

***Parogovia pabsgarnoni*, sp. n. (Arachnida, Opiliones, Cyphophthalmi) from Sierra Leone, with notes on other African species of *Parogovia***

**Gerald Legg**

The Booth Museum of Natural History,  
194 Dyke Road,  
Brighton, Sussex, BN1 5AA

**Summary**

An account of the external morphology of a new species of cyphophthalmid, *Parogovia pabsgarnoni*, is given. The morphological changes between instars and the taxonomic position of the new species are discussed. *Parogovia sironoides* Hansen, 1921 is redescribed from the type material. *Metagovea gabonica* Juberthie, 1969 is formally transferred to the genus *Parogovia*, and the relationships between the African species of *Parogovia* are discussed.

**Introduction**

Over the past few years there has been a marked increase in our knowledge of cyphophthalmids, strange mite-like opilionids which occur in leaf litter, soil and caves. Increased interest in the soil/litter and cave ecosystems, and improved sampling techniques, have contributed to this knowledge. During a study of the litter, humus and soil system of a tropical semi-deciduous rainforest in Sierra Leone, a hitherto undescribed species of cyphophthalmid was found together with many other arachnids new to science. The species was at first thought to be *Ogovea grossa* Hansen & Sørensen, 1904 (Pabs-Garnon, 1977). However, W. A. Shear (pers. comm.) pointed out that this was not the case and that it was more likely to be a species of *Parogovia* Hansen, 1921. Additional, more detailed observations of the species, and examination of similar, known species, proved this to be the case. These studies also highlighted a number of difficulties within the family Neogoveidae, notably the problematic status (Shear, 1980) of *Metagovea gabonica* Juberthie, 1969.

The present paper provides a redescription of *Parogovia sironoides* Hansen, 1921, and a description of *P. pabsgarnoni* sp. n., with details of the comparative morphology of its various instars. In addition *Metagovea gabonica* is formally transferred to the genus *Parogovia*.

**Family Neogoveidae**

There are currently three genera included in this family: *Neogovea* Hinton, 1938, *Parogovia* Hansen, 1921 and *Metagovea* Rosas Costa, 1950, excluding *Brasilogovea* Martens, 1969 which is a synonym of *Neogovea* (Shear, 1980). A detailed diagnosis of the family has been provided by Shear (1980).

**Distribution**

The genus *Neogovea* is confined to the New World, as was *Metagovea* until the description of *M. gabonica* Juberthie. Before the assignment of *gabonica* to

*Metagovea*, the Neogoveidae were represented in Africa only by *Parogovia* Hansen. With the following transfer of *M. gabonica* to *Parogovia*, Africa's only genus in the Neogoveidae is again *Parogovia*.

**Genus *Metagovea* Rosas Costa, 1950**

*Metagovea* Rosas Costa, 1950; Juberthie, 1960, 1961, 1969; Goodnight & Goodnight, 1980; Shear, 1979, 1980.

*Type species: Metagovea disparunguis* Rosas Costa, 1950. Department of Antioquia, Rio Negro, Colombia 1945, collected from debris by J. Alejandro. Deposited in the author's collection.

**Characters of genus**

Typical medium-sized cyphophthalmids. Grooves between opisthosomal tergites weakly developed and median groove absent. Ozophores removed from margin of prosomal scute by about 2-2.5 times diameter of their base; not fully dorsal; openings subterminal. Anterior margin of scute indented, with low rounded lateral extensions, bases of which equal to diameter of ozophore base; median process absent. Claws of legs I, III and IV smooth, those of leg II toothed. Leg tarsi II, III and IV not longer than corresponding metatarsi; tarsus I much larger than metatarsus. Chelicerae stout with hand + fixed finger broadest at point 1/3 from base; cheliceral teeth small, blunt and irregular on fixed finger, and large, pointed and interspersed with small rounded teeth on moveable finger. Mesosternum arcuate with broad anterior region; metasternum small. Gonostomal lobes of coxa IV not meeting anterior to gonostome. Genital lobes of opisthosomal sternite I forming posterior limit of gonostome. Legs heavily tuberculate. Metatarsus IV of male not divided; adeno-style cylindrical, slightly out-curved and pointed, or directed outwards and straight and pointed; metatarsus completely ornamented. Penis with short complex apical setae; compact group of ventral setae; dorsal setae in three groups. Ovipositor of 30 segments including bifid tip, each segment with 2 pairs of setae; both halves of bifid tip with 3 antero-median and 5 lateral setae, distal sensilla of single trifid seta.

**Genus *Parogovia* Hansen, 1921**

*Parogovia* Hansen, 1921.

*Parogovea*: Hinton, 1938.

*Parogovia*: Rosas Costa, 1950; Juberthie, 1969; Shear, 1980.

*Type species: Parogovia sironoides* Hansen, 1921.

**Characters of genus**

Medium-sized cyphophthalmids of typical appearance. Grooves between abdominal tergites; median groove present. Ozophores removed from margin of scute by about 1.6-2 times diameter of their base; not fully dorsal; openings subterminal, away from prosoma. Anterior margin of scute indented or with median process, lateral margins somewhat curved, bases of which equal to 0.25-0.5 times diameter of ozophore base. Claws of legs I, III and IV smooth, those of leg II

toothed. Leg tarsi II, III and IV longer than corresponding metatarsi. Cheliceral hand elongate and smooth, basal article with pronounced prolateral keel and retrolateral protuberance; cheliceral teeth blunt, distinct, irregular. Mesosternum arcuate with broad raised anterior lobes and carrying 4 or more setae. Gonostomal lobes of coxa IV narrow. Genital lobe of abdominal sternite I broad. Dorsum tuberculate with few setae; legs also with tubercles. Metatarsus IV of male not divided; adenostyle cylindrical, pointed, distally sharply incurved and pointed or directed outwards and straight and pointed; metatarsus completely ornamented. Penis with few to many anterior lateral setae with distally divided tips; median lateral and median ventral setae present or absent; few to many median dorsal setae; ventral setae absent. Ovipositor of 26 segments plus a bifid tip; segments with 1-4 pairs of setae; both halves of bifid tip with 3 antero-median and 7-9 lateral setae, with or without a row of dorsal setae; sensilla of 6-9 fused bifid setae. No clear sexual dimorphism in ventral complex.

### *Parogovia gabonica* (Juberthie)

*Metagovea gabonica* Juberthie, 1969.

