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The scolopendrid centipedes in the collection of the National Museum of Natural History in Sofia (Chilopoda: Scolopendromorpha: Scolopendridae)

John G. E. LEWIS

Introduction

The National Museum of Natural History in Sofia possess a large collection of scolopendrid centipedes from Cuba, the Mediterranean, Africa and Asia made by Dr P. Beron (PB), Dr V. Beshkov (VB), Dr St. Andreev (SA) and Mrs T. Ivanova (TI). It is probable that all the genera represented in the collection require revision but, clearly, a revisional treatment is not possible here. Uncertainties and inconsistencies are pointed out, however, and in most cases the specimens are described in detail and illustrated to allow future assessments to be made. One new species, *Otostigmus beroni* from Nepal, is described and the following new synonymies proposed: *Cormocephalus brevicornis* Kraepelin, 1903 and *C. anceps segnis* Attems, 1930 = *C. anceps anceps* Porat, 1871; *C. nitidus calvus* Attems, 1928 = *C. nitidus nitidus* Porat, 1871; *Asanada zambiana* Dobroruka, 1969 = *Asanada socotrana* Pokock, 1889; *Otostigmus politus mandchurius* Verhoeff, 1942 = *Otostigmus politus politus* Karsch, 1881 and *O. politus pigmentatus* Attems, 1930 and *O. politus schindleri* Würmli, 1972 = *O. angusticeps* Pokock, 1889. *Congobius schoutedeni* Dobroruka, 1968 = *Otostigmus (Parotostigmus) schoutedeni* (new combination).

The classification adopted here is that of ATTEMS (1930). Recently SCHILEYKO (1992) and SCHILEYKO and PAVLINOV (1997) have suggested alternatives but an analysis based on morphological and molecular evidence by EDGECOMBE et al. (1999) has not altogether supported them. As the classification of the Scolopendromorpha is the subject of discussion, Attems' classification is here retained, although it too is clearly unsatisfactory.

Full synonymies are not given: they may be found in ATTEMS (1930). Subsequent synonyms are given where appropriate. The descriptions are of the specimens in the collection.

List of species

Scolopendra morsitans Linnaeus, 1758
Scolopendra. canidens oraniensis Lucas, 1846
Scolopendra mirabilis (Porat, 1876)
Scolopendra afer (Meinert, 1886)
Scolopendra alternans Leach, 1812
Cormocephalus (C.) cupipes Pocock, 1891
Cormocephalus (C.) anceps Porat, 1871
Cormocephalus (C.) nitidus Porat, 1871
Cormocephalus (C.) pseudopunctatus Kraepelin, 1903
Cormocephalus (C.) dentipes Pocock, 1891
Asanada socotrana Pocock, 1889
Otostigmus (O.) multidens Haase, 1887
Otostigmus (O.) astenus (Kohlrausch, 1881)
Otostigmus (O.) beroni sp. nov.
Otostigmus (O.) martensi Lewis, 1972
Otostigmus (O.) rugulosus Porat, 1876
Otostigmus (O.) scaber Porat, 1876
Otostigmus (O.) aculeatus Haase, 1887
Otostigmus (O.) politus Karsch, 1881
Otostigmus (O.) angusticeps Pocock, 1898
Otostigmus (O.) spinosus Porat, 1876
Otostigmus (Parotostigmus) gymnopus gymnopus Silvestri, 1898
Otostigmus (P.) schoutedeni (Dobroruka, 1968) comb. nov.
Alipes crotalus (Gerstaecker, 1854)
Ethmostigmus trigonopodus trigonopodus (Leach, 1817)
Ethmostigmus trigonopodus pygomenasoides Lewis, 1992
Rhysida lithobioides (Newport, 1845)
Rhysida immarginata immarginata (Porat, 1876)
Rhysida immarginata togoensis Kraepelin, 1903
Rhysida afra (Peters, 1855)
Rhysida singaporiensis Verhoeff, 1937

Systematic Part

Scolopendrinae

Scolopendra morsitans L.

(Figures 1-4)

Scolopendra morsitans Linnaeus 1758, Systema Naturae 10th edn, 638.
S. morsitans amazonica Bücherl 1946, Mems. Inst. Butantan **19**:136, figs. 1-3.
S. amazonica, Jangi 1959, Ent. News **70**:253.
S. amazonica, Lewis 1967, Proc. Linn. Soc. Lond. **178**:185.
S. morsitans, Würmli 1975, Dtsch. Ent. Z.N.F. **22**:206.

Material examined

Mozambique. 2 spms, 48 and 55 mm, Catuane Prov., Maputo, 24.6.1983, PB & VB. 2 spms, 65 and 76 mm, Cabo Delgado Prov., Pemba, 30.6.1983, PB. 6 spms, 53, 65, 68, 69, 72 and 75 mm, Cabo Delgado Prov., Mecufi, 6-15.7.1983, PB. 1 spm, 74 mm, Cabo Delgado Prov., Mecufi, 28-31.7.1983, PB & VB. 3 spms, 19.5, 40 and 80 mm, Cabo Delgado Prov., Pemba, the sea shore near light house, no date, PB.

Zambia. 3 spms, 55, 55, and 60 mm, Victoria Falls, 25.7.1983, PB & VB.

Zimbabwe. 2 spms, 38 and 45 mm, Bulawayo, 22.8.1983, PB &VB. 10 spms, 43 to 82 mm, Great Zimbabwe ruins, 20.8.1983, PB & VB.

Nigeria. 1 spm, 33 mm (moulting), Jos, Plateau State, 1350 m, 20.9.1978, PB. 1 spm, 37 mm, Kabwir, Plateau State, 20.9.1978, PB. 1 spm, 25 mm, Pai River Game Res., Sabon Gida Game Park, 3.9.1978, PB.

Indonesia. 2 spms, 48 and 58 mm, Nusa Penida I. (near Bali), 7.6.1994, PB & VB. 1 spm, 47 mm, Bali, Pafdangbai, 8.6.1994, PB & VB.

China. 2 spms, 54 mm, Yunnan Prov. Jinshui County, near Yan Dong (cave) under stones, 21.1.1989, PB.

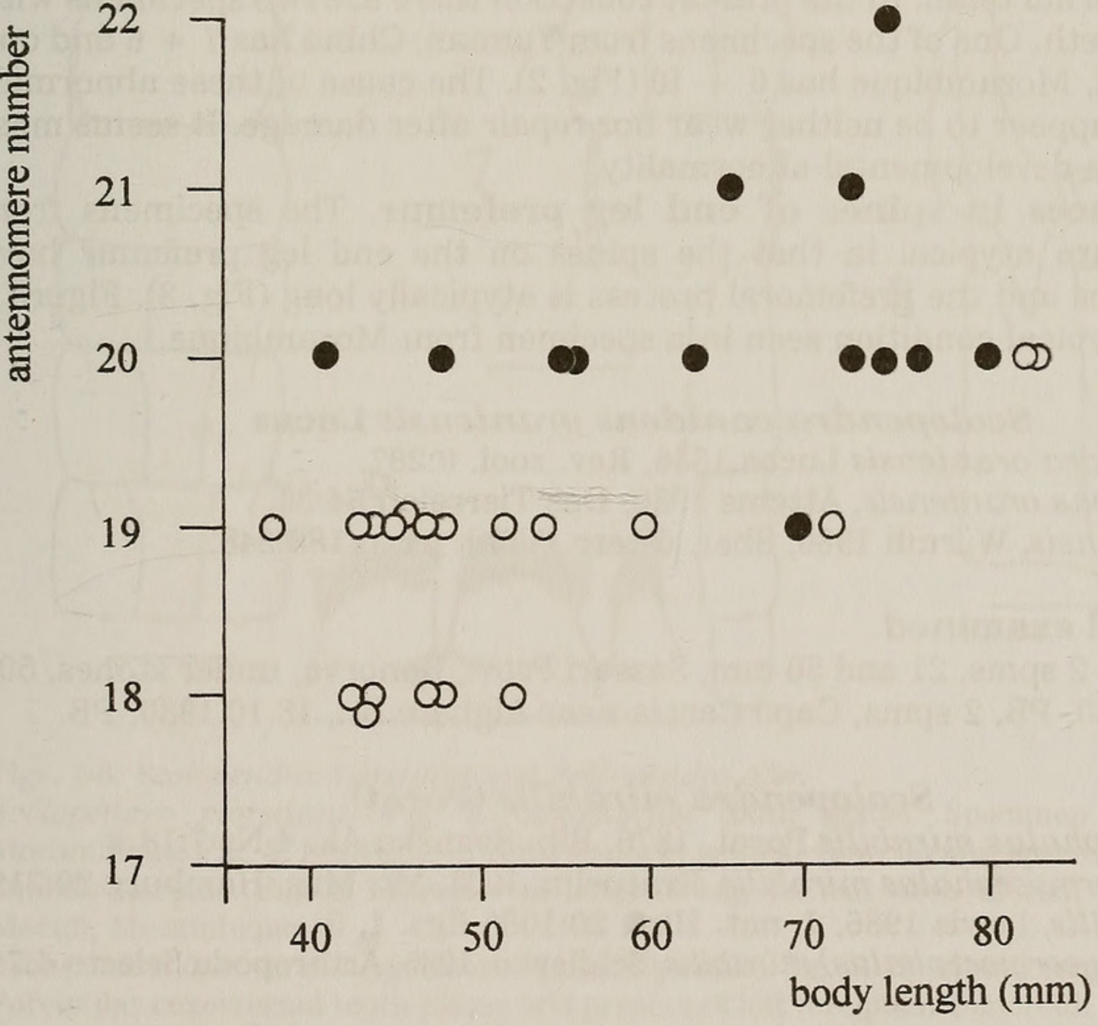


Fig. 1. The relationship between antennomere number and body length (mm) in populations of *Scolopendra morsitans* from Mozambique (●) and Zimbabwe (❍). Damaged and regenerated antennae excluded

Remarks on variation

Presence of tarsal spine on leg 20. JANGI (1959) regarded the presence of a tarsal spine on leg 20 as the most important character separating *S. morsitans* from *S. amazonica* in which it is absent. WÜRMLI (1975), however, regarded *S. amazonica* as a junior synonym of *S. morsitans* which he considered to be a polymorphic species.

In the present collection the specimens from Mozambique, Zambia, Nigeria and China lack the tarsal spine on leg 20. One of the 12 specimens from Zimbabwe has a tarsal spine on the left leg 20 (right leg 20 missing) and one specimen (from Nuisa Pendina) of the three from Indonesia has a tarsal spine on right leg 20, absent on left.

Antennomere number. LEWIS (1969) presented data on antennomere number in populations of *S. morsitans* from Africa. The largest samples were from Northern Nigeria where there are most commonly 19 antennomeres and Northern Sudan (mostly 18). As antennomere number increases with body length, this must be taken into consideration. Figure 1 shows the number of antennomeres in the samples from Zimbabwe and Mozambique. For individuals between 41 and 82 mm in length the majority of specimens from Mozambique have 20 antennomeres, those from Zimbabwe 18 or 19.

Number of forcipular coxosternal teeth. Typically, *S. morsitans* has 5 + 5 coxosternal teeth. In the present collection there are two specimens with abnormal teeth. One of the specimens from Yunnan, China has 7 + 6 and one from Mecufi, Mozambique has 6 + 10 (Fig. 2). The cause of these abnormalities would appear to be neither wear nor repair after damage. It seems most likely to be a developmental abnormality.

Differences in spines of end leg prefemur. The specimens from Zimbabwe are atypical in that the spines on the end leg prefemur have swollen bases and the prefemoral process is atypically long (Fig. 3). Figure 4 shows the typical condition seen in a specimen from Mozambique.

Scolopendra canidens oraniensis Lucas

Scolopendra oraniensis Lucas 1846, Rev. zool. **9**:287.
S. canidens oraniensis, Attems 1930, Das Tierreich **54**:36.
S. oraniensis, Würmli 1980, Sber. österr. Akad. wiss. **183**:348.

Material examined

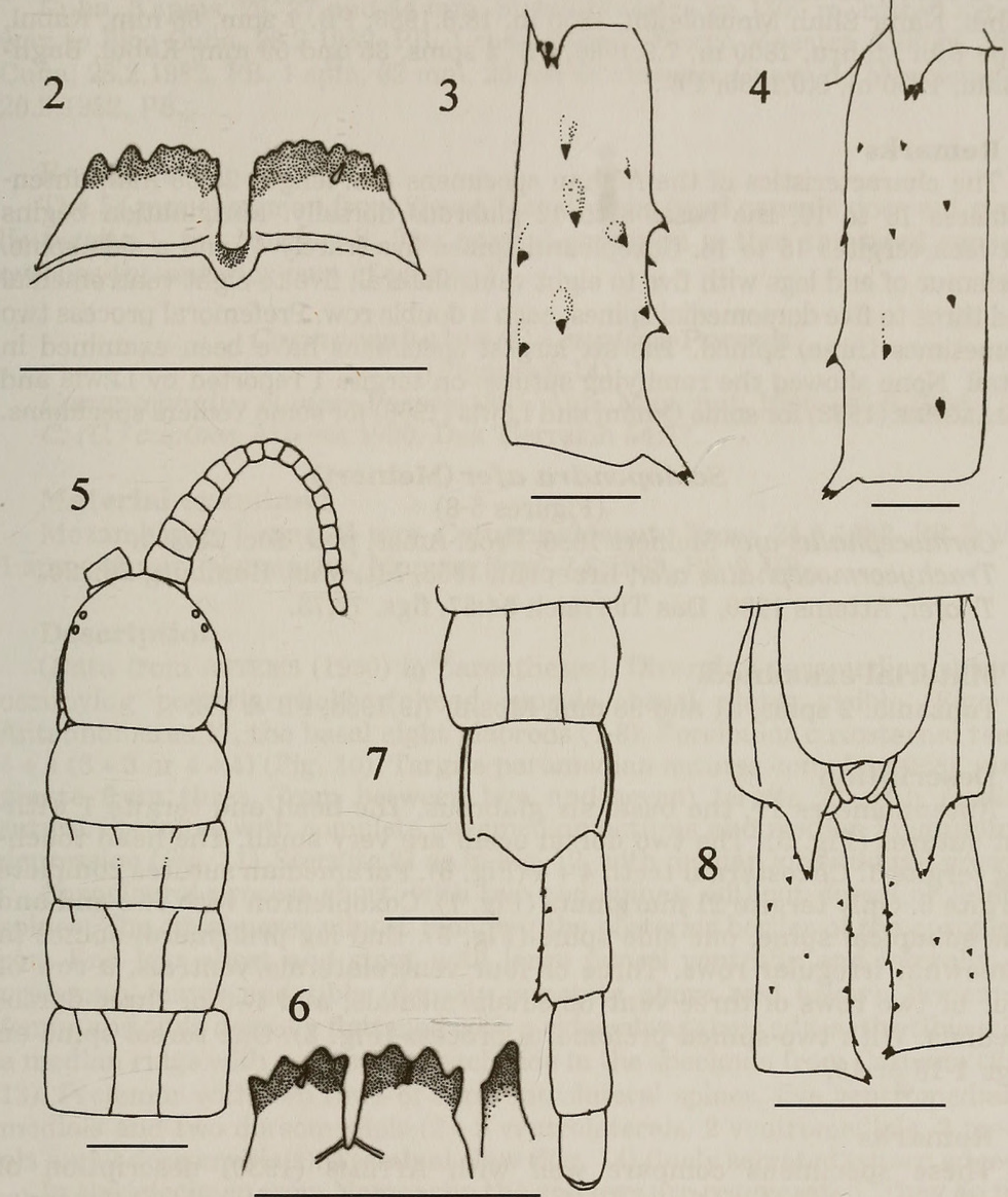
Sardinia. 2 spms, 21 and 50 mm, Sassari Prov., Bonorva, under stones, 500 m, 16.10.1980, PB. 2 spms, Capo Caccia near Alghero lit., 18.10.1980, PB.

Scolopendra mirabilis (Porat)

Cormocephalus mirabilis Porat, 1876, Bih. Svenska Ak. **4** Nr 7:18.
Trachycormocephalus mirabilis, Kraepelin, 1903, Mt. Mus. Hamburg **20**:219.
S. mirabilis, Lewis 1986, J. nat. Hist. **20**:1085 figs. 1, 5.
S. (Trachycormocephalus) mirabilis, Schileyko, 1995, Arthropoda Selecta **4**:78.

Material examined

Afghanistan. 1 spm, 39 mm, Kabul, Sherdarwasa, 2000-2220 m, 3.6.1986,



Figs. 2-8. *Scolopendra morsitans* and *Scolopendra afer*.
Scolopendra morsitans. Fig. 2. Coxosternal tooth plates. Specimen from Mecufi, Mozambique. Fig. 3. Prefemur of right end leg, ventral view. 60 mm specimen from Great Zimbabwe ruins. Fig. 4. Prefemur of left end leg, ventral view. 67 mm specimen from Mecufi, Mozambique.
Scolopendra afer. 31 mm specimen Moshi Tanzania. Fig. 5. Head and tergites 1-4. Fig. 6. Forcipular coxosternal tooth plates and process of left forcipular femoroid. Fig. 7. Tergites 20 and 21 and right end leg which is bent ventrally. Fig. 8. Ventral view of terminal segments and end leg prefemora. Coxopleural pores not shown.
Scale lines = 1 mm (except fig. 6 = 0.5 mm).

PB. 2 spms, 28 and 58 mm, Kabul, 2-19.6.1986, PB. 2 spms 44 and 46 mm, Kabul, Nadir Shah Mausoleum, 1850 m, 18.6.1986, PB. 1 spm, 68 mm, Kabul, Tape Bibi Mahru, 1800 m, 7.6.1986, PB. 2 spms, 35 and 59 mm, Kabul, Bagh-I-Bala, 1900 m, 8.6.1986, PB.

Remarks

The characteristics of the Afghan specimens are: length 28-68 mm, antennomeres 18 to 19, the basal 8 to 12 glabrous dorsally. Margination begins between tergites 15 to 18. Coxopleural spines five (rarely 4) and a side spine. Prefemur of end legs with five to eight ventrolateral, five to eight ventromedial and three to five dorsomedial spines, each a double row. Prefemoral process two (sometimes three) spined. The six largest specimens have been examined in detail. None showed the ramifying sutures on tergite 1 reported by LEWIS and GALLAGHER (1993) for some Omani and LEWIS (1996) for some Yemeni specimens.

Scolopendra afer (Meinert)

(Figures 5-8)

Cormocephalus afer Meinert 1886, Proc. Amer. phil. Soc. **23**:205.
Trachycormocephalus afer, Kraepelin 1903, Mt. Mus. Hamburg **20**:220.
T. afer, Attems 1930, Das Tierreich **54**:57, figs. 72,73.

Material examined

Tanzania. 2 spms, 31 and 38 mm, Moshi, 7.9.1983, PB & VB.

Description

Antennomeres 17, the basal six glabrous. The head and tergite 1 without sutures (Fig. 5). The two dorsal ocelli are very small. The head touching tergite 1. Coxosternal teeth 4 + 4 (Fig. 6). Paramedian sutures complete tergite 3. Only tergite 21 marginate (Fig. 7). Coxopleuron with two end and one subapical spine, one side spine (Fig. 8). End leg prefemoral spines in somewhat irregular rows. Three or four ventrolaterals/ventrals, a row of four or two rows of three ventromedials/medials, and two or three dorsomedials. With two-spined prefemoral process (Fig. 8). One tarsal spine on legs 1-18 or 19.

