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PART II.

FAMILIES CYPHODERIDAE AND ONCOPODURIDAE¹

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In 1906 Börner described *Cyphoderus assimilis* from material partly collected in Egypt. Since that time the family Cyphoderidae has been well represented in the collections from the region until at the present moment nine species have been recorded from Lebanon, Palestine, Egypt, and Iraq. Four of the nine species mentioned above were again recovered in the course of this research and two new species were uncovered. The relatively poor recovery of previously located species along with the extremely spotty nature of the distribution of the collections appears to indicate a small sampling of the total population of this family present in the area.

The family Oncopoduridae has not previously been reported from the area. The single new species described herein does not give any new insight into the biogeography of the region.

Genus *Cyphoderus*

Delamare-Deboutteville (1948) in his excellent work upon Termitophilous and Myrmecophilous Collembola divided the old genus *Cyphoderus* into a number of genera. Since two of the species here examined indicated a clear need for the re-examination of these genera, I have con-

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sidered his genera as subgenera (*Cyphoda* and *Serroderus*) throughout, merely to avoid confusion. Three species had been previously recorded from Lebanon. In the present work two of these were re-discovered, and species previously recorded from Egypt and Palestine were found. Along with one new species, this brings the total known from the area to six species.

Cyphoderus genneserae Carpenter

Cyphoderus genneserae Carpenter, 1913, Jour. Proc. Asiat. Soc. Bengal 9:215

This species is fairly widespread throughout the southwestern Syrian Region. Handschin and Carpenter reported it from Palestine and the variation described by Handschin as "*aethiopica*" has been found in several regions in Central Africa. I have recovered the species from two localities: Litani River near the mouth on August 23, 1953 (Asfour and Salaymeh Coll.) and Antelias Stream Bank on November 9, 1952. Both of these localities are in the coastal plain of Lebanon and all of the specimens (about 25) agree with the descriptions and figures shown in Handschin, except in one startling respect: The presence of only two fringed scales in the inner row of dental scales. This characteristic places the species in the genus *Serroderus* of Delamare, although it lacks any hint of the gradation between scale and seta structure described as characteristic of the genus. The species of this genus which it most resembles is *S. sublimis* and this species also lacks the above mentioned characteristics. In spite of the difficulty of separating the specimens at hand from the last mentioned species I feel that the exact detail for detail identity of the present form with the described *genneserae* leaves little doubt that the existence of only a single pair of internal scales is a local variation. This, of course, points up the necessity of revising the limitations of the genus *Serroderus*, but this is beyond the scope of the present paper. The only other modification of Handschin's description is that in a few specimens the tenent hair can be seen to have a minutely clavate tip, visible only under the highest magnifi-

cation. In both populations the *aethiopica* type of mucronal form was present in addition to the normal type.

Cyphoderus (Cyphoda) grassei

Cassagnau & Delamare-Deboutteville

Cyphoda grassei, Cassagnau & Delamare, 1951, *Biospeologica* 75: 384-385.

This species was described by Cassagnau and Delamare from a single specimen. The relative size of the mucro and dens (1-10) was taken as a characteristic of the species and upon this basis it was placed in the genus *Cyphoda*. I have several series of specimens which I have identified as this species. In one of these I have five specimens. The relative sizes of the mucro and dens varying as follows: 1-10, 1-9, 1-8.5, 1-7.5, 1-7. In a second series of three specimens the sizes are: 1-10, 1-6, and 1-5.5. In still a third series both specimens have a mucronal dentes ratio of 1-5.5. This presents a problem since the sole basis for separation of members of the genus *Cyphoda* is the relative mucronal length. Whatever the eventual decision concerning this genus, the species *grassei* can no longer be considered part of the genus.

In addition to this variation in mucro the species shows another peculiarity in that the tunica is absent in a few specimens, particularly young forms. In over 95% of the specimens seen, a clear tunica is present on the ungues. Perhaps the most unique characteristic of the group is the shape of the mucro. This is particularly noticeable upon specimens having a relatively large mucro, but can be seen upon all. The mucro has in addition to the apical hook, a very shallow antepical tooth. This condition is always the same and places it directly on a line between the two groups *bidenticulati* and *inermes*.

Distribution: Hammana, Lebanon, August 28, 1952 and July 28, 1957. Vic. East Base Quornet es Sauda Lebanon, elev. 2200 meters, July 1, 1953; Vic. Turkish Border Latakia, Syria, August 2, 1953, lat. 35° 50" long. 36° 01"; Dahr el Ain, Lebanon, October 10, 1951.

