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NEW AND LITTLE-KNOWN FALSE SCORPIONS FROM VARIOUS PARTS OF THE WORLD (ARACHNIDA, CHELONETHIDA), WITH NOTES ON STRUCTURAL ABNORMALITIES IN TWO SPECIES

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This paper is a report on miscellaneous new and little-known species of false scorpions, mostly of the subfamily Cheliferinae, which the author accumulated over a period of several years. These specimens are from California, Virginia, Florida, Africa, Crimea, Tibet, India, Australia, and New Zealand. It was originally intended to incorporate these descriptions in various revisional studies. Since these revisions will be long deferred, it seems best to publish the descriptions at this time in order to validate important names and to correct certain errors. Acknowledgments are made under the various specific headings.

Some structural abnormalities are noted in connection with *Synsphyronus mimetus* Chamberlin and *Xenochelifer davidi*, new genus and species.

All types, unless otherwise specified, are in the collections of the American Museum of Natural History.

All microscopic slides bearing types, important specimens, or other preparations are marked distinctively with the slide numbers of the author (for example, JC-1731.02001), which follow citation of such specimens.

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SUBORDER HETEROSPHYRONIDA CHAMBERLIN

FAMILY CHTHONIIDAE HANSEN

Chthonius (Ephippiochthonius) californicus J. C. Chamberlin

Figure 1

Chthonius californicus J. C. CHAMBERLIN, 1929, Ann. Mag. Nat. Hist., ser. 10, vol. 4, p. 74; 1931, Stanford Univ. Publ., Univ. Ser., Biol. Sci., vol. 7, no. 1, p. 50, fig. 9B (carapace).

Chthonius (Ephippiochthonius) californicus J. C. Chamberlin, BEIER, 1932, Das Tierreich, vol. 57, p. 57.

MATERIAL: Male holotype (JC-66.01001) and female allotype (JC-66.01002), collected at Berkeley, California, January, 1920. Also one additional female (JC-323.01001) collected by P. N. Annand at base of cypress tree, Half Moon Bay, San Mateo County, California, January 20, 1925. Types deposited in Cornell University collections.

DIAGNOSIS (EMENDED): Carapace subquadrate of typical facies; smooth; with four relatively small eyes, the anterior pair of which are corneate and spaced about an ocular diameter from the anterior carapacial margin and from the posterior pair of eyes, respectively; chaetotaxy 4-2 (18).

Abdomen of typical facies; tergal chaetotaxy (female; segments 1-12), 4:4:4:4:6:6:6:6:6:4:6:0. Sternal chaetotaxy (female; segments 3-12), 9:7:9:7:6:6:6:7:0:2. The anterior genital operculum of the female (sternites 1 and 2) with eight setae, of which six are ranged, three on a side, to form an inverted "V," while the remaining two are paired therein. The internal lateral genital guard setae of the male are longitudinally divided on either side into two groups of two setae each, separated by a non-setose hiatus (in the holotype, at least).

Chelicerae (fig. 1C) typically with seven setae on palm (two lateral subbasal and one sublateral median accessory setae); spinneret present as a sclerotic protuberance.

Palps of normal appearance; chela (fig. 1A) with the typical ephippiochthoniine dorsal depression distad on the tactile setae of the hand; derm smooth. Fixed finger of chela with about 11 to 13 prominent and well-spaced teeth distally and about the same number of small, rounded, contiguous teeth proximally; movable finger with six to eight prominent, spaced teeth distally and 15 to 18 small, rounded, contiguous teeth proximally (fig. 1B).

Palpal proportions: trochanter 1.6 to 1.8 times as long as broad; femur 4.85 (in male) and 5.0 to 5.2 (in the female) times as long as

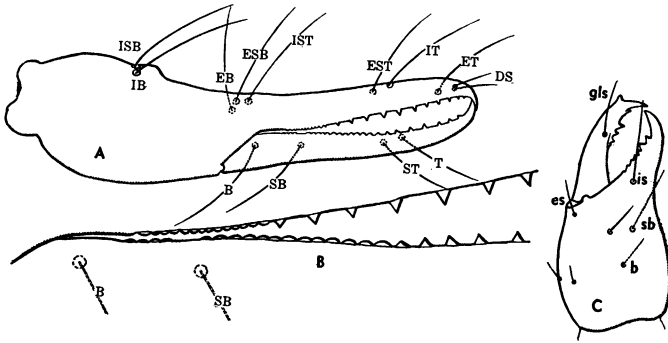


FIG. 1. *Chthonius* (*Ephippiochthonius*) *californicus* Chamberlin (all illustrations from female JC-323.01001). A. Interior aspect of left chela. B. Dental margin of fixed (upper) and movable (lower) fingers of chela showing detail of basal dentition. C. Exterior aspect of left chelicera.

broad; tibia 1.8 to 1.9 times as long as broad; chela 5.0 (in the male) and 3.9 (in the female) times as long as broad; hand 2.07 (in the male) and 1.6 to 1.7 (in the female) times as long as broad; finger 1.3 to 1.4 times as long as the hand in both sexes. Chela (both sexes) 1.3 to 1.5 times as long as femur and 3.2 to 3.3 times as long as tibia.

Miofemur of leg IV (female only; male not known), 2.2 times as long as deep; tibia 3.6 to 3.7 times as long as deep.

MEASUREMENTS (MM.): Male (holotype): Total length exclusive of chelicerae 1.21. Carapace .359 long; chelicerae .261 by .140. Palps: trochanter .149 by .084; femur .448 by .092; tibia .196 by .104; chela .653 by .131; hand .271 long; finger .383 long; total length of palps 1.446.

Female (allotype): Total length 1.36. Palps: trochanter .168 by .103; femur .522 by .103; tibia .224 by .121; chela .718 by .183; hand .299 long; fingers .420 long; total length of palps 1.632 mm.

Female (JC-323.01001): Total length 1.44. Carapace .426 long; chelicerae .344 by .167. Palps: trochanter .170 by .103; femur .553 by .107 \pm ; tibia .221 by .125; chela .731 by .189 \pm ; hand .317 long; fingers .421 long; total length palp 1.675. Leg I: basifemur .303 by .073; telofemur .139 by .062; tibia .182 by .048; miotarsus .325 by .037; total length (excluding coxa and trochanter) .949. Leg IV: miofemur .503 by .230; tibia .343 by .094; metatarsus .177 by .070; telotarsus .325 by .037; total length (excluding coxa and trochanter) 1.348.

REMARKS: The holotype and allotype of this species are no longer available for study, and this redescription is based upon brief unpublished notes taken on these specimens and on the single additional female studied since the original description was prepared. This specimen was compared closely with the allotype in 1928, when it was noted that "it differs by its greater size and more acutely shouldered femur. Otherwise typical."

The apparent depression in which IB and ISB occur, as shown in figure 1A, may not be accurate. The chela in question was treated with KOH and may merely be slightly shrunken at this point. The illustration of the carapace published in 1931 omits the interocular seta evident in the female now before me. It was probably broken from the original specimen and hence escaped observation. Or it may possibly be truly absent, a point which cannot at present be checked. The measurements of total length as given in the original description are in error. The true lengths are as given herein.

KLEPTOCHTHONIUS, NEW GENUS

Heterochthonius J. C. CHAMBERLIN, 1929, Canadian Ent., vol. 61, p. 153 (original diagnosis as a subgenus of *Apochthonius*). BEIER, 1932, Das Tierreich, vol. 57, p. 42 (maintained as a subgenus of *Apochthonius*). HOFF, 1945, Trans. Amer. Micros. Soc., vol. 64, no. 4, pp. 313-314 (revised diagnosis; group regarded as of full generic rank).

GENEROTYPE (ORTHOTYPE): *Apochthonius* (*Heterochthonius*) *crobyi* J. C. Chamberlin.

REMARKS: *Kleptochthonius* is proposed to replace the name *Heterochthonius* J. C. Chamberlin, which was described in 1929 as a subgenus of *Apochthonius*. *Heterochthonius* Chamberlin, 1929, is a homonym of *Heterochthonius* Berlese, who employed the name in 1910 for a genus of oribatid mites (see Ewing, 1917, Ann. Ent. Soc. Amer., vol. 10, p. 125).

Chamberlin's diagnosis of 1929 as modified by Hoff's revision of 1945 for *Heterochthonius* will define the genus.

SUBORDER DIPLOSPHYRONIDA CHAMBERLIN

FAMILY GARYPIDAE HANSEN

Synphyronus (*Synphyronus*) *mimetis* J. C. Chamberlin

Figure 2

Synsphyronus paradoxus TUBB (*nec* Chamberlin; misdet.), 1937, Proc. Roy. Soc. Victoria, new ser., vol. 49, no. 2, p. 412.

Synsphyronus (*Synsphyronus*) *mimetus* J. C. CHAMBERLIN, 1943, Ent. Soc. Amer. Ann., vol. 36, pp. 492-496, figs. 3 (eyes), 6 (carapace and anterior tergites), 8 (pseudoderm), 10 (flagellum), 11 (chelicera), 12 (leg IV), 15 (leg I), 18 and 20 (fourth tarsus), 22 (chela), 25 and 27 (female and male palps).

MATERIAL: Through the courtesy of Dr. J. A. Tubb I have been privileged to examine four males and one female (JC-1602.01001-5) of this species collected by him on Lady Julia Percy Island, Australia, in January, 1936. It was stated to be the commonest species on the island. These specimens were erroneously determined and recorded by Tubb as *Synsphyronus paradoxus* Chamberlin.

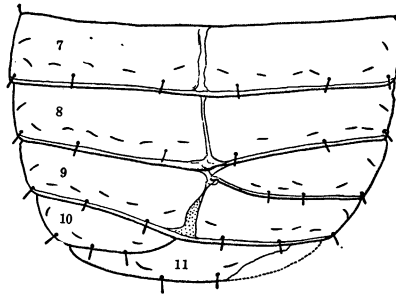


FIG. 2. *Synsphyronus* (*Synsphyronus*) *mimetus* Chamberlin. Tip of abdomen showing abnormal tergal segmentation (specimen JC-1602.01005).

REMARKS: One of the male specimens (JC-1602.01005) in the above lot shows an interesting segmental abnormality involving tergites 8, 9, and 10, but not the corresponding ventral segmentation, which is completely normal. Essentially, it appears that tergite 9 obliquely bisects tergite 10, so that the right half of tergite 9 is caudad of 10, while the left half of tergite 9 is situated normally with respect to 10. This oblique position of tergite 9 causes the two scuta of tergite 10 to narrow rapidly mesally, finally pinching out entirely medially. The abnormality also causes a slight distortion in tergite 8, the left scutum of which is slightly but distinctly broader than the right. The undivided tergite 11 is nearly normal, but is also affected to some extent, being somewhat better developed on the right than on the left side. Figure 2 graphically shows the nature of this interesting abnormality.

SUBORDER MONOPHYRYONIDA CHAMBERLIN

FAMILY **CERNETIDAE** MENGE**PHOBEROCHEIRUS**, NEW GENUS

GENEROTYPE (ORTHOTYPE): *Phoberocheirus cribellus*, new species.

DISTRIBUTION: United States of America, North Carolina.

DIAGNOSIS: (Based on male only; female unknown.) Chernetine genus related to *Dendrochernes* and *Pachycheirus*.

Carapace and basal palpal segments more or less granulate; vestitural setae thickened to strongly denticuloclavate on dorsal surfaces of body and appendages (fig. 3C, D, E). Completely eyeless, but weakly defined eye spots present; carapace somewhat longer than broad, with two well-defined transverse furrows. Abdomen broad, subovate, tergites with intersegmental and inter-scutal membranes prominent and papillate, merging gradually into the squamose tessellations of the scuta proper; tergites and sternites uniseriate (except for the usual lateral discal setae) and bordered by 18 to 20 setae, which are strongly clavate dorsally (fig. 3E) and acuminate ventrally; pleural membrane hispidously papillate; tergites 1 to 10 and sternites 4 to 10 divided into scuta by a comparatively broad membranous stripe; tergite and sternite 11 entire, reduced, and each more or less fitted into the concavity of the recurved tenth segment; sternite 11 (and probably tergite 11 also) with a lateral pair of acuminate tactile setae.

Chelicerae small; flagellum with four blades, of which the anteriormost only is anteriorly denticulate (fig. 3G); chaetotaxy of palm normal, with setae *sb* and *b* both relatively short, robust, and completely acuminate.

Palps probably strongly differentiated sexually; those of male extremely robust (fig. 3A). Chela with an enormously expanded hand which bears interiorly a large area of densely clustered sense spots which occupies the distal half of the hand (fig. 3J). Chaetotaxy and dentition of chela as illustrated (fig. 3B). Movable finger with ST and T closely associated, distad of nodus ramosus and widely separated from SB and B, with a slender pseudotactile seta ventrad of and median between ST and T. Fixed finger with IT subterminal and about as far proximad of ET as IST is distad of EST; IT closer to ET than to IST; accessory teeth occur paradentally exteriorly and interiorly.

Legs of usual facies; fourth tarsus (fig. 3F) with a dorsal sub-basal sense dome and a short but acuminate pseudotactile seta

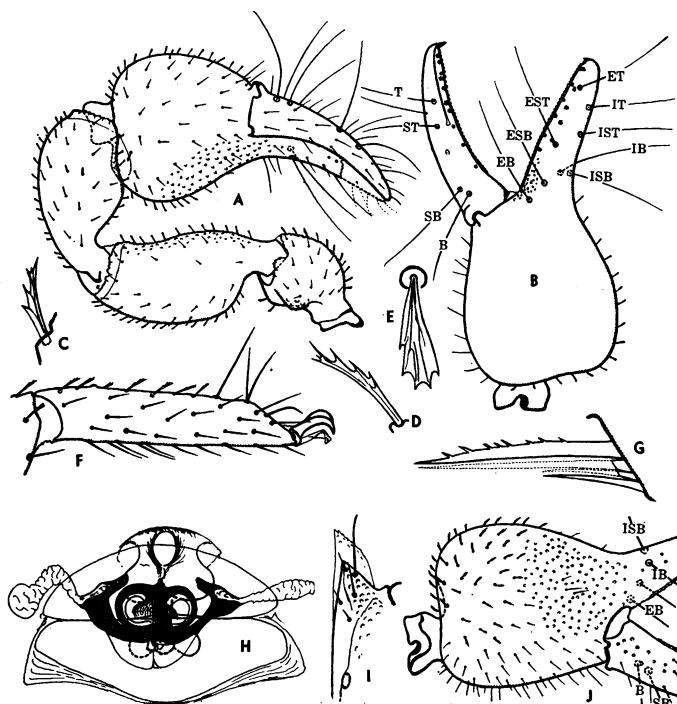


FIG. 3. *Phoberocheirus cribellus*, new species (all drawings from male holotype). A. Ventral aspect of right pedipalp. B. Exterior aspect of left chela showing dentition, chaetotaxy, and venom apparatus. C. Vestitural seta of palps. D. Vestitural seta of tarsus. E. Vestitural seta of carapace. F. Fourth tarsus. Note distal tactile seta. G. Flagellum (reconstructed in part). H. Sketch of male genitalic structures. I. Apex of maxilla showing apical and subapical setae. J. Interior aspect of hand and base of fingers. Note the extensive sensory area.

situated less than the tarsal depth proximad of the apical setae (about .7 of the total, or .9 of the dorsal, tarsal length from its base).

Apical seta of maxilla much shorter than the subapical seta (fig. 3G).

REMARKS: Close to both *Pachycheirus* and *Dendrochernes*, but differing in the strongly clavate tergal and carapacal setae and in the chaetotaxy of the chela. The large sense spot area of the inner, distal face of the hand is unique. Only the orthotype can presently be assigned to this genus.

Phoberocheirus cribellus, new species

Figure 3

MATERIAL: Holotype, male (JC-1731.02001), collected at Vienna, Virginia, November, 1942, "from the 1942 nest of *Bombus americanorum* in flying squirrel nest in black oak stub twenty feet above the ground" by J. C. Bridwell. No other material known. The type collection, however, also included a male of *Mirochernes dentatus* (Banks).

DIAGNOSIS: Small species of extremely robust facies. Carapace longer than posterior breadth; eye spots very weakly defined or absent; anterior furrow caudad of median, sharply defined and nearly transverse; posterior furrow also transverse, situated closer to the posterior carapacial border than to the median furrow; evenly but relatively sparsely granulate, the granulation most distinct laterally; bordered posteriorly by about 14 setae; vestitural setae conspicuously denticuloclavate (fig. 3E).

Tergites as described under generic heading; vestitural setae strongly denticuloclavate as on carapace; chaetotaxy:

$$16:17: \frac{2.0}{17} : \frac{2.0}{18} : \frac{2.0}{18} : \frac{2.0}{18} : \frac{2.0}{19} : \frac{2.0}{18} : \frac{2.0}{17} : \frac{4}{14} : \frac{4}{T5T} : 2m.$$

The tactile setae indicated for segment 11 may not actually occur (all setae broken from this segment), but their presence is probable as judged from the size of the seta areoles. Tergite and sternite 11 with scutal surface sparsely sprinkled with microlyrifissures, especially caudally. Sternites nearly smooth, weakly squamotessellate; vestitural setae acuminate; chaetotaxy (segments 2-12):

$$(35):(3) \frac{(21)}{15} (3):(1)10(1): \frac{0.4}{19} : \frac{0.3}{18} : \frac{2.1}{17} : \frac{2.4}{17} : \frac{2.3}{13} : \frac{6}{11} : \frac{TT}{T6T} : 2m.$$

The discal tactile setae indicated for sternite 11 may not actually occur (setae lost and character inferred from size of areoles). Sternites 4 to 7 with a more or less distinct discal zone of scattered microlyrifissures.

