

TRANSACTIONS
OF THE
ROYAL SOCIETY OF NEW ZEALAND

ZOOLOGY

VOL. 1

No. 8

SEPTEMBER 15, 1961.

[Continued from *Transactions of the Royal Society of N.Z.*, Volume 88, Part 4.]

Revision of the Rhaphidophoridae (Orthoptera) of
New Zealand

Part VIII—The Species *Turbottoplectron cavernae* (Hutton) 1900

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[Received by Editor, July 15, 1960.]

Abstract

THE species *Pleioplectron cavernae* Hutton is re-described and placed in the genus *Turbottoplectron* Salmon as *Turbottoplectron cavernae* (Hutton). The synonymy of this species is discussed.

INTRODUCTION

IN 1959, when Part V of this Revision was published, the only specimens of the species *Pleioplectron cavernae* Hutton known to be in existence consisted of an immature and badly damaged male and female in the British Museum (Nat. Hist.) Collection. From this type material, it appeared that *cavernae* did not belong to the genus *Pleioplectron* Hutton but was more closely related to *Pachyrhamma* Brunner. Since then the rest of Hutton's type material has been found and the author has been able to examine an adult male and female and a female nymph. Further fresh material which proves to belong to this species has also been collected from a cave at Taupo. This extra examination has confirmed the author's theory that the species *cavernae* does not belong to the genus *Pleioplectron*.

Genus *TURBOTTOPLECTRON* Salmon, 1948

Rec. Auck. Inst. & Mus., 3: 303.

Turbottoplectron cavernae (Hutton, 1900). Text-fig. 1, figs. 1-5.

1900. *Pleioplectron cavernae* Hutton, *Trans. N.Z. Inst.*, 32: 21.

1900. Non *Pachyrhamma edwardsii* (Scudder), Brunner, *Verh. z-b Gesellsch. Wien*, 38:

302. Hutton, *Trans. N.Z. Inst.* 32: 21.

1923. *Pleioplectron cavernae* Hutton, Chopard, *Trans. N.Z. Inst.* 54: 234.

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1930. *Pleiopectron cavernae* Hutton, Karny, *Ann. Nat.-Hist. Mus. Wien*, 44: 182–185.
1959. *Pleiopectron cavernae* Hutton, Richards, *Trans. Roy. Soc. N.Z.*, 87: 27–29, 326.
1959. *Pachyrhamma cavernae* (Hutton), Richards, *Trans. Roy. Soc. N.Z.*, 87: 327.

Hutton (1897) erected the genus *Pleiopectron* and placed in it four new species. *Pleiopectron simplex*, *P. hudsoni*, *P. pectinatum* and *P. diversum*. Two years later he added *Macropathus edwardsii* (Scudder) to the genus as *P. edwardsii* (Scudder). In 1900, he added another species to the genus as *Pleiopectron cavernae*, claiming it to be “easily distinguished from the others belonging to the genus by the greater number of spines on the lower surface of the hind femur”. Hutton described *P. cavernae* “from four males and two females”. Of this co-type series five specimens are still in existence, a male and a female nymph in the British Museum (Nat. Hist.) Collection, and an adult male and female and a female nymph in the Canterbury Museum Collection. The discrepancy between the number of specimens of each sex stated by Hutton and those specimens examined by the author is rather puzzling.