Cyphoderus (Serroderus) spinatus n. sp.

Plate 6, figures 9-11, Plate 7, figure 8

Body oval, head bluntly oval with well developed mouth-

parts. White without eyes or any indication of pigment. Antennae four-segmented with first and second segments subcylindrical, third segment short and swollen apically, and fourth segment fusiform. Clothing of fourth segment of numerous setae some curved acuminate and ciliate, others smooth blunt and sharply curved. Both varieties decrease in size apically. The remainder of antennal segments are similarly clothed except that ciliate setae become relatively larger and straighter, and the smooth setae are largely limited to the ventral surfaces. The third antennal sense organ of two blunt ovoid stalked knobs and a pair of small slender, sharply angled blunt setae.

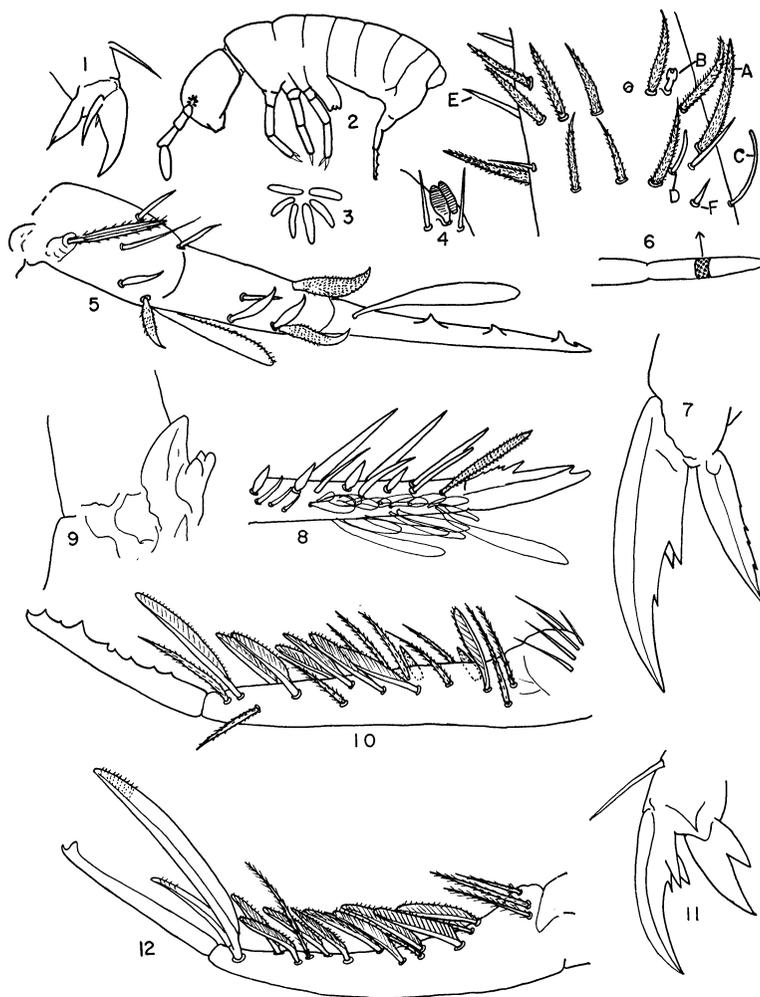
The body well covered with fine scales. Large ciliate acuminate setae present on the ventral surface of the animal and posterior two segments. Body with scattered short to long slender bothriotrichia.

Legs with numerous short acuminate setae. Tenent hair stout and pointed on all legs. Unguis stout, sharply acuminate with paired basal prominent teeth, two small but definite median teeth. Apical-most tooth at about mid-level of unguis.

Manubrium with normal clothing, dens with acuminate ciliate setae, ciliate and smooth scales and spines (see Plate 6, fig. 10). Outer row of dorsal fringed scales six

EXPLANATION OF PLATE 6

Figures 1-5 *Oncopodura ambigua* n. sp. 1. Claw, paratype, approx. 1000 x. 2. Habitus, setae and scales omitted, holotype, approx. 100 x. 3. Left postantennal organ, paratype, approx. 1000 x. 4. Third antennal sense organ, paratype, approx. 2000 x. 5. Dens and mucro, holotype, approx. 2000 x. Figures 6-8 *Troglopedetes canis* n. sp. 6. Detail of clothing of antenna, with different types of setae mentioned in description labelled. Small lower diagram shows whole fourth segment with expanded part hatched, detail holotype, approx. 1000 x. 7. Front claw, holotype, approx. 1000 x. 8. End of dens and mucro, paratype, approx. 350 x. Figures 9-11 *Cyphoderus spinatus* n. sp. 9. Clasp organ at base of dens, paratype, approx. 1000 x. 10. Mucro and dens, holotype, approx. 400 x. 11. Hind foot, paratype, approx. 400 x. Figure 12. *Cyphoderus assimilis* Börner. Mucro and dens of specimen from Syria, approx. 400 x.



