

METASTENASELLUS POWELLI SP. N., A NEW STENASELLID ISOPOD
CRUSTACEAN FROM LITTORAL GROUNDWATERS OF
SOUTHEASTERN NIGERIA

BY

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Stenasellid isopods are a characteristic group of crustaceans, all anophthalmous and living in underground waters, many species showing a pink or red colour caused by blood pigments, even though their integument is always translucent. They differ from asellids in many features, such as: absence of any reductions in the 1st and 2nd free pleonites, existence of a rudimentary exopodite on the 3rd segment of the peduncle of the antenna, absence of an epipodite on the maxillipeds, but presence of a large oostegite on these, in the ovigerous ♀; a 2-segmented endopodite of the 2nd ♂ pleopods, etc...

First discovered in southwestern Europe, where at least 11 endemic species are known, all belonging to the same phyletic line, it was proved recently that the group is more diversified in tropical Africa, in two main areas. In eastern Africa (Kenya, Somalia), the species known so far are clearly related to the Eurasiatic fauna (genus *Stenasellus* s.str.), may be as a consequence of a common mesogeanean origin. In western and central Africa, 3 or 4 phyletic lines exist, quite different from the European fauna: the genera *Jobannella* Monod, 1924, from Algeria (1 sp.), *Parastenasellus* Magniez, 1966 from the Guinean area (1 sp.), *Magniezia* Lanza, 1966, from the Guinean area and southern Morocco (5 sp.) and *Metastenasellus* Magniez, 1966, from the Benue River (lower Niger) and Congo River basins (4 species until now).

The new *Metastenasellus* described herein has been collected by Mr. C. B. Powell, in the oligohaline zone of New Calabar River, about 1.5 km S.W. of Choba (= Isioba) village and 15 km N.W. of Port Harcourt, southeastern Nigeria (04°52'30"N 06°54'E). According to Mr. Powell's observations, the isopods were found clinging to pieces of wood, buried or half-buried in superficial mud or underlying sandy alluvial deposits, but never more than 15 cm under the surface and all in the lower half of the intertidal zone. Even though the locality is close to the upstream limit of mangroves, with an oligohaline surface biocenosis (the local tidal amplitude is about 2 metres, but the surface water is virtually fresh), the biotope appears to be drained, at low tide, by interstitial fresh-water (Powell, 1977, in litt.). All previously known stenasellids live in inland hypogean waters: karstic waters, alluvial sheets, thermal springs. Therefore, it is

of interest to signalize the existence of stenasegellids in a "limit-biotope" of the groundwater medium: the intertidal resurgence-zone in alluvial permeable deposits, at the boundary between continental and marine spheres.

