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## A new genus and species of callipodidan milliped from Vietnam (Callipodida, Schizopetalidae)

By William A. Shear

### ABSTRACT

*Scotopetalum warreni*, n. gen., n. sp., is described from a cave near Hanoi, Vietnam. The new species shows troglobitic adaptations, and is most similar in gonopod structure to members of the North American genus *Colactis*. This is the first record of a schizopetalid from southeast Asia. Two newly proposed families of callipodidans from that region, Paracortinidae Wang & Zhang, and Sinocallipodidae Zhang, are briefly discussed. Paracortinidae is probably synonymous with Schizopetalidae. A new suborder, **Sinocallipodidea**, is proposed for the latter family.

### INTRODUCTION

The milliped order Callipodida was thought until 1993 to be distributed only in North America, Europe, and far western Asia. In that year, two new families of callipodidans were recorded from China. The family Sinocallipodidae was established for the single species *Sinocallipus simplicipodus* Zhang, collected in a cave in Yunnan Province (Zhang, 1993), and the family Paracortinidae was set up to accommodate six species in three new genera found in Yunnan and Szechuan provinces and Tibet (Wang & Zhang, 1993). These finds suggested that yet a third center of callipodidan diversity may be added to southwestern North America and the eastern Mediterranean region. More evidence now comes in the form of a troglobitic schizopetalid from near Hanoi, Vietnam.

This new species, collected by Dave Warren (Perth), was sent to me for study by William Humphreys of the Western Australian Museum. Rowland M. Shelley provided useful manuscript review. This research was supported by a grant (DB-9712438) from the National Science Foundation.

#### TAXONOMY

Order Callipodida Bollman  
Suborder Schizopetalidea Hoffman  
Family SCHIZOPETALIDAE Verhoeff

#### *Scotopetalum*, new genus

TYPE SPECIES: *Scotopetalum warreni*, new species.

DIAGNOSIS: Distinct from other genera of Schizopetalidae in lacking any indication of a sternum or coxal process in the gonopod, and in having no crest transition (full number of primary crests present on all segments). Each hemipleurotergite bears a series of five setae; all are in the anterior position on segments 1-4, setae *b*, *d*, and *e* migrate posteriorly on segment 5, and all setae are posterior on segment 6.

NAME: From *skotos* (Greek, darkness) combined with *-petalum*, often used as a stem for generic names in this order, referring to the troglobitic habitat of the type species.

DISTRIBUTION: Known only from two localities near Hanoi, Vietnam.

#### *Scotopetalum warreni*, new species

(Fig. 1)

TYPES: Male holotype from an unnamed cave at Hong Mat, northwest of Hanoi, Vietnam (20°44'33" N, 105°08'27" E), collected 16 January 1994 by Dave Warren (collector's number BES 1207); deposited in the Western Australian Museum, Perth.

NAME: The specific epithet honors the collector.

MALE: Length, about 32 mm, width 2.4 mm. Head normal, without modification. About 15 poorly defined black ocelli in three linear series. Antennae long, extending back at least to 8th trunk segment. 53 segments. Color uniformly pale yellowish-tan. Metazona with six slightly serrate primary and six secondary crests between poriferous crests; lateral to the latter are three lateral crests with a diminishing series of four to six lower crests down to ventral pleurotergal edge. No crest transition: all segments with the complete number. Pleurotergal setae 5+5, setal migration as

described for the genus. Paraprocts bisected into small dorsal and larger ventral, sclerites.

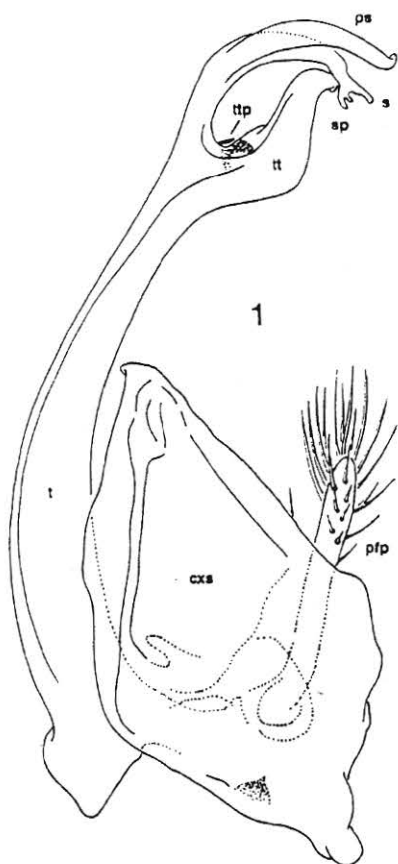


Fig. 1. *Scotopetalum warreni*, left gonopod of holotype, lateral aspect. Abbreviations: cxs, coxosternum; pfp, prefemoral process; ps, parasolenomerite; sp, subapical process; s, solenomerite; t, telopodite shaft; ttp, tibiotarsal process.

Legpairs 1 and 2 with six podomeres and dense brushes of dark setae; gonopores opening from small cones on coxae of 2nd legs. Legpairs 6 and 7 with small mesoventral thorns, otherwise unmodified. Coxal sacs on legpairs 3-19. Legs long, slender; tarsi of postgonopodal legs with indistinct segmentation at distal third.

