A new Pill-milliped from the Malayan Peninsula (Diplopoda, Sphaerotheriidae) by C. A. W. JEEKEL (with 7 text-figures)

From the Director of the Raffles Museum, Mr M. W. F. Tweedie I received two specimens of a pill-milliped for identification. The animals had been collected by the Scrub Typhus Research Unit and were found infested with Trombiculid mites by the Institute of Medical Research. They proved to represent a new species which is described below.

*Sphaeropaeus globus-magicus* nov. spec.


Colour of head and antennae brownish black. Collum brownish black with a narrow pale posterior margin. Second tergite brownish black, posterior third of raised part ochraceous, posterior margin brownish black. Lateral marginal rim pale. Tergites 3—12 brownish black, except the posterior third of each, which is ochraceous. Posterior margin brownish black. Upper half of pygidium brownish black, lower half ochraceous, somewhat infuscate towards the margin. Legs brownish to blackish.

Length of holotype about 42 mm, width 22.5 mm. Length of paratype about 40 mm, width 22.2 mm.

Anterior margin of head almost straight, labral sinus with one median tooth. Head plate longitudinally slightly arched, more strongly in the posterior part; transversely almost flat, except for a slight depression on each side medio-anteriorly of the praeanimal bridge. Anterior part strongly and roughly punctate and hairy. Middle part with irregularly scattered punctuation and without hairs. Posterior margin densely pubescent. Prae-antennal bridge straight, not emarginate. Laterally of the eyes, behind the antennal socket one single ocellus, separated by about 1 1/2 of its diameter from the others.

Antennae (fig. 1) with sixth joint anteriorly expanded. Seventh joint reduced to an elliptical pad, placed obliquely on the longitudinal axis and bearing numerous sensitive cones.

Collum with scattered punctuation, near the anterior margin somewhat more strongly punctate and hairy. Along the anterior border from one side to the other a fine ridge, in the middle somewhat remote from the border.

Raised part of second tergite smooth and shining, longitudinally almost flat. Laterally the raised part is distinctly marked from the
declivous part, but anteriorly it is rounded and passes into a narrow steeply sloping zone, that is anteriorly delimited by a fine ridge, the middle continuation of the marginal rim of the tergite. Just above this ridge a narrow bristle zone. Towards the sides the steep zone becomes more sloping, increases slightly in width to attain its largest expansion in the latero-posterior edge. Declivous part with setiferous punctuation and some indistinct radial folds. Seen from the side, the anterior margin of the tergite is evenly rounded. The lateral border of the raised part is asymmetrically rounded, the posterior border is slightly bent forward with respect to the posterior border of the tergite. Underside of second tergite with well developed pubescent swellings laterally of the eyes.

Tergites 3—12 smooth and shining, with some minute wrinkles. Anterior margin beaded, with one row of granules. On the sloping part behind the depression a narrow zone of bristles. Underside of the tergites with a zone of marginal bristles which generally do not surpass the posterior border (Fig. 2). Intersegmental membrane with two types of bristles: long bristles of the normal kind and short conical bristles. This second type is also found on other hairy parts of the body, e.g. the legs. On the intersegmental membrane the normal bristles are predominating on the posterior part, whereas the conical bristles are to be found on the anterior part, where normal bristles are almost completely wanting.

Pygidium smooth and shining, in the central part irregularly and finely punctate and minutely wrinkled. In the paratype the punctuation is more dense and the wrinkles are more developed, and only a broad marginal zone is smooth. Seen from above, the
posterior margin of the pygidium is semicircular, seen from behind the margin is somewhat curved below the horizontal line in the middle. Seen from the side, the pygidium is arched dorsally and rather steeply sloping posteriorly, not saddle-shaped. Margin of pygidium rather sharp, with a fine premarginal ridge. The fine furrow which marks this ridge dorsally, ends at some distance of the anterior border of the pygidium. Underside of the pygidium laterally with a short dark crest, about as long as the homologous crest of the preceding tergite. After an indistinct interruption it is followed up by a dark line, about three times as long as the crest, which remains parallel to the margin of the pygidium. The wall on

Fig. 5. *Sphaeropaeus globus-magicus* nov. spec., left anterior telopod, from behind. prf: praefemur. co: syncoxite. — Fig. 6. id., right anterior telopod, distal part from behind. ta: tarsus. ti: tibia. fe: femur. fe pr: femoral process. — Fig. 7. id., right posterior telopod, anterior view, ta: tarsus. ti: tibia. fe: femur. fe pr: femoral process. prf: praefemur. co: syncoxite. co pr: coxal process. br 1: bristle lobe.
the underside of the pygidium is developed only on the lateral sides and disappears gradually towards the middle. Excepting a hairless zone along the margin, the underside of the pygidium is pubescent.