Genital structures of male of usual type, general appearance as sketched (fig. 3H).

Chelicera of usual appearance; galea short with very minute terminal branches, serrula exterior with about 17 ligulate teeth; serrula interior with slender, dentate apical process and three

dentate subapical lobes; seta *b* shorter than *sb*; all setae of chelera completely acuminate.

Palps extremely robust (fig. 3A). Trochanter squamosely granulate both anteriorly and posteriorly, with a small posterior and larger dorsal protuberance; 1.53 times as long as broad. Femur moderately granulate dorsally, interiorly, and exteriorly; strongly pedicellate, especially posteriorly; bulb broadest proximad of median; 1.89 times as long as broad. Tibia strongly pedicellate, bulb subterminally slightly excavated distally; granulate distally on inner face but smooth elsewhere; 2.00 times as long as broad. Chela (fig. 3B, J) smooth except for weakly developed granulate area interiorly at base of fixed finger; with hand enormously expanded interiorly and dorsally; condylar development of movable finger conspicuous; interior and distal half of hand to base of fingers with a conspicuously defined area of thickly clustered sense spots. Chela 2.13 (including pedicel 2.28) times as long as broad; hand scarcely longer than broad; depth and breadth subequal; fingers distinctly (1.17 times) longer than hand exclusive of the pedicel; venom duct .41 as long as finger. Marginal teeth of chela contiguous and numbering about 37 on either finger; fixed finger exteriorly with an evenly spaced series of closely paradental accessory teeth; interiorly with a similar series of five large accessory teeth which are not closely paradental; movable finger exteriorly with a closely paradental series of seven or eight small accessory teeth and interiorly with two large submedian accessory teeth.

Legs of usual facies but more robust than usual. Leg I: "miofemur" 2.84 times as long as deep; tibia 3.46 times as long as deep; miotarsus 5.00 times as long as deep. Leg IV: "miofemur" 3.12 times as long as deep; tibia 4.27 times as long as deep; miotarsus (fig. 3F) 5.05 times as long as deep. Tarsal tactile seta short, .88 of dorsal and .70 of total tarsal length from the base; tactile seta itself about 1.5 times as long as depth of tarsus and completely acuminate.

MEASUREMENTS (MM): Male (holotype): Total length 2.00. Abdominal breadth .98. Carapace: .72 long; ocular breadth .39; posterior disk .12 long. Palps: trochanter .410 by .267; femur .582 by .308; tibia .597 by .298; chela 1.009 (with pedicel 1.082) by .474 broad and .467 deep; hand .497 long; fingers .581 long; venom duct .241 long. Leg I: "miofemur" .418 by .147; tibia .343 by .099; miotarsus .315 by .063. Leg IV:

"miofemur" .589 by .189; tibia .487 by .114; miotarsus .394 by .078; tactile seta .277 from base of tarsus and .098 long; dorsal length of tarsus (to apical setae) .317.

FAMILY **CHELIFERIDAE** HAGEN

SUBFAMILY **CHELIFERINAE** SIMON

TRIBE **CHELIFERINI** CHAMBERLIN

XENOCHELIFER, NEW GENUS

GENEROTYPE (ORTHOTYPE): *Xenochelifer davidi*, new species.

DISTRIBUTION: United States of America, southern California.

DIAGNOSIS: Cheliferine genus of typical facies. Carapace densely granulate; with a few scattered larger tubercles; with true corneate eyes; with two rather weakly defined transverse furrows; posterior disk of male with lateral crests; vestitural setae short, distinctly clavate.

Abdomen ovate; tergites 1 to 10 and sternites 4 to 10 more or less distinctly divided by a longitudinal linear stripe or impression (line of division not necessarily membranous on anterior tergites particularly); tergite and sternite 11 distinct, almost entire (partially divided at most); pleural membrane nearly smooth, striate but not evenly so; vestitural setae short, denticulo-clavate; sternal setae on segments 3 to 8 nearly or quite acuminate, on terminal segments thickened to weakly clavate; tergite and sternite 11 with a posterior zone of sparsely scattered microlyrifissures; sternite 11 with a submedian pair of short, acute, pseudotactile setae. Tergal chaetotaxy distinctly biseriate; sternal chaetotaxy uniseriate except for the usual lateral discal seta; male tergites with well-developed lateral crests or keels; tergites evenly, squamosely granulate; sternites nearly smooth but distinctly squamotessellate.

Genital structures of male of typical cheliferine facies (fig. 5D, E); statumen convolutum medially incised and with a distinct median process; ramshorn organs present and normally developed; coxal sacs of usual cheliferine facies, lacking a differentiated atrium and opening on the medioventral face of the fourth coxae which are also provided with prominent lateral spurs. Female genital area of usual facies; median cribriform plates paired, separate, and distinct (fig. 5A).

Chelicerae small, of normal facies; chaetotaxy of normal cheliferine type; setae *sb* and *b* short, robust, and terminally more or

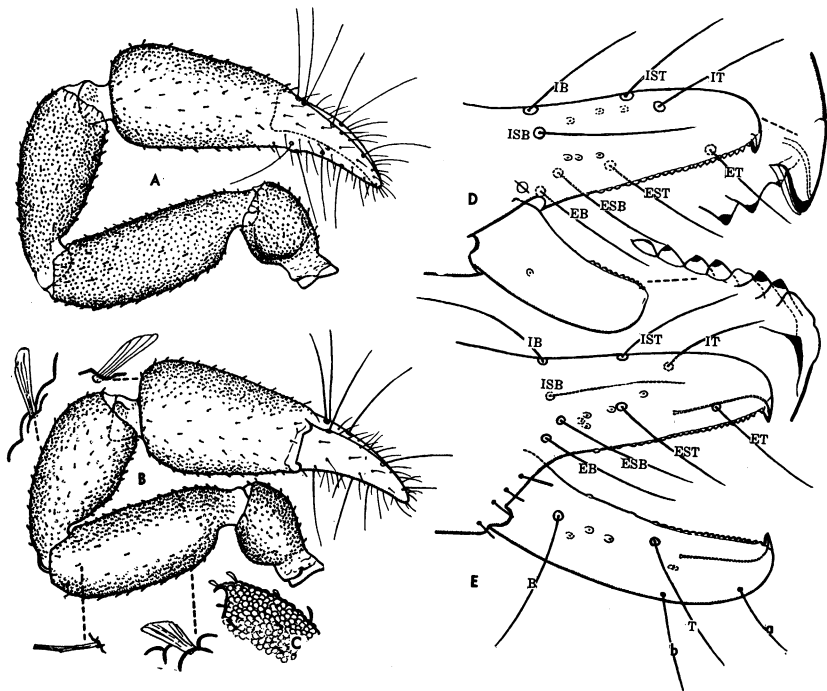


FIG. 4. *Xenochelifer davidi*, new species. A. Dorsal aspect of left pedipalp, male (JC-252.04001). B. Ventral aspect of right pedipalp, female (allotype). C. Detail of dermal ventral sculpture of palpal trochanter (allotype). D. Interior aspect of deformed left chela of male holotype. The shortened movable finger lacks tactile setae and venom apparatus. Inserts: details of dentition and other terminal structures of fixed and movable fingers. E. Exterior aspect of normal right chela of male holotype.

less clavate (fig. 5F); no accessory setae; galea not markedly differentiated sexually; flagellum 3 bladed; serrula exterior with about 16 to 18 ligulate blades.

Palps robust, femur and tibia definitely pedicellate; evenly and densely granulate except for the fingers; vestitural setae very short, stout, and thickened to prominently clavate (fig. 4A, B). Chaetotaxy of chela as illustrated (fig. 4E), unique among all hitherto known Cheliferidae in lacking two of the usual four tactile setae on the movable finger (setae ST and SB apparently absent); seta IST about opposite EST; seta IT distinctly distad of EST but closer to IT-EST than to ET. Movable finger with two slender pseudo-tactile setae, one subterminal, the other almost median (slightly

distad of seta "T"). Venom apparatus present in both fixed and movable fingers; venom duct about one-third the total length of the finger; nodus ramosus situated opposite the fifteenth to eighteenth marginal tooth; marginal teeth well developed on both fingers; a few sense spots present exteriorly and interiorly.

Legs of usual facies. Tarsal claws (fig. 5P) simple and un-toothed; subterminal setae dorsally monodentate (fig. 5N-P); fourth tarsus with a short and nearly terminal tactile seta situated scarcely caudad of the apical setae (fig. 5K). Male fore tarsus (fig. 5L) swollen and markedly differentiated from the others; with a well-developed terminal spine; fore claws markedly asymmetrical.

REMARKS: This presently monotypic genus is unique in the reduced chaetotaxy of the chela (setae ST and SB presumably absent). Possibly in correlation with the loss of setae ST and SB, two slender, pseudotactile setae occur on the movable finger, ventrodistad of seta T. It is to be emphasized that these setae are not "true" tactile setae, as is clear from the nature of the areoles.

***Xenochelifer davidi*, new species**

Figures 4 and 5

MATERIAL: Holotype, male (JC-552.04003); allotype, female (JC-552.04004); paratopotypes, male and female (JC-552.04001 and 552.04002). All from the United States, California, Los Angeles County, Big Rock Creek, under cottonwood bark, April 25, 1926. Coll. J. C. Chamberlin. An additional female paratype is available (JC-492.01001), labeled "Sud California (Morr. 81) (5.194)," belonging to the Paris Museum and lent through the courtesy of M. Louis Fage.

DIAGNOSIS: Carapace posteriorly broader than long, densely granulate and with scattered larger tubercles laterally; eyes about their own diameter from the anterior carapacial margin; transverse furrows weakly defined; posterior disk of male with well-defined lateral crests; vestitural setae short and denticuloclavate.

Tergites granulosquamose; tergites 1 to 10 more or less clearly divided by a linear suture or stripe; 11 nearly entire, but with a partial division visible anteriorly; vestitural setae prominently denticuloclavate (fig. 5G). Tergites of female: 1 to 3 irregularly uniseriate, with 15 to 18 marginal setae; 4 to 11 irregularly biseriate, the discal row comprising 12 to 18 setae (fewer on posterior

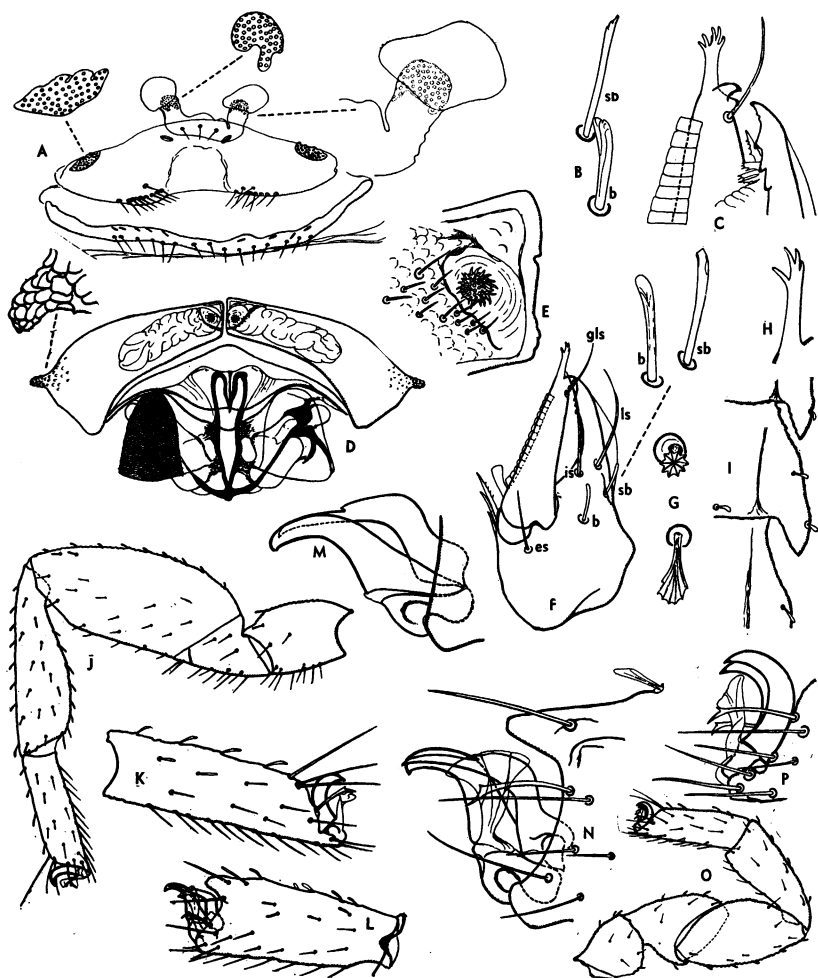


FIG. 5. *Xenochelifer davidi*, new species. A. Genital area of female showing chaetotaxy, seminal receptacles, and cribriform plates. Inserts: details of cribriform plate (492.01001). B. Subbasal and basal setae of chelicera, male (252.04001). C. Tip of cheliceral fingers and galea of female (492.01001). D. Male genitalic structures including fourth coxae and coxal sacs. Insert: heavily sculptured spur of fourth coxa. E. Detail showing ventral opening of coxal sac on fourth coxa. F. Exterior aspect of left chelicera, serrula interior omitted. Insert: details of subbasal and basal setae of chelicerae, male (holotype). G. Subterminal (upper) and lateral (lower) aspects of tergal vestiture setae (holotype). H. Galea of male (holotype). I. Tergal crests of segments 5, 6, and 7, male (holotype). J. Lateral aspect of leg IV, female (252.04002). K. Fourth tarsus of female showing chaetotaxy and claws (252.04002). L. Fore tarsus of male (holotype). M. Asymmetrical fore claw of male (other structures omitted) (holotype). N. Praetarsus of leg I, male (holotype). O. Fore leg of female (252.04002). P. Praetarsus of leg I, female (252.04002).

segments); anal operculum with the usual pair of microsetae. Tergites of male with well-developed lateral crests on segments 1 to 9, vestigial on segment 10; chaetotaxy essentially as in female, except that tergites 1 to 3 have a lateral discal seta situated on the lateral crests. Sternites smooth, but markedly squamo-tessellate in stained material, 4 to 10 completely divided by linear stripe; 11 nearly entire, but with an anterior notch and a distinct longitudinal impression; vestitural setae simple and acute on segments 4 to 8; thickened and terminally bluntly denticulate to weakly clavate on segments 9 to 11. Sternal chaetotaxy (female): anterior spiracular guard sclerite non-setose, posterior guard sclerites monosetose; all sternites uniseriate, except for the usual pair of lateral discal setae which occurs on segments 5 to 10, border setae (observed range in two specimens) as follows (segments 3 to 12): 13 to 15:14:17 to 21:18:14 to 16:15 to 18:12 to 16:12 to 13:3S6S3:2m. Sternal chaetotaxy of male essentially similar, but border setae somewhat more numerous; border setae on segments 4 to 12 of holotype as follows: 16:21:22:21:22:18:14:3S4S4:2m. As indicated there is a submedian pair of semitactile or short pseudotactile setae present in both sexes on sternite 11.

Male genitalic structures typical, as illustrated (fig. 5D); coxal sac relatively small, lacking a differentiated atrium and opening ventrally through a circular pore, which is situated near the median edge and at the bottom of a marked depression involving the anteromedian corner of the coxa (fig. 5E); fourth coxae with markedly rugose anterolateral spurs (fig. 5D, insert).

Female genitalic structures typical, as illustrated (fig. 5A); the well-developed median cribriform plates separate and distinct and occurring dorsally on the short but large-calibered tubule of the seminal receptacle just proximad of the point of terminal expansion (fig. 5A, insert).

Palps robust, tibia and femur markedly pedicellate; conspicuously, densely, and uniformly granulate on all surfaces and segments except for the ventral surfaces of the femur, tibia, and hand, and all surfaces of the fingers; only slightly differentiated sexually (fig. 4A-B); vestitural setae (except for fingers) very short and strongly clavate. Proportions of the male palp (holotype and paratype, respectively): trochanter 1.69 to 1.67 times as long as broad; femur 2.67 to 2.74 times as long as broad; tibia 2.58 to 2.62 times as long as broad; chela 2.85 to

2.94 (including pedicel 3.12 to 3.14) times as long as broad and 3.48 to 3.60 times as long as deep; hand distinctly broader than deep and much longer (1.29 to 1.30 times), as long as the short, stout fingers. Proportions of the female more robust than those of the male but not conspicuously so; proportions (observed range for three specimens including the allotype); trochanter 1.53 to 1.63 times as long as broad; femur 2.33 to 2.41 times as long as broad; tibia 2.22 to 2.36 times as long as broad; chela 2.50 to 2.69 (plus pedicel 2.69 to 2.94) times as long as deep; hand distinctly broader than deep and much longer (1.43 to 1.47 times) than the short, stubby fingers.

