Proceedings of the United States National Museum

SMITHSONIAN INSTITUTION · WASHINGTON, D.C.

Volume 111 1960 Number 3422

A NEW AMERICAN GENUS OF CRYPTOPID CENTIPEDES, WITH AN ANNOTATED KEY TO THE SCOLOPENDROMORPH GENERA FROM AMERICA NORTH OF MEXICO

By Ralph E. Crabill, Jr.

Of all centipedes perhaps the Scolopendromorpha are the best known, at least at generic and suprageneric levels. This knowledge has come about partly as a result of the availability of large numbers of study specimens drawn very widely from the earth, and partly as a result of the relatively clear-cut, usually well-defined assemblages that we encounter throughout much of the order. In contrast, where our understanding of the suprageneric structure of all other centipedes is faulty or imperfect, the lack of adequate numbers of geographically representative specimens or intrinsic categorical difficulties or both are generally responsible.

The scolopendromorphs that we know best, quite understandably, are the larger forms—the kinds attractive to collectors because they are big, fierce looking, and, in the tropics, abundant; for the most part they are the familiar Scolopendridae. By the same token the ones that we know less well are the smaller, often tiny Cryptopidae. Here I believe much more remains to be learned; as a matter of fact, it is quite reasonable to anticipate the discovery particularly in the New World Tropics and Subtropics of new cryptopid species and new cryptopid supraspecific patterns, the present new genus being one example.

The new form seems most like those presently included under *Kethops*, and yet apparently differs sufficiently to warrant elevation to equivalent generic rank. Admittedly this decision may seem undesirable once the suprageneric structure of the Scolopocryptopinae has been extended and more perfectly delineated; however, at the

time of this writing, certain of the differences distinguishing *Thalkethops grallatrix*, new genus, new species, from the *Kethops* species seem at least qualitatively to justify my action.

Thalkethops and *Kethops* stand alone within the scolopocryptopine constellation in their possession of cryptopiform ultimate legs (see note 1, p. 13) and lack of sclerotized plates or other appurtenances on the anterior prosternal margin (fig. 13). The lack of prehensorial spinous processes of the basal article distinguishes both genera from the two closely allied genera, *Scolopocryptops* and *Dinocryptops* (see note 2, p. 13). They also differ from *Kartops* in lacking prosternal armature. *Newportia* and *Tidops* are readily signalized by their seventh pedal segment spiracles, which *Thalkethops* and *Kethops* lack.

I believe the most striking superficial features of *Thalkethops* are also prominent among the features giving it its generic identity, namely, the extraordinarily long antennal articles (fig. 5), and the long, thin, almost stiltlike legs (hence *grallatrix*, a female stilt walker, see fig. 14). Additional characters of significance are the following: *T. grallatrix:* Tarsi 1–21 each with a nearly complete circumarticular suture (fig. 3), hence each essentially bipartite; sternital cross-sulci and submarginal sulci absent. *Kethops* spp.: Tarsi 1–21 each undivided, not suturate (fig. 12); sternital cross-sulci more or less and submarginal sulci always distinct. Finally, the following characters may prove to differ consistently between the two: *T. grallatrix:* Each first maxillary coxosternum with a thin longitudinal and essentially membranous strip (fig. 7); coxopleural ventral margin without a submarginal sulcus, its edge not reflected to form a low flange. *Kethops* spp.: Each first maxillary coxosternum without a thin membranous strip (at least in *T. euterpe* Crabill); coxopleuron with a submarginal sulcus, with a flangelike reflected edge (at least in *T. euterpe* Crabill and *T. utahensis* (Chamberlin), the genotype).

Several features of *T. grallatrix* suggest adaptation for cave life. The long, light, thin legs seem well suited for swift passage along the cluttered cave floor and over the walls and perhaps along the ceiling. The pale, virtually transparent tergites and appendages may represent a loss of pigmentation such as is well known to occur commonly in many kinds of cavernicoles.

Thalkethops, new genus

Generic diagnosis: Color: Tergites, sternites, and parts of legs mostly translucent, the underying musculature plainly discernible underneath. Antennae, each with 17 articles; each article extraordinarily elongate. Cephalic plate without eyespots or margins; posteromedially with a pair of short, slightly divergent sutures. Maxillae: First, each coxosternum with a weak longitudinal membra-