#### Type material

Belinga, no. 146, one male (type) and two females;

from washed earth close to bed of a forest stream. Deposition of specimens not known by present author, except the penis which is with Dr C. Juberthie of the Laboratoire Souterrain du C.N.R.S., Moulis, France. Repeated attempts to obtain this material were unsuccessful.

#### Affinities

Juberthie (1969) placed *gabonica* in the genus *Metagovea* as its structure appeared to correspond with the generic definition given by Rosas Costa (1950). However, Juberthie goes on to note two features that are at variance with this definition: (1) Tarsi II, III and IV longer than the corresponding metatarsi; (2) The presence of a small triangular, median ventral piece (*sic*) situated between coxae II in the male. This seemed to represent the remains of the sternum, whereas in *M. disparunguis* this feature is lacking unless, as Juberthie points out, the outline of the triangle in Rosas Costa's fig. 4 represents the vestigial fusion of lobes of these coxae.

Shear (1977) thought that it was likely that more than one genus was included in *Metagovea*. Later (1980), the same author cast further doubt on the status of the genus when he considered that *M. gabonica* was probably misplaced and should be transferred to the genus *Parogovia*. The reasons that Shear gave for this

	<i>P. pabsgarnoni</i>	<i>P. gabonica</i> *	<i>P. sironoides</i>
<b>Total length:</b>			
Male	1.9	1.76	2.4
Female	1.8	1.88	2.46
<b>Prosoma anterior marginal triangle</b>	weak	weak	well-developed
<b>Ratio distance between ozophores/distance between prosomal projections</b>	3.6	3.19	4.7
<b>Opening of ozophore</b>	anterior ventral	anterior (?*)	anterior ventral
<b>Teeth on male tarsus IV claws</b>	5	5	3
<b>Tarsus IV length/breadth:</b>			
Male	1.67	1.47	2.63
Female	1.91	2.3	2.1
<b>Male tarsus IV shape</b>	proximally broad	proximally broad	distally expanded
<b>Adenostyle length:</b>			
Ratio base/tip	0.38	1.46	0.07
Ratio tarsus length/adenostyle	3.7	3.5	2.93
Ratio adenostyle/tarsus width	0.45	0.34	1.02
<b>Penis:</b>			
Ratio length/breadth	1.86	3.0	2.74
Anterior lateral setae	6-8	7	24
Median ventral setae	1	—	—
Median lateral setae	10	6	—
Median dorsal setae	4	—	36
Ventral setae	—	24(?)	—
<b>Ovipositor:</b>			
Sensory brush bifid setae	6	6	9
Rows of stem setae	2	8	8

Table 1: Comparisons of the three known African species of *Parogovia*. \*taken and estimated from Juberthie (1969).

conjecture included the differences in the penes of the African species and those described from South America, and "other characters". Previously, Martens (1969) had also noted the discordance between *M. gabonica* and the South American species. Neither the penis nor the ovipositor were described by Rosas Costa (1950) in the original definition of the genus *Metagovea* or in the description of the type species, *M. disparunguis*. However, Goodnight & Goodnight (1980) described these structures in their account of *M. philipi* which appears to be a good species of *Metagovea*. The penis of *M. philipi* possesses a distal group of complex setae absent from species of *Parogovia*. Differences also occur in the form of the ovipositor which in *Metagovea* appears to have 29 segments, excluding the bifid tip, whilst that of *Parogovia* species has 26. The sensory brush of *Metagovea* consists of a trifid structure which differs from the 6-9 bifid complexes found in *Parogovia*.

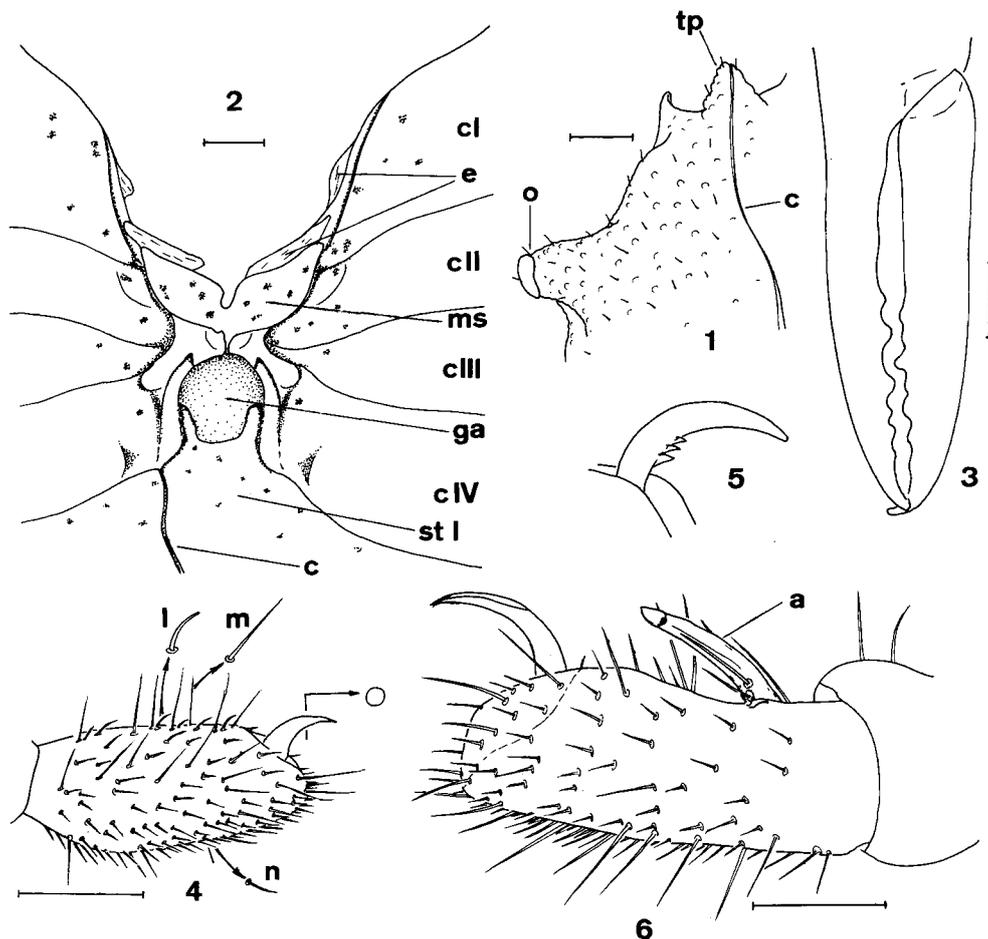
Shear (1980) mistakenly stated that *M. gabonica* had smooth claws as described for *Parogovia* by Hansen (1921), when in fact Juberthie figured male tarsus II claws with teeth. In addition, Hansen (1921) had not noticed the small number of these (rather hidden) teeth in *P. sironoides* (Fig. 5), which are in fact present in all

known species of *Parogovia*, as they are also in *M. disparunguis* and *M. philipi*.