Chela with chaetotaxy, dentition, and sense spots as illustrated (fig. 4D, E); movable finger with setae SB and B absent, but with two pseudotactile setae (*a* and *b*) which occur submedially and subterminally on the finger in addition to setae T and B; marginal teeth well developed, contiguous, retroconical, and somewhat better developed in the female than in the male. Marginal teeth numbering 21 to 25 on the fixed, and 22 to 32 on the movable, finger of the female, and 24 to 25 on the fixed, and about 17 to 19 on the movable, finger of the male; tending towards reduction, obsolescence, and basal spacing in both sexes. Venom apparatus difficult to make out but apparently as indicated in figure 4E; the nodus ramosus about opposite the fifteenth to eighteenth marginal tooth (opposite seta IT on the fixed, and somewhat distad of seta T on the movable, finger). A few (two or three) sense spots occur basally both exteriorly and interiorly on either finger.

Legs robust, as illustrated (fig. 5J–O); granulosquamose and vestitured dorsally with short clavate setae; ventral setae acuminate; tarsal claws simple and untoothed (fig. 5P); subterminal setae dorsally monodentate (fig. 5N, P); third and fourth tarsi with a short, nearly terminal tactile seta (.94–.96 of dorsal length or .72–.75 of total length from the tarsal base; fig. 5K). Fore tarsus of male markedly specialized, swollen, and with a distinct terminal tarsal spine (fig. 5L); claws asymmetrically developed, the anterior (exterior) claw strongly curved and nearly normal; the posterior (interior) claw slender, acute, terminally nearly straight, parallel to the long axis of the tarsus and with a dorsal, tooth-like depression (fig. 5M, N).

Pedal proportions (both sexes unless otherwise indicated). Leg I: "miofemur" 2.39 to 2.48 times as long as deep; tibia

2.57 to 2.74 times as long as deep; tarsus of male 2.71 to 2.98 times as long as maximum depth; tarsus of female 3.44 to 3.49 times as long as deep. Leg IV: "miofemur" 2.70 to 2.82 times as long as deep; tibia 3.57 to 3.73 times as long as deep; tarsus of male 3.90 to 3.94 times as long as deep, of female 3.63 to 3.76 times as long as deep.

MEASUREMENTS (MM.): Male (holotype and paratype 252.-04001, respectively): Total length 2.89-2.98. Abdominal breadth 1.43-1.48. Carapace: .90-.86 long; ocular breadth .48-.49; posterior breadth 1.07-1.05; ocular disk .48 long; median disk .25-.23 long; posterior disk .16-.15 long; cucullus .082-.066 long; ocular diameter .082. Palps: trochanter .443 by .262-.266; femur .823-.817 by .308-.298; tibia .787-.786 by .305-.300; chela 1.140-1.151 (plus pedicel 1.246-1.230) by .400-.392 broad and .328-.320 deep; hand .667-.682 long; fingers .517-.525 long. Leg I: "miofemur" .481-.479 by .194-.198; tibia .349-.366 by .136-.140; tarsus .339-.358 by .125-.120; minimum(basal) depth of tarsus .077-.081. Leg IV: "miofemur" .738-.735 by .271-.262; tibia .558-.546 by .151-.147; tarsus .402-.390 by .103-.099; dorsal length of tarsus .309; tactile seta .296-.291 from base of tarsus and .132-.129 long.

Female [observed extremes and means (in parentheses) for three specimens including the allotype, and paratypes 252.04002 and 492.01001]: Total length: 3.18-3.80 (3.41); abdominal breadth 1.48-1.82 (1.67). Carapace: .82-.89 (.86) long; ocular breadth .46-.53 (.50); posterior breadth .98-1.08 (1.02); ocular disk .43-.51 (.48) long; median disk .25-.26 (.26) long; posterior disk .13-.15 (.14) long; cucullus .066-.082 (.077) long; ocular diameter .066-.082 (.074). Palps: trochanter .407-.426 (.418) by .238-.276 (.259); femur .712-.764 (.746) by .295-.328 (.314); tibia .695-.758 (.729) by .295-.331 (.317); chela .984-1.104 (1.048) [plus pedicel 1.058-1.205 (1.137)] by .394-.412 (.405) broad and .321-.336 (.331) deep; hand .597-.664 (.637) long; fingers .418-.462 (.441) long. Leg I: "miofemur" .423-.443 (.436) by .177-.180 (.179); tibia .315-.331 (.321) by .118-.121 (.120); tarsus .295-.307 (.302) by .085-.088 (.087). Leg IV: "miofemur" .672-.738 (.712) by .244-.269 (.258); tibia .492-.528 (.515) by .132-.147 (.141); tarsus .346-.380 (.367) by .094-.103 (.099); dorsal length of tarsus .265-.294 (.282); tactile seta .250-.283 (.270) from base of tarsus and .129-.144 (.134) long.

REMARKS: This interesting and unusual species is dedicated to my son, David C. Chamberlin, who "likes pseudoscorpions."

The holotype of this species exhibits one of the most unusual abnormalities yet observed in the Order Chelonethida. The movable finger of the left chela of this specimen is greatly reduced, being only half the normal length. The fixed finger is apparently completely normal. This abnormal chela, in comparison with the normal chela, is shown in figure 4D-E. No comparable abnormality has previously been reported for any of the Chelonethida.

OCALACHELIFER, NEW GENUS

GENEROTYPE (ORTHOTYPE): *Ocalachelifer cribratus*, new species.

DISTRIBUTION: United States of America, Florida.

DIAGNOSIS: (Based on male only; female unknown.) Cheliferrine genus of slender proportions but typical facies, the male unique in possessing a prominent sclerotic, cribrate area in the atrial region of the coxal sac.

Carapace granular; with corneate eyes; two well-developed transverse furrows and denticuloclavate vestitural setae. Posterior disk lacking lateral crests.

Abdomen ovate, of usual facies; granulate or granulosquamose; vestitural setae denticuloclavate. Tergites more or less biseriate with about six discal and 10 to 15 marginal setae; tergites 1 to 3 medially depressed but not divided, 4 partially divided, 5 to 11 completely divided by linear membranous stripe; tactile setae apparently lacking on terminal segments although a submedian pair may possibly occur on tergite 11. Tergal crests of male reduced, vestigial, and scarcely apparent. Pleural area more or less armored by downturned margins of tergites. Pleural membrane somewhat hispidously striate or plicate; not smoothly plicate.

Sternites squamotessellate, scarcely roughened; vestitural setae simple and acuminate anteriorly, thickened and somewhat denticular to weakly clavate posteriorly. Sternite 4 impressed but not divided; sternites 5 to 11 completely divided by linear membranous stripe. Chaetotaxy uniseriate, with about 10 or 12 marginal setae. Sternites 10 and 11 with a submedian pair of semitactile or pseudotactile setae, which are relatively short on sternite 10 but longer and more slender on 11.

Coxal area of usual facies; evenly granulate on all surfaces;

vestitural setae acuminate; fourth coxae of male modified, with reduced and inconspicuous lateral spurs and with a moderately developed, highly specialized coxal sac, which opens to the exterior through a minute pore situated at the apex of a slender, translucent, "spine-like" papilla or process. Coxal sac with reduced, heavily sclerotic cribrate area and with numerous internal "setae" (fig. 6J, K, N).

Genital structures of male more or less typical but with the statumen convolutum only shallowly invaginated and lacking the usual median process (fig. 6F); ramshorn organs present and normal; general appearance of genitalia as illustrated (fig. 6M).

Chelicerae of usual facies; chaetotaxy normal; setae *sb* and *b* short, robust, and terminally more or less denticulate (fig. 6B); flagellum three bladed, anterior blade only dentate.

Palps attenuate, granular in all surfaces except fingers; vestitural setae thickened and terminally denticulate to weakly denticuloclavate. Chela with normal chaetotaxal pattern (fig. 6I); seta IT close to, but distinctly caudad of, ET; IST and EST submedian and closely approximate; T and ST submedian in position and well separated from SB and B. Venom ducts elongate, the nodus ramosus only a little distad of median.

Legs normal; granulate to granulosquamose; vestitural setae thickened and terminally denticulate to denticuloclavate dorsally, acuminate ventrally; tarsal claws simple and untoothed; subterminal setae acuminate. Male fore tarsus scarcely modified, lacking a terminal spine, with distinctly asymmetrical, curved fore claws, which may be more or less toothed ventrally (fig. 6O). Fourth tarsus with a short, terminal, tactile seta, which is closely associated with, or even opposite to, the more or less displaced apical setae.

FEMALE: The female is unknown but should be characterized by simple claws, simple subterminal setae, and with the same chelal chaetotaxy as in the male. The probable character of the median cribriform plates is doubtful, probably paired but possibly fused.

REMARKS: The systematic position of this genus is somewhat uncertain, in the absence of the female, owing to certain structural peculiarities of the male genitalia (i.e., the shallowly incised statumen convolutum which also lacks the usual median process) and the sclerotic, cribrate character of the coxal sacs, which are distinctive and quite different from any previously described. If

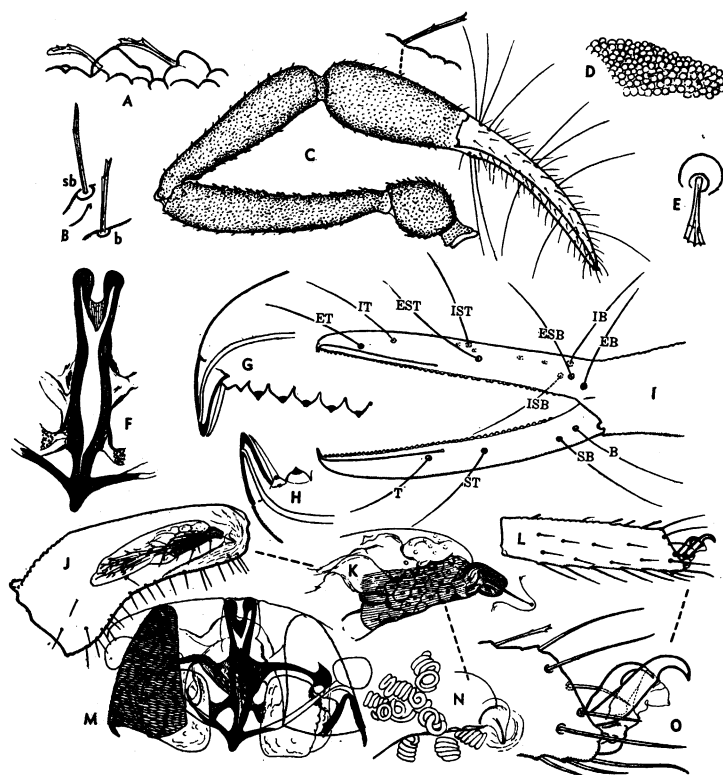


FIG. 6. *Ocalachelifer cribratus*, new species (all drawings from holotype except as noted). A. Vestitural setae and granulations from inner margin of palpal femur. B. Subbasal and basal setae of chelicera. C. Ventral aspect of right pedipalp. D. Detail of dermal sculpturation. Ventral surface of hand of chela. E. Denticuloclavate tergal seta. F. Statumen convolutum of male genitalia. G. Venedens and lamina defensor of fixed finger. H. Venedens and lamina defensor of movable finger. I. Exterior aspect of chela showing venom apparatus, chaetotaxy, and dentition. J. Fourth coxa of male showing coxal sac. K. Cribrate area of coxal sac. L. Fore tarsus of male. M. Male genitalic structures. N. Tubule-like structures of unknown significance found adjacent to cribrate area of coxal sac. O. Male praetarsus of leg I showing asymmetrical fore claws, acuminate subterminal setae, and arolium.

correctly placed (in the Cheliferini) it is close to *Idiochelifer*. Only the type species can currently be assigned to the genus.

***Ocalachelifer cribratus*, new species**

Figure 6

MATERIAL: Holotype, male (JC-1494.02002); male paratopo-

type (JC-1494.02001). Both from the United States, Florida, Ocala National Forest, between Ocala and Umatilla, June 14, 1935. Coll. W. Ivie. Holotype in University of Utah collection. Paratype in collection of the American Museum.

DESCRIPTION: (Male only; female unknown.) An unusually small species of typical facies. Carapace slightly broader posteriorly than long; densely granulate over entire surface with scattered, larger setiferous tubercles, which are especially distinct laterally and posteriorly; vestitural seta sparse, short, moderately denticuloclavate; anterior furrow deeply grooved, slightly recurved medially, distinctly procurved laterally; posterior furrow deeply grooved, nearly transverse; eyes distinct, about their own diameter from the anterior margin.

All tergites distinctly granulate and sclerotic, laterally strongly deflexed, thus armoring much of the pleurum. Tergal crests scarcely evident, vestigial. Tergites 1 to 3 impressed but scarcely divided; tergite 4 partially divided, tergites 5 to 11 divided by linear, membranous stripe. Vestitural setae of tergites moderately denticuloclavate (fig. 6E); chaetotaxy:

$$8:11:10:10:10:\frac{5}{7}:\frac{6}{8}:\frac{5}{7}:\frac{4}{9}:\frac{3}{9}:\frac{1SS2}{7}:2m.$$

The presence of the submedian semitactile setae of tergite 11, as indicated in the foregoing formula, is doubtful (presence inferred on the basis of slightly enlarged areoles), the setae themselves being lost.

Coxal area typical, broadest across fourth coxae, granulate on lateral surfaces and squamosely tessellate ventrally. Fourth coxae typically recurved around genitalic structures, lateral spurs (fig. 6J) nearly vestigial. Coxal sacs relatively small, with numerous internal setae and with a prominent, ovate, heavily sclerotic, cribrate area mesoposteriorly. Coxal sacs further characterized by a peculiarly shaped, heavily sclerotic vestibule (reduced atrium?) which opens to the exterior by means of a slender duct, which terminates in a minute pore at the apex of a slender, translucent, process or papilla (fig. 6J, K, N). Genital structures of male as illustrated (fig. 6F, M); statumen convolutum shallowly incised and lacking a median process; ramshorn organs normal.

Sternites squamotessellate, nearly smooth; sternite 4 entire; sternites 5 to 11 divided by a longitudinal, linear membranous stripe. Vestitural setae short and acuminate on all but sternites

9 to 11, where they are thickened and minutely denticulate to slenderly clavate. Chaetotaxy (segments 3-12):

$$(0) \frac{4}{12} : (0) : (1) 8(1) : 10 : 10 : 11 : 10 : 9 : 3S2S3 : 2T2T2 : 2m.$$

Chelicerae of usual facies; flagellum three bladed, anterior blade with about six subterminal unilateral teeth, the other blades simple; galea small, short, slender, and weakly curved, vestigially branched (the galea is probably sexually dimorphic, with short but well-developed terminal and subterminal branches in the female). Serrula exterior with 16 ligulate teeth, of which the basal one is longer than the others and terminally acute. Well-developed, subapical lobe present, which is subdivided into two small triangular sub-lobes (sub-lobes visible only from certain aspects). Chaetotaxy normal, no accessory setae; setae *sb* and *b* (fig. 6B) short, thickened, and terminally and subterminally microdenticulate.

Palps (fig. 6C) slender, evenly granulate on all segments and surfaces (dorsal and ventral) except for fingers; vestitural setae (fig. 6A) short, sparse, thickened, and terminally and subterminally minutely denticulate to moderately denticuloclavate (especially on inner face of trochanter, femur, and tibia). Trochanter with a rounded dorsal protuberance; femur and tibia scarcely pedicellate, slenderly clavate. Palpal proportions (observed range in holotype and paratype specimen, respectively): trochanter 1.77 to 1.70 times as long as broad; femur 5.08 to 5.04 times as long as broad; tibia 4.07 times as long as broad; chela 4.94 to 4.97 (with pedicel 5.13 to 5.24) times as long as broad; hand 2.25 to 2.24 times as long as broad; fingers 1.29 to 1.28 times as long as hand.

Chela with chaetotaxy and dentition as illustrated (fig. 6I). Venom ducts elongate, more than one-third the length of the entire finger, the nodus ramosus situated about opposite the twenty-seventh to twenty-eighth marginal tooth of either finger (caudad of seta T on movable finger, much caudad of seta IT but distinctly distad of seta IST on fixed finger). Marginal teeth of chela tending to be somewhat weaker and non-contiguous on the basal half of both fingers; numbering 46 on the movable finger and 48 to 51 on the fixed finger.

Legs of typical facies, more or less squamosely granulate on all surfaces; vestitural setae denticulate; thickened to slightly

clavate on all parts, except ventrally on the tarsi of all legs and on the tibiae of legs 1 and 2, where they are acuminate. Tarsal claws normal, simple, and untoothed, subterminal setae simple and untoothed. Fourth tarsus with a short, terminal, tactile seta, the areole of which is nearly opposite one of the laterally displaced apical setae; tactile seta about one-third longer than the apical setae. Fore tarsus of male (fig. 6L, O) scarcely differentiated except for the asymmetrically developed claws. Both fore claws strongly curved, and each with a small ventral tooth or "tooth-like" process about medially, the development of this tooth variable; posterior claw distinctly much smaller than the anterior claw (fig. 6O).

Pedal proportions (observed range in holotype and paratype, respectively). Leg I: "miofemur" 3.04 to 3.34 times as long as deep; tibia 3.28 to 3.26 times as long as deep; miotarsus 4.42 to 4.33 times as long as deep. Leg IV: "miofemur" 3.08 to 2.94 times as long as deep, tibia 4.29 to 4.39 times as long as deep, miotarsus 4.59 to 4.90 times as long as deep. Tactile seta of fourth tarsus .99 of dorsal (.80 to .76 of total) tarsal length from the base of the segment.