Remarks

These specimens compare well with ATTEMS (1930) description of *Trachycormocephalus afer* (= *Scolopendra afer*) but run down to *Scolopendra gardullana* Attems, 1909 from Southern Ethiopia, in his 1930 key for *Scolopendra*. *Scolopendra gardullana* however differs from *S. afer* in the possession of two dorsal coxopleural spines and the absence of a lateral spine. The type should be re-examined: the two species may be conspecific.

Scolopendra alternans Leach

Scolopendra alternans Leach 1812, Trans. Linn. Soc. **11**:383.
S. alternans, Attems 1930, Das Tierreich **54**:37.

Material examined

Cuba. 3 spms, 26, 27 and 54 mm, Sierra Maestra ca 1300 m, rotten log on way to Pico Cuba, 28.2.1982, PB. 1 spm, 96 mm, Sierra Maestra 1300 m, Pico Cuba, 28.2.1982, PB. 1 spm, 62 mm, 25 km de Havana, Cueva de Murcielagos, 20.2.1982, PB.

Remarks

The 54 mm specimen from Sierra Maestra the head capsule does not overlie tergite 1, but touches it. The normal condition is that the head capsule overlies the anterior part of tergite 1.

***Cormocephalus (C.) cupipes* Pocock**

(Figures 9-14)

Cormocephalus cupipes Pocock 1891, Ann. Mag. nat. Hist. ser 6, **7**:64.
C. (C.) cupipes, Attems 1930, Das Tierreich **54**:77.

Material examined

Mozambique. 1 spm, 45 mm, Catuana, Maputo Prov., 24.6.1983, PB & VB. 1 spm, 45 mm, Namaacha, Maputo Prov, 7.8.1983, PB & VB.

Description

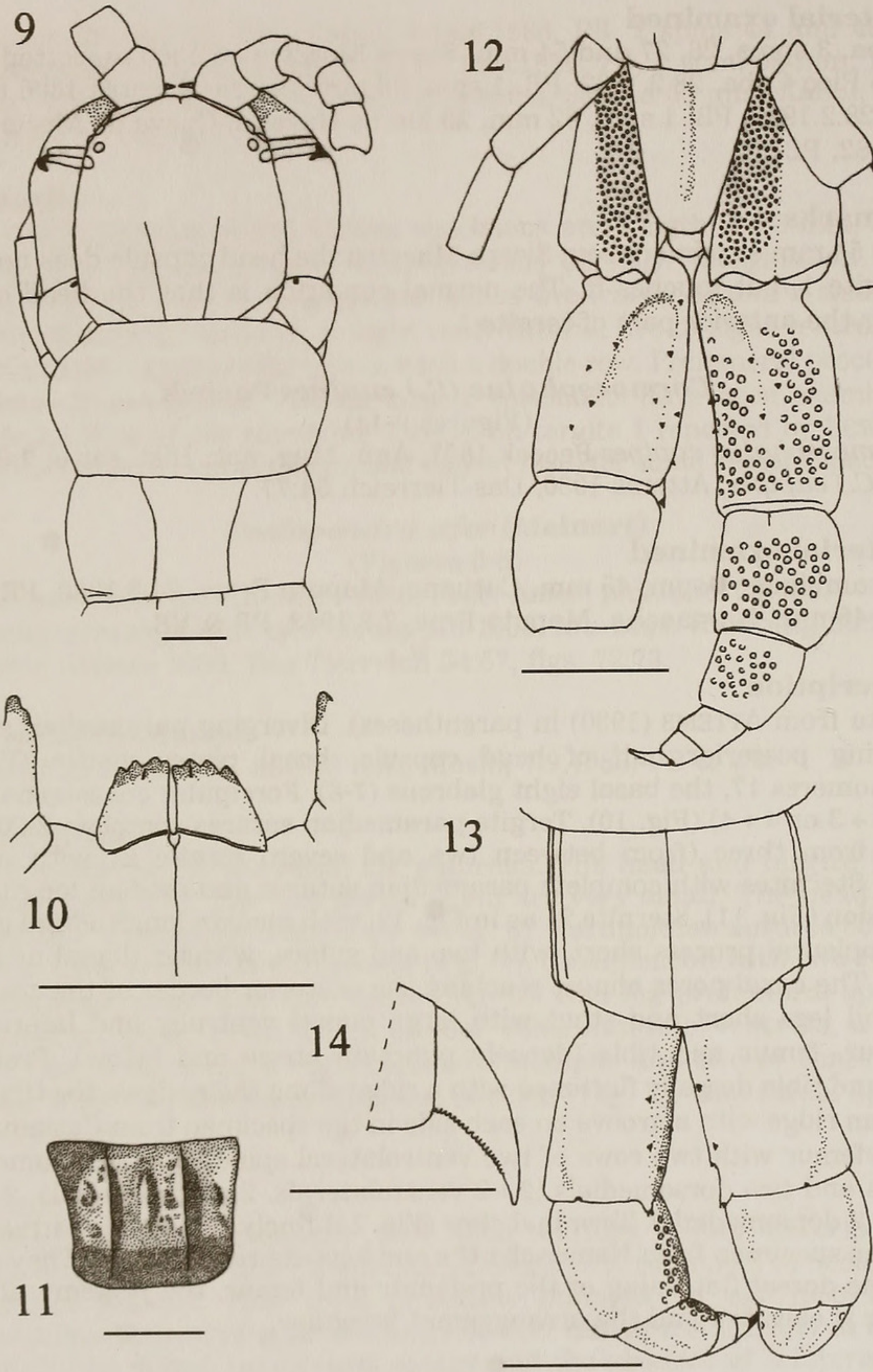
(Data from ATTEMS (1930) in parentheses). Diverging paramedian sutures occupying posterior half of head capsule, basal plates visible (Fig. 9). Antennomeres 17, the basal eight glabrous (7-8). Forcipular coxosternal teeth 4 + 4 (3 + 3 or 4 + 4) (Fig. 10). Tergite paramedian sutures complete 2-20, marginate from three (from between two and seven) tergite 21 with median suture. Sternites with complete paramedian sutures and median longitudinal depression (Fig. 11). Sternite 21 as in Fig. 12, with median longitudinal groove.

Coxopleural process short, with two end spines, without dorsal or lateral spines. The coxal pores almost reaching the posterior border of the coxopleuron. End legs short and stout with large puncti ventrally and laterally on prefemur, femur and tibia (densely punctate above and below). Prefemur, femur and tibia dorsally flattened with a ridge along their edges, the tibia with a median ridge with a groove on each side in the specimen from Catuana (Fig. 13). Prefemur with two rows of two ventrolateral spines, five ventromedials/ medials and two dorsomedials (2 + 2 ventrolaterals, 2 ventromedials, 2 medials and 2 dorsomedials). Terminal claw (Fig. 14) finely serrated (sharp edged).

In the specimen from Namaacha the end legs are regenerated. They do not show the dorsal flattening of the prefemur and femur, the prefemoral spine number is elevated and the arrangement irregular.

Remarks

Previously recorded from Natal, Zululand and Mozambique. I regard the difference in the distribution of puncta on the end legs between these specimens and those previously described as individual variation. The fact that the end claw is serrated may have been overlooked by previous workers.



Figs. 9-14. *Cormocephalus (C.) cupipes.* Fig. 9. Head and tergites 1 and 2. Fig. 10. Forcipular coxosternal tooth plates and forcipular femoroid processes. Fig. 11. Sternite 8. Fig. 12. Terminal segments and end legs, ventral view. Puncti not shown on right end leg. Fig. 13. Tergite 21 and end legs. Fig. 14. Terminal claw of right end leg.
Scale lines = 1 mm (except fig. 14 = 0.5 mm).

Cormocephalus (C.) anceps Porat

(Figures 15-21)

Cormocephalus anceps Porat 1871, Öfv. Ak. Förh. **28**:1157.
C. brevicornis Kraepelin 1903, Mt. Mus. Hamburg **20**:206. **syn. nov.**
C. anceps segnis Attems 1928, Ann. S. Afr. Mus. **26**:101. **syn. nov.**
C. (C.) anceps anceps, Attems 1930, Das Tierreich **54**:81, fig. 88.
C. (C.) anceps segnis, Attems 1930, Das Tierreich **54**:81.
C. (C.) brevicornis, Attems 1930, Das Tierreich **54**:83.

Material examined

Zimbabwe. 1 spm, 34 mm, Victoria Falls, 23.8.1983, PB & VB. 6 spms, 39-51 mm, Great Zimbabwe Ruins, 20.8.1983. PB & VB.

Zambia. 1 spm, 29 mm, Victoria Falls, 25.8.1983, PB & VB.

Description of specimens from Victoria Falls

(Data from ATTEMS (1930) in parentheses where appropriate). Diverging paramedian sutures occupying posterior half of head capsule, basal plates visible. Antennomeres 17, the basal 11 glabrous (11-16, rarely 8-10). Antennae when reflexed reach tergite 4. Forcipular coxosternal teeth 4 + 4 or 4 + 3, the inner ones partially fused (Fig. 15).

Tergites with paramedian sutures complete 2, marginate from 10 or 11 (10-17), tergite 21 with median suture (Fig. 16). Sternites with complete paramedian sutures from 2 to 20, sternite 21 (Fig. 17) longer than wide with sides converging posteriorly (somewhat longer than wide, weakly attenuated posteriorly, truncated).

Coxopleuron with process of moderate length, two end spines and one side spine. Pores almost reaching posterior border of coxopleuron. End leg prefemur ventrolaterally with six or seven spines in two rows (mostly 2 + 3, rarely with 3 + 3 or 3 + 5), ventromedials/medials seven to 11 (4-6) in two posteriorly diverging rows forming an inverted V (Fig. 18), dorsomedials two, prefemoral process two-spined. End leg without claw spines, claw finely serrated (ventrally two-ridged).

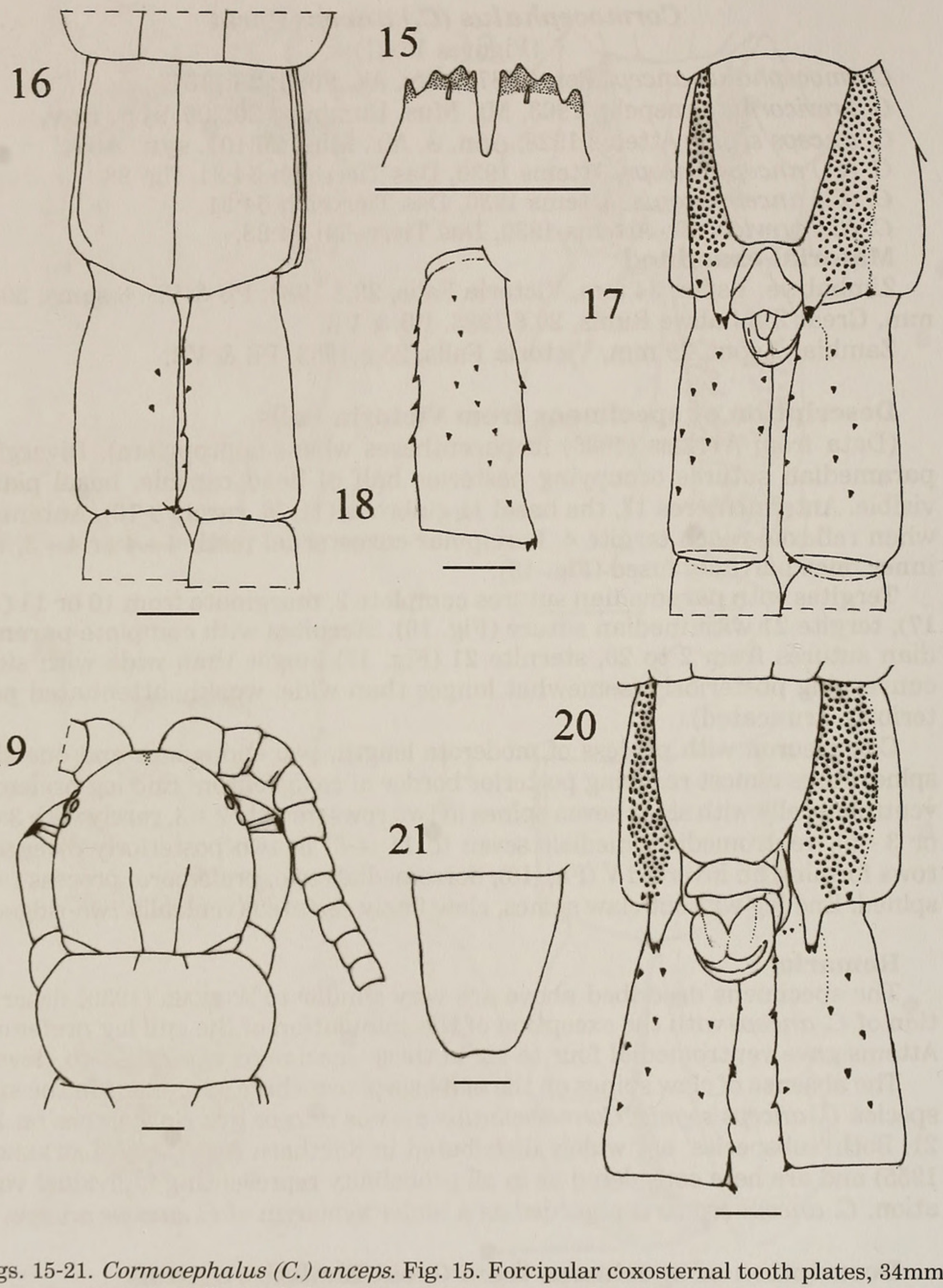
Remarks

The specimens described above are very similar to ATTEMS (1930) description of *C. anceps* with the exception of the spinulation of the end leg prefemur. Attems gave ventromedial four to six in these specimens it is seven to eleven.

The absence of claw spines on the end legs places these specimens in the subspecies *C. anceps segnis*: *Cormocephalus anceps anceps* has claw spines on leg 21. Both 'subspecies' are widely distributed in Southern Africa (see LAWRENCE, 1955) and are here considered as in all probability representing individual variation. *C. anceps segnis* is regarded as a junior synonym of *C. anceps anceps.*

Description of specimens from Great Zimbabwe Ruins

(Data from ATTEMS (1930) description for *C. brevicornis* in parentheses). The specimens are identical in most characters to the specimens from Victoria Falls, brief details are: head capsule as in Fig. 19, basal six, seven, or eight, typically seven, antennomeres glabrous (6-7 glabrous), reaching tergites two, three or four when reflexed (reach end of tergite 1). Coxosternal tooth plate typical-



Figs. 15-21. *Cormocephalus (C.) anceps.* Fig. 15. Forcipular coxosternal tooth plates, 34mm specimen, Victoria Falls, Zimbabwe. Fig. 16. Tergite 21 and prefemora of end legs, the same. Fig. 17. Terminal segments and end leg prefemora, the same. Fig. 18. Right end leg prefemur, internal view, the same. Fig. 19. Head and tergite 1, 47 mm specimen, Great Zimbabwe Ruins. Fig. 20. Terminal segments and end leg prefemora, ventral view, 51 mm specimen, Great Zimbabwe Ruins. Fig. 21. Sternite 21, 42 mm specimen, Great Zimbabwe Ruins. Scale lines = 0.5 mm.

ly with four teeth (2-4) the inner three partially fused. Tergites marginate from 13, 14 or 15 (15). Sternite 21 longer or as long as wide showing some variation in shape (Figs. 20, 21) (almost parallel walled, hind border semicircular).

End leg prefemur with double row of five to seven, mostly six ventrolateral spines (3 + 3), eight or nine ventromedials/medials (ventromedial 3-4, medial 2-3), two dorsomedials (2), prefemoral process two-spined (2). At the base of the diverging rows of ventromedials/medials usually two, sometimes three very small spines (Fig. 20).

Remarks

These specimens from the Great Zimbabwe Ruins run down to *C. brevicornis* in both ATTEMS (1930) and LAWRENCE (1955). Attems used the 6 or 7 (8) basal antennomeres glabrous to separate a group of species including *C. brevicornis* from *C. spinulosus* Attems, 1928 and *C. anceps* with (8) 9-16 basal antennomeres glabrous. LAWRENCE (1955) gave 6 or 7 as opposed to 9-16. The estimation of the number of glabrous antennomeres in *Cormocephalus* is not always easy and this character should therefore be treated with caution. Other characters given by KRAEPELIN (1903) for *C. brevicornis* namely antennal length and shape of sternite 21, are subject to variation and do not distinguish it from *C. anceps*. The number of glabrous antennomeres, a somewhat subjective character, thus seems to be the sole basis for the distinction of these two species and they are here regarded as, at most differing local populations. LAWRENCE (1955) gave Zimbabwe and Transvaal for *C. brevicornis* although his map shows only three localities in Zimbabwe. ATTEMS (1930) gave also Cape Province but there appears to be no record of *C. brevicornis* from there. *Cormocephalus anceps* is widely distributed in South Africa and in Namibia, Botswana and Zimbabwe. *Cormocephalus brevicornis* is regarded as a junior synonym of *C. anceps*.

Cormocephalus (C.) nitidus Porat

(Figures 22-25)

Cormocephalus nitidus Porat 1871, Öfv. Ak. Förh. **28**:1154.
C. nitidus calvus Attems 1928, Ann. S. Afr. Mus. **26**:101. **syn. nov.**
C. (C.) nitidus nitidus, Attems 1930, Das Tierreich **54**:85.
C. (C.) nitidus nitidus var. *calvus* Attems 1930, Das Tierreich **54**:86.