Gonopods (Fig. 1) lacking any indication of free sternum; coxosterna (cxs) lateral and separate, somewhat membranous, subtriangular, coxal process absent. Prefemoral process (pfp) loosely articulated to coxa near telopodite base, much longer than wide, densely setose; telopodite attached to coxosternum posteriorly by flexible cuticle, but no true hinged articulation. Telopodite shaft (t) long and stout, tibiotarsus (tt) flattened-acuminate, with small, hooklike basal process (ttp); solenomerite (s) surpassing tibiotarsus, with long parasolenomerite (ps) and trifold subapical process (sp).

Female unknown.

DISTRIBUTION: Only the type locality with certainty, but a penultimate male closely similar to the holotype was collected by Dave Warren on 17 January 1994 in Hang Tua Cave (same coordinates as the type locality), collector's number BES 1214, Western Australian Museum.

## DISCUSSION

Although *Scotopetalum* seems clearly to be a schizopetalid, it is not easy to assess its relationships, separated as it is by thousands of miles from any confamilial form (but see the discussion below of the family Paracortinidae). However, there is an obvious resemblance of the gonopods to those of species of the North American genus *Colactis* (Shelley, 1996, 1997). Two species of *Colactis* have caudal sternal

processes and two do not; the coxal process<sup>1</sup> is lobelike and setose and is present in all species of the genus. No *Colactis* appears to have a prefemoral process, but a setose area close to the base of the telopodite in some species may represent this structure. *Scotopetalum* also differs from *Colactis* in the presence of a gonopodal parasolenomerite, and in lacking transition in number of dorsal crests.

Hoffman & Lohmander (1964) introduced improvements in our knowledge of homologies in the gonopods of callipodidans, but difficulties in the interpretation of these complex structures persist. In describing the six new species of their new family Paracortinidae, Wang & Zhang (1993) provided excellent illustrations of the gonopods, but only minimal accounts of their structure and homologies. However, from the drawings it is evident that paracortinids have a long, acuminate medial sternal process that parallels the telopodite (a process not present in *Scotopetalum* and a further distinction of this genus from paracortinids). At the lateral distal margin of the coxosternum arises a lobe-like setose coxal process and a separate, articulated prefemur and prefemoral process can be seen near the base of the telopodite articulation. Because the coxal and prefemoral processes are both lobelike and setose, Wang & Zhang considered them both prefemoral, and diagnosed their family in part on this basis. But if my interpretation is correct, the gonopod plan of the paracortinids becomes essentially indistinguishable from that of schizopetalids. The family was further diagnosed on "Pleurotergite of segments 1-4 with a row of 5 setae, segment 5 with two rows of 5-7 setae, all setae in the back of segments from 6 to penultimate (Wang & Zhang, 1993: 386)." Do they mean that each hemipleurotergite has 5-7 setae, or is that the total number? So far as we know from other callipodids (Hoffman & Lohmander, 1964) ten setae (five on each side) is the minimum number. I interpret their statement as describing in part a setal occurrence and migration pattern similar to that seen in *Scotopetalum warreni* and other schizopetalids, and it is clear from subsequent generic diagnoses that this is so, but the specific setae that migrate are not identified. Setal migration is not sufficient, *per se*, to diagnosis a family, given the variation in pattern demonstrated within families by Hoffman & Lohmander.

Wang & Zhang diagnosed (1993) their three new genera of Paracortinidae solely on setal patterns: *Paracortina* having at least some of the five (ten) setae "in two rows" on segment 5, and segment 6 having six (12) setae, all in the posterior position. *Relictus* differed in having seven (14) posterior setae on segment 6, and *Altum* in having five (ten) posterior setae on 6 (the condition on segment 5 is not mentioned for this taxon). However, the gonopods of all six species in these nominal genera are

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<sup>1</sup>In describing *Colactis briggsi* in 1974, I called this structure the prefemoral process. But I now agree with Shelley that it is actually a coxal, not prefemoral, process.

so similar, they could be considered as congeneric by the standards current in milliped taxonomy.

On the basis of available descriptions and drawings only, I am inclined to suspect that the nominal family Paracortinidae cannot be maintained as a taxon separate from Schizopetalidae, although it might constitute a subfamily on the basis of the extremely reduced 2nd legs of females when these usually neglected characters have been examined in genera throughout the family. I further believe that it is unjustified to award generic status to species in which variations in setal pattern contravert the indications of gonopod structure. The disposition of dorsal setae varies randomly in the order: the pattern being the same in all 12 genera of the two North American families (Shelley, pers. comm, 2000) although rather diverse among West Palearctic taxa, and the systematic importance may not be the same in different regions. I would not formalize any of the foregoing alterations without having first examined specimens, but if my hypothesis is correct, *Scotopetalum* may have some geographically close relatives after all.

The situation regarding the family Sinocallipodidae is quite different. The single known species *Sinocallipus simplicipodus* (Zhang 1993) is unique among all callipodids by virtue of the extraordinarily simple gonopods with a sternum like that of the walking legs. The block-like coxae bear three processes, of which the most posterior is flagelliform (an incipient cannula, as seen in some other callipodids?). The apparent telopodite is unisegmented with three apical branches like elongate claws; and no prostatic groove was described. It would be very difficult to homologize these gonopods with those in any other family, so there is no doubt that the Sinocallipodidae is a valid taxon. It further appears to be the plesiomorphic sister-group of the other families collectively, and therefore should be accorded subordinal rank under the name **Sinocallipodidea**, new suborder.

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Address of the author:

Dr. William A. Shear  
Hampden-Sydney College  
Hampden-Sydney, Virginia 23943