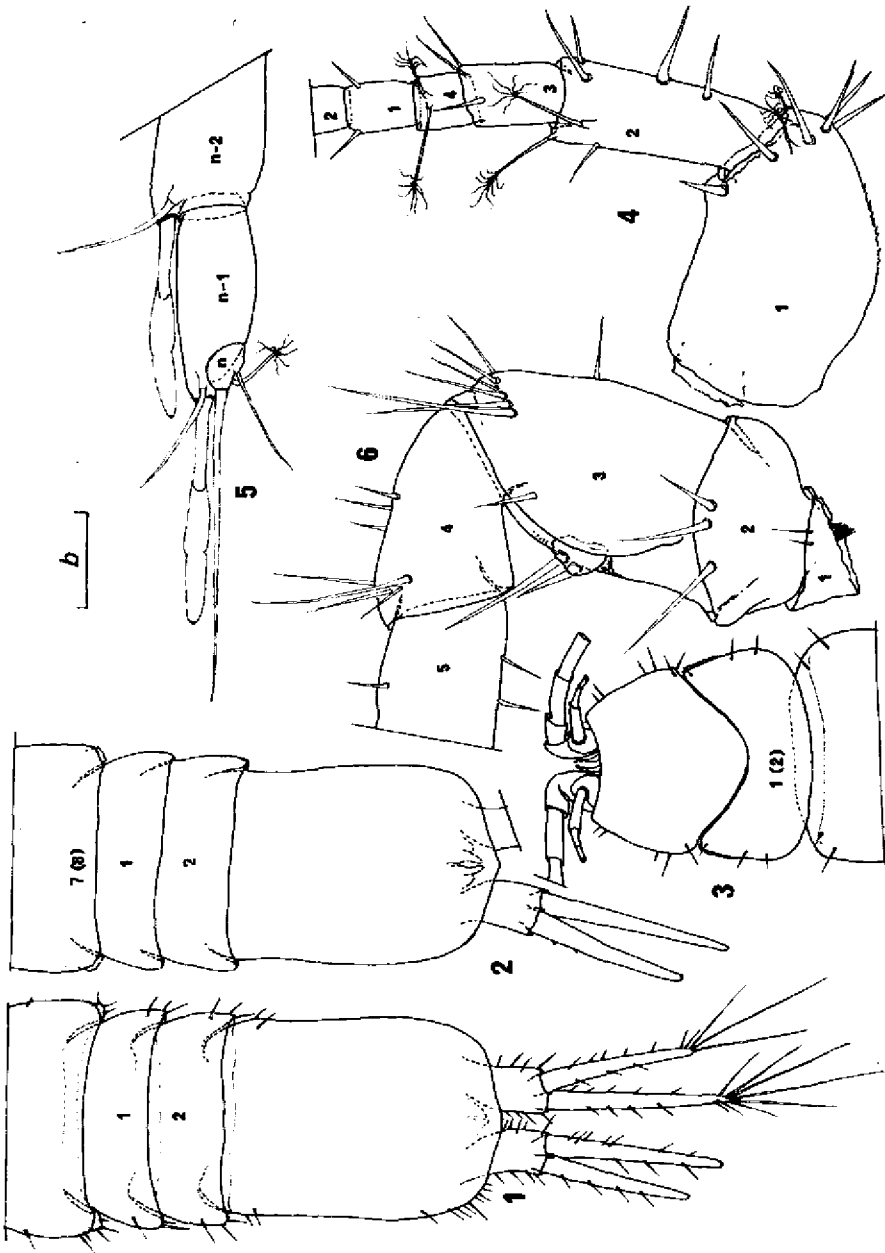
***Metastenasellus powelli* sp. n.**

Material examined. — First sample, collected by Mr. C. B. Powell on 25 April 1977 (U.S.N.M. 170748): ♂ 1, 8 mm; ♂ 2, 6.4 mm (holotype); ♂ 3, 6.1 mm; ♂ 4, 5.8 mm; ♂ 5, 4.9 mm; ♂ 6, 4.8 mm (all adults); ♀ 1, 5.8 mm (allotype, adult with genital-rest oostegites); ♀ 2, 6.7 mm (adult with empty pouch, end of reproductive intermolt); ♀ 3, 5.7 mm (largest juvenile stage, without oostegites). Second sample, collected by Mr. C. B. Powell, on 4 August 1977 (Musée Royal de l'Afrique Centrale, B.1980, Tervuren, Belgium): ♂ 7, 6.5 mm; ♂ 8, 6 mm (adults); ♀ 4, 5.7 mm (largest juvenile stage). All specimens are conspecific. Length of body is taken between the anterior margin of the head and the tip of the caudal process of the pleotelson.

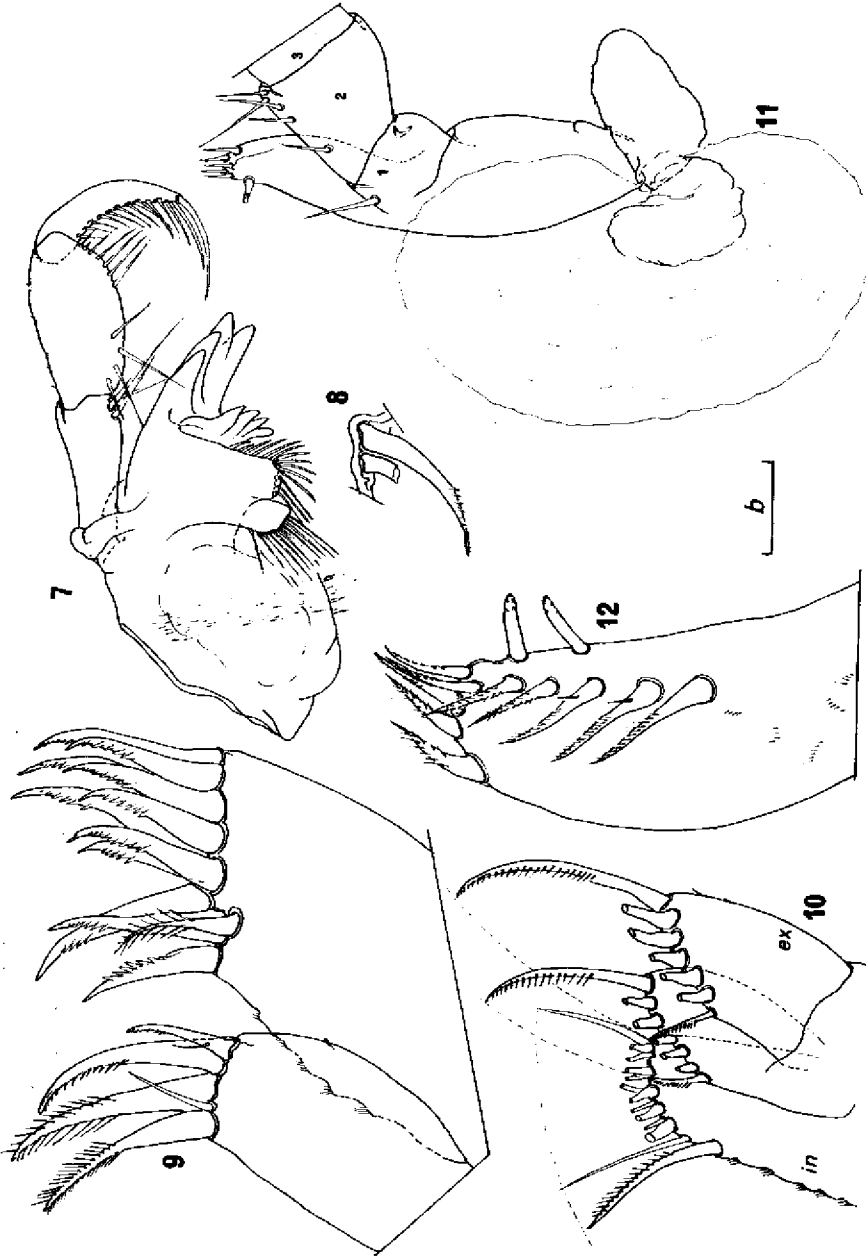
Diagnosis. — Medium-sized *Metastenasellus*; 2nd segment of mandibular palp inflated; peduncle of 1st ♂ pleopod clearly shorter than wide; 2nd endopodial segment of 2nd ♂ pleopods strongly twisted, with a subterminal helicoidal girdle of about 14 triangular chitinous teeth; external margin of exopodites of 3rd pleopods densely setose; distal segment of exopodites of 4th pleopods with numerous thin marginal setae; uropods hardly shorter than pleotelson, almost identical in both sexes.