Since it was not possible to examine the types of *M. gabonica*, the following comparison of this species with the others is based on text and figure details given in Juberthie (1969).

As well as the discordance between *gabonica* and the other known species of *Metagovea* (*M. disparunguis* and *M. philipi*), *M. gabonica* has many features in common with the two species of *Parogovia*, particularly *P. pabsgarnoni* sp. n. (Table 1). Notable amongst these are: (1) the form of the ovipositor; (2) the form of the penis and its setation; (3) ratios of various parts of the body; (4) the shape of the male tarsus IV and adenostyle.

In the light of these observations it would seem prudent formally to transfer *M. gabonica* to the genus *Parogovia*. Thus the distribution of *Parogovia* is restricted to the Old World: West and Central Africa (Sierra Leone, Gabon, Bioko), and *Metagovea* to the New World: Colombia, Brazil and Ecuador. The close similarities between the two genera indicate that they were possibly derived from a group of common ancestral populations which became split as the continents of Africa and South America separated. Consequently, the distribution of cyphophthalmids,



Figs. 1-6: *Parogovia sironoides*, holotype male. **1** Detail of anterior end of prosoma, dorsal view (c = crack in specimen, o = ozophore, tp = triangular process); **2** Part of ventral complex (c = crack in opisthosoma, cl-cIV = coxae I-IV, e = divided endite of coxa I, ga = genital aperture, ms = mesosternum (split), st I = sternite I); **3** Fingers of left chelicera, retrolateral view; **4** Left tarsus I, with cross-section of claw and detail of types of tarsal setae (l, m, n); **5** Toothed claw of tarsus II; **6** Tarsus IV with adenostyle (a). Scale lines = 0.1 mm (1, 2, 4, 6), 0.025 mm (3).

like ricinuleids (Legg, 1976) has important zoogeographical implications which warrant further investigation.

***Parogovia sironoides* Hansen (Figs. 1-10)**

*Parogovia sironoides* Hansen, 1921.

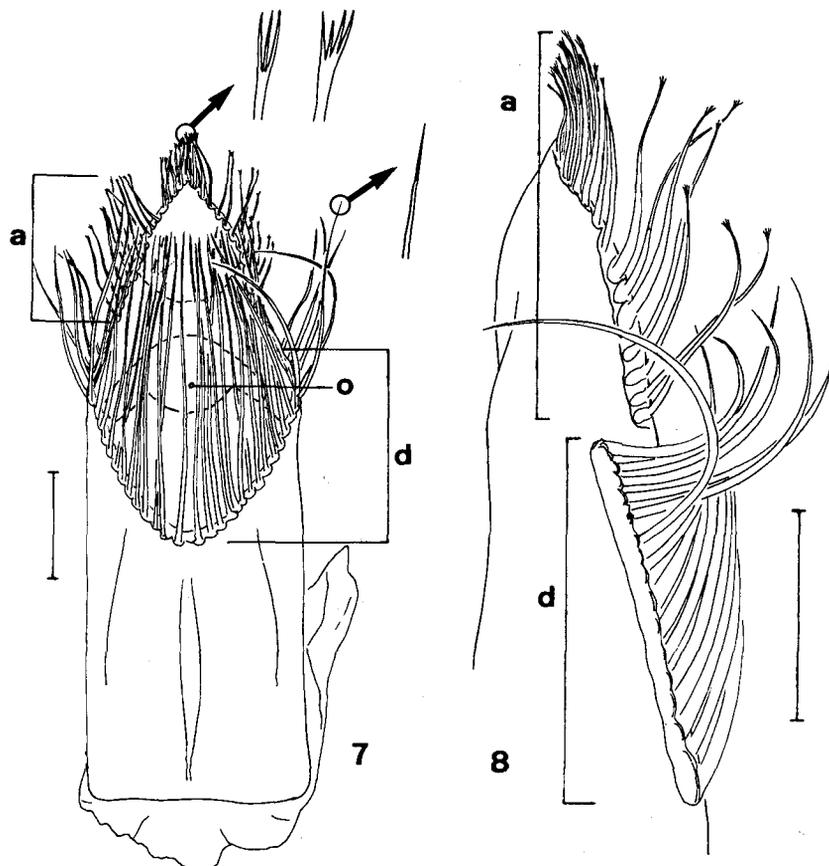
**Type material**

Collected by L. Fea in Fernando Poo (now Bioko): holotype male, Punta Frailas X-XI 1901; paratype female, Basile, 400-600m. Deposited in Museo Civico di Storia Naturale "Giacomo Doria", in Genova, Italy. Examined.

**Holotype male**

Mid-brown, 2.4 mm long. *Prosoma*: Broader than long, almost equal to opisthosoma length, distinctly enlarged posteriorly, length 1.2 mm, breadth 1.44 mm; pronounced anterior median process (Fig. 1, tp). Distance between ozophore tips 1.23 mm. Entire body rough, covered with setae and tubercles which decrease in size posteriorly. *Ozophore*: 0.135 mm tall, with antero-dorsal smooth tip, associated opening directed antero-ventrally. Ratio distance between ozophores/distance between anterior prosomal projections 4.73. *Ventral complex* (Fig. 2): With broad anterior mesosternum; the condition of the specimen made it difficult to interpret this region clearly. *Genital aperture*: 0.125 mm in diameter, 1.65 mm from posterior end of

opisthosoma. Lateral walls formed by raised thickened edges of coxa IV; posterior wall a thin extension of opisthosomal sternite I. *Chelicerae* (Fig. 3): Of normal form, 1.58 mm long; distal article (hand + fingers) length/breadth ratio 6.8; moveable finger with 2 large teeth interspersed with 5 smaller, lower teeth; fixed finger with 3 large teeth and 3 small, distal teeth. *Pedipalps*: 1.56 mm long; femur considerably longer than trochanter, about 4.5 times as long as wide, with several tubercles on lower margin; tarsus slightly shorter and thicker than tibia. *Legs*: Moderately robust; length (I-IV): 2.22, 2.31, 2.38, 2.47 mm; femora I with distal half distinctly curved so that lower margin clearly concave; femora II-IV almost straight; tarsus I slightly deeper than tibia, with lower margin rather angular somewhat before middle. Tarsi (Fig. 4) with uncinatè claw, smooth on legs I, III, IV, dentate on leg II, carrying 3 teeth (Fig. 5). Adenostyle on tarsus IV proximad (Fig. 6), 0.118 mm long, consisting of large, slightly curved, stout acuminate part, 0.110 mm long, projecting at angle of about 45°, mounted on small base, and with a central pore opening prolaterally. Adenostyle (base + tip) about equal to depth of tarsus in its immediate vicinity, and 0.34 of tarsal length. Tarsus IV distally expanded. Length/breadth tarsus IV: 2.63. *Penis*: Relatively long, 0.63 × 0.23 mm (Fig. 7), slightly curved (Fig. 8). With a curved row of 36 long dorsal acuminate setae which sweep around so that in dorsal view 4 setae on either end of the row are hidden around the ventro-lateral surface. Anterior to the dorsal setae is



