

NEW AND LITTLE-KNOWN FALSE  
SCORPIONS (ARACHNIDA, CHELO-  
NETHIDA) FROM MONTEREY  
COUNTY, CALIFORNIA

JOSEPH C. CHAMBERLIN

BULLETIN  
OF THE  
AMERICAN MUSEUM OF NATURAL HISTORY  
VOLUME 99 : ARTICLE 4      NEW YORK : 1952



NEW AND LITTLE-KNOWN FALSE SCORPIONS (ARACHNIDA,  
CHELONETHIDA) FROM MONTEREY COUNTY,  
CALIFORNIA



NEW AND LITTLE-KNOWN FALSE  
SCORPIONS (ARACHNIDA, CHELO-  
NETHIDA) FROM MONTEREY  
COUNTY, CALIFORNIA

JOSEPH C. CHAMBERLIN

*Entomologist, United States Department of Agriculture  
Agricultural Research Administration  
Bureau of Entomology and Plant Quarantine  
Forest Grove, Oregon*

BULLETIN  
OF THE  
AMERICAN MUSEUM OF NATURAL HISTORY  
VOLUME 99 : ARTICLE 4  
NEW YORK : 1952

BULLETIN OF THE AMERICAN MUSEUM OF NATURAL HISTORY

Volume 99, article 4, pages 259–312, figures 1–15,  
plates 19, 20, tables 1–11

*Issued July 30, 1952*

*Price: \$.75 a copy*

## INTRODUCTION

I AM INDEBTED AND GRATEFUL to Dr. J. M. Linsdale, of the Frances Simes Hastings Natural History Reservation, for the privilege of studying the rather extensive collection of false scorpions on which this report is based. In addition to the new forms reported, this opportunity is taken to redescribe and figure a number of previously known, but inadequately described, species.

All material, unless otherwise indicated, was collected by J. M. Linsdale in the Frances Simes Hastings Natural History Reservation which is situated 39 miles south of Monterey, California.

Types of the new species, as well as representatives of the previously named species treated herein, have been deposited in the collections of the American Museum of Natural History.

The drawings for figures 1 to 15 were made by the author.

All specimens reported herein have been assigned an individual number (for example, JC-1911.01001) with which any particular specimen is always associated. These refer to the accession catalogue of the author and specifically identify individual specimens on which illustrations, measurements, or other important data are based. This number is divided into three parts and is to be interpreted as follows: That portion of the number to the left of the decimal is the lot number assigned to each individual collection studied. A master file is maintained under this number wherein are recorded all collection data, the collector and source of the collection, the included species, and the ultimate disposition of the individual specimens comprising it. A cross index is maintained for species, localities, sources, and other pertinent information for use in conjunction with this file. The first two digits to the right of the decimal point refer to the included species. Thus if a collection comprises three species (as tentatively determined in preliminary sorting) one would be designated .01,

the second, .02, and so on (up to .99 if necessary). The last three digits of the number refer to individual specimens of the particular species and provides for an enumeration up to 999. Thus a specimen number such as 2235.06012 would indicate the 2235th lot accessioned, the sixth of the species included in the lot, and the twelfth specimen of such species.

The results of an extensive study on the metamorphosis of one of the included species (*Dinocheirus sicarius*, new species) is presented as an integral part of the specific description.

The fractional form of dental notation used in description of species of the family Chernetidae treated in this paper has not been employed heretofore in taxonomic work. The interpretation is as follows: The numerator of the major fraction represents the fixed finger, the denominator the movable finger. The first number, or numbers, of the numerator represents the total number of marginal teeth of the fixed finger; those of the denominator, the number of marginal teeth of the movable finger. The bracketed minor fractions following these numbers represent the accessory teeth of the fixed and movable fingers, respectively. The numbers in parentheses represent the total number of accessory teeth exteriorly (in the numerator) and interiorly (in the denominator) for each finger. The numbers set off by semicolons following these totals in parentheses represent the position of each accessory tooth relative to the marginal series of teeth as numbered from the tip of the finger to its base. The numbers following the letters NR indicate the position of the nodus ramosus relative to the marginal teeth. Numbers marked by an asterisk indicate a tooth that is most generally present, but may occasionally be lacking; those marked by a dagger indicate a tooth that is generally lacking.

As an example, an interpretation of the following formula is given:

$$\begin{array}{l} 44-47 \left[ \frac{(6-8) \ 2-4; \ 8-9^*; \ 11-12; \ 15-18^*; \ 19-21^*; \ 23-27^*; \ 29\dagger; \ 30-35}{(4-7) \ 2; \ 8-9^*; \ 10-11\dagger; \ 13-16; \ 17-19^*; \ 19-23; \ 24-26\dagger} \right] \\ 45-47 \left[ \frac{(6-9) \ 3-4; \ 7-9; \ 11-12^*; \ 15-16^*; \ 18\dagger; \ 19-23; \ 24-27^*; \ 28-32^*; \ 34-37}{(3-4) \ 9-14; \ 16-19; \ 21-23; \ 24-27^*} \right] \text{ NR, } 25-28 \end{array}$$

Fixed finger with 44 to 47 marginal teeth; movable finger with 45 to 47 marginal teeth. Accessory teeth of the fixed finger total six to eight exteriorly and four to seven interiorly. The exterior accessory teeth of the fixed finger occur as follows: one opposite marginal teeth 2 to 4; one generally opposite teeth 8, 9; one opposite teeth 11, 12; one generally opposite teeth 15 to 18; one generally opposite teeth 19 to 21; one generally opposite teeth 23 to 27; one rarely opposite tooth 29; and one opposite teeth 30 to 35. Interior accessory teeth of the fixed finger occur as follows: one opposite marginal tooth 2; one generally opposite teeth 8, 9; one rarely opposite teeth 10, 11; one opposite teeth 13 to 16; one generally opposite teeth 17 to 19; one opposite teeth 19 to 23; and one rarely

opposite teeth 24 to 26. Accessory teeth of the movable finger total six to nine exteriorly and three to four interiorly. The exterior accessory teeth occur as follows: one opposite marginal teeth 3, 4; one opposite teeth 7 to 9; one generally opposite teeth 11, 12; one generally opposite teeth 15, 16; one rarely opposite tooth 18; one opposite teeth 19 to 23; one generally opposite teeth 24 to 27; one generally opposite teeth 28 to 32; and one generally opposite teeth 34 to 37. Interiorly, the accessory teeth of the movable finger are distributed as follows: one opposite marginal teeth 9 to 14; one opposite teeth 16 to 19; one opposite teeth 21 to 23; and one generally opposite teeth 24 to 27. The nodus ramosus of the venom duct lies opposite marginal teeth 25 to 28.

## SYSTEMATIC ACCOUNT

### SUBORDER **DIPLOSPHYRONIDA** CHAMBERLIN

#### SUPERFAMILY **NEOBISIOIDEA** CHAMBERLIN

#### FAMILY **NEOBISIIDAE** CHAMBERLIN

#### SUBFAMILY **IDEOBISIINAE** CHAMBERLIN

#### GENUS **MICROCREAGRIS** BALZAN

#### **Microcreagris nigrescens**, new species

#### Figure 1

**MATERIAL:** Holotype, male (JC-2099.-01001), California; Frances Simes Hastings Natural History Reservation, Robertson Creek, March 26, 1946. Male paratype and three nymphs (JC-2099.01002 to 5), same data as for holotype. Allotype, female (JC-2063.01001), same locality, from "*Neotoma* midden 646 LPT January 24, 1946." Female paratype (JC-2063.01002), same collection, data as for allotype. Paratypes, two males (JC-2061.01001 and 2), same locality, from "*Neotoma* house. 646 L.P.T. January 24, 1946." Paratype, one female (JC-1267.01001), same locality, collected February 10, 1941. Paratype, one adult (sex?) (JC-2071.01001), from "*Neotoma* midden 647. January 24, 1946." Paratypes, male, and tritonymph (JC-1224.01001 and 2), same locality, collected May 1, 1940. Holotype and allotype deposited in the collections of the American Museum of Natural History. All other material in author's collection, except paratypes 1224.01001 and 2 which are in the collections of the Frances Simes Hastings Natural History Reservation.

**DIAGNOSIS:** Medium, dark, reddish brown, or "blackish" species, with non-granulate palps, closely related to *M. theveneti* (Simon), but smaller and more robustly proportioned.

Carapace dark reddish brown, nearly black, and almost square, slightly if at all longer than the posterior breadth; epistomal process well developed, rounded; eyes strongly corneate, the anterior pair about their own diameter from the carapacial margin and half their own diameter from the posterior pair; vestitural setae slender and acuminate; chaetotaxy: 6-6 (26 to 28).

All tergites and sternites dark in color, heavily sclerotic, obscurely tessellate, un-

divided, and uniseriate; tergite 11 and sternite 11 fused to form a single terminal circum-anal plate; vestitural setae elongate and acuminate; pleural membrane strongly granulostriate. Tergites with a transverse discal series or zone of scattered microlyrifissures, numbering two or three on tergites 1 and 2 and increasing towards caudal segments, where they number 30 to 40 on tergites 9 to 11. Sternites with similar discal series of microlyrifissures on segments 4 to 11. Tergal chaetotaxy essentially similar in either sex; tergite 1 with six to seven, tergite 2 with eight to 11, and tergites 3 to 10 with 10 to 13 (generally 12), marginal setae. Circumanal plate with a total of 11 to 15 setae; tergal and sternal anal opercula (reduced twelfth segment) with two microsetae each. Male sternites 4 to 10 with 10 to 12 marginal setae; female sternites 4 to 9 with 14 to 16 marginal setae; sternite 10 with 10 to 12 marginal setae. The two median setae of sternite 7 tend to be slightly but distinctly distad of the usual marginal series, but are scarcely discal in position.

Circumanal plate and possibly the tenth tergite and sternite with some of the setae more slender than usual and developed for tactile purposes (two ventral and one tergal pair?). All setae lost from available material, and details cannot be worked out.

Genital chaetotaxy of male: sternite 2 with a diffuse median cluster of 22 to 24 setae; sternite 3 with a discal, median cluster of 13 to 16, and a marginal series of 12 to 13, setae. Genital chaetotaxy of female: sternite 1 with a marginal median series of six small setae; sternites 2 and 3 with eight to 10 marginal setae each. Stigmatic plates in both sexes with four to five small guard setae each.

Male genital structures as illustrated (fig. 1A, B); characterized by a bilateral group of three to five internal microsetae and by prominent, globular, inflated, markedly sclerotic genital sacs. Female genital area, including the opercular setae, the median and the lateral cribriform areas, and the paired, very membranous, spermatic receptacles as illustrated (fig. 1C, D, E).

Coxal area of usual facies; maxillae char-

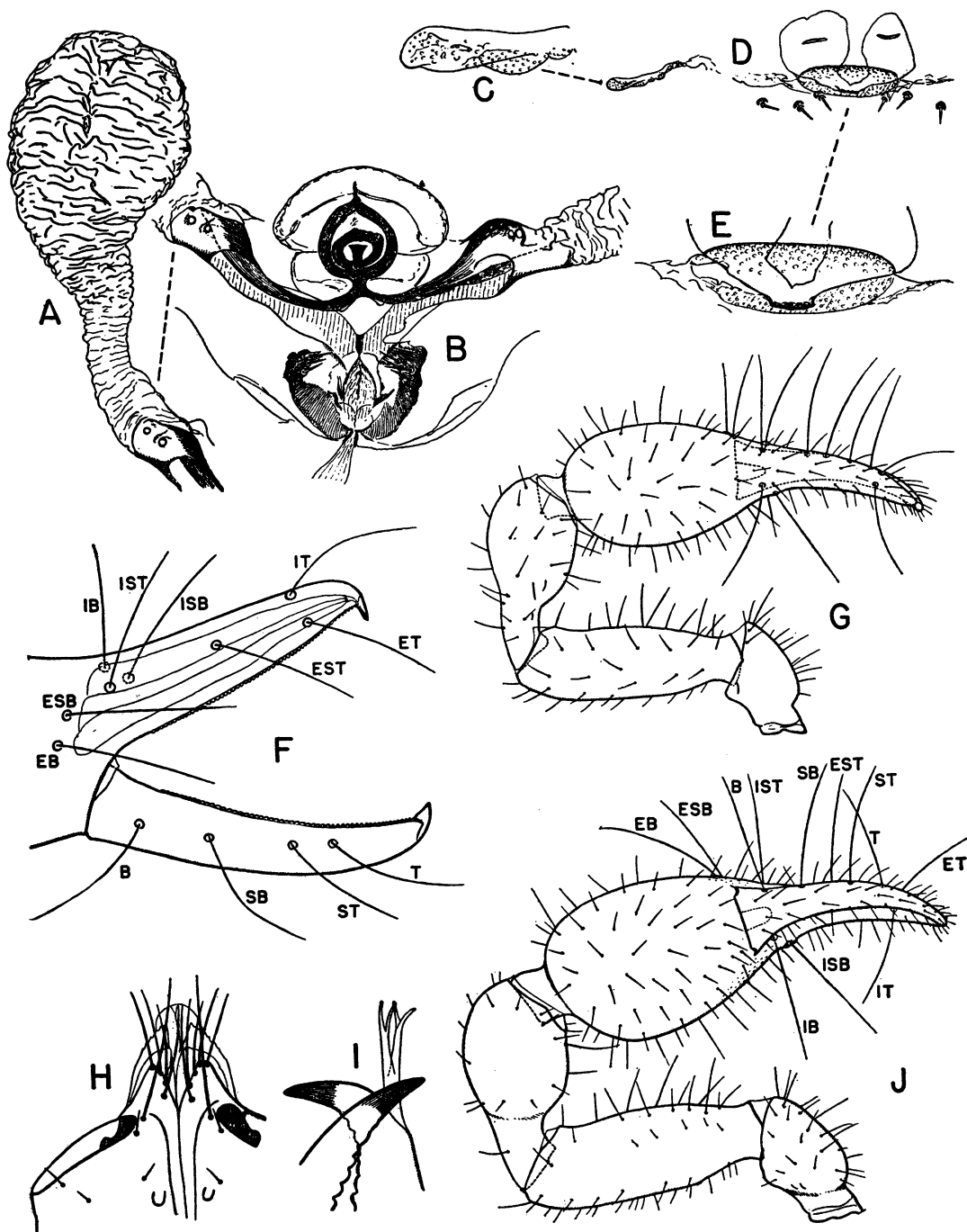


FIG. 1. *Microcreagris nigrescens*, new species. A, B. Male genitalic structures of holotype, opercular setae omitted. Genital sac (A) to smaller scale. C, D, E. Female genital structures of allotype, opercular setae included. C. Detail of lateral cribriform plate. E. Detail of median cribriform plate. F. Lateral aspect of male chela (JC-2061.01001). G. Dorsal aspect of left palp of male (JC-2061.01001). H. Apex of maxillae of female (JC-1267.01001). Four marginal setae on right maxilla, five (abnormal) on left. I. Tip of cheliceral fingers of female, showing galea (JC-1267.01001). J. Ventral aspect of right palp of female (JC-1267.01001).