Description. — Body slender, its lateral margins more or less parallel. Width of head, pereonites 1-7, pleonites 1-2 and pleotelson in ♀ 2: 1.02 - 1.17 - 1.28 - 1.35 - 1.32 - 1.30 - 1.28 - 1.28 - 1.18 - 1.17 - 1.08 mm respectively, indicating the widening of median pereonites of the reproductive ♀. Male body a little more slender and linear. Coefficient of elongation: 5. Cephalon wider than long, anterior margin regularly concave, without prominent lateral angles; posterior margin strongly convex; eyes absent (fig. 3). Pereonite 5 shorter, pereonites 6 and 7 longer than the others. Pleonites 1 and 2 conspicuously developed, as well in length as in width (figs. 1, 2), but without prominent caudal angles. Pleotelson subrectangular, longer than wide, narrower than pleonites 1 and 2; lateral margins slightly concave proximally; caudal process very reduced. Marginal setae very rare, except on the caudal angles. Preserved specimens cream-coloured, by destruction of blood pigments, the living ones being "bright red" (Powell, 1977, in litt.). Posterior gut full of beige silt, containing blackish organic particles.

Antennule. — Slightly longer than the peduncle of the antenna, peduncle 4-segmented, the last segment very short, but bearing 2 palm-tree-like bristles (= acoustic stems or otostyles, fig. 4). Flagellum of 8 or 9 segments, each of the 6 or 7 distalmost, except for the last one, bearing a single aesthetasc (= lamina olfactoria or rhinostyle). As in other stenasegellids, the distal segment is very reduced; it carries only 1 short smooth seta (trichostyle), a long smooth one (lepidostyle) and an otostyle (fig. 5).



Figs. 1-6. *Metastenasellus powelli* sp. n. 1, pleon of ♀ 2 with uropods, b (bar scale) = 500 μm; 2, pleon of ♂ 7 with uropods, all setae omitted, b = 500 μm; 3, head and peronite 1 (2) of ♀ 2, b = 500 μm; 4, left antennule of ♂ 7, peduncle, b = 100 μm; 5, left antennule of ♂ 7, tip, b = 33 μm; 6, right antenna of ♂ 7, peduncle and squama; b = 100 μm.



Figs. 7-12. *Metastenasellus powelli* sp. n. 7, left mandible of ♀ 2, $b = 100 \mu\text{m}$; 8, element of spine-row of fig. 7, magnified, $b = 33 \mu\text{m}$; 9, left maxillule of ♂ 7, $b = 33 \mu\text{m}$; 10, left maxilla of ♂ 7, $b = 50 \mu\text{m}$; 11, left maxilliped of ♀ 2, with developed oostegite, $b = 100 \mu\text{m}$; 12, left maxilliped of ♂ 7, tip of mastigatory lobe, $b = 33 \mu\text{m}$.

Antenna. — Short as in other species of the genus; peduncle 6-segmented with its main articulation between the 3rd and 4th segment. Lateral margin of segment 3 with a residual exopodite (squama), bearing 2 smooth bristles (fig. 6). Flagellum of 45 to 50 segments in the largest ♂, only 35 in the largest ♀.

Labium (paragnaths). — As in other stenasevellids (see Racovitza, 1950: 27).