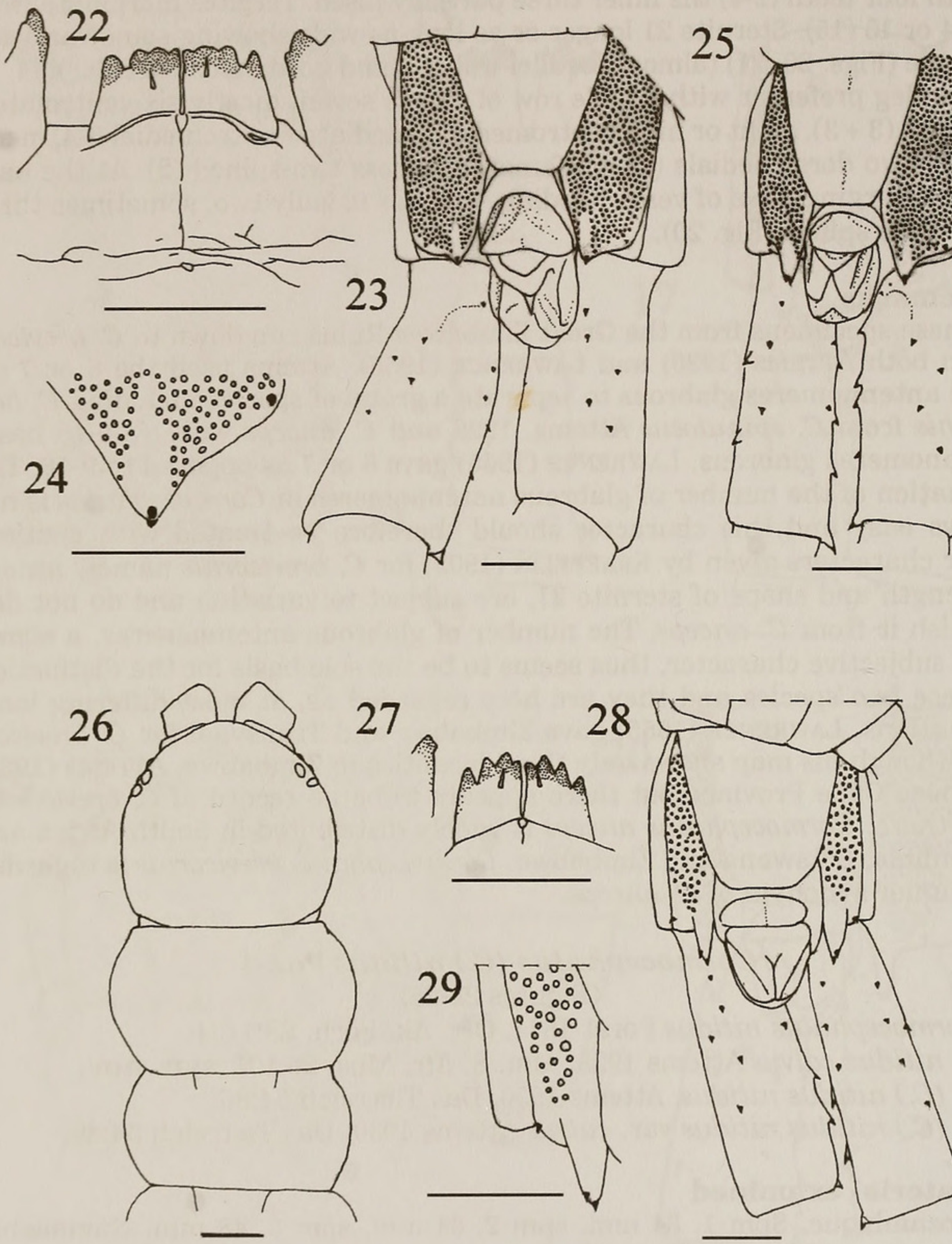
Material examined

Mozambique. Spm 1, 84 mm, spm 2, 64 mm, spm 3, 48 mm, Namaacha, Maputo Prov., 7.8.1983, PB & VB.

Description

Head as *C. anceps*. Antennomeres 17, basal nine (spm 1) seven (spm 2) and six (spm 3) glabrous. Forcipular coxosternal teeth 4 + 4 the outer separated, the inner three partially fused (Fig. 22), with median longitudinal suture running back to fine transverse sutures, these very weak and incomplete in spm 3.

Tergites with paramedian sutures complete 2 to 20, marginate from 15 in spm 1, 12 in spm 2 and 3, tergite 21 without median longitudinal sulcus.



Figs. 22-29. *Cormocephalus nitidus* and *Cormocephalus pseudopunctatus*.
Cormocephalus nitidus. Fig. 22. Forcipular coxosternal tooth plates and forcipular femoroid processes, spm 1. Fig. 23. Terminal segments and prefemora of end legs, ventral view, spm 1. Fig. 24. Detail of left coxopleural process, spm 1. Fig. 25. Terminal segments and prefemora of end legs, ventral view, spm 2.
Cormocephalus pseudopunctatus, spm 1. Fig. 26. Head and tergites 1 and 2. Fig. 27. Forcipular coxosternal tooth plates and right forcipular femoroid process. Fig. 28. Terminal segments and prefemora of end legs, ventral view. Fig. 29. Detail of right coxopleural process. Scale lines = 1 mm.

Sternites with complete paramedian sutures from 2 to 20, sternite 21 wider than long in spm 1, as long as wide in spm 2, longer than wide in spm 3. Coxopleuron with very short process in spm 1 (Figs. 23, 24), short in spms 2 and 3, with two end spines and one side spine. Pore area almost reaching posterior border of coxopleuron with pore-free posterior median strip (Fig. 25).

End leg prefemur with four or five ventrolateral spines in two rows, ventromedial and medial two to five in two rows, dorsomedial 2 + 1. Prefemoral process two-spined. End claw finely serrate.

Remarks

ATTEMS (1928) differentiated *C. nitidus calvus* from *C. nitidus nitidus* on the basis of number of antennomeres glabrous: (9)10-14 in the former, 5-7 in the latter. LAWRENCE (1955) doubted that the two could be separated. The Mozambique specimens with six, seven, and nine antennomeres glabrous are intermediate between the two. There appears to be no reason to maintain the *C. n. calvus.*

Cormocephalus pseudopunctatus Kraepelin

(Figures 26-29)

Cormocephalus. pseudopunctatus Kraepelin 1903, Mt. Mus. Hamburg **20**:194.

C. (C.) pseudopunctatus, Attems 1930, Das Tierreich **54**:89.

Material examined

Mozambique. Spm 1, 38 mm, Namaacha, Maputo Province, 7.7.1983, PB & VB. Spm 2, 42 mm, spm 3, 24 mm, Catuane, Maputo Prov., 24.6.1983, PB & VB.

Description (Data from KRAEPELIN (1903) in parentheses)

Head without paramedian sutures, basal plates visible in spms 1 (Fig. 26) and 2 but not 3. Antennomeres 17, the basal three glabrous. Forcipular coxosternal teeth 4 + 4, the outer separated from the three partially fused inner teeth (Fig. 27). Process of forcipular femoroid with small inner tooth.

Paramedian sutures complete from tergite 8 (5-9). Short anterior paramedian sutures on tergites 2, 3 and 4, anterior and posterior on 5, 6 and 7 in spm 1, short anterior paramedian sutures on 6 and 7 in spm 3 (completely absent on 2 and 3, only as short anterior sutures on segments 4 to 7). Marginate from 14 or 16 ((8) 12-14). Tergite 21 without median suture (mostly without).

Sternites with complete paramedian sutures from 2 to 20. Coxopleuron with process of moderate length, with two end spines and one side spine. Pore field oval, not reaching hind border of coxosternum (Figs. 28, 29).

End leg prefemora with 2 + 3 ventrolateral spines, two or three ventromedials, two or three medials and one or two dorsomedials (Kraepelin indicates considerably greater variation). Prefemoral process two-spined.

Remarks

Clearly distinct from the other *Cormocephalus* species in the collection, widespread in South Africa but not previously recorded from Mozambique.

***Cormocephalus (C.) dentipes* Pocock**

Cormocephalus dentipes Pocock 1891, Ann. Mag. nat. Hist. ser 6, **7**:66.

C. (C.) dentipes, Attems 1930, Das Tierreich **54**:96.

C. pseudonudipes Jangi & Dass 1984, J. scient. ind. Res. **43**:37, figs. 33-35.

C. pygmaeus, Lewis 1992, Senkenbergiana biol. **72**:437, figs. 1-6 (non Pocock 1892).

C. dentipes, Khanna 1994, Zool. Surv. India, Fauna of Conservation area 5: Rajaji National Park: 240.

Material examined

Nepal. 2 spms 37 mm, Lumbini, 5.8.1981. PB.

Description

With diverging paramedian sutures occupying the posterior half of the head capsule. The basal plates visible or not. Antennomeres 17, the basal six glabrous. Forcipular coxosternal teeth 4 + 4, the inner three partially or totally fused. Median longitudinal suture on coxosternum ending at transverse suture which is mostly double. Process of forcipular femoroid with two longitudinal ridges. Tergites 1-20 with complete paramedian sutures, margination beginning on tergite 14 or 15. Tergite 21 without median longitudinal suture but with slight posterior median depression.

Coxopleuron with process of moderate length and with two end spines and one side spine. End leg prefemur with three plus three or four ventrolateral teeth, three plus four ventromedial/medials, two dorsomedials and two-spined prefemoral process. All legs with claw spines.

Remarks

These two specimens are virtually identical to the specimen from Ilam district Nepal identified as *Cormocephalus pygmaeus* Pocock, 1892 by LEWIS (1992) with the exception of the coxopleural processes which are of moderate length rather than very short and the margination, beginning on tergites 14 or 15 rather than 17. Lewis noted that the specimen ran down to *C. pygmaeus* in ATTEMS (1930) but to *C. pseudonudipes* Jangi and Dass, 1984 in the key in JANGI and DASS (1984). Attems in his key (p. 69, couplet 55) used femur and tibia of end legs coarsely granular ventrally and 4 or 5 basal antennomeres glabrous to separate *C. dentipes* Pocock, 1891 from *C. pygmaeus* (femur and tibia of end legs smooth, 6 or 7 basal antennomeres glabrous) and other species. JANGI and DASS (1980) re-examined the type of *C. dentipes* and reported that the basal six antennomeres were glabrous and, having examined further Indian material, that the "tuberculation" of the end legs was a secondary sexual character only present in mature males. Furthermore, KHANNA (1994) reported that only 20 % of males showed the tubercles. Thus the number of glabrous antennomeres and presence or absence of tubercles on the end legs do not separate the species. *Cormocephalus pygmaeus* may, nevertheless, still be characterised by claw spines mostly absent on end leg and the presence of a median longitudinal suture on tergite 21 and *C. dentipes* by the presence of claw spines on end leg and the absence of a suture on tergite 21. I now regard the three specimens so far recorded from Nepal as *C. dentipes*.

Asanada socotrana Pocock

(Figures 30-33)

Asanada socotrana Pocock 1889, Bull. Liverpool Mus. **2**:9.
A. socotrana, Attems 1930, Das Tierreich **54**:124, figs. 164-168.
A. sokotrana (sic), Lewis 1973, Zool. J. Linn. Soc. **52**:98, figs. 2, 4-7.
A. zambiana Dobroruka 1969, Rev. Zool. Bot. Afr. **69**:356, figs. 9-12. **syn. nov.**

Material examined

Zambia. 1 spm, 40 mm, Victoria Falls, 25.8.1983, end legs detached, PB & VB.

Description

Tergites with paramedian sutures complete from 4. Sternite paramedian sutures on 3 to 20. Ratio of width to length of sternite 21 is 1.75:1 (Fig. 30). End leg prefemur without sulcus, femur with terminal sulcus occupying posterior 50 % (Fig. 31) its apparent extent and presence of pit at base of tibia dependent on angle of illumination (Fig. 32). Ratio of length of end leg tarsus to claw, 1.25:1 and 1.5:1. Claw with about 13 or 14 teeth in concavity (Fig. 33).

Remarks

LEWIS (1973) discussed the taxonomy of the genus *Asanada* in Africa pointing out that there has been considerable confusion over the status of the various populations. He recognised three species, namely *A. socotrana* (misspelled *sokotrana*), *A. walkeri* (Pocock, 1891) and *A. zambiana* Dobroruka, 1969. The Nigerian populations of *A. socotrana* were considered to consist of two forms, form 1 with incomplete end leg femoral sulcus and form 2 with complete sulcus.

The Zambian specimen here described, is clearly the same as *A. socotrana* form 1 from Nigeria and very similar to *A. zambiana*, differing only in lacking two very short posterior sulci on the head capsule, and a deep shortened sulcus on sternite 21, only present as a trace. These differences are trivial and may not be consistent. *A. zambiana* is regarded as a junior synonym of *A. socotrana*.

Otostigminae

Otostigmus (O.) multidens Haase

(Figures 34-36)

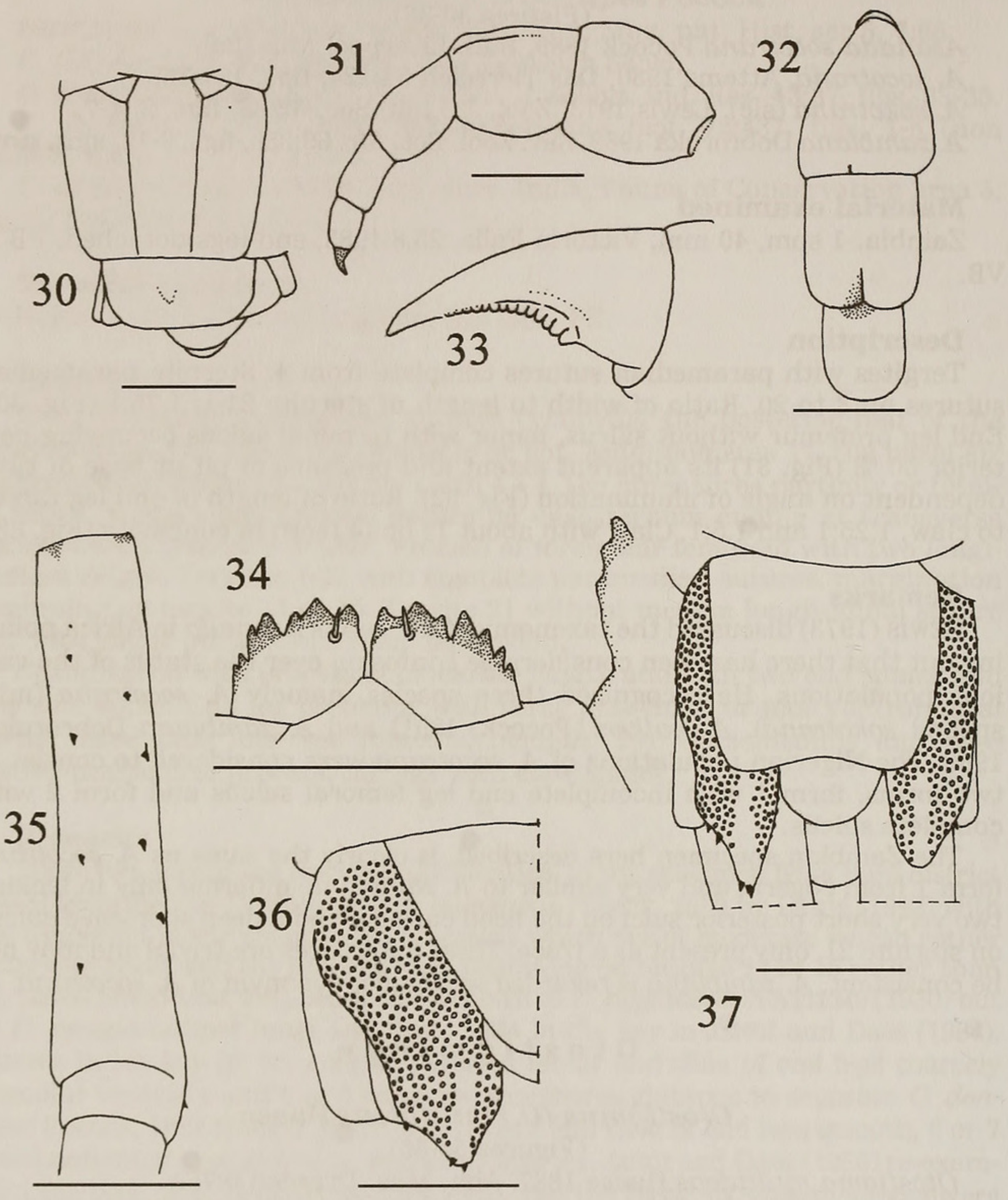
Otostigma multidens Haase 1887, Abh. Mus. Dresden **5**:75.
Otostigmus (O.) multidens, Attems 1930, Das Tierreich **54**:141, fig. 172.

Material examined

Indonesia. Spm 1, 48 mm, Kalimantan, Timur Nunukan I., rain forest, 15-17.9.1995, PB & TI. Spm 2, 38 mm, West Sumatra, Lembah Anai Nat. Reserve near Bukittinggi, 300-400 m, 14.8.1995, PB & TI.

Description (Data from ATTEMS (1930) in parentheses)

Colour. After five years the specimens still show some of original pigmen-



Figs. 30-37. *Asanada socotrana*, *Otostigmus (O.) multidens* and *Otostigmus (O.) astenus*.
Asanada socotrana. Fig. 30. Sternite 20 and terminal segments. Fig. 31. End leg 1, lateral view. Fig. 32. End leg 2, dorsal view. Fig. 33. Tarsal claw, end leg 1.
Otostigmus (O.) multidens. Fig. 34. Forcipular coxosternal tooth plates and left forcipular femoroid process, spm 1. Fig. 35. Prefemur of right end leg ventral view, spm 1. Fig. 36. Right coxopleuron, spm 2.
Otostigmus (O.) astenus. Fig. 37. Terminal segments, ventral view, spm 1.
Scale lines = 1 mm.

tation viz. head and first three or four tergites and tergites 20 and 21 brown or reddish brown, trunk dull dark green. Antennomeres 21 + 22 the basal 2.15 glabrous dorsally and 2.1 ventrally in spm 1. With 23 + 24 antennomeres, apparently not regenerated, the basal 2.4 to 2.5 glabrous dorsally, 2.25 ventrally in spm 2, (20-22). Forcipular coxosternal tooth plate with 7 + 7 (Fig. 34) or 6 + 7 teeth (five to ten).

Tergite paramedian sutures complete from 6 or 7, marginate from 9 or 11. With short paramedian sutures occupying anterior 24 or 28% of sternites. Tergite 21 with posterior median longitudinal depression occupying posterior 50 or 55%. Sternite 21 with sides converging posteriorly and posterior border concave (wide, little attenuated). Coxopleural process moderately long in spm 1, very short in spm 2 (Fig. 36) (moderately long) with two end spines, 0 + 1 or 1 + 1 lateral/subapical spines.

End leg prefemur with four ventrolateral (3-5), three or four ventromedial (3-4) no medials (0-4) and one or two dorsomedial spines (0-1), i.e. only three spine rows (Fig. 35) plus a small corner spine.

Legs 1 to 16 or 18 with one tibial spine (not mentioned by Attems). Legs 1 to 18 or 19 with two tarsal spines, 20 with one, 21 without.

Remarks

Specimen 2 has the highest number of antennomeres recorded for this species (24). The long series of tibial spines may be a characteristic of the species and the long median depression on tergite 21 may characterise many if not all specimens. Distribution: India, Java, Sumatra, Sulawesi, Sarawak, New Guinea, Vietnam. Also Tawarin Island, which I have been unable to locate.

Otostigmus (O.) astenus (Kohlrausch)

(Figure 37)

Branchiotrema astenon Kohlrausch 1881, Arch. Naturg. **47**:72.
Otostigmus (O.) astenus, Attems 1930, Das Tierreich **54**:143, fig. 174.

Material examined

Indonesia. Spm 1, 40 mm, spm 2, 39 mm, W. Timor, Kefamenanu Distr., Saenam village, 2000-2100 m, 28.6.1994, PB & VB.

Description

Antennomeres 18, basal 2.3 glabrous dorsally, 2.2 ventrally. Forcipular coxosternal tooth plate with 3 + 3 principal teeth, the inner two on each side partially fused. Tergites with paramedian sutures complete from 5 or 6, marginate from 10. Specimen 1 with scattered spines on tergites 12 to 21, spm 2 without. Sternite paramedian sutures from 9 or 10 to 18, occupying anterior half of these sternites. Sternite 21 with sides more or less parallel (Fig. 37). Coxopleural process with two end spines, one subapical and two lateral spines except the right process in spm 1 which has a rounded apex and one lateral spine only. It may have been damaged and repaired.