TABLE 1  
MEASUREMENTS (IN MILLIMETERS) OF REPRESENTATIVES OF *Microcreagris*  
*nigrescens*, NEW SPECIES

Measurements <sup>a</sup>	Specimens and Sex				
	♂ 2061.01001	♂ 2099.01001	♂ 1224.01001	♀ 2063.01001	♀ 1267.01001
Total length	3.59	3.69	—	4.40	3.30
Carapace L	.94	1.01	.92	1.03	1.07
Ocular B	.85	.89	—	.97	.97
Posterior B	.90	.92	.92	1.00	1.02
Cucullus L	.197	.235	—	.240	.240
Ocular diameter	.092	.092	—	.092	.092
Interocular space	.037	.040	—	.037	.044
Palps					
Trochanter L×B	.574×.328	.623×.336	.590×.331	.656×.341	.659×.361
Femur L×B	.991×.330	1.045×.351	1.000×.361	1.058×.385	1.099×.395
Tibia L×B	.869×.413	.930×.444	.886×.435	.951×.474	.951×.484
Chela L, L+ped.	1.640, 1.755	1.735, 1.856	1.658, —	1.812, 1.927	1.824, 1.938
Chela B, D	.566, .558	.590, .590	.574, .590	.672, —	.705, .705
Hand L, L+ped.	.836, .935	.877, .984	.836, —	.976, 1.041	.951, 1.066
Fingers L	.874	.892	.845	.877	.935
Leg I					
Basifemur L×D	.508×.171	.541×.184	—	.533×.197	.569×.202
Telofemur L×D	.367×.148	.389×.161	—	.394×.177	.397×.190
Tibia L×D	.508×.107	.538×.114	—	.513×.118	.574×.127
Metatarsus L×D	.248×.085	.253×.096	—	.246×.103	.259×.103
Telotarsus L×D	.358×.077	.377×.088	—	.374×.099	.399×.099
Leg IV					
"Miofemur" L×D	.987×.335	1.086×.394	—	1.094×.410	1.117×.385
Basif. L, telof. L	.459×.528	.508×.577	—	.517×.577	.530×.587
Tibia L×D	.869×.164	.938×.196	—	.909×.207	.954×.202
Metatarsus L×D	.344×.129	.341×.138	—	.361×.143	.358×.148
Telotarsus L×D	.492×.109	.508×.127	—	.476×.131	.525×.130

<sup>a</sup> B, breadth; basif., basifemur; D, depth; L, length; ped., pedicel; telof., telofemur.

acterized by four (rarely and abnormally five) marginal apical and subapical setae; apical foraminal seta elongate and extending to tip of apical setae (fig. 1H).

Chelicerae of typical facies; galea small and quadrispinose in both sexes (fig. 1I); fixed finger with 15 to 17 irregular marginal teeth; movable finger with 12 to 14 irregular marginal teeth; palm of chelicera typically with a total of seven setae (*is*, *sb*, *b*, and *es*, plus a basal, transverse series of three, sometimes only two, short accessory setae). Flagellum, a series of six slender, unilaterally finely serrate blades, of which the anteriormost is well separated from the rest by a distinct gap two or three times as great as the average breadth of the blade itself; posteriormost blade half as long as the others, simple and

acute. Serrula exterior with about 30 to 32 ligulate teeth; serrula interior with about 26 teeth, of which the distal nine or 10 are acuminate, sharply bent or recurved, and well separated terminally.

Palps (fig. 1G, J) of both sexes very dark reddish brown to nearly black; completely smooth and non-granulate on all surfaces. Vestitural setae long and slenderly acuminate. Palps distinctly more robust in the female than in the male; femur broadly pedicellate and slightly but distinctly broader medially than terminally or basally; tibia strongly pedicellate, the bulb well differentiated anteriorly and posteriorly; the tibial pedicel of the male distinctly more slender than that of the female (posterior length of pedicel about 1.7 to 1.8 times as long as the

minimum breadth in the male and 1.1 to 1.2 times as long as the minimum breadth in the female).

Palpal proportions of male (specimens 2061.01001 and 2099.01001, respectively): trochanter 1.75 to 1.85 times as long as broad; femur 3.00 to 2.98 times as long as broad; tibia 2.10 to 2.09 times as long as broad; chela 2.90 to 2.94 (plus pedicel 3.10 to 3.15) times as long as broad; breadth and depth of chela subequal; hand 1.48 to 1.49 (plus pedicel 1.65 to 1.67) times as long as broad; fingers slightly shorter than hand plus pedicel but longer than hand only. Palpal proportions of female (specimens 2063.01001 and 1267.01001, respectively): trochanter 1.92 to 1.83 times as long as broad; femur 2.75 to 2.78 times as long as broad; tibia 2.01 to 1.96 times as long as broad; chela 2.70 to 2.59 (plus pedicel 2.87 to 2.75) times as long as broad; breadth and depth of chela subequal; hand 1.45 to 1.35 (plus pedicel 1.55 to 1.51) times as long as broad; fingers slightly shorter than the hand minus the pedicel.

Chela with dentition, chaetotaxy, and venom apparatus essentially similar in the two sexes, as illustrated (fig. 1F); fixed finger with 52 to 55 marginal teeth; movable finger with 57 to 60 marginal teeth.

Legs of typical structure, moderately robust, significantly more robust in the female than in the male. Pedal proportions of male (specimens 2061.01001 and 2099.01001, respectively): Leg I, basifemur 3.0 to 2.9 times as long as deep; telofemur 2.5 to 2.4 times as long as deep; tibia 4.8 to 4.7 times as long as deep; metatarsus 2.9 to 2.6 times as long as deep; telotarsus 4.6 to 4.3 times as long as deep. Leg IV, "miofemur" 3.0 to 2.8 times as long as deep; telofemur 1.15 to 1.14 times as long as basifemur; tibia 5.3 to 4.8 times as long as deep; metatarsus 2.7 to 2.5 times as long as deep; telotarsus 4.5 to 4.0 times as long as deep. Pedal proportions of female (specimens 2063.01001 and 1267.01001, respectively): Leg I, basifemur 2.7 to 2.8 times as long as deep; telofemur 2.2 to 2.1 times as long as deep; tibia 4.4 to 4.5 times as long as deep; metatarsus 2.4 to 2.5 times as long as deep; telotarsus 3.8 to 4.0 times as long as deep. Leg IV, "miofemur" 2.7 to 2.9 times as long as deep; telofemur 1.12

to 1.11 times as long as basifemur; tibia 4.4 to 4.7 times as long as deep; metatarsus 2.5 to 2.4 times as long as deep; telotarsus 3.6 to 4.0 times as long as deep. Fourth legs in both sexes with a submedian tibial tactile seta, a subbasal metatarsal tactile seta, and a median, telotarsal tactile seta. Subterminal tarsal seta deeply bifurcate, the dorsal branch with one or two minute subterminal denticles. Claws normal; arolium shorter than claws.

MEASUREMENTS: As given in table 1.

REMARKS: This species, while close to *M. theveneti* (Simon), differs distinctly in its somewhat smaller size and more robust proportions.

#### FAMILY SYARINIDAE CHAMBERLIN

##### SUBFAMILY CHITRELLINAE BEIER

##### AGLAOCHITRA, NEW GENUS

GENEROTYPE (ORTHOTYPE): *Aglaochitra rex*, new species.

DIAGNOSIS: Carapace (fig. 2C) much longer than broad, rounded anteriorly and lacking an epistomal process; with two well-defined transverse thickenings or stripes; eyeless, but with a single pair of small tuberosities in the usual ocular position (fig. 2D).

Coxal area (fig. 3H) narrow, elongate, with subparallel sides. Second pedal coxae meso-caudally prominently overlapping the anteriorly produced mesal portion of the third pedal coxae and forming an articulation, functionally but not morphologically, comparable to that occurring in *Menthus* (Menthidae). Anterior condylar processes moderately developed on coxae I and II.

Abdomen moderately ovate, semispatulate, being broadest subterminally; pleural membrane evenly and finely striate; all tergites and sternites moderately sclerotic, undivided, and uniseriate; eleventh tergite and sternite fused into a terminal and subventral circumanal plate; sternal half of anal operculum with the usual pair of microsetae; dorsal half with a single pair of "macrosetae" (fig. 3F). Stigmatic structures typically neobisoid; tracheae with internal reticulate thickenings as in the Neobisiidae.

Male genital structures of type illustrated for orthotype (fig. 3A, B, C); female genital structures as illustrated (fig. 3E); character-

ized by a small, heavily sclerotic, ovate median cribriform plate (fig. 3G).

Chelicera (figs. 2C, 3D) relatively small, less than half as long as the carapace, lacking any trace of a galea in either sex as well as in the tritonymph; seta *ls* lacking and with a single accessory seta caudad of *es* (in the orthotype, at least); flagellum with eight blades, of which all but the posteriormost, or eighth, are anteriorly finely serrate; the three posterior blades progressively shorter than the anterior blades, the eighth blade, especially, greatly reduced.

Palps of orthotype moderately slender, in part evenly granulate (fig. 2B, E).

Chela with distinctive chaetotaxal pattern as illustrated (fig. 2F); setae ET, EST, IT, and IST closely grouped on the distal third of the fixed finger. ET, IT, and T about opposite and closer to the finger tip than to the setae EST, IST, and ST, all of which are about one-third of the finger length from the finger tip; SB about median in position and somewhat closer to ST than to B; ISB basal and subdorsal on the fixed finger; IB dorsal and median on the hand, as close to the pedicel of the chela as to ISB; EB and ESB distinctly caudad of the finger base on the bulb of the chela, but much closer to ISB than to IB. Venom apparatus developed in fixed finger only; duct very short and with the nodus ramosus nearer the finger tip than to seta ET. Marginal teeth numerous and contiguous, well developed from base to tip of either finger.

Legs moderately slender; leg I with the basifemur distinctly longer than the telofemur; leg IV with the femoral articulation symphytic and nearly vertical with respect to the long axis of the segment; basifemur distinctly shorter than the telofemur; tibia with a short, semitactile seta somewhat distad of median; metatarsus with a slightly longer semitactile seta about one-third of the metatarsal length from its base (fig. 2G). Tarsal claws simple, scimitar-like; arolium shorter than tarsal claws, simple and undivided; subterminal seta (fig. 2A) terminally, unilaterally serrate.

REMARKS: This genus includes only the orthotype at present. The non-condylar intercoxal articulation between the second and third coxae and ventrad of the posterior

carapacal margin is of particular interest in its functional similarity to the condylar intercoxal articulation occurring in *Menthidae*.

#### *Aglaochitra rex*, new species

Figures 2 and 3

MATERIAL: Holotype, male (JC-1266.-01001), California; Frances Simes Hastings Natural History Reservation, collected April 15, 1941, under large rock on west side of Red Hill on grassy, sunlit, warm slope; allotype, female (JC-2064.01001), same locality, collected December 7, 1941, from "*Neotoma* midden. 646. L.P.T." Paratype collections (all from same locality as types) as follows: lot JC-1222.01001 (one female collected April 8, 1941); lot JC-1222.02001 (one female collected February 1, 1940); lot JC-1222.03001 and 2 (two newly molted females, date of collection not indicated); lot JC-1222.04001 to 3 [one male; two females collected April 8, 1940 (Linsdale 215)]; lot JC-1264.01001 to 18 (10 males, seven females, and one nymph, collected February 1, 1941); lot JC-1265.01001 (one male collected February 24, 1944); lot JC-1266.01002 to 5 (two males, two females collected April 14, 1941, under lava rock, west side of Red Hill on grassy, warm, sunlit slope. "J.A.G."); lot JC-2072.01001 to 5 (two males; three females collected March 21, 1945, under rock on Red Hill); lot JC-2079.01001 to 38 (23 males, 14 females, and one nymph collected March 23, 1945, under rock on Red Hill); lot JC-2081.01001 and 2 (male and female collected January 19, 1946, under rock, Red Hill) and lot JC-2097.01001 (one nymph collected March 28, 1946, under rock on Red Hill). Total material studied: 42 males, 34 females, and three nymphs. The holotype, allotype, and part of the paratype material deposited in collections of the American Museum of Natural History. The following material returned for deposition in the Frances Simes Hastings Natural History Museum: female (JC-1222.01001); female (JC-1222.02001); male (JC-1222.04003); six males, three females (JC-1264.01010 to 18); male (JC-1265.01001); two males, one female (JC-1266.01003 to 5). Balance of material in author's collection.

