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SCORPIONS, PRINCIPALLY FROM
CAVES, BELONGING TO THE
FAMILIES CHTHONIIDAE AND
NEOBISIIDAE (ARACHNIDA,
CHELONETHIDA)

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FALSE SCORPIONS

INTRODUCTION

THE PRESENT STUDY is based on a miscellaneous group of false scorpions belonging to the Chthoniidae and Neobisiidae. It is primarily concerned with new and little-known species collected from caves, but secondarily treats of species or genera studied incidental to the placing and identification of the cave forms. Most have been received directly or indirectly from the American Museum of Natural History through the courtesy of Dr. Willis J. Gertsch, to whom I express my sincere appreciation. Other sources are acknowledged under the various specific headings. New names are proposed in certain instances in which errors of determination have been made, and certain new names are proposed to eliminate long-evident homonymy.

All specimens studied have been assigned an individual preparation number (for ex-

ample, JC-376.01001) which relates it to the author's original records. It is also cited to identify exact specimens upon which specific observations or illustrations are made.

Unless otherwise noted, types and other material are deposited in the collections of the American Museum of Natural History.

This study is the third of a series concerned primarily with the cave-inhabiting false scorpions of North America. The first two of these dealt with the syarinid genus *Chitrella* (Malcolm and Chamberlin, 1960, Amer. Mus. Novitates, no. 1989, pp. 1-19) and the chthoniid genus *Kleptochthonius* (Malcolm and Chamberlin, 1961, Amer. Mus. Novitates, no. 2063, pp. 1-35). A fourth paper, now nearing completion, will treat the chthoniid genus *Tyrannochthonius*.

SYSTEMATIC ACCOUNT

SUBORDER **HETEROSPHYRONIDA** CHAMBERLIN

FAMILY **CHTHONIIDAE** HANSEN

SUBFAMILY **CHTHONIINAE** HANSEN

TRIBE **CHTHONIINI** CHAMBERLIN

SATHROCHTHONIUS, NEW GENUS

GENEROTYPE (ORTHOTYPE): *Sathrochthonius tuena*, new species.

DIAGNOSIS: Chthoniine genus of generally typical facies. Carapace (fig. 1A) weakly constricted posteriorly, about as long as anterior breadth; eyeless in orthotype but eyed forms are possibly, or even probably, to be expected; epistomal process more or less distinctly developed; vestitured with about 18 macrosetae.

Tergites and sternites entire; uniseriate (about six to eight border setae on anterior segments); eleventh tergite and sternite fused to form terminal circumanal plate of which sternal element is greatly reduced and non-setose; dorsal half of circumanal plate with pair of true tactile setae; dorsal half of anal operculum (twelfth tergite) non-setose, sternal half bisetose.

Male genitalia of generally typical facies, about as illustrated for orthotype (fig. 1D), characterized most distinctively by having only three (instead of usual four) pairs of internal guard setae. Female genital area distinctively sclerotized, about as illustrated for orthotype (fig. 1F).

Coxal area of typical facies; well-developed, bisetose, intercoxal tubercle present (fig. 1C). Coxal spines almost completely reduced, traces persisting as granular or hispid area mesially on pedal coxae II only (fig. 1C); vestitural coxal setae fairly numerous, about eight to 12 in all for each pair of pedal coxae; maxilla (fig. 1B) with condylar seta elongate and semitactile, apical setae elongate, two in number, the second the longer; apical process of coxa obsolescent for all legs—scarcely evident as such.

Chelicera typical in facies; spinneret absent or obsolete; with usual setae (*is*, *sb*, *b*, and *es*), plus two accessory setae more or less caudad of and between setae *es* and *b* (as in fig. 1A).

Palp moderately robust. Chela with chaetotaxy and dentition of type illustrated for orthotype (fig. 1G); marginal teeth numerous

and contiguous; seta ET about as close to medially placed setae EST and IT as to finger tip; seta T a little distad of median, with SB closer to ST than to B and with ST about midway between SB and T; setae ISB and IB transversely opposite and situated at base of hand just distad of pedicel (about 0.2–0.3 of hand length, including pedicel, from its base).

Legs of usual facies but more robust than ordinary. Legs III and IV with a long, slender, tactile seta situated near base of metatarsus (index, $0.3 \pm$); telotarsus (probably tibia as well) apparently lacking tactile setae.

REMARKS: It seems probable that *Chthonius caecus* Tullgren (1909) [*nec Chthonius caecus* Simon (1885) or *Chthonius coecus* Packard (1884)] belongs to this genus rather than to *Mundochthonius* where it was referred by Beier. As is noted below, this species name is a homonym and must be changed. The two forms can be separated by means of the following key:

Moderately slender, chela almost or quite four times as long as broad; fingers 1.5 to $1.6 \pm$ times as long as hand; small form, male femur 0.26 mm. long; from southwest Australia (Brunswick) *tullgreni*, new name (*pro Chthonius caecus* Tullgren)
Robust species, chela (both sexes), 3.4–3.6 times as long as broad; fingers shorter, 1.2 times as long as hand; larger form, femur (either sex) 0.48–0.50 mm. long; from cave, probably in Blue Mountains near Sydney, Australia *tuena*, new species

***Sathrochthonius tuena*, new species**

Figure 1

MATERIAL: Two males and two females (JC-2014.02001–JC-2014.02004) collected by W. B. Jones in an unnamed cave “probably in the Blue Mountains near Sydney.” Holotype, male (JC-2014.02001); allotype, female (JC-2014.02002).

DIAGNOSIS: Both sexes unless otherwise indicated. Small, blind species of robust facies; dorsal sclerotic parts yellowish, palps reddish yellow, the fingers somewhat darker, under parts paler; not at all troglobitic in facies.

Carapace (fig. 1A) as broad anteriorly as long but distinctly narrowed posteriorly;

derm smooth; no eyes or vestiges of eyes; epistomal area irregularly serrated, culminating apically in more or less distinct, somewhat irregular process (fig. 1A, insert); chaetotaxy 6-2(18).

Tergal chaetotaxy somewhat variable and not significantly differentiated sexually, about as follows (observed range in four specimens): 6:6 to 8:8 or 9:6 to 10:8 or 9:8:8: to 10:6 to 8:7 to 9:6 \pm T2T:0. Sternal chaetotaxy of male:

$\frac{6}{8 \text{ or } 9}:(3-3):(4) \frac{(14 \text{ to } 17)(14 \text{ to } 16)}{5 \text{ or } 6} (4):(3 \text{ or } 4)$
6 to 8(2 to 4):mm6 or 7mm:mm5 or 6mm:mm5
or 6mm:8 to 10:7 or 8:6 to 8:0:mm.

Chaetotaxy of female essentially similar except for slightly more numerous setae, observed range (two specimens) as follows:

$\frac{7}{3-3}:(3 \text{ or } 4)10 \text{ to } 12(3 \text{ or } 4):(3)7 \text{ to } 10(3):mm6$
or 7mm:mm6 or 7mm:mm6 or 7mm:10 or
11:10 or 11:6 or 7:0:mm.

Chaetotaxy of female genital segments also shown in figure 1F.

Coxal area of typical facies, chaetotaxy somewhat variable but averaging about as follows: male, 2-2-1:0–1 or 2–6 or 7:1 or 2-7-(CS area):1 or 2–6 or 7:2–8; female, 2-4-1 or 2:0–2 or 3–4 to 6:2–5 or 6-(CS area):3–6 or 7:2 or 3–7 to 9; intercoxal tubercle bisetose, relatively large (fig. 1C); coxal spines reduced, persisting only as hispid or granular area mesially on coxa II only (fig. 1C); coxa I produced apically into small, rounded process.

Male and female genitalic structures as illustrated (figs. 1D, 1E, 1F).

Chelicera of usual facies (fig. 1A), about 1.8–1.9 times as long as broad; distinctly shorter than carapace but about as long as hand of chela; spinneret absent or obsolescent; serrula exterior with about 16 teeth; serrula interior typical but teeth cannot be counted in available material; flagellum typical, but numbers of setae not observable; movable finger with two or three relatively large teeth preceded basally by about three small to very small denticles; fixed finger with nine or 10 serrations which are basally obsolescent; chaetotaxy normal, with two acces-

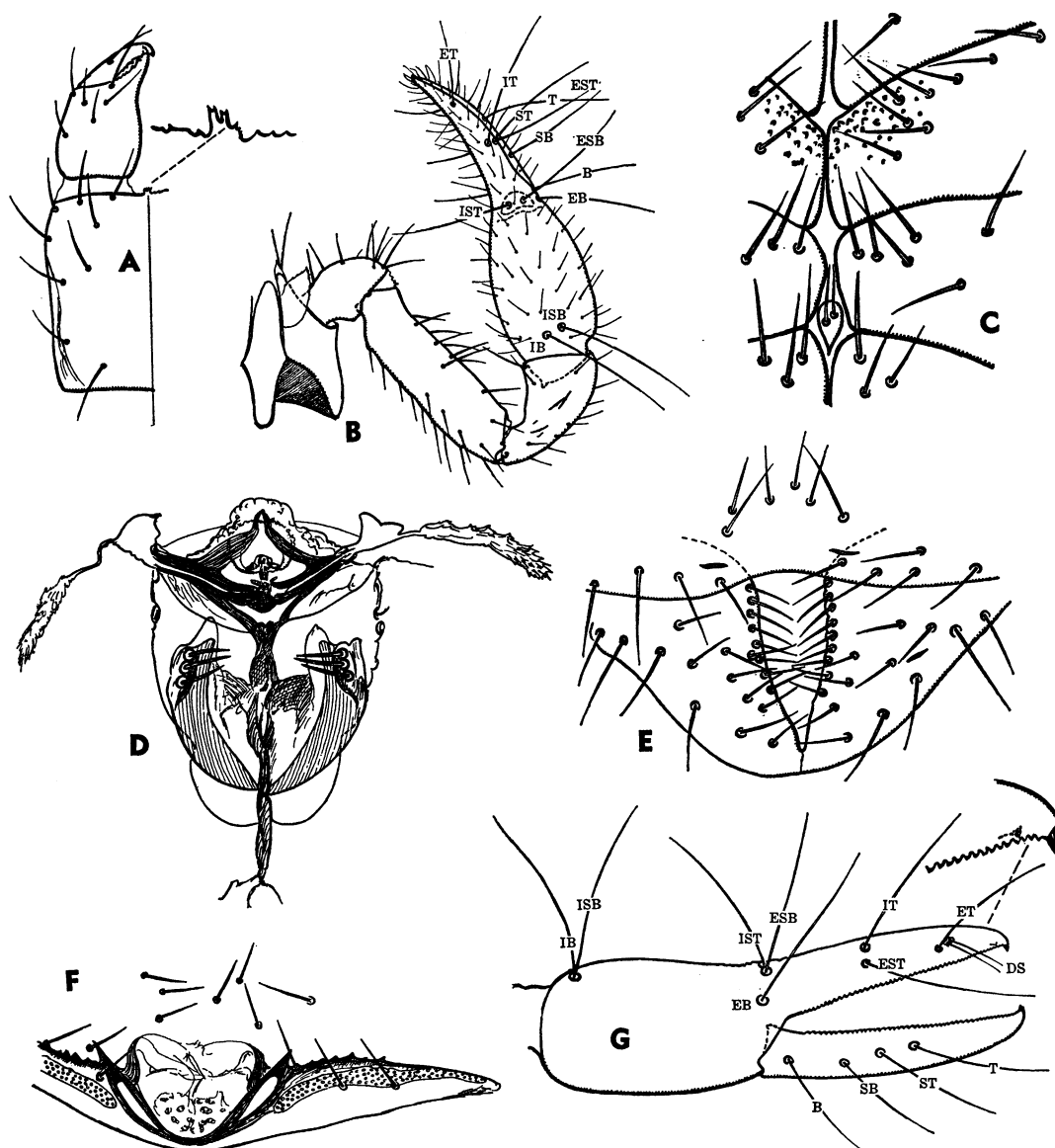


FIG. 1. *Sathrochthonius tuena*, new species. All drawings from holotype male and allotype female. A. Female carapace, chelicera, and epistomal process. B. Dorsal aspect of female palp including the maxilla and jugum. C. Coxal segments II-IV, showing rugosities on coxae II (replacing the usual coxal spines) and the intercoxal tubercle (male). D. Internal structures of male genitalia. E. Genital operculum, showing external chaetotaxy of the male genital area. F. Female genital area, with external genital setae superimposed on the internal structures. G. Exterolateral aspect of right chela of male, showing chaetotaxy and dentition. Note accessory tooth opposite denticle 4 of the fixed finger.

sory setae, one between *es* and *sb*, the other caudad of *es* and laterad of *b* (fig. 1A).

Palp (fig. 1B) smooth, relatively robust and less angular in facies than usual: not significantly differentiated sexually; propor-

tions: trochanter 1.64-1.75 times as long as broad; femur 3.4-3.6 times as long as broad; tibia 1.95-2.05 times as long as broad; chela 1.55-1.60 times as long as femur, 3.4-3.6 times as long as broad, and 3.3-3.5 times as

TABLE 1
MEASUREMENTS (IN MILLIMETERS) OF *Sathrochthonius tuena*, NEW SPECIES

	Male Holotype	Male JC-2014.02003	Female Allotype	Female JC-2014.02004
Total L ^a × abd. B	1.18 × 0.54	1.21 × 0.46	1.43 × 0.62	1.36 × 0.66
Carapace				
L × anterior B	0.459 × 0.451	0.459 × 0.451	0.497 × 0.508	0.492 × 0.492
Posterior B	0.410	0.410	0.459	0.459
Chelicera L × B	0.34 × 0.18	0.33 × 0.18	0.37 × 0.21	0.36 × 0.20
Palp				
Trochanter L × B	0.232 × 0.132	0.231 × 0.136	0.243 × 0.148	0.247 × 0.144
Femur L × B	0.476 × 0.132	0.477 × 0.136	0.508 × 0.148	0.508 × 0.140
Tibia L × B	0.308 × 0.158	0.320 × 0.158	0.341 × 0.173	0.344 × 0.169
Chela L × B	0.745 × 0.207	0.746 × 0.210	0.794 × 0.232	0.804 × 0.230
Chela D	0.213	0.210	0.239	0.234
Hand L; finger L	0.344, 0.415	0.344, 0.426	0.364, 0.448	0.377, 0.443
Leg I				
Basifemur L × D	0.248 × 0.062	0.243 × 0.064	0.258 × 0.068	0.257 × 0.070
Telfemur L × D	0.149 × 0.061	0.149 × 0.063	0.158 × 0.067	0.162 × 0.066
Tibia L × D	0.166 × 0.052	0.180 × 0.049	0.188 × 0.055	0.186 × 0.053
Miotarsus L × D	0.250 × 0.040	0.254 × 0.040	0.265 × 0.044	0.262 × 0.043
Leg IV				
Miofemur L × D	0.423 × 0.158	0.443 × 0.180	0.443 × 0.173	0.471 × 0.161
Tibia L × D	0.330 × 0.092	0.344 × 0.099	0.358 × 0.098	0.361 × 0.098
Metatarsus L × D	0.148 × 0.061	0.156 × 0.066	0.162 × 0.063	0.158 × 0.065
Telotarsus L × D	0.247 × 0.039	0.249 × 0.042	0.262 × 0.043	0.262 × 0.045

^a Abbreviations: abd., abdominal; B, breadth; D, depth; L, length.

long as deep; hand scarcely longer than tibia and 1.6–1.7 times as long as broad; fingers 1.18 to 1.24 times as long as hand.

Chela with dentition and chaetotaxy as illustrated (fig. 1G); marginal teeth retroconical to bluntly rounded, contiguous and well developed, numbering 43 to 46 on fixed, and 49 to 51 on movable, finger; fixed finger with prominent, subterminal, accessory tooth interiorly, about opposite fourth marginal tooth (fig. 1G, insert).

Legs of typical chthoniine facies; relatively short and moderately robust. Proportions: leg I: basifemur 3.7–4.0, telfemur 2.4–2.5, tibia 3.2–3.7, and miotarsus 6.0–6.3, times as long as deep; leg IV: "miofemur" 1.1–1.2 times as deep as breadth of palpal femur and 2.5–2.9 times as long as deep; tibia 3.5–3.7, metatarsus 2.4–2.6, and telotarsus 5.8 to 6.3, times as long as deep. Tactile seta present on metatarsus of legs III and IV (about 0.3 of length of segment from its base), but not, apparently, on tibia or telotarsus.

MEASUREMENTS: Measurements of the four

available specimens are summarized in table 1.

Sathrochthonius tullgreni, new name

Chthonius caecus TULLGREN [*nec Chthonius caecus* Simon (1885) or *Chthonius coecus* Packard (1884)], 1909, in Michaelsen, Die Fauna Südwest-Australiens, vol. 2, pt. 23, p. 414, fig. 3 (palp and genital chaetotaxy of male).

Mundochthonius caecus (Tullgren), BEIER, 1932, Das Tierreich, vol. 57, p. 38.

DIAGNOSIS: Recapitulation of original description which was based on a unique male. Whitish, with only chelicerae and pedipalps brownish.

Carapace anteriorly almost as broad as long; scarcely narrowed posteriorly. Epistomal process present and finely toothed. Integument smooth and polished, with a number of relatively long setae anteriorly and laterally; eyes absent.

Abdomen scarcely twice as long as cephalothorax, broadly rounded posteriorly; integument sparsely provided with rather long hairs.

The external male genital area, as illustrated by Tullgren, appears rather similar to that here shown for *S. tuena*, although the setae of the anterior plate are differently disposed, with the discal cluster comprising only four (of which the posterior median pair are much longer than the others) rather than six setae. The lateral marginal setae of the posterior genital plate number eight or nine, as in *S. tuena*.

Both fingers of the chelicera with a number (about eight) of pointed teeth, somewhat greater than in *S. tuena* in which they number four or five. Flagellum comprising seven pinnate setae.

Palp a little longer than body. Integument smooth, with a vestiture of fine, simple hairs, those of the outer surfaces "shorter than those of the inner surfaces." Tactile hairs of chela noted, but numbers and disposition not given. Femur about 4.0 times as long as broad, hand 1.25 times as long as broad, fingers about 1.5 times as long as hand, "finely denticulate" (i.e., fingers with marginal teeth contiguous).

MEASUREMENTS (IN MILLIMETERS): Length of carapace ("cephalothorax"), 0.26; abdomen, 0.5; trochanter, 0.07; femur, 0.26; tibia, 0.12; hand, 0.15; fingers, 0.23.

REMARKS: This small species has been renamed to eliminate a primary homonymy. The preceding descriptive synopsis gives all the points of apparent specific significance mentioned by Tullgren. The species was based on a single male from "Stat. 139, Brunswick, 7. X. 05," southwest Australia, and was collected by the Hamburg Southwest Australian Expedition of 1905. Knowledge of the exact chaetotaxy of the chela, the coxal spines (if present), and the intercoxal tubercle will be required before the taxonomic status of the species can be regarded as certain. The species is well enough described for recognition, if topotypical collections become available.

While it is quite possible that *S. tullgreni* is not truly congeneric with *S. tuena*, nothing in the original description prohibits the association. Certainly it seems much more probable that it belongs to *Sathrochthonius* than to the holarctic genus *Mundochthonius*.

Beier's assignment of this species to *Mundochthonius* was tentative only. He also re-

marks that the unique type has been lost. The abbreviated description given by him (as in the case here) was a synopsis of Tullgren's original account.

GENUS *CHTHONIUS* L. KOCH

Chthonius (*Chthonius*) *cryptus*, new name

Chthonius caecus SIMON [nec *Chthonius coecus* Packard (1884)], 1885, Ann. Soc. Ent. France, ser. 6, vol. 5, p. 214.

Chthonius (*Chthonius*) *caecus* Simon, BEIER, 1932, Das Tierreich, vol. 57, p. 54, fig. 63 (chela).

REMARKS: This species is renamed to eliminate its primary homonymy with *C. coecus* Packard which was described in 1884. Simon's original description of 1885, as supplemented by Beier's redescription of 1932 (presumably on the basis of the types), will define the species. It was described from material from the Cave of Kokkino-Vracho (Mt. Ossa, in Thessaly, Greece).

The variant spelling of *caecus* (Simon, 1885, and Tullgren, 1909) versus *coecus* (Packard, 1884) does not eliminate the three-way homonymy involved (International Rules of Nomenclature, article 35), nor does the fact that all three species are now assigned to three different genera. Thus *Chthonius coecus* Packard (1884) is not a true *Chthonius* but is more likely referable to *Apochthonius* or *Kewochthonius*, although this point remains uncertain pending a modern redescription. Packard's species was described from two specimens collected in Weyer's Cave in Virginia. Simon's species remains in the typical subgenus of *Chthonius*, while Tullgren's species (1909) is tentatively referred to *Sathrochthonius*, new genus.

APHRASTOCHTHONIUS, NEW GENUS

GENEROTYPE (ORTHOTYPE): *Aphrastochthonius tenax*, new species.

DIAGNOSIS: Carapace (fig. 2F) of typical facies but completely lacking eyes (in generotype, at least); constricted behind ("waisted") and with vestiture of approximately 18 macrosetae plus reduced subocular setae; epistomal process reduced, merely serrate in orthotype (fig. 2G).

Abdomen of usual ovate proportions, about twice as long as broad; pleural membrane finely papillate; tergites and sternites uniseriate; eleventh tergite and sternite fused to

form terminal circumanal plate of which dorsal element only is setose; ventral half only, of anal operculum (sternum of reduced twelfth segment), bisetose.

General pattern of male genitalia as illustrated (fig. 2H, I).

Coxal area of typical facies, apex of coxa I produced into well-developed process (fig. 2J); coxal spines present on coxae I and II and comprising in each case a transverse contiguous series of short, generally bipinnate blades (fig. 2C); small, setose, intercoxal tubercle present (monosetose in holotype and bisetose in allotype of generotype; probably normally bisetose).

Chelicera (fig. 2F) of typical facies, nearly as long as carapace; galea absent or vestigial; serrulae and flagellum normally chthonioid; chaetotaxy characterized by two small accessory setae (in generotype, at least).

Palp (fig. 2D) extremely attenuated in generotype which is typically troglobitic; chela homodontate, with prominent spaced teeth on each finger; base of fixed finger (fig. 2B) with prominent interior sclerotic process (attachment apodeme); chaetotaxy as illustrated (fig. 2A); setae IB and ISB about median on dorsum of hand; IST, ESB, and EB closely associated at base of finger; EST and IT closely paired, distinctly distad of median and a little caudad of ET which is distinctly closer to EST and IT than to diploid tactile setae which are situated nearly midway between finger tip and seta ET; B subbasal in position; SB nearly median and closer to T and ST than to B; T and ST closely paired and situated about one-fourth of finger length from its tip.

Legs attenuated but of typical chthonioid facies; no data on tactile setae of third and fourth legs (lost, or absent, from available material of generotype and only known species).

REMARKS: This genus seems to occupy a rather isolated position and is not, apparently, clearly related to any other genus thus far described.

***Aphrastochthonius tenax*, new species**

Figure 2

MATERIAL: Holotype, male (JC-1284.01001), allotype, female (JC-1284.01002), both collected in Bangor Cave 1 mile north-

east of Bangor, Blount County, Alabama, March 9, 1940, by W. B. Jones (lot 14). (Cave location: "SE $\frac{1}{4}$ NE $\frac{1}{4}$ S 16-12-2W.")

DIAGNOSIS: Both sexes unless otherwise indicated. Small, extremely attenuated, and pallid (light yellowish) species of typical troglobitic facies. Carapace (fig. 2F) finely tessellated, laterally minutely granulated, longer than anterior breadth, distinctly narrowed posteriorly; completely blind, no ocular vestiges remaining; epistomal process reduced to series of median serrations (fig. 2G); chaetotaxy, d4d-4(20).

Tergal chaetotaxy (both sexes), 4:4:4:6:6:6:6:6:4:T2T:0. Sternal chaetotaxy of male:

$$\left(\frac{4}{\text{mm}}\right):[4-4]:(3)\frac{6-6}{5}(3):(3)m7m(3):$$

dm6mdd:mm7mm:mm7mm:m9m:S2S1S3S:
SS1SS:0:m(=mm normally)

Sternal chaetotaxy of female:

6:(3)6(4):(4)7(4):mm6mm:mm7m:mm7mm:
mm6mm:S7S:S1S1S2S:0:mm.

Male genitalic structure as illustrated (fig. 2I). Chaetotaxy of genital segments unusually sparse and setae relatively short (fig. 2H).

Coxal area of generally typical facies: chaetotaxy, 1-S1-1:mm-3-1-CS:3-2-CS:2-4 or 5:2-4. Single apical seta of maxilla unusual, possibly diagnostic (usually paired), condylar semitactile seta unusually robust; preclivus distinctly hispid. Coxal spines present on coxae I and II, comprising in each case subtransverse, contiguous series of seven to nine short, mostly doubly pinnate blades, basal blades tending to be acute (fig. 2C). Apical process of coxa I interiorly with two border microsetae (fig. 2J). Intercoxal tubercle of allotype monosetose (probably a teratological reduction from normal bisetose structure).

Chelicera of normal facies, comparatively slender but distinctly shorter than carapace (fig. 2F); about 2.3 times as long as broad; spinneret vestigial; serrula exterior with 18 blades; serrula interior with about 15 teeth; flagellum of eight or nine long and plumose setae arranged in biseriate series; movable finger bordered by nine or 10 small serrations; fixed finger with one large median tooth which is preceded basally by seven or eight pro-

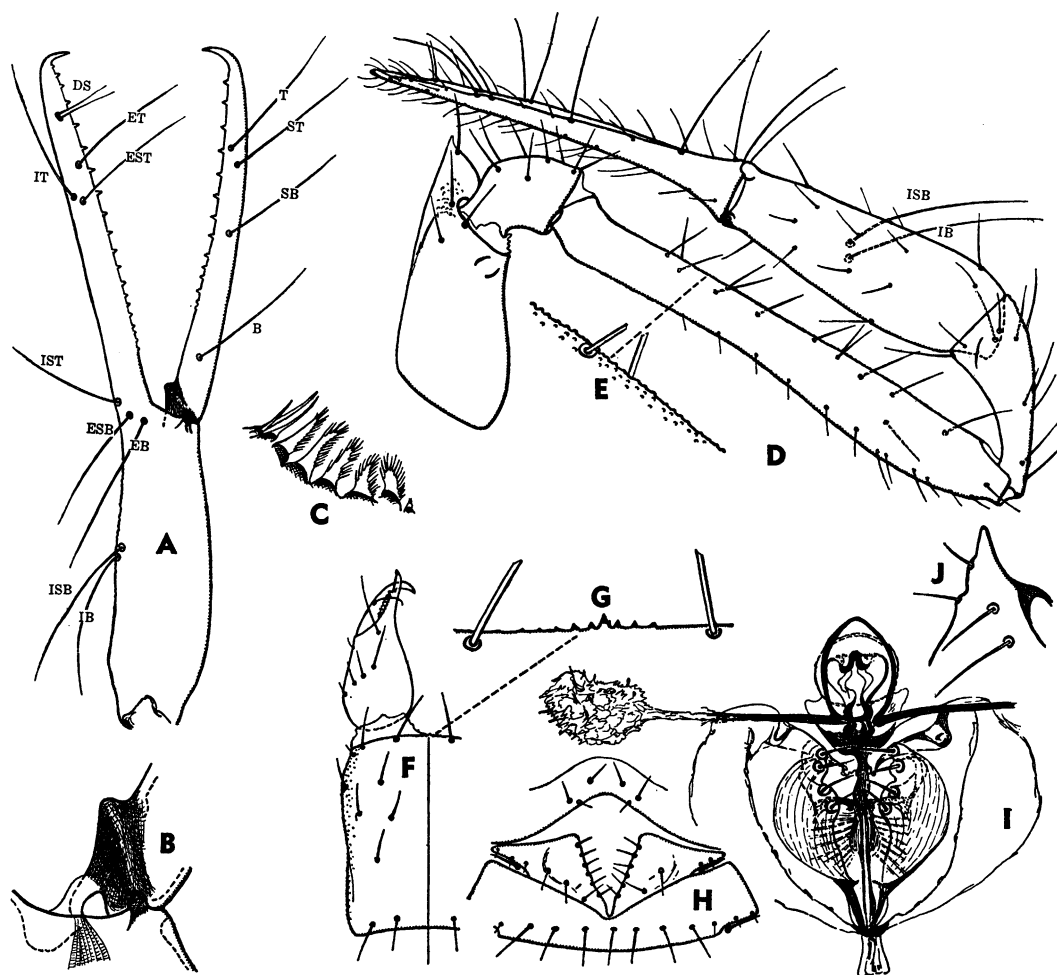


FIG. 2. *Aphrastochthonius tenax*, new species. A. Exterior aspect of right chela. B. Digital condyle of movable finger of chela. C. Coxal spines (coxa II, holotype male). D. Ventral aspect of left palp (allotype female). E. Portion of inner margin of femur, showing minute granulations (allotype female). F. Chelicera and left half of male carapace (JC-1204.01001). G. Epistomal area of carapace. H. Male genital opercula, showing chaetotaxy (JC-1284.01001). I. Structure of male genitalia. The setae represent the invaginated and modified second sternite (JC-1284.01001). J. Apex of left pedal coxa I, showing process and chaetotaxy (male, JC-1284.01001).

gressively smaller denticles or serrations; chaetotaxy comprising usual setae (*es* much reduced) plus two accessory setae, one extero-laterad of *b*, the other very short and caudo-laterad of first accessory seta.

