Pacific Insects Monograph 27: 185–192 **10 November 1971**

ENTOMOLOGY OF THE AUCKLANDS AND OTHER ISLANDS SOUTH OF NEW ZEALAND: COLEOPTERA: HYDRAENIDAE

By **R. G. Ordish**[1]

Abstract: The family Hydraenidae is represented by 3 endemic species of *Meropathus* Enderlein, *M. campbellensis* Brookes on Campbell and Antipodes Islands, *M. aucklandicus* n. sp. on the Aucklands, and *M. johnsi* n. sp. on the Snares, which are closely related to 2 undescribed species from Stewart and Chatham Islands. The new species are described after a comparison of both male and female genitalia. The bearing that the form of these organs have on higher classification, and the distribution and habitats of the genus are briefly discussed, together with the diagnostic limitations of external morphology.

INTRODUCTION

Hydraenidae from the subantarctic islands of the Indian Ocean were recorded by Kidder as early as 1876. These specimens were referred initially to the genus *Ochthebius* Leech 1815 and it was not until 1901 that Enderlein erected the genus *Meropathus* and described the type-species, *M. chuni* from Kerguelen Island. *M. randi* was later described by Jeannel from Marion Island, and in 1951 Brookes described material from the New Zealand Subregion. His subspecies, *M. chuni campbellensis*, was given species rank by Gressitt & Samuelson in 1964. In 1967 Janssens transferred the Australian *Ochthebius labratus* Deane and *O. subcostatus* Deane to this genus and described a new species from Victoria, *Meropathus cornatus*. In the same paper he tentatively synonymised *M. randi* Jeannel with *M. chuni* Enderlein regarding it simply as a geographic race, and he pointed out that the male genitalia are identical. I am particularly indebted to Mr J. Balfour-Browne, formerly of the British Museum (N.H.), for drawing my attention to this paper because it has considerable bearing on the distribution of the genus. The occurrence of the genus in Australia shows that, far from being endemic to the subantarctic, it could quite easily have originated on a temperate continent and owe its present distribution, in part, to continental drift. If the Marion Island population is a race of the type species, there is a parallel relationship within the New Zealand Subregion because the genitalia of the Antipodes population are identical with that of *M. campbellensis* from Campbell Island. There is, however a slight difference in the male labrum, which is a little more prominent in the former.

Since 1964 additional material has been collected on other island groups in the New Zealand Subregion and from a study of this it becomes apparent that there are at least nine species, the five described ones, and new species on each of the Snares, Auckland, Chatham and Stewart Islands. The Chatham and Stewart Island species are omitted from the systematic section of this paper because these islands lie outside the geographic region under review. Their presence however, suggests that the genus could well be located on the New Zealand mainland if the right habitats are examined.

The beetles appear to be essentially coastal or semiaquatic. *M. chuni* and *M. randi* were both described as littoral. J. H. Sorensen's 1947 series of *M. campbellensis* from Courrejolles point, Campbell Island is labelled as being from under stones or around the nests of a mollymawk colony and subsequently this species has been collected from coastal moss, penguin rookeries and albatross

[1]Dominion Museum, Wellington, New Zealand.

nests. Over 1,000 specimens were collected on Antipodes Island by Dr G. Kuschel, and although they too were collected in part under stones in a penguin colony, the series shows a greater association with living plants, notably *Poa foliosa*, *Tillaea moschata* and *Puccinellia antipoda*, and Dr Kuschel informs me that they will also cling closely to porous rock. The Snares Island specimens were taken under stones in a cliff face or beaten from *Poa astoni*, while the Chathams species was collected at Awatotara beach, under stones on rock. The Auckland Island specimens were collected under driftwood above high tide mark or in association with Sooty Albatross nests, while the only known specimen from Stewart Island is a female collected by Dr Kuschel under a stone at Twilight Bay, Port Pegasus. The type of *Meropathus cornatus* Janssens was collected in foam at the base of the upper Gellibrand Falls, Otaway, Victoria, and Mr B.L.C. Stoyles is recorded by Deane (1931) as having collected *M. subcostatus* under tree ferns near streams and waterfalls in the Blue Mountains, N.S.W. Tambourine, Queensland is the locality published for *M. labratus* but there are no habitat details. Thus there is a semi-aquatic association for some species and the littoral element persists for others, but the association with larger oceanic birds as suggested by Brookes (1951) is not constant. *Meropathus* can be associated with plants, plant litter or rock, even in coastal situations.

