

## The genus *Tectoporus* Carl (Diplopoda, Polydesmoidea, Strongylosomidae)

by

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(concluded from p. 271).

By the structure of the gonopods the 11 species of *Tectoporus* can be divided into two categories :

1. A group, including the type together with *castaneus* Att. and *pictus* (Carl), characterized by the lack of a large spiniform process on the posterior side of the proximal part of the tibiotarsus (Fig. 4, *b*).\*)

2. A group of 8 species in which this process is present.

Whether this partition will prove to be phylogenetically correct cannot be decided at present since our information on the species, especially of the first group, is very incomplete. Future confirmation of it may necessitate the resurrection of *Pagioprium* Att. as a subgeneric name for the second group.

The species of the first group certainly display the simplest and perhaps the most primitive gonopod-structure within the genus, a remark that applies especially to *castaneus* and *pictus*. Besides the mentioned absence of process *b*, all species agree in having process *a* at the medial side of the tibiotarsus well developed. Furthermore they have the lobes *f* and *g*, characteristic for all species referred to *Tectoporus* here.

The type species of the genus, *gracilipes* Carl, has additionally the process *e* (marked *k* in CARL's figure) and a more distal process that may be homologous either to *c* or *d* in *hispidus*. The course of the solaenomerite in CARL's species is presumably identical with that described and figured in *hispidus*, although in this respect his species needs a re-examination.

The gonopods of *castaneus* have already been discussed in comparison with *gracilipes* by ATTEMS. Unfortunately there are some discrepancies between the figures of the gonopods ATTEMS has given of his species and moreover the position of the terminal part of the solaenomerite is not clearly indicated.

A comparison of the gonopod-drawings of *pictus* and *castaneus* reveals a striking similarity of the two. From CARL's description and drawing of *pictus* it might appear that a separate solaenomerite is not present and that the spermal channel forms part of the tibiotarsus itself. This remarkable condition has led ATTEMS to create a monotypical genus for this species. However, on account of the utterly conspicuous resemblance of the other details of the gonopods of *pictus* and *castaneus* it seems pretty certain that CARL misinterpreted the gonopods of his species by overlooking the solaenomerite. The probability of this presumption is supported by various other features in the general morphology that *pictus* has in common with other species of *Tectoporus*, as for instance the incrassate anterior legs of the ♂.

The second group is larger and counts 8 species, the affinity of which to *Tectoporus* is established here for the first time. The species agree

\*) Ent. Ber. 13 : 270.

with those of the first group in having the processes *a*, *f* and *g*, but differ in having process *b*. Moreover, the tibiotarsus in these species has the general tendency to become more complicated by a stronger development of the secondary processes.

In two species of this category, viz. *scutigeroïdes* (Att.) and *filarius* (Att.), these processes are somewhat less strongly developed. For these two species ATTEMS has created a genus that also included *Orthomorpha serrulata* Att. from Ceylon, and *Orthomorpha cornuta* Att. from Flores. In the key of the cited volume of the "Tierreich" (p. 28) this genus *Pagioprium* Att. was distinguished from other Strongylosomid genera by the following alternative:

"30 Tibiotarsus des Gonopoden mit einer Anzahl kräftiger oder mit vielen kleinen Sägezähnen *Pagioprium*

— Tibiotarsus des Gonopoden ohne solche Sägezähnen" for amongst others *Orthomorpha*. A brief examination of the gonopod-drawings of the four *Pagioprium* species gives enough evidence that the so-called "Sägezähnen" of the various species represent by no means homologous structures. On the contrary, *serrulata* and *cornuta* have neither affinities to each other nor directly to *scutigeroïdes* and *filarius*, and the genus *Pagioprium* as it has been conceived by ATTEMS cannot be accepted.

VERHOEFF has proposed a monotypical genus *Periballopus* for *scutigeroïdes*, but his name is antedated by *Pagioprium* with the same type species and for obvious reasons falls as a synonym of *Tectoporus*.

The close relationship of *scutigeroïdes* and *filarius* has already been stressed by ATTEMS. Like *hispidus*, *filarius* has the processes *a* to *g*, although comparatively they are much less strongly developed. By a personal study I could verify that the solaenomerite in this species is sheathed by the tibiotarsus in the same way as in *hispidus*. In fig. 19 and 20 of ATTEMS (1932, *Treubia* 14: 38) the processes *a*, *b*, *d*, *e* and *f* of *filarius* are homologous respectively to *a*, *b*, *c*, *d* and *e* of *hispidus*.

In many respects the gonopods of *scutigeroïdes* are very similar to those of *filarius*, but owing to the shortcomings of the illustrations I am unable to determine the homology of all processes.

In the other species of the second group the processes, especially of the part of the tibiotarsus distally of the course of the solaenomerite, are more strongly developed, a condition which alters the general aspect considerably.

*T. pygmaeus* (Poc.) and *T. ambiguus* (Carl), two very closely related species, have certainly much affinity to *hispidus*, and the homology of the processes of the tibiotarsus can easily be recognized. However, instead of the two processes *c* and *d* of *hispidus* there is only one in *pygmaeus* and *ambiguus*. It is difficult to decide with which of the two this process may be identical, but probably it is *c*.