Palp (fig. 2D) of attenuated facies, inner face of trochanter and femur very minutely and sparsely granulated (fig. 2E); as usual, male palp somewhat more slender than that of female. Palpal proportions of male: trochanter 1.6 times as long as broad; femur 7.9, tibia 1.7, and chela 7.1–7.2, times as long as

broad; chela 7.3 times as long as deep; hand 3.1 times as long as broad; fingers 1.3 times as long as hand. Palpal proportions of female: trochanter 1.7, femur 7.6–7.7, tibia 2.5, and chela 6.7, times as long as broad; chela 6.9–7.0 times as long as deep; hand 2.9 times as long as deep; fingers 1.3 times as long as hand.

Chela with chaetotaxy and dentition as illustrated (fig. 2A); fixed finger of each sex with 19 to 20 acute spaced teeth, basal two or three much reduced; movable finger of each

sex with 13 or 14 similar acute spaced teeth, of which basal two or three much reduced or vestigial; base of movable finger conspicuously buttressed and sclerotic, with apodeme of retractor muscle of chela prominent and also strongly sclerotic (fig. 2B).

Legs of usual facies but more slender than usual; tactile setae of third and fourth legs "lost" (possibly absent from tibia but presence or absence uncertain for metatarsus and telotarsus). Proportions of leg I (observed values for female and male, respectively): basifemur 7.1–7.3, telofemur 4.2–3.9, tibia 4.4–4.2, miotarsus 10.0–10.9, times as long as deep. Proportions of leg IV (female and male, respectively): "miofemur" 3.2–3.1, tibia 5.8–6.2, metatarsus 3.3–3.0, telotarsus 11.7–12.7, times as long as deep.

MEASUREMENTS (IN MILLIMETERS): Holotype male: Total length, 1.56; abdominal breadth, 0.51. Carapace 0.48 long, 0.43 broad anteriorly, and 0.41 broad posteriorly. Chelicera, 0.403 by 0.177. Palp: trochanter, 0.188 by 0.119; femur, 0.812 by 0.103; tibia, 0.216 by 0.125; chela, 1.050 by 0.147 broad and 0.144 deep; hand, 0.459 long; finger, 0.590 long. Leg I: basifemur, 0.464 by 0.064; telofemur, 0.230 by 0.059; tibia, 0.212 by 0.050; miotarsus, 0.481 by 0.044. Leg IV: "miofemur," 0.672 by 0.217; tibia, 0.459 by 0.074; metatarsus, 0.200 by 0.066; telotarsus, 0.544 by 0.043.

Allotype female: Total length, 1.69; abdominal breadth, 0.57. Carapace 0.48 long, 0.44 broad anteriorly, 0.41 broad posteriorly. Chelicera, 0.410 by 0.177. Palp: trochanter, 0.206 by 0.121; femur, 0.820 by 0.107; tibia, 0.307 by 0.124; chela, 1.050 by 0.156 broad and 0.151 deep; hand, 0.459 long; fingers, 0.597 long. Leg I: basifemur, 0.462 by 0.065; telofemur, 0.246 by 0.059; tibia, 0.213 by 0.048; miotarsus, 0.451 by 0.045. Leg IV: "miofemur," 0.656 by 0.202; tibia, 0.446 by 0.077; metatarsus, 0.210 by 0.063; telotarsus, 0.525 by 0.045.

TYRANNOCHTHONIINI, NEW TRIBE

TYPE: The genus *Tyrannochthonius* Chamberlin.

DIAGNOSIS: Chthoniine group with tactile setae ISB and IB of chela transversely paired in median or subbasal position on dorsum of hand, with marginal teeth of chela spaced

(non-contiguous) and acute, the individual teeth lacking subsidiary lateral denticles. Intercoxal tubercle absent; coxal spines present, variously developed but occurring only on second pair of pedal coxae.

REMARKS: This new tribe includes the genera *Troglochthonius* Beier, *Paraliochthonius* Beier, *Tyrannochthonius* Chamberlin and its subgenus *Lagynochthonius* Beier (here elevated to generic rank), and *Morikawia*, new genus, for the reception of two species formerly assigned to the type genus *Tyrannochthonius*. The five included genera can be separated by means of the following key:

KEY TO GENERA OF THE TYRANNOCHTHONIINI

1. Fixed finger of chela provided interiorly with two or three slenderly lanceolate, forward-projecting, basal and subbasal guard setae which are much more thickened and robust than usual vestitural setae 2
- Fixed finger of chela at most with a single, forward-projecting guard seta which is little longer or more robust than usual vestitural setae (apparently absent in many cases) 4
- 2(1). Coxal spines bipinnate, five to seven in number, arising from common base or pediment from which they radiate "like fingers from the hand" (e.g., as in fig. 3E); Baja California and Japan *Morikawia*, new genus
- Coxal spines not originating from common base or pediment; comprising a linear, subtransverse series of flattened, variously dentate, ligulate blades 3
- 3(2). Fixed finger of chela with three prominent, forward-projecting guard setae; tergites 1 to 3 with only two border setae each; coxal spines numbering 10 to 12 contiguous blades; fingers of chela with alternating, spaced macrodenticles and microdenticles; only included species a true troglobite from southern Hercegovina *Troglochthonius* Beier
- Fixed finger with only two prominent, forward-projecting guard setae; tergites 1 to 3 with four or more border setae; coxal spines fewer (about seven); marginal teeth of chela narrowly spaced, homodentate; littoral epigeal forms from southern Italy and Madeira Islands *Paraliochthonius* Beier
- 4(1). Bulb of chelal hand more or less strongly constricted proximad of prominent digital condyles and heavily sclerotized, digi-

tal apodeme (hand "flask-like" in shape); Indo-China, Malaya, Philippines, Sumatra, Java, and western Micronesia . . .

. *Lagynochthonius* Beier
Bulb of chelal hand not so constricted, of normal facies; digital condyles and apodeme not unusually large or conspicuous; large genus of tropicopolitan distribution *Tyrannochthonius* Chamberlin

Tyrannochthonius Chamberlin as here restricted will be the subject of a separate review now in course of preparation and is not further considered. *Paraliochthonius* Beier has recently been reviewed in detail by Max Vachon (1960, Bull. Mus. Natl. d'Hist. Nat., Paris, ser. 2, vol. 32, no. 4. pp. 331-337), and it too is omitted from further consideration at this time.

GENUS *TROGLOCHTHONIUS* BEIER

Troglochthonius BEIER, 1939, Studien Gebiete Allg. Karstforsch. Wiss. Höhlenk. der Eiszeitforsch. Nachgeb., biol. ser. no. 4, no. 10, pp. 24-25, figs. 27 (palp), 28, 29 (chela, male and female).

GENEROTYPE (ORTHOTYPE): *Troglochthonius mirabilis* Beier.

DIAGNOSIS (EMENDED): *Tyrannochthoni*-ine genus with all indicated characters of tribe. Completely eyeless, pallid, and attenuated troglobite. Abdominal tergites with reduced chaetotaxy; two border macrosetae only on first four tergites. Chelicera lacking differentiated spinneret; cheliceral chaetotaxy undescribed.

Coxal spines 10 to 11 bipinnate blades arising independently and arranged in single contiguous or nearly contiguous transverse series on each of second pedal coxae. No intercoxal tubercle.

Chaetotaxy of chela normal; setae ET and DS nearly terminal on fixed finger and only a little distad of closely paired setae EST and IT (i.e., three tactile setae plus diploid seta concentrated on terminal fifth of fixed finger); IST, ESB, and EB on basal fourth of fixed finger; IB and ISB transversely paired on dorsum of hand about one-fourth of hand length from its base; T and ST closely paired about one-fourth of finger length from its tip; SB almost median on finger and approximately equidistant between ST and B; B about one-fourth of finger length from its base. Inner surface of chela at and near base

of fixed finger and hand with three robust, spine-like, but slender, forward-pointing, guard setae ("Pfahlborsten"), which are modified macrosetae arising from small tubercles and having nothing to do with usual tactile setae. Heterodont; marginal teeth of chela prominently developed and comprising alternating series of spaced macrodenticles and microdenticles.

REMARKS: This genus is represented at present by a single, unusual, troglobitic species, *Troglochthonius mirabilis* Beier, the unique female type of which was collected in a cave in southern Hercegovina ("*Grabovica Pećina bei Grepei auf dem Karststrücken*") between the sea and Popove-Polje). It was collected on the large stalagmite group in the back part of this large cave. This species probably represents a relict form as already hypothesized by Beier (*loc. cit.*).

MORIKAWIA, NEW GENUS

GENEROTYPE (ORTHOTYPE): *Chthonius johnstoni* Chamberlin.

DIAGNOSIS: Segregate of *Tyrannochthonius* Chamberlin, *sensu stricto*, and a member of the *Tyrannochthoniini*.

Four eyes present in the two known species. Abdominal tergites with normal vestiture of four to six macrochaetae per segment.

Coxal spines (fig. 3E) comprising five or six more or less bipinnate blades arising and radiating from a lobed, common pediment or base (much as "fingers from the hand"). Intercoxal tubercle lacking.

Chelicera lacking differentiated spinneret and provided with at most a single small accessory seta near base of hand (fig. 3F).

Chaetotaxy of chela normal (fig. 3A); ET somewhat closer to diploid setae (DS) than to the pair EST-IT which is situated about one-fourth of finger length from its tip; IST, ESB, and EB closely clustered on basal one-fifth of finger; ISB and IB transversely paired on dorsum of hand at point slightly but clearly proximad of median; seta ST about one-fourth of length of movable finger from its tip and only a little caudad of T; SB median in position and closer to ST than to B which is situated about one-sixth of finger length from its base. Inner face of base of fixed finger of chela with two robust, but slender, thorn-like, forward-pointing, and

apparently sessile guard setae (fig. 3A). Homodontate; marginal denticles of chela well spaced, equally prominent, and well developed on each finger (no alternating microdenticles in either known species).

REMARKS: This genus is presently based on the type (Mexico; Baja California) and a second, closely related, form from Japan. It is my pleasure to dedicate the new genus to Prof. Kuniyasu Morikawa of Ehime University, Matsuyama, Japan, who has recently contributed greatly to our knowledge of the Japanese Chelonethida.

The two presently included species can be separated by means of the following key:

- Chela with 26 prominently acute, spaced teeth on each finger; carapace with total of 18 setae, including dwarfed preocular setae (16 macrochaetae); third tergite with six macrochaetae; cheliceral palm with total of five setae (*is*, *sb*, *b*, *es*, plus a small accessory seta); Baja California, Mexico *johnstoni* (Chamberlin)
- Chela with 20 rather blunted, spaced teeth on each finger; carapace with total of 16 macrochaetae only (dwarfed preocular setae absent); third tergite with four macrochaetae only; cheliceral palm with four setae only; Japan *takashimai* (Morikawa)

Morikawia johnstoni (Chamberlin)

Figure 3

Chthonius johnstoni CHAMBERLIN, 1923, Proc. California Acad. Sci., ser. 4, vol. 12, p. 357, pl. 2, fig. 17 (chela), pl. 3, figs. 11 (epistomal process), 12 (coxae I and II), and 13 (coxal spine).

Tyrannochthonius johnstoni (Chamberlin) CHAMBERLIN, 1929, Ann. Mag. Nat. Hist., ser. 10, vol. 4, p. 75, figs. 2D (coxal spine) and 2F (epistomal process); 1931, Stanford Univ. Publ., biol. sci., vol. 7, no. 1, pp. 56, 92, fig. 21K (coxal spine). BEIER, 1932, Das Tierreich, vol. 57, p. 64, fig. 78 (coxal spine). ROEWER, 1937, in Bronn, Klassen und Ordnungen des Tierreichs, vol. 5, pt. 4, book 6, lief. 1, p. 93, fig. 68III (coxal spine), lief. 2, p. 240 (listed).

MATERIAL: Holotype, female (JC-111.-01001); Mexico: Baja California, Puerto Escondido; California Academy of Sciences, No. 1266.

DIAGNOSIS (EMENDED): Small species of typical facies. Carapace (fig. 3F) smooth, distinctly constricted behind, with "four pearly white eyes," of which posterior pair are weakly developed; chaetotaxy d4d-2(18); epistomal process (fig. 3F, insert) slender and

sharply acuminate, about three times as long as basal breadth.

Tergal chaetotaxy, 4:4:5(=6):6:6:6:6:6:6:4:T2T:0; sternal chaetotaxy, 9:0:(4)7(4):(3)6(3):mm6mm:mmm6mmm:m7m:11:10:9:0:mm.

Coxal area of usual facies (fig. 3D); chaetotaxy, 2-3-1;0-3-0; 2-1-CS; 2-3; 2-3; coxal spines (fig. 3E) comprising five doubly pinnate blades arising from closely contiguous lobes of common low base; apical process of coxa I elongate, prominent, rounded, non-setose.

Genital operculum of female with bilaterally symmetrical group of nine acuminate setae.

Chelicera as illustrated (fig. 3F), slightly longer than carapace, with single accessory seta caudad of *es*; movable finger medially with eight subequal, retrorse, marginal teeth; fixed finger with five median, protrorse teeth which become progressively smaller basally; serrula exterior with about 18 to 20 teeth; those of serrula interior not observable.

Palp moderately slender, lacking subterminal tubercle on fixed finger of chela. Palpal proportions: trochanter 1.8 times as long as broad; femur twice as long as tibia and 4.6 to 4.7 times as long as broad; tibia 1.9 times as long as greatest breadth; chela 1.5 times as long as femur and 5.4 times as long as broad; fingers longer than femur and about 2.3 times as long as hand.

Chaetotaxy and dentition of chela as illustrated (fig. 3A, B, C); homodontate, with 27 prominent, evenly spaced teeth on each finger; with two thickened, guard setae (*gs*) situated interiorly and basally on fixed finger opposite setae EB, ESB, and IST.

Legs of typical facies; fourth femur robust, 2.7 times as long as deep.

MEASUREMENTS (IN MILLIMETERS): Caustic-potash-cleared holotype female. Total length, 1.41; abdominal breadth, 0.49±. Carapace 0.40 long, 0.42 broad across eyes, and about 0.36 broad posteriorly; epistomal process, 0.033 by 0.010. Palp: trochanter, 0.213 by 0.103; femur, 0.492 by 0.107; tibia, 0.249 by 0.123; chela, 0.761 by 0.136 broad and 0.136 deep; hand, 0.236 long; finger, 0.525 long. Leg I: basifemur, 0.267 by 0.061; telofemur, 0.136 by 0.052; tibia, 0.151 by 0.047; miotarsus, 0.298 by 0.038. Leg IV:

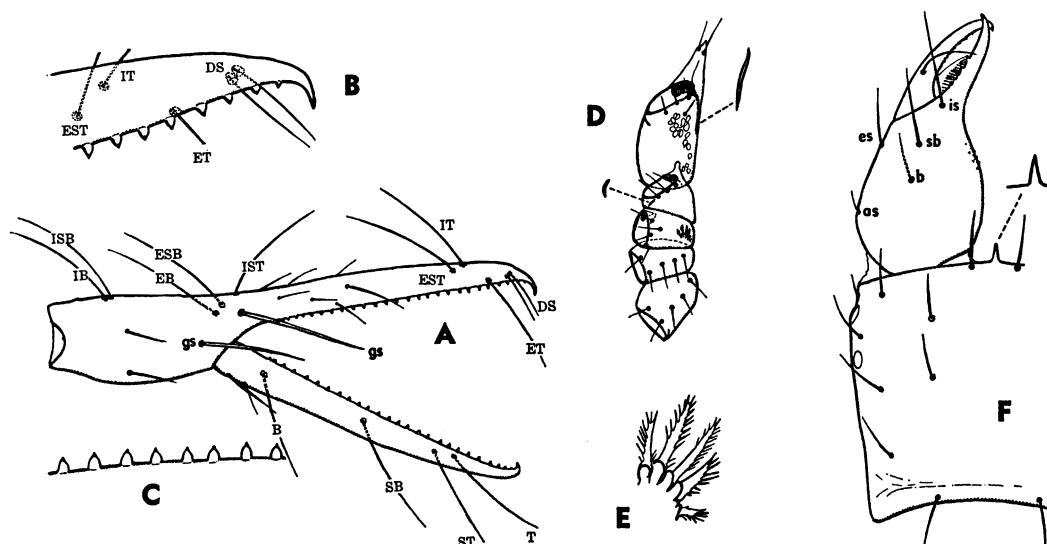


FIG. 3. *Morikawia johnstoni* (Chamberlin). All drawn from the unique holotype female. A. Interior aspect of left, chela showing chaetotaxy and dentition. Note the pair of lance-like guard setae at base of fixed finger (gs). B. Tip of fixed finger of chela, showing details of dentition and chaetotaxy. C. Marginal teeth from near middle of movable finger. Note homodontate character. D. Right coxal area. E. Coxal spine. F. Carapace and chelicera. Insert shows epistomal process on enlarged scale. Actual setae lost from specimen; pattern determined from the areoles.

"miofemur," 0.476 by 0.177; tibia, 0.315 by 0.072; metatarsus, 0.136 by 0.055; telotarsus, 0.315 by 0.038.

REMARKS: This redescription is based on a new study of the holotype and only known specimen. The measurements have not previously been published. The number of eyes was originally noted (Chamberlin, 1923) as "four pearly white eyes," which agrees with notes taken prior to the clearing of the specimen for study. Subsequently (Chamberlin, 1929) they were given as only two (in a key), a mistake that was copied by Beier in 1932. The error apparently resulted when the caustic-potash-cleared holotype was briefly restudied in 1928, when the more weakly developed posterior eyes were not observed.

The type was not recognized as a false scorpion at the time of collection. Later it was segregated from a vial of miscellaneous material from Puerto Escondido, Baja California, Mexico, when it was "assumed" to have come from near a fresh-water spring in the neighboring mountains (Escondido Gorge). This does not, at present, seem so probable since the discovery of the closely similar littoral species *Morikawia takashimai*

(Morikawa) from Japan. In other words, it seems equally possible that the specimen in question was also from a littoral habitat (e.g., under a stone or piece of driftwood on the beach).

***Morikawia takashimai* (Morikawa),
new combination**

Tyrannochthonius johnstoni subsp. *takashimai*
MORIKAWA, 1958, Mem. Ehime Univ., sect. 2, nat. sci., ser. B, biol., vol. 3, no. 1, pp. 6-7, figs. 1a (palp and chela), 1b (coxal spines).

REMARKS: This form, which Morikawa regarded as a subspecies of *johnstoni* (Chamberlin), is undoubtedly specifically distinct. It was collected intertidally under a stone on the beach at Cape Manazura, Kanagawa Prefecture, Japan. The single female from which the species was described is deposited in the collections of Ehime University.

Morikawa's illustration (*loc. cit.*) of the chela fails to show the characteristic pair of guard setae found in *johnstoni*, while the basal position shown for tactile seta SB differs widely from that found in *johnstoni* (median). Otherwise the chaetotaxy shown is typical. The coxal spines as illustrated by Morikawa

are completely typical but more conspicuously pinnate than in *T. johnstoni*.

An inquiry directed to Morikawa concerning the above points, as well as a request for a verification of his description of the tergal, carapacal, and cheliceral chaetotaxy, elicited the following information (letter, December 29, 1959): "... My figure of *Tyrannochthonius takashimai* is wrong and the tactile seta SB... is clearly situated in the middle of the movable finger. There are *two extremely thick* and robust forward projecting bristles interiorly (correspond to ESB and EB in my figure)... They are not tactile setae. Carapacal chaetotaxy 4-2(16)... dd setae (preocular dwarf setae of front marginal series) absent. Cheliceral palm with four setae and there is not any basal accessory seta."

GENUS *LAGYNOCHTHONIUS* BEIER

Lagynochthonius BEIER, 1951, Mém. Mus. Natl. d'Hist. Nat., Paris, ser. A, zool., vol. 1, p. 61.

GENEROTYPE (ORTHOTYPE): *Chthonius johnei* Redikorzev (1922).

RANGE: Indo-China and Malaya, the Philippines, Sumatra, Java, and western Micronesia.

DIAGNOSIS (EMENDED): Bulb of chela "bottle-shaped" (i.e., more or less distinctly constricted or "bottle-necked" just caudad of strongly sclerotized digital condyles and enlarged and strongly sclerotic digital apodeme); chela short fingered, less than 1.5 times hand length (in most cases 1.0–1.3 times).

Carapace subquadrate, with or without epistomal process; vestitural macrochaetae totalling 14–16. With four eyes, two, or none.

Tergites bordered by two to six marginal macrochaetae.

Coxal spines a subtransverse series of six to 10 flattened, ligulate blades variously incised or pinnate terminally, arising independently from the coxal surface, not radiating from common base or pediment.

Palm of chelicera with or without accessory setae.

Chaetotaxy of chela essentially the same as in *Tyrannochthonius*: seta ET subterminal, slightly to distinctly closer to DS than to EST or IT; DS submedian between ET and finger tip; setae EST and IT obliquely and closely paired about one-third of finger length from its tip; IST, ESB, and EB basally clustered

on dorsum of finger; ISB and IB transversely paired on dorsum of hand about one-third of hand length from its base; seta T and ST obliquely paired one-third to one-fourth of finger length from its tip; SB in normal subbasal position, with SB slightly but distinctly proximad of median and closer to B than to ST; SB to ST 1.3 to 2.0 times the distance from B to SB. As in *Tyrannochthonius*, *sensu stricto*, a single robust (but not especially prominent), forward-projecting, guard seta inserted interiorly near base of fixed finger (gs in fig. 4A). Dentition of chela basically as in *Tyrannochthonius*, with non-contiguous, alternating macrodentacles and microdentacles (e.g., as in *L. dybasi* Beier). In most included species, however, this heterodont character tends to disappear through progressive suppression of microdentacles so that, in some species, dentition comprises spaced macrodentacles only, except, at most, for a very few extremely minute, microdenticle vestiges [e.g., in *L. johnei* (Redikorzev) and *L. paucidentatus* Beier].

REMARKS: The only really certain diagnostic characters of this genus are the shape of the palpal hand and the greatly enlarged, sclerotic apodeme of the movable finger. Other distinguishing characters may become apparent with further research. The terminal digital sensorium of the fixed finger (fig. 4B) described for *L. bakeri* has not been reported for other included species.

The carapacal chaetotaxal limits are uncertain. Most species reportedly possess a total of 14 to 16 setae. However, in *L. bakeri* there are 18, two of which (the preoculars) are greatly reduced (dwarfed) and easily missed except in a cleared and stained preparation. If macrochaetae only are considered, however, the limits would be 14–16 in all species thus far included.

The presently included species, only two of which are further discussed, can be separated by means of the following key:

KEY TO SPECIES OF *Lagynochthonius*

1. Fingers and hand of equal length (fingers 0.97–1.0 times hand length) 2
Fingers distinctly longer than hand (fingers 1.1 or more times hand length) 3
- 2(1). Small species, chela 0.70 mm. long; distinct trapezoidal epistomal process present; Sumatra *johnei* (Redikorzev)

- Larger species, chela 1.1 mm. long; epistomal process lacking; Malaya
 *paucidentatus* Beier
- 3(1). Blind (weak pigment spots marking position of anterior eyes only); fingers elongate, 1.4 times as long as hand; Malaya
 *exiguus* Beier
- Four eyes apparent, anterior pair convex (corneate); posterior pair non-corneate or reduced to fairly distinct "spots". 4
- 4(3). First five tergites with four border setae each 5
- First four tergites only with four or fewer border setae 7
- 5(4). Small species, the chela 0.5, the femur 0.34, mm. long; macrodenticles of fixed finger not more than 1.5 times as numerous as on movable finger; (fixed finger with subterminal digital sensorium distad of setae DS); the Philippines
 *bakeri* (Chamberlin)
- Larger species, the chela 0.85–1.0, the femur 0.6–0.7, mm. long; macrodenticles of fixed finger more than twice as numerous as those on movable finger 6
- 6(5). Coxal spines eight in number; fixed finger of chela with 16, movable finger with six, spaced macrodenticles; epistomal process vestigial ("flach") and scarcely produced; chela 0.85 mm. long; Indo-China
 *tonkinensis* Beier
- Coxal spines 11 in number; fixed finger with 20–24, movable finger with seven, spaced macrodenticles; small, triangular, epistomal process present; chela 1.0 mm. long; Java *roeweri*, new species
- 7(4). First two tergites with two border setae each; seta SB of movable chelal finger about 1.3 times as far from ST as from B; Indo-China *annamensis* Beier
- First two tergites with four border setae each; seta SB of movable finger twice as far from ST as from SB 8
- 8(7). Marginal macrodenticles of movable finger about half as numerous as on the fixed finger (16 on fixed, seven or eight on movable, finger); epistomal process distinct, triangular in shape; fingers 1.2–1.3 (female and male) times as long as hand; eastern Caroline Islands
 *ponapensis* Beier
- Marginal macrodenticles of movable finger nearly as numerous as on fixed finger (14 on fixed, 12 on movable, finger) epistomal process reduced, "grain-shaped"; finger 1.1–1.2 (female and male, respectively) times as long as hand; Palau Islands *dybasi* Beier

***Lagynochthonius bakeri* (Chamberlin),
 new combination**

Figure 4

Tyrannochthonius bakeri CHAMBERLIN, 1929, Ann. Mag. Nat. Hist., ser. 10, vol. 4, p. 75; 1931, Stanford Univ. Publ., biol. sci., vol. 7, no. 1, p. 137, fig. 34B, 3 (chela), p. 144 (note on digital sensorium). BEIER, 1932, Das Tierreich, vol. 59, p. 64. ROEWER, 1937, in Bronn, Klassen und Ordnungen des Tierreichs, vol. 5, pt. 4, book 6, lief. 2, p. 240 (listed).

MATERIAL: Holotype, male (JC-550.18001), from Mt. Makiling, Luzon, Philippine Islands; collected by C. F. Baker; J. C. Chamberlin collection.

DIAGNOSIS (EMENDED): Based on male only; female unknown. Very small, pale species of markedly attenuated facies. Carapace slightly longer than ocular breadth, narrowed behind; anterior eyes strongly convex, prominent, slightly less than their own diameter from anterior carapacial margin and about their own diameter from relatively large, flat (non-corneate), posterior eyes; epistomal process small but distinct, smoothly rounded; anteromedial serrations of carapace, if present, not distinguishable in type preparation; chaetotaxy, m4m-2(18). Two minute, preocular, lateral, marginal setae (m) of carapace very small and difficult to see.

Abdomen ovate, of normal structure; pleural membrane minutely papillate; tergal chaetotaxy: 4:4:4:4:4:6:6:6:6:4:T2T:0; sternal chaetotaxy obscure in type preparation but apparently as follows:

$$(10):[4-4]:(3) \frac{9-9 \pm}{9 \text{ or } 10} (3):(3)6(3):m6m:m6m:$$

$$m6m:m6m:8:8:0:mm.$$

Genitalia of characteristic facies, general appearance *in situ* as illustrated (fig. 4C).

Coxal area of usual structure and facies; apical process of coxa I normal and non-setose; coxal spines comprising subtransverse linear series of eight nearly contiguous ligulate blades, terminally and subterminally deeply incised; coxal chaetotaxy, 2-2-1:0-3-0:2-2-CS:2-3:2-3.