nous strip; second, its apical claw long and acuminate, its dorsal edge pectinate, its ventral edge undissected. Prehensorial segment: Prosternum with anterior margin plain, without sclerotized ridges or plates; ventrally without, dorsally with a short pair of sinuous chitin-lines. Prehensors: Spinous processes and denticles absent; poison calyx in trochanteroprefemur, robust and elongate; tarsungula of normal size and configuration (as in *Kethops*). Tergites: First with omegoid sutural pattern plus posterior paramedian sutures and anterior cervical suture; 2–22 each with complete paramedian sutures; other sutures absent; 23 without sutures or sulci. Sternites: 1–22 each with a shallow midlongitudinal sulcus; submarginal and cross-sulci both apparently absent. Spiracles: Not operculate; on pedal segments 3, 5, 8, 10, 12, 14, 16, 18, 20, and 22. Legs: 1–21 each long and very thin, each tarsus essentially divided by an incomplete ventrobilateral suture, none with a dorsal condyle; 22 very long and thin, tarsus with a dorsal condyle and completely bipartite; 23 the leg cryptopiform, the tarsus with condyle, the prefemur, femur, tibia, and 1st tarsus each with from one to many ventrally ankylosed mucrones (see note 3, p. 13); the pretarsus unlike those preceding, without accessory claws. Coxopleuron: Porigerous; with a ventroposterior short, thin, acute spinous process.

Type species: *Thalkethops grallatrix*, new species (by present designation and monotypy).

***Thalkethops grallatrix*, new species**

Figures 1–5, 7, 9–11, 13–16

Holotype probably female. New Mexico, Eddy County, Carlsbad Cave (see note 4, p. 14); Dixon Freeland and Thomas Ela, August 31, 1957, USNM 2505.

Body length 34.5 mm. General color: Antennae, head, prehensors, and ultimate legs with associated segment pale yellow; tergites, sternites, and other legs yellowish-white to whitish and translucent to transparent, the underlying musculature plainly disclosed.

Antennae: Each 15 mm. long, each with 17 articles; very pale yellow. From dorsal aspect articles 3–17 conspicuously longer than wide (e.g., 4th, length: width = 3.4 mm.: 1.0 mm.; 10th, l: w = 3.0: 0.6; see figs. 5–6). Articles 1–3 each sparsely clothed with longer setae, 4 partly clothed with finer denser setae, 5–17 densely finely setose.

Cephalic plate: Yellowish, shining, 2.0 mm. long, 2.2 mm. at greatest width; very sparsely invested with minute setae. Posterior corners markedly rounded, sides straight as far as anterolateral angles, thereafter converging to form the anterior apex, the apex centrally indented and bisected by a short distinct suture. Paramedian sutures

distinct, beginning on posterior margin then diverging slightly, the somewhat longer of the two 0.33 mm. long. Cephalic plate without lateral margins.

Clypeus: Deep yellow, sparsely clothed with longer setae. Anterior apex weakly developed. Lateral paraclypeal sutures short, anteriorly incomplete, generally vague.

Labrum: Well separated medially from posterior clypeal margin. Median tooth deeply pigmented, robust, evenly pointed, flanked by heavily sclerotized, deeply pigmented rounded inner shoulders of labral sidepieces. True posterior margins of sidepieces membranous, delicately fimbriulate; beneath (i.e., dorsal to) each the darker heavier portions of each sidepiece are visible. Each sidepiece broadly meeting inner end of its coclypeus. Anterolateral corner of each sidepiece with a minute slitlike opening (of a labral gland?); each sidepiece with a field of microscopic sensory points, each resembling a typical sensillum basiconicum. Anteriorly across entire labrum one well-defined complete and several abortive sclerotic wrinkles (rugae).

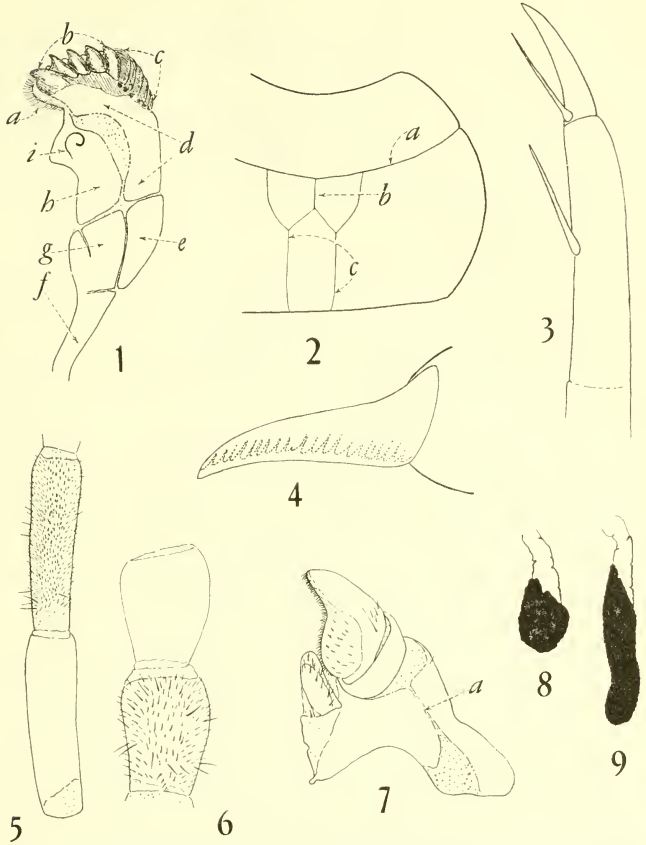
First maxillae: Each coxosternum with a weak longitudinal suture (actually a thin membranous strip).