Figs. 7-8: *Parogovia sironoides*, holotype male, penis. 7 Dorsal view; 8 Lateral view. a = apical setae, d = dorsal setae, o = orifice. Scale lines = 0.1 mm.

a lateral row of 12 setae on each side, which join with a distal tuft of approximately 16 setae, in two rows of 8. The setae in the lateral rows and distal tuft have divided tips (Figs. 7, 8) and represent the apical setae. However, in the absence of obvious ventral setae it is possible that the latter are incorporated within the double row (W. A. Shear, pers. comm.).

#### *Paratype female*

Similar to male, but differing in details of size, certain ratios and other morphological characteristics. Length 2.46 mm. *Prosoma*: Broader than long, 1.41 mm by 1.2 mm; not distinctly enlarged posteriorly. Distance between ozophore tips 1.21 mm. Ratio distance between ozophore tips/distance between anterior marginal carapace projections 4.7. *Ventral complex*: Similar to male. *Ovipositor*: Occupying entire length of opisthosoma in its contracted state, tube consisting of 26 segments bearing 8 setae per segment (Fig. 9); distally bifid, carries 66 setae in rows, excluding distal group of 3 on each side adjacent to sensory brush. Sensory brush (Fig. 10) comprises 9 bifid seta-like structures. Genital aperture 0.12 mm in diameter, 1.6 mm from posterior end of opisthosoma.

*Parogovia pabsgarnoni*, sp. n. (Figs. 11-19, Plates 1-11)

#### *Type material*

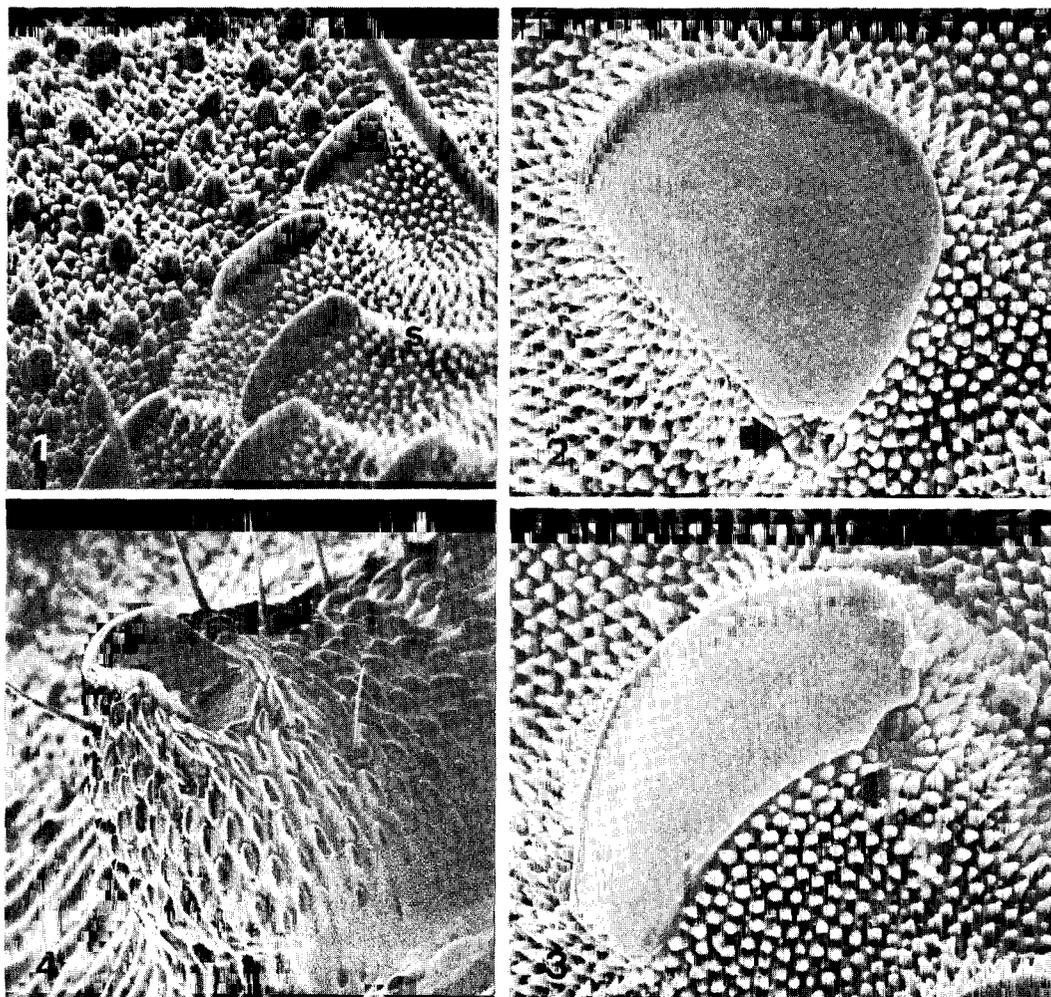
From bamboo leaf litter collected in Botanical Reserve of Fourah Bay College, University of Sierra Leone by E. B. Pabs-Garnon & G. Legg, 12 October 1973 (removed from sub-sample 1/6-12/10/73/Leaf Litter, of a soil fauna analysis programme) and forming part of a Master's dissertation (Pabs-Garnon, 1977). Holotype male, No. 400857, paratype female, No. 400858, paratype male (on SEM stub), No. 412079, and nymphs, Nos. 400859-64 deposited in Booth Museum of Natural History, Brighton.