Chelicera of usual facies, slightly longer than carapace and about twice as long as broad; galeal tubercle absent; serrula exterior with about 16 or 17 teeth; serrula interior with 13 teeth; flagellum typical, of about

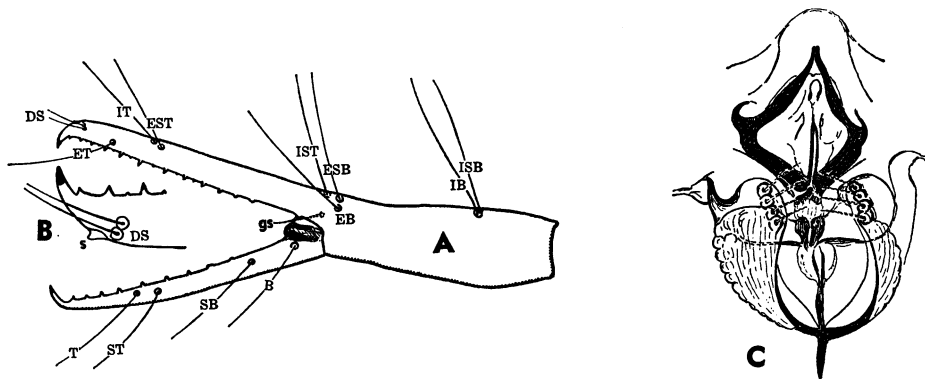


FIG. 4. *Lagynochthonius bakeri* (Chamberlin). Illustrated from holotype male. A. Exterior aspect of left male chela. B. Tubercle-like sensorium adjacent to the terminal diploid setae of the fixed finger. C. Internal structure of male genitalia. (Y-apodeme not visible in the type specimen.)

seven unilaterally pinnate setae; movable finger with about nine to 11 marginal denticles which extend from a point opposite the galeal seta distad to only a short distance proximad of finger tip; fixed finger with seven or eight marginal teeth which are largest distally and progressively decrease in size posteriorly; chaetotaxy normal, with the usual small accessory seta caudad of *es*.

Palp short but slender, femur longer than fingers and about 6.0 times as long as broad; tibia 2.1 times as long as broad; chela 1.4 times as long as femur and 6.4 times as long as broad or deep; hand 2.9 to 3.0 times as long as broad; finger 1.2 times as long as hand.

Chela of very slender facies, hand slightly constricted caudad of prominent digital condyles and apodeme; chaetotaxy and dentition as illustrated (fig. 4A); fixed finger clearly but not conspicuously heterodentate, with 12 macrodenticles, between which are interspaced seven very small microdenticles; movable finger apparently truly homodentate, with nine spaced macrodenticles only (basal two or three blunt and somewhat reduced); with usual (*tyrannochthoniine*) single, robust, pseudotactile guard seta interiorly at base of fixed finger (*gs* in fig. 4A); fixed finger subterminally with minute, protuberant sensorium distad of diploid setae (*s* in fig. 4C).

Legs of usual facies, moderately robust. Leg I: basifemur 4.4, telofemur 3.2, tibia 3.5, and miotarsus 8.0, times as long as deep. Leg IV: "miofemur" 2.27, tibia 4.1, metatarsus

2.3–2.4, and telotarsus 8.4, times as long as deep.

MEASUREMENTS (IN MILLIMETERS): Holotype male: Total length, 1.02; abdominal breadth, about 0.38. Carapace 0.26 long; ocular breadth, 0.24; posterior breadth, 0.20; diameter of anterior eyes, 0.028. Chelicera, 0.202 by 0.103 \pm . Palp: trochanter indeterminate; femur, 0.342 by 0.062 \pm ; tibia, 0.132 by 0.063; chela, 0.471 by 0.074 broad and 0.074 deep; hand, 0.217 long; fingers, 0.265 long. Leg I: basifemur, 0.180 by 0.041; telofemur, 0.110 by 0.035; tibia, 0.103 by 0.029; miotarsus, 0.202 by 0.025. Leg IV: "miofemur," 0.324 by 0.143; tibia, 0.206 by 0.050; metatarsus, 0.096 by 0.040; telotarsus, 0.213 by 0.025.

REMARKS: The original description of this species was very brief and did not include measurements.

Lagynochthonius roeweri, new species

Tyrannochthonius johnei BEIER (*nec Chithonius johnei* Redikorzev, 1922), 1930, Zool. Anz., vol. 9, p. 284; (*nec Chithonius johnei* Redikorzev, 1922), 1932, Das Tierreich, vol. 57, p. 65, fig. 80 (palp).

TYPES: Two adults (one male) collected in Batavia, Java (Roewer Nos. 1949/31 and 1951/33); determined (erroneously) by Beier as *T. johnei* (Redikorzev); type probably in C. Fr. Roewer's collection, with paratype possibly in Vienna Museum collections.

DIAGNOSIS: The species is defined by Beier's descriptions and measurements of 1930 and 1932.

REMARKS: The recorded chaetotaxal differences between this species and true *johnei*, as found in Beier's and Redikorzev's descriptions, respectively, may probably be disregarded (i.e., setae may have been lost from Redikorzev's material). The same is not true of the other differences, however, which seem quite adequate to justify the belief that two species are involved. The more important of these are contrasted in the following couplet:

Small species, femur 0.45 mm. long; hand and fingers of equal length, total length of chela (finger+hand length) 0.70 mm.; fixed finger of chela with 16, movable finger with eight, macrodenticles; Sumatra *johnei* (Redikorzev)

Larger species, femur 0.67 mm. long; fingers distinctly longer than the hand (1.1 times); chela length (hand+finger length) 1.02 mm.; fixed finger of chela with 20-24, movable finger with seven, macrodenticles; Java
 *roeweri*, new species

The species is dedicated to its collector, the eminent arachnologist, Dr. C. Fr. Roewer.

TRIBE PSEUDOTYRANNOCHTHONIINI

BEIER

GENUS TUBBICHTHONIUS HOFF

Tubbichthonius jonesi, new species

Figure 5

MATERIAL: Holotype, female (JC-2014-01001), collected in cave in Australia, "probably in Blue Mountains near Sydney" by W. G. Jones 1943. The species is respectfully dedicated to its discoverer, Mr. W. B. Jones.

DIAGNOSIS: Based on female only. Large, blind, yellowish rust species; appendages attenuated; of moderate troglobitic facies.

Carapace (fig. 5D) longer than broad, strongly narrowed posteriorly; with "ocular" disk strongly raised or elevated but completely lacking eyes or eye spots; derm smooth or tessellated except for broadly deltoid epistomal process which is conspicuously hispid (fig. 5B); carapacial chaetotaxy, m3m-2(17), norm probably m4m-2(18).

Abdomen moderately obovate, broadest subcaudally, tergites and sternites entire; eleventh tergite and sternite fused to form a terminal circumanal plate; sternal anal operculum (twelfth sternite) bisetose, dorsal operculum non-setose; pleural membrane finely papillate; tergal chaetotaxy, 2:4:4:6:6:6:6:6:7:5:TT:0; sternal chaetotaxy, 6:

(4)8(4):(3)8(3):mmm7mm:m7mm:m8m:9:8:SS2SS:0:mm; chaetotaxy of genital segments as illustrated (fig. 5E).

Genital area weakly sclerotic but with typical, elongate, transverse, lateral, cribriform plates and conspicuous, sclerotic, semilunate, median, cribriform plate measuring 0.107 mm. across (fig. 5E,F).

Coxal area of generally typical facies but unique in several respects; median maxillary lyrifissure V-shaped, unlike vast majority of chthoniids in which it comprises a simple slit; coxal spines present on coxae I only, comprising a transverse, contiguous series of eight to 10 peculiarly tridentate blades, central one distinctly spatulate (fig. 5G, H); apical process of coxa I broadly rounded (fig. 5H); bisetose intercoxal tubercle present (fig. 5C); chaetotaxy, 2-2-1:4-CS:2-2:2 or 3-3:3-2; apical maxillary seta dwarfed, antepical seta slender and elongate (fig. 5J); condylar seta of maxilla lost from type but probably elongate and semitactile in nature.

Chelicera as long as or longer than carapace; slender, about 2.4 times as long as broad; spinneret lacking; serrula exterior with 27 or 28 blades; serrula interior typical but number of teeth not visible in type preparation; flagellum comprising biseriate series of 10 or 11 unilaterally pinnate setae; movable finger with nine somewhat irregular but generally small denticles; fixed finger with large median tooth which is preceded basally by seven progressively smaller denticles; chaetotaxy including four or five accessory setae in addition to four typically present (eight or nine in all), as illustrated (fig. 5D).

Palp (fig. 5I) slender, derm smooth but distinctly squamotessellated, especially interiorly on femur and tibia. Trochanter 1.8-2.0 times as long as broad; femur longer than fingers and 6.8 times as long as broad; tibia 2.3 to 2.4 times as long as broad; chela 1.4 times as long as femur and 5.9 times as long as broad or deep; hand twice as long as broad; fingers 1.9 times as long as hand.

Chela homodentate, chaetotaxy and dentition as illustrated (fig. 5A); fixed finger with 31 spaced teeth which are smaller and more closely spaced basally; movable finger with 22 acute, spaced teeth which are preceded basally by 19 low, rounded, and nearly contiguous teeth (41 in all); movable finger also with

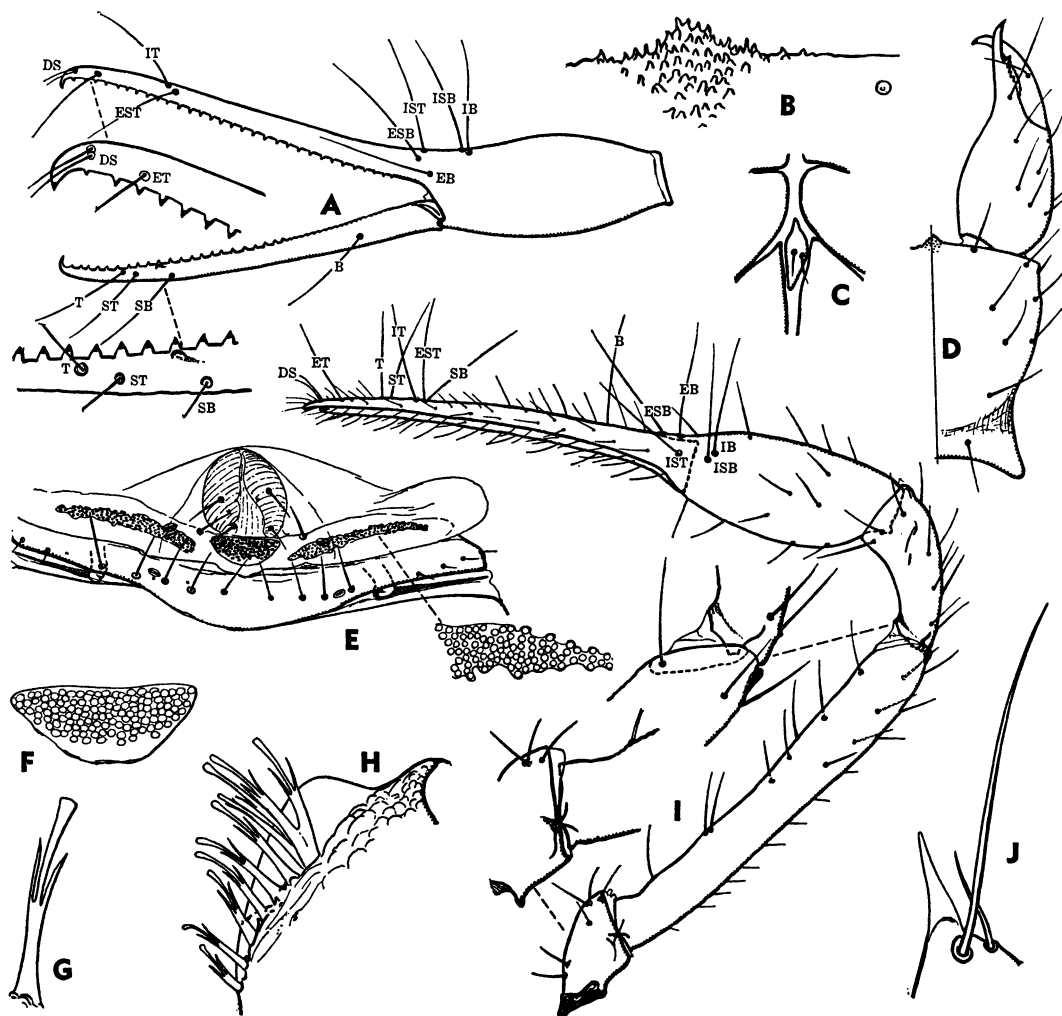


FIG. 5. *Tubbichthonius jonesi*, new species. All drawings from holotype female. A. Exterolateral aspect of left chela, showing dentition and chaetotaxy. Lower detail shows accessory tooth opposite tenth marginal tooth. B. Epistomal process. C. Bases of third and fourth coxae, showing intercoxal tubercle. D. Carapace and chelicera. E. Female genital area. Vestitural setae superimposed over the cribriform plates and other internal structures. F. Median cribriform plate. G. Single median coxal spine from right coxa I. H. Apex of left coxa I, showing apical process and the complete coxal spine series. I. Dorsal aspect of right palp. (Details show nature of articulations.) J. Tip of maxilla, showing chaetotaxy and apical process.

distinct accessory tooth opposite tenth marginal tooth (fig. 5A, insert).

Legs of typical chthoniine facies; arolium simple; fourth legs with two tibial (indices, 0.27 and 0.68), one metatarsal (index, 0.26), and two telotarsal, tactile setae (indices, 0.17 and 0.75). Proportions: leg I: basifemur 6.5, telofemur 5.2–5.3, tibia 5.0, and miotarsus about 12, times as long as deep; leg IV: "miofemur" 3.60, tibia 6.4, metatarsus 3.7, and

telotarsus 14 to 15, times as long as deep.

MEASUREMENTS (IN MILLIMETERS): Holotype female. Total length, 3.12; abdominal breadth, $0.98 \pm$. Carapace 0.90 long, 0.84 broad anteriorly, and $0.66 \pm$ broad posteriorly. Chelicera 0.94 long by 0.38 broad. Palp: trochanter, 0.481 (and 0.497) by 0.262 (and 0.254); femur, 1.706 by 0.249; tibia, 0.656 (and 0.640) by 0.279 (and 0.274); chela, 2.412 by 0.410 broad and 0.408 deep;

hand, 0.823 long; fingers, 1.591 long. Leg I: basifemur, 0.853 by 0.132; telofemur, 0.577 by 0.110; tibia, 0.461 by 0.093; miotarsus, 0.925 by 0.077. Leg IV: "miofemur," 1.304 by 0.362; tibia, 0.912 by 0.143; metatarsus, 0.435 by 0.118; telotarsus, 1.038 by 0.072.

REMARKS: This cave-inhabiting species is a much larger form than the only other known representative of the genus, *T. solitarius* Hoff. It shows numerous characteristics indicative of the true troglobite (blindness; pallid coloration; and appendicular attenuation which, however, is less pronounced than in some cave-inhabiting forms). The following couplet contrasts the more outstanding differences:

Large, blind species, female 3.12 mm. long, over-all length of pedipalp (trochanter to chela, inclusive) 5.4 mm.; femur 6.8, tibia 2.3–2.4, and chela 5.9, times as long as broad; fixed finger with 31 or 32 spaced macrodenticles, movable finger with 22 spaced macrodenticles which are preceded basally by 19 low, rounded, and nearly contiguous teeth; from an unknown Australian cave (probably in Blue Mountains, near Sydney) *jonesi*, new species

Smaller, four-eyed species, male 1.7 mm. long, over-all length of pedipalp about 2.1 mm.; femur 4.7, tibia 1.9, chela 5.6, times as long as broad; fixed finger with 19 spaced macrodenticles; movable finger with 10 spaced macrodenticles which are preceded basally by "some indication of contiguous vestigial teeth;" type from Mt. Slide near Melbourne, Australia *solitarius* Hoff

KA FIRCHTHONIUS, NEW GENUS

GENEROTYPE: *Chthoniella heterodontata* Beier.

DIAGNOSIS: Pseudotyranochthoniine genus of generally typical facies.

Carapace quadrate; typically four-eyed; with small, irregularly dentate, epistomal process; abdominal chaetotaxy sparse, uniseriate. Chelicera provided with total of seven setae in type; spinneret lacking.

Coxal spines well developed, on pedal coxae I only; comprising linear row of approximately seven blades which arise from common, trapeziform lamella or base.

Intercoxal tubercle bisetose.

Palp moderately robust, smooth, and of generally typical facies.

Chela strongly heterodontate, with large,

acute, spaced teeth alternating with smaller acute denticles. Proximally, teeth of movable finger possibly becoming low, rounded, and contiguous or nearly so. Chaetotaxy: IB and ISB caudad of ESB and EB which are situated dorsally at extreme base of fixed finger (almost at point of demarcation between hand and fixed finger), IST subbasal and about opposite EB (in all comprising close-knit group of five tactile setae, IST, ISB, IB, ESB, and EB, saddling extreme base of fixed finger). Setae IT and EST rather closely paired, distinctly closer to each other than either is to ET but nevertheless grouped therewith; ET about equidistant between IT and DS, the latter about as far from finger tip as ET is from IT, entire group (IT, EST, ET, and DS) on distal third of finger; distance of EST to finger tip only slightly less than one-half of distance from ESB; chaetotaxy of movable finger typical, B subbasal; seta SB distinctly distad of median and about as far proximad of ST as ST is proximad of T; seta T distinctly nearer finger tip than to SB.

REMARKS: This genus is known only from the type species. The heterodontate armature of the chela is presently unique in the Pseudotyranochthoniini.

Kafirchthonius heterodontata (Beier), new combination

Chthoniella heterodontata BEIER, 1955, South African animal life, Uppsala, vol. 1, pp. 276–277, fig. 3 (right chela).

REMARKS: I cannot concur with Beier in his assignment of this distinctive species to Lawrence's *Chthoniella*, from which it differs in many important respects. *Chthoniella cavernicola* Lawrence was collected in the Wynberg Cave, Table Mountain, near Cape-town, while the present species was collected from the same locality but outside the cave itself. The two species seem to have no close affinities except geographical proximity.

GENUS ALLOCHTHONIUS CHAMBERLIN

Allochthonius CHAMBERLIN, 1929, Canadian Ent., vol. 61, p. 154. BEIER, 1932, Das Tierreich, vol. 57, p. 61. MORIKAWA, 1960, Mem. Ehime Univ., sect. 2, ser. B (Biol.), vol. 4, no. 1, p. 97.

GENEROTYPE: *Chthonius opticus* Ellingsen.

DIAGNOSIS (EMENDED): Pseudotyranochthoniine genus of typical facies; carapace subquadrate, scarcely, or not at all, con-

stricted posteriorly; generally with four well-developed eyes, but two-eyed and blind, cave-inhabiting species are known; carapace lacking an epistomal process; vestiture comprising about 24 to 28 macrosetae.

Tergites and sternites entire; uniseriate; median segments with eight to 12 border macrosetae; sternites with 12 to 16 similar setae; eleventh tergite and sternite fused to form terminal circumanal plate; dorsal half of anal operculum non-setose; sternal half, bisetose (microsetae). Genitalic structures not ascertained. Only the female is thus far known with certainty.

Coxal area of typical facies; with a well-developed bisetose intercoxal sternum or tubercle (fig. 6A); coxal spines (fig. 6B) restricted to first pedal coxae and comprising a fan-like spray of slender, smoothly clavate lobes which arise from a common base (as fingers from hand). Maxillary condylar seta present but length indeterminable; apical setae two in number; lateral one short, dwarfed; median one elongate and semitactile.

Chelicera large, of usual chthoniine type; movable finger with numerous small, saw-like teeth; fixed finger with three to five relatively large but not uniformly sized teeth (e.g., fig. 6C); with one or more accessory setae on palm in addition to usual *is*, *es*, *sb*, and *b* (five or more in all); flagellum comprising biseriate row of about 10 pinnate setae.

Palp moderately slender, except hand of chela which may be rather broader than usual.

Chela with fingers strongly curved, movable finger bowed and distinctly shorter than fixed finger; chaetotaxal pattern and dentition essentially as illustrated (fig. 6D); seta ET terminal and much closer to DS than to closely paired EST and IT which are slightly distad of median on finger; distance from IT to ET about twice as great as that between finger tip and ET; IB and ISB distal on hand and closely grouped with EB, ESB, and IST to form group of five setae dorsally and subdorsally on base of fixed finger; seta SB of movable finger slightly caudad of median; ST slightly distad of median and closely associated with seta T (distance between SB and ST about twice distance between T and ST); B subbasal. Both fingers of chela with promi-

nently developed marginal teeth which are widely spaced and homodentate (i.e., lacking intervening microdenticles).

Legs of usual facies and lacking any particularly distinctive features. Tactile setae of fourth leg (based entirely on *A. shintoisticus*): tibia with subbasal and subdistal, semitactile seta (indices, 0.38 and 0.83, respectively); metatarsus with subbasal, tactile seta (index, 0.27); telotarsus with subbasal, tactile seta (index, 0.17) and subdistal, semitactile seta (index 0.62).

REMARKS: This diagnosis is based largely on a restudy of the holotype of *Allochthonius shintoisticus* Chamberlin, a species undoubtedly very close to the generotype which, however, is still very imperfectly known. The genus has previously been wrongly assigned to the tribe Chthoniini, rather than to the Pseudotyranochthoniini.

Allochthonius has been divided into two subgenera by Morikawa (*loc. cit.*), the only worker to have available a series of species on which to base his studies. In essence the discrimination is between free-living, four-eyed forms (the typical subgenus) and blind or semi-blind cave forms (the subgenus *Urochthonius* Morikawa). *Allochthonius* is currently known only from Japan, although it will be surprising if Chinese and even North American species are not ultimately discovered.

***Allochthonius (Allochthonius) shintoisticus*
Chamberlin**

Figure 6

Allochthonius shintoisticus CHAMBERLIN, 1929, Canadian Ent., vol. 61, p. 155.

MATERIAL: Holotype, female (JC-372.-01001), Unzen, Kyushu, Japan; collected by F. Silvestri, May 24, 1925; Stanford University collections.

DIAGNOSIS (EMENDED): Description based on caustic-potash-treated holotype. Small species, adult female about 1.4 mm. in length. Carapace nearly smooth, subquadrate, a little broader than long, not constricted posteriorly, lacking an epistomal process; with four distinct corneate eyes which are nearly equal in diameter; interocular space 0.5 an ocular diameter or less; anterior eyes almost 1.5 ocular diameters caudad of chelicer- al condyles; chaetotaxy, 8-4(24).

Tergal chaetotaxy not completely determinable (first two tergites broken and incomplete in type) but apparently 4(?):6(?):6:6:6:8:12:10:10. Sternites bordered by approximately 14 to 16 marginal setae.

Coxal area of typical facies; coxal spines (fig. 6B) present on first pedal coxae only and consisting of symmetrical palmate spray of eight gently clavate branches which arise from a common base (as fingers from wrist and palm); rather large, bisetose, intercoxal tubercle (sternum) present (fig. 6A).

Chelicera large, almost as long as carapace; serrula exterior with 16 ligulate teeth; serrula interior with 12 or 13 similar teeth (not accurately determinable); movable finger with slender, curved, galeal seta arising at point of insertion of serrula exterior; lacking a differentiated spinneret (outer curve smoothly rounded); with a total of 19 to 20 small marginal denticles which are contiguous anteriorly but somewhat spaced basally (none markedly larger than the others); fixed finger with usual armature of setae (*is*, *es*, *sb*, and *b*, plus a single small accessory seta, or five in all), with four or five rather large, triangular teeth medially of which basal and distal teeth are substantially larger than two or three intervening ones (fig. 6C).

Palp slender and of usual chthoniine appearance; trochanter 1.7, femur 5.3, tibia approximately 2.0–2.1, and chela (measured from tip of fixed finger) 4.9, times as long as broad; hand 1.7 times as long as deep or

broad; fixed finger 2.0, and movable finger 1.8, times as long as hand. Chela strongly curvigitate, with movable finger distinctly shorter than fixed finger (fig. 6D); chaetotaxy typical of tribe Pseudotyranochthoniini, and as described for genus. Dentition of chela completely homomorphic (fig. 6D, E), numbering 16 or 17 spaced macrodenticles on each finger.

Legs of usual facies. Proportions: leg I (from measurements taken with leg *in situ*): basifemur 4.6, telefemur 3.5, tibia 3.7, and miotarsus 8.9–9.0, times as long as deep; leg IV: "miofemur" 2.7, tibia 4.3, metatarsus 2.9, and telotarsus about 9, times as long as deep. Tactile setae of leg IV as given under generic heading.

MEASUREMENTS (IN MILLIMETERS): Subject to some error because of the nature of the preparation (i.e., specimen treated *in toto* with caustic potash with some resultant distortion). Holotype female: Length exclusive of chelicerae, 1.4; abdominal breadth indeterminate. Chelicera, 0.426 by 0.198; movable finger, 0.230 long. Carapace, 0.40 long; ocular breadth, $0.46 \pm$; posterior breadth, $0.48 \pm$; diameter of anterior eye, 0.044; posterior eye, 0.037; interocular space, 0.015; distance of anterior eye to cheliceral condyle, 0.055. Palp: trochanter, 0.215 by 0.125; femur, 0.640 by 0.121; tibia, between 0.26 and 0.27 by $0.123 \pm$; chela (plus "pedicel"), 0.951 by $0.19 \pm$; fixed finger, 0.656 long; movable finger, 0.595 long; hand, $0.328 \frac{1}{2}$ long. Leg I

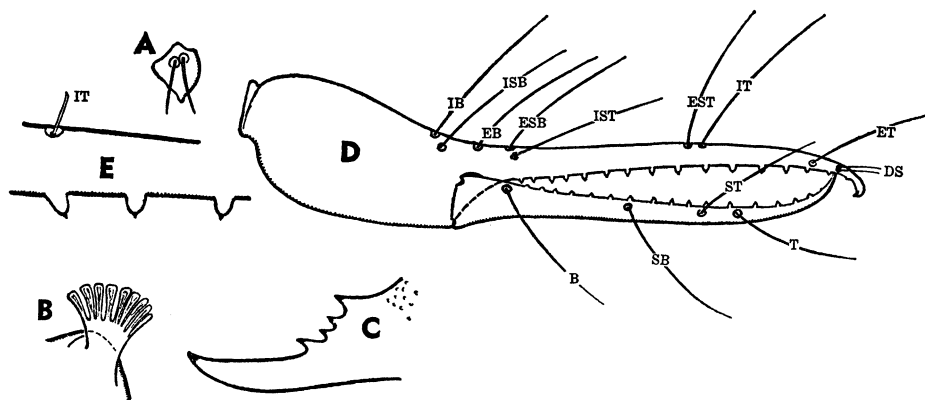


FIG. 6. *Allochthonius shintoisticus* Chamberlin. All illustrations from holotype female. A. Intercoxal tubercle or reduced sternum. B. Coxal spine from apex of pedal coxa I. C. Fixed finger of right chelicera, showing dentition. D. Dentition and chaetotaxy of right chela. E. Three marginal teeth (fifth to seventh) from fixed finger of chela, showing actual denticles at apices of dental protuberances.

(measured *in situ*): basifemur, 0.325 by 0.071; telofemur, 0.230 by 0.066; tibia, 0.194 by 0.052; miotarsus, 0.384 by 0.043. Leg IV: "miofemur," 0.508 by 0.189; tibia, 0.377 by 0.088; metatarsus, 0.185 by 0.063; telotarsus, 0.394 by 0.044.

REMARKS: The original description was very brief and was also inaccurate in one or two minor points. The length as originally given (Chamberlin, *loc. cit.*), for example, was 2.0 mm., a value that must have been inclusive of the chelicerae. The apparent differences between *A. opticus* and *A. shintoisticus* are contrasted in the following couplet:

Carapace slightly longer than chelicera (1.1 times); palpal femur distinctly shorter than fixed finger of chela (0.83); chela (hand length plus fixed finger length), 1.29 mm.; anterior eyes "scarcely" an ocular diameter from posterior eyes; fixed finger of chelicera with "posterior tooth" very large, the rest (number unknown) smaller and of equal size

. *opticus* (Ellingsen)
Carapace slightly shorter than cheliceral length (0.93 times); palpal femur barely shorter than fixed finger of chela (0.98); chela 0.95 mm. long; anterior eyes less than one-half of an ocular diameter from posterior eyes; fixed finger of chelicera with a large anterior and nearly equal posterior tooth, with two or three smaller intervening ones. *shintoisticus* Chamberlin

Morikawa [1960, Mem. Ehime Univ., sect. 2, ser. B (Biol.), vol. 4, no. 1, p. 99] considers *A. shintoisticus* and *A. opticus* synonymous. This may be true. However, pending a re-study of Ellingsen's types, I prefer tentatively to consider them distinct.

SUBORDER DIPLOSPHYRONIDA CHAMBERLIN

FAMILY NEOBISIIDAE CHAMBERLIN

SUBFAMILY NEOBISIINAE CHAMBERLIN

GENUS PAROBISIUM CHAMBERLIN

Parobisium (subgenus under *Neobisium*) CHAMBERLIN, 1930, Ann. Mag. Nat. Hist., ser. 10, vol. 5, p. 17. BEIER, 1932, Das Tierreich, vol. 57, p. 84.