Second maxillae: Second article with the usual weak dorsodistal spur. Claw long, acuminate, its dorsal edge pectinate, its ventral edge straight, undissected. Dorsal brush dense, beginning at about middle of third article.

Mandible: As shown in figure 1 (see also note 5, p. 14).

Prehensorial segment: Prosternum: Setae sparse, the majority relatively long; surface impressed with numerous microscopic pits each with a sensory point (i.e., each resembling a sensillum basiconicum); ventrally without chitin-lines, dorsally with a pair of short abortive and sinuous chitin-lines (see note 6, p. 14); pleuroprosternal sutures distinct, complete; anterior margin unarmed, without plates or raised sclerotized border, the two sides apparently (but not actually) separated by a midlongitudinal short membranous strip. Prehensors: All articles with numerous sensilla basiconica; none with spinous processes, denticles, or other armature; poison calyx within the trochanteroprefemur, elongate, thick; tarsungula of normal size and configuration (as in *Kethops*, see figs. 8 and 9), evenly curved from base to tip; poison canal aperture dorsal, very long and narrow, its greatest length to width=5:1.

Tergites: First pedal tergite yellowish, with a few larger setae; with a distinct cervical suture to which are attached omegoid (i.e., W-shaped) sutures, their posterior apices continuous with prominent paramedian sutures. Tergites 2–22 whitish and translucent, the posterior border very pale yellowish, the underlying musculature plainly visible, very sparsely clothed with minute setae; each impressed



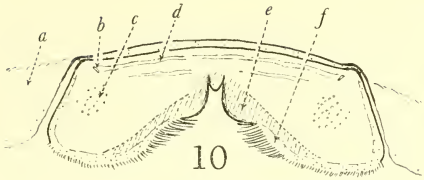
FIGURES 1–9 (unless otherwise stated, the following depict parts of *Thalkethops grallatrix*, holotype).—1, Right mandible, outer surface (see note 5): *a*, pulvillus; *b*, teeth; *c*, sickle bristles; *d*, lamina dentifera; *e*, lamina triangularis; *f*, manubrium; *g*, lamina manubrii; *h*, lamina condylifera; *i*, condylus or condyle. 2, First pedal tergite, dorsal (setae omitted): *a*, cervical suture; *b*, omegoid or W-shaped sutural pattern; *c*, paramedian sutures. 3, Distotarsus and pretarsus of tenth leg (setae omitted). 4, Second maxillary claw, left, ventral aspect. 5, Fourth (lower) and 5th (upper) antennal articles, left, (setae of 5th shown, of 4th omitted). 6, *Kethops euterpe* Crabill, type, 4th (lower) and 5th (upper) antennal articles, right (setae of 4th shown, those of 5th omitted). 7, First maxilla, left, ventral aspect (all setae shown): *a*, weak membranous strip. 8, *Kethops euterpe* Crabill, Right poison calyx (black) with its duct (outlined). 9, Right poison calyx (black) with its duct (outlined).

longitudinally with two distinct paramedian sutures; each with a pair of broad very shallow longitudinal submarginal troughs or sulci ectal to the aforementioned paramedian sutures, the sulci delineating very weakly defined atypical tergital margins on about 3 or 4 through 22.

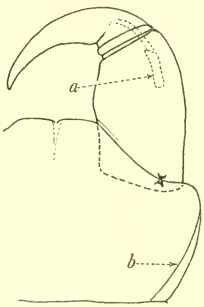
Sternites 1–22: Each whitish and translucent, the underlying musculature visible; setae extremely sparse and minute. Each longer than wide. Each with a shallow midlongitudinal and rather broad sulcus, these best seen on 1 through 20 or so, thereafter evanescent, barely discernible on 20 and 21; cross-sulci apparently absent; submarginal sulci absent.

Spiracles: Present on pedal segments 3, 5, 8, 10, 12, 14, 16, 18, 20, and 22 (see note 2, p. 13). Legs 1–22 whitish to dilute yellowish-white; setae tiny and sparse except on prefemora and femora, which have a few more robust and deeply colored setae. Legs 1–21 each thin and relatively very long (10th leg not including trochanter and pretarsus, 6.17 mm.; 1st tarsus (1.17 mm.)+2d tarsus (0.57 mm.)> tibia (1.57 mm.)> prefemur (1.53 mm.)>femur (1.33 mm.)); a pale suture incomplete only dorsally indistinctly dividing each tarsus into a longer very slightly thicker proximotarsus and a shorter very slightly thinner distotarsus; dorsal condyles absent on 1–21; each pretarsus with 2 very long thin accessory claws (actually spurs ankylosed to base of pretarsus). Legpair 22: Tarsus completely divided, with a prominent pigmented dorsal condyle; slightly longer than preceding legs, otherwise not differing significantly. Prectrotaxy: VTaM=1–21, VTiM=1–22, DTiA=1–21; pretarsal accessories=1–22.