MEASUREMENTS (MM.): Holotype and paratype, respectively: Total length 1.98–1.95. Abdominal breadth .98–.95. Carapace: .72–.71 long; ocular breadth .38–.39; posterior breadth .74–.77; ocular disk .34 long; median disk .26–.27 long; posterior disk .12–.10 long. Lengths of tergites 1 to 6, inclusive: .12–.10; .12–.10; .10–.10; .10–.10; .11–.11; .12–.12. Cucullus .071–.085 long. Ocular diameter .071–.082. Palps: trochanter .399–.392 by .226–.230; femur .859–.836 by .169–.166; tibia .777–.749 by .191–.184; chela 1.279–1.248 (plus pedicel, 1.330–1.315) by .259–.251; hand .582–.563 long; fingers .748–.718 long. Length of venom duct .303–.312. Leg I: "miofemur" .456–.454 by .148–.136; tibia .321–.313 by .098–.096; miotarsus .318–.312 by .072. Leg IV: "miofemur" .607–.579 by .197; tibia .459–.443 by .107–.101; miotarsus .344–.353 by .075–.072. Dorsal length of fourth miotarsus .280–.272; tarsal tactile seta .276–.269 from base of tarsus and .088–.092 long.

REMARKS: The peculiar cribrate coxal sacs constitute one of the most interesting and unique features of this species, which is also among the smallest known Cheliferinae. In the paratype specimen the coxal area was not cleared and stained, and in this specimen the cribrate area of either coxal sac seems to be surrounded

by a mass of slender, peculiarly coiled, tubule-like structures, which are sketched in figure 6N. The nature of these "tubules" is uncertain, and they may not actually be a normal part of the coxal structure. Nothing comparable has been observed in specimens of any other species. They appear to be confined to the coxal cavity itself and do not seem to occur in the coxal sacs proper, although it is difficult to be certain of this.

TRIBE **DACTYLOCHELIFERINI** BEIER

Rhacochelifer heterometrus (L. Koch)

Figure 7

Chelifer heterometrus L. KOCH, 1873, Uebersichtliche Darstellung der europäischen Chernetiden Nurnberg, p. 29.

Rhacochelifer heterometrus (L. Koch), BEIER, Das Tierreich, 1932, vol. 58, p. 268.

MATERIAL: One female (JC-921.01001) identified as this species by V. Redikorzev, from whom the specimen was secured in exchange. It was collected by E. Kiritshenko at the roots of a *Euphorbia* on September 2, 1927, at Kikeneis in the Crimea (U.S.S.R.).

DIAGNOSIS: Large species with extremely robust, chernetoid palps. Carapace evenly granulate, somewhat longer than posteriorly broad, with two transverse furrows; anterior furrow caudad of median; median disk scarcely longer than sclerotized portion of posterior disk; posterior lateral corners of carapace non-sclerotic. These non-sclerotic areas of the carapace triangular in shape and defined by line drawn from lateral margin of carapace at origin of anterior furrow and extending to posterior margin of carapace at a point about one-fourth of posterior breadth of carapace from its margin. Sclerotic portion of carapace broadest at anterior furrow. Two corneate eyes present, which are slightly more than their own diameter from the anterior carapacial margin. Vestitural setae short, slightly thickened, minutely denticulo-acuminate.

Tergite 1 entire; tergites 2 to 11, inclusive, longitudinally divided by a linear stripe. Sclerotic area of individual scuta squamotessellate, rectangular, about twice as broad as long, and with a subcentral darker spot; delimited posteriorly by the marginal setae. Tergites biseriate in part; chaetotaxy:

$$12:12:12:\frac{6}{9}:\frac{6}{9}:\frac{6}{10}:\frac{6}{11}:\frac{6}{9}:\frac{5}{11}:\frac{6}{11}:\frac{8}{6}:2m.$$

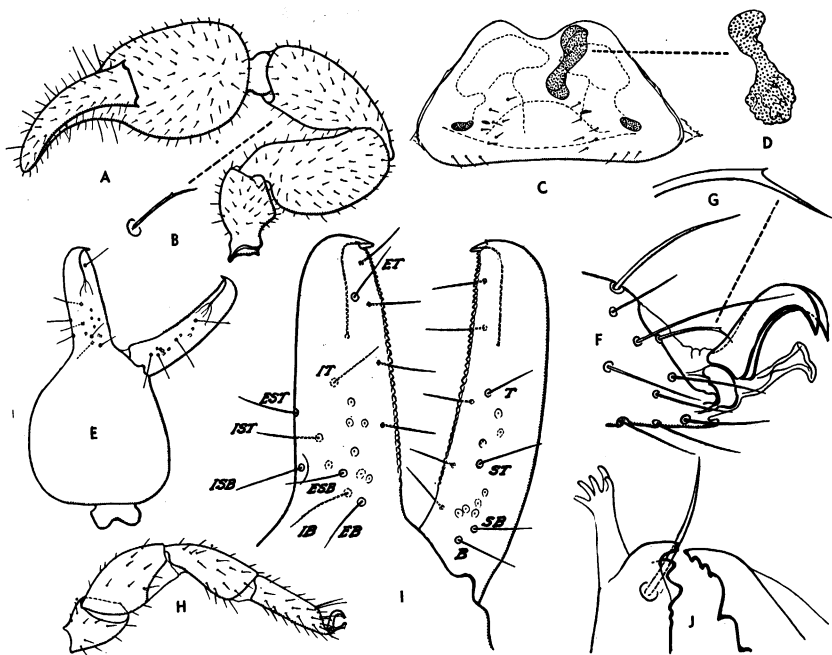


FIG. 7. *Rhacochelifer heterometrus* (L. Koch). A. Ventral aspect of left palp. B. Vestitural seta from tibia. C. Female genital area showing spermathecal receptacles and cribriform plates. D. Median cribriform plate. E. Exterior aspect of right chela. Same scale as figure A. F. Fourth praetarsus showing arolium and claws. G. Subterminal tarsal seta. H. Fore leg. I. Exterior aspect of fingers of chela showing chaetotaxy, venom apparatus, sense spots, and dental guard setae. J. Tip of chelicera showing galea, galeal seta, and subdivided subapical lobe.

Anterior setae of segment 11 elongate, semi-tactile. Vestitural setae as on carapace, short, somewhat thickened, and terminally minutely denticulo-acuminate. Pleural membrane non-rugose and almost evenly plicate. Sternites similar to tergites but more nearly smooth, the tessellations less prominent; all sternites including the eleventh longitudinally divided; vestitural setae short and acuminate; chaetotaxy (segments 3 to 12):

$$(0)15(0):(1)11(1):11:15:13:\frac{2-0}{12}:\frac{2-0}{14}:\frac{2-0}{14}:\frac{TT}{1T5T1}:2m.$$

Eleventh tergite and sternite with abundant scattering of microlyrifissures, especially caudally (peri-anally).

Genital area of female as illustrated; lateral cribriform plates distinct, elliptical in shape; median cribriform plates fused into a single, somewhat dumbbell-like plate, as illustrated (fig. 7C, D).

Chelicerae small, of normal facies; subapical lobe of movable finger divided into two prominent sublobes or teeth (fig. 7J); galea short, robust, and with five terminal, slightly recurved, simple branches; chaetotaxy of palm of chelicera normal; setae *sb* and *b* short and acuminate but with one or two minute subterminal denticles; movable finger with three subapical microdenticles and three spaced, slightly retrorse median teeth; serrula exterior with 25 blades, of which the basal one is elongated and terminally pointed; velum of serrula interior with a slender dentate terminal process and three dentate subapical lobes.

Palps (fig. 7A) extremely robust, all segments prominently pedicellate and chernetoid in appearance, evenly granular on all surfaces, except for the fingers which are smooth; vestitural setae short and denticulo-acuminate. Trochanter with rounded but relatively inconspicuous dorsal and posterior protuberances, 1.95 times as long as broad; femur slightly broadest subbasally, almost as long as tibia and 2.18 times as long as broad; tibia with pedicel not differentiated posteriorly; 1.99 times as long as broad; chela excessively robust, much deeper than broad and with strongly curved fingers, 2.26 (with pedicel 2.43) times as long as broad and 1.78 (plus pedicel 1.94) times as long as deep; fingers longer than breadth of chela, but scarcely as long as its depth; hand distinctly longer than apparent length of fingers from a ventral aspect, but scarcely longer than fingers as viewed from a lateral aspect.

Chela as illustrated (fig. 7E, I); tactile setae unusually short but areoles well differentiated; fixed finger with 38, movable finger with 41, marginal teeth; interiorly with a series of evenly spaced, very robust paradental guard setae, which number five on the movable and four on the fixed finger, respectively (shown in fig. 7I). Chaetotaxy and venom apparatus as illustrated; nodus ramosus about opposite marginal tooth 18 or 19 in both cases. Sense spots occur on the fingers exteriorly and interiorly. Fixed finger with six spots exteriorly between EB and a point opposite EST; interiorly with a single median spot about opposite IST and another subbasally between IST and ISB. Movable finger exteriorly with four spots between ST and SB and two between T and ST; interiorly with two spots, one submedian, the other subbasal.

Legs short and robust (fig. 7H). Tarsal claws acute, non-toothed; subterminal seta dorsally monodentate (fig. 7F, G). Leg IV lacking a tactile seta, although a short (much shorter than tarsal breadth) denticulate seta, which is slightly longer than usual, occurs proximad of the apical setae and distad of median. Legs faintly but clearly squamotessellate, the vestitural setae dorsally short and denticulo-acuminate, ventrally simple and acuminate. Leg I: "miofemur" 2.44, tibia 2.42, and miotarsus 3.37, times as long as deep. Leg IV: "miofemur" 2.61, tibia 2.96, and miotarsus 3.10, times as long as deep.

MEASUREMENTS (MM.): Female: Total length (KOH expanded) 6.46. Carapace: 1.28 long; .69 broad across eyes; 1.20 broad posteriorly; 1.07 broad medially (at anterior furrow); median sclerotic portion of posterior disk .85 broad; ocular disk .76 long; median disk .25 long; posterior disk .21 long; cucullus .115 long; ocular diameter .098. Dorsal length of abdominal segments 1 to 6: .16, .20, .18, .26, .30, .30. Palps: trochanter .705 by .372; femur .992 by .456; tibia 1.017 by .510; chela 1.706 (plus pedicel 1.837) by .754 broad and .958 deep; hand .935 long; fingers .787 long (ventral aspect). Chela from lateral aspect 1.706 (plus pedicel 1.886) long; hand .869 long; movable finger .836 long; venom duct .24-.25 long. Leg I: "miofemur" .640 by .262; tibia .476 by .197; miotarsus .476 by .141. Leg IV: "miofemur" 1.181 by .443; tibia .787 by .266, miotarsus .549 by .177.

REMARKS: The basis of Redikorzev's identification of this specimen with Koch's *Chelifer heterometrus* is not known. The specimen at hand agrees substantially with Koch's imperfect description as far as the latter goes. The whereabouts of Koch's types is unknown; they were apparently inaccessible to Beier, who recognized the species as a *Rhacochelifer* but added nothing to its description and did not include it in his keys. This is apparently the first published record of this species from other than the type material, which was stated by Koch to have been discovered in "Syra [= Syria ?] by Herrn. Erber." Beier gives its "distribution" as "Islands of the Aegean Sea."

This is a remarkable species in many ways. The general appearance of the palp and chela is closely similar to that of certain male Chernetidae of the genus *Dinocheirus*. It is an interesting example of structural parallelism in non-related forms.

Macrochelifer tibetanus (Redikorzev)

Figure 8

Chelifer tibetanus REDIKORZEV, 1918, Ann. Mus. St. Petersburg, vol. 22, p. 93, fig. 2 (palp and chelicera).

Hysterochelifer tibetanus (Redikorzev) BEIER, 1932, Das Tierreich, vol. 58, p. 234, fig. 242 (palp).

Macrochelifer tibetanus (Redikorzev) VACHON, 1940, Bull. Mus. Hist. Nat. Paris, ser. 2, vol. 12, no. 7, pp. 412-414. (Species designated the orthotype of *Macrochelifer*, new genus.)

MATERIAL: A single female cotype (JC-904.01001) received in exchange from V. Redikorzev. Labeled as follows: "*Chelifer tibetanus* Redikorzev, Thibet, Northern shore of Lac Tosso-nor, Tsaidam River, VI. 1901. Thibet Expedition. Female cotype!" The original collection comprised four males and two females.

DIAGNOSIS (ADDENDA): Female: Carapace about as broad as long; with the usual two transverse furrows and well-developed corneate eyes, which are slightly more than their own diameter from the carapacial margin; surface evenly granulate; vestitural setae short and denticulo-acuminate. The abdominal chaetotaxy not observable in my material. Pleural membrane of abdomen smooth, or nearly so, and more or less evenly plicate. Tergites squamotessellate. Tergites 1 to 10 divided; 11 entire, transverse. Sternites 4 to 10 divided, 11 entire. Tergal and sternal divisions linear. Both dorsal and ventral anal opercula bisetose.

Genital area typical of tribe, the median cribriform plates fused into a complex, lobed central structure as illustrated (fig. 8A, B.)

Chelicerae of normal facies; flagellum of three blades; galea broken in present specimen, but illustrated by Redikorzev as short and weakly branched (sex ?); serrula exterior reported to comprise 21 blades (not observable in present specimen); subapical lobe small, entire; chaetotaxy of palm with the usual complement of setae (*ls*, *is*, *sb*, *b*, and *es*) plus a single accessory seta situated between *es* and *sb* (the seta itself lost in my preparation but the areole is distinct); seta *es* is unusually long and slender (Redikorzev's illustration of the chelicera apparently omits seta *b* but shows the accessory seta above noted as slender, about as long as seta *sb* but clearly shorter than *es*).

Palps slender; trochanter, femur, tibia, and inner face of chela evenly granulate; balance of palps smooth; vestitural setae

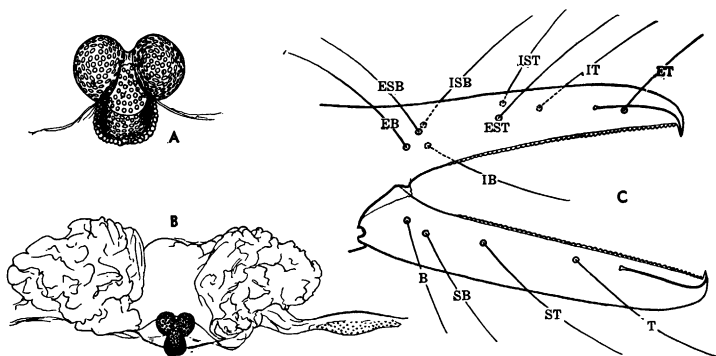


FIG. 8. *Macrochelifer tibetanus* (Redikorzev) (drawings from female "co-type," specimen JC-904.01001). A. Median cribriform plate. B. Genital structures of female showing median and lateral cribriform plates. C. Exterior aspect of right chela showing chaetotaxy, dentition, and venom apparatus.

very short and denticulo-acuminate. Trochanter 2.04 times as long as broad; femur distinctly longer than tibia and 4.01 times as long as broad; tibia 3.34 times as long as broad; chela 3.94 (including pedicel 4.22) times as long as broad; hand somewhat broader than deep and 1.16 times as long as the fingers.

Chela with chaetotaxy and dentition as illustrated (fig. 8C); fixed finger with 45, movable finger with 49, marginal teeth; venom ducts with nodus ramosus opposite the sixteenth to seventeenth marginal tooth; sense spots sparse or nearly absent, only two being noted exteriorly on the movable finger, one opposite seta T, and one slightly distad of seta ST.

Legs slender, the tarsi broader distally than proximally; subterminal seta acuminate; tarsal tactile seta apparently lacking ("teste" Vachon; all such setae lost from my specimen). Leg I: "miofemur" 3.58 times as long as deep; tibia 4.34 times as long as deep; miotarsus 5.19 times as long as deep. Leg IV: "miofemur" 5.18 times as long as deep; tibia 6.52 times as long as deep; miotarsus 5.43 times as long as deep.

MEASUREMENTS (MM.): Female cotype: Total length (KOH expanded) 6.59; abdomen 3.0 broad. Carapace: 1.54 long; ocular breadth .62; posterior breadth 1.48; ocular disk .72 long; median disk .49 long; posterior disk .33 long; cucullus .118 long; ocular diameter .098. Length of tergal segments 1 to 6, inclusive: .33, .33, .36, .30, .39, .49, and .54. Palps: trochanter .817 by .400; femur 1.591 by .397; tibia 1.381 by .413; chela

2.247 (plus pedicel, 2.411) by .571 broad and .500 deep; hand 1.246 long; fingers 1.074 long; venom duct of chela .243 long. Leg I: "miofemur" .968 by .271; tibia .705 by .162; miotarsus .656 by .118 basally and .125 subterminally. Leg IV: "miofemur" 1.528 by .295; tibia 1.261 by .194; miotarsus .820 by .136 basally and .151 subterminally.

MALE: As described by Vachon, the male lacks coxal sacs; the tergal keels are lacking; the male genitalia are medially invaginated but lack the median, rod-like process characteristic of most Cheliferini.

REMARKS: As pointed out by Vachon, this species was improperly assigned to *Hysterochelifer* by Beier and, indeed, seems properly to pertain to the Dactylocheliferini. The tarsi of this species are unusual, being distinctly broader terminally or subterminally than basally (see measurements).