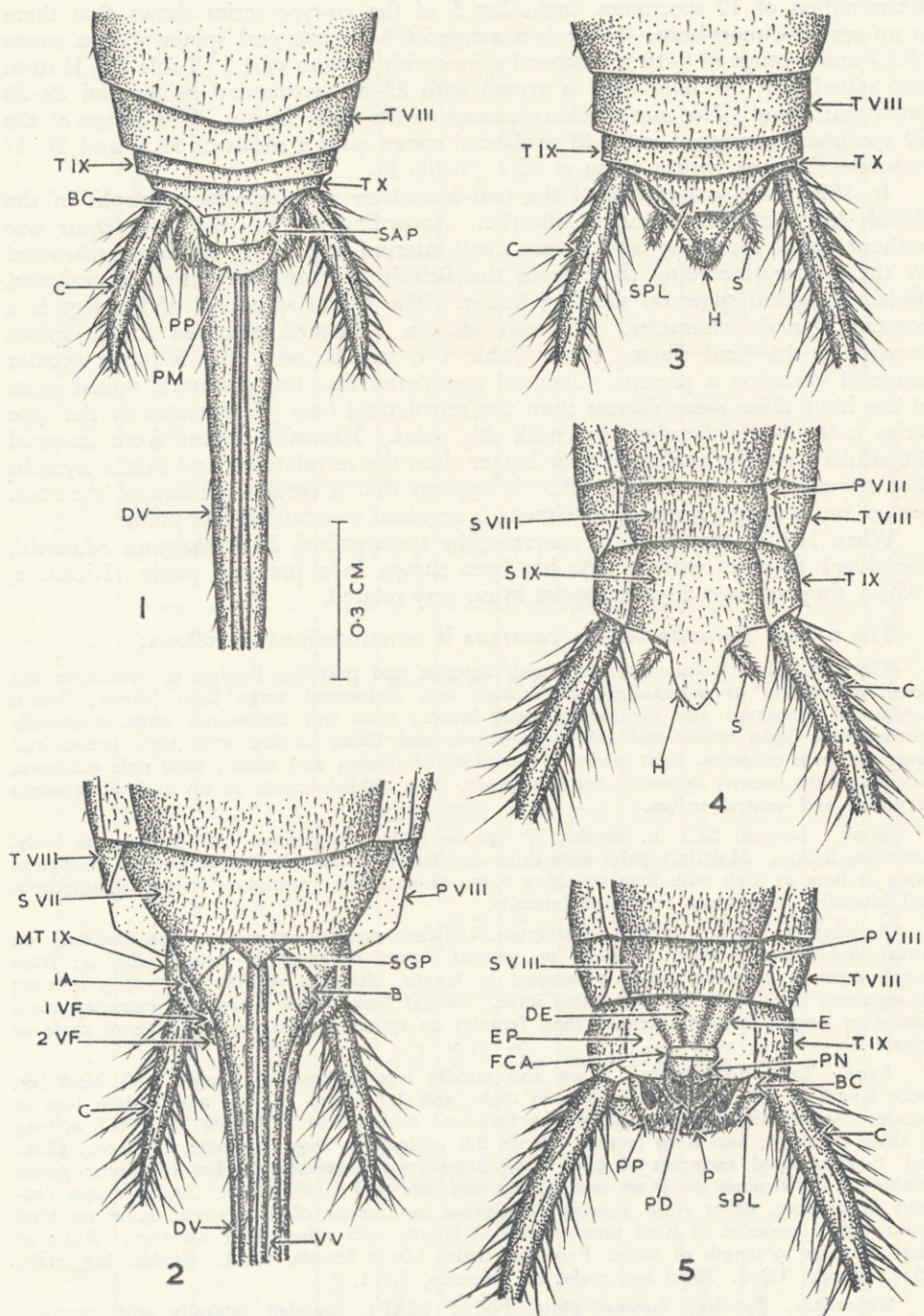
Hutton's type material was collected by R. M. Laing from a small cave near the Karapiti fumerole, Taupo. The author has attempted unsuccessfully to rediscover this cave in order to obtain further specimens of this species. In 1960, T. J. Hosking collected seven specimens, including an adult pair, from a cave in Kawakawa Bay, Western Taupo, which proved to be further specimens of *P. cavernae*.