One of the grounds on which Brookes based the avian association of *M. campbellensis* was the superficial coating that these beetles acquire in life. This has been variously described as a pale, granulate, waxlike substance but it is quite insoluble in solvents that could be expected to remove a wax. This coating is presumably an accumulation rather than an exudation because it is entirely lacking in teneral specimens and, in a long series, its formation can be traced through a linear accumulation of debris along the raised bristled sections of the elytra, to a uniform coating entirely covering the elytra, pronotum and head, but often excluding the labrum. In some cases, a massive pile of debris alters the insect's outline. This debris contains mineral particles and would appear to accumulate partly because of the rough setiferous nature of the dorsal surface, and partly because of the habitat. It is present on the Chatham and Auckland series and on the Snares specimens that were collected on the ground but it is noticeably absent from those taken from grass. When it is present it is partially made up of algae and is uniformly spread.

Acknowledgements: I am indebted to Dr G. Kuschel, Entomology Division D.S.I.R., for the invitation to contribute to this monograph as well as for the loan of specimens. For specimens I am also indebted to Mr P. M. Johns, University of Canterbury, Dr G. W. Ramsay and Dr J. C. Watt, Entomology Division, Dr J. L. Gressitt, B. P. Bishop Museum, Honolulu, and Mr K. A. J. Wise, Auckland Museum. For access to Indian Ocean material I would like to thank Prof. Ph. Dreux, University of Paris and Mr J. Balfour-Browne and Mr P.M. Hammond of the British Museum. My thanks are also due to Miss L. C. Hudson, Dr R. K. Dell and Dr G. Kuschel for reading the manuscript.

SYSTEMATICS

In his review of the natural classification of the families of Coleoptera, Crowson (1967) has indicated that a relationship between the Hydraenidae and the Hydrophiloidea is suggested by the form of the antennae, with its 5-segmented pubescent club and 3 glabrous segments before the cupule. He has mentioned general aquatic adaptions and also the non-predaceous mouthparts of the larvae and the enclosure of eggs in a cocoon, as hydrophiloid features. The family is however further characterised by having 6 or 7 visible abdominal sternites, staphylinoid wing venation, and an aedeagus lacking a distinct basal piece. Because of these features and larval morphology, some authors, notably Jeannel 1940, and Böving & Craighead 1953, have preferred to relate this

family to the Staphylinoidea.

As a contribution to a faunistic study the present paper is not the place for a detailed discussion of phylogeny, but the preparation of the systematic section has involved examination of both male and female genitalia and although these may not be conclusive, the genitalia are none the less strongly reminiscent of staphylinids. As these are very small species, the genitalia are characteristically reduced and simplified. The aedeagus is without parameres and this is one feature which originally separated the genus *Meropathus* from *Ochthebius*. The aedeagus bears a flagellum, and varies markedly from species to species in the form that it takes beyond the attachment of the flagellum at the ostium. The Australian species have, in addition, an envelopment of the base of the flagellum and, in one case, a tuft of setae at the base of the flagellum. Thus there would appear to be 2 groups within the genus, those with and those without a basal support.