Hansenius spinosus, new species

Figure 9

MATERIAL: Holotype, female (JC-205.01001), Africa, Belgian Congo, Zambi, June, 1915. Received for determination from R. V. Chamberlin. No other material known. Holotype in University of Utah collection.

DIAGNOSIS: (Female only.) Carapace vestitured with prominently denticuloclavate setae; distinctly and evenly granulate, but with many scattered setiferous spines or tubercles, especially laterally and anteriorly; with two corneate eyes situated about one ocular diameter from the anterior margin; anterior furrow deeply grooved, medianly recurved, laterally procurved; posterior furrow well defined and about a tergal length from the posterior margin; posterior disk with a distinct median furrow continuous with the tergal divisions of the abdomen; bordered by about 12 clavate setae.

Abdomen normally ovate; first four tergites distinctly "shortened," the third medially less than half as long as one of the median tergites; all tergites and sternites (including 11) longitudinally divided by a narrow stripe or suture; biseriate; tergal chaetotaxy:

$$\frac{10}{14} \cdot \frac{10}{14} \cdot \frac{10}{14} \cdot \frac{11}{14} \cdot \frac{11}{16} \cdot \frac{10}{20} \cdot \frac{10}{25} \cdot \frac{10}{20} \cdot \frac{10}{17} \cdot \frac{8}{14} : 2m.$$

Scuta of tergites 4 to 10 with a central darker spot; squamosely

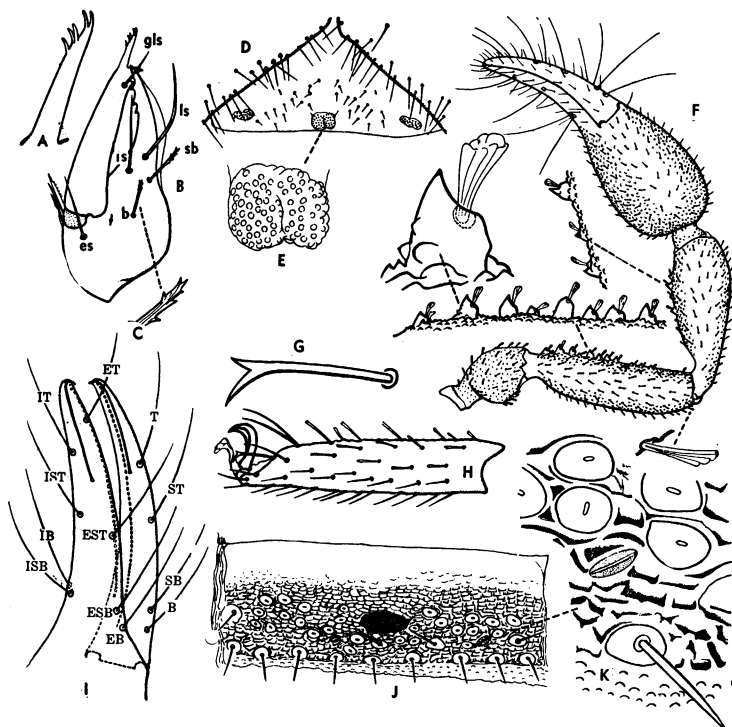


FIG. 9. *Hansenius spinosus*, new species (all drawn from female holotype). A. Galea. B. Chelicera. C. Tip of subbasal seta of chelicera. D. Genital area showing chaetotaxy and cribriform plates. E. Median cribriform plate. F. Ventral aspect of left palp. Inserts: details of structure of setiferous tubercles or spines and vestitural setae. G. Subterminal seta. H. Fourth tarsus. Note absence of tactile seta. I. Subdorsal aspect of right chela showing chaetotaxy, venom ducts, and dentition. J. Right half of eighth sternite showing chaetotaxy, dermal sculpturation, and discal zone of "collared" microlyrifissures. K. Detail of dermal sculpturation, "collared" microlyrifissures, and seta:

tessellate; vestitural setae broadly clavate and inserted in large and conspicuous, non-sculptured areoles. Sternites finely squamosely tessellate; sternites 8 to 11 beset by slenderly clavate setae, the others with simple setae. Sternites obscurely biseriate; chaetotaxy (segments 2 to 12):

$$(27):(0)8(0):(1)10(1):\frac{7}{16}:\frac{7}{15}:\frac{7}{17}:\frac{10}{16}:\frac{8}{18}:\frac{5}{17}:\frac{1TT1}{12}:2m.$$

Sternites 5 to 10 characterized by an irregular transverse zone of about 50 to 60 microlyrifissures which occupies the posterior

half of each of the sternites, the anterior half smooth and almost completely non-tessellate (fig. 9J); the individual microlyriform fissures each occupy the center of a smooth sclerotic plate the size of a normal seta areole and quite as distinct (fig. 9K). A slender submedian pair of acuminate tactile setae occurs on the disc of sternite 11. No other abdominal tactile setae. Pleural membrane generally smooth, irregularly and sinuately plicate.

Genital area of typical dactylocheliferine facies; median cribiform plate medium in size and subcircular (fig. 9D, E).

Chelicerae of usual facies (fig. 9B); flagellum of three blades, the anterior one of which is laterally minutely denticulate; setae *sb* and *b* of chelicera short; stout and terminally denticulate (fig. 9C); serrula exterior with 18 ligulate blades; galea slender, with five very short, slightly recurved terminal and subterminal branches (fig. 9A).

Palps (fig. 9F) moderately robust, of usual cheliferine facies, except that the basal half of the anterior face of the femur bears a close series of eight large setiferous tubercles (fig. 9F, inserts), which are as "high" as the length of the ordinary palpal seta. The tibia bears in the middle of its anterior face three or four such tubercles, while the heel of the trochanter is crowned by two or three more. Aside from these the palps are smoothly and evenly granulate, except for the fingers of the chela and the ventral surface of the femur, tibia, and hand, which are nearly or quite smooth. Vestitural setae of palps clavate to stout and thick (fig. 9F). The setiferous tubercles bear the seta areole about halfway to the spine-like apex which, in turn, reaches halfway to the tip of the strongly clavate seta. Palpal proportions (exclusive of larger setiferous tubercles): trochanter 1.86 times as long as broad; femur subequal to, or slightly longer than, tibia, distinctly shorter than the carapace and 3.62 times as long as broad; tibia 2.92 times as long as broad; chela 3.03 (plus pedicel 3.21) times as long as broad; hand and fingers subequal in length; hand 1.6 times as long as broad.

Chaetotaxy of chela as illustrated (fig. 9I); marginal teeth of fixed finger number 46; of movable finger, 48. A few sense spots may occur on the fingers of the chela, but they are not distinct.

Legs of usual facies; tarsal claws simple and untoothed; fourth tarsus (fig. 9H) completely lacking a tactile seta or sense dome; subterminal tarsal seta slightly curved distally and with a single prominent, dorsal tooth (fig. 9G). Leg I: "miofemur" 3.03

times as long as deep; tibia 3.18 times as long as deep; miotarsus 4.89 times as long as deep. Leg IV: "miofemur" 2.33 times as long as deep; tibia 3.88 times as long as deep; miotarsus 4.84 times as long as deep.

MEASUREMENTS (MM.): Female, holotype: Total length 2.69. Abdominal breadth about 1.4. Carapace: .94 long; ocular breadth .46; posterior breadth about .9; anterior disk .45 long; median disk .32 long; posterior disk .16 long; cucullus .069 long; ocular diameter .082. Length of tergites 1 to 6: .13, .12, .08, .10, .15, .20. Palps (measurements exclusive of larger tubercles): trochanter .499 by .269; femur .879 by .243; tibia .861 by .295; chela 1.392 (plus pedicel 1.476) by .459; hand .738 long; fingers .741 long. Leg I: "miofemur" .531 by .175; tibia .394 by .107; miotarsus .362 by .074. Leg IV: "miofemur" .771 by .331; tibia .574 by .148; miotarsus .436 by .090.

REMARKS: This species is closely related to *Hanseni* *mirabilis* Beier (1933, Ann. Mag. Nat. Hist. ser. 10, vol. 11, pp. 645-647). *H. mirabilis* is a strongly dimorphic species, the hand of the chela of the male being proportionally greatly expanded in comparison with that of the female. It seems probable that the same feature will be found to characterize the present species once the male becomes known.

In the females of *H. mirabilis* the hand is much longer than the fingers (about 1.4 times), while in the present species the hand and fingers are of subequal length.

GENUS MICROCHELIFER BEIER

Microchelifer BEIER, 1944, Eos, vol. 20, pp. 208-209.

GENEROTYPE (ORTHOTYPE): *Microchelifer vosseleri* Beier.

DISTRIBUTION: East Africa, India.

DIAGNOSIS (EMENDED): (Based on male only; female unknown.) Dactylocheliferine genus of typical facies but of unusually small size. Similar in many structural characteristics to *Dactylochelifer*.

Carapace longer than posteriorly broad; with corneate eyes; transverse furrows pronounced, deeply grooved; posterior disk lacking lateral crests. Vestitural setae relatively slender but more or less denticulate.

Abdomen moderately slender, normal in facies; tergites and sternites divided in part at least; tergite and sternite 11 separate,

undivided, and each apparently provided with at least a single lateral pair of tactile setae; anterior tergites provided with prominent lateral crests. Tergal setae slender, denticulo-acuminate; sternal setae acuminate; tergites and sternites uniseriate (except for the usual lateral discal setae on some segments); the marginal setae numbering about eight to 10 both dorsally and ventrally. Pleural membrane nearly smooth and longitudinally, finely plicate.

Male genital structures, including coxal sacs, of typical dactylocheliferine facies (fig. 10E, F).

Chelicera with three-bladed flagellum; setae *sb* and *b* transversely opposite; seta *b* terminally, minutely bifurcate or denticulate; all others acuminate; single galeal seta only; serrula exterior with about 12 to 15 ligulate blades.

Palps (fig. 10C) slender, of typical cheliferine facies; granulate in part; vestitural setae short, slender, denticulo-acuminate. Chela gaping (in *sadiya*, new species, at least); chaetotaxy as illustrated (fig. 10B); interior setae of fixed finger more or less clustered on basal half of the finger, IT about opposite EST; IST somewhat closer to IT than to ISB; seta ST closer to SB than to T; T distad of median and opposite nodus ramosus of venom apparatus.

Legs of typical structure. Male fore tarsus (fig. 10A) strongly modified (swollen), but lacking a terminal spine; tarsal claws asymmetrical. Claws of other legs untoothed, of typical form; subterminal seta dorsally monodenticulate; fourth tarsus (fig. 10D) with a long and slender submedian tactile seta (.53 of dorsal length and about .4 of total tarsal length from its base).

REMARKS: Known only from the orthotype and the present species. Female not known, but with little doubt characterized by essentially the same chelal chaetotaxy as the male, by simple tarsal claws, by dorsally monodenticulate subterminal setae, by a submedian tactile seta on the fourth tarsus, and by a fused, median, cribriform plate.

KEY TO RECOGNIZED SPECIES OF *Microchelifer* (MALES ONLY)

- Femur 4.1, tibia 3.2, times as long as broad; exterior claw of fore tarsus with a distinct ventral tooth; fingers of chela with 35 to 38 marginal teeth; from India.....*sadiya*, new species
 Femur 4.5, tibia 3.9, times as long as broad; both claws of fore tarsus untoothed; fingers of chela with 25 to 28 marginal teeth; from East Africa.....*vosseleri* Beier

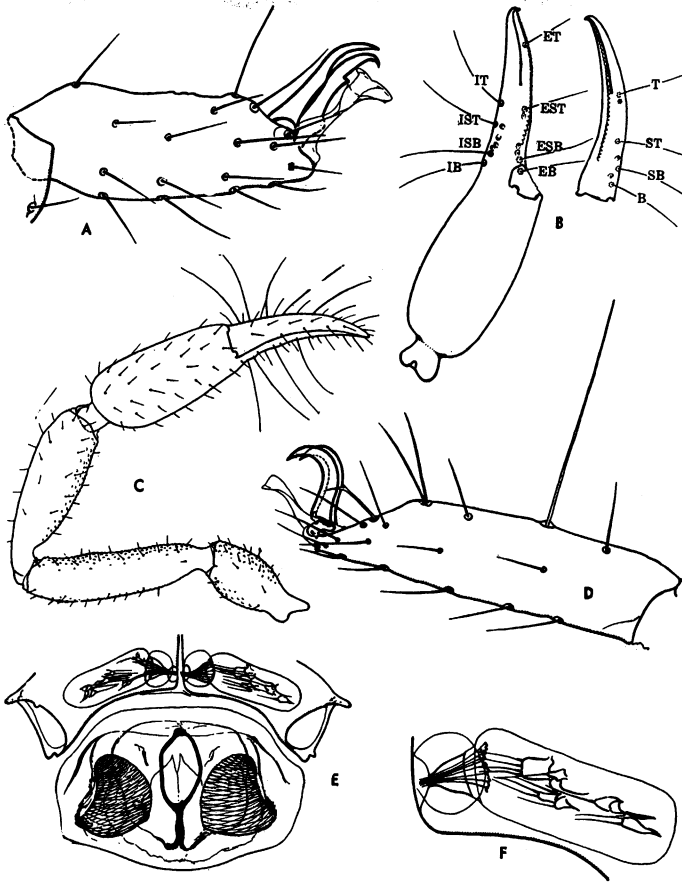


FIG. 10. *Microchelifer sadiya*, new species. A. Posterior aspect of right fore tarsus. B. Sublateral aspect of chela showing chaetotaxy, dentition, and venom apparatus. C. Ventral aspect of right palp. D. Posterior aspect of left fourth tarsus. E. Sketch of male genital structures, fourth coxae, and coxal sacs. F. Coxal sac.

***Microchelifer sadiya*, new species**

Figure 10

MATERIAL: Holotype, male (JC-1071.25001). India, upper Assam, Atkel, Nazira. Coll. F. H. Wilson, 1910, "on a brick outside my bungalow." Specimen donated by H. W. Kew, to whom I wish to express my sincere appreciation.

DIAGNOSIS: General appearance typical of species of the subfamily Cheliferinae and of the tribe Dactylocheliferini, but re-

markable because of its small size, the total body length being less than 2 mm.

Carapace heavily sclerotic, the surface tessellate and smooth dorsally but becoming distinctly granulate laterally; somewhat longer than posteriorly broad; both furrows sharply defined (grooved) and transverse; eyes large, well developed, corneate, and about half their diameter from the anterior carapacial margin; vestitural setae slender and denticulo-acuminate.

Abdomen more than twice as long as the carapace, relatively slender; tergites 4 to 10 and sternites 4 to 10 completely divided by a linear suture; tergite and sternite 11 entire, transverse, and separate. Tergites 1 to 4 undivided and with distinct lateral crests; tergite 5 partially divided and with vestigial lateral crests; scuta weakly tessellate, nearly smooth; vestitural setae slender, denticulo-acuminate; tergal chaetotaxy (exclusive of the lateral discal setae which occur on tergites 3 to 9): 7:8:8:8:10:10:10:10:8:8:T4T:2m. The lateral tactile setae of tergite 11 inferred from the size of the areoles, the setae themselves being lost from the type. Sternites nearly smooth; each bordered by eight to 10 slender, acuminate setae; anal segment with the usual pair of microsetae; sternite 11 with a lateral pair of tactile setae as on tergite 11.

Genital structure of male of typical dactylocheliferine type; statumen convolutum anteriorly rounded, not incised; ramshorn organs typical (fig. 10E); coxal sacs with prominently differentiated atrium (fig. 10F).

Chelicerae of typical facies; setae *sb* and *b* laterally opposite; *sb* acuminate; *b* terminally, minutely bifurcate; *es* longer than *b* or *sb*; serrula exterior with 13 ligulate teeth; galea long and slender with six or seven minute terminal branches.

Palps (fig. 10C) slender; trochanter and anterior face of femur and tibia finely granulate; vestitural setae slender and denticulo-acuminate. Trochanter with a moderate dorsal protuberance, 2.17 times as long as broad; femur pedicellate, broadest distally, 4.14 times as long as broad; tibia slender, broadest subterminally, 3.20 times as long as broad; chela with nearly parallel sides, equally swollen anteriorly and posteriorly, 3.98 (with pedicel 4.24) times as long as broad; depth and breadth of chela subequal; hand about twice as long as broad and as long as the fingers.

Chela as illustrated (fig. 10B); fixed finger with 36 or 37, mov-

able finger with about 35, marginal teeth. Proximal seven or eight marginal teeth of either finger reduced. Fixed finger interiorly with four sense spots between IST and ISB; interiorly with a couple of spots distad of ESB and another closely associated with EST; movable finger with a couple of spots close to SB. Interior setae clustered on basal half of fixed finger with seta IST about opposite EST. Nodus ramosus about opposite the nineteenth to twentieth marginal tooth on either finger.

Legs of typical facies. Leg I: "miofemur" 3.54 times as long as deep; tibia 2.66 times as long as deep; tarsus 2.86 times as long as deep. Fore tarsus (fig. 10A) thickened, lacking a terminal spine; claws asymmetrical, the posterior (exterior) claw slender and untoothed; the anterior claw more strongly curved and with a stout, median, ventral tooth. Leg IV: "miofemur" 3.07 times as long as deep; tibia 3.77 times as long as deep; tarsus 4.17 times as long as deep. Fourth tarsus (fig. 10D) with simple acuminate claws of the usual form; subterminal seta dorsally monodenticulate; with a long and slender median tactile seta, situated .53 of dorsal length (base to apical setae) and .38 of total tarsal length from its base.

