A simple scenario for stygobitization in *Stenobermuda* Schultz, 1978 (Isopoda: Asellota Stenetridae), with description of a new species from Andros Island, Bahamas

Lazare Botosaneanu * and Thomas M. Iliffe **

**SUMMARY**

Description of a new stygobitic and pleomorphous species of *Stenobermuda* from a Blue Hole in the Bahamas, as an opportunity for speculation about hypogean colonization by this and by another cave-dwelling species from Bermuda, starting from populations of a widely distributed Western Atlantic shallow water marine species.

**INTRODUCTION**

Gnathostenetridae and Kussakin, 1967, and Stenetridae Hansen, 1905, are two of the four superfamilies in which Isopoda: Asellota are presently divided. These two superfamilies are considered as being the most primitive Asellota.

Despite much progress achieved in the study of diversity in the two superfamilies, incertitude still reigns concerning their characterization and delimitation, the generic limits and the relationships between genera, and even on author names conflicting opinions were published (most of the papers in the References, and several more, would have to be quoted here in support of this statement). For example, genus *Stenobermuda* was described in Stenetridae (Schultz, 1978) but transferred to Gnathosteneotidae by Kussakin (1994). In our opinion, the male pleopodal arrangement in species of this genus matches better the pattern shown for Stenetridae in *Wigele* (1983: Fig. 4) and in Kussakin and Scholtze (1989: Fig. 34 and not the diagnoses in this last publication, which sometimes are at strong variance with this figure), and we sustain *Stenobermuda* in Stenetridae. Much evidence from the revision of Stenetridae by Serov and Wijson (1995) clearly supports this decision.

* I.S.P. / Zoölogisch Museum, University of Amsterdam, Plantage Middenlaan 64, 1018 DH Amsterdam.
** Dept. of Marine Biology, Texas A. & M. University, Galveston, TX 77553, U.S.A.
Representatives of the two superfamilies are in their overwhelming majority marine, with the centre of gravity in shallow waters. Quite a few are known to have colonized subterranean waters in karst or in pozzuoli habitats, and in some cases the Cretaceous limestones, with various information, in Henry, Lewis & Magniez, 1996; subsequently described were: StenobedrumsiöfriKensley, 1994; Eupepistemonaxilusulis Stock & Vonk, 1990; and C. ascensionis Vonk & Stock, 1991). 

The present paper is a contribution to the knowledge of stygobitization in primitive Acellata (see Conclusions).

**Stenobedrumsiöfri** n.sp.

Figs. 1-9

Material and locality

Male holotype from Conch Sound Blue Hole, Andros Island, Bahamas. Collected by diving (6.IV.1996, by Brian Kakuk) with plankton net in 26 m water depths at 750 m penetration into the cave. A series of appendages missing or broken. Were dissected for study only these appendages strictly necessary for describing the new species (dissecting more would have resulted in completely destroying the unique available specimen). Deposited in the Zoological Museum of the Universit; of Amsterdam.

Description of male

Length (from tip of rostrum to end of pleotelson): 3.2 mm. Completely depigmented. Eyes (ommatidia) absent. Ratio body length/maximal width (being that of pereionites II and III; slightly exceeding 3:5.

Distal margin of cephalon with triangular, not very acute, rostrum; frontal processes antennae, antennal processes acute, well developed but much shorter than rostrum. The longest pereionites are II and III; pereonites I-III with anterolateral corners point ed and directed anteriorly; pereionite IV with small obtuse anterolateral corners followed posteriorly by a distinct emargination; pereionites V-VI laterally very obtuse, pereionite VII with acute postero lateral corners directed posterior. Two very small pleonites. Pleotelson like in the two already described *Stenobedrums* (but also like in some *Stenurium*), relatively broad, distal margin slightly sinuous, moderately produced (obtuse). Uropods missing.

Maxillipedal endite with only two very characteristic coupling hooks looking like crossed, on rs straight median margin; distal margin with 7
spines, all simple, arranged like in Fig. 3. Maxillipodal palp typical for *Stenobermuda*.

Carpus of gnathopod with row of some 10 strong setae on internal margin. Propodus distally strongly widening (distal margin only slightly shorter than internal margin, and with a hyaline "blade" along most of its length); on distal margin ("cutting edge") 7 spines - that in the internal corner by far the strongest; on internal margin (palm) 5 spines, all spines finely pectinate. Pereiopod II (and following) propodus ending in strong conical projection on which a pair of fine setae are inserted.

Pleopod I with very small (i.e.: short and narrow) common protopodite: they form an operculum covering pleopods II and have relatively numerous short setae along their lateral margins.