Mandible. — Body short, strongly bent inwards; insertion very anterior, as in typical stenasevellids; a large 3-segmented palp with its 2nd segment wider and its 3rd one falcate; on their inner margin, a brush of 7+13 strong bristles, the distal ones being longer and denticulate (fig. 7). Incisor process with 4 stout teeth; lacinia mobilis of left appendage short and thick, with 4 processes; spine-row with 15 or 16 dentate spines (fig. 8), the distal ones being attached at the bottom of a depression; molar lobe with a dozen of smooth setae.

Maxillule. — Outer lobe bearing 2 distal rows of spines: 1 ciliate and 11 large ones, dentate on the distal half of their internal edge; inner ramus with 3 strong ciliate spines, 1 short denticulate spine and 1 short smooth bristle (fig. 9).

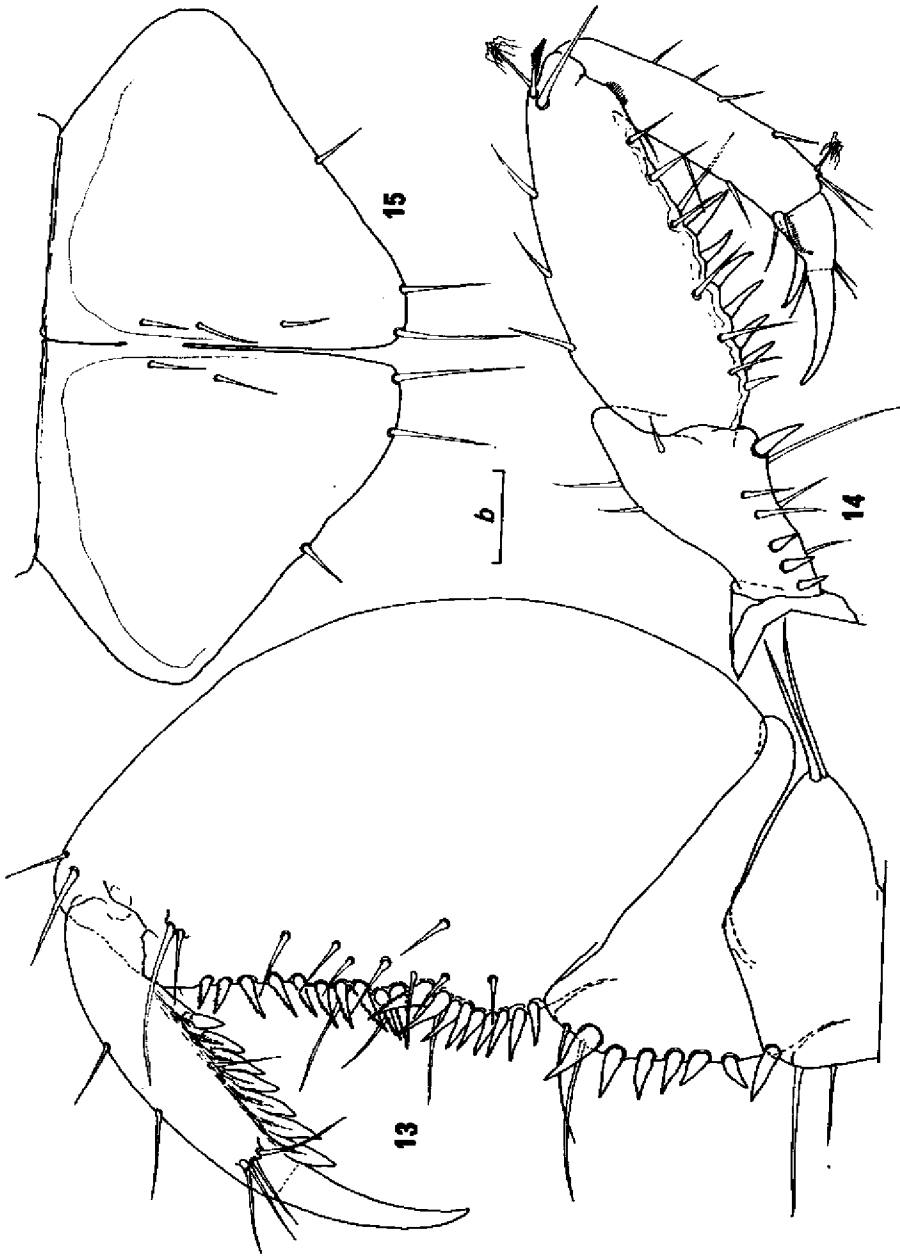
Maxilla. — Outer and middle plates, each with a distal row of 7 falcate, incurved medial spines, pectinated on their medial margin and increasing in length from inner side to outer (outer: 35-110 μm ; middle: 30-90 μm); inner plate bearing 2 rows of distal bristles (6-7 denticulate and 8-9 smooth: 75-50 μm) (fig. 10).