The female genitalia are similarly simplified and lack spermathecal glands, accessory glands, and styli. Crowson (1967) has noted as a hydraenid feature the fact that eggs are enclosed in a cocoon and in *Meropathus* cocoon formation is also suggested by the very broad, open-ended vagina. In some preparations the vagina is faintly divided into 2 equal compartments by a horizontal constriction where the spermathecal duct enters, but in others it appears as a continuous sac. The whole structure is delicate and membranous, except for a pair of weakly developed sclerotised plates on the anteroventral surface. A sac, which could be interpreted as a bursa copulatrix, extends anteroventrally from the vagina (Fig. 6) in some species. The spermathecal duct is typically coiled or undulating but may be straight for part of its length as it approaches the vagina. It is always well sclerotised and merges with the spermatheca, which is coiled, tubular, often distally dilated, and more heavily pigmented. Dissection of staphylinids reveals a reproductive system which, if simplified, would equate with that found in *Meropathus* but all the hydrophilids so far examined reveal a completely different arrangement.

At this juncture it is clear that the genitalia provide the best method of differentiating species within the genus, and they already indicate 2 groups, an Australian group with a supporting collar at the base of the flagellum, and a subantarctic group without. However, until a systematic revision of the Australian *Ochthebius* is carried out, together with further collecting in the New Zealand region, relationships with the groups cannot be fully understood. Similarly it is difficult to assess the diagnostic value of external morphology, but size, configuration, labral projections in the male, form of elytral punctuation, carinae of the ventral thorax, and the form of the 8th sternite (6th visible) of the female, appear useful. Larvae which are available to me, collected since 1964, are all of *M. campbellensis* and add nothing to our understanding of the genus, as a larval description of this species has already been published (Samuelson 1964), except that the lateral constriction in the specimen illustrated by him is not typical.

Genus **Meropathus** Enderlein, 1901

Enderlein, 1901, *Zool. Anz.* **24:** 121; 1903, Wiss. Ergebn Dt. Tiefsee-Exped. **3**: 206; 1909, Dt. Südpol-Exped. **10** (Zool 2.): 411.—Orchymont, 1938, *Rev. Franc. Ent.* **5:** 78.—Jeannel, 1940, *Mem. Mus. Natl. Hist. Nat. Paris* ser 2, **14:** 129.

In 1938 d'Orchymont advocated subgeneric rank for *Meropathus*, returning it to the genus *Ochthebius*, and it was in response to this that Jeannel (1940) outlined some of the salient features of the genus. He drew attention to a complete lack of parameres and the presence of a long flagellum in the male genitalia which he likens to *Hydraena*. While he accepted a relationship with *Ochthebius* based on external morphology, it is clear that he regarded the genitalia as being generically diagnostic. Species which can be distinguished only with difficulty on external structure can be separated

easily when the genitalia are compared, and when the genus is better known it should be possible to expand its diagnosis and exclude much that is now included in specific descriptions. At the moment the genus is characterised by its broad rough elytra, with deep strial puncturation, irregular mound-like ridges on the elytral intervals and stout, recumbent setae, as well as by the form of the aedeagus and the absence of parameres.

KEY TO THE SPECIES OF MEROPATHUS IN THE NEW ZEALAND SUBANTARCTIC ISLANDS

1. Small species (1.6 mm); head not uniform in color; ♀ with 8th sternite weakly emarginate posteriorly (Fig. 4). Snares Is.....**M. johnsi** n. sp.
   Larger species (2.0–2.5 mm); head uniform in color; ♀ with 8th sternite deeply emarginate posteriorly (Fig. 5, 6).....2
2. Male with aedeagus constricted medially and acute beyond ostium (Fig . 2); ♀ with the spermathecal duct tightly coiled at its junction with bursa copulatrix (Fig. 5) Auckland Is.....**M. aucklandicus** n. sp.
   Male with aedeagus not constricted medially and broad beyond the ostium (Fig. 3); ♀ with spermathecal duct not tightly coiled at its junction with bursa copulatrix (Fig. 6) Campbell I.....**M. campbellensis** Brks

Meropathus johnsi Ordish, new species Fig. 1, 4.

Length 1.6–1.8 mm; width 0.6 mm. Color uniform, dark brown excluding head, pale fawn in teneral specimens. Clothed in moderately dense setae, dorsal microsculpture present on head and thorax only.