Coxae of second pair of legs with a small blunt cone on the antero-lateral side. Coxae of following pairs (fig. 3) with a lateral lobe which ends distally in some small tubercules. The lateral lobe bears only a few hairs, but is densely covered with conical bristles. These conical bristles are also present on the coxa itself and on the other joints, especially on the third. On the tarsus they are missing. Ventral margin of third joint with a number of small notches. Tarsi of first two pairs of legs attenuated towards the end, without a supra-apical spine. Tarsi of following pairs obliquely truncate (fig. 4), each with one supra-apical spine. Number of ventral spines varying between 6 and 11, from the third pair onwards the number is generally 10. The proximal spines just before the middle of the tarsus.

Syncoxite of anterior telopods (fig. 5) with distinct median suture. Anterior surface with some tiny bristles. Praefemur, excepting the posterior side, densely pubescent. Bristles long on the medial side. Femur also densely covered with hairs, long hairs especially on the medial side. Femoral process (fig. 6) on the latero-posterior end of femur, rather short and broadly rounded. The distal part hairless. Tibia rather short, curved backwards like a hook, attenuated towards the end. Only a few tiny hairs. The distal end bears on its lateral side a series of stridulating knobs. Tarsus completely reduced, indicated only by an incomplete suture on the medial side of the distal part of the tibial hook just before the end.

Posterior telopods (fig. 7) with coxal processes curved strongly backwards and slightly outwards, covered with fine bristles. Bristle lobes densely covered with long hairs. Praefemur and femur more or less densely covered with hairs on all sides, except for a longitudinal hairless zone on the latero-posterior side of the femur. Posterior surface of femoral process also densely pubescent, the distal end hairless. The middle of the process incrassate, with the posterior side rather strongly inflated. The end attenuate, the distal point curved forward. Latero-posterior margin of femoral process heavily chitinized, the surface directed towards the tibia membranous, with two digitiform lappets. Tibia almost hairless, bearing at the distal end on the posterior side a longitudinal row of ca. 13 stridulating knobs. Tarsus distinctly separated from the tibia, slightly incrassate in the middle and bearing some sparse bristles.

♀ unknown.

Determining the affinity of the present species to other Indo-Malayan *Sphaerotheriidae* is a rather difficult proposition. The species known from Malacca have been referred by subsequent authors to *Sphaeropaeus* Brandt and *Zephyonia* Gray. These two genera each have been interpreted by various authors in a very different way, and in the course of time they have become very heterogeneous.
In Zephronia the confusion is due mainly to the fact that the type species, *Z. ovalis* Gray, has never been described adequately. In 1895 Pocock (Ann. Mag. N.H. (6) 16: 413) restricted the genus for species which have attenuate tarsi and a distinct tarsal joint on the posterior telopods, and as he might have studied *Z. ovalis*, this is the only information we have concerning the more important characters of this species. The structure of the anterior telopods is not known, and it remains to be seen whether the numerous species described as *Zephronia* really are congeneric with *ovalis*. This is certainly not the case with some *Zephronia*-species recently published by Chamberlin (1945, Am. Mus. Nov. 1282: 1,2).

The type of Sphaeropaeus, *S. hercules* Brandt, is sufficiently known, at least in the sense of Pocock (1894, in Weber, Ergeb. Reise Niederl. O. Indien 3: 326, pl. 20, fig. 1—1c) and Carl (1906, Zool. Jahrb. Syst. 24: 230, pl. 17, fig. 5—6). Nevertheless the interpretation of this genus as it has been given more recently by Verhoeff (1924, Ark. f. Zool. 16 (5): 59) and Attems (1935, Arch. f. Hydrobiol. Suppl. 14: 130 and 1944, Ann. Mus. Wien: 153: 61) is wrong. Their definition was based principally on a species from Malacca: *S. malaccanus* Verhoeff (l.c.: 68) which has only a remote relationship with *S. hercules* and may even be regarded generically different from the latter. *Sphaeropaeus* in its true sense has been redescribed as *Pantitherium* Attems (1932, in v. Straelen, Rés. Sci Voy. Ind. Or. Léopold 3 (12): 7) and to make things even more complicated some recently described *Sphaeropaeus* species have been placed by their authors erroneously in other genera.