Maxilliped. — Typical of stenasevellids: without epipodite, but bearing a large and reniform, thin and glabrous oostegite, with a fleshy hilum in the ♀ in reproductive intermolt (fig. 11). Masticatory lobe of basipodite with 2 coupling hooks (♂), or only 1 (♀) and a distal reflexed row of strongly ciliated spines (fig. 12). Palp large, 5-segmented, with 1-5-11-12-10 smooth bristles.

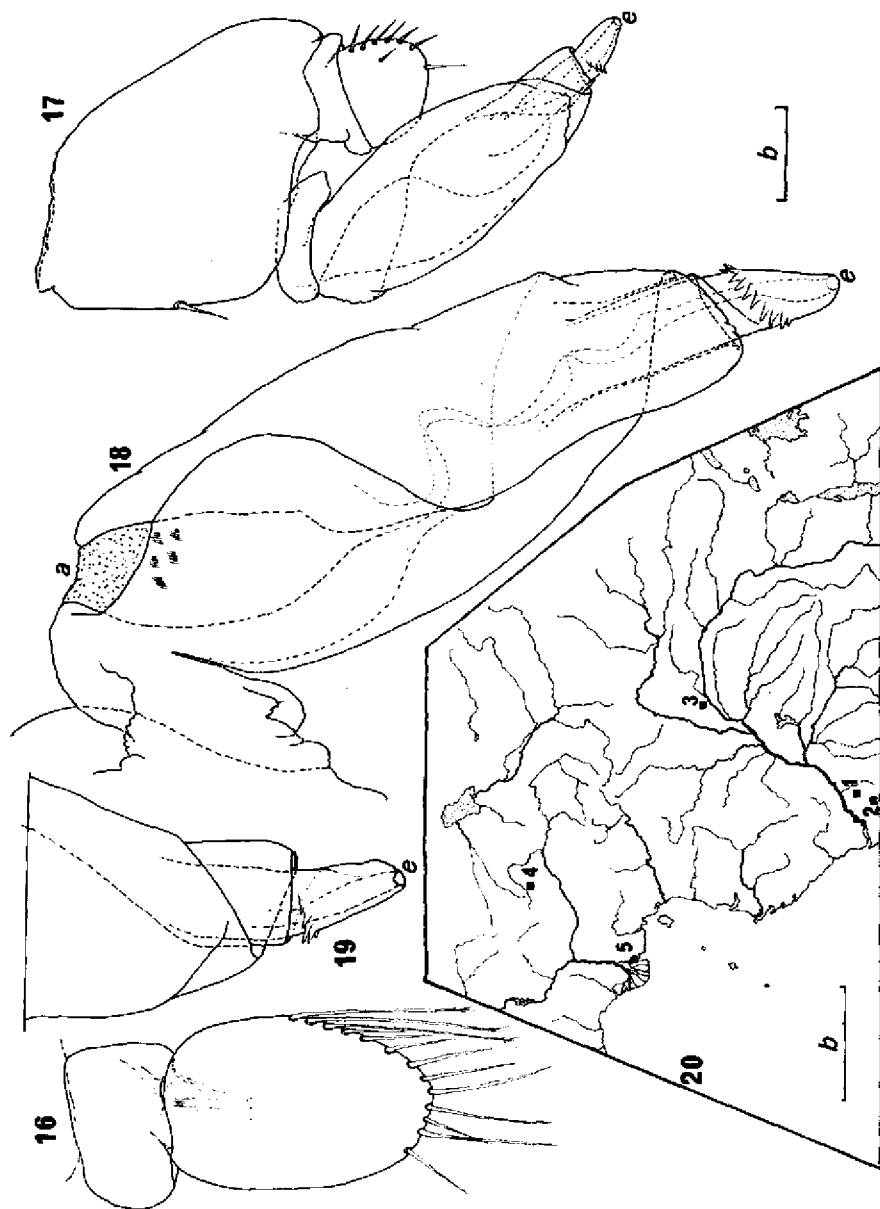
Pereopod 1. — Strongly subcheliform, functioning as gnathopod, underlying the maxillipeds in rest-position. Palmar margin of the propodite with a row of strong ensiform spines on the proximal zone (identical spines on sternal edge of the carpopodite), followed by dentate spines on the distal zone. Sternal margin of the dactylopodite with a row of contiguous smooth blades (flattened spines, fig. 13).

Pereopods. — Lengths of pereopods 1-7 in ♂ 7: 3.13 - 3.18 - 3.32 - 3.08 - 3.43 - 4.18 - 4.73 mm; relative lengths: 0.98 - 1.00 - 1.04 - 0.97 - 1.08 - 1.31 - 1.49. Tergal longitudinal crest of basipodites 2-7 with a row of 7-7-7-6/7-6-6 otostyles in ♂, 6-6-5-6-6-6 in ♀. Tergal distal edge of the carpopodites of pereopods 2-4 with a short pennate bristle (a characteristic first discovered in stenasevellids by Lanza, 1966), and a longer otostyle (fig. 14). Only 1 sternal spine in all dactylopodites 2-7. Some pectinated scales are present on the sternodistal edge of the carpopodites and the sternal edge of the dactylopodites.