Head dark brown anterior to clypeal suture and in center but paler near eyes. Clothed in golden brown recumbent setae which are very dense near eyes, and sparse in center, and anterior to clypeal suture. Eyes prominent and coarsely faceted, lateral ocelli very prominent and separated from eyes by a distance less than their own diameter. Front without lateral keels. Vertex raised between the ocelli and bordered by deep lateral pit-like depressions. Labrum dark brown, strongly emarginate in ♀, and bearing projections in ♂ which are broadly triangular when viewed from above and very much shorter than those of *M. campbellensis*. Gena strongly concave.

Pronotum constricted posteriorly, densely setiferous at the sides. Discal groove broadly lanceolate anteriorly, narrowed and parallel-sided in posterior 1/2, smooth and bordered with recumbent setae. Ventral surface of thorax bearing granulose microsculpture and very fine setae. Prosternum lacking obvious carina, but mesosternum with strong "m"-shaped ridging. Metasternum deeply grooved medially at its border with hind coxae. Legs smooth with scattered fine setae except for dorsolateral face of tibia which is armed with numerous stout setae. Median tarsi of ♂ not enlarged.

Elytra with striae represented by rows of unconnected, moderately coarse punctures clearly visible from the ventral surface but obscured dorsally by numerous recumbent setae. Intervals interrupted by ridge-like thickenings which make dorsal surface uneven. Outer edge of elytra slightly serrated. Abdomen with 8th sternite of ♀ weakly emarginate (Fig. 4).

Male genitalia (Fig. 1) not constricted medially, briefly extended and abruptly pointed beyond ostium. Flagellum lacking any basal enveloping support. Female genitalia (Fig. 4) with the bursa copulatrix ill-defined, spermathecal duct loosely and evenly coiled and merging with spermatheca which is irregularly and loosely coiled and only slightly greater in diameter than the duct.

Material examined.

SNARES. Holotype ♂: Cliffs E of Sinkhole Flat, Snares I, P. M. Johns, 30.I.1967, beaten from *Poa astoni*. Paratypes, 5 ♂♂ and 11 ♀♀ from the same locality. Holotype and paratypes in Entomology Division, D.S.I.R.; paratypes in Canterbury, Dominion and Bishop Museums.

Distribution: Snares I.

Meropathus aucklandicus Ordish, new species Fig. 2, 5.

Length 2.6 mm; width 0.8 mm. Color uniform dark brown including head. Dorsal surface densely clothed

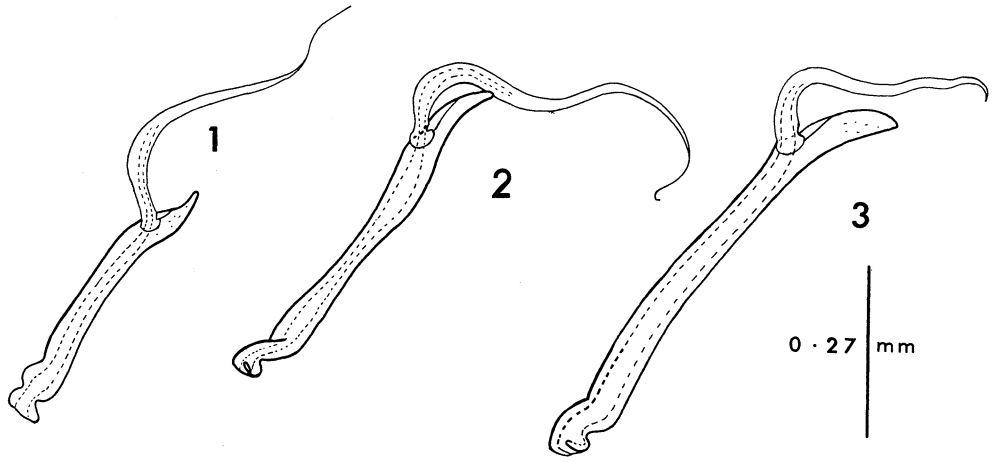

Fig. 1–3. Aedeagus (lateral): 1, *Meropathus johnsi* sp. n., Sinkhole flat, Snares Is; 2, *M. aucklandicus* sp. n., Webling Bay, Auckland Is; 3, *M. campbellensis* Brookes, Courrejolles peninsula, Campbell I. All to the same scale.

in strong recumbent setae which are numerous enough to entangle debris, giving specimens a grey overtone. Granular microsculpture confined to head anterior to clypeal suture, remainder of dorsal surface smooth and shining between punctures and setae.