For a right diagnosis of *Sphaeropaeus* I may refer to that of *Pantitherium* given bij Attems in 1935 (l.c.: 131) with the addition that the stridulating knobs on the posterior telopods may be reduced in number or even absent. In this sense the following species belong to this genus: *S. hercules* Brandt, *S. gladiator* Pocock 1894, *S. punctulatissimus* Silvestri 1897, *S. tigratus* Silvestri 1897 and *S. velutinus* Carl 1906, and additionally: *Pantitherium lugubre* Attems 1932, *Pantitherium politum* Attems 1935, *Kophosphaera uncigera* Attems 1944, *Arthrosphaera glabra* Attems 1944 and *Tonkinobulum sumatrense* Chamberlin 1945. All the species mentioned are from Sumatra, to which island the genus seems to be confined. A restudy of the types of these species may reveal the identity of at least some of them with previously described *Sphaeropaeus* species.

It is quite evident that when we accept the definition of *Sphaeropaeus* as it is given here, the present new form does not belong in this genus. The reduction of the tarsal joint of the anterior telopods, together with the presence of a stridulating apparatus on both pairs of telopods, not to mention other characters, would certainly justify the erection of a new genus. However I prefer to erect this genus later, on one of the allied species from Malacca which I have in study and of which also ♀ specimens are available.

These preliminary remarks may suffice to prove the necessity to review all species known so far from the area involved, irrespective of the genera in which they have been placed.
All species from Malacca referred to Zephronia belong to a group characterized by the possession of three supra-apical spines on the tarsi of the ambulatory legs. As far as known the anterior telopods have a well developed tarsus, more or less distinctly separated from the tibia, while the tibia itself is more straight and never hooklike as in the present species.


The original descriptions of the two species of Silvestri are very incomplete and offer no characteristic features that would make possible their recognition without a re-examination of the types. Moreover S. extensis was described from Nias and S. modiglianii from the West coast of Sumatra and from a geographical point of view their presence on the Malayan peninsula must be considered doubtful. For the same reason the record of S. hercules needs confirmation. From the remarks Sinclair made on his "extensis" and "modiglianii", it may be inferred that these species are specifically different from globus-magicus, although his drawing of an anterior telopod of "extensis", in spite of its shortcomings, gives reason for the presumption that the species he designated under this name is closely related to the present form.

Pocock described his two species S. bimaculatus and S. zonatus in a synoptical key (l.c.: 412). The few lines spent on each of them leave us completely ignorant of their more important characters, and their systematic position must remain dubious until a restudy of the types has taken place.

S. malaccanus Verhoeff is easily distinguished from globus-magicus by, amongst other things, the structure of the anterior telopods. Judging from its description it seems likely indeed that malaccanus is more closely related to the Malayan Zephronia-species.

It is with the remaining species, S. evansi Sinclair (l.c.: 526, pl. 31, fig. 57, pl. 32, fig. 79, 80, 83, 91) that the new form may have closest relationship. The description does not permit a thorough comparison but the drawing of the anterior telopod given by Sinclair shows a hooklike tibia which obviously suggests the one of globus-magicus. The movable digit of the anterior telopods is stated to be single-jointed, but as the tarsus in globus-magicus is indicated only by a suture, a similar structure in evansi might easily have been overlooked by Sinclair. The available information about evansi gives us only the colour as distinctive character.

From what is known of the fauna of the adjacent countries, it seems likely that we will have to look for the relatives of globus-magicus among the Birmese Zephronia-species. Many of these species are insufficiently known as regards their telopods, and a discussion of their systematic position would be premature.
The holotype of the new species will be preserved at the Zoological Museum at Amsterdam, while the paratype will be returned to the Raffles Museum, Singapore. For the privilege of studying this interesting form, which rates among the most beautifully coloured in the entire family, I am very much indebted to Mr Tweedie.