CHAMBERLIN'S *Oxidus* species were described very briefly, and especially the gonopods, being pictured in situ, need a re-examination. As the same author gave similar illustrations of the gonopods of *filarius* and *pygmaeus* it is possible by a comparison of his figures to establish the close relationship of his *lamellifer*, *malabaricus* and *pangrangus* with *pygmaeus*. The tibiotarsus of the three species evidently is at least as complicated as in the latter, although very little can be said by the absence of more information.

A few species should be mentioned here, that may belong to *Tectoporus*, but the available information on them makes it impossible to assign them with any certainty to the genus as yet.

CHAMBERLIN (1945, Am. Mus. Nov. 1282 : 9, 10) described two *Oxidus* species : *O. sequens* and *O. annex* which however seem to have no special affinity to the type of that genus, *O. gracilis* (Koch). *O. sequens* may belong to *Tectoporus* because CHAMBERLIN calls it "a form belonging in the *filarius* group". However, neither his description, nor his gonopod drawings can give us any evidence in support of his view. The drawing of *annex* is also insufficient to determine its systematic position. The gonopods of this species markedly resemble those of an unpublished Sumatran *Tectoporus*, that will be described elsewhere. A similar resemblance exists in the gonopods of these two species and those of another species from Java, *Orthomorpha* (*Kalorthomorpha*) *brevipilus* Attems (1930, Arch. Hydrob. Suppl. 8 : 130). This species was compared by its author with *scutigeroideus* and *pygmaeus* but its generic position has to remain arbitrary as long as the position of the terminal part of the solaenomerite is unknown.

The preceding remarks will be sufficient explanation for the impossibility of drawing up a comprehensive diagnosis of *Tectoporus*. Of course the genus is virtually defined by the species referred to it, but in the present case the affinities have been established almost exclusively on the structure of the gonopods, and even so many points need a confirmation by actual study. Moreover the specific descriptions generally lack a methodical concept, and in view of our almost complete ignorance of the taxonomic value of the morphological characters, aside the gonopods, it is extremely difficult to define the limits of the genus. Still, it seems worthwhile to bring up some points characteristic for the species of *Tectoporus* in its emended sense.

#### *Tectoporus* Carl

1902 *T.* Carl, Rev. Suisse Zool. 10 : 567.

1931 *Celebestia* Attems, Zoologica Stuttg. 30 (79): 114.

1937 *C.* + *Pagioprium* + *T.* Attems, Tierreich 68 : 49, 94, 150.

1941 *Periballopus* Verhoeff, Zeits. Naturw. 73 : 241.

Small to medium sized *Strongylosomidae* with 20 segments, of brownish colour. Poreformula normal. Collum without lateral keels, sides generally appressed to the body. Bodysegments weakly to moderately constricted, waist finely longitudinally striate, beaded or without structure. Metazonites often with uneven surface, transverse sulcus well developed. Keels reduced to well developed. When well developed not wide, but with sharply pointed posterior edges. Pleural keels absent, seldom weakly present on anterior segments. 5th segment of ♂ with sternal process. Legs mostly rather long and slender, often with secondary sexual characters in ♂, as incrassate anterior pairs, or strongly elongate posterior pairs. Tarsal brushes absent. Gonopods with coxa of moderate length. Praefemur short, more or less oviform. Femur rather slender, of moderate length. No indication of postfemur. Tibiotarsus on lateral side distinctly separated from femur. Solaenomerite slender, proximal part on medial side, distal part on the lateral side of the main lamella of the tibiotarsus, and generally completely sheathed by two

opposite lamellae. Tibiotarsus without a separate solaenophore in the sense of VERHOEFF, but acting itself as such, often complicated by secondary processes. On the anterior side of the tibiotarsus two basal thin lamellae (*f* and *g*), on the medial side a lamella (*a*) placed transversely on the course of the solaenomerite.

Out of 11 species of *Tectoporus* 2 are recorded from Sumatra, 1 from Celebes and the other 8 from Java, principally West Java. It is highly probable that quite a number of forms await discovery, Java being faunistically the best known island of the Malayan archipelago.

The following is a key to the species of *Tectoporus* based on ♂ characters. The 3 species of CHAMBERLIN could not be included.