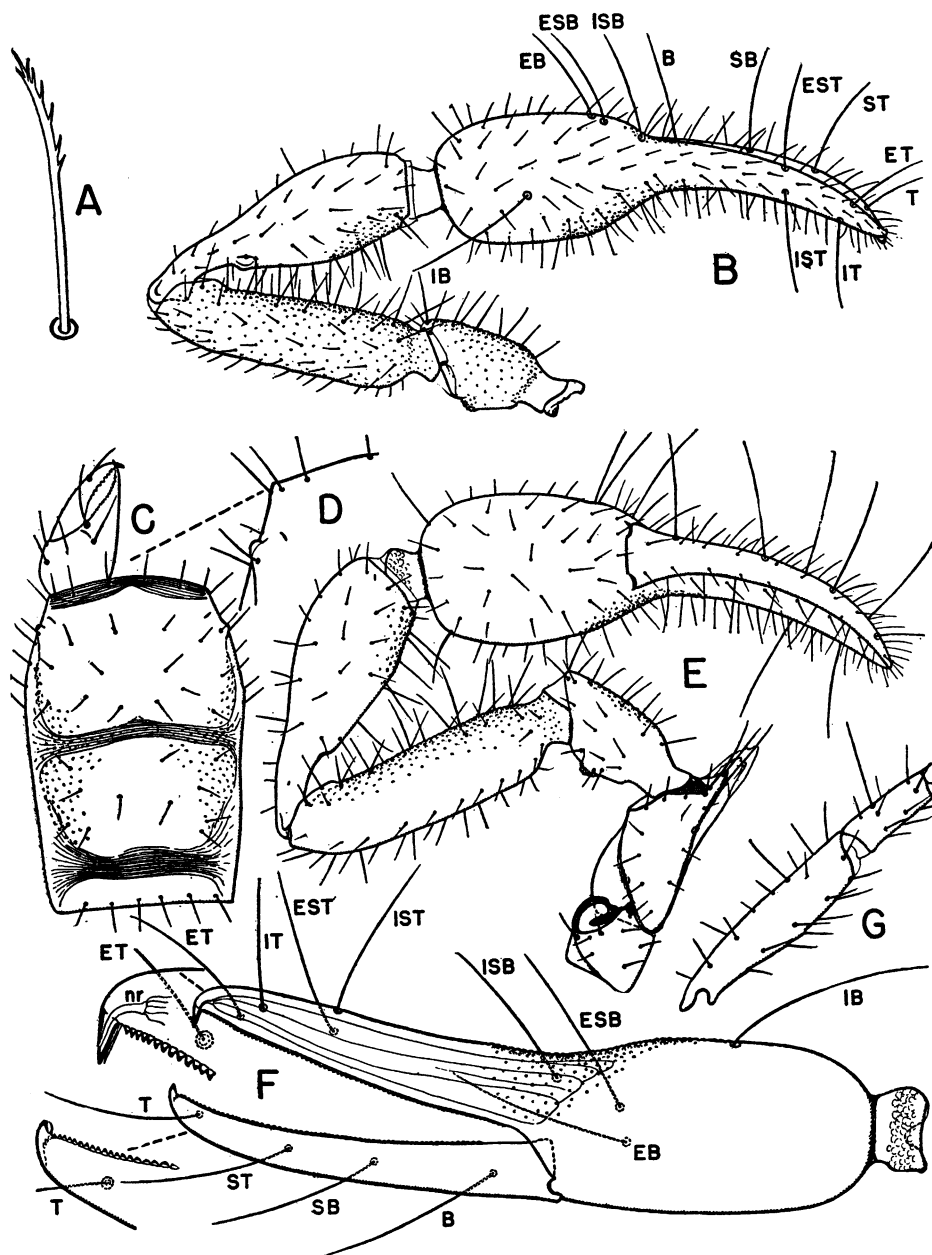


FIG. 2. *Aglaochitra rex*, new genus and species. A. Subterminal seta of fourth tarsus (female, JC-2072.01002). B. Dorsal aspect of left palp of male (JC-2079.01001). C. Carapace and left chelicera (male, JC-2079.01001). D. Carapace, detail of left anterior corner showing ocular tuberosity. E. Female palp, ventral aspect (JC-2064.01001). F. Interior aspect of right chela. Details show venom apparatus of fixed finger and sheathing apparatus of movable finger (male, JC-1222.04001). G. Tibia and metatarsus of fourth leg showing semitactile setae (female, JC-2072.01002).

**DIAGNOSIS:** Moderately slender, apparently cursorial species of moderate size; palps and coxae bright reddish brown; carapace light reddish brown; legs and abdomen lighter yellowish brown.

Carapace as illustrated (fig. 2C), much longer than broad; broadest cephalad of median stripe; with one pair of small, apparently non-corneate, ocular tuberosities anterolaterally (fig. 2D); smooth and polished, except for inconspicuous sparse granulation laterally on median and ocular disks; transverse stripes (scarcely furrows) broad and relatively conspicuous; setae sparsely distributed, short, slender, and acuminate; chaetotaxy: 8-6 (about 50 to 60).

Abdomen moderately slender, semispatulate in shape, being broadest subterminally; tergites and sternites smooth, evenly sclerotic, uniseriate; vestitural setae slender and acuminate; terminal abdominal segments with a number of semitactile or tactile setae, the relative lengths of which are not ascertainable owing to breakage from available material; tergite and sternite 10, apparently, with a sublateral and submedian pair of more or less differentiated "tactile setae"; circumanal plate (fused eleventh tergite and sternite) apparently with three pairs of terminal tactile setae (fig. 3F); dorsal half of anal opercula with a pair of normal macrosetae, the ventral half with the usual pair of microsetae. Tergal chaetotaxy not significantly different between male and female; the marginal setae numbering seven to nine on tergite 1, and 10 to 14 on tergites 2 to 10 (including semitactile or "tactile" setae). Sternal chaetotaxy essentially similar in male and female, aside from the genital segments; spiracular guard sclerites with four marginal microsetae each; sternites 3 and 4 with 11 to 14 marginal setae; sternite 5 with 14 to 17, and sternites 6 to 10 with 12 to 15 marginal setae each.

Chelicerae of usual chitrelline facies, as illustrated (fig. 3D); galea completely lacking; chaetotaxy normal, palm with five macrosetae (*ls* absent as is usual and with a single accessory seta caudad of *es*); flagellum a linear series of seven unilaterally multi-denticulate blades and a basal, vestigial, acute eighth blade; serrula exterior with about 32 to 35 ligulate teeth; serrula interior with ap-

proximately 23 to 26 nearly ligulate teeth, of which the terminal four are semi-acute, curved, and well separated; movable finger with a marginal series of eight rounded, irregularly spaced teeth, which are largest subdistally and medially; fixed finger with about 16 to 18 irregularly spaced, and also somewhat irregularly sized, teeth.

Palps moderately robust, dorsal and lateral surface of trochanter and femur, inner apical and subapical face of tibia, and inner and subdorsal surface of chela at base of fingers evenly, finely, and rather sparsely granulate (figs. 2B, E).

Palpal proportions of male (observed range, and mean in parentheses, of seven specimens): trochanter 2.08 to 2.35 (2.20) times as long as broad; femur 3.79 to 4.14 (3.94) times as long as broad; tibia 2.83 to 3.09 (2.95) times as long as broad; chela 3.40 to 3.57 (3.49) times as long as broad, chela plus pedicel 3.61 to 3.81 (3.72) times as long as broad; hand 1.49 to 1.55 (1.52) times as long as broad, hand plus pedicel 1.70 to 1.79 (1.74) times as long as broad; fingers 1.36 to 1.47 (1.40) times as long as hand (exclusive of pedicel).

Palpal proportions of female (observed range, and mean in parentheses, of seven specimens): trochanter 2.12 to 2.26 (2.18) times as long as broad; femur 3.73 to 3.97 (3.82) times as long as broad; tibia 2.71 to 2.92 (2.84) times as long as broad; chela 3.17 to 3.45 (3.28) times as long as broad, chela plus pedicel 3.38 to 3.68 (3.5) times as long as broad; hand 1.40 to 1.55 (1.47) times as long as broad, hand plus pedicel 1.60 to 1.78 (1.68) times as long as broad; fingers 1.27 to 1.36 (1.31) times as long as hand (exclusive of pedicel).

Chela with chaetotaxy, venom apparatus, and dentition as illustrated (fig. 2F); fixed finger with 67 to 78 marginal teeth; movable finger with 62 to 70 such teeth.

Coxal area as illustrated (fig. 3H); legs moderately slender, with a sparse vestiture of moderately slender acuminate setae; tibia of fourth leg with a relatively short pseudo-tactile seta situated approximately two-thirds of the tibial length from its base; metatarsus with a similar seta about one-third of the metatarsal length from its base; telotarsus lacking differentiated tactile setae;

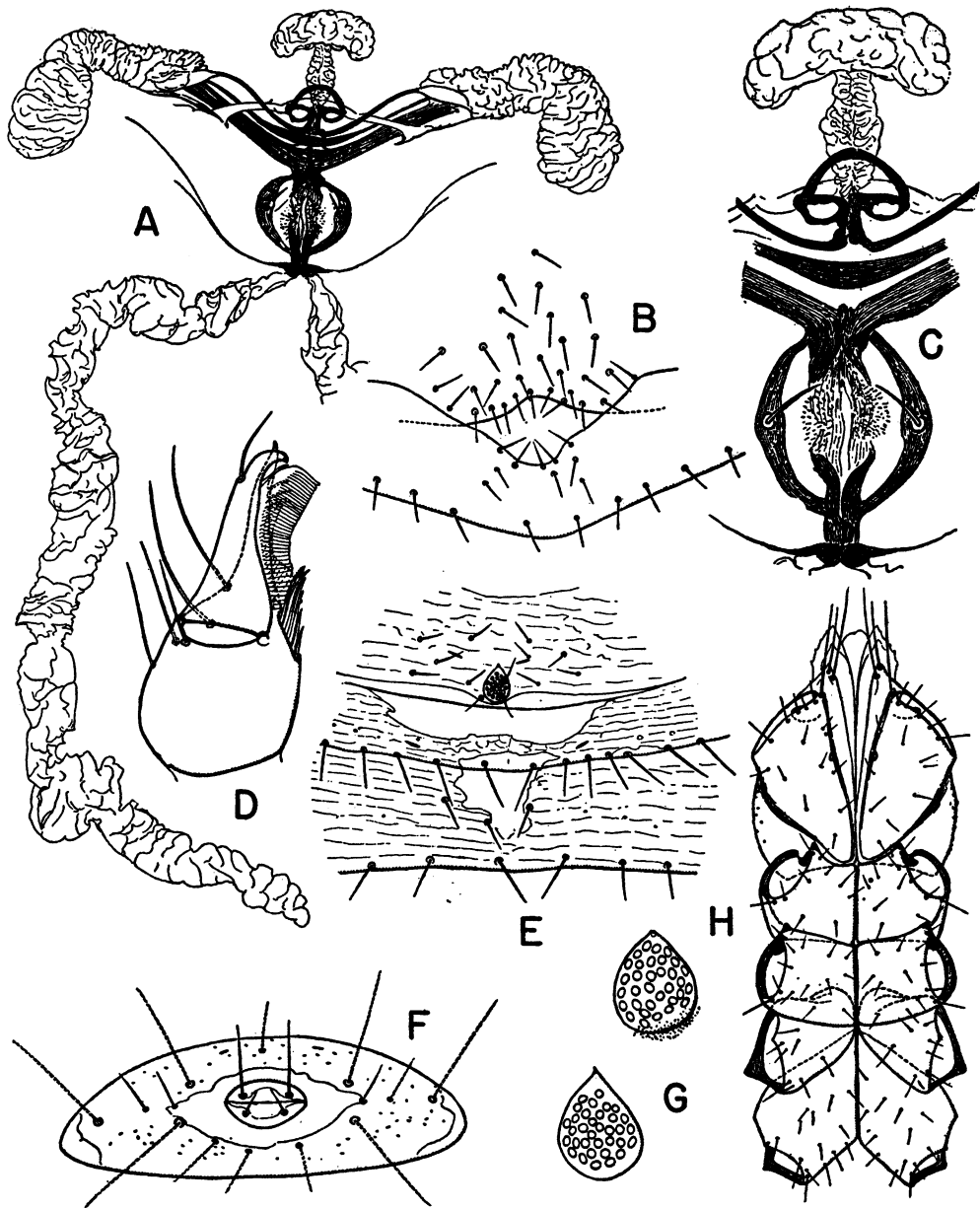


FIG. 3. *Aglaochitra rex*, new genus and species. A. Male genital structures showing lateral and caudal genital sacs (JC-1222.04001). B. Chaetotaxy of male genital opercula (same scale as A; JC-1222.04001). C. Central structures of male genitalia, showing details (JC-1272.01001). D. Ventral aspect of chelicera (female, JC-2079.01002). E. Chaetotaxy of female genital area showing position of median cribriform plate (JC-2064.01001). F. Terminal aspect of abdomen (diagrammatic) showing presumed chaetotaxy of circumanal plate and anal opercula (upper dorsal; lower ventral; based on female, JC-2064.01001). G. Median cribriform plates of female; upper from specimen JC-2064.01001; lower from specimen JC-2079.01004. H. Coxal area. Note overlap of pedal coxae 3 by coxae 2 (male, JC-2079.01001).

claws simple, arolium entire and undivided; subterminal seta unilaterally dentate (fig. 2A).

Proportions of legs (mean values for seven males and seven females, respectively): Leg I, basifemur 3.35 to 3.30 times as long as deep; telofemur 2.58 to 2.53 times as long as deep; tibia 5.32 to 5.19 times as long as deep; metatarsus 3.03 to 2.93 times as long as deep; telotarsus 6.44 to 5.87 times as long as deep. Leg IV, "miofemur" 2.72 to 2.78 times as long as deep; telofemur 1.42 to 1.39 times as long as basifemur; tibia 4.68 to 4.81 times as long as deep; metatarsus 2.66 to 2.73 times as long as deep; telotarsus 6.04 to 5.40 times as long as deep; tibial tactile seta .62 to .64 of the tibial length from its base; metatarsal tactile seta .35 to .34 of the metatarsal length from its base.