End leg with three or four ventrolateral spines, two ventromedials, two or three medials, two dorsomedials and one corner spine.

A tibial spine on leg 1, two tarsal spines on legs 1 to 5 on the right and 1 to 6, 8, 10 on the left in spm 1. On legs 1 to 6 on the right and 1 to 8 on the left in spm 2. The remaining legs to 20 with one tarsal spine. Leg 21 without.

Remarks

These specimens compare well with Attems (1930) description but spm 1 runs down to *O. punctiventer* (Tömösvàry, 1885) in his key as some tergites are spined. However, the two specimens clearly belong to the same species. Lewis (2000) noted spines present or absent in *O. astenus* from Rennell Island and New Britain.

Otostigmus beroni sp. nov.

(Figures 38-43)

Otostigmus (O.) glaber, Lewis 1992, Senkenbergiana biol. **72**:441, figs. 19-27 (non Chamberlin, 1920).

Derivatio nominis: After Dr Petar Beron, Director of the National Museum of Natural History, Sofia.

The specimens here described belong to the same species as the two specimens from Nepal which Lewis (1992) identified as *Otostigmus (O.) glaber* Chamberlin, 1920 and which were deposited in the Senckenberg Museum, Frankfurt a. M. Although they run down to *O. glaber* in Attems (1930, 1934), I now regard them as belonging to a new species *O. beroni.* Specimen SMF 6456 from the Senkenberg Museum is here designated the holotype and SMF 6457 a paratype. The specimens from Langtang are further paratypes.

Diagnosis

18 antennomeres, the basal 2.25 to 2.4 glabrous dorsally. Forcipular coxosternal teeth 3 + 3, rarely 4 + 4. Tergites without keels or spines, margination begins between 6 and 9. Sternites with paramedian sutures occupying at least anterior 66 to 100% in mid- and hind-body, sometimes with weak median depression. Coxopleuron little inflated, long, tapered with two end spines, no subapical spine, one or two lateral and one or two dorsal spines. End leg prefemur with prominent spines on swollen bases. Legs 1 to between 15 and 18 with two tarsal spines, the remainder to 20 with one.

Material examined

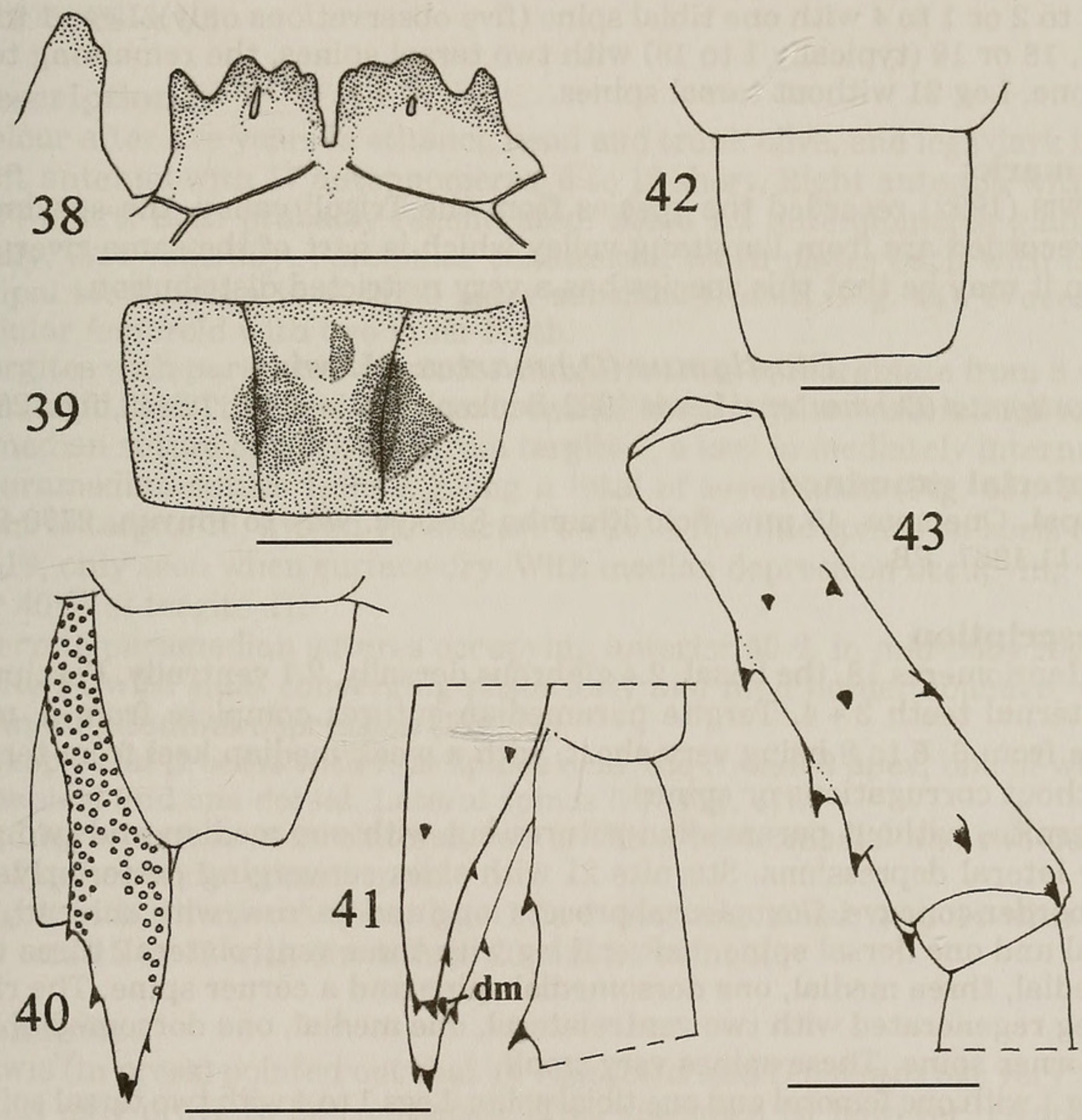
Nepal, Langtang Valley. Spm 1, 45 mm, Langtang, 3500-3600 m, 17.9.1984, PB & SA. Spm 2, 35 mm, Ghora Tabela, 2700-3000 m, 16.9.1984, PB & SA. Spms 3-5, 36, 40 and 22 mm, Kyangjin Gompa, 3700-3800 m, 19.9.1984, PB & SA. Spms, 6 & 7, 40 and 35 mm, Khangjung-Sharpugaon, 2225-2600 m, PB & SA. Spm 8, Langtang, 3500-3600 m, 17.9.84, PB & SA. Spm 9 and remains of two others, Ghora Tabela, 3100-3350 m, 17.9.1984, PB & SA. Spms 10 & 11, 36 and 34 mm, Sharpugaon, 2600-2800 m, 16.9.1984, PB & SA.

Description

The specimens have at some time dried out and as a consequence are somewhat contracted so body lengths are estimates. In most specimens, the anterior segments curve downward making the characters of the anterior sternites difficult to observe.

Antennomeres 18, the basal 2.3 to 2.4 glabrous dorsally, 2.2 ventrally. Forcipular coxosternal teeth 3 + 3, the inner two partially fused but sometimes with a small fourth inner tooth (Fig. 38), process of femoroid with a small inner tooth, or without.

Tergite paramedian sutures complete from 5 or 6 (4 in spm 11), marginate from 7, 8 or 9. Tergite 21 with or without a posterior median depression. Sternites with paramedian sutures (Fig. 39) varying from 71 % on sternite 11 and complete on sternites 13 to 16 in spm 11, 50 % on sternites 4, 79 % on sternite 10 and 87 % on sternite 17 in spm 6 and 29 % on sternite 11 and 68 % on



Figs. 38-43. *Otostigmus beroni*. Fig. 38. Forcipular coxosternal tooth plates and right forcipular femoroid process, spm 1. Fig. 39. Sternite 15, spm 2. Fig. 40. Sternite 21 and right coxopleuron, spm 7. Fig. 41. Lateral view of coxopleura and base of left end leg, spm 7, (dm = dorsomedial spine). Fig. 42. Sternite 21, spm 9. Fig. 43. End leg prefemur, internal view, spm 1. Scale lines = 1 mm.

sternite 17 in spm 1. Sutures not observed on anterior sternites due to the ventral curvature of the anterior ends and the transversely ridged cuticle, the latter presumably the result of the previous desiccation. A slight median depression, variable in position, on some sternites in six out of ten specimens. Sternite 21 with sides converging posteriorly (Fig. 40) or almost parallel (Fig. 42)

Coxopleural process moderately long and tapered, the coxopleuron little inflated (Figs. 40 and 41). With two end spines, two (rarely one) lateral spines and two (rarely one or three) dorsal spines. In specimen 11 the left coxopleural process (damaged and repaired) lacks end spines.

End leg prefemur (Fig. 43) with three or four ventrolateral, two, rarely one or three, ventromedial, two or three medial, one or two dorsomedial spines and a corner spine. The spines on swollen bases and prominent.

Anterior legs stout. Leg 1 with one femoral spine (two observations only), legs 1 to 2 or 1 to 4 with one tibial spine (five observations only). Legs 1 to 15, 16, 17, 18 or 19 (typically 1 to 18) with two tarsal spines, the remaining to 20 with one. Leg 21 without tarsal spines.

Remarks

LEWIS (1992) recorded the species from the Trisuli valley, the specimens here recorded are from Langtang valley which is part of the same river system so it may be that this species has a very restricted distribution.

Otostigmus (O.) martensi Lewis

Otostigmus (O.) martensi Lewis 1992, Senkenbergiana biol. **72**:443, figs. 28-35.

Material examined

Nepal. One spm, 45 mm, Solo Khumba Sankye, way to Piuyun, 2700-2600 m, 10.11.1987, PB.

Description

Antennomeres 18, the basal, 2.4 glabrous dorsally, 2.1 ventrally. Forcipular coxosternal teeth 3 + 4. Tergite paramedian sutures complete from 4, marginate from 6, 6 to 8 being very short, with a weak median keel from tergite 8. Without corrugations or spines.

Sternites without paramedian sutures but with one median and two posterior lateral depressions. Sternite 21 with sides converging posteriorly and hind border concave. Coxopleural process long and narrow, with one end, one lateral and one dorsal spine. Left end leg with three ventrolateral, three ventromedial, three medial, one dorsomedial spine and a corner spine. The right end leg regenerated with two ventrolateral, one medial, one dorsomedial and one corner spine. These spines very small.

Leg 1 with one femoral and one tibial spine. Legs 1 to 4 with two tarsal spines, legs 5 to 21 with one tarsal. The regenerated right end leg lacks a tarsal spine.

Remarks

Previously known only from the Taplejung district of Nepal at 2300 to 2700 m, it is possible that this is a species limited to the far east of Nepal at high altitude.

The specimen here described is very similar to the type material, differing in lacking sternite paramedian sutures (short or obscure in the type material).

Otostigmus (O.) rugulosus Porat

(Figures 44-47)

Otostigmus rugulosus Porat 1876, Bih. Svenska Ak. **4**:21.
Otostigma rugulosum and *carinatus*, Pocock in Ann. Mus. Genova **30**:412.
Otostigmus (O.) rugulosus, Attems 1930, Das Tierreich **54**:44.
O. (O.) scaber, Lewis 1992, Senkenbergiana biol. **72**:440, figs. 14-18 (non Porat 1876).

Material examined

Indonesia. 1 spm, 30 mm, Nias I., (N. Sumatra), Teluk Dalam, sea level. 19.5.1995, PB & VB.

Description

Colour after five years in ethanol: head and trunk olive, end legs dark blue.

Left antenna with 17 antennomeres, 6 to 16 short. Right antenna with 18, 9 to 17 short. Both probably regenerated. Basal 2.2 antennomeres glabrous dorsally, 2.14 ventrally. Forcipular coxosternal tooth plates each with three principal teeth and a very small outer subsidiary tooth (Fig. 44). Process of forcipular femoroid with two inner teeth.

Tergites with paramedian sutures complete from 6, marginate from 8 with low rounded keels, the median from 6, two rather irregular keels lateral to the paramedian suture on each side from tergite 7, a keel immediately internal to the paramedian suture from 9 giving a total of seven keels (Fig. 45). These present to tergite 18, five on 19, obscure on 20. A few fine spines on keels from 12 to 19, only seen when surface dry. With median depression occupying posterior 40 % of tergite 21.

Sternite paramedian sutures occupying anterior 50 % in mid-body region. Sternite 21 with sides converging posteriorly and hind border concave, with median longitudinal depression (Fig. 46).

Coxopleural process with four spines near the rounded apex, one of which is subapical and one dorsal. Lateral spines 0-1 (Fig. 47).

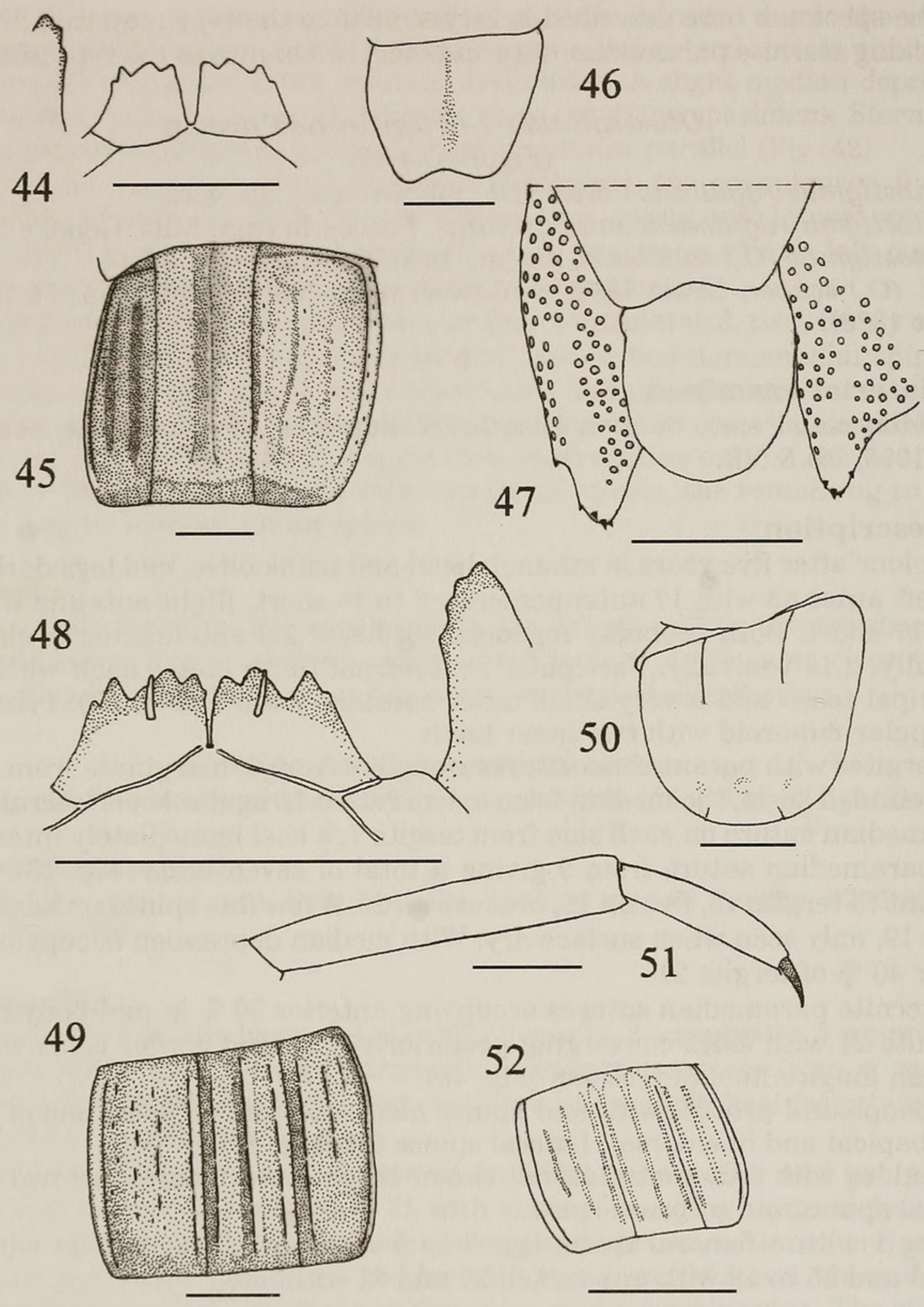
End leg with four ventrolateral, two or three ventromedial and two dorsomedial spines and a corner spine.

Leg 1 with a femoral spine, legs 1 to 5 with one tibial, 1 to 14 with two tarsal and 15 to 19 with one tarsal, 20 and 21 without.

Remarks

LEWIS (in press) pointed out that *O. rugulosus* and *O astenus* are very similar and may prove to be conspecific. This specimen is, however, clearly *O. rugulosus* having low tergal keels, four spines very near the apex of the coxopleuron, prefemur of the end leg with only three spine rows, two tarsal spines on legs 1 to 14 and no tarsal spine on 20 and 21.

Previously recorded from Mauritius, Seychelles, India, Nepal, Burma, Andaman Is., 'Siam'.



Figs. 44-52. *Otostigmus (O.) rugulosus* and *Otostigmus (O.) scaber.*
Otostigmus (O.) rugulosus. Fig. 44. Forcipular coxosternal tooth plates and right forcipular femoroid process. Fig. 45. Tergite 18. Fig. 46. Sternite 21. Fig. 47. Detail of coxopleura, ventral view.
Scale lines = 0.5 mm.
Otostigmus (O.) scaber. Fig. 48. Forcipular coxosternal tooth plates and left forcipular femoroid process, spm 1. Fig. 49. Tergite 16, spm 1. Fig. 50. Sternite 10, spm 1. Fig. 51. Tarsus 1 and 2 of end leg, spm 1. Fig. 52. Tergite 14, spm 2.
Scale lines = 1 mm.

Otostigmus (O.) scaber Porat

(Figures 48-52)

Otostigmus scaber Porat 1876, Bih. Svenska Ak Handl 4: 20.

O. (O.) scaber, Attems 1930, Das Tierreich, **54**:153.

Non *O. (O.) scaber*, Lewis 1992, Senkenbergiana biol. **72**: 440, figs. 14-18.

Material examined

Indonesia. Spm 1, 44 mm, West Sumatra, Padang Panjang, rain forest, 600-700m, 13.8.1995, PB & TI.

China. Spm 2, 22.5 mm, Hainan Dao Qingdao, 200-300 m, 14.10.1988, PB.

Description

Specimen 1. Colour after five years in ethanol: head and tergite 1 reddish-brown, trunk olive brown. Antennomeres 20 (left damaged, right regenerated), the basal 2.14 glabrous.

Each tooth plate with three principal forcipular coxosternal teeth, the inner two partially fused, the outer with a small outer subsidiary tooth; a very small inner subsidiary tooth on right left tooth plate only (Fig. 48). Forcipular femoroid process with three small inner teeth.