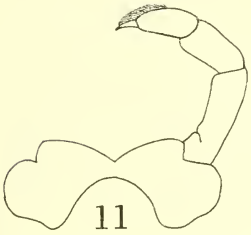
Ultimate pedal segment and legs: Tergite yellowish, opaque, with about 20 scattered setae; without sutures or sulci; slightly longer than wide, posterior margin evenly bowed outward, the apex round and broad; side abruptly reflected upward on each side to form a flange with the contingent upper coxopleural margin. Coxopleuron yellowish-white, opaque; with a few stout setae; porigerous area without setae reaching anterior margin but separated from dorsal margin by a narrow strip, posteriorly sloping ventrally to posterior and ventral margins, pores small, numbering at least 100 on each side; ventrolateral margin not reflected into a flange, not submarginally sulcate; each coxopleural spinous process very thin, almost ensiform, between ⅓ and ¼ as long as posterior margin is high, tipped with a black point and 2 delicate setae, its shaft ventrally with 2 stout setae; the ventral edges of the 2 coxopleura contiguous for nearly their entire lengths. Ultimate legs: Right (left abnormal), excluding pretarsus, 6.0 mm. long (i.e., prefemur+trochanter=1.80 mm., femur=1.50 mm., tibia=1.27 mm., 1st tarsus=0.60 mm., 2d tarsus=0.83 mm.); yellow and opaque; trochanter nearly completely amalgamated with prefemur, the latter very slightly flattened dorsally, the remaining articles dorsally



10

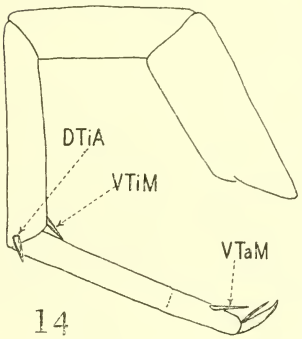


13

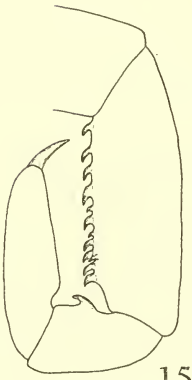


11

12



14



15

FIGURES 10–15 (unless otherwise stated, the following depict parts of *Thalkethops grallatrix*, holotype).—10, Labrum, ventral aspect: *a*, coclypeus; *b*, slitlike opening; *c*, field of sensilla basiconica; *d*, translabral rugae; *e*, solid, pigmented underlying portion; *f*, hyaline, fimbriulate posterior border of labrum. 11, Second maxillae (all setae omitted). 12, *Kethops euterpe* Crabill, 10th leg, anterolateral surface (setae omitted). 13, Prosternum and left prehensor, ventral aspect (setae omitted): *a*, poison calyx; *b*, pleuroprosternal suture. 14, Tenth leg, anterolateral surface, showing serial spurs and their formulae (setae omitted). 15, Ultimate right leg, inner surface (setae omitted), showing pigmented mucrones.

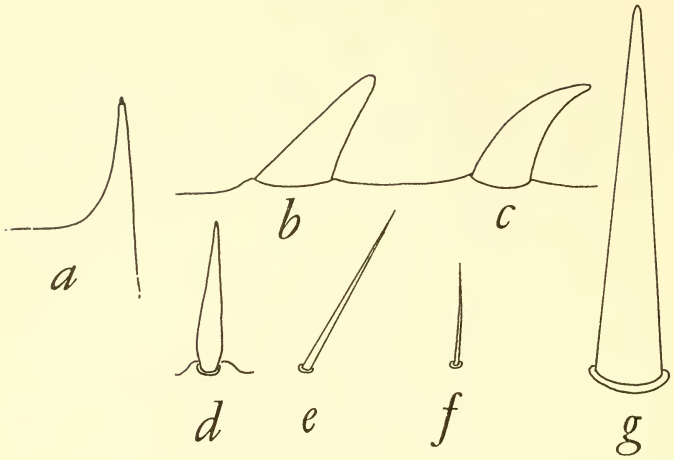


FIGURE 16.—*Thalkethops grallatrix*, holotype: *a*, typical spine, the spinous process arming the coxopleuron of *grallatrix; b*, a straight mucro; *c*, a curved mucro; *d*, a lanceolate setae; *e, f* typical setae; *g*, a typical leg spur or calcar.

rounded; all articles finely dorsally setose; prefemur on each side with sparse stout lanceolate (see note 3, p. 13) setae, ventrally with a linear series of 7 short stout and pointed ankylosed mucrones (see note 3, p. 13) and a few scattered fine setae; femur ventrally with 12 ankylosed mucrones, its sides with lanceolate setae; tibia ventrally with a row of 11 mucrones, without lanceolate setae, subdensely with long fine setae; first tarsus ventrally with one hooked firmly ankylosed (nearly spiniform) mucro; second tarsus proximoventrally excavate, without mucrones or lanceolate setae, with numerous long fine setae; pretarsus long, thin and curved, without accessory claws.