MEASUREMENTS (MM.): Male (largest and smallest observed value of seven specimens examined; mean values in parentheses): Total length 3.13 to 3.58 (3.28); abdominal breadth .88 to 1.15 (1.04). Carapace: 1.06 to 1.20 (1.11) long; ocular breadth .59 to .69 (.62); median breadth .70 to .79 (.73), posterior breadth .61 to .74 (.65); ocular disk .49 to .58 (.53) long; median disk .41 to .45 (.43) long; posterior disk .13 to .16 (.14) long; cucullus .15 to .18 (.16) long; diameter of ocular tuberosity about .035. Palps: trochanter .615 to .708 (.655) by .280 to .341 (.298); femur .989 to 1.153 (1.060) by .251 to .303 (.269); tibia .987 to 1.148 (1.059) by .344 to .402 (.359); chela 1.683 to 1.866 (1.747) [plus pedicel 1.781 to 1.984 (1.859)] by .472 to .549 (.500) broad and .443 to .520 (.471) deep; hand .705 to .828 (.759) long [plus pedicel .804 to .951 (.872) long]; fingers 1.033 to 1.123 (1.064) long. Total length of palp, 4.372 to 4.993 (4.633). Leg I: basifemur .492 to .574 (.532) by .149 to .169 (.156); telofemur .328 to .369 (.341) by .128 to .146 (.132); tibia .459 to .564 (.505) by .089 to .102 (.095); metatarsus .213 to .262 (.239) by .077 to .082 (.079); telotarsus .325 to .366 (.348) by .052 to .056 (.054). Total length of leg I 1.840 to 2.113 (1.955). Leg IV: "miofemur" .809 to .910 (.845) by .298 to .335 (.311); basifemur .339 to .377 (.349) long; telofemur .464 to .530 (.495) long; tibia .656 to .722 (.725) by .148 to .171 (.155); metatarsus .279 to .328 (.303)

by .108 to .121 (.114); telotarsus .417 to .461 (.435) by .069 to .075 (.072). Tibial tactile seta .402 to .492 (.446) from base of segment; metatarsal tactile seta .082 to .136 (.106) from base of segment. Total length of leg IV, 2.161 to 2.489 (2.309).

Female (largest and smallest observed measurement in seven individuals; mean values in parentheses): Total length 3.07 to 4.05 (3.47); abdominal breadth .95 to 1.26 (1.16). Carapace: 1.08 to 1.26 (1.16) long; ocular breadth .62 to .75 (.69), medial breadth .74 to .84 (.78); posterior breadth .67 to .77 (.72); ocular disk .52 to .62 (.56) long; median disk .43 to .51 (.45) long; posterior disk .11 to .15 (.13) long; cucullus .16 to .18 (.17) long; diameter of ocular tuberosity .023 to .036 (.030). Palps: trochanter .661 to .754 (.693) by .295 to .348 (.318); femur 1.050 to 1.230 (1.128) by .266 to .333 (.295); tibia 1.020 to 1.238 (1.106) by .353 to .426 (.389); chela 1.738 to 1.983 (1.835) [plus pedicel 1.853 to 2.116 (1.954)] by .508 to .626 (.559) broad and .467 to .607 (.533) deep; hand .787 to .894 (.820) [plus pedicel .902 to 1.025 (.938)] long; fingers 1.017 to 1.197 (1.076) long. Total length of palps 4.599 to 5.338 (4.882). Leg I: basifemur .492 to .607 (.535) by .151 to .179 (.162); telofemur .328 to .390 (.354) by .131 to .153 (.140); tibia .489 to .582 (.519) by .097 to .107 (.100); metatarsus .230 to .279 (.249) by .082 to .092 (.085); telotarsus .328 to .397 (.364) by .057 to .066 (.062). Total length of leg I, 1.888 to 2.255 (2.021). Leg IV: miofemur .845 to .984 (.891) by .300 to .351 (.320); basifemur .361 to .400 (.374) long; telofemur .484 to .582 (5.18) long; tibia .713 to .932 (.774) by .151 to .179 (.161); metatarsus .307 to .356 (.322) by .105 to .131 (.118); telotarsus .423 to .476 (.443) by .075 to .087 (.082). Tibial tactile seta .492 to .525 (.496) from base of segment; metatarsal tactile seta .098 to .115 (.108) from base of segment. Total length of leg IV, 2.288 to 2.748 (2.430). Cribriform plate .029 to .044 (.039) long by .033 to .041 (.038) broad.

TYPE MEASUREMENTS (MM.): Male (holotype, JC-1266.01001): Total length 3.13; abdomen 1.02 broad. Carapace: 1.10 long; ocular breadth .59; median breadth .70; posterior breadth .61; ocular disk .51 long; median

disk .44 long; posterior disk .13 long; cucullus .16 long. Palps: trochanter .656 by .287; femur 1.050 by .262; tibia 1.050 by .344; chela 1.771 (plus pedicel 1.894) by .497 broad and .490 deep; hand .754 (plus pedicel .874) long; fingers 1.091 long. Leg I: basifemur .525 by .153; telofemur .335 by .128; tibia .508 by .093; metatarsus .243 by .080; telotarsus .366 by .054. Leg IV: "miofemur" .836 by .310; basifemur .344 long; telofemur .492 long; tibia .722 by .156; metatarsus .307 by .115; telotarsus .443 by .071.

Female (allotype, JC-2064.01001): Total length 3.33; abdomen 1.23 broad. Carapace: 1.15 long; ocular breadth .69; median breadth .78; posterior breadth .72; ocular disk .56 long; median disk .45 long; posterior disk .13 long; cucullus .16 long. Palps: trochanter .689 by .317; femur 1.115 by .294; tibia 1.091 by .385; chela 1.845 (plus pedicel 1.957) by .574 broad and .574 deep; hand .804 (plus pedicel .918) long; finger 1.096 long. Leg I: basifemur .541 by .167; telofemur .336 by .144; tibia .500 by .102; metatarsus .246 by .085; telotarsus .348 by .066. Leg IV: "miofemur" .886 by .320; basifemur .377 long; telofemur .508 long; tibia .743 by .164; metatarsus .313 by .118; telotarsus .440 by .082.

TRITONYMPH: (Based on one specimen, JC-2079.01007.) The general facies of the tritonymph is typical and, except for size and the usual reduction in the chaetotaxy, closely similar to the adult. Carapace essentially as in adult; chaetotaxy, 6-6 (35). Tergites and sternites as in adult, tergal chaetotaxy (segments 1 to 10):

7:11:12:11:11:12:10:11:11:12.

Circumanal plates and anal opercula essentially as in adult; sternal chaetotaxy (segments 1 to 10):

0:2:(3)8(3):(3)9(3):12:12:12:10:11:13.

Coxal area and legs essentially as in adult; palps as in adult, except for the more robust femur and tibia. Palpal proportions: trochanter 2.19 times as long as broad; femur 3.57 times as long as broad; tibia 2.58 times as long as broad; chela 3.40 (plus pedicel 3.68) times as long as broad; hand 1.57 (plus pedicel 1.83) times as long as broad; fingers 1.20 times as long as hand exclusive

of pedicel. Chela about as in adult, except that seta B (probably) is absent from the movable finger, while seta ISB (probably) is absent from the base of the fixed finger; fixed finger with 47, movable finger with 51, marginal teeth.

TRITONYMPHAL MEASUREMENTS (MM.): (Specimen JC-2079.01007): Total length 2.59; abdomen .90 broad. Carapace: .69 long; ocular breadth .46; median breadth .52; posterior breadth .49; ocular disk .37 long; median disk .24 long; posterior disk .08 long; cucullus .10 long. Palps: trochanter .410 by .187; femur .656 by .184; tibia .595 by .230; chela 1.030 (plus pedicel 1.115) by .303 broad and .287 deep; hand .476 (plus pedicel .553) long; fingers .569 long.

#### SUBORDER MONOSPHYRONIDA CHAMBERLIN

#### SUPERFAMILY CHELIFEROIDEA CHAMBERLIN

#### FAMILY CHERNETIDAE CHAMBERLIN

#### PYCNOCHERNES BEIER

*Pycnochernes* BEIER, 1932, Das Tierreich, vol. 58, p. 136; 1933, Zool. Jahrb. Abt. für Systematik, Geogr. und Biol. Tiere, vol. 64, no. 6, p. 522 ("original" description; actually predated by the 1932 reference); 1935, Zool. Anz., vol. 111, no. 1/2, p. 46 (note on status of genus). ROEWER, 1937, in Bronn, Klassen und Ordnungen des Tierreichs, vol. 5, div. 4, book 6, p. 297 (in key). FEIO, 1946, Livro de homenagem a R. F. d'Almeida, no. 15, pp. 169-170 (history of the genus and notes on status of included species.).

GENEROTYPE (ORTHOTYPE): *Chelifer celerimus* With.

DIAGNOSIS (EMENDED): Derm in general smooth, but carapace and portions of palpal segments often more or less granulate. Vestitural setae of carapace, abdomen, and appendages moderately short, slender, acuminate, and minutely denticulate (fig. 5A, inserts). Carapace (figs. 4B, 5C) longer than broad, with a single prominent, submedian transverse stripe or furrow; posterior furrow absent or vestigial; eye spots absent or inconspicuous.

Tergites and sternites divided into scuta by a linear stripe or suture; tergites more or less clearly biseriate. Eleventh tergite and sternite entire, each with two pairs (four in all) of elongate tactile setae; tenth sternite

with a moderately slender pair of tactile or pseudotactile setae. Pleural membrane irregularly, sinuately striate. Tracheal trunks smoothly striate; male and female genital structures of types illustrated (figs. 5E and 4I, respectively).

Chelicerae (fig. 4E) of normal facies; flagellum of three blades, of which the first only is anteriorly dentate (figs. 4D, 5B); chaetotaxy normal; setae *b* and *sb* short and terminally dentate or denticulate (fig. 4H); seta *es* simple and acute; lamina interior with dentate terminal process and three dentate subapical lobes. Galea well branched in both sexes (figs. 4C, 5G). Subapical seta of maxilla much longer than apical seta (fig. 5F).

Palps robust, the femur and tibia strongly pedicellate, with the femur broadest about medially or proximad of median (figs. 4A, 5A); trochanter, femur, and tibia generally more or less finely granulate.

Chela with chaetotaxal pattern, venom apparatus, and dentition of type illustrated (figs. 4G, 5D); venom ducts slender, the nodus ramosus distinctly proximad of seta T. Chaetotaxy of chela normal; T, about one-third of the finger length from its tip; seta ST submedian to proximad of median between T and SB. Setae SB and B subbasal and about two or three areolar diameters apart; seta ET subterminal in position; EST submedian and about opposite or slightly anterior to IST, which is submedian to slightly proximad of median; ESB and EB subbasal and about opposite ISB and IB. Seta IT distad of EST, about one-third of the finger length from its tip, from which it is also more distant than the distance between IST and ISB. Accessory teeth and sense spots conspicuous but relatively few in number.

Legs of normal facies, moderately robust. Tarsus of leg I distinctly longer than the tibia. Fourth legs with a moderately slender pseudotactile seta dorsally and subdistally on the femur and tibia, respectively; tarsus with a long and slender tactile seta situated slightly proximad of median (about median relative to the dorsal length) and with a distinct sense dome between the tarsal base and the tactile seta (fig. 4F). Tarsal claws and subterminal setae normal, acute.

REMARKS: With the addition of the two

new species hereinafter described, the range of this genus is extended to include western United States. The previously known species are from South America and the Windward Islands (Grenada) of the West Indies.

Beier's assignment of *Pycnochernes* to the Chernetinae is incorrect and cannot be maintained on morphological grounds. The genus actually pertains to the Lamprochernetinae as presently defined.

It seems probable that the species *P. brevifemoratus* (Balzan) and *P. guarany* Feio are not correctly assigned to this genus, and they are omitted from the following key.

#### KEY TO SPECIES OF *Pycnochernes*

1. Fingers short, scarcely longer than the breadth of the hand (less than 1.1 times); chela (less pedicel) 2.5 times as long as broad; from Brazil . . . . . *eidmanni* Beier  
Fingers longer, 1.3 to 1.5 times as long as the breadth of the hand; chela (less the pedicel) not less than 2.7 times as long as broad . . . 2
2. Femur unusually expanded, as broad as the tibia and 2.0 times as long as broad; fingers 1.5 times as long as the breadth of the hand; from Idaho . . . . . *foxi*, new species  
Femur less expanded, distinctly narrower than breadth of tibia and 2.1 to 2.2 times as long as broad; fingers 1.3 to 1.4 times as long as the breadth of the hand . . . . . 3
3. Posterior margin of median tergites bordered by 14 to 16 setae; tibia of leg IV, 3.3 to 3.4 times as long as deep; from the Windward Islands (Grenada) . . . *celerrimus* (With)  
Posterior margin of median tergites bordered by 20 to 22 setae; tibia of leg IV, 3.7 to 3.8 times as long as deep; from California . . . . . *linsdalei*, new species

#### *Pycnochernes linsdalei*, new species

##### Figure 4

MATERIAL: Female holotype (JC-1225.-08001), California, Monterey, Frances Simes Hastings Natural History Reservation, collected May 30, 1940, J. M. Linsdale (No. 198). Deposited in the American Museum of Natural History. Paratype, female (JC-264.01001), California, Stanford University, under "tub in moist soil"; collected October 9, 1923, by Brighton C. Cain; author's collection.