Head uniformly dark brown, clothed with pale recumbent setae which are much sparser on vertex. Eyes prominent, lateral ocelli moderately prominent and separated from eyes by more than their own diameter. Front without lateral keels. Vertex raised between ocelli as in *M. johnsi* and bordered laterally by moderately deep depressions. Labrum moderately emarginate in ♀ and bearing triangular projections in ♂ which are intermediate in length between *M. johnsi* and *M. campbellensis*. Gena strongly concave.

Pronotum constricted posteriorly, and densely setiferous at sides. Discal groove shallow, and shaped and margined as in *M. johnsi*, but occasionally bearing a raised horizontal bar. Ventral surface of thorax bearing granulose microsculpture and fine setae. Prosternum without a carina but mesosternum with weak "m"-shaped ridging. Metasternum deeply grooved medially at its junction with hind coxae. Legs as in *M. johnsi*. Median tarsi of ♂ not enlarged.

Elytra with striae represented by rows of very coarse, penetrating punctures which are much larger than *M. johnsi* or *M. campbellensis*, the 7th and 8th row disrupted in posterior 1/2 of elytron. Intervals interrupted by ridge-like thickenings. Elytra obviously serrated along outer edge. Abdomen with 8th sternite of ♀ strongly emarginate and bearing a row of coarse setae.

Male genitalia (Fig. 2) with aedeagus obviously constricted medially, produced considerably beyond ostium, and gently tapered and slightly curved. Flagellum lacking basal support. Female genitalia (Fig. 5) with spermathecal duct tightly coiled as it approaches vagina, merging anteriorly with spermatheca which is obviously dilated.

Material examined.

Holotype ♂ from Sooty Albatross nest (*Phoebetria palpebrata*), Crozier-Webling Bay, Auckland I (N), 30.XII.1962, J. L. Gressitt. Paratypes, 4 ♂♂, 6 ♀♀; 2 ♂♂ from type locality, 1 ♂ from Ewing I, 5.I.1963, Gressitt, and 1 ♂ from Ocean I, 29.XII.1962, Gressitt; 1 ♀ from Tucker Point, 15.I.1963 K. A. J. Wise (Bishop Mus.); 2 ♀♀ from Crozier Point, 28.XII.1962, Wise (Bishop); 2 ♀♀ from Tagua Bay, Musgrave Peninsula, Adams I, 31.I.1966, K. A. J. Wise; 1 ♀ Magnetic Cove Stn., Adams Is, 28.I.1966, ex litter, G. Kuschel.

Distribution: Auckland Is.