in number, distalmost strikingly larger than remainder. Inner row with two scales and in addition two short stout spines which appear to take the positions normally occupied by scales. If we consider the two pairs of spines as equivalent to scales, the group ends up as part of Delamare's "multidentati group" to which it shows a number of similarities. Taken from one locality; Jisr esh Chouer, Syria, September 21, 1953. In swamp, Berlese funnel sample, wet soil mixed with dead reeds and roots. Mucronal formula (after Delamare) aA1A5.

VARIATION

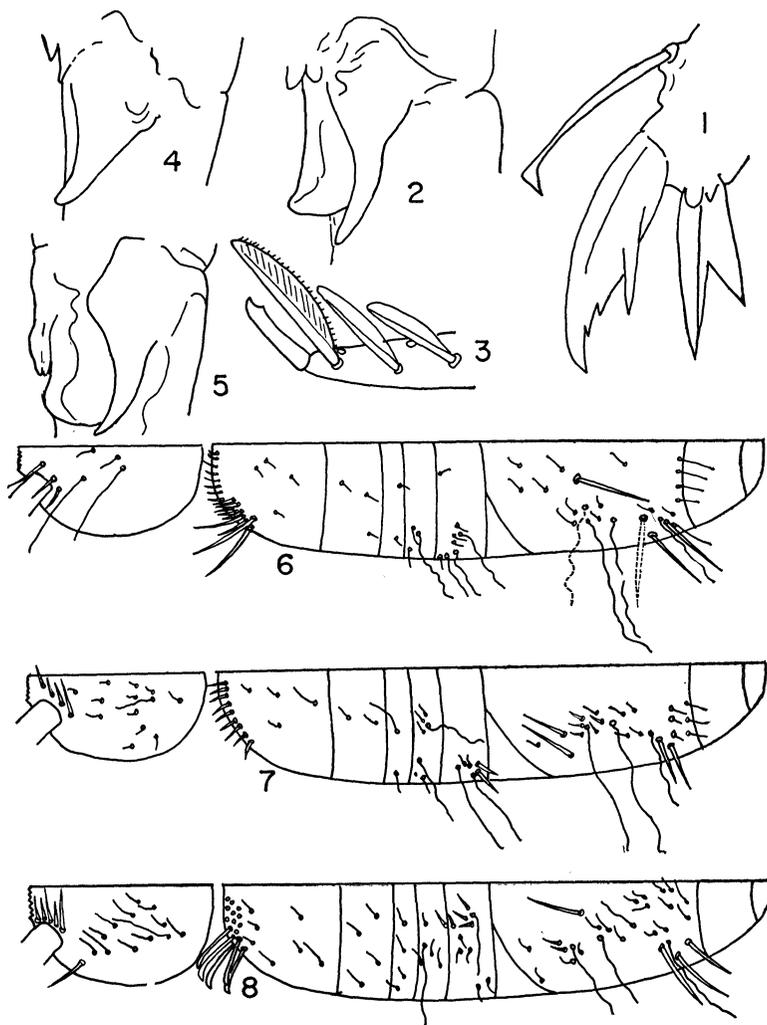
Only four specimens were seen and in this series little variation was noted. In one specimen the unpaired teeth were reduced to one extremely minute tooth on the first two pairs of legs. The external row of fringed scales were five in number on two specimens.

DISCUSSION

The presence of spines along with the fringed setae on the dens serves to separate this species readily from all previously described species of the genus. The presence of only two fringed scales on the internal row in this species would appear to place the species in Delamare's *Serroderus*. As is pointed out elsewhere the limits of this taxon need re-definition.

EXPLANATION OF PLATE 7

Fig. 1. *Cyphoderus assimilis* Börner. Claw, specimen from Syria, approx. 500 x. Fig. 2. *C. genneserae* Carpenter. Clasp organ at base of dens, specimen from Lebanon, approx. 1200 x. Fig. 3. *C. (Cyphoda) grassei* Cassagnau and Delamare. Mucro and tip of dens typical Lebanese specimen, approx. 600 x. Fig. 4. *C. (Cyphoda) grassei* Cassagnau and Delamare. Basal dental organ, approx. 1200 x. Fig. 5. *C. assimilis* Börner. Basal dental organ, specimen from Syria, approx. 1200 x. Fig. 6. *C. (Cyphoda) grassei* Cassagnau and Delamare. Semi-diagrammatic representation of dorsal chaetotaxy. Fig. 7. *C. genneserae* Carpenter. As above, specimen from Lebanon. Fig. 8. *C. spinatus* n. sp. As above, paratype.