REMARKS: *Parobisium* is here segregated from *Neobisium*, *sensu stricto*, and accorded full generic rank on the basis of the same characters that defined it as a subgenus [i.e., the fixed chelal finger in *Parobisium* is characterized by a compact subterminal cluster of only three tactile setae (ET, EST, IT) and

a more diffuse subbasal to basal cluster of five tactile setae (IST, ISB, IB, ESB, and EB) as shown in fig. 7A]. By contrast, in *Neobisium* the subterminal and subbasal tactile setae of the fixed chelal finger comprise four setae each (e.g., fig. 8D), seta IST being subterminal instead of subbasal in position.

Parobisium charlotteae, new species

Figure 7

MATERIAL: Holotype, male (JC-1255.-01001), collected in "Redmond Lava Cave," Deschutes County, Oregon, by J. M. Valentine, June 19, 1938; in the collections of the American Museum of Natural History.

DIAGNOSIS: A large, handsome, blind, or nearly blind, species of semiblothroid facies which, except for the dark reddish brown coloration, could be taken for a true troglobite. However, it should probably be classed as a troglophile for the present, at least.

Carapace (fig. 7G) reddish brown, about as long as fingers of chela but much shorter than palpal femur; smooth and shining except caudolaterally where it is slightly rugose; with subparallel sides; lacking eyes (or else with almost completely vestigial ones) but with a single pair of small, rugose, "ocular" tuberosities which may represent modified and functionless anterior eyes; with a small but distinct, rounded, epistomal process, chaetotaxy 4-6(22±).

Abdomen rather narrowly ovate, much longer than broad and but little wider than cephalothorax; eleventh tergite and sternite fused into terminal circumanal plate; scuta entire, moderately sclerotic and pigmented; uniseriate. Tergal chaetotaxy, 9:10:12:13:11:13:11:13:10:11:6±:mm. Sternites with scuta entire, smooth but more weakly sclerotic and lighter in color than tergites; uniseriate; chaetotaxy:

$$(49):[(10)-(11)]:(8)\frac{(19)}{14}(8):(6)11(6):15:14:14:15:14:12:2T1T2\pm:\text{mm.}$$

Male genitalic structures distinctive in pattern, as illustrated (fig. 7E); lateral genital sacs conspicuously inflated and apparently somewhat sclerotic. Internal, flanking, genital setae shown in figure 7E apparently representing retracted second sternite, external

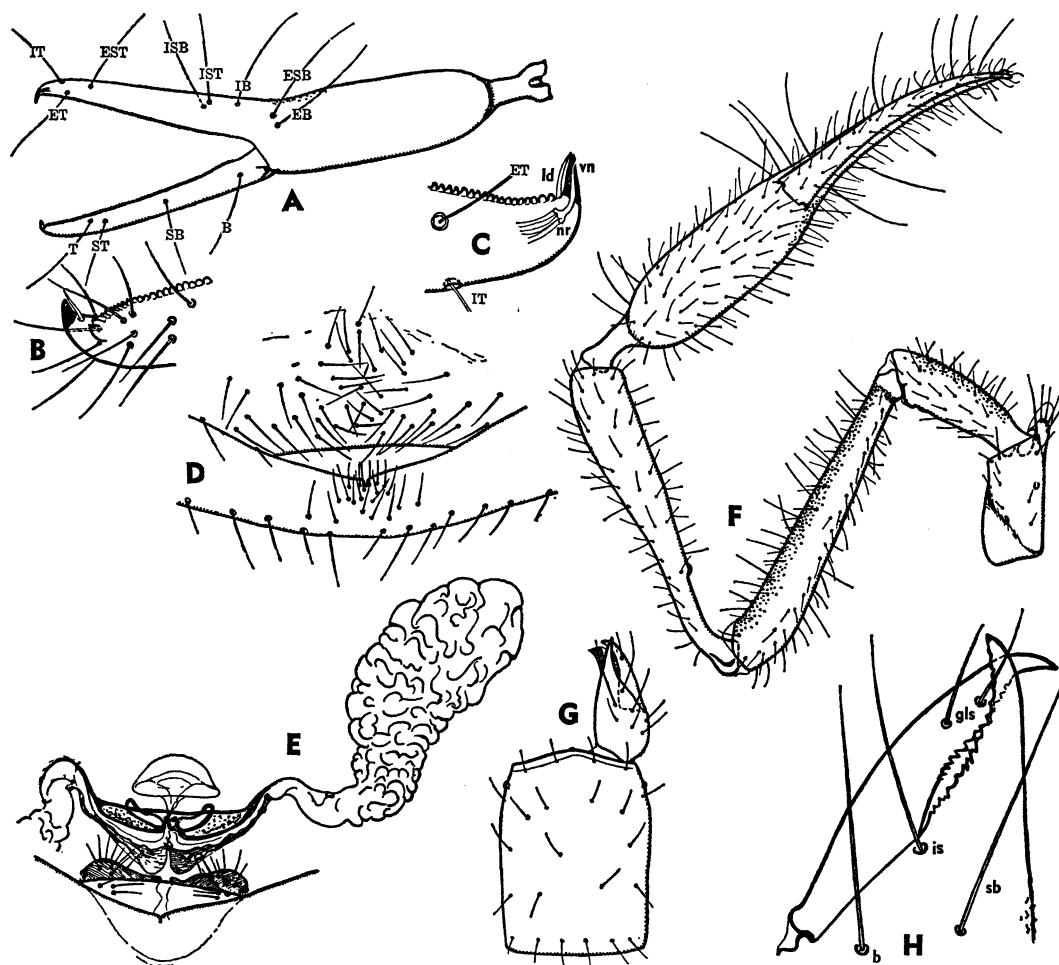


FIG. 7. *Parobisium charlotteae*, new species. All figures from holotype male. A. Exterolateral aspect of left chela, showing chaetotaxy (exclusive of vestitural setae). B. Tip of movable finger of chela, showing sheathing device (venedens receptor). C. Tip of fixed finger of chela, showing venom apparatus and type of dentition. The closely appressed translucent blade (ld) caudad of the venedens (vs) is the lamina defensor, probably a "triggering" sensorium. D. External chaetotaxy of the genital opercula (segments 1 and 3). E. Ventral aspect of internal structures of male genitalia. Note the very large sclerotic genital sac (right sac omitted). F. Ventral aspect of right pedipalp including the maxilla or palpal coxa. G. Carapace and right chelicera. H. Fingers of left chelicera, showing dentition and chaetotaxy. Note the teratologically "doubled" galeal setae (gls).

genital plates (opercula) shown in figure 7D thus representing true first and third abdominal segments.

Coxal area narrow, of subequal width throughout; maxilla darkly pigmented; coxa I moderately pigmented, other coxae becoming progressively paler, with coxa IV a light reddish yellow; anterolateral corners of coxae I and II heavily sclerotic and moderately produced; disk of maxilla unusually produced

and narrow, its mesial length (base to trochanteral condyle) 1.8 times breadth; maxillaris apicalis shortened, rounded, and bordered by four robust macrosetae; as usual condylar seta elongate and semitactile (fig. 7F).

Chelicera (fig. 7G, H) large and robust, shining deep reddish brown; about 2.1 times as long as broad, but little more than half as long as carapace; spinneret completely lack-

ing, curve of movable finger smoothly rounded; flagellum of typical facies, apparently comprising bilinear series of at least eight setae, all but basal one of which unilaterally pinnate; serrula exterior with about 46–47 teeth or blades; serrula interior with about 26–27 blades; movable finger with nine or 10 rounded teeth which are medially raised into gently rounded crest; fixed finger with 16–18 rounded or bluntly acute, non-uniform teeth or denticles; palm of chelicera with total of seven setae, all of which are relatively long (but not equally so) and slender (*is*, *sb*, *b*, *es*, plus three accessory setae); galeal seta of right chelicera one-third removed from finger tip and with a distinct sense spot distad thereof and opposite dental crest (in left chelicera this sense spot apparently replaced, teratologically in all probability, by typical macroseta (see gls in fig. 7H).

Palp (fig. 7F) extremely attenuated (blothroid); dark reddish brown or wine-colored; all segments slenderly pedicellate, especially tibia; trochanter and femur interolaterally and dorsally densely but evenly granulate; elsewhere smooth and glossy; tibia and chela uniformly smooth and polished except for distal inner face of hand which is weakly but distinctly granulate; trochanter slenderly clavate, 3.2 times as long as broad; femur very slenderly clavate, much longer than fingers and 6.2 times as long as broad; tibia very slenderly pedicellate (inner length of pedicel about four times narrowest breadth, while total pedicel length, inner curve to posterior condyle, approximately a third of total tibial length), and 5.6 times as long as greatest breadth; chela also slenderly pedicellate (pedicel more than half as long as hand breadth), 5.5 (plus pedicel, 6.1) times as long as broad and 5.6 times as long as deep; hand with rounded base and nearly parallel sides, 2.6 times as long as broad; fingers 1.1 times as long as hand proper, but subequal in length to hand plus pedicel; chaetotaxy and dentition of chela, structure of venom apparatus, and venedens receptor as illustrated (fig. 7A, C, and B, respectively).

Legs moderately slender (especially tibiae), somewhat yellowish, of typical morphology; vestitural setae rather numerous, long and slender, of unequal length but with none apparently specialized as true tactile setae. Subterminal seta distinctly asymmetrically fur-

cate, with each branch subdenticulate. Pedal proportions: leg I: basifemur 4.3, telofemur 4.0, tibia 8.1, metatarsus 3.9, and telotarsus 7.4 to 7.5, times as long as deep; leg IV: "miofemur" 4.8 times as long as deep; telofemur 1.3 times as long as basifemur; tibia 9.3, metatarsus 3.4, and telotarsus 7.3, times as long as deep.

MEASUREMENTS (IN MILLIMETERS): Holotype male: total length, 6.02; abdomen, $1.31 \pm$ broad. Carapace 1.55 long, 1.14 broad anteriorly, and 1.06 broad posteriorly (measured width possibly too great owing to partial flattening of structure by cover slip). Chelicera 0.866 by 0.405. Palp: trochanter, 1.181 by 0.371; femur, 2.329 by 0.377; tibia, 2.481 by 0.440 (inner length of pedicel, 0.623; total length of pedicel, 0.787; narrowest width of pedicel, 0.153); chela, 3.337 (plus pedicel, 3.685) by 0.607 broad and 0.599 deep; hand (without pedicel), 1.574 long; fingers, 1.788 long. Leg I: basifemur, 1.041 by 0.241; telofemur, 0.727 by 0.180; tibia, 1.099 by 0.136; metatarsus, 0.459 by 0.118; telotarsus, 0.656 by 0.088. Leg IV: "miofemur," 1.733 by 0.361; basifemur, 0.758 long; telofemur, 0.976 long; tibia, 1.788 by 0.193; metatarsus, 0.544 by 0.162; telotarsus, 0.781 by 0.107.

TERATOLOGY: It is of interest to note that the galeal seta of the left chelicera of the type is teratologically doubled.

REMARKS: This distinctive and elegant species is dedicated to my wife, Mrs. Charlotte M. Chamberlin, who has borne with patience and understanding the long hours of preoccupation required by these studies. *Parobisium charlotteae* is an unusually large or giant species, particularly when the extended pedipalps are considered (total length, including the chelicera, nearly 7 mm., while the total length of the extended pedipalp, trochanter excluded, contributes an additional 8 to 8.5 mm).

GENUS NEOBISIUM CHAMBERLIN

Obisium LEACH (*pars*), 1817, The zoological miscellany, vol. 3, pp. 48–53. SIMON, 1879, Les arachnides de France, vol. 3, p. 76. (*Obisium* is a synonym of *Chelifer*.)

Neobisium CHAMBERLIN, 1930, Ann. Mag. Nat. Hist., ser. 10, vol. 5, pp. 11–12. BEIER, 1932, Das Tierreich, vol. 57, p. 78.

This is a large genus which is especially well represented in Europe. Only two forms from

North America have thus far received nomenclatorial recognition. The addition of a third species at this time may indicate that the genus is better represented in the United States than heretofore believed. A thorough study based on extensive collecting throughout the middle and southeastern United States will be necessary before the status of the genus in America can be fully elucidated. The possibility of accidental introductions of species from Europe cannot be disregarded in this connection. The three American forms here recognized can be separated by means of the following key:

1. Fixed finger of chela with about 74–79 marginal teeth; anterodorsal femoral margin smooth, at most only vestigially granulate near base *ingratum*, new species
Fingers of chela with fewer than 70 (generally 65 ± or fewer) marginal teeth; anterodorsal femoral margin finely but distinctly granulate from pedicel to near tip 2
2. Marginal teeth of movable finger of chela rounded and truncate but well developed along entire dental ridge from base to apex (total number, 60–65 distinct teeth); femur 3.7–3.9, tibia 2.4–2.6, times as long as broad *carolinense* (Banks) Chamberlin
Marginal teeth of movable finger progressively reduced from a point slightly caudad of seta T, becoming obsolescent and barely detectable on basal half of finger (total number detectable, including vestiges, 46–55); femur 3.9–4.4, tibia 2.7–2.9, times as long as broad *tenuis* Chamberlin

All American representatives of *Neobisium* thus far studied agree in having homomorphic chelal dentition, unlike some European species [including the generotype, *N. muscorum* (Leach)] in which the contiguous marginal teeth of the chela are heterodont (i.e., with larger, acute teeth separated by two or three truncately rounded intervening ones). American forms also agree in having the face of the palpal tibia 1.3 to 2.3 times as long as the terminal excavation and 2.4 to 3.6 times as long as the inner length of the pedicel. The tibia as a whole is 2.1–2.6 times as long as its face, while the pedicel is only 0.6–1.0 times as long as its least breadth.

Neobisium carolinense (Banks)

Figure 8

Obisium carolinensis BANKS, 1895, Jour. New York Ent. Soc., vol. 3, p. 12 (conspecificity with species as here defined open to doubt).

Neobisium carolinensis (Banks), CHAMBERLIN, 1930, Ann. Mag. Nat. Hist., ser. 10, vol. 5, p. 15, figs. 2G, M (pleural membrane), 2W (maxilla), 3A, D (chela; chaetotaxy and dentition); 1932, Stanford Univ. Publ., biol. sci., vol. 7, pt. 1, figs. 4F (rostrum and associated structures), 6B (lateral aspect of entire animal minus legs and palps), 8C, 11F, X (carapacial details), 9C (carapace), 12C (cheliceral condyle), 13H (chelicera), 19C (coxal area, dorsal aspect), 25J (dorsum of maxilla), 33B, C, G (chela; dentition), 40-O (tarsal subterminal seta), 45B, C, D (chaetotaxy of male genital area), 50D (male genitalia). HOFF AND BOLSTERLI, 1956, Trans. Amer. Micros. Soc., vol. 75, no. 2, p. 162 (note on status of species).

Neobisium carolinense (Banks), BEIER, 1932, Das Tierreich, vol. 57, p. 91, fig. 98 (palp).

STATUS OF THE SPECIES: The present author in 1930 (*loc. cit.*) reported on a large number of collections (mostly from Cornell University), all of which he identified as this species. At the same time he pointed out that a great deal of variability was involved and that there was a distinct possibility that more than one species was included. He also recognized the commoner, more robust form as "typical *carolinensis*" and "the more extreme slender form" as a "variety" under the name of *tenuis*. All the illustrations by Chamberlin cited in the bibliography pertain to what he considered typical *carolinensis* from North Carolina material recorded from Mt. Mitchell (lot JC-318.02001–JC-318.02025) and Grandfather Mountain (lot JC-302.01001–JC-302.01013). Duplicate specimens (two females) of the Mt. Mitchell lot were sent to Max Beier on December 26, 1928, and it is presumably from one of these specimens that the description and illustration used in Beier's 1932 paper were prepared. Thus, as presently recognized, *N. carolinense* is defined on the basis of material from Mt. Mitchell and Grandfather Mountain in North Carolina and not from the types.

In 1956 Hoff and Bolsterli (*loc. cit.*) expressed doubt that this species was actually polyphyletic or as variable as I suggested in 1930 and tentatively recognized the variety *tenuis* (*tenuis*) as a valid species, a conclusion that is here accepted. All collections identified by Chamberlin in 1930 as "atypical" or "intermediate" forms are to be considered doubtful and may actually represent other species. A restudy of the types of *Obisium carolinensis* Banks (type locality, Retreat,

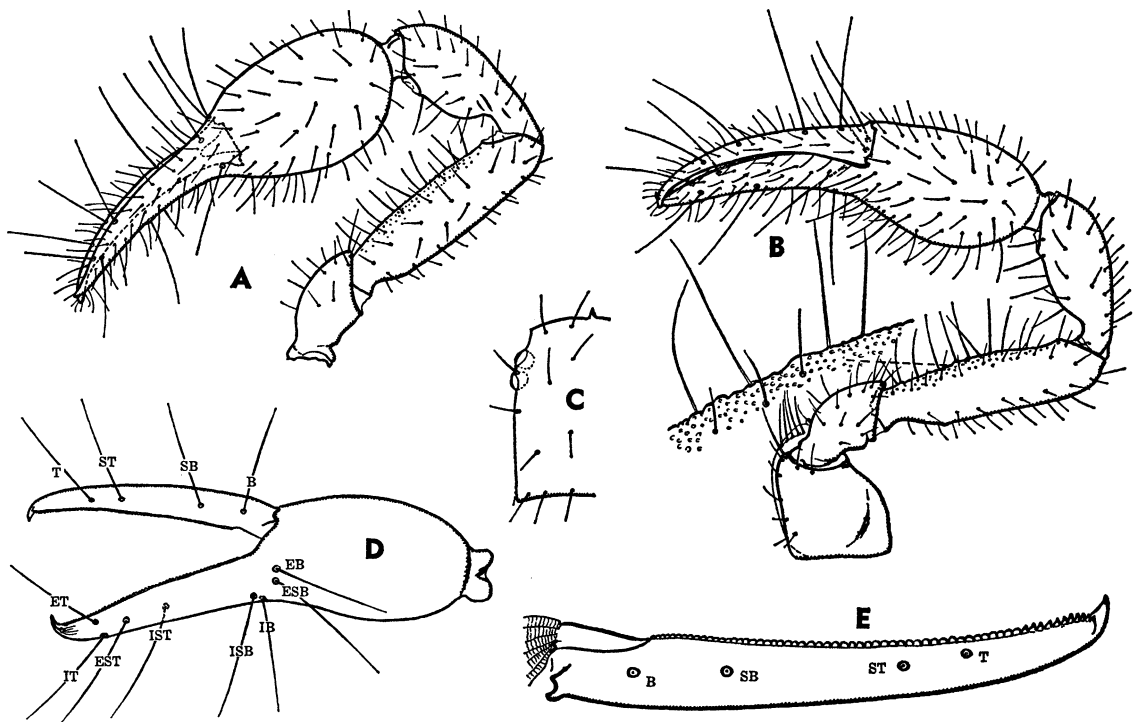


FIG. 8. *Neobisium carolinense* (Banks). A. Dorsal aspect of right female palp (JC-302.01001). B. Ventral aspect of left male palp including the coxa (maxilla). Insert shows nature of the femoral granulation (JC-318.02003). C. Carapace (male, JC-318.02003). D. Exterior aspect of right chela (female, JC-302.01003). E. Movable finger of chela, showing well-developed dentition extending from base to apex (female, JC-302.01003).

North Carolina, and Lee County, Virginia; H. G. Hubbard) is a requisite for a final definition of the species. For the present a full redescription of *N. carolinense* (Banks), as currently recognized by Chamberlin and Beier, and of *N. tenue* Chamberlin, is presented, while still a third form found in an Alabama Cave (presumably near the mouth) is described as new.

DIAGNOSIS: Both sexes unless otherwise indicated. Medium-sized species, 2.6–3.3 mm. long, of robust proportions; palps and body a medium to dark reddish brown.

Carapace (fig. 8c) subquadrate (slightly longer than ocular breadth), smooth, with four prominent, subcontiguous eyes (interocular space about one-half of an ocular diameter), the anterior pair of which are removed from cheliceral condylar margin of carapace by about one and one-third ocular diameters; epistomal process prominent and

nearly equilaterally triangular in shape; chaetotaxy, 4-6(22).

Coxal area of usual facies; maxillaris apicalis rounded and with five border setae; condylar seta of maxilla elongate, semitactile; condylar rim of pedal coxae I and II strongly sclerotic but not produced apically.

Abdomen of usual neobisiid facies; tergites entire, smooth; chaetotaxy variable, approximately 5-9:7-9:7-11:10-12:10-12:9-13:10-11:11-12:11-12:8-11:T1T:mm. Sternites similarly smooth and entire, eleventh sternite and tergite fused into usual terminal circumanal plate; chaetotaxy of male (segments 1 to 6),

$$30 \pm : [(3)(3)] : (3) \frac{10}{16} (3) : (3) 12(3) : 13 : 13.$$

Chaetotaxy of female, 3-7 ± : (0) : (3-4) 21-29 (5) : (4) 13(4) : 17-18:15-17:14-16:14-15:14-15:11-13:T1T 3 or 4 T1T:mm.

TABLE 2
MEASUREMENTS (IN MILLIMETERS) OF MALE AND FEMALE REPRESENTATIVES OF
Neobisium carolinense (Banks)

	Male JC-318.02001	Male JC-318.02003	Female JC-302.01001	Female JC-302.01003
Total L ^a ×abd. B	2.89 ×1.1±	3.08 ×1.4±	3.28 ×1.6±	2.59 ×1.2±
Carapace L×ocular B	0.85 ×0.82	0.95 ×0.79	0.98 ×0.90	0.87 ×0.82
Chelicera L×B	0.57 ×0.29	0.58 ×0.30	0.67 ×0.34	0.65 ×0.33
Palp:				
Trochanter L×B	0.533×0.269	0.566×0.295	0.607×0.295	0.607×0.292
Femur L×B	1.017×0.262	1.082×0.290	1.155×0.303	1.066×0.284
Tibia L×B	0.795×0.308	0.853×0.326	0.861×0.346	0.804×0.328
Tibial ped. L×B	0.246×0.146	0.230×0.159	0.279×0.172	0.262×0.175
Tibial ped. inner L	0.131	0.155	0.164	0.155
Chela L×B	1.837×0.51±	1.801×0.540	1.927×0.604	1.870×0.543
Chela+pedicel L	1.935	1.902	2.025	1.968
Hand L; fingers L	0.754×1.148	0.853×1.074	0.853×1.132	0.820×1.050
Leg I:				
Basifemur L×D	0.618×0.147	0.582×0.155	0.602×0.162	0.574×0.151
Teloferum L×D	0.377×0.132	0.397×0.140	0.385×0.136	0.377×0.136
Tibia L×D	0.476×0.107	0.508×0.107	0.499×0.134	0.492×0.107
Metatarsus L×D	0.287×0.088	0.295×0.088	0.451×0.110	0.279×0.081
Telotarsus L×D	0.410×0.085	0.384×0.081	0.384×0.099	0.394×0.074
Leg IV:				
Mioferum L×D	1.033×0.284	1.050×0.369	1.082×0.358	1.022×0.346
Basif. L; telof. L	0.353; 0.549	0.361; 0.574	0.361; 0.590	0.377; 0.554
Tibia L×D	0.853×0.153	0.918×0.184	0.918×0.171	0.869×0.169
Metatarsus L×D	0.349×0.118	0.367×0.119	0.361×0.121	0.344×0.129
Telotarsus L×D	0.558×0.096	0.574×0.107	0.585×0.107	0.574×0.107

* Abbreviations: abd., abdominal; B, breadth; basif., basifemur; D, depth; L, length; ped., pedicel; telof., telofemur.

Genital structures of male as previously illustrated (Chamberlin, 1930); female genital operculum with greatly reduced chaetotaxy; median cribriform plate distinct, hemispherical, and about 0.04 mm. in diameter.

Chelicera of typical neobisoid facies, spinneret present as rounded, sclerotic, subterminal crest on movable finger; flagellum eight-bladed; fixed finger with 17 or 18 irregular protrorse denticles; movable finger with about nine to 11 irregular teeth plus a single large tooth or dental crest opposite galeal seta; serrula exterior with 26–28± teeth; serrula interior with about 17 more or less ligulate divisions; palm of fixed finger with total of six setae (two accessory setae median and caudad of *es* and *b*).

Palp (fig. 8A, B) moderately robust, femur nearly equally broad from pedicel to tip but actually broadest submedially, finely granu-

late interiorly from pedicel to near tip; palps otherwise completely smooth and evenly contoured; tibia with pedicel short and robust and not differentiated exteriorly (maximum length, 1.5–1.6 times breadth; inner length, 0.6–0.9 of breadth); chela pedicellate, greatly expanded interiorly, only slightly expanded and nearly straight exteriorly. Palpal proportions: trochanter, 1.9–2.1 times as long as broad; femur, 3.7–3.9 times as long as submedian breadth; tibia, 2.4–2.6; chela, 3.2–3.6 (plus pedicel, 3.4–3.8); hand, 1.4–1.6 times as long as broad; fingers, 1.3–1.5 times as long as hand.

Chela with chaetotaxy and dentition as illustrated (fig. 8D). Marginal teeth well developed from base to tip and numbering 65–67 on fixed, and 60–65 on movable, fingers; teeth mostly retroconical (and homomorphic) on fixed and truncately rounded on movable

finger (fig. 8E) except for 10 to 12 distal teeth which are acute and somewhat protrorse; two or three terminal teeth of movable finger offset to form receptor venedentis; venom duct of fixed finger very short, nodus ramosus opposite second marginal tooth.

Legs yellowish, of usual neobisiid structure; subterminal tarsal seta deeply but unequally furcate, with minute subsidiary denticles; tactile setae of fourth legs not completely known owing to actual loss of most such setae from available specimens; tibia apparently with submedian tactile or semi-tactile seta (index, 0.48, as inferred from position of areole); metatarsus with subbasal, true tactile seta (index, 0.13–0.17); telotarsus with slender, subbasal, tactile seta (index, 0.17–0.20) and a longer submedian seta (index, 0.43–0.47). Pedal proportions: leg I: basifemur 3.7–4.2, telofemur 2.8–2.9, tibia 3.7–4.8, metatarsus 3.3–4.1, and telotarsus 3.5–4.9, times as long as deep; leg IV: "miofemur" 2.8–3.0, tibia 5.0–5.6, metatarsus 2.7–3.1, and telotarsus 5.4–5.8, times as long as deep.

The measurements of four representative specimens are summarized in table 2.

REMARKS: The specimens studied seem to agree in most respects with Banks's original description, but the chela (= "claw") is actually distinctly longer than the carapace (= cephalothorax) plus the chelicerae (= mandibles) rather than about equal thereto as stated by Banks. Thus, in the specimens here considered, the mean length of the carapace plus chelicerae is 1.4–1.6 mm., while the length of the chela is 1.8–1.9 (plus the pedicel, 1.9–2.0) mm. Also the breadth of the chela is 1.6–1.7 times the breadth of the tibia as compared to Banks's statement that it is "nearly twice as broad." These apparent differences, however, are not great, unless Banks's statement was based on actual measurements rather than visual estimates. Banks makes no statement concerning the sculpturation (granulation) of the palpal femur.

***Neobisium tenue* Chamberlin**

Figure 9

Neobisium tenuis CHAMBERLIN, 1930, Ann. Mag. Nat. Hist., ser. 10, vol. 5, p. 16.

Neobisium tenue Chamberlin, BEIER, 1932, Das Tierreich, vol. 57, p. 92. HOFF AND BOLSTERLI,

1956, Trans. Amer. Micros. Soc., vol. 75, no. 2, pp. 161–162 (recorded from Kentucky and Tennessee; measurements given).

MATERIAL: Holotype, male, and allotype, female (JC-311.01001, JC-311.01002), and paratype males and females collected by C. R. Crosby at "Top of Mt. Leconte, Tennessee" (two males and one female, JC-311.-01003–JC-311.01005), and "Mill Creek on Mt. Leconte, Tennessee" (two males and one female, JC-310.01001, JC-310.01002, JC-310.-01005); types in Cornell University collections.

DIAGNOSIS (ADDENDA): Both sexes unless otherwise noted. Medium yellowish brown species of moderately slender facies; close to *N. carolinense* (Banks) as recognized by Chamberlin (1930).

Carapace slightly longer than broad; with four prominent corneate eyes of approximately equal size; anterior eyes about an ocular diameter removed from anterior margin of carapace (i.e., from cheliceral condyle) and 0.5 ocular diameter from posterior eyes; epistomal process well developed, usually more or less acutely but in some cases equilaterally triangular; derm smooth; interocular seta dwarfed; chaetotaxal formula, 4–6 (22) (in one case, the allotype, eight marginal setae observed along posterior margin).