#### *Etymology*

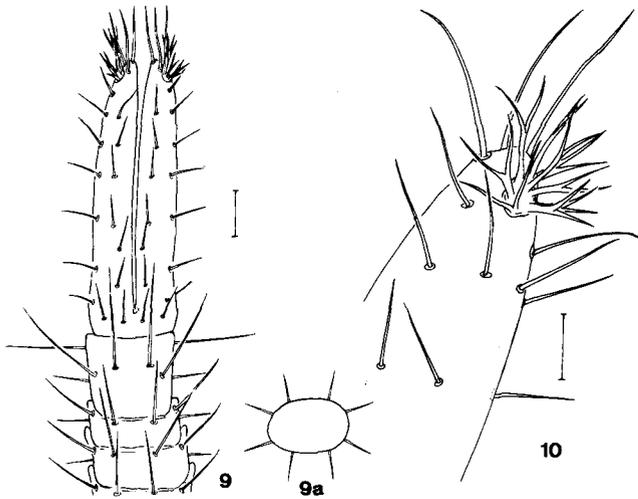
This species is dedicated to the late E. B. Pabs-Garnon who was instrumental in the initial study of the species.

#### *Holotype male*

Dark brown, 1.9 mm long. *Prosoma*: Broader than long, maximum length 0.872 mm, width 0.92 mm. Weak anterior marginal triangle. Distance between ozophore tips 0.9 mm. Entire body rough, pitted, covered with



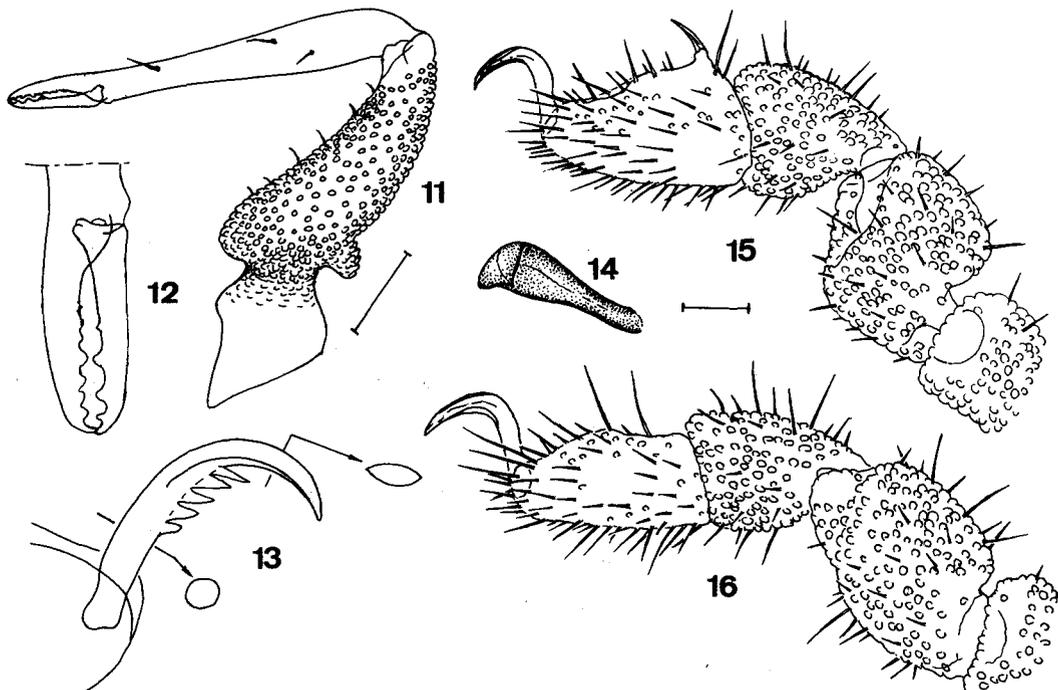
Plates 1-4: *Parogovia pabsgarnoni* sp. n., paratype male. **1** Detail of posterior opisthosomal cuticle, showing sternite (s) and tergite (t) features,  $\times 2150$ ; **2, 3** Details of prosomal cuticle, showing "tubercles" and their associated pores (arrowed),  $\times 3600$ ; **4** Ozophore, ventro-lateral view,  $\times 360$ .



Figs. 9-10: *Parogovia sironoides*, paratype female, ovipositor. **9** Detail of distal bifid end (**9a** cross-section of basal part); **10** Detail of sensory brush. Scale lines = 0.05 mm (9), 0.025 mm (10).

setae and tubercles (Plates 1-3, 5, 7). Each tubercle consists of "island" of smooth rounded cuticle surrounded by fine papillae. Towards one end of smooth part is a small circular depression resembling a pore and also with small papillae (Plates 2-3). *Ozophores*: 0.11 mm tall, with dorso-lateral smooth tip and associated antero-horizontal aperture (Plate 4); 7 setae near tip. Ratio distance between ozophores/distance between anterior prosomal projections 3.6. *Ventral complex* (Plate 5): Arcuate mesosternum carrying 4 and 5 setae (4-6 in other specimens). *Genital aperture*: Broader than long, 0.125 × 0.09 mm. Sternite

I with 4 setae projecting over aperture. *Spiracle* (Plate 6): On anterior ventral surface of opisthosoma (sternite I). *Anal region* (Plate 7): With complete corona analis carrying 12 setae and numerous tubercles. *Chelicerae* (Figs. 11, 12): 2.21 mm long; distal article, including fixed finger, length/breadth 8.33; moveable finger 0.245 mm long. Moveable finger with distal and proximal small tooth and 2 large teeth between; fixed finger with 4 large, distinct teeth and 3, proximad, small teeth. Cheliceral hand elongate, smooth, with 3 setae, contrasting with basal article which bears numerous tubercles and acuminate setae including 6 on prolateral margin. Basal article with pronounced prolateral keel and retrolateral protuberance. *Pedipalps*: 1.07 mm long, larger than those of female, leg-like, with simple acuminate setae distributed over surface, more on tarsi than on other articles. Tarsal setae of two types: fine, short and curved, lying close to surface, and longer, stouter setae projecting more vertically. Tarsi with straight, tube-like, distal process resembling small straight claw. Coxae with prominent, rounded maxillary lobes, with group of 4 strong setae at base. *Legs*: Tarsi with uncinata claw, smooth on legs I, III, IV, dentate on leg II (Fig. 13) with 5 teeth. Claws of legs I-II oval-triangular in section (Fig. 13), those of legs III-IV spatulate, flattened median-distally (Fig. 14). Adenostyle on tarsus IV (Plate 8) proximad (Fig. 15), 0.087 mm long, consisting of nearly straight acuminate-lamellate tip, 0.063 mm long, projecting at acute angle to dorsum of tarsus, mounted on conical base, with central pore opening prolaterally. Adenostyle (base + tip) much shorter than depth of tarsus in its immediate vicinity, 0.45 of thickness, and 0.27 of tarsal length. Length/



Figs. 11-15: *Parogovia pabsgarnoni* sp. n., holotype male. **11** Left chelicera, retrolateral view; **12** Detail of cheliceral fingers; **13** Tarsus II claw, showing teeth and cross-sections; **14** Curved and flattened tarsal claw of leg IV; **15** Left leg IV, retrolateral view.