Cyphoderus assimilis Börner

Plate 6, figure 12, Plate 7, figures 1, 5

Cyphoderus assimilis Börner, 1906, Mitt. Naturhist. Mus. Hamburg 23:181.

The true identity of this species is a difficult problem to solve. The species *C. assimilis*, *C. similis*, *C. subsimilis*, and *C. simulans* all have in common: bidentulate mucro, unguis without tunica and with two unpaired teeth, only a single well developed basal unguis tooth and a clavate tenent hair. Although the absence of the tunica, the unpaired median tooth, and clavate tenent appear to show some variation and much difference of interpretation, we have little choice other than to accept these as real characteristics. It would appear from Börner's description that his original diagnosis is a composite of two species. One of these is the species later described by Folsom as *C. similis*. The evidence for this is as follows: First Börner, 1906, described the species from two collections; one from Egypt, and one from orchids from the West Indies. Since the form Folsom described was from the West Indies, it seems quite probable that it is equivalent to the latter form seen by Börner. If this is accepted then a number of facts indicate that the description is composite, and the Egyptian form is another species. Börner says that the inner terminal scale is shorter to somewhat longer than the mucro. In the West Indian and Central American specimens it is never as long as the mucro. He says there is usually a small lamella upon the mucro; the West Indian and Central American material always have some lamella. This would mean that to account for his description the species seen by Börner were two: one an Egyptian form sharing the common characteristics of the group with a dental scale longer than mucro and without lamella on the mucro, and a second form later described by Folsom as *C. similis*. *C. subsimilis* of Delamare satisfies both requirements for the Egyptian species, but the figure of the unguis differs strikingly from that given by Börner in 1913. I have collections from Syria which satisfy all of the characteristics listed above. The one major disagreement between the species is the relative size of the

mucrones. Since this, as most ratio distinctions, is very unstable it is not a serious objection. If this is accepted as the true *assimilis* then the following table can be used to separate the four species:

	<i>assimilis</i> ?	<i>similis</i>	<i>subsimilis</i>	<i>simulans</i>
dental formula	5/6	5/6	4/6	6/6
internal setae of tibiotarsus	"smooth"	1 row "smooth"	?	?
mucro	no lamella	with lamella	no lamella	no lamella
distal scale / mucro	longer	shorter	longer	shorter

Distribution: Bahr Atibe, east of Damascus, Syria, July 10, 1953.

Cyphoderus albinus (Nicolet)

Cyphoderus albinus (Nicolet), 1842, *Nouv. Mem. Soc. Helv. Sci. Nat.* 6:1-88.

Cassagnau and Delamare reported this from Dahr el Ain in Lebanon. I have two specimens taken from Latakia Syria, which appear to be this species. Unfortunately both were damaged in capture so that a certain identification is impossible.

Cyphoderus bidenticulatus (Parona)

Cyphoderus bidenticulatus (Parona), 1888, *Ann. Mus. Civico Genova Ser.* 6:83.

Reported from two caves in Lebanon by Cassagnau and Delamare.

Cyphoderus agnotus Börner

Cyphoderus agnotus Börner, 1906, *op. cit.*: 180-181.

Although this form has not been recorded from Lebanon or Syria its widespread occurrence throughout Palestine makes it quite probable that it does occur in the southern part of this area.

Genus *Troglopedetes*

Cassagnau and Delamare recorded two new species of this cavernicolous genus from Lebanon (*op. cit.*). This known species of the genus is largely circum-Mediterranean in distribution; but, the existence of Paleotropical and Neotropical members indicates the possibility of a tropicopolitan but still undiscovered distribution. One new species was discovered in this work bringing the known Syrian-Lebanese forms to three.

Troglopedetes orientalis Cassagnau & Delamare

Troglopedetes orientalis, Cassagnau & Delamare, 1951, *op. cit.*: 385-387.

These authors recorded this species from three localities in Lebanon. One record was non-cavernicolous.

Troglopedetes vandeli Cassagnau & Delamare

Troglopedetes vandeli, Cassagnau & Delamare, 1951, *op. cit.*: 387-388.

Taken from one cave in Lebanon.

Troglopedetes canis n. sp.