MEASUREMENTS (MM.): Male holotype: Total length 1.86. Abdomen .74 broad. Carapace: .55 long; ocular breadth .26; posterior breadth .47; ocular disk .25 long; median disk .21 long; posterior disk .09 long; cucullus .033 long; ocular diameter .062. Length of tergites 1 to 6, inclusive: .098, .087, .090, .098, .118, and .120. Palps: trochanter .287 by .132; femur .476 by .115; tibia .464 by .145; chela .733 (plus pedicel .781) by .184 broad and .182 deep; hand .377 (plus pedicel, .389) long; fingers .377 long. Venom duct .155 long. Leg I: "miofemur" .326 by .092; tibia .202 by .076; miotarsus .180 by .063. Leg IV: "miofemur" .418 by .136; tibia .298 by .079; miotarsus .217 by .052. Tactile seta of tarsus IV .144 long and situated .082 from base of segment.

REMARKS: This species is of unusual interest as it is the smallest representative of the family Cheliferidae yet known.

TELECHELIFER, NEW GENUS

GENEROTYPE (ORTHOTYPE): *Telechelifer lophonotus*, new species.

DISTRIBUTION: Ceylon (possibly doubtful).

DIAGNOSIS: (Based on male only, female unknown.) Dactyl-

ocheliferine genus of unique facies owing to the prominent lateral crests developed on the median, as well as on the posterior, disk of the male carapace.

Carapace (fig. 11F) nearly smooth, weakly tessellate laterally; with corneate eyes; with two equally prominent transverse grooves or furrows; median disk constricted posteriorly and provided with lateral crests; posterior disk tergiform and also provided with lateral crests or keels; vestitural setae slender and finely denticulo-acuminate.

Abdomen ovate, of usual facies; tergites 11 and sternites 10 and 11 each with a pair of tactile setae; anterior tergites of male with prominent lateral crests; tergites and sternites more or less clearly divided in part by a longitudinal suture; tergite and sternite 11 entire, transverse and separate; tergites and sternites uniseriate except for lateral discal setae on some segments; marginal setae of tergites slender and denticulo-acuminate, numbering about 16 per segment; sternal setae acuminate and numbering about 16 to 18 per segment. Tergites nearly smooth; weakly tessellate. Pleural membrane smooth and evenly longitudinally striate.

Male genital structure typical of *Dactylocheliferini*; ramshorn organs well developed; general appearance as sketched (fig. 11A). Fourth coxa unusually broadened and with pronounced lateral spurs; coxal sacs large; atrium well developed, anteriorly at least (fig. 11E).

Chelicerae of normal facies; chaetotaxy normal, no accessory setae; character of setae *sb* and *b* not ascertainable (lost from only known specimen of orthotype). Serrula exterior with about 16 to 18 ligulate teeth.

Palps slender but chela unusually large in proportion to the proximal segments (fig. 11H); trochanter, femur, and tibia finely granulate, in part at least.

Chela of male markedly gaping (fig. 11I); chaetotaxy and dentition as illustrated (fig. 11G, I, L). Seta ET subterminal; EST and IST nearly median and about opposite; IT slightly closer to ET than to IST; T somewhat distad of median; ST closer to SB than to T; venom duct of fixed finger with nodus ramosus nearly opposite IT; of movable finger well distad of T (in either case about opposite the eighteenth to twentieth marginal tooth).

Legs of usual facies. Male fore tarsus (fig. 11B) scarcely

modified although somewhat swollen, lacking a terminal spine; claws basally, peculiarly thickened but scarcely asymmetrical, terminally flattened into nearly straight, sharply acuminate, lanceolate, and translucent points (fig. 11D). Fourth tarsus with a submedian, tactile seta (fig. 11J); subterminal seta curved, but untoothed and acuminate (fig. 11J, insert); claws untoothed but peculiarly modified, being basally normal but either terminating bluntly at a point proximad of the usually acute, strongly curved apex, or with the tip of the claw laminiform (as in fore claws) and very delicate in structure, in which case they have been broken from all remaining claws of the only available specimen (fig. 11K).

REMARKS: In spite of some doubtful features noted in the foregoing diagnosis this genus is sharply distinct from any thus far described.

Telechelifer lophonotus, new species

Figure 11

MATERIAL: Holotype, male (JC-565.03001), from India or Ceylon, probably the latter. Coll. E. E. Green. No additional material known.

DIAGNOSIS: (Male only; female not known.) Carapace (fig. 11F) nearly smooth, at most weakly tessellate laterally; with two equally prominent transverse furrows, the anterior of which is laterally procurved, the posterior gently recurved throughout its length. True corneate eyes present, less than their diameter from the anterior carapacial margin. The carapace is unique in that the median disk is strongly constricted posteriorly and produced into a lateroposteriorly projecting crest similar to the lateral crests of the tergites; the posterior disk (as is often the case in other species also) tergiform and laterally crested. Vestitural setae relatively sparse, slender, and denticulo-acuminate.

Tergites nearly or quite smooth but weakly tessellate; vestitural setae slender and denticulo-acuminate (fig. 11C). Tergites 1 to 3 entire, tergite 4 showing a trace of a division, tergites 5 to 10 divided by a linear suture, tergite 11 entire and not fused with sternite 11. In general uniseriate; chaetotaxy (exclusive of the lateral discal setae that occur on segments 1 to 10, inclusive): 14:16:10:16:14:14:12:14:14:10:1T4T1:2m. Tergites 1 to 4 with distinct, tergite 5 with vestigial, lateral crests (fig. 11F).

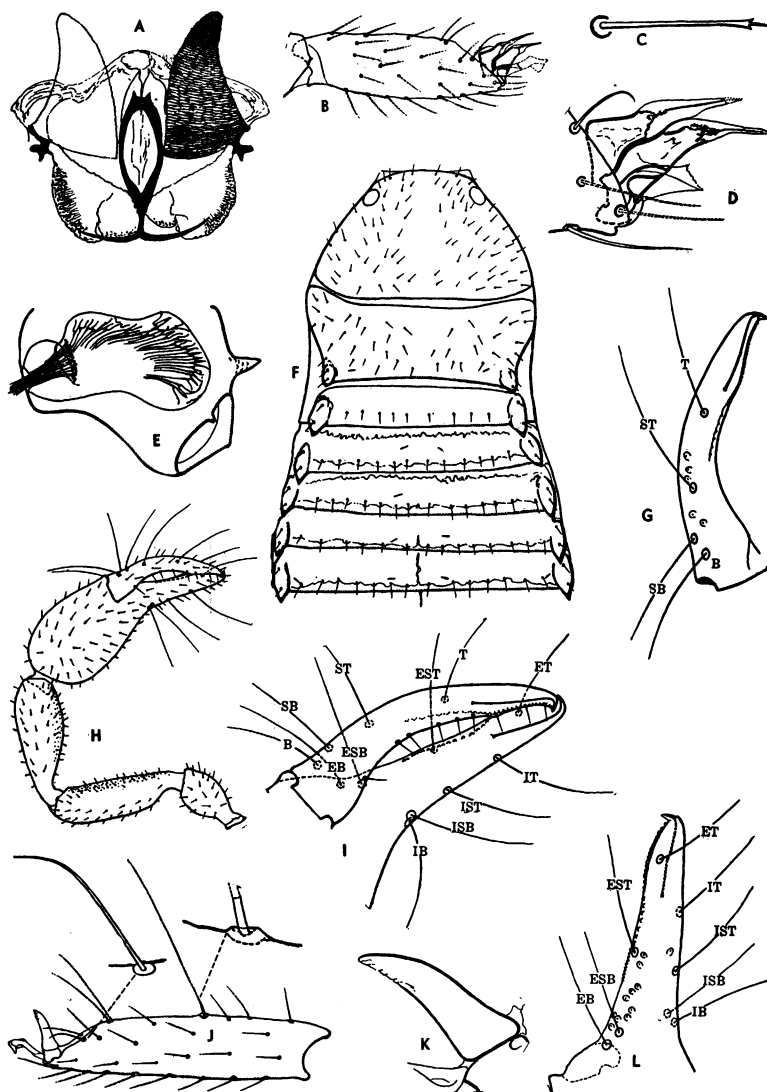


FIG. 11. *Telechelifer lophonotus*, new species (all illustrations from male holotype). A. Sketch of male genital structures; ramshorn organs abnormally displaced anteriorly. B. Anterior aspect of left fore tarsus; setae mostly lost from specimen; reconstructed. C. Vestitural seta; fourth tergite. D. Anterior aspect of left praetarsus of leg I; arolium omitted. E. Left fourth coxa and coxal sac. F. Carapace and tergites 1 to 4. Note lateral crests of median and posterior disk of carapace. G. Exterior aspect of movable finger of left chela. H. Ventral aspect of right palp. I. Interior aspect of fingers of right chela in closed position. J. Anterior aspect of right fourth tarsus; setae mostly lost; reconstructed. Inserts: left, subterminal seta; right, base of tactile seta. K. Right anterior claw of fourth tarsus. L. Subinterior aspect of fixed finger of left chela.

Sternites 4 to 10 divided, sternite 11 entire and similar to tergite 11; setae slender and acuminate. Chaetotaxy of segments 4 to 12 (exclusive of the usual lateral discal setae that occur on segments 4 to 12, inclusive): (1)16(1):20:18:16:16:14:3T4T3:1T4T1:2m. Tactile setae of terminal segments broken from specimen, but the sizes of the areoles clearly indicate their presence.

Genital structure of typical dactylocheliferine facies; general appearance as sketched (fig. 11A). Fourth coxa (fig. 11E) unusually broad, with prominent lateral spurs. Coxal sacs (fig. 11E) large and inflated, largely filling the cavity of the fourth coxae; atrium not constricted posteriorly but deeply so anteriorly; lateral anterior walls abundantly provided with "setae," about 30 to 35 in all, opening flush with mesal walls of coxae.

Chelicera of normal facies; chaetotaxy normal, no accessory setae; character of *sb* and *b* not ascertainable (lost from only known specimen); galea present but broken in holotype; serrula exterior with 18 or 19 ligulate teeth.

Palps unicolorous, slender, but with chela unusually large compared to the other palpal segments (fig. 11H). Heel and anterior face of trochanter, inner face of femur, and tibia and chela at base of fingers very finely and evenly granulate, elsewhere quite smooth. Palps longer than body; trochanter with rounded heel, 2.00 times as long as broad; femur shorter than tibia and 3.46 times as long as broad; tibia not quite so long as carapace and 2.93 times as long as broad; chela about as broad as deep and about 2.8 (plus pedicel 3.0) times as long as broad; fingers and hand subequal in length, both distinctly shorter than femur. (Proportions of chela somewhat doubtful owing to partial crushing.)

Chela markedly gaping (fig. 11I). Chaetotaxy and dentition as illustrated (fig. 11G, I, L). Dental contour of the fingers straight and normally dentate for the distal third, proximad thereof with a deep and opposing concavity on either finger in which the marginal teeth are reduced and somewhat irregularly spaced; marginal teeth of movable finger total 25, of which the seventeenth marks the beginning of the concavity previously noted, and the twenty-fifth tooth marks the "bottom" of the concavity; dentition of fixed finger similar to that described for the movable finger but totaling 31 or 32 and somewhat better developed within the dental concavity than on the movable finger.

Leg I: "miofemur" longer than palpal trochanter, 3.3 times as long as deep; tibia 3.2 times as long as deep; miotarsus slightly longer than breadth of palpal tibia and 3.5 times as long as deep. Fore tarsus (fig. 11B) lacking an apical spine; claws scarcely asymmetrical but peculiarly thickened and terminating in a translucent, lanceolate, and sharply acute point (fig. 11D).

Leg IV of usual facies, "miofemur" 2.9 times as long as deep, tibia 4.2 times as long as deep, tarsus 4.4 times as long as deep. Fourth tarsus (fig. 11J) with a tactile seta, which is .40 of total, and .56 of dorsal, length from base of segment (broken from holotype but almost certainly as indicated). Tarsal claws un-toothed (fig. 11K).

MEASUREMENTS (MM.): Male holotype: Total length 2.72. Abdominal breadth about 1.0–1.1. Carapace: .92 long; ocular breadth .44; posterior breadth .84; breadth at anterior furrow .82; breadth from crest to crest of median disk .67, of posterior disk .76; anterior disk .48 long; median disk .30 long; posterior disk .15 long; cucullus .057 long; diameter of eyes .085. Length of tergites 1 to 6, inclusive: .16, .15, .12, .15, .16, .20. Palps: trochanter .478 by .239; femur .804 by .231; tibia .836 by .287; chela 1.312 (plus pedicel 1.386) by .467±; hand .722 (plus pedicel .795) long; fingers .722 long. Venom ducts .212 long. Leg I: "miofemur" .505 by .151; tibia .369 by .117; miotarsus .310 by .088. Leg IV: "miofemur" .717 by .246; tibia .590 by .140; miotarsus .426 by .096. Dorsal length of tarsus IV (base to apical setae) .309; tactile seta .173 from base of segment.

REMARKS: The measurements of the carapacial breadth are somewhat uncertain owing to partial flattening of the structure under the cover slip of the slide preparation.

The structure of the pedal claws (aside from those of the fore leg) is open to some doubt. Nearly all are broken from the only available specimens, and those that remain appear to have lost their terminal half. It is possible that they are similar to the fore claws, and that the delicate, thinned-out, and transparent apex, such as occurs in the fore claws, also occurs on the others. Their resulting delicacy in that case would readily account for their breakage; otherwise almost entirely inexplicable.

The chelicerae of the holotype were unfortunately lost (after the preparation of this description) in the course of remounting the specimen.

PROTOCHELIFER BEIER

Protochelifer BEIER, 1948, Eos, vol. 24, no. 4, pp. 552-553.

GENEROTYPE (ORTHOTYPE): *Protochelifer nova-zealandiae* Beier.

DISTRIBUTION: New Zealand and Australia.

DIAGNOSIS (REVISED): (Based on males only; female representatives not available.) Cheliferine genus of generally typical facies.

Carapace evenly and densely granular, about as broad posteriorly as long; with true, corneate eyes and two deeply grooved transverse furrows; no trace of lateral crests on the posterior disk; vestitural setae denticuloclavate.

Abdomen ovate; all tergites and sternites including the eleventh more or less clearly longitudinally divided; pleural membrane smooth, more or less evenly longitudinally striate; vestitural setae of tergites distinctly denticuloclavate (fig. 12B); sternal setae acuminate; tactile setae completely lacking on terminal segments. Tergites and sternites uniseriate except for usual lateral discal setae on some of the segments. Tergites with about 20 to 30, sternites with about 25 to 40, marginal setae. Tergal crests lacking in male. Sternites 4 to 9 with large, transversely paired, smooth, and non-tessellate discal areas, which are characterized by a more or less even scattering of microlyrifissures (fig. 12A).

Genital area of male of a modified dactylocheliferine type, statumen convolutum more or less rounded; ramshorn organs absent (figs. 12I, 13F). Fourth coxae larger than usual, lacking lateral spurs, with very large, "inflated" coxal sacs, the atrium of which is very small and nearly vestigial (fig. 12H, I).

Chelicerae of usual facies; chaetotaxy of usual cheliferine type, except that accessory setae may occur between setae *sb* and *es*; all cheliceral setae acuminate; galea a nearly simple stylet in the male; flagellum three bladed; serrula exterior with about 20 ligulate blades.

Palps unusually slender; densely and evenly granulate except for the fingers; vestitural setae thickened, denticulate but not clavate. Chaetotaxy and venom apparatus of chela as illustrated (figs. 12G, 13A, B); setae ET and IST closely associated, nearly terminal; setae IST and EST about opposite, median in position between ET or IST and ESB-EB; nodus ramosus about opposite seta EST; seta ST of movable finger distad of median, much closer to T than to SB and about opposite the nodus ramosus. Sense spots rare or absent.

Legs of usual facies. Unusual in that the fore tarsus of the

male is almost completely typical of the usual pedal tarsi and not at all modified or differentiated as is usual in most Cheliferinae; with tarsal claws of leg I somewhat asymmetrical but not markedly different from those of the other legs (figs. 12C, 13C). Subterminal setae arcuate, untoothed, and acuminate; claws untoothed; fourth tarsus completely lacking a tactile seta (fig. 13L).

REMARKS: The non-modified male fore tarsus and the microlyrifissure-bearing areas of the male sternites are unique in the Cheliferinae. The absence of ramshorn organs, while unusual, is paralleled in *Ellingsentius* and *Haplochelifer*. Although definitely an aberrant type, *Protochelifer* is undoubtedly a member of the cheliferine tribe Dactylocheliferini as presently understood. The definitely delimited areas of microlyrifissures on the male sternites, while more diffuse, strongly suggest the sternal bristle patches of male Withiinae. On the other hand the strongly oblique femoral articulation of legs I and II is typically cheliferine, as is the possession of coxal sacs.