DIAGNOSIS: Female only (male unknown). Carapace (fig. 4B) longer than broad; eye spots absent or very indistinct; with pro-

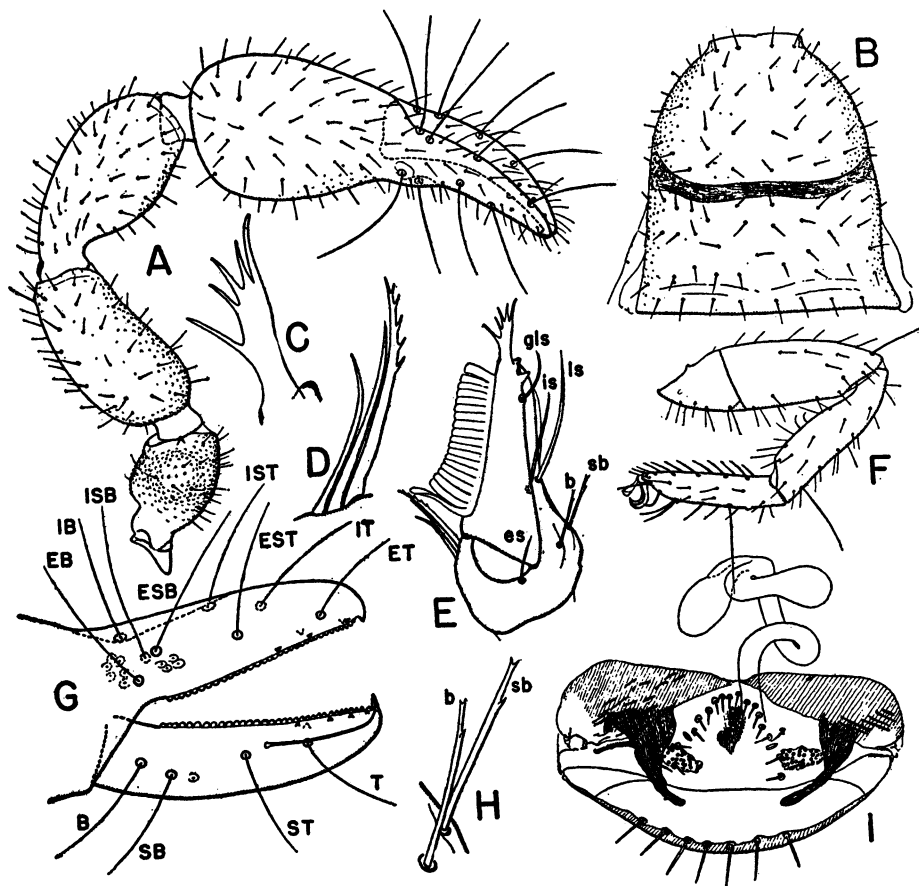


FIG. 4. *Pycnocheres linsdalei*, new species, female, holotype. A. Dorsal aspect of left palp. B. Carapace. C. Galea. D. Flagellum. E. Ventral aspect of chelicera. F. Leg IV. Note tactile setae of femur, tibia, and tarsus. G. Exterior aspect of fingers of right chela. H. Basal and subbasal setae of chelicera. I. Female genital area. Note character of median, terminally paired, spermatic receptacle.

nounced submedian furrow; posterior furrow absent or obsolete; smooth discally but finely granulate laterally on ocular disk, lateral granulations weakly developed or absent on posterior disk; chaetotaxy sparse, bordered posteriorly by eight marginal setae.

Coxal area of normal facies, slightly broadest across fourth coxae; maxillae smooth, except laterally where they are weakly granulate; subapical seta of maxilla much longer than apical seta.

Abdomen moderately ovate, pleural membrane smoothly striate; tergites 1 to 3 divided by a linear suture, 4 to 10 by a rather broad, striate, membranous stripe; sternites 4 to 10 divided by a similar membranous stripe; tergite and sternite 11 entire, separate;

subterminal abdominal segments transverse, not recurved around reduced eleventh segment; tergite 11 and sternite 11 each provided with four slender tactile setae; sternite 11 with the six discal setae which are more elongate than usual and semitactile in nature. Tergal and sternal scuta tessellate but smooth. All tergites more or less clearly bi-seriate; chaetotaxy (holotype):

$$\frac{2-2}{16} : \frac{2-2}{20} : \frac{2-2}{20} : \frac{2-2}{21} : \frac{2-2}{22} : \frac{2-2}{23} : \frac{2-2}{22} : \frac{8}{20} : \frac{7}{19} : \frac{8}{16} : \\ \frac{TTTT}{6} : 2m$$

The tergal chaetotaxy of the paratype is essentially the same as for the holotype, but differs in the following details: only the two

lateral discal setae are developed on tergite 1, five discal setae on tergite 8, and six on each of tergites 9 and 10. Evidently considerable variations are to be expected. Sternites biserial; chaetotaxy (holotype):

$$(19):(4s)7(4s):(4s)8(4s):\frac{2-2}{19}:\frac{2-2}{23}:\frac{2-2}{23}:\frac{2-2}{23}:\frac{2-3}{21}:$$

$$\frac{9}{14}:\frac{T1TT1T}{6}:2m$$

Sternal chaetotaxy of paratype differs in having only three stigmal setae, while sternite 10 has only six discal setae.

Female genital structures as illustrated (fig. 4I); spermathecal receptacle comprising a single median duct of large caliber terminating in paired, non-pedicellate, pyriform receptacles.

Chelicerae small, of normal facies (fig. 4E); flagellum three bladed, anterior blade only, unilaterally dentate (fig. 4D); galea with five or six branches (fig. 4C); chaetotaxy of palm normal, seta *b* and *sb* moderately slender and terminally dentate (fig. 4H); serrula exterior with 18 or 19 ligulate teeth; subapical lobe simple, distinct; lamina interior with dentate terminal process and three subapical lobes.

Palps (fig. 4A) robust, all segments strongly pedicellate; trochanter with moderately developed, dorsal protuberance; tibia scarcely broader than the unusually broad femur, which attains its greatest breadth proximad of median; trochanter and inner face of femur distinctly and evenly but finely granulate; inner face of tibia moderately granulate and inner face of chela proximad of finger base weakly, but evenly and distinctly, granulate. Proportions of palp: trochanter 1.8 times as long as broad; femur slightly but distinctly shorter than tibia and 2.1 to 2.2 times as long as broad; tibia 2.1 to 2.2 times as long as broad; chela 2.7 (plus pedicel 2.8 to 2.9) times as long as broad; breadth of hand subequal to, or slightly greater than, depth; hand 1.4 times as long as broad and subequal to, or slightly longer, than the fingers.

Chela as illustrated (fig. 4G). Dentition:

$$32-33 \left[ \frac{(3) 4; 11-13; 17-18}{(2-3) 3; 12-13; 15^*} \right]$$


---


$$36 \left[ \frac{(3-4) 5-7; 9-14; 16-19; 24^*}{(1) 14-15} \right] \text{NR, 20-21}$$

Movable finger with no or one sense spot closely adjacent to seta SB; fixed finger with a cluster of three or four sense spots exteriorly and distad of setae EB-ESB, interiorly with a small cluster of about six spots slightly caudad of setae IB-ISB.

Legs moderately robust, of usual facies; leg IV as illustrated (fig. 4F), femur and tibia each with a subterminal pseudotactile seta, tarsus with a subbasal sense dome and an elongate tactile seta about .4 of total tarsal length from base of the segment (.51 to .56 of dorsal length of tarsus from its base). Proportions: Leg I, "miofemur" 2.7 to 2.9 times as long as deep; tibia 3.1 times as long as deep; miotarsus 4.7 to 4.8 times as long as deep. Leg IV, "miofemur" 3.5 times as long as deep; tibia 3.7 to 3.8 times as long as deep; tarsus 4.5 to 4.6 times as long as deep.

MEASUREMENTS (MM.): (Female holotype and paratype, respectively.) Total length 2.0 to 2.1 long; abdomen .8 to .9 broad. Carapace: .56 long; median breadth .44 to .46; posterior breadth .48 to .49; anterior disk .31 to .30 long; posterior disk .24 to .26 long, median disk not clearly differentiated. Palps: trochanter .294 to .283 by .162 to .161; femur .394 to .390 by .185 to .180; tibia .426 to .438 by .207 to .197; chela .769 to .731 (plus pedicel, .820 to .784) by .289 to .269 broad and .279 to .262 deep; hand .405 to .385 (plus pedicel, .464 to .443) long; fingers .394 to .377 long. Length of venom duct .144 to .155. Leg I: "miofemur" .302 to .305 by .103 to .114; tibia .224 to .226 by .072; miotarsus .241 to .247 by .051 to .052. Leg IV: "miofemur" .453 to .444 by .131 to .127; tibia .328 to .333 by .088; miotarsus .295 to .292 by .066 to .063; dorsal length of tarsus .221; tactile seta of tarsus .113 to .125 from tarsal base.

REMARKS: This species is respectfully dedicated to J. M. Linsdale. It is known only from the female, while *P. foxi*, new species, is known from the male only. They are closely related, but *P. linsdalei* females are much smaller than the male of *P. foxi*. Since males are normally smaller than females, once the opposite sexes of these two species are known, the differences now apparent should be even more distinct.

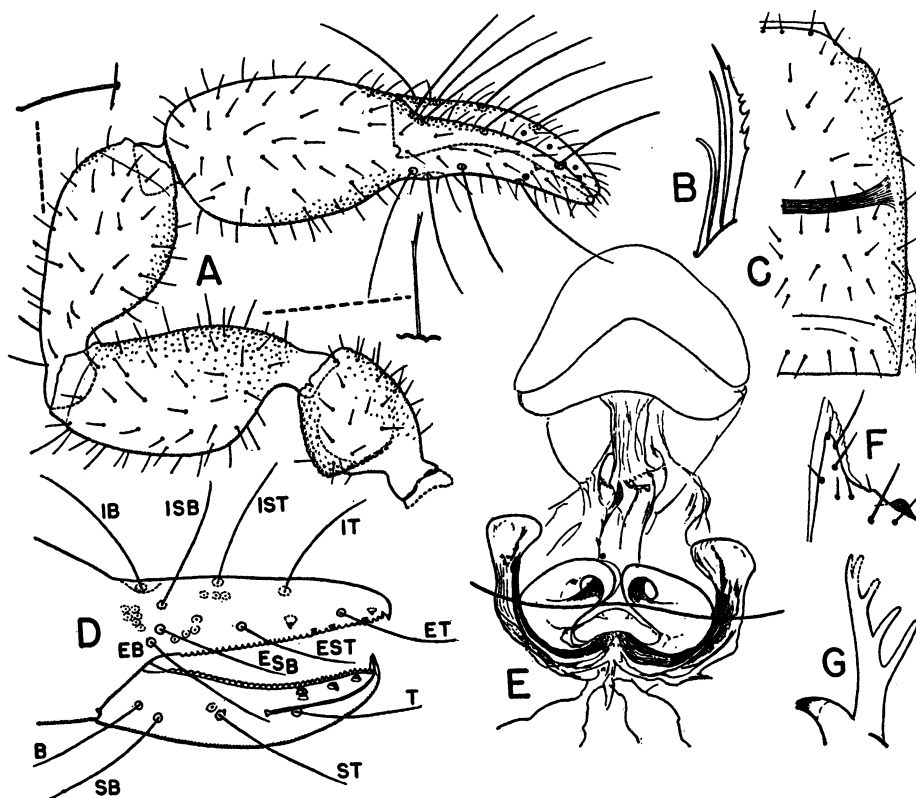


FIG. 5. *Pycnocheres foxi*, new species, male, holotype. A. Dorsal aspect of left palp; inserts show nature of vestitural setae. B. Flagellum. C. Right half of carapace. Note ocular notch. D. Exterior aspect of right chela. E. Sketch of male genital structures, not treated with caustic potash. F. Apex of left maxilla. G. Galea.

***Pycnocheres foxi*, new species**

Figure 5

**MATERIAL:** Holotype, male (JC-794.01001), Idaho, Twin Falls, swept from sugar beets July 31, 1931, by David E. Fox. No additional material known. Type deposited in the American Museum of Natural History.

**DIAGNOSIS:** (Based on male only.) Carapace (fig. 5C) distinctly longer than broad, with the even contour of the sides suddenly narrowed or "notched" at the normal ocular position; eyes or ocular spots absent; with a single prominent, slightly procurved, submedian furrow, the posterior furrow lacking or obsolete; sparsely and very finely granulate, especially anteriorly and anterolaterally; setae sparse, slender, and denticuloacuminate.

Coxal area of usual facies; smooth, except for lateral margins of maxillae which are

weakly granulate; subapical maxillary seta much longer than the apical seta (fig. 5F).

Tergites 1, 2, and 11 entire, the rest divided by a narrow, linear membranous stripe; vestitural setae slender, minutely denticulate terminally; tergal chaetotaxy:

$$\frac{2-0}{14} : \frac{2-2}{14} : \frac{2-2}{16} : \frac{2-2}{16} : \frac{2-2}{18} : \frac{2-2}{18} : \frac{2-2}{16} : \frac{2-2}{18} : \frac{6}{16} : \frac{6}{14} : \\ \frac{TTTT}{8} : 2m$$

All but the eleventh sternite divided by a narrow stripe; chaetotaxy:

$$(28) : (3s) \frac{6}{14} (3s) : (4s) 16(4s) : \frac{2-2}{24} : \frac{2-2}{20} : \frac{2-2}{24} : \frac{2-2}{22} : \frac{6}{20} : \\ \frac{SSSSS}{14} : \frac{T1TT1T}{5} : 2m$$

Pleural membrane smoothly striate. The tergal and sternal setae are not uniform in

size, one or two larger setae irregularly alternating with one or two smaller ones; median and lateral setae generally of large type; discal setae tending to be longer than the marginal setae.

General appearance of male genitalic structures as sketched (fig. 5E).

Chelicerae of typical facies; galea slender, with about five well-developed terminal and subterminal branches (fig. 5G); serrula exterior with 17 to 18 teeth; flagellum three bladed, anterior blade, only, unilaterally dentate (fig. 5B); seta *sb* and *b* thickened and terminally dentate.