Tergites with paramedian sutures complete from 6 and marginate from 6. With a median keel low on 4, becoming sharp-ridged. Two sharp-ridged lateral keels on each side from 8, with a further keel outside these on each side from 9 giving seven in all. Traces of another keel on each side lateral to these (Fig. 49). Tergite 19 with seven, 20 with five keels. The keels spined. Tergite 21 median longitudinal depression in posterior third.

Sternites of mid and hind body with paramedian sutures occupying the anterior 33 to 50 % of the sternite. Most only seen in specimen with surface dried off. Most sternites with a very shallow posterior median depression, some in addition with very slight lateral depressions (Fig. 50). On some posterior sternites the sutures terminate in a very shallow depression. Sternite 21 with sides converging posteriorly and hind border concave.

Coxopleural process with two end and one subapical, two lateral and one dorsal spine on left. Without end spines or dorsal spines on right presumably due to damage and repair.

End legs very long and slender, 43 % of body length, prefemur length to width 5.2:1. Second tarsus (Fig. 51) somewhat flattened laterally. Prefemoral spines: ventrolateral four, ventromedial two or three, dorsomedial one or two plus corner spine.

Legs 1 to 5 with a tibial spine, 1 to 4, and leg 9 on right with two tarsal spines, otherwise one tarsal on 5 to 19. Legs 20 and 21 without tarsal spine.

Specimen 2. (Only differences from spm 1 noted). Colour after twelve years in ethanol: head and tergite 1 reddish brown, trunk yellowish brown. Antennomeres 21, basal 2 and 2.2 glabrous. Forcipular femoroid process with two small inner teeth.

Tergites marginate from 4, with a median and two lateral keels on each side from 3, these sharp-edged with two further, initially, low lateral keels from 5 giving nine in all (Fig. 52). Tergite 19 with seven, 20 with five keels. The keels spined the lateral cuticle rough.

Coxopleural process with two end and one subapical, one lateral and one dorsal spine.

End legs. Prefemoral spines: ventrolateral four, ventromedial two or three, medial two or three,dorsomedial three plus a corner spine.

Legs 1 to 9 or 10 with two tarsal spines, one tarsal on 10 or 11 to 19 (leg 20 wanting). Leg 21 without tarsal spine.

Remarks

Otostigmus scaber is widely distributed, being recorded from China, Japan, Taiwan, Andamans, Nicobars, Siam, Sumatra 'Indo China,' Vietnam, Burma, Sumatra, Hawaii and the Maritime Province of Russia. LEWIS (1992) recorded the species from Nepal but this was a misidentification (see *O. rugulosus* above). The two specimens described here are from widely separated localities: spm 1 from Sumatra and spm 2 from China. They show differences probably associated with this, most significantly lateral keels commencing on tergite 8 in spm 1, on 3 in spm 2 and two tarsal spines on legs 1 to 5 in spm 1, on 1 to 9 or 10 in spm 2, three rows of prefemoral spines in spm 1, four in spm 2.

Otostigmus aculeatus **Haase**

(Figures 53-58)

Otostigma aculeatum Haase 1887, Abh. Mus. Dresden **5**:71, Taf 4, Fig 69.
Otostigmus aculeatus, Kraepelin 1903, Mt. Mus. Hamburg **20**:108.
O. (O.) aculeatus, Attems 1930, Das Tierreich **54**:148.

Material examined

Vietnam. 6 spms, 23 to 42 mm, Prov. Quang Ninh, Camp Vinh Ha Long (Halong Hotel), 28.2.1989, PB and D. Kojucharov. Two spms, 42 and 58 mm, Langson Prov., rain forest near Huu Lung, 19.3.1989, PB.

China. One spm 40 mm, Yunnan, Jinshui County, 18.1.1989, near Yan Dong (cave) under stones, PB. 5 spms, 27-58 mm, 4 spms, 11.5 to 27 mm (not examined in detail), Hainan Dao Qingdao, 200-300 m, 14.10.1988, PB.

Description

Undamaged antennae have 17 antennomeres, the basal three completely glabrous except for a small area distally on the anteroventral (inner) surface of antennomere 3 in smaller specimens. In the 58 mm specimen from Hainan Dao (China), however, antennomere 4 is largely glabrous dorsally with only scattered setae distally (Fig. 53) and the proximal 50 to 75 % is glabrous ventrally. Forcipular coxosternal teeth 4 + 4 (Fig. 54). Process of forcipular femuroid with two inner teeth but both coxosternal and femoroid teeth very worn in some specimens.

Tergite paramedian sutures complete from 4, 5 or 6, marginate from 10, 11, 12, 14 or 15, without keels or spines. Tergite 21 with posterior median depression.

Sternite paramedian sutures complete from 2 or 3 (4, 5) to 19. Sternite 21 with sides converging posteriorly and posterior border concave (Fig. 55).

Coxopleural process moderately long (Fig. 55) except for the largest (58 mm) specimen from Langson Province (Vietnam) in which it is short (Fig. 56). With four to five (6,7) end spines, one to four lateral spines and (nil) one to three dorsal spines. Total spine number eight to eleven (rarely 12 or 13). Spine positions are very variable.

End leg prefemur (Figs. 57, 58) with 24 to 30 spines arranged in five rows: two ventrolateral rows of four to six and five to nine spines, a ventromedial row of four to eight, a medial row of six to eight and a dorsomedial row of three to five (rarely two) spines and a corner spine. A mid-ventral longitudinal strip without spines clearly separates the ventrolaterals from the ventromedials. Six of the 22 end legs examined were regenerated. In these the spine rows were irregular and generally the spine number was elevated (30 to 42). In one of these regenerated legs there were no dorsomedial spines and in two no corner spine.

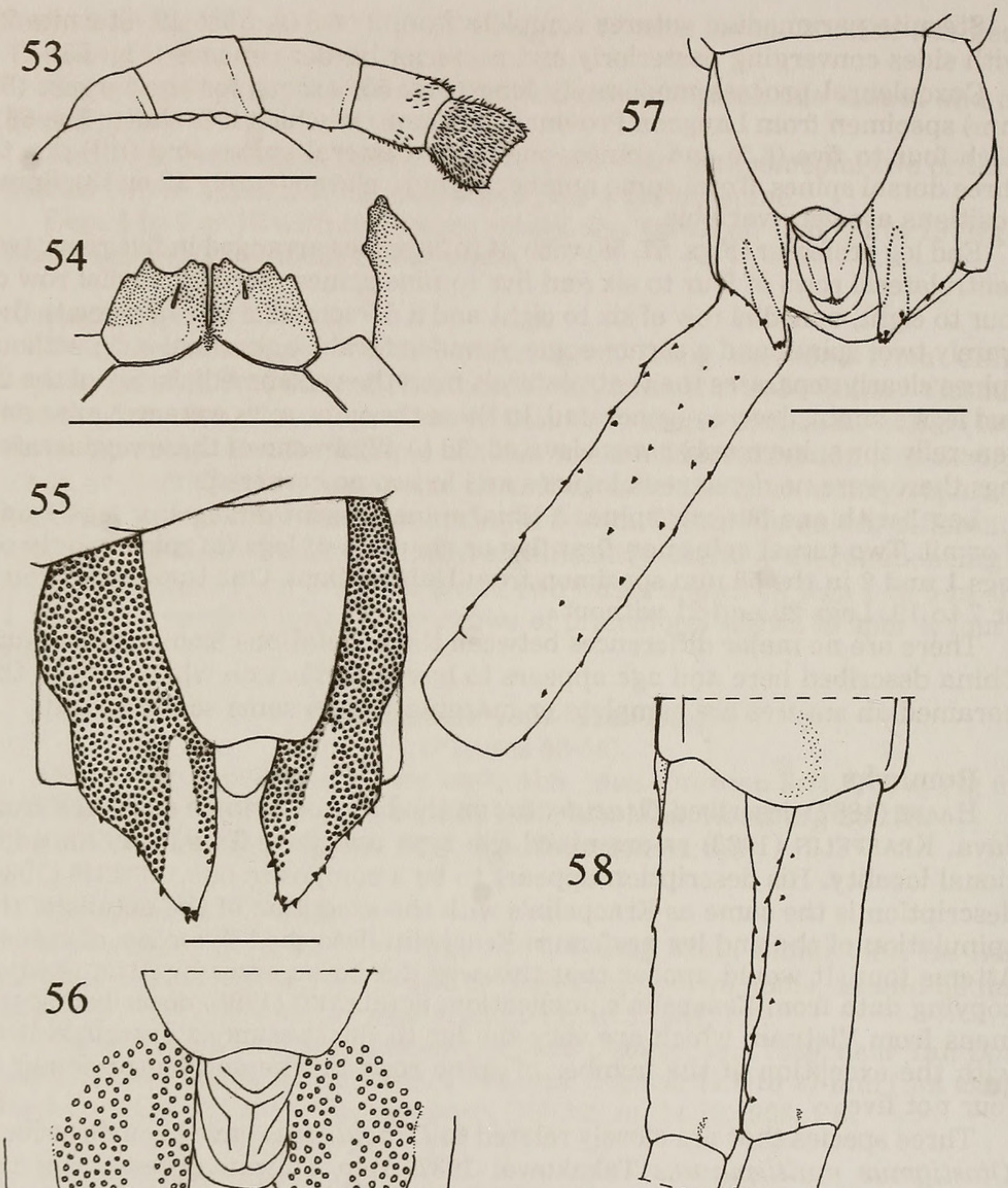
Leg 1 with one femoral spine. A tibial spine present on leg 1 or legs 1 and 2 or nil. Two tarsal spines on first five or six pairs of legs (atypically only on legs 1 and 2 in the 58 mm specimen from Hainan Dao). One tarsal spine on 6 or 7 to 19. Legs 20 and 21 without.

There are no major differences between the populations from Vietnam and China described here and age appears to have no effect on which tergite the paramedian sutures are complete or marginate as in some scolopendrids.

Remarks

HAASE (1887) described *O. aculeatus* on the basis of a single specimen from Java. KRAEPELIN (1903) re-examined the type and gave Tonkin as an additional locality. His description appears to be a composite one. ATTEMS (1930) description is the same as Kraepelin's with the exception of the details of the spinulation of the end leg prefemur: Kraepelin described five rows of spines, Attems four. It would appear that this was due to an error by Attems when copying data from Kraepelin's publication. SCHILEYKO (1995) described specimens from Vietnam which are very similar to the specimens described here with the exception of the number of spine rows on the end leg prefemur is four not five.

Three species that are closely related to *O. aculeatus* have been described. *Otostigmus multispinosus* Takakuwa, 1937 from Taiwan differs from the specimens described here in that the prefemora of the end legs lack dorsomedial and corner spines. *Otostigmus ziesel* Schileyko, 1992 from Vietnam is characterised by a short coxopleural process often slightly curved medially, the presence of a femoral spine on leg 1, three median and ventromedial and two ventrolateral spine rows on the end leg prefemur (presumably no dorsomedian row) and some other minor characteristics. *Otostigmus reservatus*, Schileyko 1995, also from Vietnam, is a large species up to 80 mm long with the basal 4 to 4.5 basal antennomeres glabrous, lacking the distal spine on telomere 2 of the second maxilla and having 4 + 4 very small coxosternal teeth and five spine rows on the end leg prefemur: two ventrolateral, two ventromedial and one dorsomedial.



Figs. 53-58. *Otostigmus (O.) aculeatus.* Fig. 53. Antennomeres 1-5 of right antenna, dorsal view, 58 mm specimen, China, Hainan Dao. Fig. 54. Forcipular coxosternal tooth plates and left forcipular femoroid process, 46 mm specimen, Vietnam, Langson prov. Fig. 55. Terminal segments, ventral view, 58 mm specimen Hainan Dao. Fig. 56. Detail of coxopleura, 58 mm specimen Hainan Dao. Fig. 57. Terminal segments and right end leg prefemur, ventral view, 39 mm specimen China, Guanxi Zhangxu. The end leg prefemur is rotated and the dorsomedial spines are visible. Fig. 58. Dorsal view of end leg prefemora, 32 mm specimen Hainan Dao.
Scale lines = 1 mm.

Only one end leg of one specimen examined here (Langson valley, Vietnam, 42 mm) lacks dorsomedial prefemoral spines and corner spine as does *O. multispinosus* but this leg is regenerated. The larger specimen from the Langson valley has a very short coxopleural process and thus resembles *O. ziesel* but does not show the other characters of the species. The 58 mm specimen from Hainan Dao (China), having antennomere 4 but sparsely setose distally, approaches the condition in *O. reservatus* but it has a distal spine on telomere 2 of the second maxillary telopodite, absent in *O. reservatus.*

It may be that some of these putative species are but differing populations of *O. aculeatus.* Examination of the types and a further study of individual variation should elucidate this matter.

Otostigmus politus **Karsch**

(Figures 59-68)

Otostigmus politus Karsch 1881, Berliner Ent. Zeitschr. **25**:62.

Otostigma politum, Haase 1887, Abh. Mus. Dresden **5**: 75, Tafel 4, fig. 76.

O. politus, Kraepelin 1903, Mt. Mus. Hamburg **20**:109, (in part).

O. (O.) politus politus, Attems 1930, Das Tierreich **54**:149.

Non *O. (O.) politus pigmentatus* Attems 1930, Das Tierreich **54**:150, figs.177-180.

Non *O. (O.) politus australianus*, Attems 1930, Das Tierreich **54**:151.

O. politus mandchurius Verhoeff 1942, Zool. Anz. **138**:186, figs. 6,7. **syn. nov.**

? *O. frigidus* Verhoeff 1942, Zool. Anz. **138**:186, figs. 1-4.

? *O. frigidus takakuwai* Verhoeff 1942, Zool. Anz. **138**:188, fig. 5.

Non *Otostigmus politus schindleri* Würmli 1972, Verhandl. Naturf. Ges. Basel. **82**:97, figs.13,14.

Non *O. (O.) politus*, Lewis 1991, Mem. Mus. Victoria, **52**:342, Figs 15-20.

O. (O.) politus, Zalesskaja & Schileyko 1992, The scolopendromorph centipedes (Chilopoda, Scolopendromorpha), p. 22, Fig. 8. (in part).

Otostigmus politus (s. str.), Schileyko 1995, Arthropoda Selecta **4**:80.

Non *Otostigmus (O.) politus*, Lewis 2000, J. nat Hist. **34**:436, Figs. 15-20.

Diagnosis

Antennomeres 17 (and 18?), the basal three glabrous dorsally. Forcipular coxosternal teeth typically 4 + 4, the central pair on each tooth plate larger than the outer and inner teeth, and quite widely separated (Fig. 62). Sternites with complete paramedian sutures. Coxopleural process short or very short, without a dorsal spine and without a ventral median posterior pore free strip. Sternite 21 with sides converging posteriorly the hind border only very slightly concave.

Material examined

China. Spm 1, 55 mm, Beijing, Xiangshan Park, 11.8.1993, PB. Spm. 2, 36 mm, Yunnan, Jinshui County near Yan Dong (cave) under stones, 18.1.1989, PB.

Description (Where the specimens differ, the character for spm 2 is given in parentheses).

Undamaged antennae with 17 antennomeres, the basal three glabrous dorsally except for very narrow area on distal half of internal (= anterior) side (Fig. 59), present ventromedially but not ventrolaterally, more extensive in spm 1 (Fig. 60) than in spm 2 (Fig. 61). Forcipular coxosternal teeth 5 + 4 (4 + 4) (Figs. 62, 63). Process of forcipular femoroid with one small inner tooth.

Tergite paramedian sutures complete from 5 (6) to 20, marginate from 11 (15), with median keel from 5 (and weak lateral corrugations from 16 to 19). Tergite 21 without (with) shallow posterior median depression.

Sternite paramedian sutures complete from 4 (6) to 19, a weak posterior median depression at least from 10 to 19 (Fig. 64). (with trace of median and posterior median depression on some). Sternite 21 with sides converging posteriorly and, in spm 1, strongly curved (Fig. 65).

Coxopleural process relatively short, ratio of length of coxopleuron to length of sternite 21 1.4:1 (1.3:1) (Figs. 65 to 68) with two end spines and one subapical spine (three end spines), one lateral spine, dorsal spines nil. Number of coxal pores posterior to articular condyle 14 on the left, 16 on the right (four left, eight right). See Remarks and Fig. 68 for an explanation of this character.

End leg prefemur with three (five) ventrolateral spines, two (four or five) ventromedials, two or three (four) medial spines, two dorsomedials and a corner spine (Figs. 65, 67). Karsch (1881) gave 3, 2, 2, 3.

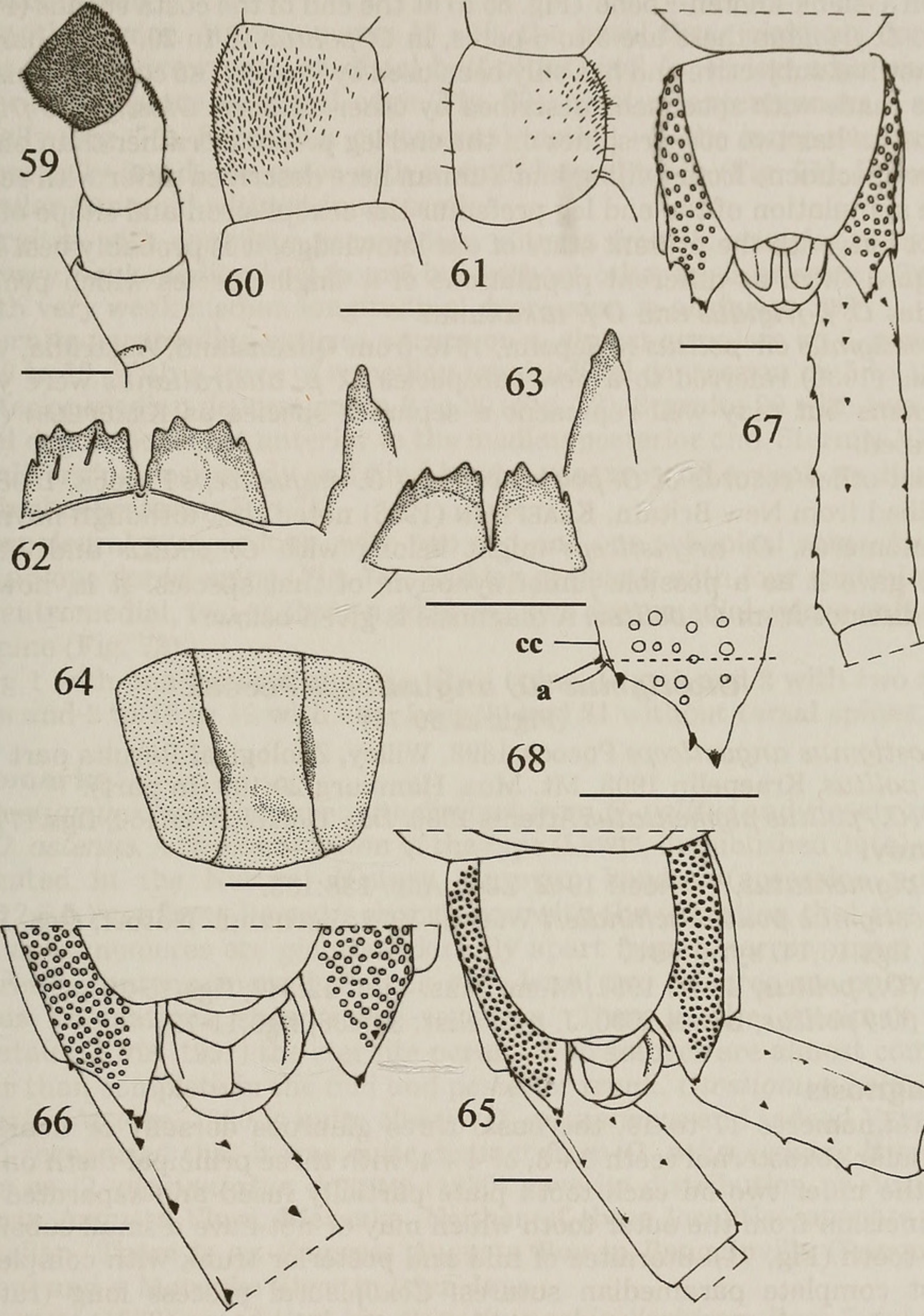
Leg 1 with one femoral spine, legs 1, 2 and 3 (1 and 2) with one tibial, legs 1 to 6 with two tarsal spines and 7 to 19 or 20 (19) with one tarsal spine. Leg 20 with or without (without), leg 21 without a tarsal spine.