Comparison of Hutton's type material of *P. cavernae* with his generic description for *Pleiopectron* has revealed several points in which they differ. He says the hind femora are without apical spines; but all specimens examined possess a prolateral apical spine beneath. He states that the hind tibiae have three pairs of apical spines, whereas four pairs are always present. His description of the genitalia, while agreeing with other species in the genus, does not fit for *P. cavernae*. He described the supra-anal plate as having the apex truncate with a point in the middle. In the female of *P. cavernae* examined by the author the apex was truncate without a median point; in the male the apex was slightly emarginate. He described the apex of the female subgenital plate as having three points. In *P. cavernae* the plate tapers to a single apex terminally. The subgenital plate of the male he described as cuspidate, terminating in an acute point between the styles. In *P. cavernae* it is triangular with a rounded apex. The genus *Pleiopectron* Hutton has been revised by the author, and the genus redescribed (Richards, 1959b). In view of the number of differences between *P. cavernae* and the generic description, it appears that *P. cavernae* was placed in the wrong genus.

In 1948, Salmon erected the genus *Turbottoplectron* to describe a new species of raphidophorid from Great Island, Three Kings Group. His description is based on two male specimens, the female being unknown. Salmon considered this genus was closely related to *Gymnoplectron* Hutton, but was distinguished from it by the absence of a retrolateral apical spine on the hind femora. In 1958, the present author synonymised *Gymnoplectron* with *Pachyrhamma* Brunner thus relating the latter genus with *Turbottoplectron*.

In all its generic characters *Pleiopectron cavernae* agrees with those given for *Turbottoplectron*. Because of this, the author proposes to place the species *cavernae* in the genus *Turbottoplectron* as *T. cavernae* (Hutton).

There are several points in which *T. cavernae* differs from Hutton's description of the species *Pleiopectron cavernae* but none of them are as important as the generic differences. Hutton claimed that there is a sexual dimorphism in the spination of the hind femur, there being 5–7 prolateral spines in the male and 4 in the female, and two retrolateral ones in the male and none in the female.



TEXT-FIG. 1.—*Turbottoplectron cavernae* (Hutton). Fig. 1—Female genitalia, dorsal view. Fig. 2—Female genitalia, ventral view. Fig. 3—Male genitalia, dorsal view. Fig. 4—Male genitalia, ventral view. Fig. 5—Male genitalia, ventral view, subgenital plate removed to expose structures beneath.

Examination of 12 specimens, including 5 of the co-type series shows that there is no sexual dimorphism. There is a range of 3–7 prolateral spines with a mean of 5.7 and a range of 0–10 retrolateral spines with a mean of 4.5 (Table I). Hutton also stated that the hind tibia is armed with 25–30 retrolateral spines and 22–28 prolateral spines. Not one specimen examined fits these figures. The range of the 12 specimens examined is 27–43 prolateral spines with a mean of 33.5, and 26–47 retrolateral spines with a mean of 35.7 (Table I).

In 1923, Chopard examined the two immature and imperfect nymphs in the British Museum (Nat. Hist.) Collection. According to him, the fore femur was without apical spines, or with a very small internal one. Every specimen examined by the author, including those from the British Museum, have had an inferior, prolateral apical spine on the fore femur. The apical spination of the legs is a constant generic character. As with Hutton, Chopard observed 25–30 spines present on the hind tibiae. From Table I it can be seen that a much greater range of variation is present. Chopard considered that the prolateral apical spurs of the hind tibiae were shorter than the retrolateral ones. Unfortunately the type series is too badly damaged to check this point. However, in the fresh material the adults have the prolateral spur longer than the retrolateral, and in the nymphs they appear to be equal in length. It appears that a certain amount of variation occurs, but a longer series of specimens is required to establish this point.

When Hutton described *P. cavernae*, he synonymised *Pachyrhamma edwardsii* (Scudder) Brunner with it. As has been shown in a previous paper (Richards, 1959a) they are two distinct species in no way related.

The species *Turbottoplectron cavernae* is now redefined as follows:

COLOUR. Basic colour ochreous, with anterior and posterior borders of pronotum and posterior borders of mesonotum, metanotum and abdominal terga light brown; lateral borders of pronotum and mesonotum light brown; nota and abdominal terga irregularly mottled with light brown and ochreous; femora and tibiae banded with light brown and deep and pale ochreous, light brown at junctions of femora and tibiae; tarsi pale ochreous, antennae light brown; ovipositor reddish-brown, deep reddish-brown at tip and along edges of dorsal and ventral valves.