1. Tibiotarsus of gonopods without a large basal process on the posterior side ..... 2
  - Tibiotarsus of gonopods proximally of the course of the solaenomerite with a large spiniform process (*b*) at the posterior side, pointing in a distal direction ..... 4
2. Anterior legs strongly incrassate ..... *T. pictus*
  - Anterior legs not obviously incrassate ..... 3
3. Lobes at the base of the tibiotarsus at the anterior side (*f* and *g*) finely notched. Tibiotarsus without a lateral process on the part distally of the solaenomerite (*e*). Legs long, but the posterior pairs not exceptionally elongate ..... *T. castaneus*
  - Lobes at the base of the tibiotarsus evenly rounded. Process *e* present. Legs long, those of posterior pairs almost equalling half the body length ..... *T. gracilipes*
4. Basal process (*b*) exceeds the processes distally of the course of the solaenomerite by far in dimensions ..... 5
  - Aside the basal process at least one distal process of more or less equal dimensions ..... 6
5. Process *a* on medial side of tibiotarsus directed proximally .....
  - ..... *T. scutigeroides*
  - Process *a* directed distally ..... *T. filarius*
6. Distally of the course of the solaenomerite 3 processes (*c*, *d* and *e*) ..... *T. hispidus*
  - Distally only two processes ..... 7
7. Femur of 2nd and 3rd pair of legs without a strong ventral tubercle ..... *T. pygmaeus*
  - Femur of these legs with a strong ventral tubercle ... *T. ambiguus*

A list of the species of *Tectoporus* is given here, in which full bibliographical reference will be found.

#### ***Tectoporus gracilipes* Carl.**

1902 *T. g.* Carl, Rev. Suisse Zool. 10: 557, pl. 10, fig. 13–16 (1).

1937 *T. g.* Attems, Tierreich 68: 150, fig. 187.

Java (1).

#### ***Tectoporus castaneus* Attems.**

1930 *T. c.* Attems, Arch. Hydrob. Suppl. 8: 134, fig. 17–20 (1).

1937 *T. c.* Attems, Tierreich 68: 151, fig. 188.

Central Java, Ngatiloga-fall near Sarangan (1).

**Tectoporus pictus (Carl).**

- 1912 *Strongylosoma p.* Carl, Rev. Suisse Zool. 20 : 130, pl. 5, fig. 1—3 (1).  
 1931 *Celebestia p.* Attems, Zoologica Stuttg. 30 (79): 114.  
 1937 *C. p.* Attems, Tierreich 68 : 49, fig. 63.  
 South Celebes, Bowonglangi, 1200—1500 m. (1).

**Tectoporus scutigeroides (Attems).**

- 1930 *Orthomorpha (Kalorthomorpha) s.* Attems, Arch. Hydrob. Suppl. 8 : 128, fig. 10—13 (1).  
 1937 *Pagioprium s.* Attems, Tierreich 68 : 95, fig. 119—121.  
 1941 *Periballopis s.* Verhoeff, Zeits. Naturw. 73 : 241.  
 South Sumatra, Ranau-territory, east of Surabaia (1).

**Tectoporus filarius (Attems).**

- 1932 *Orthomorpha f.* Attems, Treubia 14 : 38, fig. 19—20 (1).  
 1937 *Pagioprium f.* Attems, Tierreich 68 : 96, fig. 122.  
 1945 *Oxidus f.* Chamberlin, Am. Mus. Nov. 1282 : 9, fig. 51 (2).  
 West Java, Tjibodas, 1400 m (1,2), Pangrango 2000 m (2).

**Tectoporus pygmaeus (Pocock).**

- 1894 *Strongylosoma p.* Pocock, in : Weber, Ergebn. Reise Niederl. O.-Ind. 3 : 360, pl. 22, fig. 2 (1).  
 1903 *S. trichonotum* Attems, Zool. Jahrb. Syst. 18 : 67, pl. 5, fig. 4 (2).  
 1907 *Orthomorpha p.* Attems, Mitt. Mus. Hamb. 24 : 110 (3).  
 1914 *O. (Kalorthomorpha) p.* Attems, Arch. Natg. 80A : 197.  
 1937 *O. (K.) p.* Attems, Tierreich 68 : 87, fig. 110.  
 1945 *Oxidus p.* Chamberlin, Am. Mus. Nov. 1282 : 10, fig. 52 (4).  
 West Java, Buitenzorg (1), Gedéh, 2000 m (2), Buitenzorg, Botanical Garden, Tjibodas, wood of Tjompea (3), Tjibodas, 1400 m, Pangrango 2000 m (4).

**Tectoporus ambiguus (Carl).**

- 1941 *Orthomorpha (Kalorthomorpha) a.* Carl, Rev. Suisse Zool. 48 : 359, fig. 1—3 (1).  
 West Java, Sukabumi (1).

**Tectoporus lamellifer (Chamberlin).**

- 1945 *Oxidus l.* Chamberlin, Am. Mus. Nov. 1282 : 9, fig. 50 (1).  
 West Java, Tjibodas, 1400 m (1).

**Tectoporus malabarus (Chamberlin).**

- 1945 *Oxidus m.* Chamberlin, Am. Mus. Nov. 1282 : 10, fig. 55. (1).  
 West Java, Gunung Malabar, 1600 m (1).

**Tectoporus pangrangus (Chamberlin).**

- 1945 *Oxidus p.* Chamberlin, Am. Mus. Nov. 1282 : 10, fig. 56 (1).  
 West Java, Pangrango, 3000 m (1).

**Tectoporus hispidus Jeekel.**

- 1951 *T. h.* Jeekel, Ent. Ber. 13 : 268, fig. 1—4 (1).  
 West Sumatra, Gunung Singgalang, 1200—1800 m (1).

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