Key to the Scolopendromorph Genera of America North of Mexico

The key given below should facilitate the identification of all scolopendromorph genera and obligate higher categories presently known to be represented in America north of Mexico.[1] In addition, I have included and identified by daggers (†) those few genera common to adjacent regions to the south, chiefly Mexico, whose presence within our area may eventually be demonstrated. Following the

[1] Since the preparation of this manuscript Professor Chamberlin has written me of his discovery of a new Californian *Ethmostigmus;* this is the first record of the genus in North America. At the time of this writing his description of the new species was not published.

key, the North American distribution of each genus is briefly summarized, and mention is made of the more important species. To the best of my knowledge, a similar treatment devoted to the genera represented in North America has not appeared in print since 1893, a span of years characterized by the steady accumulation of distributional information as well as by significant revisionary activity.

1*a*. With four ocelli on each side of the cephalic plate . . SCOLOPENDRIDAE (2)
1*b*. Without ocelli, the ocellar positions either concolorous with the remainder of the cephalic plate or unpigmented and contrasting with the deeply colored environs . . . . . CRYPTOPIDAE (3)
2*a*. Spiracles operculate, i.e., each divided into an inner and an outer atrium by an internal and essentially tripartite valve . . . SCOLOPENDRINAE (5)
2*b*. Spiracles not operculate, i.e., each spiracular atrium fully exposed, none with an internal valvular partition . . . . . OTOSTIGMINAE (7)
3*a*. With 21 pairs of legs and pedal segments 4
3*b*. With 23 pairs of legs and pedal segments . . . . SCOLOPOCRYPTOPINAE (8)
4*a*. Anterior margin of prosternum with a pair of elongate, coarsely toothed plates. Cephalic plate with prominent eyespots in the ocellar positions. Ultimate pedal segment conspicuously elongate; ultimate legs extremely heavy, robust . . . . . THEATOPINAE, genus **Theatops**
4*b*. Anterior margin of prosternum without such toothed plates. Cephalic plate without eyespots. Ultimate pedal segment of normal proportions. Ultimate legs only slightly heavier than penults . . . CRYPTOPINAE (12)
5*a*. First or proximotarsi of the first 15 to 20 pairs of legs each with a prominent ventrodistal spur 6
5*b*. No proximotarsus with a ventrodistal spur . . . . Genus **Hemiscolopendra**
6*a*. Ultimate pretarsus basally with two accessory claws . . Genus **Scolopendra**
6*b*. Ultimate pretarsus without accessory claws . . . . Genus **Arthrorhabdus**
7*a*. Seventh pedal segment without a pair of spiracles . Genus **Otostigmus** †
7*b*. Seventh pedal segment with a pair of spiracles. Trochanteroprefemur of prehensor with a prominent inner spinous process. . . . . Genus **Rhysida**
7*c*. Seventh pedal segment with a pair of spiracles. Trochanteroprefemur of prehensor without an inner spinous process . . . Genus **Ethomostigmus** †
8*a*. Seventh pedal segment with a pair of spiracles (see note 2, p. 13). Ultimate second tarsus either subdivided into many pseudosegments or undivided 9
8*b*. Seventh pedal segment normally without a pair of spiracles. Ultimate second tarsus undivided 10
9*a*. First pedal tergite often with an omegoid sutural pattern, always with posterior paramedian sutures, complete or abortive. Ultimate second tarsus divided into pseudosegments . . . . . Genus **Newportia** †
9*b*. First pedal tergite never with an omegoid sutural pattern, normally without paramedian sutures or fragments thereof. Ultimate second Tarsus undivided . . . . . Genus **Dinocryptops** (formerly *Scolopocryptops*; see note 2, p. 13)
10*a*. Prosternal anterior margin with a pair of low dark, heavily sclerotized ridges. Trochanteroprefemur distally with a prominent inner spinous process . . . . . Genus **Scolopocryptops** (formerly *Otocryptops*; see note 2, p. 13)
10*b*. Prosternal anterior margin unadorned, without dark, well sclerotized ridges. Trochanteroprefemur without an inner distal spinous process 11

505109—59——2

11*a*. Legs 1–21 each without trace of tarsal division. Sternital cross-sulci usually apparent; submarginal sulci typically pronounced.
Genus **Kethops**

11*b*. Legs 1–21 each with a tarsal suture delineating a proximotarsus and a distotarsus. Sternital cross-sulci absent; submarginal sulci absent.
Thalkethops, new genus

12*a*. Each coxopleuron with a prominent ventroposterior spinous process.
Genus **Anethops**