Penis lobes. — The male genital papillae are borne on the medial angle of the coxopodial areas of the last pereopodal sternite. Length: 550-600 μm in ♂ 7, width: 130 μm ; in section, they are dorso-ventrally flattened. Distally, the lobes are directed backwards and their tips converge in the middle line, near the medio-



Figs. 13-15. *Metastenasellus powelli* sp. n. 13, right pereopod 1 of ♂ 1, b = 100 μm; 14, left pereopod 3 of ♂ 7, rostral view, b = 100 μm; 15, pleopods 2 of ♀ 3, sternal view, b = 100 μm.



Figs. 16-20. *Metastenasellus powelli* sp. n. 16, right pleopod 1 of ♂ 1, b = 200 μ m; 17, left pleopod 2 of ♂ 7, sternal view, b = 100 μ m; 18, endopodite (copulatory organ) of fig. 17, tergal view, a = afferent opening, c = efferent opening, b = 50 μ m; 19, the same, sternal view of tip, b = 50 μ m; 20, map of Central Africa, with type-localities of *Metastenasellus* species: 1 = *M. leleupi*, 2 = *M. congolensis*, 3 = *M. dextrevellei*, 4 = *M. wikkienis*, 5 = *M. powelli* sp. n., b = 600 km = 373 miles.

distal corners of the protopodites of pleopods 1. Inside the lobes, a thin vas deferens is visible; in some specimens, a bunch of spermatozoids has been ejaculated halfway through the small terminal opening.

Oostegites. — In genital-rest adult ♀ 1, the coxopodites of pereopods 1-4 bear subrectangular oostegites, long enough to attain the symmetrical ones in the medio-sternal line.

Pleopod 1 ♂. — Protopodite much wider than long, its inner margin almost rectilinear and contiguous with the contralateral appendage; no coupling hooks. Exopodite ovate, as wide as the protopodite, 1.6 times as long as wide, with a row of 13 smooth setae on the distal and medial margins, the 3 proximal setae being longer and slightly plumose at their tips (fig. 16). No spines on the ventral surfaces of the exopodites.

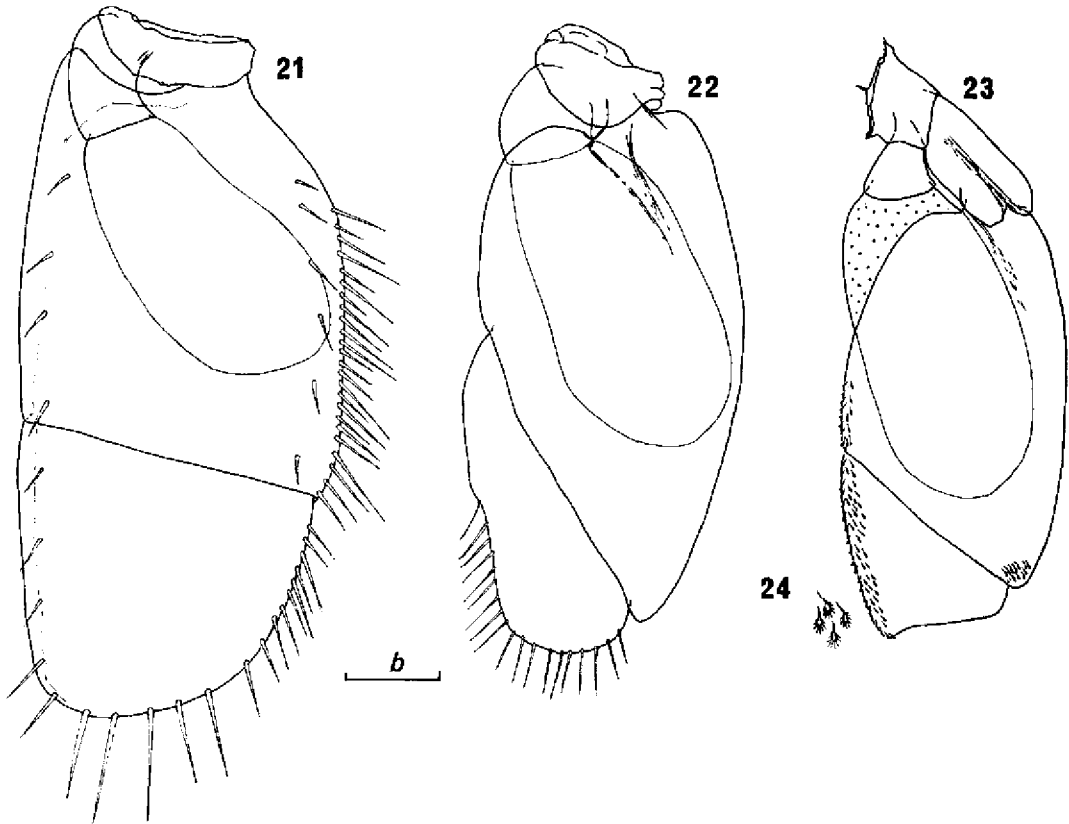
Pleopod 2 ♂. — Showing the typical characters of the genus, though quite different from the 4 previously known species. Protopodite large, subtrapezoidat; its distal margin very oblique and longer than the proximal one. An inconstant (often unilateral or lacking) smooth spine may be present on its medial edge. Exopodite 2-segmented, short; 1st segment bare; externodistal margin of 2nd segment with 7 smooth setae (fig. 17). Endopodite (copulatory organ) conical, very large; its proximal segment is extremely reduced in size and is rigidly connected with the distal segment (their common external margins seem to be sutured). The distal segment is hypertrophic, as in other *Metastenasellus* species, and strongly twisted (more than 2 rotations) by rolling up around its longitudinal axis. It seems to be composed of a large external funnel-like leaf, surrounding distally a twisted leaflet which constitutes the distal process, bearing the distal efferent opening (e); laterally, it bears an helicoidal row of about 13-14 chitinous teeth (figs. 18, 19). The medioproximal angle of the organ bears the large infundibulum of the afferent aperture (a) of the internal helicoidal canal (fig. 18).