BODY. Length, 22.5 in female; 27 mm in male. Ovipositor 0.66 as long as body. Antennae broken. Maxillary palpi with third and fourth joints subequal in length. Fastigium twice as long as high with base touching scape of antennae; pronotum margined anteriorly and laterally, mesonotum margined laterally.

ANTENNAE. As in generic description. Third segment narrower than pedicel; on dorsal aspect almost twice as long, on ventral aspect subequal in length with it; from fourth segment onwards segments unequal in length, although steadily decreasing in size; all segments thickly clothed with short setae. Sexual dimorphism present in antennae, male possessing longer, stouter antennae than female; no spines present on flagellum of male or female.

LEGS. Long and slender. Fore and middle legs subequal in length with hind leg, twice length of fore and middle legs in male, and 1.7 length of fore and middle legs in female. Sexual dimorphism is shown by fore and middle legs of female being 0.7 as long as those of male; and hind legs of female 0.6 as long as those of male. Femora, tibiae and two proximal segments of hind tarsi armed with variable number of linear spines (Table I). No spines occur on fore femora and fore and middle tarsi. Apical spines constant in number, differ from generic description in absence of retrolateral spine on hind femur. First segment of hind tarsus equal in length with other three together. Ratio of length of legs to length of body: Fore leg, male, 1.5:1; female, 1.3:1. Middle leg, male, 1.5:1; female, 1.2:1. Hind leg, male, 3:1; female, 2.2:1.

GENITALIA. *Female:* Suranal plate, Fig. 1 (SAP), rounded laterally with terminal margin truncate, bearing two groups of setae. Subgenital plate, Fig. 2 (SGP), truncate laterally, tapering to a pointed apex distally; whole plate very sparsely clothed with setae. *Male:* Suranal plate, Fig. 3 (SPL), concave laterally, slightly emarginate terminally. Subgenital plate (hypandrium), Fig. 4 (H), triangular, 1.2 longer than wide, sides spreading slightly proximally, tapering to concave distally with a rounded apex; sparsely clothed with setae on dorsal side, but with apical protuberance on ventral surface thickly clothed with

TABLE I.
VARIABILITY IN NUMBER OF LINEAR SPINES ON THE LEGS OF TWELVE
SPECIMENS OF *TURBOTOPLECTRON CAVERNAE* (HUTTON)

| | | Arith. Mean | | No. of Specimens | | Std. Dev. | | Range (or distribution) | |
|-----------------------|-------|-------------|------|------------------|----|-----------|------|-------------------------|----------|
| | | L | R | L | R | L | R | L | R |
| Fore Femur Inf. | Pro | 0 | 0 | 11 | 10 | — | — | — | — |
| | Retro | 0 | 0 | 11 | 10 | — | — | — | — |
| Fore Tibia Inf. | Pro | 2.8 | 2.9 | 11 | 10 | 0.40 | 0.57 | 2-3 | 2-4 |
| | Retro | 3 | 3 | 11 | 10 | — | — | — | — |
| Fore Tarsus | Pro | 0 | 0 | 10 | 10 | — | — | — | — |
| | Retro | 0 | 0 | 10 | 10 | — | — | — | — |
| Mid Femur Inf. | Pro | 0 | 0 | 12 | 9 | — | — | — | — |
| | Retro | 0.1 | 0 | 12 | 9 | — | — | (011, 1) | — |
| Mid Tibia Sup. | Pro | 2.9 | 3.0 | 12 | 9 | 1.16 | 1.22 | 1-5 | 1-5 |
| | Retro | 1.3 | 1.4 | 12 | 9 | 0.65 | 0.53 | 0-2 | 1-2 |
| Mid Tibia Inf. | Pro | 3.1 | 2.9 | 12 | 9 | — | — | (311, 4) | (2, 38) |
| | Retro | 3 | 3 | 12 | 9 | — | — | — | — |
| Mid Tarsus | Pro | 0 | 0 | 11 | 9 | — | — | — | — |
| | Retro | 0 | 0 | 11 | 9 | — | — | — | — |
| Hind Femur Inf. | Pro | 5.7 | 5.8 | 12 | 11 | 1.33 | 0.75 | 3-7 | 5-7 |
| | Retro | 4.1 | 5.0 | 12 | 11 | 3.37 | 3.22 | 0-10 | 0-10 |
| Hind Tibia Sup. | Pro | 33.0 | 34.1 | 12 | 11 | 3.86 | 4.89 | 27-41 | 27-43 |
| | Retro | 36.3 | 35.0 | 12 | 11 | 4.65 | 5.48 | 26-47 | 27-43 |
| Hind Tarsus 1 Sup. | Pro | 2.9 | 3.3 | 11 | 9 | 1.37 | 1.22 | 1-6 | 2-6 |
| | Retro | 2.8 | 2.8 | 11 | 9 | 0.87 | 0.67 | 2-4 | 2-4 |
| Hind Tarsus 2 Sup. | Pro | 0.3 | 0.4 | 11 | 9 | — | — | (08, 13) | (05, 14) |
| | Retro | 0.5 | 0.3 | 11 | 9 | — | — | (06, 14, 2) | (06, 13) |