Fig. 1 - Stenobermuda mergens n.sp., male holotype: habitus.
The very small pleopods II with uniarticulate exopodite ("a" in Fig. 7) having the shape of a parallelogram, slightly emarginate distally, with long subapical seta and serrate internal margin. Copulatory endopodite biarticulate, strongly flexed, 1st article swollen, 2nd article of very complex structure: antapical part ("F") widened and bloomed, apically with two appendages: lower one ("c") a darker, slender "spine" with shorter "tooth" near its root, and with apex surrounded by a hyaline blade; upper one ("f") broadly oval, with small, hyaline, wrinkled "crown".

Pleopods III: endopodite much more slender than the biarticulate exopodite, tapering towards the truncate apex on which four plumose setae are inserted; both articles of exopodite strongly widened.
Comparisons

The new species clearly belongs to genus *Stenobermuda* Schultz, 1978, in which two species were already described: *S. ecuadorensis* Schultz, 1978, and *S. illisii* Kenseley, 1994 (according to Kenseley, 1994 "it is probable that several species described under *Stenodactyla* are actually representatives of *Stenobermuda*"; and in Sero & Wilson, 1995, the South African marine linear *Stenodactyla pygmaea* Barnard, 1944, is transferred to *Stenobermuda*). In what follows we shall mention only characters for which comparison with the published descriptions and illustrations shows clear difference.
From *S. aequirostrana* the new species differs in: the smaller size; the complete depigmentation (however, in the original description of *aequirostrana* we read "Pigmentation light (if at all)"); the anophtalmy; a less pointed rostrum and shorter anterolateral processes of cephalon; the blunt lateral ends of pereonites IV-V (and possibly other details of the pereonites); the relatively broad and distally less produced pleotelson; the very distinctive coupling hooks of the maxillipedal endite; the uniarctulate exopodite of pleopod II (this is illustrated – but not described – as biarticulate in *aequirostrana*), as well as details of its endopod; (although – compare our Fig. 8 with Fig. 3 in Ichihara, 1978 – there seems to be some similarity in the structure of its apical appendage.).
From *S. riggi*, *S. mergens* n.sp. can be distinguished by: the asphtalmity; the very distinctive coupling hooks of the maxillipeds ending; and the very different armature on its distal margin; the distinctly more strongly widened pereopod propodus asi the more numerous strong setae on the internal margin of its carpus; the strong conical projection at the apex of first pereopod II; and following propodus; the smaller common protopodite of pereopods I; the shape of the exopodite or pereopod II (however, a similarity seems to be the fact that also in *S. riggi* the exopodite seems to be unarticulate: Fig. 10 C in Kensey, 1994); the abundantly different structure of the two apical appendages of pereopod II endopodite.

*Derivatio nominis*

The specific name was coined from (Lat.) meta- to dive, alluding to the fact that the specimen, caught by diving, belongs to a species “diving” in the depths of Blue Holes.
CONCLUSIONS

Stenosomatoidea acutirostris, S. illefi, and S. mergans n.sp. are doubtless closely related species. S. acutirostris was described (Schultze, 1978) from the South shore of Bermuda, from "a bottom of sand and rocks at 90m". It was rediscovered (Schone, Heard & Kearley, 1991) in two localities in the Caicos Islands: "Rack Cay, sponge washings" and "Pine Cay, inside fringing reef, rubble and sublittoral, 4-5m". Meagre as it is, the available evidence shows that this is a shallow water species widely distributed in the Western Atlantic. It is lightly pigmented and has apparently eyes consisting of some 5 ommatidia. S. illefi is known (Kemley, 1994) from Walsingham Cave, Ber- muda, where – judging from the number of collected specimens – certainly an important population is present: the species is ocular (eyes consisting of only 4 ommatidia) and probably a relatively recent subterranean colonist. S. merg- ans n.sp., completely depigmented and apochalainous, was collected from the depths of a Blue Hole at Andros Island, Bahamas. It is practically certain that S. illefi and S. mergans are hypogean ophiuroids of different populations of S. acutirostris; we predict that other populations of these two species, and possibly also other closely related subterranean-adapted species will be dis- covered in hypogean habitats inside the distribution area of the marine spe- cies. The colonization of subterranean aquatic biotopes by shallow water marine elements in subterraneous trogloida and Stenosomatoidea is considered (Wägele, 1990) as being a general phenomenon.

The stygogebological literature abounds in examples supported by seri- ous evidence (from morphology, distribution, and ecology) of several closely related stygobitic troglophiles species being apparently ophiuroids – of synonhanic or synarchic origin – from different populations of a re- cem epigean species. Cladists could to their profit ponder over this matter; the existence of such "bushes" contradicts a central dogma of cladistics: the universality of ehotomous branching as phylogenetical scenario (Hoelzer & Melnick, 1994; Kolbseh, 1997).

ACKNOWLEDGEMENTS

We express thanks to Dr. Nicole Cuénot (Banyuls-sur-Mer) and to Prof. Dr. J.-W. Wägele (Bochum) for various information. We also thank Brian Rakus (Cambridge Marine Research Center) for offering to the second author the specimens here described.

REFERENCES