Pleopod 2 ♀. — Subtriangular, partly fused proximally (a secondary or late-occurring suture during morphogenesis?) with the contralateral plate. A single exopodal smooth seta on outer margin (fig. 15).

Pleopods 3, 4, 5. — Exopodites lamellar and chitinous, very large. Endopodites 3, 4 and 5 suboval, fleshy with respiratory function, each of them shorter than the proximal segment of the corresponding exopodite. Outer margin of exopodite 3 with a continuous row of numerous smooth setae, more dense along the proximal segment (fig. 21). Intersegmental suture of exopodite 4 extremely oblique; thin marginal setae on distal segment only (fig. 22). Distal segment of exopodite 5 subtriangular; intersegmental suture oblique (fig. 23); two areas (a long medial and a short external one) covered with small, auriculate, cuticular scales (fig. 24).

Uropod. — Well developed in both sexes (but without important heterogonic growth as in *M. wikkiensis*), just a little shorter than the pleotelson (about 8/9th); exopodite slightly shorter than the endopodite (figs. 1, 2).

Relationships. — In all its characters, particularly in the structure of ♂ pleopods, the new species clearly belongs to the genus *Metastenasellus* Magniez, 1966, but



Figs. 21-24. *Metastenasellus powelli* sp. n. 21, left pleopod 3 of ♀ 2, b = 200 μ m; 22, left pleopod 4 of ♀ 2, b = 200 μ m; 23, left pleopod 5 of ♀ 2, b = 200 μ m; 24, cuticular scales of internal margin of exopodite 5, b = 33 μ m.

it appears to be distinct from the 3 Congolese species (the type-samples of which have been re-examined by us in 1966), as well as from the recently accurately described *M. wikkiensis* Lincoln, 1972, from northeastern Nigeria.

Considering the high degree of spiralling in the copulatory organ as the main evolutionary feature of the genus, the evolutionary stage found in *M. powelli* sp. n. seems to be rather similar to that of *M. congolensis*, but quite less primitive than in *M. wikkiensis* and clearly less evolved than in the type-species, *M. leleupi*. Since, however, the geographical area of the genus is very large, and the known localities of the different species are relatively remote from one another (map, fig. 20), it is not unlikely that inside this area (Lower Niger and Benue Basins, Zaire Basin), further species are to be discovered, particularly from phreatic layers. This point needs further study.

Magniez (1966: 180-182) pointed out an important difference between the species of the genus *Metastenasellus* and all other stenasevellids. In the latter (genera *Stenasellus*, *Parastenasellus*, *Magniezia* and also in the recently discovered Ameri-

can species), the 1st segment of the 2nd ♂ pleopodal endopodite is always more or less elongate and the articulations between the protopodite and the 1st segment, and between the 1st and the 2nd segment allow large movements inside the plan of the appendage. So, this inner ramus can assume a rest-position: the 1st segment resting against the inner margin of the peduncle, the 2nd segment against the outer margin of the 1st one: this means that, at rest, the endopodite is folded and underlies entirely the 1st pleopod. In copulatory activity, due to the two knee-like articulations described above, the 2nd segment can be directed strongly downward. In contrast, in *Metastenasellus* the proximal segment of the endopodite is quite reduced in length and the two articulations are rigid, so that this endopodite is practically unable to protrude. In compensation, it is necessary that it should be longer than in other stenasellids and, in fact, the 2nd segment is so much elongated that it is no longer completely hidden under the 1st pleopod at rest position: beyond the tip of the 1st pleopod, the entire distal part of this copulatory organ is naked. Underlying the ventral surface of the operculum (3rd pleopodal exopodite), the tip of the copulatory organ seems to interfere with the respiratory movements of the operculum. This hypertelic evolution of the copulatory organ is a characteristic of the phyletic line in the stenasellids represented by the genus *Metastenasellus* and reaches its maximum in the Congolese species *M. leleupi* (Chappuis, 1951).