Fig. 16: *Parogovia pabsgarnoni* sp. n., paratype female. Left leg IV, retrolateral view. Scale lines = 0.25 mm (11), 0.1 mm (15, 16).

breadth tarsus IV: 1.67. Adenostyle base/tip: 0.38. *Penis* (Figs. 17, 18, Plate 9): With 4 median dorsal setae, innermost pair with distally divided tips (group a); a single median ventral and on each side 5 median lateral (group b) setae; and 3 (paratype) or 4 (holotype) anterolateral setae (group c). Cuticle of anterior ventral and dorsal regions of penis produced into acute, toothed scales (Plate 9).

#### Paratype female

Similar to male, 1.8mm long. *Prosoma*: Broader than long, 0.863mm by 0.872mm. *Opisthosoma*: Longer than broad, 1.145mm long, length/breadth 1.32. *Ventral complex*: Mesosternum arcuate with more rounded lateral tips than in male. Forty short conical teeth along margin of anterior + antero-lateral walls of genital aperture. *Ovipositor* (Plates 10-11, Fig. 19): Distally bifid, with 4 distal setae, a 6-branched sensory brush and 9 lateral setae on each branch; a pair of lateral setae project at right-angles to surface of each of the 26 tube segments (Fig. 19). *Chelicerae*: Slightly larger than in male, 2.25mm long, length/breadth of distal article, including fixed finger, 8.14. *Pedipalps*: Slightly smaller than male, 1.04mm long. *Tarsus IV* (Fig. 16): length/breadth 1.91.

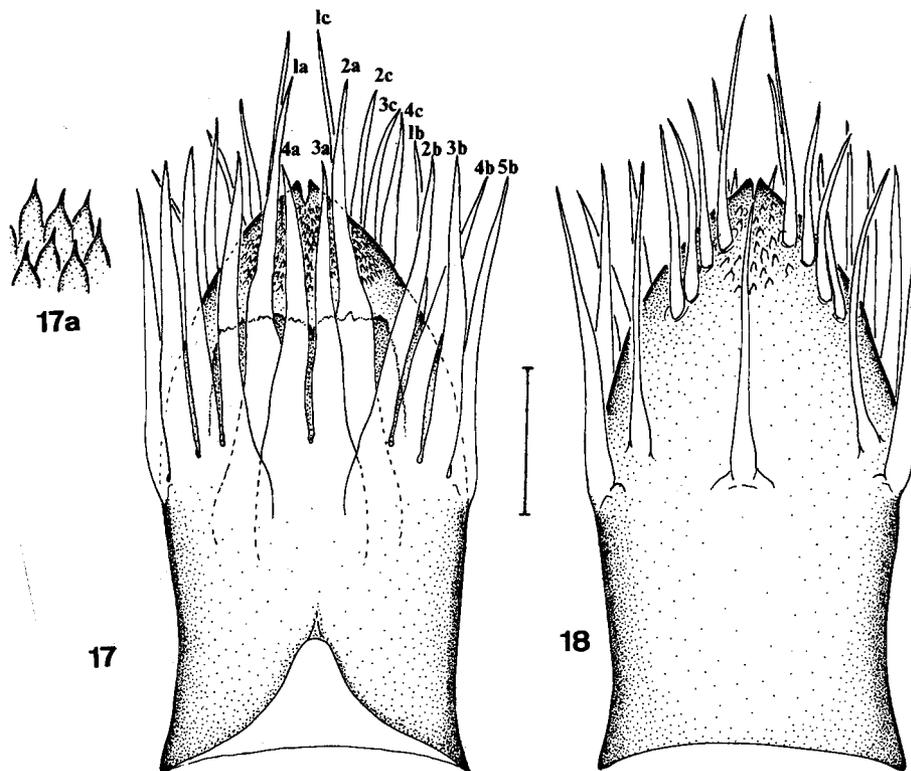
#### Immature stages

Extensive analyses of three years' soil sampling revealed three distinct classes of immature stages, based on pigmentation, size and setation. Measurements and plots of individuals of each class, including pedipalps, show linear relationships. In addition there

are progressive changes in setation, particularly with respect to the dorsal setae of the pedipalp tarsi: protonymph one, deutonymph two, tritonymph three, adult four. The legs show less distinct changes in their setation. These results strongly suggest that there are three free-living nymphal stages.

Prospective male and female protonymphs and deutonymphs are not easily distinguishable, but length/breadth of tarsi IV in 20 tritonymphs examined were found to be bimodally distributed, with mean ratios of 2.2 and 2.58 respectively. This suggests that male tritonymphs are distinguishable from females, having stouter tarsi IV.

Numbers of cheliceral teeth remain constant. Pedipalps change gradually in setation from instar to instar. Trochanters carry constant numbers of stout setae, but other articles possess more of these setae at each moult. Femora bear distal ventral setae in each instar, and the prolateral surface carries one in protonymphs and deutonymphs and two in tritonymphs and adults. The patella distal tip bears two setae dorsally and ventrally which remain constant. Tritonymphs have two further mid-dorsal and ventral setae, and adults two more ventral setae posterior to these mid-setae. Protonymphal tibiae bear two distal setae, dorsally and ventrally; in deutonymphs a prolateral and a proximal dorsal seta are added; tritonymphs have a further prolateral seta proximal to the first, and a ventral seta midway along the tibia; adults have a third dorsal seta, two more prolateral setae distal to the other two, and two additional ventral setae, proximal to the previous two. Tarsi of protonymphs with 1 dorsal, 1 prolateral and 1 ventral seta; deutonymphs with a further dorsal and



Figs. 17-18: *Parogovia pabsgarnoni* sp. n., holotype male, penis. **17** Dorsal view (**17a** detail of anterior scales); **18** Ventral view. 1a-4a = median dorsal setae, 1b-5b = median lateral setae, 1c-4c = anterior lateral setae. Scale line = 0.05 mm.