Coxal area normal; maxillaris apicalis rounded, bordered by five setae; condylar seta of maxilla slender, semitactile; condylar foramen of coxae I and II reënforced, sclerotic but not produced.

Tergites entire, derm smooth; setae acute, uniseriate; chaetotaxy, 6:6:8–9:9–11:9–11:9–11:9–11:9–11:9–11:9–10:T1T:mm. Possibly other terminal abdominal setae also tactile, a point not ascertainable from available material. Eleventh tergite and sternite fused into usual terminal circumanal plate. Sternites entire, smooth; setae acute; chaetotaxy, both sexes (segments 4–12): (3 or 4) 11–12 (3 or 4): 12–17:12–16:12–14:12–14:10–14:10–12:T1T1 or 2T1T:mm. Sternal chaetotaxy of male (segments 1–3):

5–4:[(2)(2–3)]:(3 or 4) $\frac{\text{comb 4–7 (setae)}}{15–19}$ (3 or 4).

Sternal chaetotaxy of female (segments 1–3): mm-mm (or mmm):0:(4)17–20(4).

Male genitalic structures essentially as in

N. carolinense; lateral genital sacs nearly tubular, membranous; median sac well developed, membranous; lateral, internal, genital setae of segment 2 two or three in number. Female genitalic area non-distinctive; median cribriform plate hemispherical, 0.037 mm. in diameter.

Chelicera of usual facies; spinneret a rounded, crest-like, sclerotic knob; chaetotaxy of palm comprising total of six setae—*is*, *sb*, *b*, and *es* plus two accessory setae caudad of *b* and *es*; flagellum of seven or eight blades, proximal one much reduced; serrula exterior with 25–27 blades; serrula interior with 15 or 16 blades; fixed finger with 16 or 17 to 20 \pm irregular protrorse teeth; movable finger with 12–15 \pm variable denticles, with largest ones opposite galeal seta.

Palp (fig. 9A, C) nearly unicolorous, light yellowish brown except for fingers which are darker; moderately slender, trochanter 2.1–2.2 times as long as broad; femur moderately pedicellate, gently clavate, slightly broadest distad of median (about two-thirds of femoral

length from its base); anterior face of trochanter and anterior dorsal surfaces of femur finely and evenly granulate (palps otherwise smooth); femur of female 3.9–4.2, of male 4.1–4.4, times as long as broad; tibia with short, thick pedicel which is differentiated only on inner contour, 2.6–2.8 (in female) and 2.7–2.9 (in male) times as long as broad (inner length of tibial pedicel 0.7–0.8 as long as breadth; maximum pedicel length 1.4–1.7 times its breadth); chela (exclusive of pedicel) 3.5–3.9 (in female) and 3.9–4.1 (in male) times as long as broad or deep; finger 1.3–1.4 (in female) to 1.5–1.6 (in male) times the length of the hand.

Chela as illustrated (fig. 9B); chaetotaxal pattern normal for genus; fixed finger with 57 to 60 homomorphic, acute, retroconical teeth which are well developed from base to tip; apical 10 or 11 teeth of movable finger also acute and saw-like (including three that comprise the receptor venedentis), these acute protrorse teeth preceded by 30 to 40 low, flat, or slightly rounded teeth at a point

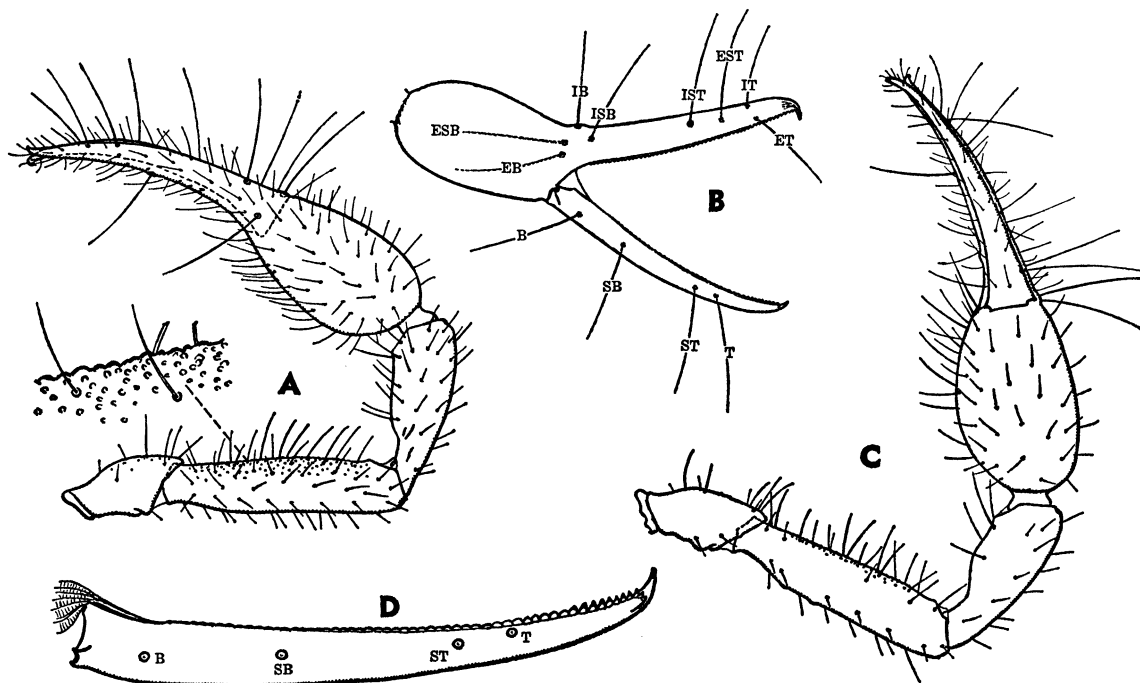


FIG. 9. *Neobisium tenue* Chamberlin. A. Dorsal aspect of male right palp. Insert shows nature of femoral granulation (JC-310.01001). B. Exterior aspect of right male chela (JC-310.01002). C. Ventral aspect of female left palp (JC-310.01003). D. Movable finger of chela, showing progressive reduction in denticle size caudad of seta T (male, JC-310.01002).

distad of seta T and becoming progressively lower until they are obsolescent, vestigial, or even completely lacking near finger base and just distad of seta B (fig. 9D); total detectable teeth on movable finger (including vestiges) $46-55 \pm$.

Legs normally developed; straw-yellow; subterminal seta deeply but unequally forked with subsidiary denticles; tactile seta of fourth legs lost or broken in available material, but the following apparently present: tibia with relatively short (probably), median, tactile seta (index, 0.42–0.50); metatarsus with basal (probably elongate), tactile seta (index, 0.13–0.14); telotarsus with relatively short, basal seta (index, 0.13–0.14); telotarsus with relatively short, basal seta (index, 0.13–0.20) and a distinctly longer submedian one (index, 0.40–0.50). Pedal proportions (both sexes): leg I: basifemur 3.5–4.2, telofemur 2.4–3.0, tibia 4.1–5.1, metatarsus 3.0–3.5, and telotarsus 3.9–5.5, times as long as deep; leg IV: "miofemur" 2.8–3.4, tibia 4.8–5.9, metatarsus 2.7–3.0, and telotarsus 5.1–6.1, times as long as deep.

The measurements are summarized in table 3.

REMARKS: When originally named, good criteria for the discrimination of this form from *N. carolinense* were not apparent; it merely seemed smaller, paler, and more slender than typical *N. carolinense*. It was, therefore, tentatively discriminated merely as a variety (*tenuis*) of that species. This name was subsequently modified by Beier (on lexicographical grounds) to *tenuis*. Subsequently Hoff and Bolsterli (*loc. cit.*) tentatively recognized it as of specific rank and gave some palpal measurements. These are in substantial agreement with those here given, for the type material. This is the first complete published description of the species.

Neobisium ingratum, new species

Figure 10

MATERIAL: Holotype, male (JC-1276.-01001), from McFarlen Cave, near Garth, Jackson County, Alabama; February 29, 1940 (Jones and Archer). Although not so

TABLE 3
MEASUREMENTS (IN MILLIMETERS) OF MALE AND FEMALE SPECIMENS OF
Neobisium tenue CHAMBERLIN

	Male Holotype	Male JC-310.01002	Male JC-311.01002	Female JC-310.01003	Female JC-311.01005	Female Allotype
Total L ^a ×abd. B	2.36 ×1.2 ±	2.34 ×0.90	2.62 ×0.98 ±	2.59 ×1.15 ±	2.54 ×indet.	3.07 ×1.23
Carapace L×ocular B	0.77 ×0.69 ±	0.82 ×0.67 ±	0.79 ×indet.	0.84 ×0.74 ±	0.84 ×0.66	0.85 ×0.77 ±
Chelicera L×B	0.50 ×0.27	0.52 ×0.25	0.56 ×0.27	0.61 ×0.29	0.52 ×0.25	0.56 ×0.28
Palp:						
Trochanter L×B	0.489×0.233	0.525×0.246	0.492×0.233	0.549×0.253	0.513×0.246	0.508×0.246
Femur L×B	0.886×0.218	1.033×0.235	0.918×0.225	1.005×0.239	0.951×0.230	0.959×0.246
Tibia L×B	0.705×0.257	0.771×0.262	0.681×0.246	0.746×0.279	0.705×0.254	0.705×0.269
Tibial ped. L×B	0.213×0.130	0.221×0.126	0.194×0.134	0.233×0.148	0.213×0.148	0.230×0.138
Tibial ped. inner L	0.107	0.107	0.107	0.115	0.098	0.098
Chela L×B	1.624×0.402	1.845×0.459	1.656×0.426	1.804×0.467	1.638×0.464	1.648×0.449 ±
Chela+pedicel L	1.706	1.927	1.738	1.902	1.697	1.730
Hand L; fingers L	0.631; 1.017	0.754; 1.107	0.672; 1.033	0.771; 1.082	0.705; 0.984	0.754; 0.984
Leg I:						
Basifemur L×D	0.508×0.144	0.558×0.139	0.533×0.128	0.574×0.140	0.541×0.129	0.525×0.144
Telofemur L×D	0.320×0.132	0.336×0.121	0.344×0.119	0.361×0.121	0.328×0.114	0.339×0.125
Tibia L×D	0.394×0.096	0.467×0.096	0.435×0.092	0.467×0.093	0.443×0.096	0.451×0.098
Metatarsus L×D	0.235×0.077	0.279×0.080	0.246×0.075	0.279×0.081	0.254×0.085	0.251×0.080
Telotarsus L×D	0.344×0.088	0.385×0.077	0.366×0.070	0.382×0.070	0.372×0.079	0.377×0.070
Leg IV:						
"Miofemur" L×D	0.877×0.312	0.989×0.320	0.910×0.295	0.968×0.328	0.918×0.271	0.961×0.287
Basif. L; telof. L	0.336; 0.487	0.349; 0.541	0.312; 0.500	0.354; 0.528	0.344; 0.508	0.336; 0.530
Tibia L×D	0.733×0.136	0.836×0.162	0.776×0.140	0.861×0.147	0.807×0.167	0.771×0.147
Metatarsus L×D	0.289×0.103	0.326×0.105	0.287×0.107	0.328×0.110	0.300×0.107	0.300×0.110
Telotarsus L×D	0.487×0.096 ±	0.554×0.092	0.536×0.088	0.541×0.096	0.508×0.099	0.525×0.092

^a Abbreviations: abd., abdominal; B, breadth; basif., basifemur; D, depth; L, length; ped., pedicel; telof., telofemur.

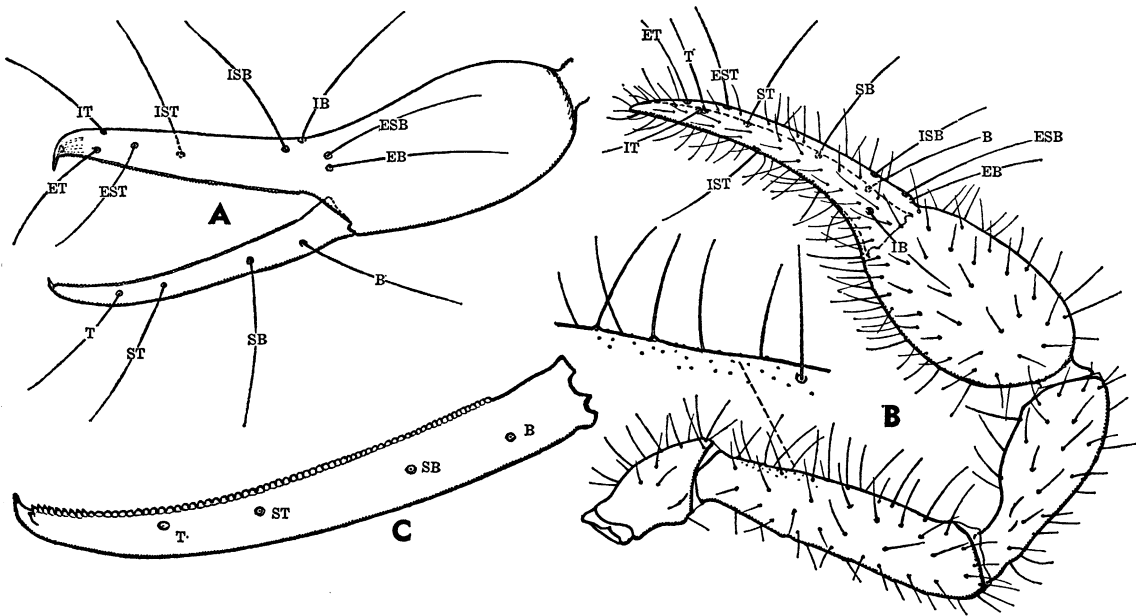


FIG. 10. *Neobisium ingratum*, new species. All drawn from holotype male. A. Exterior aspect of left chela. B. Dorsal aspect of right pedipalp. Insert shows vestigial femoral granulations. C. Movable finger of chela, showing well-developed denticles extending from base to apex.

stated, this is definitely an epigeal form only fortuitously present in the cave. Other material: two females (JC-2362.01001, JC-2362.-01002) from Bee Rock near Monterey, Putnam County, Tennessee, collected by Thomas C. Barr, December 10, 1955, "from *Cladonia* (lichen) on sandstone ('non cave')."

DIAGNOSIS: A typical, medium-sized *Neobisium* of the *N. carolinense* complex.

MALE, HOLOTYPE: Carapace light reddish brown; subquadrate, only a little longer than broad; epistomal process prominent; with four nearly equal and strongly corneate eyes, anterior pair of which removed from cheliceral condyle of carapace by about 1.5 ocular diameters; interocular space about half of an ocular diameter; derm smooth except caudolaterally where it is slightly hispid; chaetotaxy, 4-6 (23 or 24); interocular seta dwarfed. Coxal area typical; maxillary structure and chaetotaxy as in *N. carolinense*; maxillaris apicalis bordered by five setae. Abdomen with tergites and sternites smooth, entire, and uniseriate; rather light reddish brown; eleventh tergite and sternite fused into usual terminal circumanal plate; tergal chaetotaxy: 5:6:9:10:11:10:10:9:9:9:TT1TT:mm; sternal chaetotaxy:

$$\frac{6}{6}:[(2)(3)]:(4)\frac{5}{12}(4\pm):(4\pm)12(4\pm):14:14:13:$$

$$13:13:11:1T2T1:mm.$$

Exterolateralmost one or two setae of sternites 5 to 8 somewhat dwarfed. Male genital structures of usual type; lateral and median genital sacs large, semimembranous.

Chelicera large, robust, twice as long as broad, with spinneret a rounded, sclerotic knob or crest; teeth of serrulae indeterminate but of usual structure; marginal teeth of fixed finger, 18 or 19 in all, very small distally, becoming progressively larger basally; movable finger with 13 or 14 irregular denticles, the largest occurring submedially about opposite galeal seta; chaetotaxy of palm typical, with two rather short accessory setae caudad of *b* and *es*—a total of six.

Palp (fig. 10B) moderately robust; medium reddish brown; derm smooth, including inner face of femur which shows a very few minute granules interobasally; trochanter 2.1 times as long as broad; femur weakly pedicellate, slightly broadest distad of median, 4.1 times as long as broad; tibia 2.6 times as long as broad and 2.3 times as long as its face, rather slender, pedicel strongly developed but with

exterior contour nearly straight and merging imperceptibly into bulb; face of tibial bulb 2.4 times as long as excavation; pedicel robust, its exterior length 1.9 times as long as interior length, which is in turn 0.8 as long as broad; chela robust, more strongly convex interiorly than exteriorly, 3.6–3.7 times as long as broad (including pedicel, 3.8 times as long as broad); hand 1.5 times as long as broad; fingers 1.4 times as long as hand.

Chela typical; chaetotaxy as illustrated (fig. 10A); venom duct very short, nodus ramosus opposite second or third tooth; marginal teeth numbering 75 on movable and 77 on fixed finger; median teeth longer and relatively acute on fixed finger as compared to rounded teeth of movable finger; movable finger with 10 acute, protrorse, terminal, and subterminal teeth, of which apical two or three comprise venedentis receptor, all others truncately rounded and well developed to finger base opposite seta B (fig. 10C).

Legs straw-yellow; of usual structure; subterminal tarsal setae deeply but unequally bifurcated with subsidiary denticles. Leg IV: tibia with long, slender, submedian, tactile seta (index, 0.35); metatarsus with similar subbasal, tactile seta (index, 0.15); telotarsus with long, slender, submedian, tactile seta (index, 0.42); other shorter (but erect) semi-tactile setae also present on tibia and telotarsus at least. Pedal proportions: leg I: basifemur 4.0, telofemur 3.0, tibia 5.3, metatarsus 3.8, and telotarsus 5.9, times as long as deep; leg IV: "miofemur" 3.0, tibia 5.8–5.9, metatarsus 3.0, and telotarsus 6.0, times as long as deep.

MEASUREMENTS (IN MILLIMETERS): Holotype male: total length (exclusive of chelicera), 2.71; abdominal breadth, $1.0 \pm$; carapace, 0.87 long; ocular breadth, 0.70; posterior breadth, 0.75; diameter of both anterior and posterior eyes, $0.074 \pm$; interocular interval, 0.037; anterior eye to anterior carapacial margin (at cheliceral condyle), 0.110; epistomal process, 0.037 long. Chelicera 0.56 by 0.28. Palp: trochanter, 0.533 by 0.256; femur, 1.017 by 0.249; tibia, 0.779 by 0.295 (tibial face, 0.320 long; terminal excavation, 0.205 long; pedicel, 0.246 long exteriorly, 0.115 long interiorly, and 0.148 broad); chela, 1.706 (plus pedicel, 1.804) by 0.476 broad and 0.467 deep; hand, 0.722 long; fingers, 0.984

long. Leg I: basifemur, 0.574 by 0.144; telofemur, 0.377 by 0.127; tibia, 0.485 by 0.092; metatarsus, 0.279 by 0.074; telotarsus, 0.377 by 0.064. Leg IV: "miofemur," 0.981 by 0.328; basifemur, 0.358 long; telofemur, 0.538 long; tibia, 0.836 by 0.143; metatarsus, 0.320 by 0.107; telotarsus, 0.525 by 0.088.

FEMALE, PARATYPE MATERIAL, NO ALLOTYPE DESIGNATED: Carapace and eyes as in male; chaetotaxy, 4–6 or 7 (23 or 24). Abdomen essentially as in male except for chaetotaxal differences; tergal chaetotaxy, 6:8 or 10:11:12:12:12 to 14:11 or 12:12 or 13:11 or 12:10:4 or 5 [2 pairs tactile (?)] :mm; sternal chaetotaxy, mmm-mmm: 0:(4 \pm)22 to 27(4 \pm):(3 or 4) 13 or 14(3 or 4):15 to 17:17 to 20:16 to 18:14 to 16:13 to 15:12 to 13:9(2 pairs tactile):mm.

Palp essentially as in male except for more robust chela and completely non-granulate femur (no traces of anterobasal microgranulations); palpal proportions: trochanter 2.0–2.1, femur 4.1, and tibia 2.6–2.7, times as long as broad; chela 3.2 (plus pedicel, 3.4) times as long as broad and 3.3 times as long as deep; hand 1.6 times as long as broad; finger 1.2 times as long as hand. Form of tibia essentially as in male—2.4–2.6 times as long as its face which is $1.5 \pm$ times as long as terminal excavation, and 2.8–2.9 times as long as interior length of pedicel; interior length of pedicel 0.6–0.8 as long as minimum breadth; pedicel not differentiated exteriorly.

Chela essentially as in male; marginal teeth of fixed finger 74 to 79, those of the movable finger 71 to 77; marginal teeth⁶ of movable finger rounded but well developed from base to tip, except for terminal 10 or 11 which are acute and somewhat retrorse (as in male).

Legs essentially as in male except that fourth femur may be significantly more slender, 3.7 to 3.8 times as long as deep as compared to only 3.0 times as long as deep in male. Other pedal proportions: leg I: basifemur 3.4–4.2, telofemur 2.2–3.0, tibia 4.4–4.9, metatarsus 3.3–3.4, and telotarsus 4.7–5.4, times as long as deep; leg IV: "miofemur" 3.7–3.8, tibia 5.6–6.0, metatarsus 2.9–3.1, and telotarsus 4.3–5.7, times as long as deep. Subterminal seta of tarsus deeply but unequally bifurcate. Tactile setae of fourth leg essentially as in male, tibial seta slightly

proximal of median (index, 0.39); metatarsal seta subbasal (index, 0.13) and telotarsal seta submedian (index, 0.55).

MEASUREMENTS (IN MILLIMETERS): Female (JC-2362.01001): total length, 4.0; abdominal breadth, $1.4 \pm$. Carapace 0.95 long by 0.75 broad across eyes; diameter of anterior eyes, 0.090, of posterior eyes, 0.082; interocular interval, 0.049; distance of fore eyes to anterior carapacial margin, 0.115. Chelicera 0.62 by 0.34. Palp: trochanter, 0.585 by 0.285; femur, 1.153 by 0.284; tibia, 0.876 by 0.328 broad (face, 0.361; terminal excavation, 0.246; inner pedicel length, 0.131, breadth, 0.171); chela, 1.963 (plus pedicel, 2.061) by 0.607 broad and 0.590 deep; hand, 0.951 long; fingers, 1.140 long. Leg I: basifemur, 0.607 by 0.145; telofemur, 0.402 by 0.134; tibia, 0.508 by 0.103; metatarsus, 0.279 by 0.081; telotarsus, 0.377 by 0.070; leg IV: "miofemur," 1.110 by 0.295 (basifemur, 0.369 long; telofemur, 0.615 long); tibia, 0.886 by 0.147; metatarsus, 0.361 by 0.118; telotarsus, 0.528 by 0.092.

REMARKS: The specific association of the available females in this collection with the male holotype is probably correct, although the completely smooth palpal femur and the more slender fourth pedal femur introduce a mild doubt. Hence no allotype has been designated. The various tibial indices (of the palp) are not significantly different from those of *N. carolinense* or *N. tenue*.

SUBFAMILY IDEOBISIINAE CHAMBERLIN

GENUS MICROCREAGRIS BALZAN

Microcreagris BALZAN, 1891, Ann. Soc. Ent. France, vol. 60, p. 543 (type: *M. gigas* Balzan). CHAMBERLIN, 1930, Ann. Mag. Nat. Hist., ser. 10, vol. 5, p. 23.

Microcreagris is a widespread holarctic genus, with its center of distribution apparently either the Orient or the west coast of America. Including the species herein described it presently includes approximately 50 species. Most are free-living, primarily in moist humus and leaf mold. While well represented in southern Europe, *Microcreagris* is "replaced" in most of that continent by *Neobisium* and *Roncus*. These genera, in turn, are very poorly represented in the United States. Only a few species of *Microcreagris* are presently known from caves, and of these

few only one true troglobite (*M. cavernicola* Vachon from Portugal) has been described previously. It is, therefore, of more than usual interest to be able to add three additional troglobitic species from caves in Alabama and Tennessee. In addition four other American species recorded from caves or cave-like situations are also described or redefined.

The following key will assist in the separation of the epigeal species of the genus thus far known to occur in the United States east of the Mississippi River, as well as the presently known troglobites (or near troglobites) from all localities.

1. Four-eyed, epigeal species from United States east of Mississippi River; tibial pedicel moderately slender to robust, measuring less than twice as long as its least breadth 2
- Blind or two-eyed, cavernicolous species of world fauna; tibial pedicel extremely slender, measuring at least 2.5–3.0 or more times as long as its least breadth . . . 6
- 2(1). Palpal femur completely smooth interiorly and dorsally; maxillaris apicalis with four border setae 3
- Palpal femur distinctly (but in some cases only minutely or sparsely) granulate; maxillaris apicalis with three border setae 4
- 3(2). Inner face of tibia less than twice as long as terminal tibial excavation ($1.7 \pm$); tibial excavation 1.5 to 2.0 times as long as inner length of pedicel
- *atlantica* Chamberlin
- Inner face of tibia 2.4 to 3.8 times as long as tibial excavation; tibial excavation shorter to only slightly longer (0.75–1.2 times) than inner length of pedicel; Spring Cave, Alabama
- *subatlantica*, new species
- 4(2). Femur evenly and densely granulate; relatively large species, chela (including pedicel) 1.6–2.0 mm. long; tibia strongly and slenderly pedicellate, inner length of pedicel about 1.6–1.7 times as long as breadth; subterminal seta unequally furcate . . .
- *rufula* (Banks)
- Femur moderately to inconspicuously (minutely) and sparsely granulate; smaller species, chela plus pedicel 1.0–1.3 mm. long; tibial pedicel more robust, its inner length 1.0–1.2 times as long as broad; subterminal seta almost equally furcate 5

- 5(4). Inner face of tibia 4.0–4.1 times as long as terminal excavation and 3.3–3.4 times as long as inner length of pedicel; exterior length of pedicel 2.3 times as long as interior length; larger species, femur 0.72–0.75, tibia 0.66–0.68, and chela plus pedicel 1.2–1.7, mm. long; galea small, stylet-like, and obviously present even when broken from specimen . . . *lata* Hoff

Inner face of tibia 3.3–3.8 times as long as terminal excavation and 2.7–3.1 times as long as inner length of pedicel; exterior length of pedicel 1.7–2.0 times as long as interior length; smaller and more graceful species, femur 0.6–0.7, tibia 0.5–0.6, chela plus pedicel 0.9–1.2, mm. long; galea apparently either abnormally fragile or deciduous, or both, so that it is often, if not in most cases, lacking, leaving little if any evidence of its original presence . . .

- *fallax*, new species
6(1). Femur of palps slightly but distinctly granulate interiorly; seta EST of chela only a little proximad of IT and clearly on terminal third of finger 7

Femur of palps smooth, non-granulate; seta EST of chela almost submedian on finger and much proximad of IT; troglobites from Tennessee and Alabama caves . . . 8

- 7(6). Carapace with total of 18 macrosetae; completely blind; true troglobitic species from a cave in Portugal . . . *cavernicola* Vachon

Carapace with total of 26 to 28 macrosetae; with two greatly reduced but still corneate eyes; only known specimen "drawn from a well" in Oregon

- *columbiana*, new species

- 8(6). Chelicera with two accessory setae; subterminal seta of tarsus deeply furcate and secondarily denticulate; tibial pedicel moderately attenuated, about 5.0 times as long as its minimal breadth in male and 4.1 times as long as broad in female; palpal chela (plus pedicel), 2.0–2.4 mm. long. 9
Chelicera with single accessory seta; subterminal seta of tarsus not furcate but with a few subterminal denticles; tibial pedicel extremely attenuated, about 6.0–6.2 times as long as its minimal breadth; palpal chela (plus pedicel), 2.6–2.7 mm. long; King Solomon Cave, Tennessee . .

- *valentinei*, new species
9(8). Female palp moderately robust, femur 4.9 times as long as broad; chela, plus pedicel, 4.4 times as long as broad; fourth tibia 7.2 times as long as deep; fingers of chela with 85–90 marginal teeth; Terrell Cave No. 1, Alabama *pluto*, new species

Female more slender, femur 5.8 times as long as broad; chela, including pedicel, 5.8 times as long as broad; fourth tibia 8.8 times as long as deep; fingers of chela with 97–105 marginal teeth; Davidson's Cave, Alabama . . . *persephone*, new species

Microcreagris columbiana, new species

Figure 11

MATERIAL: Holotype, male (JC-1081-01001), "drawn from well" at Clatskanie, Oregon; August 18, 1938; collector E. A. Gibson; deposited in collections of the American Museum of Natural History (donor: J. C. Chamberlin).