(Superscripts in parentheses represent number of specimens.)

short setae. Two styli, Figs. 3, 4 (S), thickly clothed with short setae, length of styli being 0.2 length of sternite IX (S IX). Subgenital plate covers genitalia. Parameres, Fig. 5 (P), attenuated, broad at base and tapering to a point, subequal in length to width, prolateral margin thickly clothed with long setae, rest of paramere clothed with short setae. Pseudosternite, Fig. 5 (PD), 1.2 wider than long, tapering to a point distally. Penis, Fig. 5 (PN), two-lobed, each lobe 1.3 wider than long. Paraprocts, Figs. 3, 5 (PP), elongate, 1.7 longer than broad.

LOCALITY. In cave, Karapiti, Taupo (type locality), coll. R. M. Laing; in cave, Kawakawa Bay, Western Taupo, coll. T. J. Hosking.

TYPES. Lectotype male, paratype female and nymph in Canterbury Museum. Paratype male and female nymphs in British Museum (Nat. Hist.).

Turbottoplectron cavernae differs from *T. unicolor* Salmon, the only other species in the genus, in:

1. The absence of linear spines on the fore femora, and almost total absence of spines on middle femora.
2. Fewer number of linear spines on hind femora.
3. Possession of very slender legs.
4. Smaller styli on subgenital plate of male.

ACKNOWLEDGMENTS

I should like to thank Mr. E. G. Turbott, Assistant Director Canterbury Museum, and Dr. D. R. Ragge, curator of Orthoptera at the British Museum (Nat. Hist.) for permission to examine Hutton's type material of *Pleioplectron cavernae*. I should also like to thank Dr. H. R. Thompson, of the Applied Mathematics Laboratory, for assistance in preparing the table.

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INDEX TO TEXT-FIGURE

- B—basivalvula.
 BC—basal segment of cercus.
 C—cercus.
 DV—dorsal valve.
 H—hypandrium (subgenital plate of male).
 IA—intersegmental apodeme.
 MT IX—membrane tergite IX.
 P—paramere.
 P VIII—pleurite, VIII.
 PD—pseudosternite
 PM—perianal membrane.
 PN—penis
 PP—paraproct.
 S—stylus.
 SAP—Suralan plate, female.
 SGP—subgenital plate, female.
 SPL—suralan plate, male.
 S VII, S VIII, S IX—sternite VII, VIII, IX.
 T VIII, T IX, T X—tergite VIII, IX, X.
 1 VF—first valvifer.
 2 VF—second valvifer.
 VV—ventral valve.

INDEX TO TABLE I.

- Arith. mean—Arithmetic mean.
 Inf.—Inferior.
 L.—Left leg.
 Mid.—Middle.
 Pro.—Prolateral.
 R.—Right leg.
 Retrol.—Retrolateral.
 Std. Dev.—Standard Deviation.
 Sup.—Superior.

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