12*b*. Each coxopleuron without such a process, its posterior border essentially straight. . . . . Genus **Cryptops**

Distribution of Genera

Scolopendridae

Scolopendra: There are apparently fewer than half a dozen species in North America; of them three are quite common, viz, *viridis* Say, in the Southeastern Atlantic, South-Central, and apparently in some Western States; *polymorpha* Wood, in the States west of Missouri; *heros* Girard, throughout most of the Southern States across the continent. In addition, a number of Tropical or Pantropical species are frequently intercepted at seaports; e.g., *alternans* Leach, *subspinipes* Leach, and *morsitans* Linné; none is known to be established within North America. In general, distribution of the genus in North America is different east and west of about long. 95° W., as follows: East of long. 95° W., from the gulf coast north into southern Missouri, Illinois, and Kentucky (*heros* and *viridis*), up the Atlantic Coastal States from Florida as far north as southern Virginia (*viridis*); west of long. 95° W., throughout the Southwest (*heros*, *polymorpha*, and perhaps *viridis*), up the Pacific Coastal States as far north as Washington (*polymorpha* and *heros* extending evidently only into California and Utah), throughout all but the most northern Montane and Plains States (*polymorpha* and possibly *heros*). Both *heros* and *polymorpha* have been reported from Mexico, but whether the true *viridis* occurs there, in my opinion, remains to be settled.

Arthrorhabdus: One species, *pygmaeus* (Pocock), has been recorded infrequently from New Mexico, Texas, and Arizona. It undoubtedly also inhabits adjacent Mexico.

Hemiscolopendra: Only *punctiventris* (Newport) [=*Cormocephalus* (*H.*) *punctiventris* (Newport) of authors] is believed to inhabit North America. Quite common east of the 95th meridian, viz, from just south of the Great Lakes to the gulf coast and Southeastern Atlantic States where it is extremely prevalent, on the Atlantic coastal plain northward into Virginia, Pennsylvania, New York, and New England; not known to occur west of about long. 95° W., in the United States.

Otostigmus: This genus is common to all Tropical and most

Subtropical lands including America south of the United States. Its species can be expected at seaports, and probably one or more Mexican forms presently undetected have established themselves in our extreme Southwest.

Rhysida: A common Neotropical genus, *Rhysida* is represented in the United States by at least one possibly established species, *longipes* (Newport), discovered recently in southern Florida (Chamberlin, 1958, p. 14). Others may eventually be found in the Southwest. The report of *celeris* (Humboldt and Saussure) in Georgia given by Kraepelin (1902, p. 150) and repeated by Attems (1930, p. 189) has not been corroborated by subsequent collections. My own suspicion is that the species is not established in inland Georgia at the present time.

CRYPTOPIDAE

Theatops: Four species are known to occur in North America: *T. californiensis* Chamberlin (?=*erythrocephala* (Koch)), California and Oregon; *phana* Chamberlin, Texas; *spinicauda* (Wood), Mexico and California in the West, in the East from northern Missouri and Illinois south to the Gulf States, north through the Carolinas, continuing up the coastal plain probably as far as extreme southern Pennsylvania; and *postica* (Say), recorded sporadically from Utah and Arizona, in the East a very common and widespread centipede, viz, southern Illinois to Ohio, south to the Gulf States, and north to northern Virginia. In general, the western distribution of the genus is poorly known, but east of the Plains States *postica* and *spinicauda* have been reported from numerous localities, viz, very common in the Southeastern Atlantic States, both extending northward to south of the Great Lakes and well up the Atlantic coastal plain; not known to occur in New York and New England.

Newportia: Abundantly represented in the American Tropics, this genus is as yet unrecorded from the United States; however, its presence in the Southwest near Mexico is a possibility.

Dinocryptops (formerly *Scolopocryptops*, see Crabill, 1953, p. 96): *D. miersii* (Newport), a common Neotropical species, has been linked several times with areas in the United States, principally California and the Southeastern Atlantic States (Attems, 1930, p. 256, and Kraepelin, 1902, p. 78). Chamberlin (1911, p. 475), probably following Kraepelin, reported: "Doubtfully recorded from California. However it is widespread in the Southeastern States and through Mexico." Despite these reports I have yet to see a single North American specimen, so that everything considered, I am inclined to doubt the presence of established populations in the Southeastern Atlantic States. At the same time it seems not unreasonable to anticipate finding, say, *miersii* in the Southwest near Mexico.

