land mass, since these insects are unlikely to be capable of transport by adventitious means.

Other Homoptera include a single cicada, *Psaltoda insularis* Ashton, which is an endemic species belonging to an Australian genus and has doubtless been derived from an adventitious immigrant.

There are also at least two species of cercopids, but these would seem to be closer to two of the three species occurring in New Zealand (*Ptyelus trimaculatus* (White) and *P. subvirescens* (White)) than to any Australian ones.

ACKNOWLEDGEMENTS

For administrative purposes Lord Howe Island is part of New South Wales, and I am indebted to Mr. A. G. Kingsmill, Under-Secretary in the New South Wales Chief Secretary's Department, for arranging for facilities to be made available to my wife and myself, which made possible the ascent of Mt. Gower.

Appreciation is expressed to Mr. N. Fenton, Superintendent of the Island, for much help in many directions, and to our guide, Mr. R. Payten, for making the ascent of Mt. Gower as delightful an experience as it was an arduous one. Mention has been made of a visit paid to New Caledonia in 1957 in order to search for Peloridiids. This was financed by the Trustees of the Commonwealth Science and Industry Endowment Fund, to whom grateful acknowledgement is made.

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