Remarks

Kraepelin (1916) considered that several species had been included under *O. politus*, whilst Attems (1930) recognised three subspecies namely, *O. p. politus*, *O. p. australianus* Attems, 1930 and *O. politus pigmentatus* Attems, 1930, the last of which, Verhoeff (1942) considered a separate species *O. pigmentatus*. Other subspecies described are *O. p. mandschurius* Verhoeff 1942 and *O. p. schindleri* Würmli, 1972.

It is clear that *O. politus* as understood by both Kraepelin (1903) and Attems (1930) comprises at least two species. *Otostigmus politus* s. str., was first described by Karsch (1881) from Peking (Beijing) and Tientsin (Tianjin) in northern China. A diagnosis for this species is given above. Further material of the species has been recorded from Manchuria (Verhoeff, 1942), Korea (Zalesskaja and Schileyko, 1992), Vietnam (Schileyko, 1995) and China (the specimens described here).

Otostigmus politus mandchurius was characterised primarily by the presence of two rows of six spines on the inner surface of the end leg prefemur as opposed to two rows of 2 to 5 spines. It is here regarded as a junior synonym of *O. politus politus*. *Otostigmus frigidus frigidus* Verhoeff 1942 and *O. f. takakuwai* Verhoeff 1942 each described from single specimens from Manchuria, fall within the diagnosis given here for *O. politus*. In order to characterise *O. frigidus*, Verhoeff introduced a new character namely the number of pores on the coxopleuron distal to a line drawn transversely from the artic-



Figs. 59-68. *Otostigmus (O.) politus.* Fig. 59. Antennomeres 1-4 of left antenna, dorsal view, spm 1. Fig. 60. Left antennomere 3, ventral view, spm 1. Fig. 61. Right antennomere 3, ventral view, spm 2. Fig. 62. Forcipular coxosternal tooth plates and left forcipular femoroid process, spm 1. Fig. 63. The same, oblique view, spm 2. Fig. 64. Sternite 18, spm 1. Fig. 65. Terminal segments and end leg prefemora, ventral view, spm 1. Fig. 66. Detail of the same. Fig. 67. Terminal segments and left end leg prefemur, ventral view, spm 2. Fig. 68. Right coxopleural process, spm 2, (cc = coxa costalis, a = articulation).
Scale lines = 0.5 mm.

ulation 'Gelenk-knoten-Ebene' (Fig. 68 a) at the end of the costa coxalis (Fig. 68 cc). In *O. frigidus* there are 5 to 6 pores, in *O. politus* 16 to 20. This character is somewhat subjective and has only been used by Verhoeff so comparisons cannot be made with specimens described by other authors. *Otostigmus frigidus takakuwai* has two corner spines on the end leg prefemur rather than one.

The specimens from Beijing and Yunnan here described differ with respect to the spinulation of the end leg prefemur the coxopleuron and shape of sternite 21 but, with the present state of our knowledge, it is probably best being to regard them as different populations of a single species which probably includes *O. f. frigidus* and *O f. takakuwai.*

Otostigmus cfr *politus* Kraepelin, 1916 from Queensland, Australia, which ATTEMS (1930) referred to a new subspecies *O. p. australianus* were young specimens but may well represent a separate species as KRAEPELIN (1916) suggested.

Most other records of *O. politus* refer to *O. angusticeps* Pocock, 1898 first described from New Britain. KRAEPELIN (1903) noted that although having 19 antennomeres, *O. angusticeps* might belong with *O. politus* and ATTEMS (1930) gave it as a possible junior synonym of that species. It is, however, quite distinct from *O. politus.* A diagnosis is given below.

Otostigmus (O) angusticeps Pocock

(Figures 69-74)

Otostigmus angusticeps Pocock 1898, Willey, Zoological Results part **1**:62.

O. politus, Kraepelin 1903, Mt. Mus. Hamburg **20**:109 (in part).

O. (O.) politus pigmentatus Attems 1930, Das Tierreich **54**:150, figs.177-180. **syn. nov.**

O. pigmentatus, Verhoeff 1942, Zool. Anz. **138**:183.

Otostigmus politus schindleri Würmli 1972, Verhandl. Naturf. Ges. Basel. **82**:97, figs.13,14. **syn. nov.**

O. (O.) politus, Lewis 1991, Mem. Mus. Vict. **52**:342, figs.15-20.

O. (O.) politus, Lewis 2000, J. nat. Hist. **34**:436, figs.11-19.

Diagnosis

Antennomeres 17 to 19, the basal three glabrous dorsally or nearly so. Forcipular coxosternal teeth 3 + 3, or 4 + 4, with three principal teeth on each side, the inner two on each tooth plate partially fused and separated by a deep incision from the outer tooth which may or not have a small subsidiary outer tooth (Fig. 71). Sternites of mid and posterior trunk with complete or almost complete paramedian sutures. Coxopleural process long (ratio of length of coxopleuron to sternite 21 about 2:1), with a dorsal spine and a ventral median posterior pore free strip. Sternite 21 with sides converging a little posteriorly, parallel or diverging.

Material examined

1 spm. Indonesia, Kalimantan, Timur Nunukan I., rain forest, 15-17.9.1995. PB & TI.

Description

Length 48 mm. Antennomeres 19 + 19, the basal three glabrous dorsally, except for a narrow area on distal half of internal (anterior) edge and few scattered fine setae on distal edge (Fig. 69). Most of antennomere 3 setose ventrally (Fig. 70). Forcipular coxosternal teeth 3 + 3, the inner two on each side partially fused, the outer with a small lateral tooth (Fig. 71). Process of forcipular femoroid without inner teeth.

Tergites with complete paramedian sutures from 5, marginate from 8. With very weak median keel from 8 but without other keels or spines. Tergite 21 with very weak median longitudinal depression in posterior 30%.

Sternite paramedian sutures a trace on 4, almost complete on 5, complete from 6 to 19. With a trace of a median longitudinal depression on 5 to 18 and a posterior median depression on 9 to 20 (Fig. 72). Sternite 20 with two weak lateral depressions just anterior to the median posterior one. Sternite 21 with sides diverging posteriorly and hind border concave and a weak median longitudinal depression (Fig. 73).

Coxopleural process long, with two end and one subapical spine, two lateral and one dorsal spine (Fig. 74). End leg prefemur with four ventrolateral, two ventromedial, two or three medial and two dorsomedial spines and a corner spine (Fig. 73).

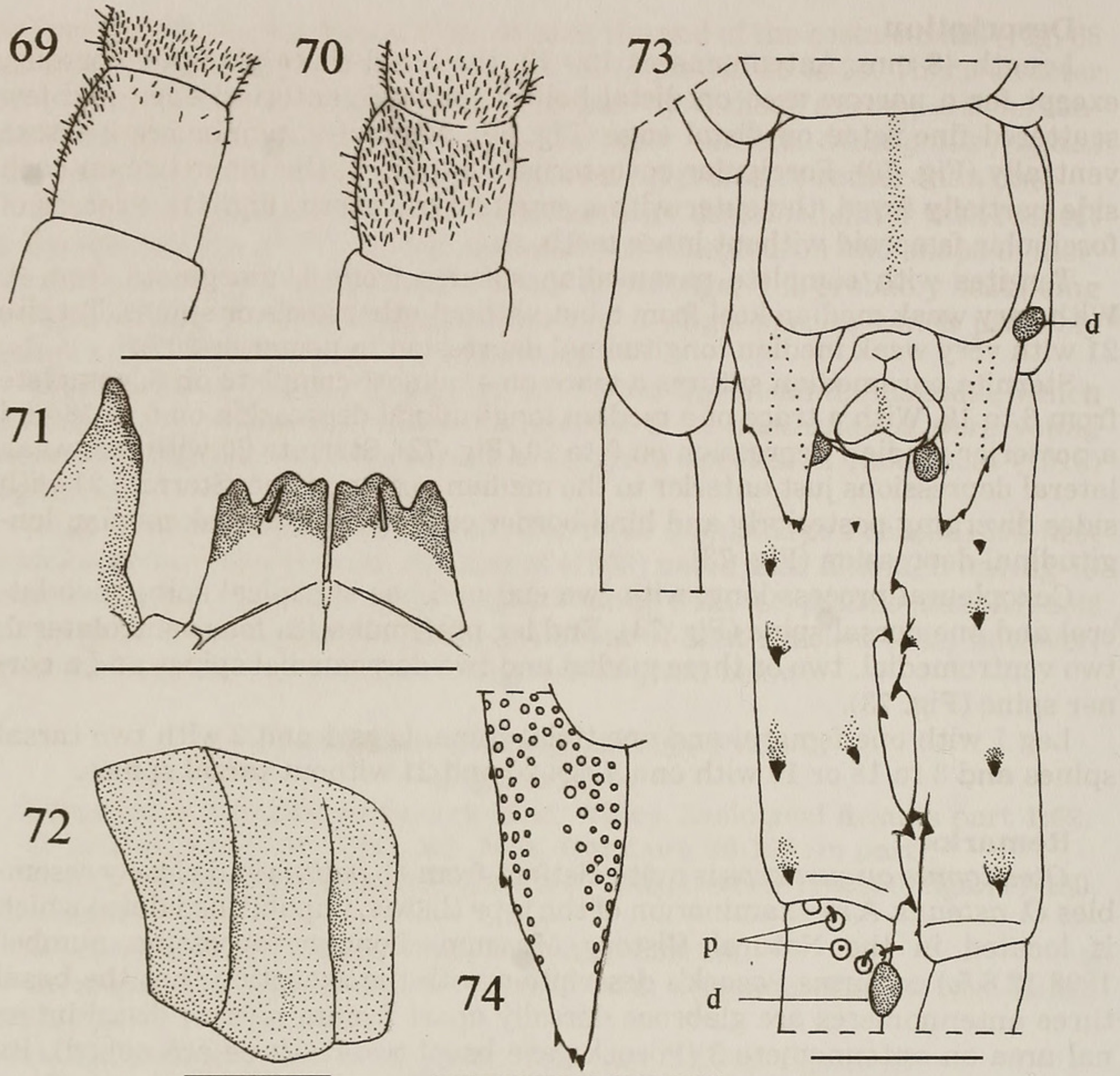
Leg 1 with one femoral and one tibial spine. Legs 1 and 2 with two tarsal spines and 3 to 18 or 19 with one. Legs 20 and 21 without tarsal spines.

Remarks

Otostigmus angusticeps is quite distinct from *O. politus* and closely resembles *O. astenus*. A re-examination of the type (LEWIS, unpublished data) which is located in the Natural History Museum, London (accession number 1898.12.6.5.) confirms Pocock's description with the exception that the basal three antennomeres are glabrous dorsally apart from a narrow distal internal area on antennomere 3 (Pocock gave basal two or three are naked). Its various populations show some variation. Thus in the specimen from Krakatau (LEWIS, 1991) the sternite paramedian sutures are almost complete rather than complete in the mid and posterior trunk. *Otostigmus politus pigmentatus* Attems, 1930 is quite clearly *O. angusticeps* and indeed VERHOEFF (1942) recognised that it was quite distinct from *O. politus* giving it specific status as *O. pigmentatus*. ATTEMS (1930) gave its distribution as Australia: Kaiserin Augusta Fluss, Merauke. Neither of these localities appears to be Australian. There is an Empress Augusta Bay in Bougainville (Papua New Guinea) and a Marauke River in Irian Jaya.

WÜRMLI (1972) noted that his *O. politus schindleri* from East Sumba was very similar to Attems' *O. politus pigmentatus* differing only in that the basal 2 2/3 antennomeres were glabrous and the coxopleural process longer. It is clearly *O. angusticpes* whether or not it merits subspecific status is debatable.

Those specimens currently confirmed as *O. angusticeps* are from East Sumba, the Krakatau Islands, New Britain, the Solomon Islands, Kalimantan and possibly Papua New Guinea and Irian Jaya.



Figs. 69-74. *Otostigmus (O.) angusticeps*. Fig. 69. Right antennomere 3, dorsal. Fig, 70. Left antennomere 3, ventral. Fig. 71. Forcipular coxosternal tooth plates and right forcipular prefemoral process. Fig. 72. Sternite 7. Fig. 73. Terminal segments and end leg prefemora, ventral view, (d = uropodid deuteronymph, p = anal pedicel). Fig. 74. Right coxopleural process, ventral view.
Scale lines = 1 mm.

The specimen here described is the only one so far recorded with sternite 21 diverging posteriorly as seen in some *O. astenus*. This may be a character of some specimens of the local population.

Phoretic mites

The specimen carries a number of phoretic deutonymphs of a uropodid mite (Fig. 73d). These attach by an anal pedicel several of which are seen, the deutonymphs having detached (Fig. 73p). The specimen carries 15 deutonymphs and 12 anal pedicels on segments 2, 3, 4, 5, 7, 13 and 16, 17, 19, 20 and 21. The majority on the prefemur and femur.

Otostigmus (O.) spinosus Porat

(Figs. 75-78)

Otostigmus spinosus Porat 1876, Bih. Svenska Ak. **4**:22.
Branchiotrema nitidulum Tömösvàry 1885, Termész. Füzetek **9**:66.
O. spinosus, Kraepelin 1903, Mt. Mus. Hamburg **20**:116, fig. 53.
O. (O.) spinosus, Attems 1930, Das Tierreich **54**:152, fig. 182.

Material examined

Indonesia. 1 spm, 45 mm, Java, Puncak Pass, 34 km from Bogor, 1500-1600 m, 6.8.1994, PB & VB.

Description

Colour: head and end legs brownish grey, trunk yellowish brown.

Antennomeres 19 + 20, the basal 2.44 glabrous dorsally, 2.2 ventrally. Coxosternal tooth plates on each side with a wide worn median tooth, probably double, and a well separated lateral tooth. In addition a small additional outer tooth on the right (Fig. 75).

Tergite paramedian sutures fine, complete from 5 to 20, marginate from 15. Very weak lateral corrugations from 11. Without keels or spines. Tergite 21 with sides converging posteriorly and shallow median posterior depression (Fig. 76).

Sternite paramedian sutures short, occupying the anterior 16% of sternite 9, 22% on 14, 19% on 18. Without obvious depressions. Sternite 21 with sides converging strongly posteriorly (Fig. 77).

Coxopleural processes short, with two end spines, one subapical spine and one lateral on the left (Fig. 78), two end spines and one lateral on the right.

End leg prefemora, the left with five ventrolateral, five ventromedial, two medial, three dorsomedial spines and two corner spines, the right with 4, 4, 4, 1, 4 and one corner spine.

Legs 1 and 2 with one tibial spine, 1 to 4 with two tarsal spines, 5 to 21 with one. Left leg 20 with a dorsal distal prefemoral spine. Absent on the left leg 20 which is smaller and may be regenerated (Fig. 76).

Remarks

This specimen lacks a dorsal spine on the coxopleuron and therefore does not run down to *O. spinosus* in Attems (1930) but in other respects it is typical.

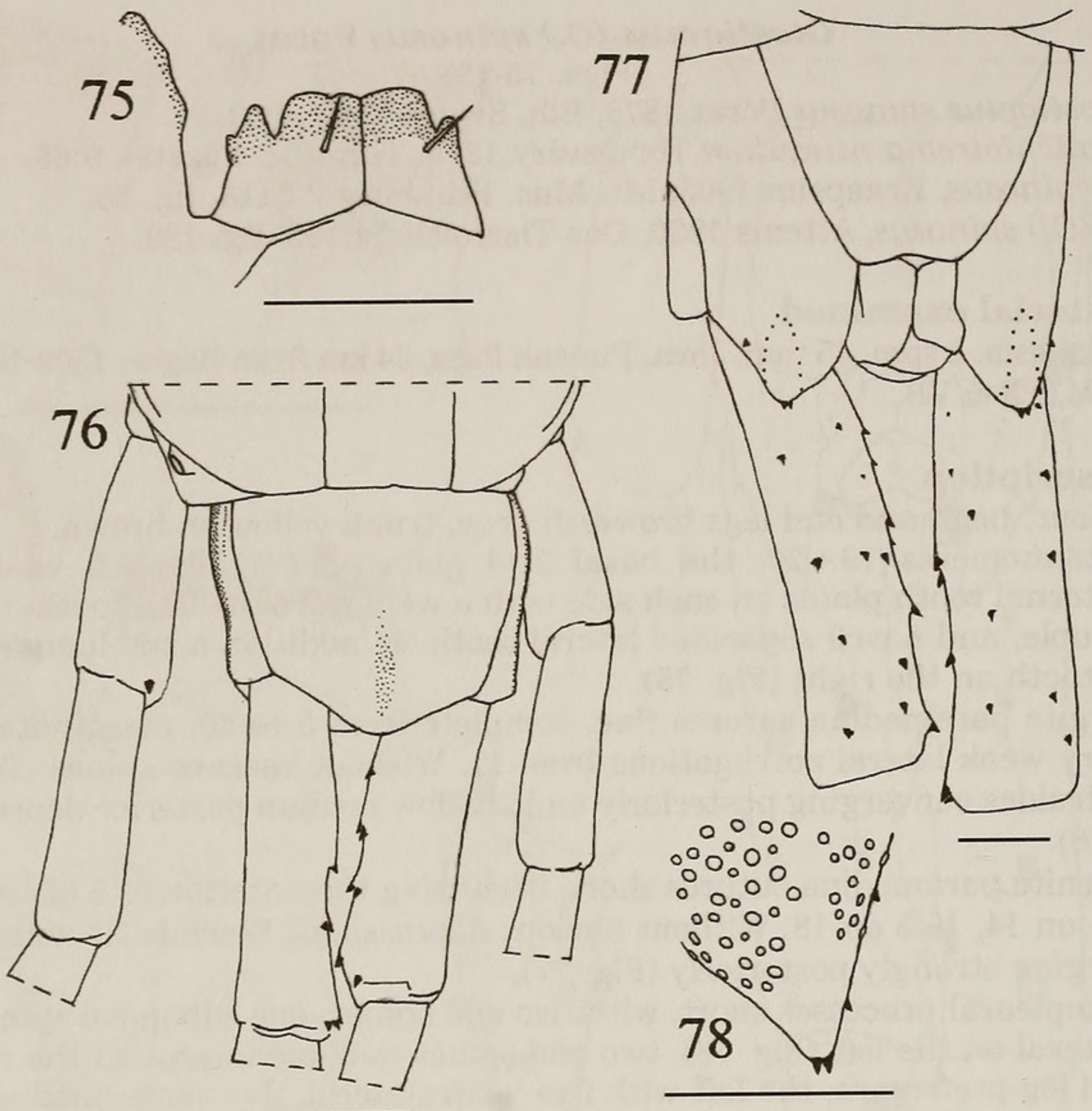
Otostigmus (Parotostigmus) gymnopus gymnopus Silvestri

(Figs. 79-85)

Otostigma gymnopus Silvestri 1898, Ann. Mus. civ. Stor. Nat. Genova **39**: 135, fig. 1.
Otostigmus gymnopus, Kraepelin 1903, Mt. Mus. Hamburg **20**:127, fig. 69.
O. (P.) g. gymnopus, Attems 1930 Das Tierreich **54**:156, Fig. 184.