Palps (fig. 5A) robust, with the inner face of all segments, the posterior face of the tibia, and the exterior basal third of the fingers finely and uniformly granulate; all segments strongly pedicellate, the femur greatly swollen basally, thereafter gradually attenuate; trochanter with a pronounced dorsolateral protuberance. Palpal proportions: trochanter between 1.6 to 1.7 times as long as broad; femur 2.0 times as long as broad; tibia 2.2 times as long as broad; chela 3.0 (plus pedicel 3.2) times as long as broad; chela slightly broader than deep; hand 1.6 times as long as broad and slightly longer than fingers.

Chela as illustrated (fig. 5D); dental formula:

$$\frac{35 \left[ \begin{array}{c} (3) \ 4, \ 10, \ 13 \\ (2) \ 3, \ 18 \end{array} \right]}{38 \left[ \begin{array}{c} (3) \ 5, \ 10, \ 17 \\ (1) \ 17 \end{array} \right]} \text{NR, 22}$$

Movable finger exteriorly with a single sense spot adjacent to seta ST; fixed finger exteriorly with about four sense spots slightly anterior to setae ESB and EB; fixed finger interiorly with about three spots laterad of seta IST and a second cluster of six or seven spots caudad of setae IB and ISB. Venom duct elongate, nodus ramosus median between setae T and ST.

Legs moderately robust, femur and tibia of legs III and IV each with a short, subterminal pseudotactile seta; miotarsus of leg IV with a long and slender tactile seta .3 of the tarsal length from its base (.4 of dorsal length). A small sense dome occurs between the tactile seta and the tarsal base of the third and fourth legs. Proportions: Leg I, "miofemur" 2.9 times as long as deep; tibia

3.2 to 3.3 times as long as deep; tarsus between 4.1 and 4.2 times as long as deep. Leg IV, "miofemur" 2.9 to 3.0 times as long as deep; tibia 3.5 times as long as deep; miotarsus 4.5 times as long as deep.

MEASUREMENTS (MM.): Male holotype: Total length (abdomen not cleared with caustic and more or less contracted) 1.67; abdominal breadth .74. Carapace: .65 long; median breadth .52; posterior breadth .56; anterior disk .36 long; posterior disk .29 long. Palps: trochanter .348 by .216; femur .515 by .253; tibia .558 by .253; chela .874 (plus pedicel .943) by .295 broad and .287 deep; hand .469 (plus pedicel .533) long; fingers .443 long. Venom duct .177 long. Leg I: "miofemur" .356 by .123; tibia .264 by .081; miotarsus .236 by .057. Leg IV: "miofemur" .517 by .177; tibia .385 by .109; miotarsus .295 by .066; dorsal length of miotarsus .210; tactile seta .086 from base of the segment.

REMARKS: This species is respectfully dedicated to the collector, my good friend and former colleague, David E. Fox.

#### SUBFAMILY CHERNETINAE BEIER

GENUS *DINOCHIRUS* J. C. CHAMBERLIN

#### *Dinocheirus sicarius*, new species

Figures 6-9

MATERIAL: Holotype, male (JC-1225-05001); allotype, female (JC-1225.05002); paratype, female JC-1225.05003), all from California, Frances Simes Hastings Natural History Reservation, June 30, 1940, "from barn owl pellets." Other paratypes (totaling nine males, 14 females, and 49 nymphs) also from the Frances Simes Hastings Natural History Reservation as tabulated at top of next page.

Other paratypes, as follows: 10 males, 10 females, three nymphs (JC-1749.02001 to 23), Berkeley, California, October, 1919 (C. R. Crosby collection); five males (JC-456-01001 to 5), same locality, from nest of wood rat (*Neotoma fuscipes*) collected December, 1928, by Barrett (*ex* E. C. Van Dyke). Holotype, allotype, and several paratypes deposited in collections of the American Museum of Natural History; paratypes in author's collection and in the collections of the Frances Simes Hastings Natural History Reservation.

DIAGNOSIS: (Adults of both sexes unless

SPECIMENS	"HABITAT"	COLLECTION DATES
Female (JC-1225.01001)	"Upper barn #43 <i>Mus musculus</i> "	May 11, 1940
Female (JC-1225.03001)		May 20, 1940
Male (JC-1225.04001)		June 28, 1940
Female (JC-1225.06001)		
Male, two females (JC-1268.01001 to 3)	"Clinging to trochanter of third leg of Muscidae fly"	June 2, 1940
Female (JC-2060.01001)		Feb. 11, 1941
Two nymphs (JC-2062.01001 to 2)	"Among pellets of <i>Tyto alba</i> "	July 3, 1941
Two males (JC-2083.01001 to 2)	" <i>Neotoma</i> midden. 646"	Jan. 24, 1946
	"From <i>Neotoma</i> house nest. (Schuck-Voge #562). Robertson Creek"	Aug. 22, 1945
Male (JC-2082.01001)	"From <i>Neotoma</i> house (LPT 646)"	Jan. 24, 1946
Three females, six nymphs (JC-2085.01001 to 9)	"From <i>Neotoma</i> nest (LPT 647)"	Jan. 24, 1946
Three males (JC-2086.01001 to 3) and 26 nymphs (JC-2086.01001 to 26)		
Nymph (JC-2077.01001)	"From <i>Neotoma</i> nest (LPT 646)"	Jan. 24, 1946
Male, five females, 14 nymphs (JC-2076.01001 to 20)	"From <i>Neotoma</i> nest (LPT 649)"	Jan. 25, 1946
	"From <i>Neotoma</i> midden, (LPT 647)." Jan. 24, 1946	

specially noted.) Moderate-sized species of generally typical facies, except for a unique angular protuberance on the inner or subdorsal face of the palpal femur of the male (fig. 6B).

Carapace of usual shape, somewhat longer than posterior breadth; both transverse furrows distinct; eye spots present and typical; derm evenly and finely granulate; vestitural setae short, prominently denticuloclavate (fig. 7L, M, N, O); chaetotaxy about 6-11 or 12 (90-100±).

Abdomen of usual facies; tergites 1 to 10 (left scuta of tergite 2 shown in fig. 6H) and sternites 4 to 10 divided by the usual, broad, membranous stripe; tergite 11 entire, forming an undivided median, supra-anal shield, beneath which the anal protuberance is completely hidden; sternite 11 also an undivided subanal shield, shaped like, but smaller than, the supra-anal shield. Segment 11, as a whole, retracted between the distinctly recurved tenth segment (fig. 7G).

Tergal scuta weakly sclerotic, granulate or finely squamotessellate, all tergal setae prominently denticuloclavate (fig. 9G); chaetotaxal pattern essentially similar in both sexes, the marginal setae numbering about 12 to 18 on tergite 1, 14 to 21 on tergites 2 to 7, and 9 to 16 on tergites 8 to 10; tergite 11 (supra-anal plate) biseriate, with four discal and five or six ordinary marginal setae flanked on either side by a long and slender tactile seta (fig.

7G); the twelfth segment or anal process with the usual pair of microsetae dorsally and ventrally; mean tergal chaetotaxy (four males and four females) about as follows (all but tactile setae denticuloclavate):

$$15:17:17:\frac{2}{16}:\frac{2}{16}:\frac{2}{16}:\frac{2}{16}:\frac{2}{15}:\frac{2}{13}:\frac{2}{12}:\frac{4}{T6T}:2m$$

Sternal scuta small, weakly defined, smooth anteriorly, but becoming minutely hispidously tessellate or roughened on caudal segments; sternites 4 to 8 with an irregular transverse series or zone of 14 to 20 widely spaced microlyrifissures, anterior marginal setae simple and acuminate, but some becoming progressively weakly denticuloclavate to strongly denticuloclavate on caudal segments; anterior genital operculum of female with a loose median cluster of 18 to 22 acuminate setae; posterior operculum (sternite 3) with a crescentic series of nine to 12 acuminate setae (fig. 9E); sternite 4 of female with three to six marginal setae. Anterior genital operculum of male with a similar cluster of 19 to 23 setae, of which one submedian pair is extraordinarily elongated (fig. 7K); anterior margin of posterior genital operculum (sternite 3) with two closely adjacent pairs of forward projecting microsetae, about six to eight normal discal setae and 12 to 19 marginal setae (fig. 7K); sternite 4 with a marginal series of six to 10 acuminate setae. Anterior stigmatic plate of both sexes with three

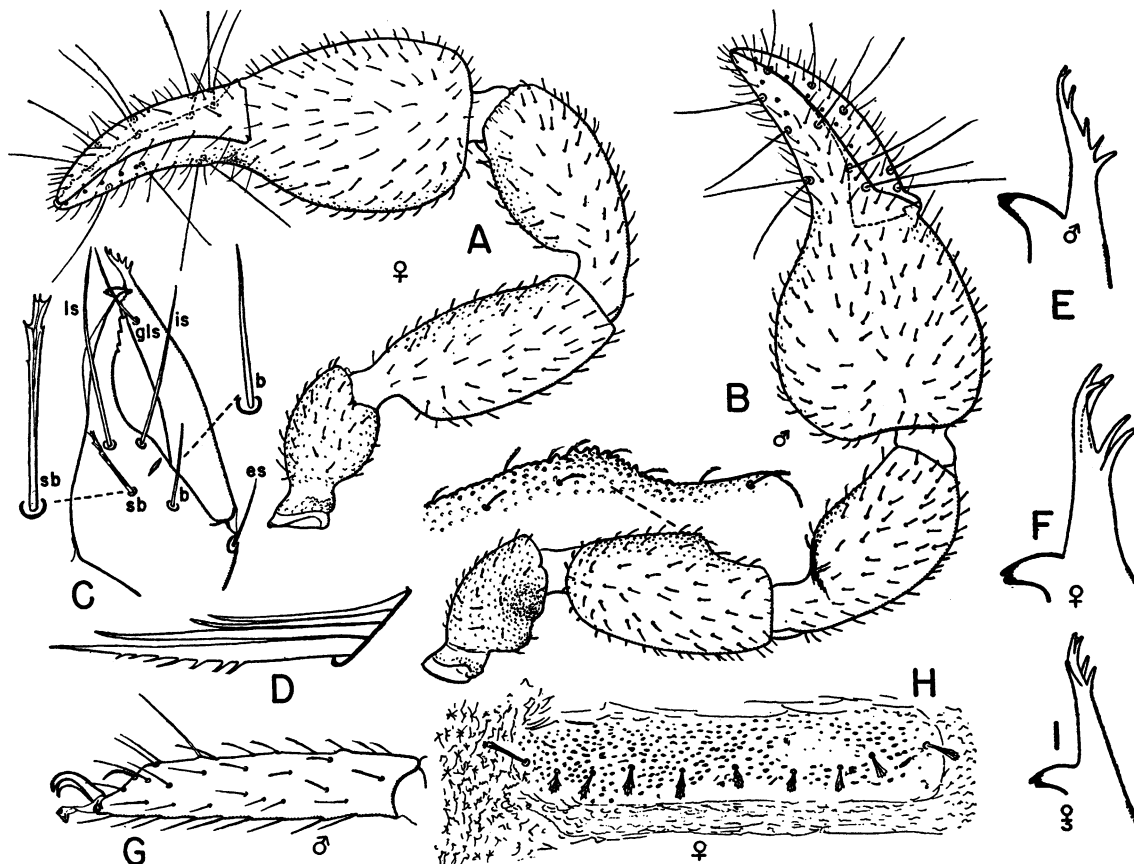


FIG. 6. *Dinocheirus sicarius*, new species. (Homologous structures in figs. 6 and 7 are drawn to the same scale, with the exception of fig. 7H as compared to fig. 7G, I, and J.) A. Ventral aspect of female palp (allotype). B. Dorsal aspect of male palp; insert shows detail of femoral process (holotype). C. Chelicera (sublateral, exterior aspect) showing chaetotaxy; inserts show character of setae *sb* and *b*, respectively; serrulae omitted (holotype). D. Flagellum (holotype). E. Galea of male (holotype). F. Galea of female (JC-1225.03001). G. Fourth tarsus of male (holotype). H. Left scutum of tergite 2 (female, JC-1225.03001). I. Galea of tritonymph (JC-2086.02002).

dwarf setae, posterior stigmatic plate with one dwarf seta, each. Sternites essentially uniseriate, except for the usual lateral discal setae on segments 5 to 10 and a weakly differentiated median discal pair of setae on segments 8 to 10; marginal setae (both sexes) number 16 to 21 on segments 5 to 8 and eight to 14 on segments 9 to 10; sternite 11 (subanal plate fig. 7G) biseriate with a median and lateral discal pair of tactile setae (four in all) and a marginal series of three to five ordinary setae.

All sternal setae acuminate on segments 2 to 5, except for one or two denticuloclavate lateral marginal setae on sternite 5, and three

to five on sternite 6; setae of sternites 8 to 11 all denticuloclavate, except for the tactile setae, the median discal setae, and, on segment 8, of two to six of the median marginal setae. In the following chaetotaxal formulas numbers of denticuloclavate setae are italicized. Mean sternal chaetotaxy of female (five specimens, segments 2 to 12) about as follows:

$$(20):(3)11(3):(1)4(1):17:\frac{2}{18}:\frac{2}{5, 10, 5}:\frac{2-2}{7, 3, 7}:\frac{2-2}{11}:$$

$$\frac{2-2}{10}:\frac{TT}{T5T}:2m$$

of male (five specimens; segments 2 to 12):

$$\frac{(9ee10)}{dd-dd}:(3)\frac{7}{14}:(3):(1)8(1):17:\frac{2}{18}:\frac{2}{4,10,4}:\frac{2-2}{5,4,6}:$$

$$\frac{2-2}{14}:\frac{2-2}{9}:\frac{TT}{T4T}:2m$$

The letter "e" for segment 2 in the preceding formula indicates the submedian elongated setae of the opercular cluster, the four "d's" in the denominator the four dwarf setae of the posterior operculum. The terminal abdominal structure showing the chaetotaxy and structure of the sub- and supra-anal plates is shown in figure 7G.