Scolopocryptops (formerly *Otocryptops*, see Crabill, 1953, p. 96): Represented by at least five species, it is the most widespread scolopendromorph genus of North America; east of the Mississippi its members are among the most commonly-encountered centipedes. Indeed, in the East from Massachusetts to the Gulf of Mexico, one can hardly overturn many logs and rocks without discovering specimens of the large orange or red-orange *sexspinosa*. Again, we do not know much about the genus in the Far West; viz, *gracilis* Wood is common in California but has also been reported from Texas, while a presumed subspecies, *g. peregrinator* (Crabill) (1952, p. 124), is common in montane Virginia and has been taken in Maryland and Pennsylvania; *munda* Chamberlin, is known only from Kendrick, Idaho (possibly an intraspecific variant of *gracilis*); *sexspinosa* (Say) is the commonest eastern species, but west of the Rocky Mountains it is known from Alaska, Vancouver Island, all of the Pacific Coastal States and from Mexico. East of the Rocky Mountains recorded distributions are more complete: *S. sexspinosa* (Say), the dominant form, is known to range from the North Central States south to the Gulf of Mexico and east to the Atlantic coast, thence north to Massachusetts; *rubiginosa* L. Koch is common in the midcontinent, from Kansas and Missouri east to Ohio, north through Minnesota and Wisconsin, and undoubtedly inhabits adjacent Canada as well; *nigridia* McNeill is apparently entirely eastern, its known range extending from and including Alabama north into Indiana, east of the Appalachians where it is extremely common northward into eastern Pennsylvania.

Kethops: Recorded from Utah, New Mexico, Arizona, and adjacent Mexico. The geography of the genus is known almost entirely from the type localities of its four species.

Thalkethops, new genus: Known only from Carlsbad Caverns in southeastern New Mexico.

Anethops: Only the rare Californian *occidentalis* Chamberlin has been described.

Cryptops: A number of foreign species have been detected within North America; one of them, the European *hortensis* Leach, is definitely known to be established in the Northeast and in Utah. It is undoubtedly more widespread than we now know. Of our half dozen or so species, *hyalina* Say occurs widely, at least east of the Plains States. It appears to be common throughout the Midwestern, Southeastern Atlantic, and Northeastern Atlantic United States, its known range stopping just short of New England (in whose temperate coastal areas it and *hortensis* undoubtedly occur). There is some evidence that *hyalina* may be either polytypic or reducible to several species. In general one may postulate *Cryptops* to occur throughout all but the extreme northern United States.

Supplementary Notes

1. Unfortunately, the ultimate legs of the British Guianan *Kartops* have never been described. "Cryptopiform," a new term, is used here to describe the recurrent type of ultimate leg seen in the genus *Cryptops* and characterized by the possession of an opposable second tarsus capable of being flexed against the first tarsus and lower tibia to form a clasping apparatus.

2. For a clarification of the correct allocation of *Scolopocryptops* (formerly *Otocryptops*) and *Dinocryptops* (formerly *Scolopocryptops*), the reader is referred to Crabill, 1953, p. 96. Careful examination discloses that members of the two genera are very similar save in one striking particular, the presence in *Dinocryptops* and the absence in *Scolopocryptops* of seventh pedal segment spiracles. Nonetheless, I believe them to be more closely related to each other than either of them is to any other scolopocryptopine genus now known. The loss of spiracles among the scolopendromorph genera is like the loss of primary tarsal division among certain genera and species, or like the variation in the Lithobiomorpha in tergital production. All are changes that may proceed independently within quite different evolving lines. So it is that we encounter all states of tarsal change both within the Scolopendromorpha and Lithobiomorpha. For the same reason we find both spiracular conditions (seventh segment spiracles present or absent) in both great divisions of the Scolopendromorpha. As is well known, considerable variability in this character is also seen in the lithobiomorphous Henicopidae. I believe, therefore, that these changes are taking place repeatedly in parallel fashion independently within different phyletic lines. I am less certain of their direction, though the evidence suggests that the trend is toward spiracular loss, tarsal consolidation (the bipartite tarsus becoming undivided), and in the Lithobiomorpha toward the secondary loss of tergital corners—these changes appearing concomitantly with progressive body contraction and consolidation.

3. To insure our understanding one another, I feel that it is most desirable to establish a uniform terminology for the setae, spines, spurs, and other armature of the centipede leg and body sclerite. For instance, the word spine as it is currently used in the literature often refers to a variety of structures among which it is obviously desirable to distinguish. Equally if not more confusing is the ruck of German terms that one must depend upon in the great monographs—Sporne, Höcker, Spinen, Zapfen, Borsten, Sägezähne, and Dornen—all of which when unqualified or when used differently upon different occasions lead to much misunderstanding and confusion. The terminology that I have adopted and used consistently for some years is based upon the definitions of Professor Comstock (1940, p. 32) and

of the eminent insect morphologist Dr. R. E. Snodgrass (1935, ch. 3), and may be summarized as follows: A spur or calcar is a movable multicellular outgrowth connected by a joint to the exoskeleton. A seta is a movable unicellular outgrowth connected to the exoskeleton by a joint. In contrast a spine is an immovable multicellular outgrowth of the exoskeleton but not connected to it by a joint (i.e., not arising from a socket or alveolus). In figure 16*a*, we see a typical spine—the coxopleural spinous process of *T. grallatrix*—multicellular and immovably attached to the exoskeleton. In figure 16, *d–g* are all movably attached and are fundamentally setiform structures; *d–g* are setae of various sorts, *e* and *f* being typical setae and *d* being a modified seta here for the sake of convenience termed a lanceolate seta; *b* and *c* though immovably attached to the exoskeleton and though apparently spinous are in reality spurs or setal derivatives as is shown by their vestigial alveoli. Thus, *b* and *c* are secondarily ankylosed setae, to which for convenience and clarity I have applied the new term "mucro" (pl. "mucrones"); *g* is a spur or calcar such as is typical of distal pedal positions.