Material examined

Zaire. 1 spm, 27 mm, Kisangani, 6-11.4.1979, PB.



Figs. 75-78. *Otostigmus (O.) spinosus*. Fig. 75. Forcipular coxosternal tooth plates and right forcipular femoroid process. Tilted down to the right so right tooth plate is foreshortened. Fig. 76. Dorsal view of posterior end showing prefemora and femora of 20th pair of legs and prefemora of end legs. Fig. 77. Terminal segments and end leg prefemora, ventral view. Fig. 78. Left coxopleural process, ventral view.
Scale line = 0.5 mm.

Description (Data from KRAEPELIN (1903) in parentheses where appropriate)
Colour: Head and tergite 1 brown, trunk yellowish brown.

Antennomeres 18 (18), the basal 2.22 glabrous dorsally (Fig. 79) (2 1/3), 2.12 ventrally. Antennae moderately long, reaching tergite 6 when reflexed.

Forcipular coxosternal teeth 4 + 4 (Fig. 80), process of femoroid with two small inner teeth. Claw of telopodite of second maxilla without accessory claw and second telomere without distal spine (Fig. 81).

Tergites without spines but very finely punctate (with spines from 12 to 18 in some specimens). Marginate from 10. With a broad low median keel from 3 to 19 and a low ridge on each side in the position of the paramedian suture. These most clearly seen when the specimen is dried and tilted. Short posterior paramedian lines apparent from 8 to 20, occupying posterior 20 % on tergite 12 (Fig. 82). Very weak lateral corrugations from 7 to 19. Tergite 21 (Fig. 83) without posterior median depression.

Sternites (Fig. 84) without paramedian sutures (with very short sutures on anterior walls) but a very small posterior median depression on 7 to 15 (without clear pits). Sternite 21 with sides converging posteriorly and posterior border straight (Fig. 85). With a shallow median longitudinal depression (near end with short median groove).

Coxopleuron truncated, without spines (Fig. 85).

Legs 1 to 18 with 2 tarsal spines (19), legs 19 to 21 wanting.

Remarks

This specimen runs down to *O. (P.) gymnopus* in ATTEMS (1930) as it has incomplete tergite paramedian sutures. It compares well with KRAEPELIN's (1903) description of the type. The type locality is Dime in southern Ethiopia and it is widely distributed in Zaire and also recorded from Angola. *Otostigmus (P.) gymnopus aethiopicus* Ribaut, 1907 has two tarsal spines on only the first six to nine pairs of legs; *O. g. gymnopus* has two tarsal spines on the first 18 to 19.

DOBRORUKA (1968) proposed a new genus *Congobius* with two species: *C. schoutedeni* and *C. kivuensis* which he separated from *Otostigmus* (subgen. *Parotostigmus*) by its lack of an accessory claw and of a spine on the second telomere of the second maxilla. On this basis, the specimen here assigned to *O. g. gymnopus* is a *Congobius*. Dobroruka noted that many specimens labelled *Otostigmus* sp. by Attems, and presumably from Zaire, were *Congobius schoutedeni* and that specimens identified as *O. gymnopus* by ATTEMS (1952) were probably this species. ATTEMS (1930) gave the presence of a spine on the second telomere of the second maxilla and an accessory claw as a characteristic of the genus *Otostigmus* but SCHILEYKO (1995) noted that in *O. reservatus* the spine on the second telomere was absent and that in related species it is sometimes nearly transparent and almost invisible. There appear to be no published data on the presence or absence of the accessory claw and spine on the telopodite of the second maxilla in *Otostigmus (Parotostigmus)* species so there is no way of telling whether the separation of *Congobius* is valid. Consequently the specimen described here is regarded as a member of the subgenus *Parotostigmus* and not as *Congobius*.

Otostigmus (P.) schoutedeni (Dobroruka) new combination

(Figs. 86-89)

Congobius schoutedeni Dobroruka 1968, Rev. Zool. Bot. afr. **68**:206, figs.6-9.

Material examined

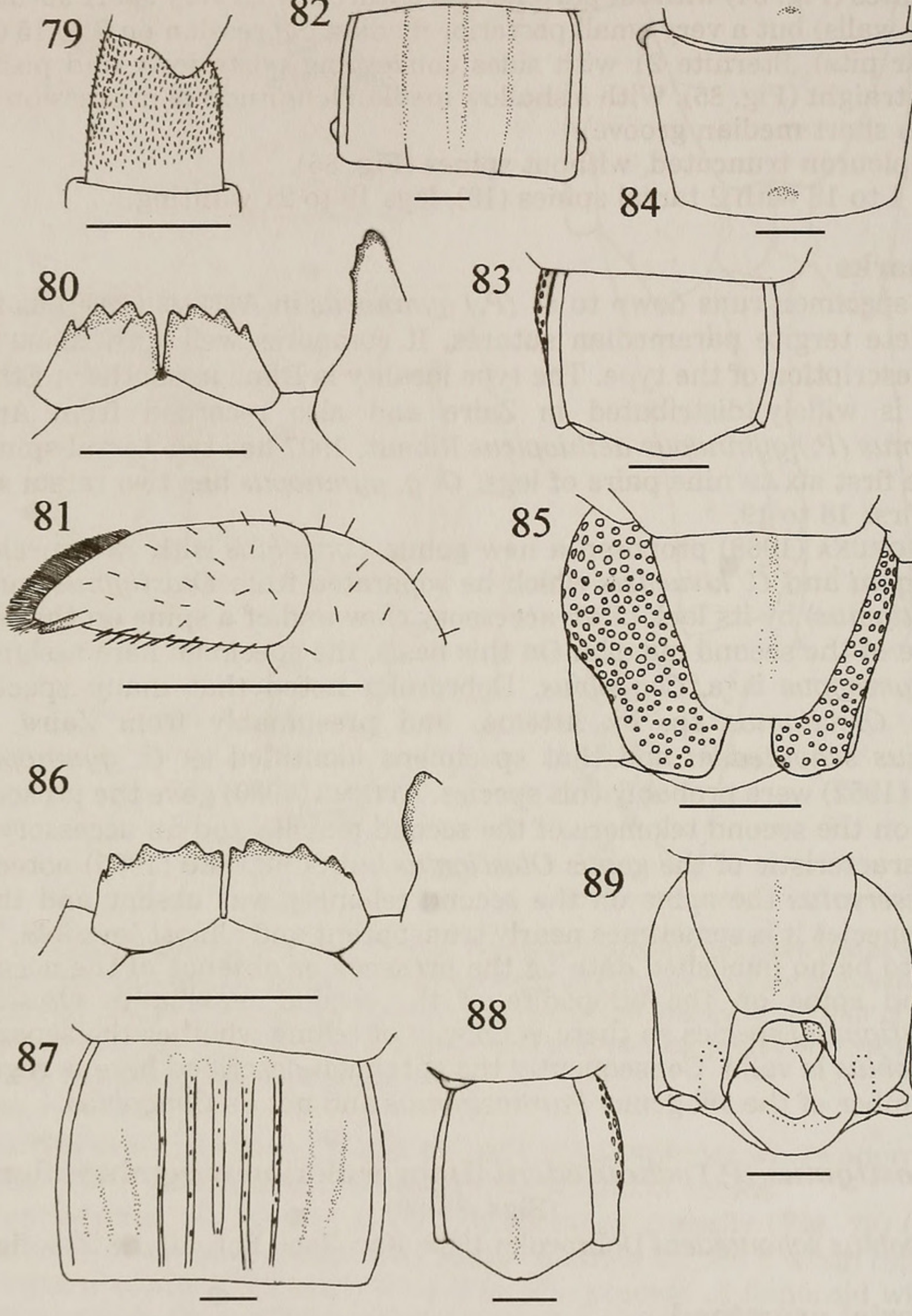
Zaire. 1 spm, female, 33 mm, Kisangani, 6-11.4.1979, PB.

Description

Colour: head and tergite 1 light brown, trunk greenish yellow.

Antennomeres 17, the basal 2.14 glabrous dorsally. Claw of telopodite of second maxilla lacking accessory claw and second telomere without distal spine.

Forcipular coxosternal teeth 5 + 5 (Fig. 86). Process of femoroid without inner teeth.



Figs. 79-89. *Otostigmus (P.) gymnopus gymnopus* and *O. (P.) schoutedeni*.
Otostigmus (P.) gymnopus gymnopus. Fig. 79. Right antennomere 3 dorsal view. Fig. 80. Forcipular coxosternal tooth plates and left forcipular femoroid process. Fig. 81. Distal part of telomere of second maxilla. Fig.82. Tergite 16. Fig. 83. Tergite 21. Fig. 84. Sternite 15. Fig. 85. Sternite 21 and coxopleura.
O. (P.) schoutedeni. Fig. 86. Forcipular coxosternal tooth plates and left forcipular femoroid process. Fig. 87. Tergite 17 (semidiagrammatic). Fig. 88. Tergite 21. Fig. 89. Terminal segments, ventral view. Coxal pores omitted.
Scale lines = 0.5 mm.

Tergites without paramedian sutures, marginate from 7, with a median keel from 7 and two lateral keels on each side from 8 to 19 (Fig. 87). Apparently with very fine spines from 13 (initially scored as from 7). This character is difficult to resolve, it requires analysis using the scanning electron microscope. Laterally the tergite cuticle is uneven. Tergite 21 with slight median posterior depression (Fig. 88).

Sternites 11 to 19 with short anterior paramedian sutures only visible when dry, occupying 26 % on sternite 13. An indistinct posterior median depression visible on some sternites. Sternite 21 with sides converging posteriorly, the posterior margin concave. A long shallow median depression seen only when dry (Fig. 89).

Coxopleuron scarcely produced, without spines.

End legs (detached) prefemur without spines or processes.

Legs 1 to 18 with two tarsal spines, 19 with one, 20 and 21 without.

Remarks

This specimen also runs down to *O. g. gymnopus* in ATTEMS (1930) and apart from the presence of tergite keels it is very similar to the specimen of *O. g. gymnopus* described above. It is clearly the same species as the specimens described as *Congobius schoutedeni* Dobroruka, 1968 but for reasons given above under *O. g. gymnopus* it is here assigned to *Otostigmus*. Data on individual variation are required to show whether *O. gymnopus* and *O. schoudeteni* are conspecific. The single specimen of each species here described was collected into the same tube from the same locality.

A re-examination of all the African species of *Otostigmus (Parotostigmus)* and *Congobius* is required.

Alipes crotalus (Gerstaecker)

(Figs. 90-99)

Eucorybas crotalus Gerstaeker 1854, Ent. Zeit. Stettin **15**:312, taf. 2, fig. 1.
Alipes crotalus, Kraepelin 1903, Mt. Mus. Hamburg **20**:138 figs. 78, 79.

Material examined

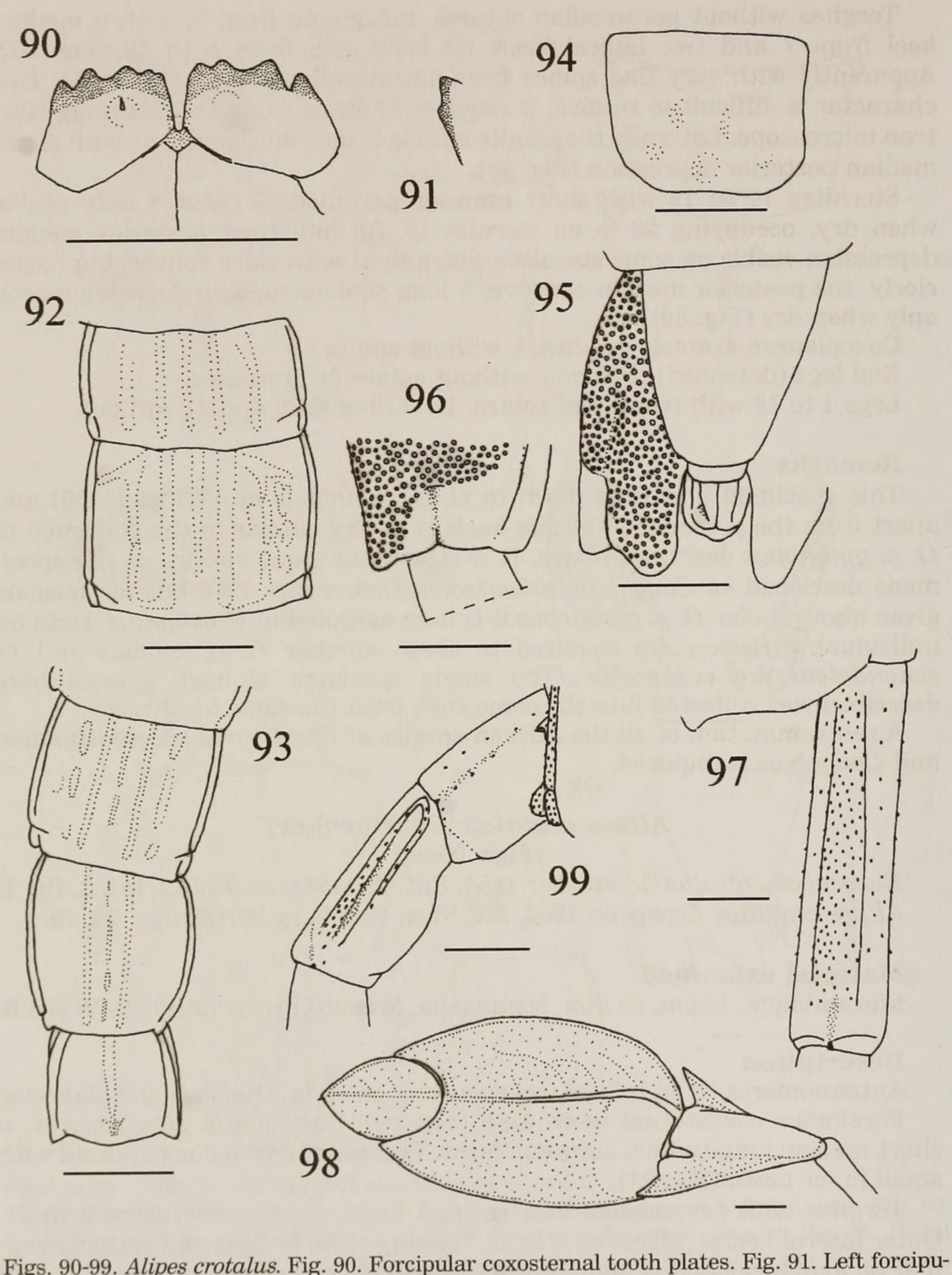
Mozambique. 1 spm, 69 mm, Namaacha, Maputo Prov., 7.8.1983, PB & VB.

Description

Antennomeres 18 on left, 19 (regenerated) on right, the basal 2.3 glabrous.

Forcipular coxosternal teeth 4 + 5 (Fig. 90), Post dental seta present, a short median longitudinal suture present. Process of forcipular femoroid with small inner tooth (Fig. 91).

Tergites with paramedian keels from 3 to 20, median keel from 5 to 21. Outer lateral keels (ridges) on 5 to 18, tending to be broken and rather irregular on long tergites (Fig. 92). Anterior lateral oblique ridges on 5 to 8, 10, and 12. The keels rounded, with fine spines. Between the keels fewer spines and also small tubercles, the two difficult to differentiate and apparently intergrading. Cuticle also rough (bumpy) especially laterally. Tergites marginate from 3 to 21 the margins densely spined, more so on posterior tergites. The



Figs. 90-99. *Alipes crotalus.* Fig. 90. Forcipular coxosternal tooth plates. Fig. 91. Left forcipular femoroid process. Fig. 92. Tergites 9 and 10. Fig. 93. Tergites 19, 20 and 21. Fig. 94. Sternite 11. Fig. 95. Terminal segments, ventral view. Fig. 96. Left coxopleural process, lateral view. Fig. 97. Prefemur of right end leg, dorsal view. Fig. 98. Tibia and tarsus 1 and 2 of right end leg. Reticulated areas stippled. Fig. 99. Prefemur and femur of left leg 16 dorsal view.
Scale lines = 1mm

marginal ridge with a transverse furrow near its posterior end from 8 forming a posterior hump, this well marked from 13 (Figs. 92, 93). Tergite 21 with median ridge occupying anterior 70 % and short posterior median depression (Fig. 93). Pleurites with scattered spines from segment 3.

Sternites without paramedian sutures, extremely weak indications of five depressions from about 7 to 20 (Fig. 94). Last sternite longer than wide with sides converging posteriorly and hind border straight (Fig. 95). Coxopleuron rounded posteriorly, coxal pores almost to end. The pore field narrows markedly in the posterior third of the coxopleuron, its edge, termed the posterior border ('Hinterrand') by ATTEMS (1930) forming an obtuse curve (Fig. 96).

End leg prefemur with dorsal longitudinal band of dense spines (Fig. 97), femur with narrow dorsal longitudinal band of very small spines. Tibia and tarsus 1 and 2 with reticulate vein like appearance except for clear ventral proximal region of tarsus 1 (Fig. 98). Midrib of tarsus 1 complete but less thickened distally. Pretarsus a small unarticulated spine. Ratio of tibial length to width: right 1.29:1, left 1.22:1. Ratio of length of tarsus 1 to width: right 1.26:1, left 1.34:1 (Fig. 98).

Legs 1 to 3 with one tibial spine, two tarsal spines on 1 to 5 and one tarsal on 6 to 20. Two claw spines on 1 to 20. With scattered spines dorsally on prefemora, femora and tibiae from leg 6. Prefemora with weak dorsal groove widening distally, femora with a groove demarcated on each side by a spined ridge on 7 to 19 (Fig. 99), less pronounced on 20.

Remarks

Three species of *Alipes* lack a process at the base of the end leg prefemur. They are *A. multicostis* Imhoff, 1854 from west and central Africa, *A. crotalus* (Gerstaecker,1854) from southern Africa and Uganda and *A. grandidieri* (H. Lucas, 1864) from East Africa. *Alipes multicostis* is distinguished from the other two by the absence of tubercles (spines) from the dorsal surface of the end leg prefemur.