Male genital structures (cleared in caustic potash) as shown in figure 9B; those of the female in figure 9E, F. In the female, note particularly the tubular spermathecal receptacles and the reticulated character of their pyriform terminations.

Chelicerae of typical facies (fig. 6C); galea only weakly differentiated between male and female, with five or six short, weakly curved, terminal and subterminal branches in both sexes, but somewhat shorter in the male (compare fig. 6E, F); flagellum of the normal four blades (fig. 6D); chaetotaxy typical for genus, seta *sb* being thickened and terminally denticulate, while seta *b* is completely acuminate; serrula exterior with 17 to 19 blades in both sexes; serrula interior normal, with three dentate subapical lobes.

Palps robust in both sexes; of typical chernetine facies, sexually differentiated, the chela of the male being much more robust than that of the female (fig. 6A, B); all palpal segments finely but distinctly granulate interiorly and subdorsally; femoral protuberance of male with larger granules than elsewhere; trochanter finely granulate on all surfaces except ventrally. Vestitural setae of trochanter and the lateral and dorsal surfaces of the femur, tibia, and hand thickened and variously denticuloclavate; all others more or less acuminate.

Palpal proportions (range, and mean in parentheses, of six specimens of each sex) of male: trochanter 1.63 to 1.99 (1.81) times as long as broad; femur 2.03 to 2.22 (2.15) times as long as broad; tibia 2.03 to 2.27 (2.18) times as long as broad; chela 2.10 to 2.42 (2.21) times as long as broad, chela plus pedicel 2.26 to 2.62 (2.39) times as long as broad; hand 1.10 to 1.18 (1.13) times as

long as deep; fingers .99 to 1.15 (1.05) times as long as hand without the pedicel. Palpal proportions of female: trochanter 1.66 to 1.97 (1.87) times as long as broad; femur 2.29 to 2.47 (2.35) times as long as broad; tibia 2.14 to 2.25 (2.19) times as long as broad; chela 2.48 to 2.77 (2.57) times as long as broad, chela plus pedicel 2.68 to 3.00 (2.78) times as long as broad; hand 1.29 to 1.47 (1.35) times as long as depth, and .90 to 1.09 (1.03) times as long as fingers.

Chela with chaetotaxy, dentition, and sense spots as illustrated (figs. 8A, B, 9A); with two accessory pseudotactile setae (*a* and *b*) submedially and subdistally, respectively, on the movable finger; dental formulas for both sexes as given in table 2.

The exterior accessory teeth rather closely parallel the marginal series and are only moderately larger than the marginal teeth, while the interior accessory teeth are large and distinctly removed laterally from the marginal series.

Sense spots of chela few and inconspicuous; female, in general, with a few more than the male, totaling five or six (both faces of both fingers), compared with three or four in the male. Female: fixed finger generally with one (rarely none) subbasal to submedian spot; interiorly with two to four (generally three) spots arranged subbasally to submedially; movable finger exteriorly generally with one (rarely none) subbasal spot; interiorly with none to three (generally two or three) subbasal to submedial spots. Male: fixed finger exteriorly with none to one (generally none) subbasal spot; interiorly with none to three basal to submedian spots; movable finger exteriorly generally lacks spots (occasionally one is present); interiorly there are generally two or three (mostly two) subbasal spots.

Legs of typical chernetine facies, lacking specifically distinguishing features except possibly in their proportions; third and fourth tarsi with a short but acuminate, subterminal tactile seta (fig. 6G).

Proportions (observed range and means for seven examples of each sex) of leg I: Male, "miofemur" 3.09 to 3.37 (3.26) times as long as deep; tibia 3.77 to 3.98 (3.89) times as long as deep; tarsus 5.32 to 5.71 (5.53) times as long as deep. Female, "miofemur" 3.23

TABLE 2  
DENTAL FORMULAS FOR CHELA OF *Dinocheirus sicarius*, NEW SPECIES

MALE	
Observed Range in Six Specimens	
44-47	$\left[ \frac{(6-8) \ 2-4; 8-9^*; 11-12; 15-18^*; 19-21^*; 23-27^*; 29\dagger; 30-35}{(4-7) \ 2; 8-9^*; 10-11\dagger; 13-16; 17-19^*; 19-23; 24-26\dagger} \right]$
45-47	$\left[ \frac{(6-9) \ 3-4; 7-9; 11-12^*; 15-16^*; 18\dagger; 19-23; 24-27^*; 28-32^*; 34-37}{(3-4) \ 9-14; 16-19; 21-23; 24-27^*} \right]$ NR, 25-28
Mean of Six Specimens	
45	$\left[ \frac{(6) \ 3; 8^*; 12; 16^*; 20^*; 25^*; 29\dagger; 32}{(5) \ 2; 8; 10\dagger; 15; 18^*; 21; 25\dagger} \right]$
46	$\left[ \frac{(7) \ 4; 8; 12^*; 15^*; 18\dagger; 21; 26^*; 30^*}{(4) \ 12; 17; 22; 26^*} \right]$ NR, 26.5
Holotype	
44	$\left[ \frac{(6) \ 4; 11; 15; 20; 24; 30}{(6) \ 2; 8; 14; 17; 21; 24} \right]$
46	$\left[ \frac{(8) \ 4; 8; 11; 15; 19; 24; 28; 34}{(3) \ 12; 17; 22} \right]$ NR, 26
FEMALE	
Observed Range in Six Specimens	
42-46	$\left[ \frac{(6-7) \ 2-7; 7-11; 12-14; 16-19; 21-25; 26-28^*; 31-34}{(3-4) \ 2-3; 7-11; 15-17^*; 18-23} \right]$
43-47	$\left[ \frac{(6-9) \ 3-4^*; 6-8\dagger; 8-12; 12-15; 16-17\dagger; 19-20; 23-24^*; 25-28^*; 29-31^*; 33-36^*; 37-39\dagger}{(2-3) \ 11-14; 20-25; 26\dagger} \right]$ NR, 24-28
Mean of Six Specimens	
44	$\left[ \frac{(7) \ 4; 9; 13; 18; 23; 27^*; 32}{(4) \ 2; 9; 16; 21} \right]$
45	$\left[ \frac{(8) \ 4^*; 7\dagger; 10; 14; 16\dagger; 19; 24^*; 26^*; 30^*; 34^*; 38\dagger}{(2) \ 13; 22; 26\dagger} \right]$ NR, 26
Allotype	
43	$\left[ \frac{(7) \ 7; 10.5; 14; 19; 22; 27; 32}{(4) \ 2; 7.5; 15.5; 20} \right]$
44	$\left[ \frac{(9) \ 3; 6; 9.5; 14; 19; 24; 28; 33; 37.5}{(2) \ 11; 20.5} \right]$ NR, 26

to 3.48 (3.30) times as long as deep; tibia 3.90 to 4.10 (3.97) times as long as deep; tarsus 5.32 to 6.21 (5.61) times as long as deep. Proportions of leg IV: Male, "miofemur" 3.29 to 3.61 (3.43) times as long as deep; tibia 4.92 to 5.28 (5.07) times as long as deep; tarsus 5.29 to 5.95 (5.62) times as long as deep; tarsal tactile seta .82 to .87 (.85) of dorsal length of tarsus from its base; sense dome .21 to .27 (.23) of dorsal tarsal length from its base. Female; "miofemur" 3.43 to 3.75 (3.60) times as long as deep;

tibia 4.84 to 5.45 (5.07) times as long as deep; tarsus 5.41 to 6.10 (5.62) times as long as deep; tarsal tactile seta .84 to .87 (.86) of dorsal tarsal length from its base; sense dome .19 to .27 (.22) of dorsal tarsal length from its base.

MEASUREMENTS (MM.): Male (observed extremes, and means in parentheses, of specimens JC-456.01001, 1225.03001, 1225.04001, 1268.01001, 1749.02003, 2082.01001, and 2086.01001): Total length 2.30 to 2.92 (2.52); abdominal breadth 1.03 to 1.25 (1.16). Cara-

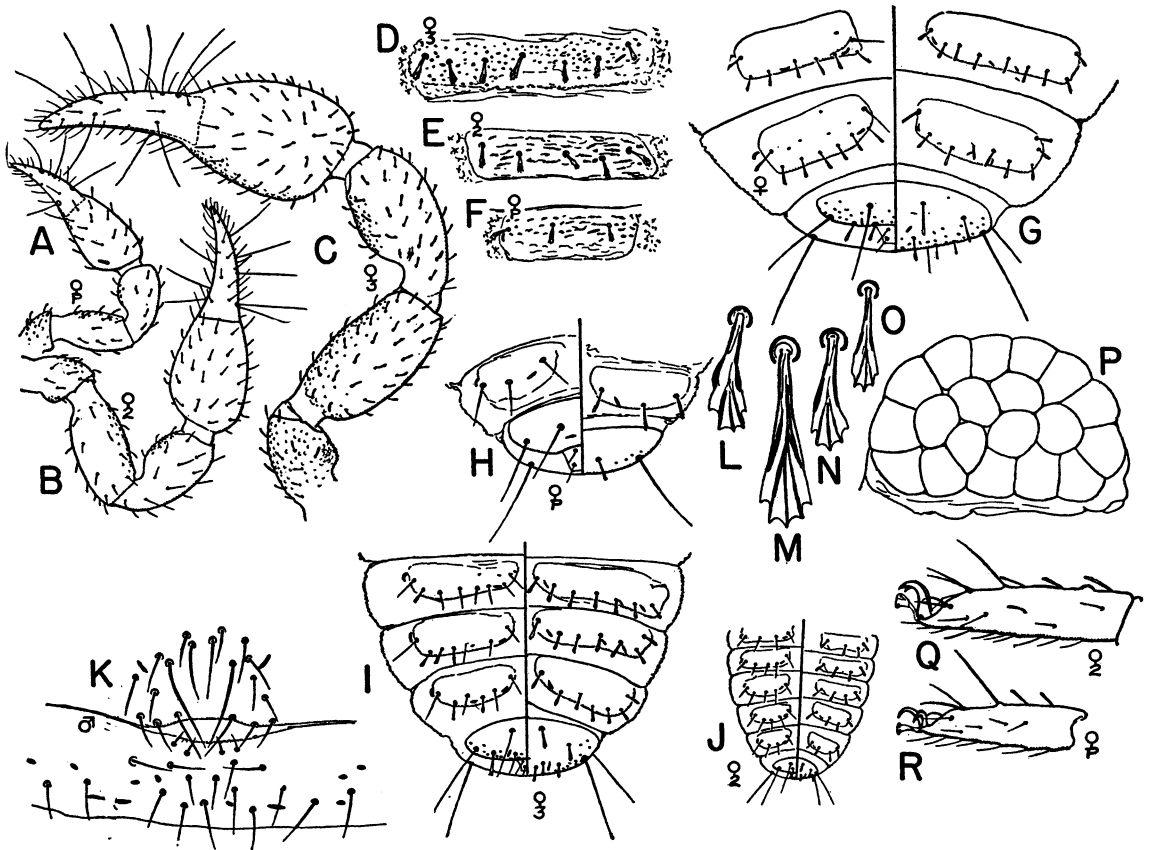


FIG. 7. *Dinocheirus sicarius*, new species. (See fig. 6.) A. Dorsal aspect of palp of protonymph (JC-2086.01004). B. Ventral aspect of palp of deutonymph (JC-2086.02003). C. Dorsal aspect of palp of tritonymph (JC-2086.02001). D-F. Left scutum of tergite 2 of tritonymph (JC-2086.02001); of deutonymph (JC-2086.02003), and of protonymph (JC-2086.02004), respectively. G, I, J. Terminal abdominal segments showing chaetotaxy and structural characteristics of female (allotype), tritonymph (JC-2086.02002), and deutonymph (JC-2086.02003), respectively. Left half ventral; right half dorsal. H. Terminal abdominal segments of protonymph (JC-2086.02004). (Larger scale of magnification than G, I, J.) K. Chaetotaxy of male genital opercula (JC-2082.01001). L-O. Denticuloclavate setae from median, posterior portion of carapace of the various instars. All to same scale. L. Tritonymph (JC-2086.02002). M. Female allotype. N. Deutonymph (JC-2086.02003). O. Protonymph (JC-2086.02004). P. Larval mass, ventral aspect (from allotype). Q. Fourth tarsus of deutonymph (JC-2086.02003). R. Fourth tarsus of protonymph (JC-2086.02004).

pace: .84 to .95 (.89) long; .34 to .41 (.39) broad across "eye spots" and .69 to .84 (.76) broad posteriorly; ocular disk .48 to .54 (.51) long; median disk .20 to .25 (.22) long; posterior disk .15 to .16 (.16) long. Palps: trochanter .423 to .513 (.470) by .230 to .279 (.259); femur .651 to .800 (.736) by .321 to .364 (.342); tibia .648 to .787 (.719) by .297 to .364 (.330); chela 1.164 to 1.304 (1.229) long by .484 to .615 (.556) broad and .493 to .633 (.565) deep, chela plus pedicel 1.255 to 1.410 (1.329) long; hand .558 to .702

(.638) long; fingers .640 to .713 (.669) long; total palpal length, 2.991 to 3.505 (3.254). Leg I: "miofemur" .467 to .541 (.502) by .144 to .166 (.154); tibia .369 to .426 (.393) by .095 to .107 (.101); tarsus .361 to .410 (.387) by .066 to .077 (.070); total length of leg I 1.202 to 1.377 (1.282). Leg IV: "miofemur" .664 to .787 (.728) by .197 to .228 (.212); tibia .558 to .656 (.608) by .112 to .129 (.120); tarsus .435 to .508 (.472) by .080 to .096 (.084) dorsal length of tarsus .353 to .415 (.384); tarsal tactile seta .301

to .354 (.327) from base; tarsal sense dome .079 to .112 (.090) from base; tarsal tactile seta .115 to .131 (.122) long; total length of leg IV 1.660 to 1.951 (1.808).