4. Carlsbad Caverns, the subject of an interesting book on its fauna by Vernon Bailey in 1928, are situated in the desert of the Pecos River Valley of southeastern New Mexico and is maintained by the National Park Service. I should like to take this opportunity to express my gratitude to Chief Ranger Tom Ela and Ranger Dixon Freeland, the collectors, and to Dr. Thomas C. Barr of Tennessee Polytechnic Institute, who transmitted the specimen to me for examination.

5. The mandibular differences distinguishing the geophilomorph families or family-groups have been well known and used for over half a century, but the application of mandibular criteria in other orders, particularly in Scolopendromorpha, has been generally slighted except perhaps by the late Karl W. Verhoeff, the first person to study the mandible with any precision and from the standpoint of comparative morphology (see Verhoeff, 1918, pp. 467–532). Verhoeff extended study beyond the examination of the masticatory surface and thereby prepared the way for future investigations, which I believe may reveal the scolopendromorph mandible to possess adjuvant higher categorical characters heretofore unsuspected. Verhoeff's designation in German of previously unnamed and obscure mandibular parts has perhaps compromised the adoption or even the study of his work. Obscure parts without ready interlinguistic cognates should, I feel, be expressed in an international idiom, preferably in classical terms or at least in approximate classical derivatives. While terms like head, Zähne, back, foot, bouche, yeux, etc., are readily understood and translatable by anyone, the correct, consistent application of, e.g.,

Polster, Dreieck, and Zapfenstück, are not. The following new terms are intended to replace their original German counterparts, which are given in parentheses, the new terms being for the most part closely synonymous; since teeth and sickle bristles are self-explanatory in whatever language they are rendered, they are given below in English and German: a=pulvillus (Polster); b=teeth (Beisszähne); c=sickle bristles (Sickelborsten); d=lamina dentifera (Zahnstück); e=lamina triangularis (Dreieck); f=manubrium (Schaft); g=lamina manubrii (Schaftplatte); h=lamina condylifera (Zapfenstück); i=condylus or condyle (Drehzapfen).

6. Heretofore by "chitin-lines" authors have referred to ventral thin pigmented sutures or ridges, one passing anteriorly toward the condyle on each side of the prosternum, but here I refer to a new character dependent upon their dorsal homologues. The suture ectal to each chitin-line is usually called the coxopleural suture, a confusing designation since the coxopleuron is at the rear of the body. To avoid ambiguity and confusion, I propose a surrogate expression—pleuroprosternal suture.

References

Attems, Carl Graf von

1930. Scolopendromorpha. Das Tierreich, Lief. 54, pp. 1–308.

Bailey, Vernon.

1928. Animal life of the Carlsbad Cavern. Monogr. Amer. Soc. Mammologists, No. 3, pp. 1–195.

Chamberlin, Ralph V.

1911. The Chilopoda of California II. Pomona Coll. Journ. Ent., vol. 3, No. 2, pp. 470–479.

1958. Some records of Chilopoda from Florida. Ent. News, vol. 69, No. 1, pp. 13–14.

Comstock, John H.

1940. An introduction to entomology, ed. 9.

Crabill, Ralph E., Jr.

1952. A new subspecies of *Otocryptops gracilis* (Wood) from the Eastern United States, together with remarks on the status of *Otocryptops nigridius* (McNeill) and a key to the species of the genus now known to occur east of the Rocky Mountains. Ent. News, vol. 63, No. 5, pp. 123–129.

1953. Concerning a new genus *Dinocryptops* and the nomenclatorial status of *Otocryptops* and *Scolopocryptops*. Ent. News, vol. 64, No. 4, p. 96.

1955. On the reappearance of a possible ancestral characteristic in a modern chilopod. Bull. Brooklyn Ent. Soc., vol. 50, No. 5, pp. 133–136.

Kraepelin, Karl.

1902. Revision der Scolopendriden. Mitt. Naturh. Mus. Hamburg, vol. 20, pp. 1–276.

Snodgrass, Robert E.

1935. Principles of insect morphology, ed. 1.

Verhoeff, Karl W.

1918. Section from "Chilopoda," *in* Bronns, Die Klassen und Ordnungen des Thier-Reichs, Band 5, Abt. II, Lief. 92–99, pp. 467–532.

U. S. GOVERNMENT PRINTING OFFICE: 1959