The four included species may be separated by means of the following key:

KEY TO SPECIES OF *Protochelifer* (BASED ON MALE ONLY)

1. Chela about 3.5 times as long as broad, and about 1.6 times as long as the femur; tibia robust, about 3 to 3.5 times as long as broad; fingers and hands of about equal length; from Australia.....*brevidigitatus* (Tubb)
Chela not less than 4 times as long as broad and 1.3 to 1.45 times as long as the femur; tibia slender, not less than 4 times as long as broad; fingers distinctly longer than hand.....2
2. Cheliceral palm with one accessory seta (six in all); from New Zealand.....*novae-zealandiae* Beier
Cheliceral palm with either none or two accessory setae (either five or seven in all).....3
3. Cheliceral palm with only the usual five setae; chela 4.1 to 4.2 times as long as broad; each scutum of sternite 7 of male with about 30 to 50 microlyrifissures (fig. 12A). Sternite 9 lacking microlyrifissures; from New Zealand.....*maori*, new species
Cheliceral palm with seven setae (two accessory seta); chela 4.7 to 4.9 times as long as broad; microlyrifissures of seventh sternal scuta much more numerous, numbering in excess of 100 (fig. 13J); sternite 9 with numerous microlyrifissures; from Australia.....*australis* (Tubb)

***Protochelifer maori*, new species**

Figure 12

MATERIAL: Holotype, male (JC-95.01001), collected "under the rolls of papery bark of *Fuchsia iscortierata*" in the rain forest at

Porirua, New Zealand, on October 20, 1920, by Dr. Robert E. Grimmet, to whom I am indebted for this specimen.

DIAGNOSIS: (Male only). Carapace evenly and densely granulate; with two distinctly corneate eyes, which are slightly more than their own diameter from the anterior carapacial margin; anterior furrow almost median; posterior furrow half as far from

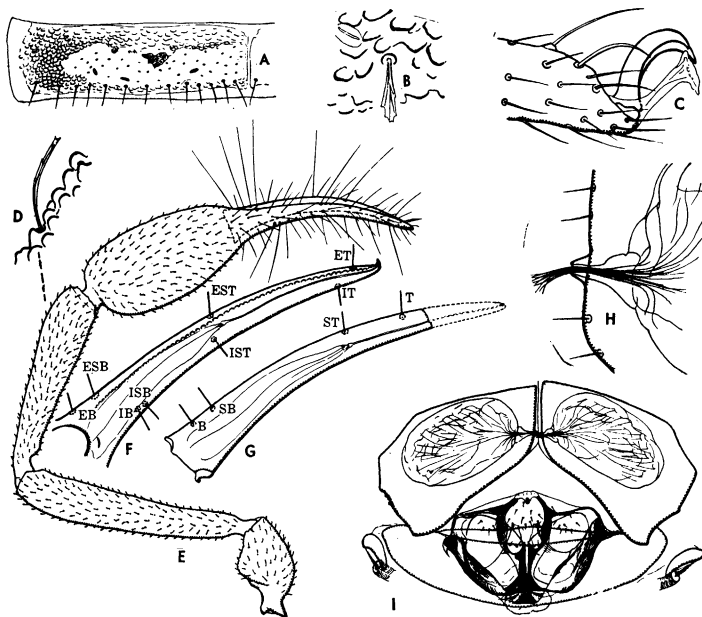


FIG. 12. *Protochelifer maori*, new species (all drawings from male holotype). A. Right half of sternite 7 showing pattern of sculpturation, zone of microlyrifiatures, and chaetotaxy. B. Denticuloclavate seta from tergite 6. C. Tip of male fore tarsus showing symmetrical fore claws and acuminate subterminal seta. D. Vestitural seta from tibia. E. Dorsal aspect of left pedipalp. F. Subventral aspect of fixed finger of right chela. G. Ventral aspect of movable finger of chela (reconstructed in part) showing venom apparatus and chaetotaxy. H. Median opening of coxal sac. I. Male genital structures and fourth coxae with coxal sacs. Note reduction of atrium.

the posterior carapacial border as from the anterior furrow; vestitural setae thickened and terminally and subterminally dentate (as in *P. australis*, fig. 13D, inserts).

Tergites 1 to 11 and sternites 4 to 11 divided into scuta by a longitudinal suture. Tergites densely squamosely granulate; vestitural setae distinctly denticuloclavate (fig. 12B); uniseriate

except for usual lateral discal setae which occur on segments 4 to 10; exclusive of these the tergal chaetotaxy is as follows: 20:19:21:19:23:23:21:18:17:17:15:2m. Tergites lacking lateral keels. Coxal area broadest across the unusually expanded fourth coxae; maxillae granulosquamosae but nearly smooth on ventral surface; other coxae tessellate at most, nearly smooth. Sternites distinctly tessellate and slightly rugose, except for a smooth, transverse, subovate, central area on each scutum of segments 4 to 9 which completely lacks tessellations (except for a central darker spot) and is rather sparsely sprinkled with microlyrifissures (fig. 12A); smooth discal area of segment 9 distinct, but almost completely lacking the microlyrifissures typical of the preceding segments. Sternites uniseriate; vestitural setae acuminate; chaetotaxy (segments 4 to 12 and exclusive of the usual lateral discal seta which occur on sternites 9 and 10):

$$(1)13(1):22:24:24:21:19:17:\frac{6}{13}:2m.$$

General appearance of genital area about as sketched (fig. 12I); ramshorn organs absent; statumen convolutum not incised. Coxal sacs relatively large, inflated; atrium very small (fig. 12I, H); fourth coxae lacking anterolateral spurs.

Chelicera of usual facies; anterior blade of flagellum with five or six subterminal, anterior denticulations, the two posterior blades untoothed and acuminate; with only the usual five setae on the palm of the chelicera (accessory setae lacking); serrula exterior with 19 ligulate teeth; galea slender, nearly stylet-like but with vestigial indications of terminal and subterminal branches.

Palps slender (fig. 12E); densely and evenly granular on all surfaces and segments except the distal two-thirds of the fixed finger, the movable finger, and the ventral surface of the hand just proximad of the articulation of the movable finger; vestitural setae numerous, short, somewhat thickened, and denticulo-acuminate. Trochanter with a rounded subdorsal protuberance, 1.86 times as long as broad; femur longer than tibia and 5.74 times as long as broad; tibia longer than fingers, wider than femur and 4.49 times as long as broad; chela slender, 4.15 (plus pedicel 4.35) times as long as broad; fingers 1.27 times as long as hand.

Chela with dentition and chaetotaxy as illustrated (fig. 12F, G); marginal teeth numbering 51 to 52 on either finger.

Legs slender; granulosquamose; vestitural setae thickened, denticulate, and nearly lanceolate dorsally, acuminate ventrally; tactile setae completely lacking on third and fourth tarsi; claws simple, untoothed; subterminal setae arcuate but acuminate. Fore tarsus of male completely typical of the other tarsi including the acuminate, and almost, if not quite, completely symmetrical fore claws (fig. 12C). Leg I: "miofemur" 3.64 times as long as deep; tibia 5.02 times as long as deep; miotarsus 5.90 times as long as deep. Leg IV: "miofemur" 2.96 times as long as deep; tibia 5.58 times as long as deep; miotarsus 5.97 times as long as deep.

MEASUREMENTS (MM.): Total length 2.98. Abdominal breadth 1.45. Carapace: 1.02 long; ocular breadth .48; posterior breadth 1.09; cucullus .102 long; ocular diameter .090; ocular disk .49 long; median disk .36 long; posterior disk .17 long. Length of tergites 1 to 6, inclusive: .19, .17, .14, .17, .20, .20. Palps: trochanter .566 by .306; femur 1.253 by .218; tibia 1.121 by .249; chela 1.796 (with pedicel, 1.891) by .433; hand .827 long; fingers 1.034 long. Leg I: "miofemur" .651 by .179; tibia .493 by .096; miotarsus .440 by .074. Leg IV: "miofemur" .915 by .309; tibia .725 by .130; miotarsus .525 by .088.

Protochelifer australis (Tubb)

Figure 13

Ideochelifer (pro *Idiochelifer*) *australis* TUBB, 1937, Proc. Roy. Soc. Victoria, new ser., vol. 49, no. 2, p. 414, figs. 3a (female palp), 3b (male palp), 3c, 3d (vestitural setae).

MATERIAL: Male paratype (JC-1603.01001) received through the courtesy of J. A. Tubb. Australia, Lady Julia Percy Island (near Seal Bay). Rock-dwelling species. January, 1936. Coll. J. A. Tubb. Types in National Museum at Melbourne.

DIAGNOSIS (ADDENDA): Carapace evenly and densely granulate; form as illustrated (fig. 13D); vestitural setae thickened, denticulate (fig. 13D, inserts). All tergites, including the eleventh, divided by linear suture; all densely squamosely granulate or tessellate; vestitural seta short, denticuloclavate (fig. 13I), except on tergite 11 where they are thickened and denticulo-acuminate. All tergites uniseriate, except segments 4 to 10 which possess the usual pair of lateral discal setae; exclusive of these the chaetotaxy is as follows: 19:22:24:23:24:27:26:25:21:22:14:2m. Tergites lack lateral keels. Coxal area narrowest

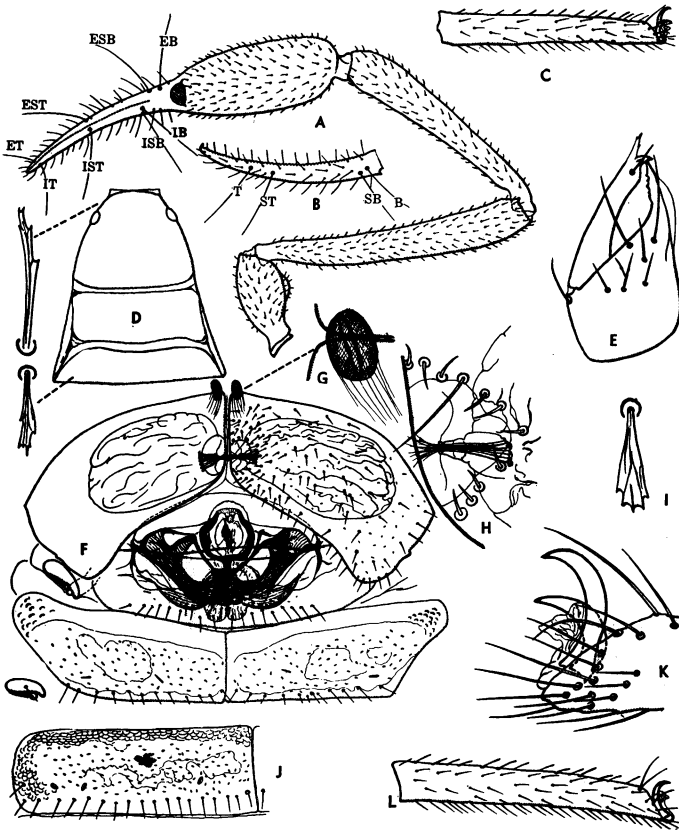


FIG. 13. *Protochelifer australis* (Tubb) (all drawings from male paratype). A. Ventral aspect of left pedipalp. B. Exterior aspect of movable finger of left palp. C. Posterior aspect of right fore tarsus. D. Carapace; setae omitted. Inserts: character of vestitural setae. E. Exterior aspect of left cheliera; serrulae omitted. F. Male genital area including the fourth coxae, genital sacs, and sternite 4. Note zone of discal microlyrifissures on sternite 4. G. Condylar-like structure at inner apex of fourth coxa; significance unknown. H. Detail of opening pore of coxal sac and bordering setae. I. Tergal seta. J. Right scutum of sternite 7 showing dermal sculpturation, chaetotaxy, and discal zone of microlyrifissures. K. Anterior aspect of right fore claws. L. Anterior aspect of left fourth tarsus.

across first coxae and broadest across the fourth; maxillae granulosquamosae, nearly smooth on ventral surface; other coxae tessellate but nearly smooth. Sternites 4 to 11 more or less completely divided by a linear suture; nearly smooth but dis-

tinctly squamosely tessellate, except for the discal areas of sternites 4 to 9 which are large, completely smooth, and thickly sprinkled with abundant microlyrifissures (fig. 13J); microlyrifissures about half as numerous on sternite 9 as on the preceding segments; vestitural setae acuminate; sternal chaetotaxy (segments 4 to 12 omitting the usual lateral discal setae of sternites 6 to 10, inclusive): (1)21(1):30:37:35:35:31:27:15: 2 m.

General appearance of genital area as sketched (fig. 13F); coxal sacs as illustrated (fig. 13F, H); fourth coxae lacking lateral spurs.

Chelicerae small, of usual cheliferine appearance; palm of chelicera with seven acuminate setae (two accessory setae occur between setae *b* and *es*, fig. 13E); galea short with a few minute, lateral, and terminal branches; serrula exterior with 21 ligulate teeth; flagellum three bladed, anterior blade broad and anteriorly with four or five subterminal denticles, others simple and acuminate.

Palps (fig. 13A) of very slender facies; all segments, except fingers and the ventral surface of the chela, distinctly and evenly granulate; vestitural setae relatively short, somewhat thickened, and clearly denticulo-acuminate (not lanceolately acuminate as illustrated by Tubb). Trochanter with a weak, rounded, subdorsal protuberance, 2.02 times as long as broad; femur scarcely pedicellate, evenly expanded from base to tip, 6.94 times as long as broad; tibia weakly pedicellate, slightly shorter than femur and 5.97 times as long as broad; chela distinctly pedicellate, subequally expanded exteriorly and interiorly, 4.92 (with pedicel 5.14) times as long as broad; fingers much shorter than tibia and 1.14 times as long as hand.

Chela with dentition and chaetotaxy as illustrated (fig. 13A, B); fixed finger with 55, movable with 58, marginal teeth; venom ducts not observable in the only available specimen, but no doubt much as in *P. maori*, new species (see fig. 12F, G).

Legs very slender; claws simple and untoothed; subterminal setae acuminate; tactile setae completely lacking from third and fourth tarsi (fig. 13L); fore tarsus of male not significantly differentiated from the others (fig. 13C) but fore claws are apparently slightly asymmetrical (fig. 13K); dorsal vestitural setae of legs thickened, denticulate; ventral setae acuminate. Leg I: "mio-femur" 4.96 times as long as deep; tibia 6.65 times as long as deep; miotarsus 7.79 times as long as deep. Leg IV: "mio-

femur" 3.84 times as long as deep; tibia 7.63 times as long as deep; miotarsus 7.40 times as long as deep.

MEASUREMENTS (MM.): Male paratype: Total length 3.48; abdominal breadth about 1.5–1.6. Carapace: 1.16 long; ocular breadth .54; posterior breadth 1.08 (about); anterior disk .61 long; median disk .34 long; posterior disk .21 long; cucullus .123 long; ocular diameter .098. Lengths of tergites 1 to 6: .21, .15, .16, .18, .20, .21. Palps: trochanter .640 by .317; femur 1.624 by .234; tibia 1.451 by .243; chela 2.050 (with pedicel, 2.142) by .417; hand .968 long; fingers 1.099 long. Leg I: "miofemur" .823 by .166; tibia .672 by .101; miotarsus .623 by .080. Leg IV: "miofemur" 1.132 by .295; tibia .984 by .129; miotarsus .733 by .099.

REMARKS: These measurements are derived entirely from the single male paratype studied by me, and hence no indication can be given as to the amount of variation to be expected. This is likely to be considerable in the case of attenuated appendages such as characterize this species. The proportion of the tibia, as given by Tubb, markedly differs from the one here given (4.8, compared to 5.97 times as long as broad). This may perhaps be within the normal range of variation, although I rather strongly suspect that remeasurement of the holotype and allotype will show that the tibial proportions are actually more slender than indicated by Tubb. His illustration of the palps agrees well with the paratype before me. Tubb gives no measurements aside from the total length (3.8 mm.).

***Protochelifer brevidigitatus* (Tubb)**

Ideochelifer (*pro Idiochelifer*) *brevidigitatus* TUBB, 1937, Proc. Roy. Soc. Victoria, new ser., vol. 49, no. 2, p. 414, figs. 2a (male palp), 2b (palpal seta), 2c (tergal seta).

REMARKS: This species is not known to me. Judging from Tubb's brief account, however, it would appear probable that the generic assignment here made is correct.

The unique type was taken under a basalt boulder on Lady Julia Percy Island, Australia. Type in the National Museum at Melbourne.

GENUS *ELLINGSENIUS* J. C. CHAMBERLIN

Ellingsenius J. C. CHAMBERLIN, 1932, Canadian Ent., vol. 64, p. 35.

Ellingsenius Chamberlin, BEIER, 1932, Das Tierreich, vol. 58, p. 274.

GENEROTYPE (ORTHOTYPE): *Chelififer sculpturatus* Lewis.

DIAGNOSIS (REVISED): Carapace of usual shape, generally deeply sculptured or tuberculate; true eyes lacking, but eye spots present; with two well-developed transverse furrows; vestitural setae short and robust, terminally more or less denticulate or, sometimes, semiclavate.

Abdomen ovate, broadest subterminally; tergites often markedly tuberculate or deeply sculptured and usually more or less granulate, in part at least; biseriate; vestitural setae short, thickened, and terminally denticulate or sometimes semiclavate. Tergal crests well developed, in the male at least, while in some species reduced tergal crests occur in the female as well. Tactile setae not developed, dorsally or ventrally on posterior abdominal segments. Sternites 4 to 11 divided by linear suture; biseriate; with a poorly defined discal zone of microlyrifissures anterior to the discal series of setae; sternal setae acuminate, except on the posterior segments where they are thickened and terminally denticulate.