Plate 6, figures 6-8

Facies characteristic for the genus. Antennae with basal three segments subcylindrical and fourth segment divided in middle and elongate fusiform in shape. Antennae covered with a variety of setae of different types (see Plate 6, figure 6). Setae of Type A decreasing in size apically and with the ciliations becoming more prominent. Setae of types F and B are limited to the fourth antennal segment while those of type C are most numerous here and upon a limited region on the inner margin of the apex of the second segment. Fourth segment with two scale-like knobs having a lateral axis, and a pair of small and oval blades projecting out from this. In addition nine smooth setae are present. Scales oval, with extremely short fine striations. Dorsum of first thoracic segment with an anterior lateral fringe of large acuminate finely ciliate setae. Because of the dense covering of large scales, the remainder of the body setae are difficult to perceive, but the situation appears to be quite similar to that found in *Cyphoderus*. Dense with a single row of twenty-one spines. Mucro with four very small and two large dorsal teeth.

Tibiotarsi with all setae uniformly ciliate. Tenent hair prominent and clavate. Unguis with basal teeth well developed, one definitely larger, two unpaired median teeth, the apical one being very minute. Median teeth more prominent upon the hind unguis. Unguiculus acuminate and sparsely serrate along its posterior margin.

Variation in dental spines: 22/19, 21/23, 22/21, 19/20, 19/23.

Known only from the type locality: Dog River Cave, Lebanon, July, 1951 on Debris 1 km. inside cave.

DISCUSSION

This species is similar in many respects to *T. orientalis* but differs from this species in the shape of the mucro, the number and disposition of the dental spines, possession of a clavate tenent hair, the type of setae upon the antennae (see below), and the structures of the ungues. In this last characteristic the present species resembles *T. machadoi* Delamare, but it differs from this form in most respects, most strikingly in the relative length of the mucro.

The setae upon the antennae of these animals furnish an excellent series of characteristics. Unfortunately only three species were available for comparison but as the following table will illustrate, these indicated the value of further investigations of this characteristic.

In addition to this the so-called sense organ of the third antennal segment differs among the three forms (axis central in *ruffoi* and lateral in the other two).

seta type	<i>orientalis</i>	<i>ruffoi</i>
A *		longer, ciliation more prominent
B	stalk longer than apical expansion	longer only slightly expanded apically
C	unilaterally finely ciliate	dense mass upon apex of third segment
D *		straight
E *		*
F	longer and definitely curved	longer

* signifies similar to that illustrated for *canis*

***Oncopodura ambigua* n. sp.**

Plate 6, figures 1-5

Facies typical for genus. White, without trace of pigment or eyes. All antennal segments subovoid. Antennal segment four equipped with an apical conical projection and four blunt oval "sensory" setae. Remainder of setae of fourth segment slender smooth and acuminate. Third antennal segment with apical organ of two elliptical rods, with marked ladder-like striations, without clearly visible central axis. Remainder of antennae covered with a mixture of smooth setae (as in fourth antennal segment) and heavy conical finely striate setae. Postantennal organ of six lobes, the anterior pair lying at right angles to the long axis of the head, and the remainder radiating backward from this.

Tibiotarsus without any clearly spatulate setae. Unguis untoothed, with a definite "triangular lamella" and an opposing smaller but similar seta. Both structures are attached near the base of the unguis. Empodial appendage simple, external edge straight and equipped with a short apical filament.

Mucro slightly shorter than dens, equipped with an apical and three dorsal teeth. A single large scale is attached to the base of the mucro. Dens clearly subdivided into two portions. Inner dorsal margin of dens equipped with four apically curved heavy ciliate setae. A sixth seta is on the outer margin near the base of the dens. Remainder of dorsal surface with one large scale and five acuminate smooth setae.

DISCUSSION

In the series examined there was little variation outside of relative size. The large ciliate setae upon the inner margin may be five in number. Occasionally the basal-most of these setae is not curved at its apex.

The P.A.O. is often sunken into the head and it is very difficult to puzzle out the exact arrangement of the lobes. The presence of a definite triangular unguis lamella combined with the presence of a six-lobed P.A.O. immediately serves to distinguish this species from all those given in

Bonet (1943). In most characteristics this species would appear to be most closely allied to *O. crassicornis* Shoebotam and *O. cruciata* Bonet, but it may readily be distinguished from both of these by the presence of the unguis lamella.

This animal was extracted from a soil sample with a Berlese Funnel. Since only one locality is known, the range of the animal cannot be determined.

Known only from the type locality: Campus American University, Beirut, Lebanon, various dates, 1953.

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