DIAGNOSIS: Moderately large, slender species with only a single pair of much reduced eyes. Normally pigmented, medium reddish brown. Carapace much longer than broad ($1.3 \pm$ times), with subparallel sides; epistomal process absent (vestigial); with a single pair of weakly corneate eyes which are situated about their own diameter from anterior carapacial margin; chaetotaxy, 4–6 (26 to $28 \pm$). Abdomen of usual structure, scarcely wider than cephalothorax and moderately elongate; pleural membrane granulostriate; tergites and sternites entire and uniseriate; eleventh tergite and sternite fused to form terminal circumanal plate which has two dorsal and two ventral pairs of tactile setae. Tergal chaetotaxy, 9:11:12:11:10:11:11:12:12:10:TTTT:mm. Sternal chaetotaxy:

(46):[(7)–(6)]:(7) $\frac{11-10}{15}$ (9):(7)15(8):14:16:17:

14:13:12:T1T3T1T:mm.

Chaetotaxy of eleventh segment (circumanal plate) difficult to make out, and indicated arrangement possibly erroneous.

Male genital structures too distorted in type for purposes of illustration; genital sacs very large, slenderly ovate, and apparently somewhat sclerotic.

Coxal area typical, rather elongate, and with subparallel sides; maxillae relatively broad, little more than 1.5 times as long as wide; apical portion short, strongly rounded, and bordered by five macrosetae; condylar seta very long and acuminate, semitactile.

Chelicera little more than half (0.57) as long as carapace and twice as long as broad; galea very small and only vestigially branched

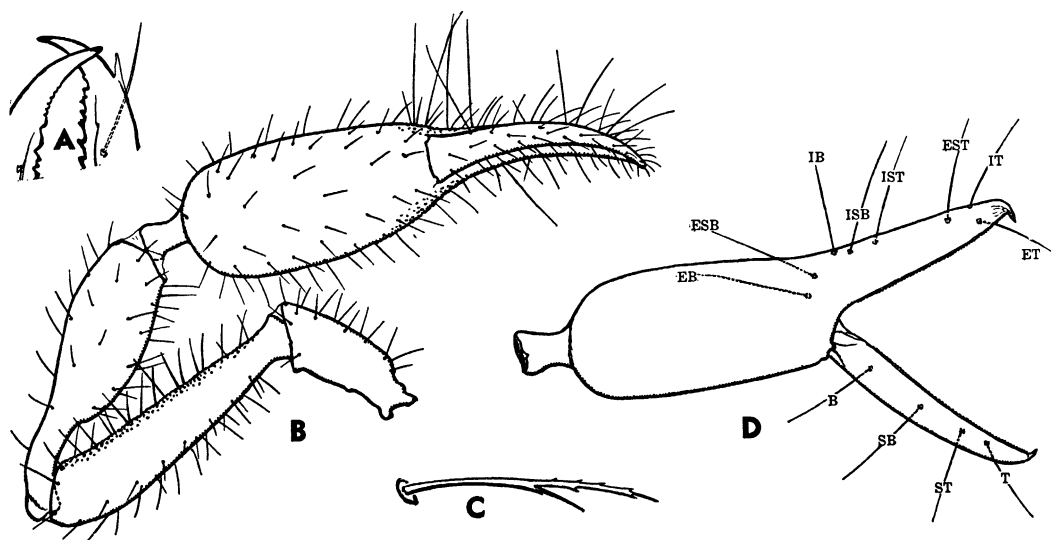


FIG. 11. *Microcreagris columbiana*, new species. Drawn from holotype male. A. Tip of chelicera, showing reduced galea. B. Ventral aspect of right palp. C. Unequally bifurcate subterminal seta of fourth tarsus. D. Interior aspect of left chela.

(fig. 11A); serrula exterior with 38 to 40 teeth; serrula interior with 19 to 22 teeth, basal one broad and apparently comprising several fused teeth; flagellum of nine blades, all but acute basal one unilaterally serrated; movable finger with nine irregular, marginal teeth or lobes which combine to form distinct crest opposite galeal seta; fixed finger with 14 small, irregular, marginal teeth (or serrations), chaetotaxy of palm including usual setae (*is*, *sb*, *b*, and *es*), plus two elongate setae and one short accessory seta in transverse series caudad of *b* and *es* (seven in all).

Palp (fig. 11B) slender, unicolorous, medium reddish brown (not at all pallid); heel of trochanter with a few small, rounded tubercles, femur anteriorly evenly and densely granulate; distal portion of hand at base of fingers both exteriorly and interiorly evenly and finely granulate; rest of palp smooth. Trochanter 2.4 times as long as broad; femur longer than hand and 4.3 times as long as broad; tibia as long as femur, slenderly pedicellate and 3.3 to 3.4 times as long as broad (inner length of pedicel 2.5 times as long as its narrowest breadth, outer length 3.3 to 3.4 times as long as broad); chela 3.6 (plus pedicel, 3.9) times as long as broad and 3.7 times as long as deep; fingers distinctly but not greatly shorter than hand but much shorter than hand plus its pedicel.

Chela with chaetotaxy and dentition as illustrated (fig. 11D); fixed finger with 73, movable finger with 64, marginal teeth which are rounded or truncate except apically and subapically where they are acutely retroconical; no accessory teeth.

Legs of usual structure, moderately slender; third and fourth legs with tactile setae differentiated on tibia (index, 0.49), metatarsus (index, 0.14), and telotarsus (index, 0.38); subterminal seta deeply furcate, with each branch minutely subdenticulate (fig. 11C). Pedal proportions: leg I: basifemur 3.7, telofemur 3.0, tibia 5.3, metatarsus 2.6, and telotarsus 4.3, times as long as deep; leg IV: "miofemur," 3.8 times as long as deep; telofemur, 1.3–1.4 times as long as basifemur; tibia 6.0, metatarsus 2.7–2.8, and telotarsus 4.6–4.7, times as long as deep.

MEASUREMENTS (IN MILLIMETERS): Male holotype: total length, 4.02; abdominal breadth, $1.1 \pm$. Carapace 1.23 long, 0.95 broad across ocular region, and 0.93 broad posteriorly; diameter of eyes, 0.13 to 0.15. Chelicera, 0.704 by 0.344. Palp: trochanter, 0.820 by 0.344; femur, 1.427 by 0.331; tibia, 1.427 by 0.425 (inner length of pedicel, 0.361, outer length, 0.484, breadth, 0.144); chela, 2.362 (plus pedicel, 2.575) by 0.654 broad and 0.645 deep; hand, 1.279 long; fingers, 1.125 long. Leg I: basifemur, 0.640 by 0.173;

telofemur, 0.456 by 0.152; tibia, 0.661 by 0.125; metatarsus, 0.287 by 0.110; telotarsus, 0.426 by 0.099; leg IV: "miofemur," 1.104 by 0.290; basifemur, 0.467 long; telofemur, 0.636 long; tibia, 1.081 by 0.181; metatarsus, 0.377 by 0.137; telotarsus, 0.513 by 0.110.

REMARKS: This species is possibly a soil-inhabiting form only fortuitously found in the well from which the type was collected. The reduced eyes, however, may be indicative of a normal subterranean environment, as all species of *Microcreagris*, other than true cave forms, are four-eyed, generally conspicuously so. The dark pigmentation, on the other hand, suggests a normal epigeal environment.

***Microcreagris phyllisae* Chamberlin**

Figure 12

Microcreagris phyllisae CHAMBERLIN, 1930, Ann. Mag. Nat. Hist., ser. 10, vol. 5, p. 31. BEIER, 1937, Das Tierreich, vol. 57, p. 153.

MATERIAL: The type material has been restudied; no additional material has been reported. Holotype, male (JC-376.01001), Coronado Beach, California, collected "on beach in kelp" by F. R. Blaisdell; and paratype male (JC-9.01001) collected in Eaton's Cave, Los Angeles County, California.

DIAGNOSIS (EMENDED): Male only. Small species of moderately slender facies; dorsal sclerotic parts light, uniform, brilliant rust; under parts and legs paler. Carapace not greatly but distinctly longer than broad (crushed and flattened in types so that exact proportions are not ascertainable); with two pairs of distinct eyes placed about one-third of an ocular diameter apart and with anterior eyes about their own diameter from carapacial margin; smooth but laterally tessellated; epistomal process small but distinct, rounded; chaetotaxy, 4-6(24).

Abdomen relatively slender and subcylindrical; tergites and sternites entire, smooth; eleventh tergite and sternite fused into terminal circumanal plate, of which both tergal and sternal elements are setose. Tergal chaetotaxy: $8 \pm : 12$ or $13 : 12$ to $13 : 13$ to $15 : 12$ to $14 : 12$ to $13 : 12$ to $14 : 12$ or $13 : 12$ to $13 : 9$ to $11 : S1S1S1S$:mm. Sternal chaetotaxy:

$$\left(\frac{10 \text{ to } 13}{21 \pm} \right) : [(3) - (3 \text{ or } 4)] : (6 \text{ or } 7) \frac{5 \text{ to } 8}{16 \text{ or } 17}$$

$$(6 \text{ or } 7) : (6) 11 \text{ to } 16(6) : 16 : \frac{2}{14 \text{ to } 16} : \frac{2}{15 \text{ or } 16} : \frac{2}{16 \text{ to } 18} : 15 \text{ or } 16 : 13 \text{ to } 15 : S2 \text{ or } 3S : \text{mm.}$$

Indicated differentiation of tactile or semi-tactile setae of eleventh segment uncertain (inferred on basis of seta areoles only, actual setae lost).

Male genitalia distinctive, as illustrated (fig. 12F-I); genital sacs non-sclerotic, subcylindrical.

Coxal area typical, narrow, of subequal width throughout; maxillaris apicalis rounded, bordered by four (in some cases five) macrosetae; condylar apices of coxae I and II strongly sclerotic but scarcely produced.

Chelicera (fig. 12C) typical, about 0.6 as long as carapace, longer than palpal trochanter, and 1.95-2.20 times as long as broad; galea a short but slender stylet; serrula exterior with 31 to 32 teeth; serrula interior (fig. 12D) with 18 to 20 teeth; flagellum of about six to eight unilaterally serrate setae; movable finger with 10 to 12 small, protrorse serrations or denticles; fixed finger with 14 to 17 small, retrorse denticles; fixed finger with setae *is*, *sb*, *b*, and *es* present as usual plus a transverse series of three accessory setae caudad of, and between, *b* and *es* (seven in all).

Palp (fig. 12E) moderately robust, trochanter, femur, inner surface of tibia, distal portion of hand, and base of fingers exteriorly and interiorly distinctly and evenly granulate, especially interiorly; trochanter 2.0-2.1 times as long as broad; femur clavate, broadest subdistally, 3.6-3.7 times as long as broad; tibia slenderly pedicellate, 3.0-3.2 times as long as outer length of pedicel and 2.4-2.6 times as long as broad; chela 3.1-3.2 ± (plus pedicel, 3.4-3.5 ±) times as long as broad and 3.0-3.1 ± times as long as deep; hand 1.4 times as long as broad; fingers 1.3 times as long as hand.

Chela as illustrated (fig. 12J); fixed finger with 50 to 51, movable finger with about 56 to 62, contiguous, somewhat rounded, truncate teeth except apically on sheath of movable finger where they are smaller and acuminate; setae EB and ESB on base of finger but scarcely on bulb of chela; setae IST, IB, and ISB closely grouped and closer, as a

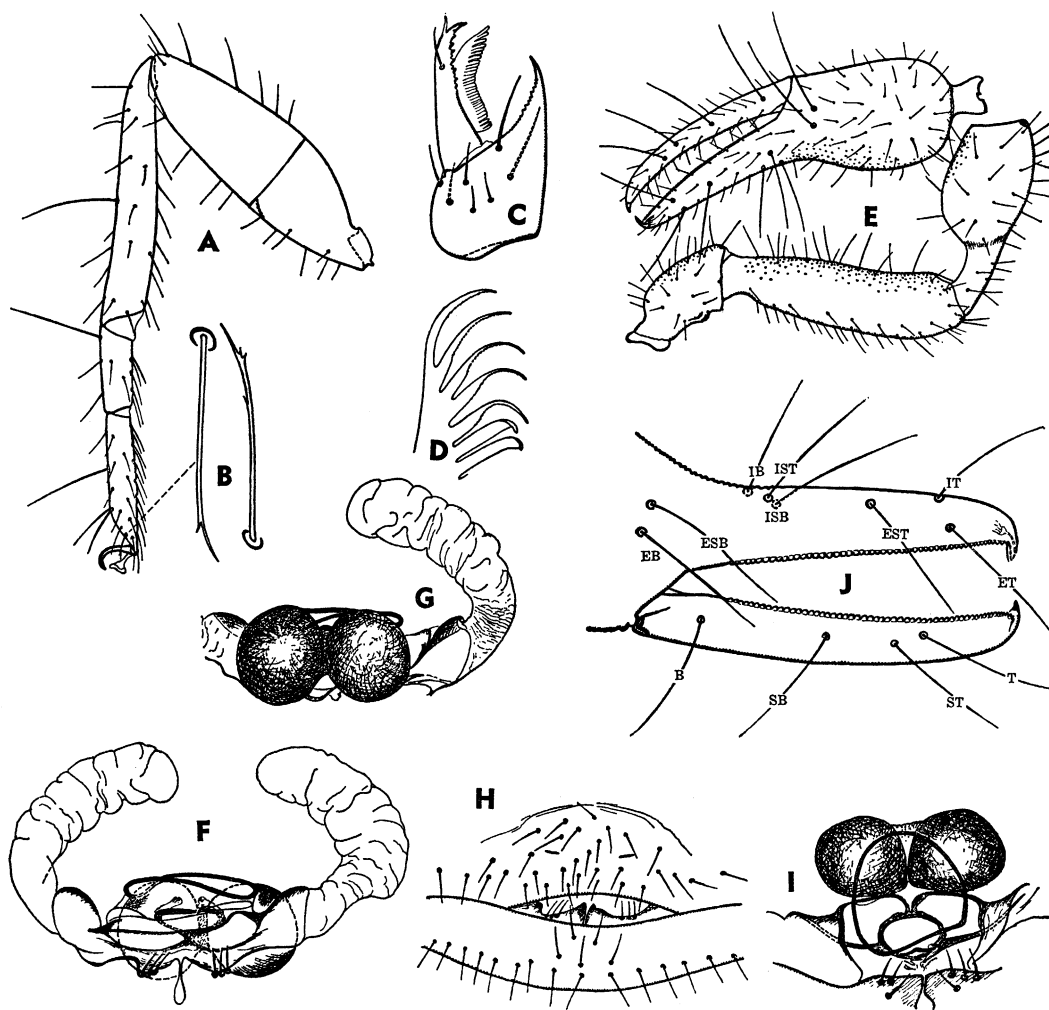


FIG. 12. *Microcreagris phyllisae* Chamberlin. All drawn from holotype male unless otherwise indicated. A. Leg IV. B. Subterminal setae of tarsus IV (one from each leg). C. Exterior aspect of left chelicera. Dotted setae were lost from specimen. Serrula interior omitted. D. Terminal portion of serrula interior of chelicera (male paratype). E. Right pedipalp (chela detached and viewed from exterior aspect). F. Sketch of ventral aspect of male genitalic structures (somewhat distorted). The internal setae identify the invaginated second segment. G. Dorsal aspect of median, sclerotized, spherical structures of male genitalia. H. Chaetotaxy of genital opercula. The invaginated setose portions of the genital segment (two) appear within the genital slit. I. Sketch of central portion of male genitalic structures of paratype. Portions of the less sclerotic parts omitted and some of the sclerotic structures strongly displaced relative to F. J. Exterior aspect of fingers of right chela, showing chaetotaxy and dentition.

whole, to EST than to EB and ESB; seta SB much closer to ST than to B.

Legs of normal facies; semitactile or pseudotactile setae distinctly differentiated on tibia, metatarsus, and telotarsus of leg IV (fig. 12A); tactile seta of tibia 0.55 of tibial length from its base, that of metatarsus 0.13–0.15 of

metatarsal length from its base, that of telotarsus 0.38 of telotarsal length from base of segment; subterminal seta not furcate but with a few lateral and subterminal denticles (fig. 12B). Proportions of legs: leg I: basifemur 3.0–3.1, telofemur 2.3–2.5, tibia 4.6–5.0, metatarsus 2.9–3.0, telotarsus 5.1–6.0,

times as long as deep; leg IV: "miofemur," 3.3–3.4 times as long as deep; telofemur, 1.2–1.3 times as long as basifemur; tibia 6.1–6.3, metatarsus 2.5–2.6, and telotarsus 5.3–5.4, times as long as deep.

MEASUREMENTS (IN MILLIMETERS): Holotype male: total length, 3.18; abdominal breadth, 1.07. Carapace 0.90 long; anterior (ocular) breadth, about 0.74; posterior breadth indeterminable owing to breakage and flattening under cover slip. Chelicera 0.590 by 0.269. Palp: trochanter, 0.541 by 0.261; femur, 0.967 by 0.266; tibia, 0.836 by 0.347 (pedicel: exterior length, 0.379; inner length, 0.180; minimum breadth, 0.114); chela, 1.574 (plus pedicel, 1.722) by $0.492 \pm$ broad and $0.525 \pm$ deep; hand, $0.689 \pm$ long; fingers, 0.910 long. Leg I: basifemur, 0.459 by 0.151; telofemur, 0.323 by 0.128; tibia, 0.459 by 0.091; metatarsus, 0.194 by 0.066; telotarsus, 0.353 by 0.059; leg IV: "miofemur," 0.845 by 0.248; basifemur, 0.369 long; telofemur, 0.476 long; tibia, 0.779 by 0.123; metatarsus, 0.246 by 0.099; telotarsus, 0.413 by 0.077.

Paratype male: total length, 3.18; abdominal breadth, $1.15 \pm$. Carapace 0.85 long (breadth indeterminable). Chelicerae $0.525 \pm$ by $0.271 \pm$. Palp: trochanter, 0.485 by 0.238; femur, 0.877 by 0.243; tibia, 0.748 by 0.294 (tibial pedicel: outer length, 0.233; inner length, 0.148; minimum breadth, 0.103); chela, 1.378 (plus pedicel, 1.509) by $0.446 \pm$ broad or deep, respectively (accurate measurement impossible owing to partial crushing); hand, $0.640 \pm$ long; fingers, $0.853 \pm$ long. Leg I: basifemur, 0.443 by 0.147; telofemur, 0.298 by 0.131; tibia, 0.420 by 0.092; metatarsus, 0.200 by 0.069; telotarsus, 0.339 by 0.066. Leg IV: "miofemur," 0.802 by 0.243; basifemur, 0.369 long; telofemur, 0.443 long; tibia, 0.727 by 0.119; metatarsus, 0.246 by 0.096; telotarsus, 0.400 by 0.075.

REMARKS: The original description of this species was a mere diagnosis and did not include measurements or other important details.

The species is undoubtedly a free-living form. There is no indication that the specimen from Eaton's Cave is modified in any way for a cavernicolous existence, and its presence must be assumed to be more or less "accidental" (perhaps taken near the cave

entrance). No actual ecological or habitat data, however, accompanied the specimen. No information is available on the nature or exact location of Eaton's Cave.

***Microcreagris atlantica* Chamberlin**

Figures 13, 14E, F

Microcreagris atlantica CHAMBERLIN, 1930, Ann. Mag. Nat. Hist., ser. 10, vol. 5, p. 29. BEIER, 1932, Das Tierreich, vol. 57, p. 148.

MATERIAL STUDIED: Holotype, male, and allotype, female (JC-434.01001, JC-434.-01002); "eastern United States." I have also seen a specimen, apparently of this species (female, JC-262.01001), from Ashville (?), North Carolina. The following description is based entirely on the types.

DIAGNOSIS (ADDENDA): Based on both sexes unless otherwise noted. Relatively small species (2.4–2.9 mm. long), with polished, non-granulate palps and with femur reaching its maximum breadth median or proximad of median.

Carapace smooth and polished; distinctly longer than greatest breadth, about 1.7–1.8 times as long as chelicera and only slightly broader behind than across eyes; with four well-developed, corneate eyes, anterior pair of which removed from condylar corner of carapace by about their own diameter; interocular interval about 0.3 to 0.4 ocular diameters; posterior eyes variable but almost or quite as large as anterior eyes; chaetotaxy, 4–6 (26 or 27); epistomal process distinct, but relatively small and rounded.

Coxal area narrow; with subparallel sides; apex of maxilla rounded, bordered by four macrosetae; maxillary condylar seta attenuated and semitactile.

Tergites smooth, entire; eleventh tergite and sternite fused into single circumanal sclerite; chaetotaxy, 6:10:11:11:10 to 12:10 to 12:10 to 12:10 to 12:8 to 11:8 or 9: T1T1T1T1T: mm.

Sternites smooth; chaetotaxy (segments 4–12, inclusive, both sexes), (mmm or mmmm) 6 to 7 (mmm or mmmm): 10 to 12: 11 to 12: 12 to 14: 12 to 13: 10 to 12: 11 or 12: 2T1T2: mm. Exact number of terminal tactile setae not surely determinable, broken or lost from available material but eleventh segment at least with two dorsal and one ventral pair. Chaetotaxy of segments 1–3 of female: 5:(0):

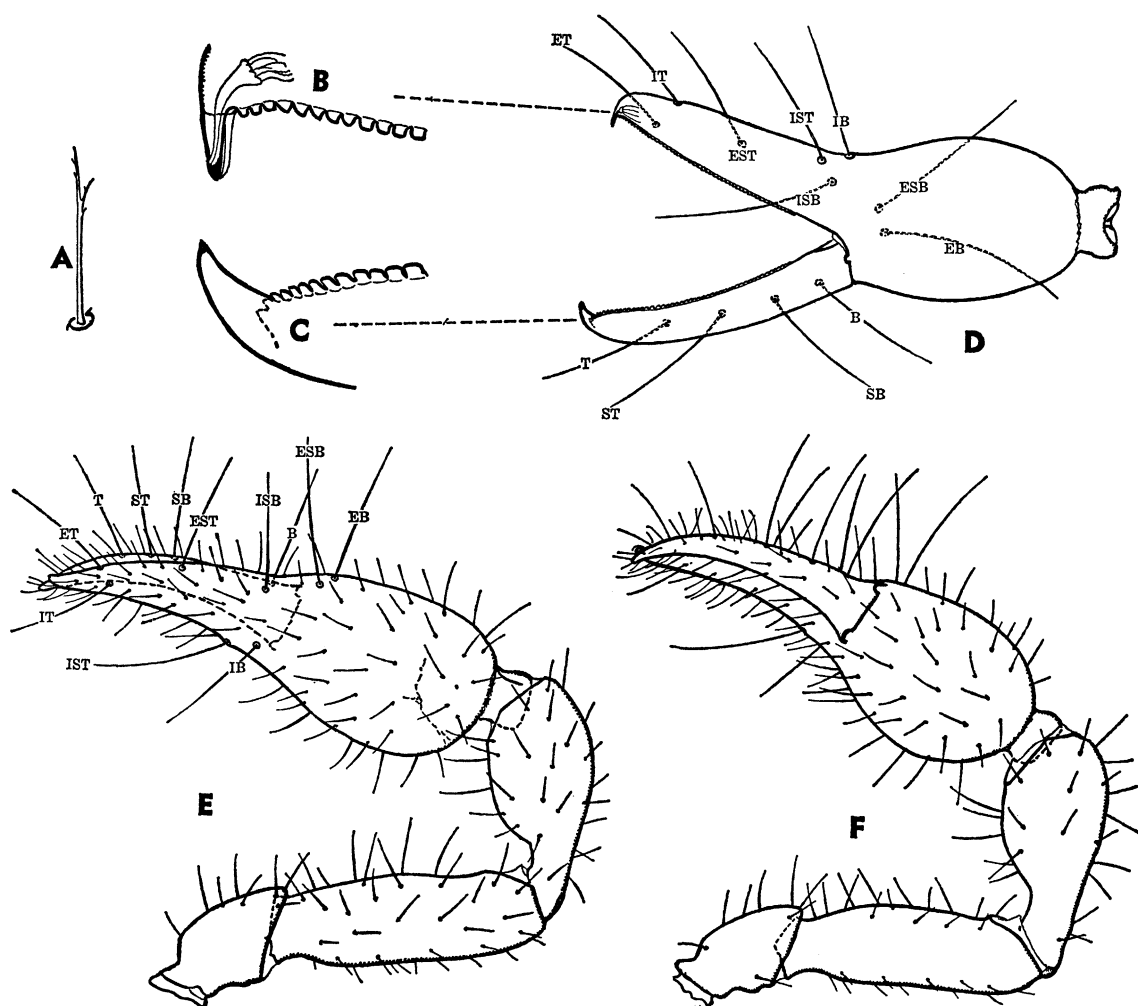


FIG. 13. *Microcreagris atlantica* Chamberlin. Drawn from holotype male and allotype female; to same scale as comparable structures in figure 14. A. Subterminal tarsal seta (allotype). B, C. Tips of fingers of chela, showing venom apparatus of fixed and receptor venedens of movable finger, respectively (holotype). D. Interior aspect of right male chela (larger scale than for palp). E. Dorsal aspect of right female palp (partially crushed hand reconstructed). F. Ventral aspect of left male palp. (See also fig. 14E, F for details of palpal tibia of this species.)

(mmm)10(mmm); of male:

$$9:[(3)(3)]:(\text{mmmm})\frac{9}{10}(\text{mmm}).$$

Setae on segment 2 of male "internal"; genital structures of male not worked out; female genital area non-distinctive; cribriform plates not apparent in available material.

Chelicera relatively small and 1.7 to 1.9 times as long as broad. Galea a small translucent stylet with a few (two or three very small) simple, terminal branches in female at

least; not greatly, if at all, differentiated sexually; chaetotaxy comprising usual setae [*is*, *sb*, *b*, and *es* plus two accessory setae (one caudad of *b*, the other caudad of *es*), six in all on palm of fixed finger]; details of serrulae not worked out; movable finger with 12 to 13 irregular, protrorse, saw-like, marginal teeth; fixed finger with 15 to 16 small denticles, smallest apically and gradually increasing in size posteriorly; flagellum apparently comprising a series of seven narrow, flattened, contiguous blades, some of which seem to be unilaterally serrate.

Palp (fig. 13E, F) uniformly pigmented, medium, clear reddish brown; moderately robust but somewhat more slender in male than in female; completely smooth and non-granulate on all surfaces.

Palpal tibia (fig. 14E, F) rather strongly pedicellate (pedicel weakly differentiated exteriorly), and measuring over all about 2.2–2.3 times as long as its face, which in turn is 1.7 times as long as terminal excavation; pedicel slightly differentiated behind, robust, its inner length scarcely greater than breadth; exterior pedicel length 2.1 to 2.2 times as great as inner length; terminal excavation 1.5 to 1.8 times as long as inner length of pedicel.

Palpal proportions of male: trochanter 1.9, femur 3.3, tibia 2.3, chela 2.85 (including pedicel, 3.1), and hand 1.3, times as long as broad; palpal proportions of female: trochanter 1.8, femur 3.1, tibia 2.1, chela 2.8 (plus pedicel, 3.0), and hand $1.3 \pm$, times as long as broad; fingers (both sexes), 1.1–1.2 times as long as hand (exclusive of pedicel).

Chela with chaetotaxy as illustrated (fig. 13D); marginal teeth averaging 47 to 49 on fixed and 52 to 53 on movable finger; individual teeth rounded and well developed from base to tip of each finger except that terminal three or four teeth making up venedens receptor acute (fig. 13C); venedens of fixed finger strongly developed; venom duct very short, nodus remosus lying about opposite third marginal tooth (fig. 13B).

Legs of usual facies. Fourth leg with weakly developed, semitactile setae on tibia (index, 0.43–0.44); metatarsus with elongate, sub-basal, tactile seta (index, 0.14–0.16), and telotarsus with similar subbasal seta (index, 0.27–0.33); subterminal tarsal setae deeply unequally bifurcate, each branch with a few subordinate denticles (fig. 13A).

MEASUREMENTS (IN MILLIMETERS): Male holotype: total length (exclusive of chelicerae), 2.36; abdominal breadth, $0.82 \pm$; carapace, 0.66 long by 0.54 broad (ocular); diameter of anterior eyes, 0.055, of posterior eyes, 0.052; interocular space, $0.018 \pm$. Chelicera, 0.39 by 0.23. Palp: trochanter, 0.392 by 0.210; femur, 0.656 by 0.199; tibia, 0.607 by 0.262; chela, 1.099 (plus pedicel, 1.181) by 0.385 broad and 0.366 deep; hand, 0.518 long; fingers, 0.631 long. Palpal tibia: terminal excavation, 0.156; face, 0.262; pedicel, inner

length, 0.107, outer length, 0.221, and breadth, 0.108. Leg I: basifemur, 0.321 by 0.131; telofemur, 0.251 by 0.110; tibia, 0.318 by 0.081; metatarsus, 0.166 by 0.063; telotarsus, 0.261 by 0.055. Leg IV: "miofemur," 0.669 by 0.244 (basifemur, 0.361 long; telofemur, 0.308 long); tibia, 0.561 by 0.125; metatarsus, 0.239 by 0.092; telotarsus, 0.309 by 0.077.