KRAEPELIN (1903) separated *A. crotalus* and *A. grandidieri* on the proportions of the end leg tibia and tarsus 1 and the shape of the pore field of the coxopleuron (hind border of pore area). His figures give length to width ratios of 1.18:1 for the tibia and 1.36:1 for the tarsus in *A. crotalus* and *in A. grandidieri* 1.78:1 for the tibia and 1.63:1 for the tarsus. In *A. crotalus* the hind border of the pore area is has a right-angled or obtuse indentation. In *A. grandidieri* it is acutely incised.

ATTEMS' (1930) figure 211 of *A. grandidieri* shows, however, the tibia with a length to width ratio of 1.66:1 and tarsus 1 1.4:1 and SKOVMAND and ENGHOFF's (1980) photograph of the end leg gives ratios of 1.24:1 and 1.39:1 respectively. Clearly there is considerable variation in the proportions of the end leg tibia and tarsus. POCOCK (1903) pointed out that in comparing end legs of species of *Alipes* it is necessary that the specimens be certainly adult and added that according to Cook these appendages differ considerably in a series of examples from the same locality. KRAEPELIN (1903) commented that *A. grandidieri* might be only a variety of *A. crotalus* but retained these two species. Unfortunately the data for *A. grandidieri* are very inadequate. More data, especially on individual variation are required for the three species.

The Mozambique specimen here described satisfies the characters of *A. crotalus* as described by KRAEPELIN (1903), however in ATTEMS (1930) some additional characters are given, namely antennomeres 17, no large post-dental seta on coxosternal tooth plate, no median longitudinal coxosternal suture and his figure 210 shows the end leg tarsus 1 midrib very short. The Mozambique specimen has 18 antennomeres, coxosternal tooth plate with post-dental seta, longitudinal coxosternal suture present and the end leg tarsus 1 midrib complete. These differences, however, may be of little significance. The grooved and spined characters of the trunk legs and the spined pleurites have not previously been recorded in the genus: they may have been overlooked.

Ethmostigmus trigonopodus trigonopodus (Leach)

Scolopendra trigonopoda Leach 1817, Zoological Misc. **3**:36

Ethmostigmus trigonopodus, Kraepelin 1903, Mt. Mus. Hamburg **20**:157, figs. 102,103.

Material examined

Zimbabwe. 1 spm, 99 mm, Great Zimbabwe Ruins, 20.8.1983, PB & VB.

Tanzania. 1 spm, 38 mm, Moshi, 800 m, 7.8.1983, PB & VB.

Ethmostigmus trigonopodus pygomenasoides Lewis

E. t. pygomenasoides Lewis 1992, Senkenbergiana biol. **72**:449, figs. 45-51, 53-54.

Material examined

Nepal. 1 spm 110 m, Langtang Nat. Park, Ramche, 1200 m, 11.7.1981, PB.

Remarks

The Langtang specimen is very similar to *E. t. trigonopodus*. The coxosternal teeth are weakly lobed, the coxopleuron bears two end spines, one lateral and four dorsal spines. LEWIS (1992) stated that sternite 21 was much narrower in *E. t. pygomenasoides* than in *E. t. trigonopodus*. His figures give ratios of length to width of 1.14:1 and 1.05:1. In this specimen, however, the ratio is 1:1.23 i.e. wider than long, approaching the condition in *E t. trigonopodus*. The coxopleura, however, are very long, more than twice the length of the sternite (2.3:1) which clearly separates it from *E. t. trigonopodus*.

Rhysida lithobioides (Newport)

Branchiostoma lithobioides Newport 1845, Trans. Linn. Soc. Lond. **19**:411.

Rhysida lithobioides, Kraepelin 1903, Mt. Mus. Hamburg **20**:150, fig. 93.

Material examined

Indonesia. 1 spm (juv.), 19 mm, Nias I. (N. Sumatra), Teluk Dalam, sea level, 19.5.1994, PB & VB.

Description

Antennomeres 19, basal three glabrous dorsally, two and a half ventrally. Forcipular coxosternal teeth 4 + 4, process of femoroid with two inner teeth.

Tergites with complete paramedian sutures from 6, marginate from 19, without keels or spines. Tergite 21 without posterior median depression.

Sternites with short anterior paramedian sutures, without pits. Sternite 21 with sides converging posteriorly and posterior border concave. Coxopleural process short with two end and one subapical spine, no dorsal spines.

Legs 1 to 16 with two tarsal spines, legs 17-21 wanting.

Remarks

Rhysida lithobioides is a widely distributed species, being recorded from East Africa, Saudi Arabia, India, Burma (Myanmar) and China. Currently five subspecies are recognised *R. l. lithobioides* (Newport 1845), *R. l. paucidens* Pocock, 1897 and three subspecies from India (*R. l. trispinosus* Jangi and Dass, 1984 *R. l. kumaonensis* Khanna, 1994 and *R. l. shivalikensis* Khanna, 1994). The latter three are very similar and probably consubspecific. The Sumatran specimen resembles them in that it has three coxopleural spines and at least legs 1 to 16 with two tarsal spines but as the specimen is juvenile and lacks legs 17-21 it has not been assigned to a subspecies.

Rhysida immarginata immarginata (Porat)

Branchiostoma immarginatum Porat 1876, Bih. Svenka Ak Handl. **4**:24.

Rhysida immarginata, Pocock 1891, Ann. Mus. Civ. Genova **30**:417.

R. immarginata, Kraepelin 1903, Mt. Mus. Hamburg **20**:143.

R. nuda nuda, Attems 1930, Das Tierreich **54**:189, figs. 236,237. (non Newport, 1845)

R. nuda immarginata, Attems 1930, Das Tierreich **54**:190.

R. nuda nuda (non Newport) + *R. nuda immarginata*, Attems 1938, Mem. Mus. Nat. Hist. nat. Paris, NS **6**:337.

R. immarginata, Koch L. E. 1985, J. nat. Hist. **19**:212.

Material examined

Indonesia. Spm 1, 39 mm, Kalimantan, Timur Nunukan I., rain forest, 15-17.9.1995, PB & TI. Spm 2, 56 mm, with 56 eggs, Mentawai Is. Siberut I. Muarasiberut, 15-20.8.1995, PB & TI. Spm 3, 35 mm, North Sumatra, Lake Toba, Samosir I., Ambarita village, 9.8.1995, PB & TI.

Cuba. 3 spms, 40, 45 and 50 mm, Pinar del Rio, Pica Pica Valley, 26.11.1981, PB.

Description of Indonesian specimens

Antennomeres 19 or 20. Coxosternal teeth 4 + 4.

Tergites with paramedian sutures complete from 5 or 6, only tergite 21 marginate. Sternites with or without short anterior paramedian sutures.

Coxopleuron short, with three end spines. End leg prefemur with two ventrolateral, nil or one ventromedial and nil or one dorsomedial spines. No corner spine.

Leg 1 with one femoral spine and legs 1 and 2 with one tibial. Specimen 1 with two tarsal spines on legs 1 to 13 or 14, spm 2 on left legs 1 to 13 and right legs 1 to 18, spm 3 on legs 1 to 9. The remaining legs to 19 with one tarsal spine, 20 and 21 without, except right leg 20 in spm 2 which has a tarsal spine.

Description of Cuban specimens

Antennomeres (19) 20. Coxosternal teeth 4 + 4 primary teeth with a small fifth inner tooth on each side.

Tergite paramedian sutures complete on 3 or 4, only tergite 21 marginate except a trace on the left side of tergites 16 and 17 in 40 mm specimen.

Coxopleuron with two end spines. End leg prefemur without spines.

Leg 1 with one femoral spine, legs 1 and 2 with one tibial, 1 to 17 with two tarsal (to 18 or 19 in spm 2), legs 18 to 21 without.

Remarks

ATTEMS (1930) separated what was then regarded as *R. nuda nuda* from *R. nuda immarginata* (Porat, 1876) on the two-spined coxopleural process and leg 20 with one tarsal spine in the former and the coxopleural process three-spined, leg 20 mostly without a tarsal spine in the latter. Later, however, ATTEMS (1938), stated that the distinction between these subspecies could no longer be maintained treating them as *R. nuda* but making no mention of *R. nuda togoensis* Kraepelin, 1903.

KOCH (1985) examined 149 specimens of *R. nuda* (Newport, 1845) from Australia and reported that the sample consistently "has the median sulci complete from tergite III. By contrast, *R. immarginata* specimens (viz. The extralimital forms identified as such, or in the past as species or subspecies *nuda*) have median sulci complete from tergites more posterior than tergite III (sometimes reported from III)." He noted that "In the extralimital specimens of *R. immarginata* the lateral margins start on tergite XXI rather than VI-IX as in *R. nuda* from Australia" and "the number of tergites on which lateral margins are present constitutes a principal character separating the Australian species *R. nuda* from extralimital forms hitherto included under the specific or subspecific name *nuda* and to many of which the name *R. immarginata* may be applicable".

There is obviously considerable variation between populations of *R. immarginata* with respect to antennomere number, the number of legs with two tarsal spines, number of coxopleural spines and the number of spines on the end leg prefemur. The specimens from Cuba have no spines on the end leg prefemora. *Rhysida nuda somala* Manfredi, 1933 from Somalia, *R. nuda* var. *brevicornis* Wang, 1951 from the Philippines and *R. nuda subnuda*, Jangi 1955 from India are presumably *R. immarginata*. These should be re-examined as should other populations of *R. immarginata* to ascertain the extent of geographical variation. *Rhysida i. togoensis* is dealt with below.

Rhysida immarginata togoensis Kraepelin

R. togoensis Kraepelin 1903, Mt. Mus. Hamburg **20**:145, figs. 84, 85.
R. nuda togoensis, Attems 1930, Das Tierreich **54**:190 fig. 238.
R. n. togoensis, Lewis 1972, J. Zool., Lond. **167**:401

Material examined

Nigeria. Spm 1, 28 mm, Pandam W. Park/ on light, 1.10.1978, PB. Spm 2, 23 mm, Plateau State, Wase Rock Game Reserve, 19.9.1978, PB. Spm 3, contorted, Plateau State, Sebu village, 30.9.1978, PB.

Description

Antennomeres (17) 18, coxopleural process two-spined, legs 1 to 10 with two tarsal spines in spms 1 and 2. Two tarsal spines on legs 1 to 11 and right leg 13 in specimen 3. End leg prefemur with two ventrolateral spines, one (two) ventromedials and one or nil medial/dorsomedial spines.

Remarks

These are the typical characters given for *R. i. togoensis*, a form widespread in West Africa and apparently showing very little variability. LEWIS (1972) compared *R. i. togoensis* with *R. i. immarginata* from the Sudan. The latter resemble *R. i togoensis* in that many have 18 antennomeres and occasionally two coxopleural spines on one side rather than three, but these populations nevertheless remain distinct.

Rhysida afra (Peters)

Ptychotrema afrum Peters 1855, Monatsber. Berl. Ak. p. 82.
Tremaoptychus petersi Porat 1871, Öfv K. Vetensk. Ak. Förh. 1871, 9: 1166.
Rhysida afra, Kraepelin 1903, Mt. Mus. Hamburg **20**: 153, figs. 98, 99.
R. petersi, Kraepelin 1903, Mt. Mus. Hamburg **20**: 153, fig. 100.
R. cuprea Kraepelin 1903, Mt. Mus. Hamburg **20**: 154.
R. afra, Attems 1930, Das Tierreich **54**: 195, figs. 246-248.

Material examined

Mozambique. 3 spms, 33 to 57 mm, 27.6.1983, PB & VB.

Nepal. Spm 1, 45 mm, Tansen, Lumbini Zone, 6.8.1981, PB. Spm 2, 35 mm, Langtang Valley, Sharpugaon, 2500-2800 m, 16.9.1984, PB & SA. Spm 3, Langtang Valley, 9.1984, PB.

Comparison of specimens from Mozambique and Nepal.

The Mozambique specimens have 17 + 18 antennomeres (spms 1 and 2), two coxopleural end spines and a lateral spine (three end spines and a lateral spine on one side in spm 3). End leg prefemora with one ventrolateral and one ventromedial spine in spms 1 and 2, one ventrolateral and either one ventromedial or one medial and 2 dorsomedial in spm 3.

The Nepalese specimens 1 and 2 have 20 or 21 antennomeres. Three coxopleural end spines (two end spines and one subapical spine in spms 1 and 2) and no lateral spines. End leg prefemora of specimen 2 have 2 + 2 ventrolateral spines, 0 + 1 ventromedials, 1 + 1 medials and 1 + 0 dorsomedials.

Remarks

The Mozambique specimens having two coxopleural end spines run down to *R. afra afra* (Peters 1855) in ATTEMS (1930); the Nepalese specimens, having three, run down to *R. intermedia* Attems 1910 an East African species (Pemba Island). LEWIS (1992) recorded specimens from central Nepal with three coxopleural end spines and specimens from eastern Nepal mostly with two. He considered it best to regard the Nepalese material as *R. afra* but not to assign the specimens to particular subspecies, a view here maintained.

Rhysida singaporiensis Verhoeff

(Figs. 100-103)

R. singaporiensis Verhoeff 1937, Bull. Raffles Mus. **13**:218.

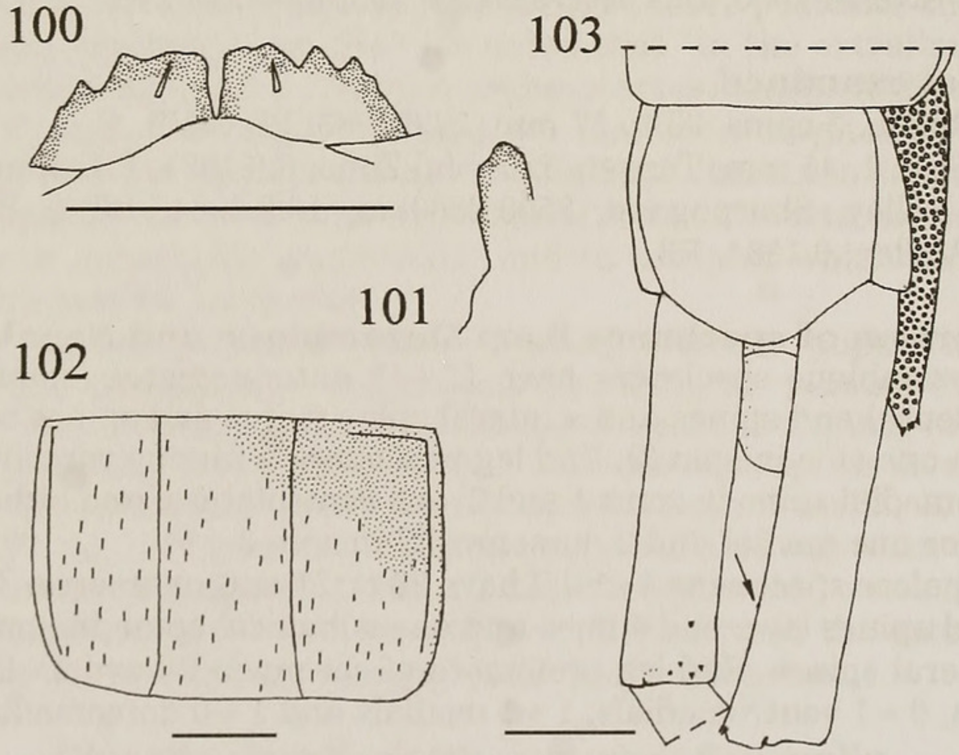
Material examined

Indonesia. 1 spm 51 mm, Lombok, Rinjani, rain forest above Sapit, ca 1700 m, 10 Jun 1994, PB & VB.

Description (Data from VERHOEFF (1937) in parentheses)

The right antenna regenerated, the left with 21 antennomeres (21), the basal three glabrous. Forcipular coxopleural teeth worn (Fig. 100), probably four or five (5-6). Process of forcipular femoroid with two small inner teeth (Fig. 101).

Paramedian sutures complete from tergite 3, marginate from 8, a trace of a median keel from tergite 6. Tergites 15 to 20 (Fig. 102) with short fine longitudinal ridges ('kurze Langstriche') each terminated by a spine ('Knotchen'). These are the structures termed Dornstricheln in *Otostigmus* by Kraepelin (1903) and Attems (1930). Tergite 21 without posterior median depression. Anterior sternites with very short anterior paramedian sutures. These occupying anterior 25 % of sternite 12 and anterior 20 % of sternite 18.



Figs. 100-103. *Rhysida singaporiensis.* Fig. 100. Forcipular coxosternal tooth plates. Fig. 101. Left forcipular femoroid process'. Fig. 102. Tergite 18. Fig. 103. Tergite 21 and end leg prefemora. Right dorsomedial spine arrowed
Scale lines = 1 mm.

Right coxopleural process with four end spines, one lateral, no dorsal spine (2-3 end spines, one lateral spine). The left process with only a single end spine.

End leg prefemora (Fig. 103) without ventral spines, a single small distal dorsomedial spine and four corner spines on the left, two on the right (without spines below, only dorsomedial, posterior to the middle, and two end spines).

Leg 1 with one femoral and one tibial spine. Two tarsal spines on legs 1 to 18 (1-18), one tarsal on 19 and 20 (19-20). Leg 21 without.

Remarks

This is the second known specimen of this species.

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Author's address:
Dr John G. E. Lewis,
Somerset County Museum,
Taunton Castle
Castle Green, Taunton,
Somerset TA1 4AA,
United Kingdom

Address for correspondence:
Manor Mill Farm,
Halse, Taunton,
Somerset TA4 3AQ,
United Kingdom

Сколопендроморфните многоножки (Chilopoda: Scolopendromorpha: Scolopendridae) в колекцията на Националния природонаучен музей в София

Джон ЛЮИС

(Р е з ю м е)

Съобщават се 31 вида сколопендроморфни многоножки от родовете *Scolopendra*, *Cormocephalus*, *Asanada*, *Otostigmus*, *Alipes*, *Ethmostigmus* и *Rhysida* от колекцията на Националния природонаучен музей в София. Материалите са събрани от П. Берон, В. Бешков, С. Андреев и Т. Иванова в 13 държави - Мозамбик, Замбия, Зимбабве, Заир, Танзания, Нигерия, Афганистан, Китай, Виетнам, Непал, Индонезия, Сардиния и Куба. Един нов за науката вид - *Otostigmus beroni* sp. nov. е описан от непалските Хималаи. След критичен анализ следните таксони са сведени в синоними: *Cormocephalus brevicornis* Kraepelin, 1903 и *C. anceps segnis* Attems, 1930 = *Cormocephalus anceps* Porat, 1871; *Cormocephalus nitidus calvus* Attems, 1928 = *Cormocephalus nitidus nitidus* Porat, 1871; *Asanada zambiana* Dobroruka, 1969 = *Asanada socotrana* Pocock, 1889; *Otostigmus politus mandchurius* Verhoeff, 1942 = *Otostigmus politus politus* Karsch, 1881; *O. politus pigmentatus* Attems, 1930 и *O. politus schindleri* Würmli, 1972 = *O. angusticeps* Pokock, 1889. Една нова комбинация е въведена - *Otostigmus (Parotostigmus) schoutedeni* (Dobroruka, 1968) comb. nov.

Рисунки на основни таксономични белези допълват описанията на двадесет от разглежданите видове.