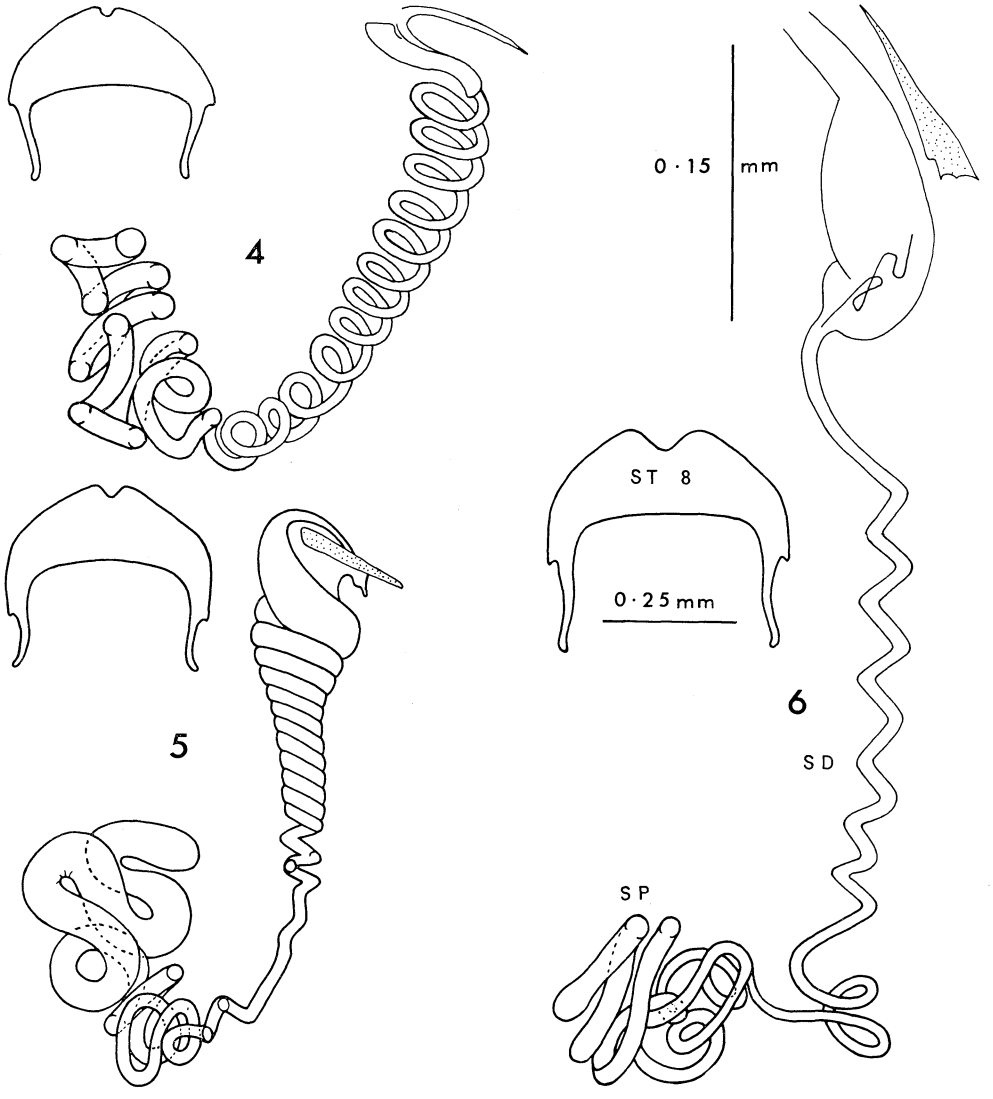

Fig. 4–6. Eighth sternite (St. 8), spermathecae (SP), and spermathecal duct (SD) (ventral) of 4, *Meropathus johnsi* n. sp., Sinkhole flat, Snares Is; 5, *M. aucklandicus* Adams I, Auckland Is; 6, *M. campbellensis* Brookes, Courrejolles peninsula, Campbell I. Sternites not to same scale as the genitalia.

Holotype and paratypes in Entomology Div., D.S.I.R., paratypes in Bishop, Canterbury Dominion and Auckland Museums.

Meropathus campbellensis Brookes Fig. 3, 6.

Meropathus chuni campbellensis Brookes, 1951, *Cape Exped. Ser. Bull.* **5:** 28.

Meropathus campbellensis: Gressitt & Samuelson, 1964, *Pacif. Ins. Monogr.* **7:** 377–78.

This species has already been described in detail by Gressitt & Samuelson and it remains only to compare it with *M. johnsi* and *M. aucklandicus* and to separate it from Australian species. The dorsal surface is very irregular; the recumbent setae are much more numerous and consequently there is a greater tendency for this species to accumulate debris. The projections on the labrum in the male extend much further than the other species.

Length 2.0–2.6 mm; width 1.0 mm. Color uniform dark brown, legs lighter. Dorsal surface heavily setiferous and usually bearing debris giving it a grey overtone. Head and pronotum bearing granulose microsculpture. Elytra smooth and shining between punctures.