Genital area of typical dactylocheliferine facies. Median cribiform plate of female fused into a single median structure; statumen convolutum of male rounded anteriorly, not incised; ramshorn organs generally present and well developed but absent (or vestigial?) in some cases. Fourth coxae of male more or less expanded; coxal sacs generally present (when present, with a well-defined atrium), but completely absent in some cases. Tracheal trunks internally minutely papillate.

Chelicerae small; palm with the normal five setae, of which *sb* and *b* are terminally flattened and minutely denticulate; *ls*, *is*, and *sb* closely associated and forming a small equilateral triangle situated subbasally on the fixed finger (rather than on the palm of the chelicera itself, fig. 14E); *b* associated with *es*, being about as far removed therefrom as *sb* is from *ls* and *es*; movable finger with three distinct galeal setae in sharp contradiction to the single one that characterizes nearly all other false scorpions; subterminal lobe large and crenate (fig. 14I); flagellum of three blades; spinneret a slender-branched galea, which may be somewhat better developed in the female than in the male (not distinctly, sexually dimorphic; fig. 14D, I).

Palps granulate and most often provided with very large and prominent setiferous tubercles, which are sometimes so abundant as to obscure the normal contour of the femur and the tibia in

particular; vestitural setae short, thickened, terminally denticulate, sometimes semiclavate. Dentition and chaetotaxy of the chela of the essential pattern shown in figure 14C.

Legs of usual cheliferine facies; tarsal claws untoothed, acuminate; fourth tarsus completely lacking a tactile or pseudo-tactile seta; subterminal setae of all tarsi dorsally monodentate; male fore tarsi generally more or less clearly differentiated from the usual form, but not provided with a tarsal spine except in species where all tarsi, one to four, are provided (in both sexes) with a terminal tarsal spine (e.g., in *Ellingsenius indicus*).

REMARKS: Contrary to Beier's diagnosis (*loc. cit.*) the subterminal tarsal seta in this genus is bifid or uncinat, not simple. This same error was made still earlier by Chamberlin (1932, Canadian Ent., vol. 64, p. 18).

Five species of *Ellingsenius* currently referred to the genus may be separated by means of the following key:

1. Even contour of palps broken, at least medially on the femur and tibia, by the presence of extremely large and setose, wart-like protuberances. 2
 Contour of palps normal, completely lacking any significant trace of large, wart-like tubercles even on the inner face of femur or tibia. 4
2. Medial face of tibia and femur with relatively sparse scattering of wart-like tubercles; exterior face of both these segments normal and smoothly granulate. *ugandanus* Beier
 Medial and dorsal aspects, as well as posterior face of femur at least, thickly beset by very large, wart-like tubercles, which are sufficiently abundant to obscure the normal contour of the segment. 3
3. Prominent tarsal spines present on all legs in both sexes; posterior face of tibia smoothly granulate; coxal and genital sacs of male reduced or absent. *indicus* Chamberlin
 Tarsal spines absent from all legs (including the male fore leg); posterior face of tibia with wart-like tubercles as abundant as on its inner face; coxal sacs and ramshorn organs of male present and well developed.
 *sculpturatus* (Lewis)
4. Palps robust; femur of female 2.8 times, tibia 2.3 times, and chela 3.1 times, as long as broad; subterminal seta of tarsus typically bifid or unicate.
 *fulleri* Hewitt and Godfrey
 Palps more slender; femur 3.0, tibia 2.6, and chela 2.7, times as long as broad; subterminal setae of tarsus simple (?) (*teste* Beier).
 *somalicus* Beier

With the exception of *Ellingsenius somalicus* Beier, which was described from a single female from Afmadu Oltregiula, Italian Somaliland, all these species are now known to occur as commensals of honeybees. *E. fulleri* was recorded from beehives from Douglas, Willowmore, and Bergvliet (near Cape Town) in the

Union of South Africa. *E. sculpturatus* is known to be widely distributed in beehives throughout the following South African provinces: Cape Province, Natal, Transvaal, and Southern Rhodesia. In addition, there is an ostensible record from southern California (Chamberlin, 1932) which, if valid (i.e., if the collection data are correct), probably indicates its introduction into the United States with bees.

Ellingsenius indicus was not known to be associated with bees at the time of its original description, but a recent collection reported hereinafter definitely indicates habits closely similar to those of its better-known relative, *E. sculpturatus*.

***Ellingsenius indicus* J. C. Chamberlin**

Figure 14

Chelifer sp. J. C. CHAMBERLIN, 1931, Stanford Univ. Publ., Biol. Sci., vol. 7, no. 1, p. 81, figs. 18, T (male galea), 39, G (male chela), p. 160, fig. 42, P (tarsus, leg IV of male) and Q (praetarsus, leg I of male), p. 187, fig. 51, M (sketch of male genitalia).

Ellingsenius indicus J. C. CHAMBERLIN, 1932, Canadian Ent., vol. 64, pp. 36-37 (Ootacamund, India). BEIER, 1932, Das Tierreich, vol. 58, pp. 276-277; 1937, Ann. Mag. Nat. Hist., ser. 10, vol. 20, pp. 633-634, t.f. 1, 2 (male and female pedipalp and fore tarsus of male).

MATERIAL: Two males, three females, two tritonymphs, and one deutonymph (JC-841.01001-841.01008) from "inside beehives at Coonoor, Nilgiris, India.... Coll. M. C. C. March 17, 1936." Submitted for determination by F. H. Gravely of the Madras Museum. Male and female specimens JC-841.01001 and 841.01002 and immature specimens JC-841.01006-841.01008 are in author's collection; balance of material is in the Madras Museum. The holotype is also deposited in the Madras Museum.

DIAGNOSIS (EMENDED): (Applies to adults of both sexes unless otherwise indicated.) Carapace as broad as, or slightly broader than, long; ocular disk longer than median and posterior disk combined; posterior disk tergiform, in the male with lateral crests; moderately setose, each seta occurring on a large, wart-like tubercle except on the anterior median part of ocular disk and on the posterior disk; chaetotaxy approximately: 16 to 18-22 to 24 (300±). Carapace evenly granulate laterally (between tubercles) and weakly granulate on the posterior part of the ocular and the median disks. Maxillaris apicalis with a long lateral and short median seta; apex of median disk of maxilla with a moder-

ately long semi-tactile seta; maxillae smooth, except for post-clivus and maxillaris apicalis which are evenly granulate.

Abdomen short, broad, and ovate; pleural membrane hispidously wrinkled; tergites strongly sclerotic, weakly squamo-

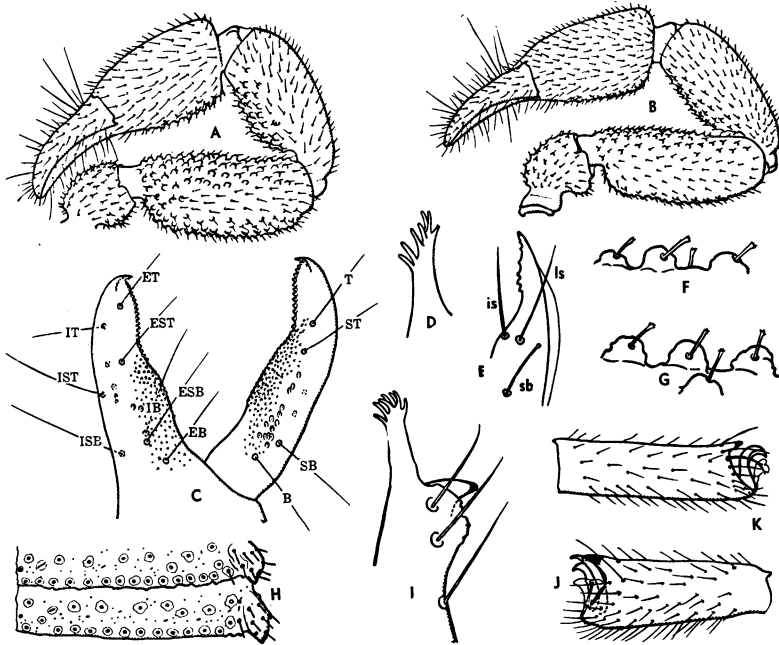


FIG. 14. *Ellingsenius indicus* Chamberlin (structures of male drawn from specimen JC-841.01001; of female, from specimen 841.01002). A. Ventral aspect of left palp of male. B. Ventral aspect of left palp of female. C. Exterior aspect of right chela of female. D. Male galea. E. Fixed finger of chelicera of female. F. Setiferous tubercles from inner margin of female palpal femur (same scale as fig. G). G. Setiferous tubercles of inner margin of male palpal femur (same scale as fig. F). H. Right half of tergites 4 and 5 of male showing lateral crests, the areolate setal insertions (setae mostly omitted), microlyrifissures, and "sense spots." I. Tip of movable finger of female chelicera showing galea and triplicated galeal setae. J. Fore tarsus of male. K. Fore tarsus of female.

tessellate but not granular; all tergites and sternites, including 11, longitudinally divided by a linear "suture"; setose tergal spurs (lateral crests) developed on segments 1-10 (reduced on 10) in male (fig. 14H) absent in female; tergites with 16 to 22 discal and 24 to 26 thickened and terminally minutely denticulate, mar-

ginal setae, each of which is inserted in a large clear areole except on the tergal spurs (fig. 14H); sternal chaetotaxy essentially similar but setae are acute; anus subventral, concealed by evenly rounded eleventh tergal scuta and fitting into a slight emargination of the eleventh sternal scuta; anal opercula dorsally and ventrally bisetose; a short, median, discal, pseudo-tactile seta occurs on either scutum of sternite 11.

Coxal sacs and ramshorn organs absent in the male; genital area of male otherwise typical of tribe (see Chamberlin, 1931, fig. 51, M).

Chelicerae typical of the genus; galea not sexually differentiated, terminally seven branched (fig. 14D, I); chaetotaxy as illustrated (fig. 14E); serrula exterior with 24 to 26 teeth.

Palps moderately robust, as illustrated (fig. 14A, B); the large, wart-like tubercles larger and better developed in the male than in the female, occurring subdorsally on the hand and dorsally on the tibia, femur, and trochanter, as well as anteriorly on the hand and tibia, and both posteriorly and anteriorly as well as subventrally on the femur and trochanter (compare fig. 14F and G).

Chela in both sexes showing a median depression in the dental contour of both fingers (fig. 14C); both fingers, exteriorly and adjacent to the proximal teeth, with extensive and distinct granular patches (fig. 14C); chaetotaxy as illustrated; marginal teeth conical and acute in, and distal of, the median depression, but low and scarcely more distinct than the accompanying granulations, caudad thereof, numbering 31 to 33 on the fixed, and 31 to 38 (mostly 31 to 34) on the movable, finger; sense spot distribution as illustrated, with 11 to 14 spots exteriorly on the movable finger and two to three interiorly; three to four sense spots occur both exteriorly and interiorly on the fixed finger; venom apparatus present, but apparently the duct is unusually slender (possibly reduced, position of *nodus ramosus* not ascertained).

Legs of typical cheliferine type, claws simple and acute, subterminal seta monodenticulate; all tarsi in either sex with a well-developed terminal spine (fig. 14J, K); fore tarsus of male moderately differentiated sexually, expanded from base to tip and with claws moderately asymmetrical but untoothed (fig. 14J); tarsus IV completely lacking a tactile seta.

APPENDICULAR PROPORTIONS: (Not including the large tuberculations of the palpal segments; both sexes unless otherwise

indicated.) Body 1.6 to 1.9 times as long as the abdominal breadth. Ocular disk .58 to .63 of the total carapacial length. Palps: trochanter 1.5 to 1.6 times as long as broad; femur 1.6 to 1.8 times as long as trochanter and 2.4 (male) to 2.6 to 2.7 (female) times as long as broad; tibia slightly but distinctly shorter than femur and 2.34 to 2.24 (male) to 2.56 to 2.61 (female) times as long as broad; chela 1.39 to 1.45 times as long as tibia and 2.8 to 2.9 (male) to 3.0 to 3.1 (female) times as long as broad; hand generally very slightly broader than deep, 1.18 to 1.39 times as long as fingers (generally 1.2 times). Leg I: "miofemur" 1.28 to 1.36 times as long as tibia and 2.80 to 2.92 times as long as deep; tibia 1.06 to 1.19 times as long as miotarsus and 2.94 to 3.08 times as long as deep; tarsus 2.74 to 3.08 times as long as deep. Leg IV: "miofemur" 1.36 to 1.47 times as long as tibia and 2.77 to 2.93 times as long as deep; tibia 1.23 to 1.27 times as long as miotarsus and 3.62 to 3.68 times as long as deep; tarsus 3.80 to 4.04 times as long as deep.

MEASUREMENTS: Measurements of specimens of *Ellingsenius indicus* (not treated with potassium hydroxide) are given in table 1. The body breadth refers to the abdomen. Measurements of the palpal segments do not include the large tuberculations.

TRITONYMPH: Facies and structure essentially as in adult with following exceptions: Tergal spurs absent. Galeal setae two only; serrula exterior with 21 teeth. Tuberculation of carapace and palps reduced but still essentially as in adult. Chela as in adult but dental depressions are not so distinct; sense spots distributed as in adult but reduced in number, exteriorly numbering only one on the fixed, and four on the movable, finger, respectively; interiorly with three to four spots on the movable, and five on the fixed, finger, respectively; chaetotaxy as in adult, except that setae IST and SB are absent. Terminal spine of tarsi reduced but still evident on all legs. The appendicular proportions fall within the range given for the adult female, except as follows: tibia 2.46 times as long as broad (within limits given for male); tibia of leg I 2.76 times as long as deep and only 1.03 times as long as tarsus, which is 3.55 times as long as deep; Leg IV: femur 2.81 times as long as deep and 1.49 times as long as tibia; tibia 3.32 times as long as deep; tarsus 3.68 times as long as deep. Measurements as given in table 1.

DEUTONYMPH: Facies very much as in adult. No larger tubercles occur on carapace. Tergal spurs absent. Only one

TABLE 1
MEASUREMENTS (LENGTH BY BREADTH IN MILLIMETERS) OF SEVERAL SPECIMENS OF *Ellingsenius indicus*

Morphological Part	Males		Females		Tritonymph	Deutonymph
	No. 841.01001	No. 841.01004	No. 841.01003	No. 841.01002		
Entire body	3.26 × 2.02	3.38 × 2.06	3.61 × 2.13	3.69 × 2.31	3.61 × 1.92	2.05 × 1.31
Carapace	1.26 × 1.23	1.28 × 1.38	1.28 × 1.47	1.38 × 1.39	1.00 × 1.07	.72 × .74
Palps						
Trochanter	indet. × .443	.735 × .459	.660 × .410	.672 × .450	.508 × .344	.377 × .230
Femur	1.295 × .535	1.352 × .557	1.150 × .426	1.230 × .475	.935 × .362	.606 × .244
Tibia	1.238 × .508	1.282 × .550	1.105 × .424	1.180 × .460	.884 × .358	.582 × .258
Chela	1.750 × .598	1.780 × .627	1.534 × .500	1.711 × .574	1.332 × .458	.950 × .334
Hand, fingers ^a	.984, .808	.994, .811	.918, .661	.962, .808	.745, .642	.508, .492
Leg I						
Miofemur	.755 × .260	.804 × .278	.740 × .258	.814 × .278	.607 × .213	indet.
Tibia	.587 × .200	.606 × .202	.542 × .180	.598 × .193	.442 × .161	indet.
Tarsus	.495 × .180	.525 × .171	.518 × .138	.515 × .136	.420 × .121	indet.
Leg IV						
Miofemur	1.165 × .408	1.122 × .405	1.095 × .374	1.218 × .423	.919 × .326	.620 × .249
Tibia	.825 × .224	.826 × .228	.755 × .205	.827 × .228	.615 × .185	.424 × .148
Tarsus	.647 × .162	.668 × .166	.604 × .159	.672 × .172	.513 × .139	.366 × .115

^a Length in each case.

galeal seta present; chaetotaxy and facies of chelicera otherwise as in adult; galea only three branched; serrula exterior with 16 teeth. A few (two or three) wart-like tubercles occur on the palpal femur but are otherwise absent or rudimentary. Marginal teeth of chela 24 to 26 on either finger, which scarcely show more than a rudimentary trace of the dental depressions characteristic of the adult; sense spots absent; chaetotaxy of same pattern as in the adult, but setae SB and T (or ST?), IST and ESB are absent. Tarsi of all legs without a trace of the terminal spine; subterminal setae toothed as in adult. Appendicular proportions generally more robust than in the adult female, as follows: Palps: trochanter 1.64 times as long as broad; femur 1.61 times as long as trochanter and 2.48 times as long as broad; tibia shorter than femur and 2.26 times as long as broad; chela 1.63 times as long as tibia and 2.84 times as long as broad; hand scarcely longer than fingers (1.03 times). Leg I: not ascertainable from available material. Leg IV: femur 1.46 times as long as tibia and 2.48 times as long as deep; tibia 1.16 times as long as tarsus and 2.87 times as long as deep; tarsus 3.19 times as long as deep. Measurements as given in table 1.

REMARKS: It may be conjectured that the gaping fingers of either sex in this species are an adaptation to permit their clinging to their "hosts" (bees) at the time of swarming. This habit has been well established for *Ellingsenius sculpturatus*.