Female, allotype: total length, 2.87; abdominal breadth, $0.82 \pm$. Carapace 0.74 long; ocular breadth, 0.57; diameter of anterior eyes, 0.048, of posterior eyes, 0.055; interocular space, 0.018. Chelicera, 0.410 by 0.213. Palp: trochanter, 0.410 by 0.221; femur, 0.705 by 0.230; tibia, 0.612 by 0.285; chela, 1.214 (plus pedicel, 1.296) by 0.426 broad and 0.410 deep; hand, 0.574 long; fingers, 0.672 long. Palpal tibia: terminal excavation, 0.164; face, 0.279; pedicel, inner length, 0.090, outer length, 0.194, and 0.115 broad. Leg I: basifemur, 0.344 by 0.147; telofemur, 0.279 by 0.129; tibia, 0.349 by 0.085; metatarsus, 0.180 by 0.066; telotarsus, 0.272 by 0.059. Leg IV: "miofemur," 0.541 by 0.205; tibia, 0.433 by 0.103; metatarsus, 0.202 by 0.085; telotarsus, 0.298 by 0.077.

REMARKS: The type locality of the species is unknown, the types having been preserved in an unlabeled vial included in a general lot of specimens from the Atlantic seaboard. The original description was only synoptic. With the discovery of a closely related species in Alabama (*M. subatlantica*, new species), a complete redescription seems in order.

***Microcreagris subatlantica*, new species**

Figure 14A–D, G–I

MATERIAL STUDIED: Holotype, male (JC-1292.02001), from Spring Cave; allotype, female (JC-1263.01001), from Dickey Cave; both lots collected September 25, 1940, by "Jones & Archer" near Maud, Colbert County, Alabama. Paratype female (JC-1277.01001) from Oak Mountain State Park, Shelby County, Alabama (July–August, 1940, A. F. Archer).

DIAGNOSIS: Both sexes unless otherwise noted. Relatively small, somewhat pallid species, 2.1–3.1 mm. long, with smooth, non-granulate palps, femur with subparallel sides (broadest near or somewhat proximad of median) and closely similar to *M. atlantica*

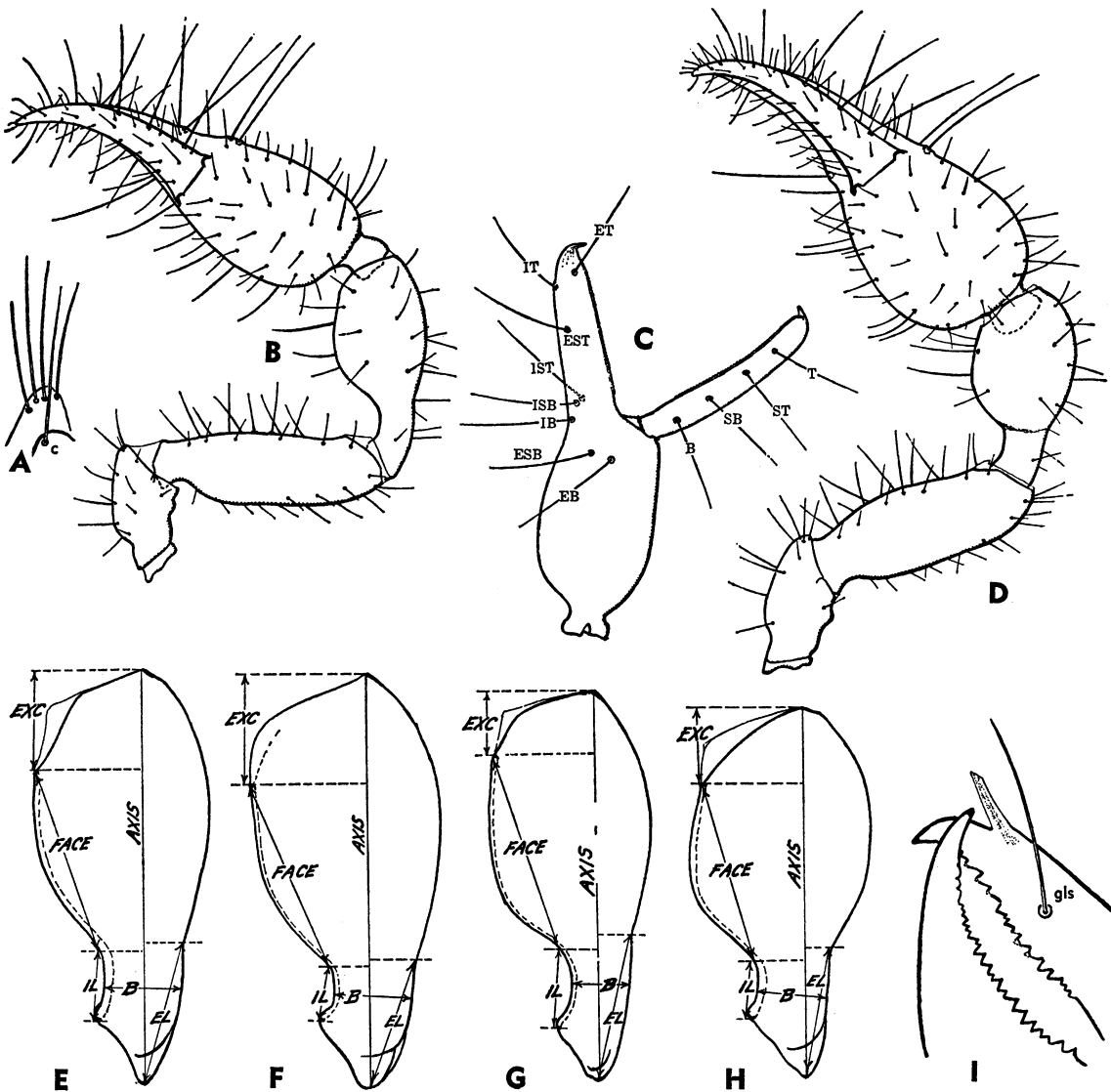


FIG. 14. *Microcreagris subatlantica*, new species. Drawn from holotype female and allotype male except as indicated. Comparable structures to same scale as those in figure 13. A. Apical maxillary and (c) condylar semitactile seta in male. B. Ventral aspect of male palp. C. Exterior aspect of male chela. D. Ventral aspect of female palp. I. Tip of cheliceral fingers, showing dentition and galea (female paratype, JC-1277.01001). E, F, G, H. Comparison of structure of palpal tibia in *M. atlantica* Chamberlin (E, male; F, female) and *M. subatlantica*, new species (G, male; H, female). All drawn to same scale. **Abbreviations:** axis, the longitudinal axis of the segment; b, minimum breadth of pedicel; el, exterior length of pedicel; exc, terminal excavation of tibia; face, face of the tibia; il, inner length of pedicel.

from which it seems to differ in the more slender and more sharply differentiated tibial pedicel (fig. 14G, H, in comparison with fig. 14E, F).

Carapace smooth, 1.7 to 1.9 times as long as chelicera, with four rather small eyes,

anterior pair 1.0 to 1.5 ocular diameters from anterior carapacial margin; interocular interval about 0.3–0.5 ocular diameters; chaetotaxy, 4(or 5)–6 (26 to 27); epistomal process small and rounded to nearly obsolete (e.g., in holotype).

Coxal area of usual facies; maxillaris apicalis (fig. 14A) rounded, with four border setae; maxillary condylar seta slender, semitactile.

Tergal chaetotaxy, 6:9 to 11:10 or 11:10 to 12:10 to 12:10 or 11:10 to 12:10 to 12:10 or 11:9:T1T1T1T:mm. Sternal chaetotaxy of segments 4-12 (both sexes), (4)5 to 7(4):12 to 13:11 to 13:10 to 13:10 to 13:11 to 14:11 to 12:T1T1T1T±:mm. Chaetotaxy of circumanal plate obscure but apparently comprising two pairs of semitactile or tactile setae both tergally and sternally. Genitalic structures not worked out but lateral genital sacs of male membranous, tubular, and comparatively inconspicuous. Chaetotaxy of genital segments (1-3) of male:

$$7:[(3)(3)]:(4)\frac{3}{9}(4).$$

Chaetotaxy of genital segments of female: segment 1 with five or six microsetae; segment 3 as follows: (4 or 5)5 to 7(4 or 5).

Chelicera comparatively small, only a little more than half as long as carapace and 1.9-2.0 times as long as broad; galea (fig. 14I) small, slender, and weakly branched terminally (none to three branchlets); serrulae not observable in detail; movable finger with 12 to 13 irregular, protrorse, saw-like teeth; fixed finger with 18 to 19 similar denticles; palm of fixed finger with setae *is*, *sb*, *b*, and *es* present, plus two accessory setae (six in all).

Palp moderately robust (fig. 14B, D), unicolorous and somewhat pallid (light yellowish brown); all segments completely smooth and non-granulate except that some femoral vestitural setae may originate from slight eminences; gross palpal proportions very similar to those of *M. atlantica* except that tibial pedicel relatively more slender and more sharply defined exteriorly. Tibia (fig. 14G, H) 1.8 to 2.1 times as long as its face and 2.7-2.8 (both sexes) times as long as interior length of pedicel; tibial face 2.4 (female) to 3.8 (male) times as long as terminal excavation; pedicel well differentiated exteriorly, relatively slender, interior length 1.3 (male) to 0.8 to 1.0 (female) times as long as broad; exterior length (both sexes) of pedicel 1.9-2.1 times as long as interior length; terminal excavation 0.7-1.2 times as long as inner length of pedicel.

Palpal proportions (both sexes): trochanter 1.8-2.0, femur 2.7-3.2, tibia 2.1-2.2 (female) to 2.4 (male), chela 2.7-3.1 (plus pedicel, 2.8-3.3), and hand 1.2-1.5, times as long as broad; fingers 1.2 times as long as hand.

Chela as illustrated (fig. 14C); marginal teeth close-set, truncately rounded, numbering 42 to 47 on fixed and 48 to 55 on movable fingers, respectively; venedens well developed, venom duct very short, about opposite third marginal tooth of fixed finger; venedens receptor of movable finger well developed.

Legs of usual facies, yellowish. Leg IV with poorly developed, submedian, semitactile setae (index, 0.43-0.46±); metatarsus with slender, subbasal, tactile seta (index, 0.12 to 0.14); telotarsus also with slender, subbasal, tactile seta (index, 0.2 to 0.3); subterminal tarsal seta deeply but unequally furcate, with a few smaller denticles.

MEASUREMENTS (IN MILLIMETERS): Holotype male (JC-1292.02001): total length (exclusive of chelicera), 2.05; abdominal breadth, 0.74±. Carapace 0.63 long by 0.48 broad anteriorly. Diameter of anterior eyes, 0.039, posterior eyes, 0.037, interocular interval, 0.018. Chelicera, 0.36 by 0.18. Palp: trochanter, 0.346 by 0.195; femur, 0.607 by 0.194; tibia, 0.571 by 0.243; chela, 0.968 (plus pedicel, 1.043) by 0.318 broad and 0.317 deep; hand, 0.476 long; fingers, 0.554 long. Palpal tibia: terminal excavation, 0.082; face, 0.312; pedicel, inner length, 0.110, outer length, 0.221, and breadth, 0.086. Leg I: basifemur, 0.279 by 0.110; telofemur, 0.230 by 0.096; tibia, 0.267 by indeterminate; metatarsus, 0.141 by indeterminate; telotarsus, 0.203 by indeterminate. Leg IV: "miofemur," 0.508 by 0.184; tibia, 0.459 by indeterminate; metatarsus, 0.188 by indeterminate; telotarsus, 0.258 by indeterminate.

Allotype female (JC-1263.01001) and paratype (JC-1277.01001; in parentheses): total length, 2.48 (3.07); abdominal breadth, 0.74± (0.77). Carapace 0.66 (0.77) long by 0.52 (0.53) broad across eyes. Diameter of anterior eyes, 0.055 (0.063), of posterior eyes, 0.040 (0.055); interocular interval, 0.017 (0.018). Chelicera, 0.38 (0.41) by 0.20 (0.21). Palp: trochanter, 0.380 (0.394) by 0.191 (0.203); femur, 0.590 (0.687) by 0.216 (0.213); tibia, 0.541 (0.590) by 0.264 (0.266);

chela, 1.025 (1.132) [plus pedicel, 1.099 (1.255)] by 0.394 (0.380) broad and 0.376 (0.374) deep; hand, 0.481 (0.525) long; fingers, 0.592 (0.640) long. Palpal tibia: terminal excavation, 0.115 (0.115); face, 0.271 (0.279); pedicel: inner length, 0.099 (0.098), exterior length, 0.189 (0.205), breadth 0.100 (0.120). Leg I: basifemur, 0.303 (0.339) by 0.121 (0.129); telofemur, 0.239 (0.262) by 0.109 (0.112); tibia, 0.304 (0.336) by 0.081 (0.081); metatarsus, 0.145 (0.172) by 0.061 (0.063); telotarsus, 0.236 (0.266) by 0.052 (0.055). Leg IV: "miofemur," 0.607 (0.667) by 0.199 (0.217); tibia, 0.497 (0.558) by 0.099 (0.107); metatarsus, 0.210 (0.238) by 0.085 (0.086); telotarsus, 0.294 (0.333) by 0.070 (0.068).

REMARKS: This species is very close to *M. atlantica*, from which it apparently differs primarily in the form of the palpal tibia. It is named with some reluctance, but the tibial character seems too distinctive to be ignored. Additional material will be required either to verify its specific status or to justify its subsumption under *atlantica* (either as a subspecies or as a synonym).

While the types are "from caves," there is no indication that the occurrence is other than "accidental" (trogloxene). In general appearance the species is normally epigean except perhaps for the light (possibly teneral) pigmentation.

The female from Oak Mountain State Park had a flat, discal cluster of 14 developing larvae attached to the vulva, indicating probable activity throughout the period of development.

***Microcreagris fallax*, new species**

Figure 15

MATERIAL STUDIED: Allotype, male (JC-1273.01001); holotype, female (JC-1273.01002); paratypes, male and female (JC-1273.01003, JC-1273.01004); Gist Cave near Allsboro, Colbert County, Alabama; May 13, 1940 (Jones and Archer). Paratypes from other localities: mutilated female (JC-2263.01001), Thomas Cave, Lawrence County, Alabama; September 12, 1947 (W. Jones and C. Royer); male (JC-1855.01001), Duke Forest, Durham, North Carolina; April 20, 1932 (A. S. Pearse).

DIAGNOSIS: Both sexes unless otherwise

indicated. Small, yellowish brown, primarily epigean species of generally typical facies. Galea apparently generally (if not always) absent (probably by breakage and loss because of extreme fragility), making its recognition as *Microcreagris* (rather than an aberrant neobisiine) difficult.

Carapace (fig. 15B) rectangular, longer than broad, about 1.3–1.4 times as long as the ocular breadth; with four small to very small but still corneate eyes, anterior pair about 1.5–2.0 times their own diameter from anterior carapacial margin; interocular interval about 0.3 of an ocular diameter; epistomal process small, short, and broadly triangular or rounded; with macrochaetae only, chaetotaxy, 4–6 (22 or 23); derm smooth.

Tergites smooth, entire, uniseriate, chaetotaxy somewhat variable, but "normally" about as follows 6:8 to 9:8 to 10:9 to 10:8 to 10:8 to 10:10 to 12:9 to 11:8 to 10:7 to 10:1TT1±:mm. Actual chaetotaxal differentiation and exact pattern of eleventh segment difficult to make out; formula as given purely arbitrary because of imperceptible merger into sternal elements. Tergal chaetotaxy of holotype apparently atypical, with only six border setae on each of segments 1 to 4. In other available specimens, border setae of tergite 1 numbering six, for segments 2 to 4 numbering eight to 10, as indicated in formula.

Sternites smooth, entire, uniseriate, with dwarf setae developed laterally on segments 5 and 6. Chaetotaxy of segments 1–4 in male,

10 to 12:(2–2):(3 or 4) $\frac{3 \text{ to } 7}{8 \text{ to } 11}$ (3 or 4):(3)6(3).

Chaetotaxy in female, five to nine microsetae:(0):(3 to 5)8 to 10(4 or 5):(4)7(4). Chaetotaxy of segments 5 to 12 (both sexes): dd 7 to 9 dd:dd 7 to 9 dd:10 to 12:10 to 13:10 to 13:10 to 13:T1T1T1T:mm. Chaetotaxal formula of eleventh or circumanal sclerite is doubtful and arbitrary. Sum of setae (dorsal and ventral) of circumanal (eleventh) segment probably close to true value. Tactile or semitactile setae are probably differentiated on tenth as well as eleventh segment; uncertain owing to their loss from presently available material.

Genital structures of male generally typical; lateral genital sacs small, membranous, and

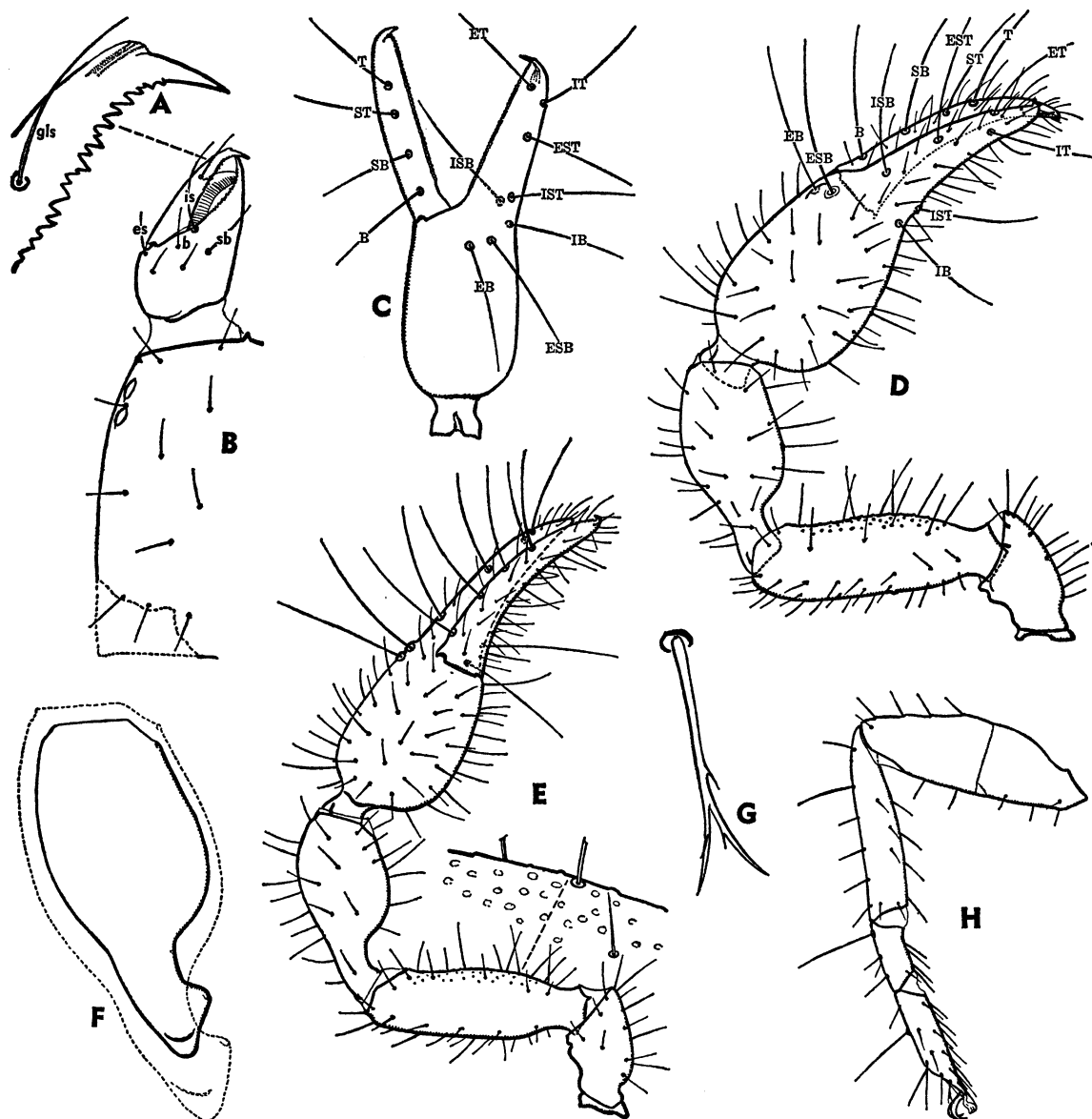


FIG. 15. *Microcreagris fallax*, new species. Unless otherwise indicated, figures are of the holotype female. A. Tip of movable finger of chelicera, showing dentition and spinneret (galea presumably lost except for the "eroded base"). B. Carapace and chelicera. C. Lateral aspect of left chela (allotype male). D. Dorsal aspect of female left palp. E. Ventral aspect of male right palp (allotype). Inset shows the weak femoral granulation. F. Ventral aspect of palpal tibia (allotype male) upon which is superimposed (in dotted lines and on the same scale) the tibial outline of a male topotype of the related species *M. lata* Hoff. G. Subterminal tarsal seta of fourth leg. H. Anterior aspect of right fourth leg of male, showing tactile setae (allotype).

tubular; median genital sac small and membranous. Genital area of female typical; opercular setae extremely small and inconspicuous.

Coxal area of usual facies; maxillaris

apicalis rounded, with three marginal setae; maxillary condylar seta elongate, semitactile; foraminal sclerotization of coxae I and II anteriorly distinct, produced on coxa I but not on coxa II.

Chelicera (fig. 15B) relatively small, much shorter than carapacial length; 1.9–2.1 times as long as broad; galea absent (broken or lost but possibly deciduous). Galeal curve of movable finger with a small, rounded, translucent “crest” that appears virtually normal (i.e., as if galea were normally absent; fig. 15A); palm of fixed finger with total of six setae (i.e., with two short accessory setae caudad of *b* and *es*); flagellum a uniseriate series of seven or eight mostly unilaterally serrate blades; serrula exterior with $24-28 \pm$ blades; serrula interior with $16-21 \pm$ blades; movable finger with $13-17 \pm$, fixed finger with $18-21 \pm$, saw-like teeth which show a tendency for large and small teeth to alternate.

Pedipalp (fig. 15D, E) light reddish to yellowish brown or tan, nearly unicolorous except for fingers which are darker than hand; derm smooth except for inner and subdorsal margin of femur which is inconspicuously and sparsely granulate (fig. 15E); femur pedicellate, bulb of nearly equal breadth from base to tip but apparently slightly broadest submedially; tibia (fig. 15F) with stout, bilaterally well-differentiated pedicel which exteriorly is 1.6–2.0 times, and interiorly 0.8–1.2 times, as long as its least breadth; setae EB and ESB on rounded eminences which interrupt smooth exterior contour of hand and finger merger as seen from above.

Palpal proportions (both sexes except for chela as indicated): trochanter 1.9–2.0, femur 3.0–3.2, tibia 2.1–2.2, chela of male 3.0–3.2 (plus pedicel, 3.2–3.4), of female 2.7–2.9 (plus pedicel, 2.9–3.1), times as long as broad or deep; hand 1.4 times as long as broad; fingers 1.05–1.1 times as long as hand.

Chela as illustrated (fig. 15C); bulb robust, deepest proximad of median; setae EB and ESB basal on fixed finger (as far from finger tip as length of movable finger) and somewhat isolated from setae IST, ISB, and IB; seta EST submedian between IT, IST, IB, and IT but generally closer to last; marginal teeth well developed from base to finger tip, contiguous, truncately rounded and numbering 44 to 52 on fixed, and 45 to 53 on movable, fingers; nodus ramosus opposite second to third marginal tooth of fixed finger.

Legs of usual facies, yellowish to light

yellowish brown. Leg IV (fig. 15H) as illustrated; tibia lacking strongly differentiated tactile setae, although at least one semitactile seta occurs subbasally (index, 0.3–0.4); metatarsus with basal tactile seta (index, 0.14–0.17); telotarsus with long and slender, subbasal, tactile seta only (index, $0.3 \pm$); subterminal seta (fig. 15G) deeply and subequally furcate with minute subdenticles.

Pedal proportions (both sexes): leg I: basifemur 2.5–2.7, telofemur 2.2–2.3, tibia 3.7–4.1, metatarsus 2.2–2.4, and telotarsus 4.2–4.5, times as long as deep; leg IV: “miofemur” 3.1–3.4, tibia 4.6–5.1, metatarsus 2.2–2.3, and telotarsus 3.8–4.2, times as long as deep.

The measurements are summarized in table 4.

REMARKS: This small species seems definitely aberrant. The apparent ease with which the diagnostically important galea is lost (or absent?) is a puzzling feature and raises the question as to whether or not it is actually a variable character (present, absent, or perhaps even deciduous). All specimens seem truly conspecific, and therefore congeneric. Taken by itself the absence of the galea, if normal, would relegate this species to the Neobisiinae rather than the Ideobisiinae. Actually it is believed to be extremely close to *M. lata* Hoff, a species that is typically galeate, i.e., a true ideobisiine. Additional material, including juveniles, are required before the status of this form can be finally resolved. Juvenile forms, in particular, should show normal galeal development, unless the structure is truly lacking.

The type collection of four specimens from Gist Cave were distinctly pallid in color. The paratypes from Thomas Cave and Duke Forest were darker.

Microcreagris pluto, new species

Figure 16

MATERIAL: Holotype, male (JC-1261.01001), and allotype, female (JC-1261.01002), both from Terrell Cave No. 1 (NE. $\frac{1}{4}$, S. 33, T. 7 S., R. 4 E.), Marshall County, Alabama; collected by W. B. Jones, June 11, 1938; in the American Museum of Natural History.

DIAGNOSIS: Moderately large, attenuated, blind, and relatively pale species of troglobitic

TABLE 4
MEASUREMENTS (IN MILLIMETERS) OF REPRESENTATIVE SPECIMENS OF
Microcreagris fallax, NEW SPECIES

	Male Allotype	Male JC-1855.01001	Female Holotype	Female JC-2263.01001
Total L ^a ×abd. B	2.38±×0.75±	1.87 ×0.64	2.69±×0.74±	Indet.
Carapace L×ocular B	0.69±× indet.	0.57 ×0.45	0.72 ×0.52	0.74± × indet.
Chelicera L×B	Indet.	0.35 ×0.18	0.44 ×0.22	0.44 ×0.21
Palp:				
Trochanter L×B	0.344 ×0.180	0.325×0.167	0.387 ×0.197	0.394 ×0.208
Femur L×B	0.574 ×0.194	0.558×0.180	0.669 ×0.213	0.672 ×0.210
Tibia L×B	0.541 ×0.246	0.502×0.236	0.594 ×0.277	0.607 ×0.279
Tib. ped. EL×IL	0.180 ×0.098	0.180×0.098	0.185 ×0.103	0.197 ×0.098
Tib. ped. B	0.082	0.082	0.102	0.098
Chela L×B	1.000 ×0.315	0.894×0.295	1.132 ×0.394	1.099±×0.410±
Chela+ped. L	1.082	0.959	1.214	1.181±
Hand L×D	0.459±×0.312	0.417×0.290	0.541×0.400	0.574±×0.410±
Finger L	0.541±	0.476	0.607±	0.607
Leg I				
Basifemur L×D	0.299 ×0.110	0.262×0.103	0.312 ×0.121	0.326 ×0.121
Telfemur L×D	0.213 ×0.099	0.213×0.094	0.246 ×0.107	0.246 ×0.105
Tibia L×D	0.282 ×0.074	0.259×0.074	0.317 ×0.081	0.235 ×0.081
Metatarsus L×D	0.132 ×0.059	0.136×0.059	0.157 ×0.066	0.147 ×0.063
Telotarsus L×D	0.230 ×0.051	0.220×0.052	0.246 ×0.055	0.239 ×0.055
Leg IV				
"Miofemur" L×D	0.541 ×0.169	0.503×0.162	0.590 ×0.177	0.610 ×0.180
Tibia L×D	0.459 ×0.074	0.440×0.092	0.492 ×0.107	0.512 ×0.100
Metatarsus L×D	0.174 ×0.081	0.172×0.074	0.194 ×0.085	0.195 ×0.086
Telotarsus L×D	0.300 ×0.074	0.279×0.074	0.298 ×0.074	0.307 ×0.074

* Abbreviations: abd., abdominal; B, breadth; D, depth; EL, exterior length; IL, interior length; L, length; Tib. ped., tibial pedicel.

facies but possibly somewhat more darkly pigmented than usual.