THE GENUS *METASTENASELLUS* AND ITS SPECIES

Revised diagnosis of the genus *Metastenasellus* Magniez, 1966. Stenasellid with body slender and linear, colour bright pink to red in live specimens (blood pigments), tegument translucent, eyes absent. Tergites of free pleonites 1 and 2 well-developed in length (more than half of pereonite 7), slightly narrower than pereonite 7, but wider than the pleotelson.

Pereopods 2-7: dactylopodites with only 1 sternal spine.

Pleopods 1 ♂: without coupling hooks. Pleopods 2 ♂: endopodite quasi unarticulate, with non-functional articulations (proximal segment very reduced and rigidly connected with the 2nd segment). Second segment hypertrophized in length, strongly twisted, fusiform, containing an helicoidal canal with a large afferent proximal aperture and a small distal efferent opening, surrounded by a row of chitinous teeth. Pleopods 2 ♀: fused proximally in medial line. Pleopods 3, 4, 5: exopodites longer and wider than the corresponding endopodites; exopodite 4: intersegmental suture strongly oblique, inner marginal setae on distal segment only; exopodite 5: intersegmental suture oblique, distal segment subtriangular.

Uropods: generally a little shorter, sometimes longer than the pleotelson.

The following species are known:

1. *M. leleupi* (Chappuis, 1951) (*Stenasellus leleupi* Chappuis, 1951: 342). Type-locality: Tordeur Cave, upper gallery (B13a), 3 km S.E. of Thysville (= Mbanza-Ngungu), 05°15'S 14°52'E, 120 km S.W. of Kinshasa, Zaire: in clay-bottomed pools and gours, 150-900 m beyond threshold (T° = 21-22°C,

pH = 7.6). Live colour carmine pink, some specimens paler or white. ♂: 7 mm; ♀: 8.2 mm. Leleup (1956) pointed out the presence of *M. cf. leleupi* (♀ only) in the B17 Cave, a subterranean river, 13 km S.E. of Thysville and in the B23 (= Kunga) Cave, 7 km S.E. of Thysville. Types in Mus. roy. Afr. Centr. Tervuren, Belgium.

2. *M. congolensis* (Chappuis, 1951) (*Stenasellus congolensis* Chappuis, 1951: 348).

Type-locality: Raymond Lambrechts Cave (B29), near Lovo village, 05°50'S 14°26'E, 25-30 km S.S.W. of Lukula and 180 km S.W. of Kinshasa, Zaire. In a subterranean lake (T° = 22°5C, pH = 7.2), associated with *Caridina lovoensis*. Live colour bright carmine. ♂: 14 mm; ♀: 13 mm, but according to Leleup (1956), the ♀ is larger than the ♂. Feeding on fecal pellets of porcupines. Types located as in 1.

3. *M. dartevellei* (Chappuis, 1952), (*Stenasellus dartevellei* Chappuis, 1952: 353).

Type-locality: a spring in Nouvelle Anvers, 01°36'N 17°07'E, 800 km N.E. of Kinshasa, Zaire, near the northern bank of the Congo River. Live colour not noted, preserved specimens whitish-cream. ♂: 8.5 mm (including uropods). Types located as in 1.

4. *M. wikkiensis* Lincoln, 1972, (Lincoln, 1972: 214).

Type-locality: among tree roots and partly decayed vegetation submerged in Wikki Warm Springs (T° = 33° C), Yankari Game Reserve, 09°30'N 10°20'E, Bauchi Province, northeastern Nigeria. ♂: 8 mm; ♀: 7.5 mm. Live colour bright pink. Types in the British Museum (Natural History), London, U.K.

5. *M. powelli* sp. n.

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RÉSUMÉ

Contrairement à tous les autres Sténasellides, qui vivent dans les eaux souterraines continentales (grottes, nappes phréatiques, sources thermales), la nouvelle espèce a été trouvée dans la zone oligohaline du littoral, près de Port Harcourt, Nigéria.

Description de *Metastenasellus powelli* sp. n. affinités de cette nouvelle espèce, aire géographique et diagnose rénovée du genre *Metastenasellus* Magniez, 1966, liste des espèces connues à ce jour.

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