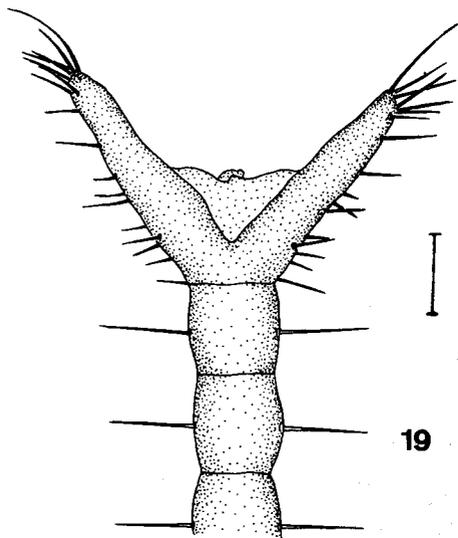


Fig. 19: *Parogovia pabsgarnoni* sp. n., paratype female. Ovipositor extended (not all tubular segments shown), showing distribution of setae. Scale line = 0.05 mm.

ventral seta and two prolateral setae; tritonymphs with three prolateral tarsal setae, and an additional seta in the adult. Dorsally, tritonymphs have an extra seta which is again added to in the adult.

It is worth noting that in the past specimens of cyphophthalmids and several other arachnid groups, including Ricinulei (Legg, 1976) and Schizomida (Legg, in prep.) have been few and far between. However, with improved sampling techniques these arachnids have been shown to occur in significant numbers. The material collected for this study was extracted from leaf-litter using modified Tullgren funnels, and sufficient numbers were obtained to be able to gain an understanding of the life-history of the species (Legg & Pabs-Garnon, 1988).

#### Relationships of the African species of *Parogovia*

In Table 1 a comparison is made between the three species of *Parogovia*. *P. pabsgarnoni* and *P. gabonica* have the following similarities: (1) size; (2) weakly developed anterior prosomal triangle which is strongly developed in *P. sironoides*; (3) shape of male and female tarsi IV; (4) form and relative ratios of adeno-style; (5) number of bifid setae in sensory brush of ovipositor.

*P. gabonica* also has a few characters which it shares with *P. sironoides*, including the eight rows of setae on the stem of the oviduct. It would appear from these data that *P. pabsgarnoni* is closer to *P. gabonica* than to *P. sironoides*.

Features unique to *P. sironoides* include: (1) larger size; (2) well-developed prosomal anterior marginal triangle (which had been used by Hansen (1921) as a generic character); (3) a larger ratio of distance between ozophores/distance between anterior prosomal projections; (4) relatively longer and distally expanded male tarsi IV; (5) relatively larger and stouter adeno-style; (6) greater number of ovipositor bifid sensory brush setae.

#### Acknowledgements

I am very grateful to Dr W. A. Shear of Hampden Sydney College for his beneficial advice and appreciated comments. My thanks also to the Trustees of the British Museum (Natural History) for making available the electron microscope facilities and special thanks to Mrs Susan Barnes for patient help and assistance in examining the specimens and taking the micrographs. Thanks also to Dr Gianna Arbocco of the Museo Civico di Storia Naturale "Giacomo Doria" Genova, Italy for the very kind loan of H. J. Hansen's types of *P. sironoides*. Thanks are also due to the Zoology Department of Fourah Bay College, University of Sierra Leone, Freetown.

#### References

- GOODNIGHT, M. L. & GOODNIGHT, C. J. 1980: *Metagovea philipi* n. sp., a new cyphophthalmid (Arachnida) from Ecuador. *Trans. Am. microsc. Soc.* **99**(1): 128-131.
- HANSEN, H. J. & SØRENSEN, W. 1904: *On two orders of Arachnida*. 1-178. Cambridge University Press.
- HANSEN, H. J. 1921: The Pedipalpi, Ricinulei and Opiliones collected by Mr Leonardo Fea in tropical West Africa. *Stud. Arthrop.* **1**: 5-55.