Head uniformly dark brown, setae most numerous on labrum and near eyes. Eyes prominent, lateral ocelli prominent and separated from eyes by more than their own diameters. Front without lateral keels. Vertex raised and bordered laterally by deep depressions. Labrum dark brown and deeply emarginate in ♀, and bearing projections in ♂ which are triangular basally, but elongate anteriorly, longer and more widely separated in the Antipodes I population. Gena strongly concave.

Pronotum constricted posteriorly, densely setiferous particularly at sides. Discal groove as in *M. johnsi* and bordered by recumbent setae. Ventral surface bearing granulose microsculpture and fine setae. Prosternum without carina but mesosternum with a strong "m"-shaped ridge. Metasternum deeply divided posteriorly. Legs as in *M. johnsi*, median tarsi of ♂ not enlarged.

Elytral striae represented by moderately strong punctures visible from ventral surface but obscured dorsally by setae and debris. Intervals interrupted by ridge-like thickenings which are more developed than in the previous species. Outer edge of the elytra strongly serrated. Female with 8th sternite deeply and widely emarginate (Fig. 6).

Male genitalia with aedeagus broadened and blade-like beyond ostium, in lateral view (Fig. 3). Flagellum lacking basal support. Female genitalia (Fig. 6) with spermathecal duct loosely corrugated or straight as it approaches the vagina, spermatheca strongly coiled and only slightly dilated distally.

Material examined.

Holotype ♂, Dominion Museum. 18 specimens from Courrejolles Peninsula, St Col ridge 700 ft; Venus Bay, Campbell I, IX.1947, J. H. Sorensen. 1143 specimens from Stella Bay, Reef Point, Central Valley, and Hut Point, Antipodes I, II.1969, G. Kuschel.

Distribution: Campbell I, Antipodes Is.

LITERATURE CITED

Böving, A. G. & F. C. Craighead. 1930. An Illustrated synopsis of the principal Larval Forms of the Order Coleoptera. *Ent. Amer.* **11**(1): 1–351.

Brookes, A. E. 1951. The Coleoptera of the Auckland and Campbell Islands. *Cape Exped. Ser. Bull.* **5.**

Crowson, R. A. 1967. The Natural Classification of the Families of Coleoptera. E. W. Classey Ltd, Middlesex. (Reprint plus corrigenda and addenda).

Deane, C. 1931. Australian Hydrophilidae—Notes and New Species. *Proc. R. Soc. Victoria* NS **43**(11): 166–76.

1933. Australian Hydrophilidae—Notes and New Species, No. 2. *Proc. R. Soc. Victoria* NS **46**(1): 20–27.

Enderlein, G. 1901. *Meropathus chuni* nov. gen., nov. spec. Eine neue Helephorinen—gattung von der Kerguelen Insel. *Zool. Anz.* **24:** 121–24.

Gressitt, J. L. & G. A. Samuelson. 1964. Insects of Campbell Island. Coleoptera: Hydraenidae, Ptiliidae, Leptodiridae, Byrrhidae, Lathridiidae, Melandryidae. *Pacif. Ins. Monogr.* **7:** 376–90.

Janssens, E. 1967. Sur Quelques Hydraenidae de la Faune Australe. *Bull. Inst. R. Sci. nat. Belg.* **43**(11): 1–13.

Jeannel, D. R. 1940. Croisière du Bougainville aux Iles Australes Françaises. *Mem. Mus. Natl. Hist. Nat. Paris* (2)**14:** 1–325.

Kidder, J. H. 1876. Natural History of the Kerguelen Island (U.S. Transit of Venus Exped. 1874–75). *U.S. Nat. Mus. Bull.* **3:** 1–122.

Samuelson, G. A. 1964. Insects of Campbell Island. Appendix. Coleoptera. Hydraenidae, Leptodiridae (Larvae). *Pacif. Ins. Monogr.* **7:** 624–27.