Carapace much longer than broad; subrectangular and lacking all traces of eyes or their vestiges; generally smooth but slightly roughened (tessellated) caudolaterally; epistomal process small but distinct, rounded; chaetotaxy, 4-6(24-28).

Abdomen elongate, narrowed; tergites and sternites entire; with eleventh tergite and sternite fused to form terminal circumanal plate of which both tergal and sternal elements setose. Tergal chaetotaxy about the same in both sexes but probably averaging more numerous in the female; male: 6:8:8:9:9:10:10:9:7:9:indet.:mm; female: 6:9:9:9:10:11:11:10:9:9:8±:mm. Terminal setae lost, but some probably differentiated for a tactile or semitactile function. Sternal chaetotaxy of male:

$$\frac{3}{7}:[(4)(4)]:(4)\frac{(5)}{8}(4):(3)7(3):9:10:10:9:9:10:$$

indet.:mm.

Sternal chaetotaxy of female: 6:(4)9(4):(4)6(4):12:11:12:11:9:11:T1T1T1T: mm. Terminal setae lost but those marked T probably, at least, semitactile in nature, judged by enlarged setal areoles.

Genital structures of male not studied in detail but genital sacs elongate, tubular, and non-sclerotic. Female genital area showing no distinctive features; chaetotaxy as indicated in formula.

Coxal area narrow, of subequal width throughout; maxillaris apicalis rounded and provided with four border setae; condylar seta of maxilla elongate and semitactile; apex of coxa I strongly sclerotic and produced into blunt apical spine, that of coxa II strongly sclerotic but not so produced.

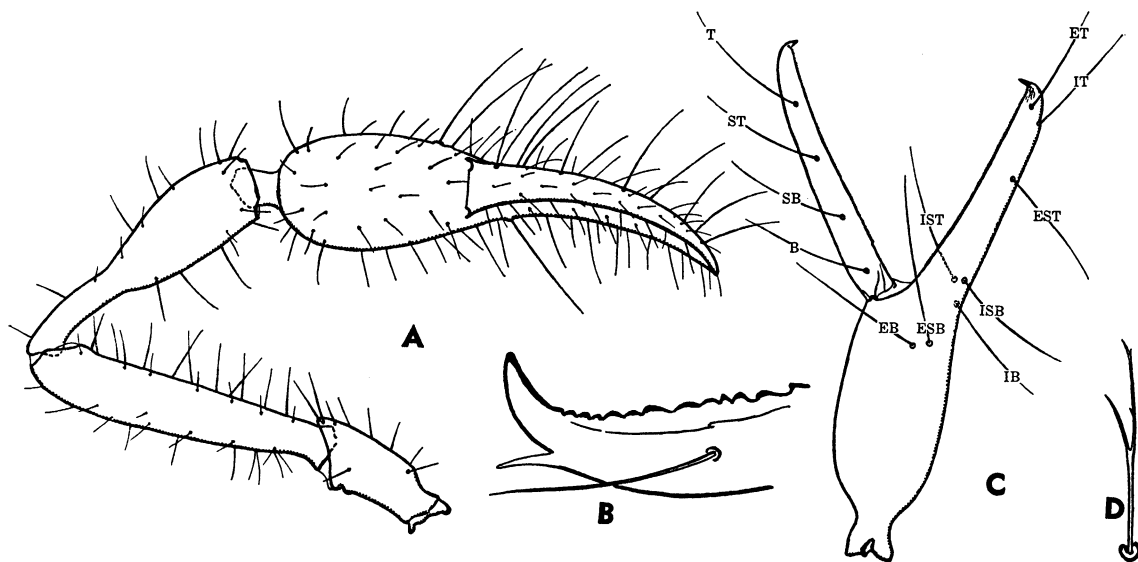


FIG. 16. *Microcreagris pluto*, new species. Drawn from allotype female. A. Ventral aspect of right palp. B. Tip of movable finger of chelicera, showing dentition and galea. C. Exterior aspect of left chela. D. Subterminal seta of fourth tarsus.

Chelicera of typical facies, nearly 0.6 as long as carapace, shorter than palpal trochanter and between 1.9 and 2.0 times as long as broad; galea in both sexes minute, translucent, unbranched stylet (fig. 16B); blades of serrula exterior numbering about 34; serrula interior typical but count of teeth not obtained; flagellum typical, comprising at least seven or eight blades some of which are unilaterally pinnate; movable finger with 14 to 16 small, irregular, protrorse teeth or denticles (fig. 16B); fixed finger with 15 to 18 small, retrorse, irregularly sized denticles; chaetotaxy of typical facies; with two transversely opposite accessory setae, one caudad of *b*, the other between *b* and *es* (palm with six setae in all).

Palp a uniform medium yellowish red; derm completely smooth but somewhat irregular, of extremely attenuated facies (fig. 16A), distinctly more slender in male than in female. Proportions of male palp: trochanter 2.0 times as long as broad; femur clavate, broadest subterminally, 5.1–5.2 times as long as broad; tibia with sharply differentiated and attenuated pedicel and with bulb broadest subterminally, 2.3 times as long as pedicel (exterior length) and 4.2 times as long as broad (tibial pedicel with

outer length 4.9 and inner length 3.8 times as long as its least breadth); chela strongly pedicellate, 5.1 (plus pedicel, 5.7) times as long as deep (breadth indeterminable but no doubt only slightly greater than depth); hand 2.0 (plus pedicel, 2.5 to 2.6) times as long as deep; fingers 1.6 times as long as hand (plus pedicel, 1.2 times as long). Female palp similar to but more robust than that of male; trochanter 2.4 times as long as broad; femur 4.9 times as long as broad; tibia 2.5 times outer length of pedicel and 3.6 times as long as broad (exterior length of tibial pedicel, 4.1; interior length 3.2 times as long as its least breadth); chela 4.0 (plus pedicel, 4.3–4.4) times as long as broad and 4.2 times as long as deep; hand 1.7 (plus pedicel, 2.0) times as long as broad; fingers 1.4 times as long as the hand (plus pedicel, 1.2 times as long).

Chela with chaetotaxy as illustrated (fig. 16C); fixed finger with 86 to 88, movable finger with 85 to 90, rounded, truncate, closely contiguous teeth except apically on movable finger where they are reduced in size and acute; setae EB and ESB placed distinctly on exterior sublateral surface of hand ($0.85 \pm$ of length on hand, exclusive of pedicel, from its base); seta IST closely grouped with ISB and IB at base of fixed

finger; EST submedian between basal setae and setae IT and ET.

Legs of slender facies and proportions; tactile setae not developed on third and fourth legs but dorsal setae (about three per segment) of third and fourth tibia, metatarsus, and telotarsus moderately elongate and erect; subterminal seta unequally furcate and secondarily denticulate (fig. 16D). Legs of male markedly more slender than those of female. Proportions: male leg I: basifemur 3.6, telofemur 3.5, tibia 6.0, metatarsus 3.9, and telotarsus 6.2, times as long as deep; leg IV: "miofemur" 5.9 times as long as deep; telofemur 1.2 times as long as basifemur; tibia 7.3, metatarsus 3.8, and telotarsus 6.2, times as long as deep. Female leg I: basifemur 3.2, telofemur 2.6, tibia 5.7, metatarsus 3.6, and telotarsus 5.5, times as long as deep; leg IV: "miofemur" 4.0 times as long as deep; telofemur 1.16 times as long as basifemur; tibia 7.2, metatarsus 3.4, and telotarsus 5.8, times as long as deep.

MEASUREMENTS (IN MILLIMETERS): Holotype male: Total length, 3.69; abdomen, $0.82 \pm$ broad. Carapace 1.00 long, 0.75 broad anteriorly, and 0.69 broad posteriorly. Chelicera, 0.56 by 0.28. Palp: trochanter, 0.600 by 0.295; femur, 1.328 by 0.257; tibia, 1.296 by 0.312 (pedicel 0.566 long exteriorly, 0.443 long interiorly, and 0.116 broad); chela, 2.058 (plus pedicel, 2.296) by 0.402 deep (breadth indeterminable); hand, 0.795 (plus pedicel, 1.033) long; fingers, 1.271 long. Leg I: basifemur, 0.640 by 0.180; telofemur, 0.507 by 0.145; tibia, 0.656 by 0.109; metatarsus, 0.320 by 0.083; telotarsus, 0.479 by 0.077. Leg IV: "miofemur," 1.087 by 0.185 (basifemur 0.494 long, telofemur 0.594 long); tibia, 1.017 by 0.140; metatarsus, 0.394 by 0.103; telotarsus, 0.581 by 0.094.

Allotype female: Total length, 4.07; abdomen, $1.15 \pm$ broad. Carapace 0.98 long, 0.74 broad anteriorly, and 0.69 broad posteriorly. Chelicera, 0.55, by 0.29. Palp: trochanter, 0.628 by 0.261; femur, 1.227 by 0.251; tibia, 1.176 by 0.323 (pedicel 0.467 long exteriorly, 0.361 long interiorly, and 0.113 broad); chela, 1.853 (plus pedicel, 2.025) by 0.466 broad and 0.443 deep; hand, 0.787 (plus pedicel, 0.951) long; fingers, 1.117 long. Leg I: basifemur, 0.590 by 0.184; telofemur, 0.451 by 0.173; tibia, 0.612 by 0.107;

metatarsus, 0.295 by 0.081; telotarsus, 0.423 by 0.077. Leg IV: "miofemur," 1.040 by 0.257 (basifemur 0.481 long; telofemur 0.559 long); tibia, 0.984 by 0.136; metatarsus, 0.376 by 0.110; telotarsus, 0.533 by 0.092.

***Microcreagris persephone*, new species**

Figure 17

MATERIAL: Holotype, female (JC-1257.01001), from Davidson Cave, "N. W. corner 34-8-3," Marshall County, Alabama; collected by W. B. Jones, December 29, 1938; in the American Museum of Natural History.

DIAGNOSIS: Female. Moderately large, blind, pale, and attenuated troglobite closely related (possibly subspecifically) to *Microcreagris pluto*, new species, to which it is superficially quite similar.

Carapace about 1.4 times longer than broad, with subparallel sides; completely eyeless; derm smooth; epistomal process present but small, rounded, and obsolescent; chaetotaxy, 4-5 (23), norm probably 4-6(24).

Abdomen elongate, narrowed, tergites and sternites smooth and undivided; eleventh tergite fused with eleventh sternite to form terminal circumanal plate of which both tergal and sternal elements setose, with two pairs of tactile or semitactile setae dorsally and a pair of similar setae ventrally (actual setae lost, so degree of differentiation uncertain). Tergal chaetotaxy: 4:6:6:7:7:9:9:8:8:T1T1T1T:mm. Sternal chaetotaxy: 6:0:(3)8(3):(3)6(2):9:9:9:9:10:10:T1T:mm. Genital chaetotaxy not distinctive. Coxal area narrow, with subparallel sides; maxillaris apicalis (see basal segment, fig. 17A) rounded, with four border macrosetae; condylar seta of maxilla elongate and semitactile; condylar apices of coxae I and II strongly sclerotized; coxa I bluntly produced.

Chelicera of typical facies, somewhat shorter than palpal trochanter, and about 0.6 as long as carapace, 2.0 times as long as broad; galea a very small, simple stylet; serrulae and flagellum obscured in type and not observable in detail, but undoubtedly typical; movable finger with about 12 or 13 small, protrorse teeth or denticles; fixed finger with 18 more or less retrorse, marginal denticles; cheliceral chaetotaxy: setae *is*, *sb*, and *b* long and slenderly acute, *es* shorter but acute; with two moderately long accessory setae, placed

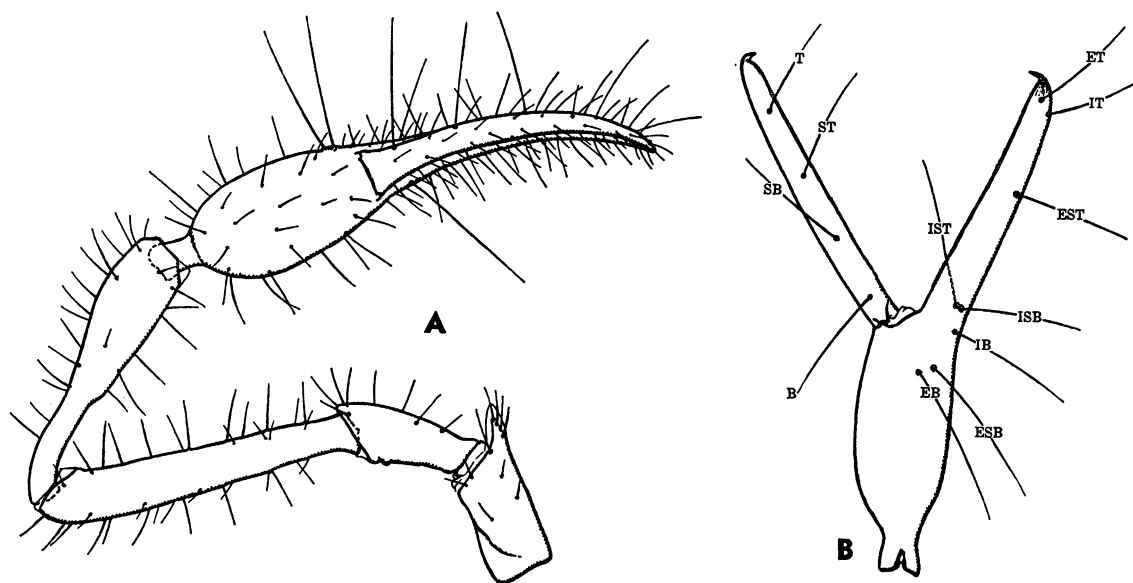


FIG. 17. *Microcreagris persephone*, new species. Drawn from holotype female. A. Ventral aspect of right palp. B. Exterior aspect of left chela.

transversely on palm caudad of *b* and more or less between *b* and *es* (total of six setae on palm).

Palp a light rust or yellowish red; derm completely smooth, non-granulate and extremely attenuated (fig. 17A). Palpal proportions: trochanter 2.7 times as long as broad; femur clavate, broadest subterminally, 5.8 times as long as broad; tibia slender and prominently pedicellate, 4.2–4.3 times as long as broad and 2.5–2.6 times as long as outer length of its pedicel; outer length of tibial pedicel 4.1; inner length 3.2 times as long as its least breadth; chela 4.6 (plus pedicel, 5.1) times as long as broad and 4.9 times as long as deep; hand 1.8 (plus pedicel, 2.3) times as long as broad; fingers 1.6 times as long as hand (1.2 times as long as hand, including pedicel).

Chela with chaetotaxy and dentition as illustrated (fig. 17B); fixed finger with 97, movable finger with 102 to 103, rounded, truncate, closely contiguous teeth except apically on movable finger where they are reduced in size and acute; setae EB and ESB situated sublaterally on distal part of bulb of chela (0.83 of length of hand, exclusive of pedicel, from its base); seta IST basal and closely grouped with ISB and IB; EST sub-

median on finger between basal cluster of setae and seta ET and IT.

Legs slender, tactile setae not distinctly differentiated on third and fourth legs but with dorsal setae of tibia, metatarsus, and tarsus moderately elongate, erect and no doubt functionally semitactile; subterminal seta unequally furcate and secondarily micro-denticulate. Proportions: leg I: basifemur 3.9, telofemur 3.6, tibia between 5.5 and 5.6, metatarsus 4.1, telotarsus 6.3 to 6.4, times as long as deep; leg IV: "miofemur" 5.4 times as long as deep, telofemur 1.09 times as long as basifemur; tibia 8.8, metatarsus 3.9, and telotarsus 6.9, times as long as deep.

MEASUREMENTS (IN MILLIMETERS): Holotype female. Total length, 3.6; abdominal breadth, $1.2 \pm$. Carapace 0.97 long, 0.69 broad anteriorly and posteriorly. Chelicera, 0.58 by 0.29. Palp: trochanter, 0.640 by 0.239; femur, 1.317 by 0.226; tibia, 1.181 by 0.277 (pedicel: exterior length, 0.459; interior length, 0.353; minimum breadth, 0.112); chela, 1.976 (plus pedicel, 2.165) by 0.428 broad and 0.400 deep; hand, 0.779 (plus pedicel, 0.984) long; fingers, 1.214 long. Leg I: basifemur, 0.645 by 0.166; telofemur, 0.492 by 0.138; tibia, 0.656 by 0.118; metatarsus, 0.348 by 0.085; telotarsus, 0.502 by

0.079. Leg IV: "miofemur," 1.174 by 0.216; basifemur, 0.563 long; telofemur, 0.612 long; tibia, 1.100 by 0.125; metatarsus, 0.431 by 0.110; telotarsus, 0.590 by 0.085.

REMARKS: Closely related to *M. pluto*, new species, but differing markedly in the more attenuated proportions. More material may, however, ultimately show a range of variation sufficient to bridge the gap and make a reduction to subspecific status necessary.

***Microcreagris valentinei*, new species**

Figure 18

MATERIAL: Holotype, male (JC-2261.-01001), March 14, 1932; paratype, male (JC-2260.01001), March 19, 1931; and paratype, tritonymph (JC-2261.01002), March 14, 1932; all collected from King Solomon Cave (=Cudjos Cave), Cumberland Gap, Tennessee, by J. M. Valentine; A. Petrunkevitch collection.

DIAGNOSIS: Male. Light straw-colored, totally blind, troglotic species of medium size but with extraordinarily attenuated palps and legs.

Carapace smooth, much longer than broad (1.4-1.7); with subparallel sides but broader

medially than anteriorly or posteriorly; no eyes or ocular vestiges (preocular setae also lacking); chaetotaxy, 4-6(24) (all macrosetae); epistomally produced but process proper small, rounded, and inconspicuous.

Tergites smooth, entire, uniseriate; chaetotaxy: 6:6:6:6-7:7-8:8-9:7-8:7-10:8-9:8-9:6: mm. All terminal setae themselves lost and areoles not appearing conclusively to indicate presence of tactile setae on circumanal plate. Sternites smooth, entire, uniseriate; chaetotaxy:

15-19: [(4 or 5)(3 or 4)] : (2 or 3) $\frac{5-9}{7-8}$ (2 or 3):

(2 or 3)6(2 or 3):10-11:9-10:10:
9-10:9-10:8-9:3: mm.

Male genital structures typical but not worked out in detail; lateral genital sacs medium in size, nearly tubular, and only moderately sclerotic; median genital sac very small.

Coxal area of usual facies; maxillaris apicalis rounded, bordered by four or five macrosetae; condylar seta of maxilla slender, elongate, and semitactile; anterior trochanteral foramina strongly sclerotic on coxae

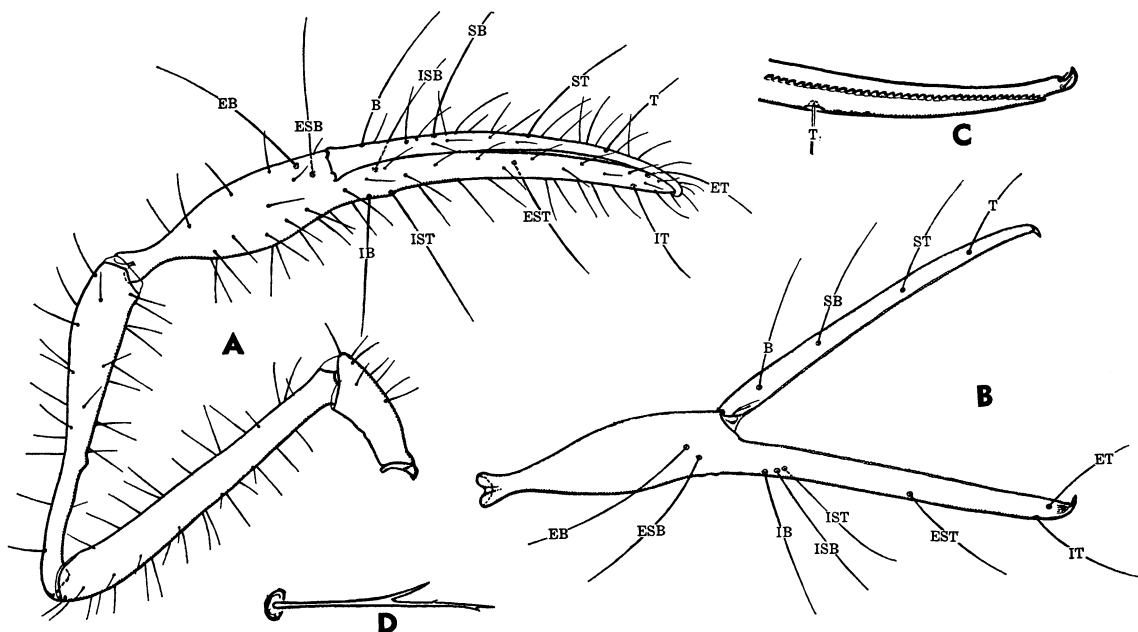


FIG. 18. *Microcreagris valentinei*, new species. A. Ventral aspect of right palp (holotype male). B. Exterior aspect of left chela (paratype male, JC-2260.01001). C. Subdorsal aspect of tip of movable finger of chela, showing dentition and venedens receptor. D. Subterminal seta of fourth tarsus.

I and II; coxa I with a heavily sclerotic apical process.

Chelicera relatively small, much shorter than carapace (0.55–0.60 as long); 2.0 to 2.1 times as long as broad; galea greatly reduced, small, slender, and unbranched; serrula exterior with 29 to 31 blades; serrula interior with 21 to 23 blades; flagellum of six blades; chaetotaxy normal, palm of fixed finger with *is*, *sb*, *b*, and *es* present, plus a single accessory seta caudad of and median between setae *b* and *es* (five in all).

Palp smooth, unicolorous (clear straw-yellow), extremely attenuated, with both tibia and chela strongly pedicellate (fig. 18A); trochanter attenuated, 2.8–2.9 times as long as broad; femur non-pedicellate, slenderly clavate, broadest terminally, 7.5–7.7 times as long as greatest breadth; tibia with extremely long, slender pedicel (6.0–6.2 times as long as least breadth), segment as a whole 6.4 to 6.6 times as long as its terminal (greatest) breadth; chela with slender pedicel 2.4 to 2.6 times as long as minimal breadth, expanding gradually into hand (pedicel measured from base to point of inflexion); hand 2.4 to 2.5 (plus pedicel, 3.1–3.5) times as long as broad or deep; chela as a whole 6.6 to 7.4 (plus pedicel, 7.4–8.3) times as long as broad or deep; fingers 1.5 times as long as hand plus its pedicel (twice as long exclusive of pedicel).

Chela with chaetotaxy as illustrated (fig. 18B); T, ST, SB, and B about equally spaced; ET and IT nearly terminal; EST submedian; IST, ISB, and IB basally clustered on finger and with EB and ESB on distal portion of bulb of chela, slightly but clearly caudad of digital condyle; venom apparatus normally developed in fixed finger, venom duct extremely short, with nodus ramosus opposite second to third marginal tooth; receptor venedentis of movable finger comprised of terminal three or four acute marginal teeth which are offset from terminal tooth (fig. 18C); marginal teeth evenly developed from base to finger tip, truncately rounded, closely contiguous and numbering 114–115 on fixed, and 116–120 on movable, fingers.

Legs attenuated, pale yellowish straw color; smooth, fourth metatarsus with basal and subdistal semitactile seta, only a little longer than usual vestitural setae; telotarsus with subbasal, elongate (but not excessively

so), true tactile seta (index, 0.37–0.42); claws and arolium simple; subbasal tarsal seta subterminally with two or three denticles but not furcate as in some species (fig. 18D). Leg I: basifemur 4.5–4.9, telofemur 4.0–4.6, tibia 7.2–7.5, metatarsus 4.2–5.1, and telotarsus 7.9–8.1, times as long as deep. Leg IV: "miofemur" 6.6–7.1 (basifemur 2.7–3.0, telofemur 3.8–4.0), tibia 9.5–9.9, metatarsus 4.4–4.9, and telotarsus 8.1–8.6, times as long as deep.

MEASUREMENTS (IN MILLIMETERS): Male (holotype and paratype, respectively): Total length, 3.36–2.95; abdominal breadth, 1.1–1.0. Carapace 0.97–0.95 long, 0.62–0.61 broad anteriorly, 0.72–0.70 broad posteriorly, and 0.77–0.75 broad medially. Chelicera 0.426–0.579 by 0.213–0.279. Palp: trochanter, 0.648–0.689 by 0.233–0.241; femur, 1.591–1.640 by 0.212; tibia, 1.542–1.624 by 0.244–0.246 (tibial pedicel, 0.49–0.61 by 0.098); chela 2.312–2.427 (plus pedicel, 2.575–2.722) by 0.348 to indeterminate, broad and indeterminate to 0.328 deep (pedicel of chela, 0.262–0.295 by 0.108–0.112); hand, 0.820–0.836 (plus pedicel, 1.082–1.132) long; fingers, 1.607–1.665 long. Leg I: basifemur, 0.787–0.840 by 0.177; telofemur, 0.561–0.604 by 0.142–0.132; tibia, 0.771–0.807 by 0.103–0.110; metatarsus, 0.426–0.418 by 0.083–0.099; telotarsus, 0.574–0.598 by 0.071–0.075. Leg IV: "miofemur," 1.356–1.492 by 0.206–0.210 (basifemur, 0.558–0.623 by 0.206–0.210; telofemur, 0.710–0.771 by 0.188–0.191); tibia, 1.246–1.345 by 0.131–0.136; metatarsus, 0.484–0.522 by 0.099–0.118; telotarsus, 0.686–0.727 by 0.085.

TRITONYMPH: Similar in general appearance to adult male but much less attenuated. Carapace essentially as in adult; also completely eyeless and with identical chaetotaxy, 4–6(24).

Tergal chaetotaxy, 6:6:6:7:8:8:8:8:10:8–9:7:7:mm. Sternal chaetotaxy, 0(?):(3)6(3):(2)4(4):9:10:9:11:7:6:3:mm. Circumanal setae (eleventh segment) lost and character indeterminable.

Chelicera with chaetotaxy same as in adult; galea a simple unbranched and very small stylet; serrula exterior with 23 blades; serrula interior with 17 blades; fixed finger with 20 small, saw-like teeth which become progressively larger basally; movable finger

with 12 marginal teeth; flagellum with six blades, the anterior ones of which are unilaterally pinnate.

Palpal facies as in adult (but of more robust proportions); trochanter 2.4 to 2.5 times as long as broad; femur non-pedicellate, gently clavate, broadest distally, 4.9 times as long as broad; tibia with pedicel 2.6 times as long as least breadth, segment as a whole 3.9 times as long as broad; chela with rather stout but well-defined pedicel (0.6 as long as breadth), 4.7 (plus pedicel, 5.0) times as long as broad; hand 1.8 (plus pedicel, 2.2) times as long as broad; fingers 1.4 times as long as hand plus pedicel.

Chela much as in adult except for usual tritonymphal reduction in tactile setae [i.e., IT and T (or perhaps, rather, ST) absent]. Venom apparatus normal, nodus ramosus opposite third tooth; fixed finger with 73, movable finger with 80, well-developed, marginal teeth.

Leg I: basifemur 3.4, telofemur 3.2, tibia 4.9, metatarsus 3.0, and telotarsus 4.3, times

as long as deep. Leg IV: "miofemur" 5.0, tibia 6.5, metatarsus 3.5, and telotarsus 4.7, times as long as deep.

MEASUREMENTS (IN MILLIMETERS): Tritonymph: Total length, 2.67; abdominal breadth, $0.75 \pm$. Carapace 0.74 long, 0.48 broad anteriorly, median and posterior breadth, 0.59. Chelicera, 0.426 by 0.213. Palp: trochanter, 0.426 by 0.174; femur, 0.869 by 0.177; tibia, 0.804 by 0.208 (pedicel, $0.28 \pm$ by 0.105); chela, 1.460 (plus pedicel, 1.574) by 0.312; hand, 0.574 (plus pedicel, 0.672) long; finger, 0.943 long. Leg I: basifemur, 0.430 by 0.125; telofemur, 0.328 by 0.103; tibia, 0.413 by 0.085; metatarsus, 0.213 by 0.070; telotarsus, 0.338 by 0.079. Leg IV: "miofemur," 0.779 by 0.155 (basifemur, 0.312 by 0.155; telofemur, 0.410 by 0.147); tibia, 0.661 by 0.101; metatarsus, 0.267 by 0.077; telotarsus, 0.415 by 0.088.

REMARKS: This splendid species is respectfully dedicated to its discoverer, Mr. J. M. Valentine.