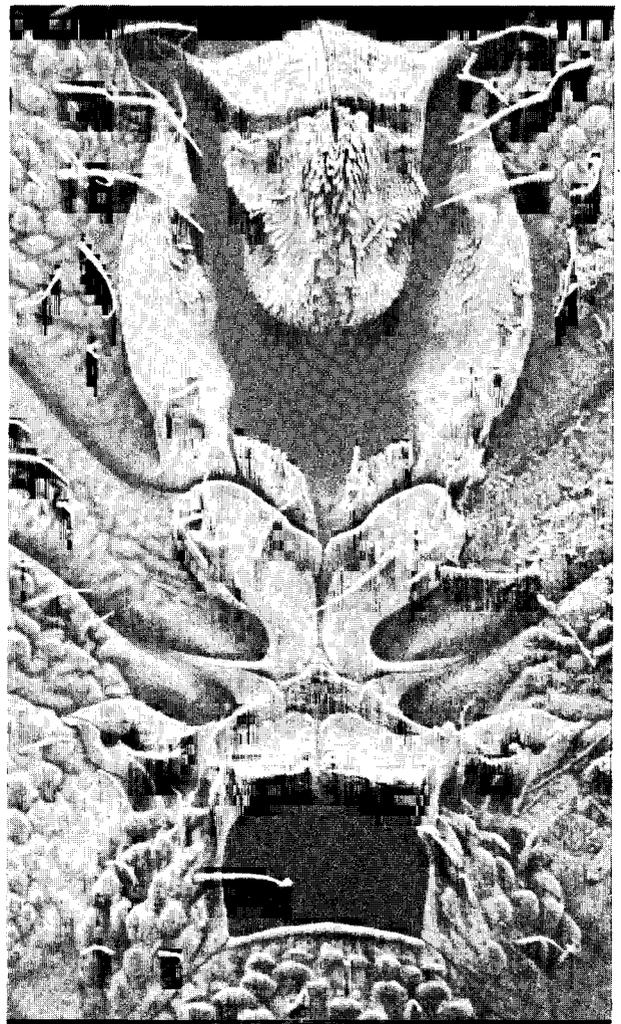
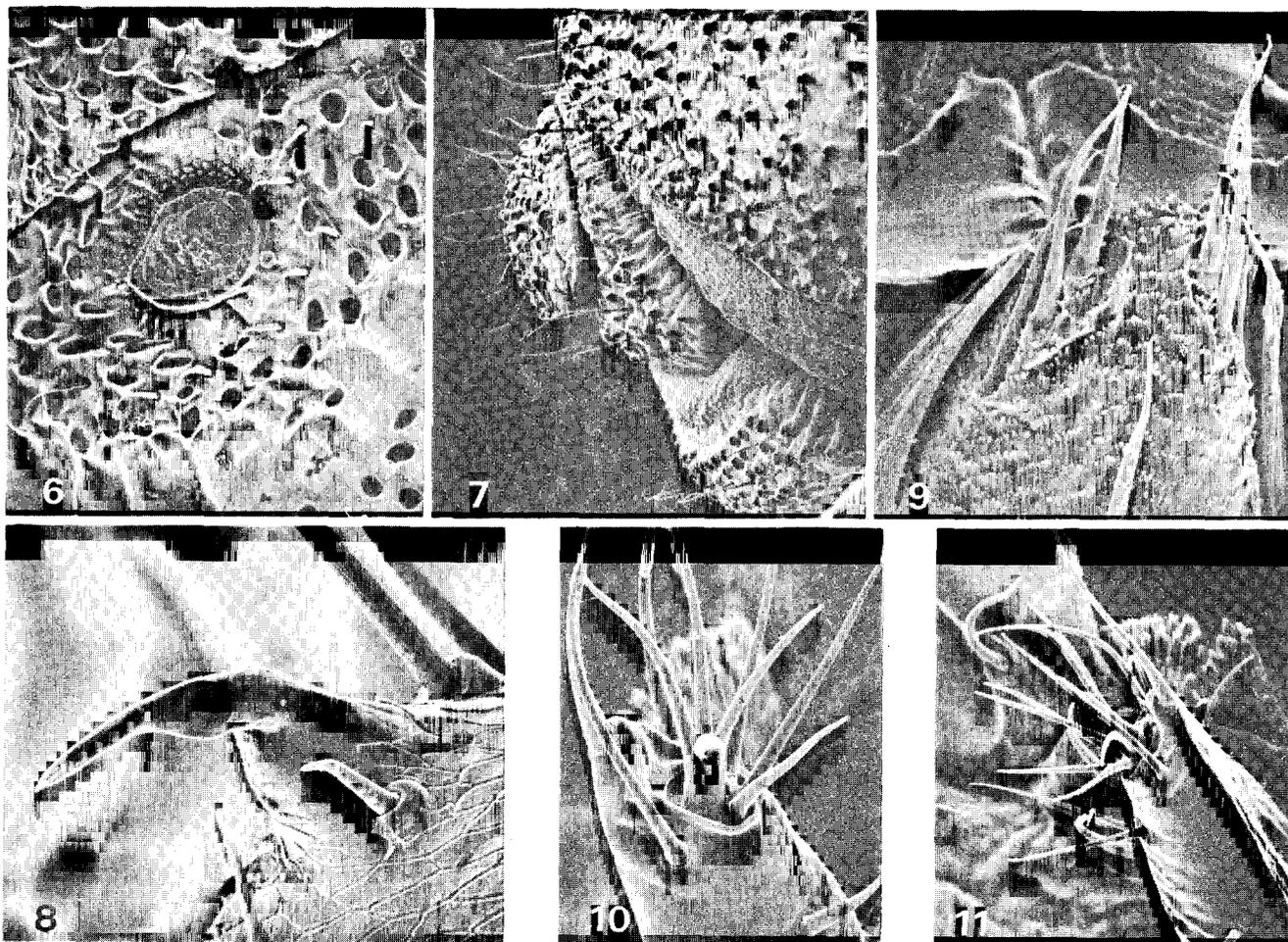


Plate 5: *Parogovia pabsgarnoni* sp. n., paratype male. Part of ventral complex including genital area, ventral view,  $\times 210$ .



Plates 6-9: *Parogovia pabsgarnoni* sp. n., paratype male. **6** Right spiracle, ventral view (arrow points anteriorly),  $\times 240$ ; **7** Anal region,  $\times 170$ ; **8** Adenostyle,  $\times 1030$ ; **9** Detail of tip of penis, ventral view,  $\times 690$ .

Plates 10-11: *Parogovia pabsgarnoni* sp. n., paratype female. Details of tip of ovipositor. **10**  $\times 1030$ , **11**  $\times 550$ .

HINTON, H. E. 1938: A key to the genera of the suborder Cyphophthalmi, with a description and figures of *Neogovea immsi*, gen. et sp. n. *Ann. Mag. nat. Hist.* (11)**2**: 331-338.

JUBERTHIE, C. 1960: Contribution à l'étude des opilions cyphophthalmes; description de *Metasiro* gen. nov. *Bull. Mus. natn. Hist. nat. Paris* (2)**32**: 235-241.

JUBERTHIE, C. 1961: Etude des opilions cyphophthalmes (arachnides) du Portugal: description d'*Odontosiro lusitanicus* g. n., sp. n. *Bull. Mus. natn. Hist. nat. Paris* (2)**33**: 512-519.

JUBERTHIE, C. 1969: Sur les opilions cyphophthalmes Stylo-cellinae du Gabon. *Biologia gabon.* **5**: 79-92.

LEGG, G. 1976: The external morphology of a new species of ricinuleid (Arachnida) from Sierra Leone. *Zool. J. Linn. Soc.* **59**: 1-58.

LEGG, G. & PABS-GARNON, E. B., 1988: The life history of a tropical forest cyphophthalmid from Sierra Leone (Arachnida, Opiliones). *Proc. XI Eur. Arachn. Coll.*, Berlin 1988: (in press).

MARTENS, J. 1969: Cyphophthalmi aus Brasilien (Opiliones). *Beitr. neotrop. Fauna* **6**: 109-119.

PABS-GARNON, E. B. 1977: *The external morphology and life history of Ogovea grossa* (Cyphophthalmi, Opiliones, Arachnida). M.Sc. thesis, Fourah Bay College, University of Sierra Leone.

ROSAS COSTA, J. A. 1950: Sinopsis de los generos de Sironidae, con la descripción de dos generos y una especie nuevos. *Arthropoda* **1**: 127-151.

SHEAR, W. A. 1977: The opilionid genus *Neogovea* Hinton, with a description of the first troglitic cyphophthalmid from the Western Hemisphere. *J. Arachnol.* **3**: 165-175.

SHEAR, W. A. 1979: *Huitaca ventralis*, n. gen., n. sp., with a description of a gland complex new to Opiliones. *J. Arachnol.* **7**: 237-242.

SHEAR, W. A. 1980: A review of the Cyphophthalmi of the United States and Mexico, with a proposed reclassification of the suborder (Arachnida, Opiliones). *Am. Mus. Novit.* **2705**: 1-34.