Female (observed extremes and means for the following seven specimens: JC-1225.05001 and 2; 1225.06001; 1749.02002 and 4; 2076.01002; 2085.01001): Total length: 2.51 to 3.39 (2.95); abdominal breadth 1.16 to 1.64 (1.43). Carapace: .89 to .98 (.93) long; .39 to .44 (.41) broad across eye spots and .75 to .92 (.85) broad posteriorly; ocular disk .49 to .52 (.51) long; median disk .23 to .25 (.24) long; posterior disk .16 to .20 (.18) long. Palps: trochanter .443 to .512 (.472) by .236 to .287 (.252); femur .704 to .771 (.728) by .285 to .333 (.310); tibia .672 to .754 (.709) by .307 to .344 (.324); chela 1.164 to 1.255 (1.215) by .426 to .507 (.473) broad and .459 to .512 (.482) deep, chela plus pedicel 1.263 to 1.361 (1.317) long; hand .607 to .672 (.638) long; fingers .574 to .689 (.620) long; total length of palps 3.098 to 3.398 (3.226). Leg I: "miofemur" .492 to .540 (.515) by .147 to .166 (.156); tibia .374 to .426 (.401) by .096 to .107 (.101); tarsus .369 to .426 (.398) by .066 to .077 (.071); total length of leg I 1.238 to 1.374 (1.316). Leg IV: "miofemur" .708 to .787 (.752) by .189 to .221 (.209); tibia .592 to .651 (.619) by .110 to .128 (.122); tarsus .462 to .495 (.478) by .078 to .088 (.085); dorsal length of tarsus .372 to .402 (.387); tarsal tactile seta .315 to .344 (.332) from tarsal base; tarsal sense dome .074 to .102 (.085) from tarsal base; tactile seta .107 to .131 (.121) long; total length of leg IV 1.784 to 1.929 (1.850).

TRITONYMPH: Except for the considerably smaller size the tritonymph has very much the same facies of the adult female. The following treatment is based on three specimens (JC-2077.01001, and 2086.02001 and 2).

Carapace with furrows, eye spots, and setae developed as in the adult; chaetotaxy somewhat reduced, averaging about 6-10 or 12 (70 to 80).

Abdomen of the same general facies as the adult; tergal and sternal divisions, scuta (left scutum of tergite 2 shown in fig. 7D), membranes, and nature of vestitural setae as in adult; retraction of terminal abdominal segment between recurved tenth segment distinct; chaetotaxy reduced as compared

to that of adult, but tactile setae of eleventh sternite and tergite the same as in the adult (fig. 7I). Mean chaetotaxy: tergites (segments 1 to 12; all setae distinctly denticuloclavate):

$$13:14:14:\frac{2-0}{13}:\frac{2-0}{14}:\frac{2-0}{14}:\frac{2-0}{14}:\frac{2-0}{13}:\frac{2-0}{12}:\frac{6}{8}:\frac{4}{T5T}:2m$$

Sternites (segments 2 to 12; denticuloclavate setae indicated by italicized numbers):

$$4:(2)8(2):(1)5(1):14:\frac{2-0}{14}:\frac{2-0}{15,I}:\frac{2-0}{2,11,I}:\frac{2-2}{3,4,3}:$$

$$\frac{2-2}{8}:\frac{TT}{T5T}:2m$$

Chelicera with same facies and characteristics as the adult; *sb* terminally denticulate; *b* acuminate; flagellum four bladed, as in adult; galea much as in female, with about four or five short terminal branches (fig. 6I); serrula exterior with 16 ligulate blades.

Palps robust, with facies of the adult female but smaller (fig. 7C), granulation and vestitural setae same as in the adult but setae fewer in number. Palpal proportions: trochanter 1.85 to 1.87 times as long as broad; femur 2.07 to 2.24 times as long as broad; tibia 1.86 to 2.02 times as long as broad; chela 2.50 to 2.73 (including pedicel 2.68 to 2.91) times as long as broad; fingers .94 to 1.09 times as long as hand. Chela with chaetotaxy and dentition as illustrated (fig. 8C, D); both accessory tactile setae of movable finger present as in adult; seta B and IST absent; accessory teeth present but fewer than in the adult; mean dental formula:

$$\frac{34\left[\frac{(6) 2.5\uparrow; 4\uparrow; 8; 12; 16; 18\uparrow; 21; 26*}{(2) 2.2; 12*; 17\uparrow}\right]}{37\left[\frac{(5) 4.5; 8\uparrow; 11; 15\uparrow; 19; 23.5*; 26\uparrow}{(1) 16}\right]} \text{ NR, 20}$$

Legs of same facies as adult but slightly more robust. Proportions: Leg I, "miofemur" 2.95 to 3.17 times as long as deep; tibia 3.10 to 3.54 times as long as deep; tarsus 4.21 to 5.07 times as long as deep. Leg IV, "miofemur" 3.46 to 3.66 times as long as deep; tibia 4.00 to 4.48 times as long as deep; tarsus 4.71 to 4.77 times as long as deep; tarsal tactile seta .80 to .86 of the dorsal length of the tarsus from its base; sense dome .24 to .26 of tarsal length from its base.

TRITONYMPHAL MEASUREMENTS (MM.):

(Observed extremes in three specimens, JC-2077.01001, 2086.02001 and 2.) Total length 1.84 to 2.21; abdominal breadth .82 to 1.15. Carapace: .67 to .80 long; ocular spot breadth .31 to .36; posterior breadth .57 to .64; ocular disk .38 to .42 long; median disk .18 to .23 long; posterior disk .10 to .16 long. Palps: trochanter .312 to .377 by .169 to .202; femur .459 to .525 by .208 to .254; tibia .454 to .525 by .225 to .282; chela .853 to .976 (plus pedicel .907 to 1.046) by .312 to .390 broad and .312 to .397 deep; hand .420 to .494 long; fingers .418 to .508 long; total palpal length, 2.132 to 2.473. Leg I: "miofemur" .330 to .380 by .104 to .129; tibia .244 to .279 by .074 to .090; tarsus .279 to .295 by .055 to .070; total length of leg I .853 to .954. Leg IV: "miofemur" .484 to .567 by .140 to .155; tibia .397 to .448 by .090 to .112; tarsus .330 to .353 by .070 to .074; dorsal tarsal length .254 to .272; tarsal tactile seta .207 to .235 from base of segment; sense dome .066 from base of segment; tactile seta .107 to .115 long; total length of leg IV 1.210 to 1.368.

**DEUTONYMPH:** Facies quite similar to that of the tritonymph but considerably smaller. The following brief account of this stage is based on two specimens, JC-2086.02003 and 2062.01001.

Carapace typical; eye spots and furrows normal; setae conspicuously denticuloclavate; chaetotaxy 6-6 or 8 (44 to 46±). Abdomen of usual facies, but relatively less ovate than in tritonymph or adult; vestitural setae conspicuously denticuloclavate dorsally; tergal and sternal divisions, pleural membrane, scuta (left scutum of tergite 2 shown in fig. 7E), and sculpturation essentially as in later stages; retraction of eleventh segment and recurved nature of tenth segment weakly evident; undivided character of eleventh tergite and sternite and tactile chaetotaxy as in tritonymph and adult (fig. 7J). Tergal and sternal chaetotaxy reduced as compared to later stages; clavate setae lacking from all except terminal sternite. Tergal chaetotaxy (segments 1 to 12):

$$8:10:8 \text{ to } 10:10: \frac{2-0}{8} : \frac{2-0}{8 \pm} : \frac{2-0}{8 \pm} : \frac{2-0}{6 \text{ to } 8} : \frac{2-0}{6 \text{ to } 8} :$$

$$\frac{2-0}{6 \text{ to } 8} : \frac{4}{T4T} : 2m$$

Sternal chaetotaxy (segments 2 to 12; denticuloclavate setae italicized):

$$(0):(1)2(1):(1)4(1):10:10:10:10:10:7 \text{ to } 9:$$

$$\frac{TT}{T2T} : 2m$$

Chelicerae with facies typical of later stages, galea terminally four branched (fig. 9D); chaetotaxy as in adult and tritonymph; *sb* apparently normally acuminate (denticulate, however, on one, and acute on the other chelicera in one of the two specimens studied); *b* acuminate; flagellum four bladed, essentially as in adult; serrula exterior with 14 ligulate blades.

Palps similar to, but smaller than, those of tritonymph; setae fewer and granulation somewhat reduced (fig. 7B). Chela as illustrated (fig. 8E); setae ST, SB, IST, and ESB lacking, but accessory setae of movable finger present as in adult and tritonymph; accessory teeth almost totally lacking, only one being present (interiorly and opposite the second marginal tooth of the fixed finger); marginal teeth numbering 26 on the fixed and 29 to 30 on the movable finger; nodus ramosus opposite the seventeenth to eighteenth marginal teeth of the movable finger; sense spots apparently lacking from the chela.

Palpal proportions as follows: trochanter 1.83 to 1.84 times as long as broad; femur 2.05 to 2.11 times as long as broad; tibia 1.88 to 1.94 times as long as broad; chela 2.81 to 2.87 (plus pedicel 2.96 to 3.07) times as long as broad; hand and fingers subequal in length.

Legs of same type and facies as in later stages but more robust. Proportions: Leg I, "miofemur" 2.84 to 2.95 times as long as deep; tibia 2.73 to 2.78 times as long as deep; tarsus 3.48 to 4.14 times as long as deep. Leg IV, "miofemur" 3.33 to 3.36 times as long as deep; tibia 3.56 to 3.87 times as long as deep; tarsus 4.03 to 4.39 times as long as deep; tactile seta of tarsus .77 to .78 of dorsal length from base of segment; tarsal sense dome vestigial, .24 to .30 of dorsal tarsal length from base of segment (fig. 7Q).

**DEUTONYMPHAL MEASUREMENTS (MM.):** Total length 1.44 to 1.74; abdominal breadth .66 to .67. Carapace: .51 to .54 long; "ocular spot" breadth .25 to .26; posterior breadth .46 to .49; ocular disk .26 to .28 long; median disk .15 to .18 long; posterior disk .08 long.

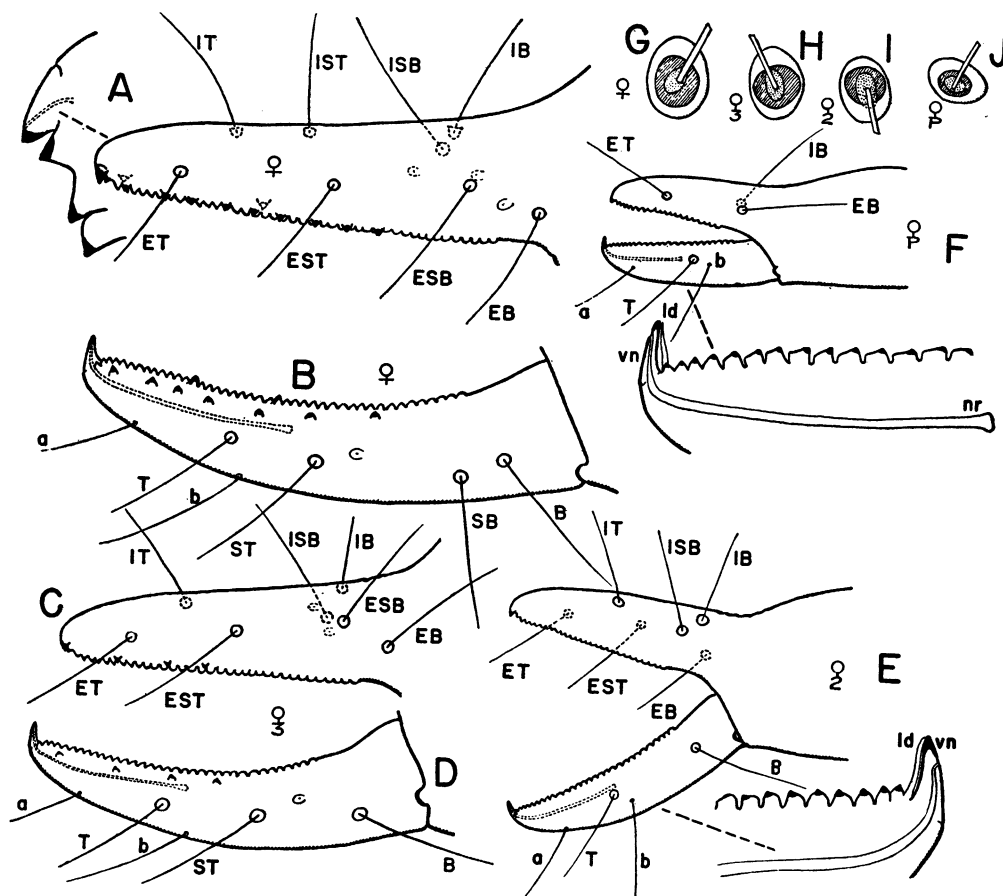


FIG. 8. *Dinocherius sicarius*, new species. (A–F drawn to same scale; G–J same scale.) A, B. Fixed and movable fingers of the chela of the female (exterior aspect) (JC-2060.01001). Insert shows vestigial venedens of fixed finger. C, D. Fixed and movable fingers of the chela of the tritonymph from exterior aspect (JC-2077.01001). E. Interior aspect of chelal fingers of deutonymph; insert shows venedens (vn), lamina defensor (ld), and terminal dentition of movable finger in more detail (JC-2086.02003). F. Exterior aspect of chela of protonymph; insert shows venom apparatus (venedens, vn; lamina defensor, ld; nodus ramosus, nr) and marginal dentition of movable finger in more detail (JC-2086.02004). G–J. Areoles (diagrammatic) of tactile setae of chela (same scale of magnification) of female (JC-1225.05002); tritonymph (JC-2086.02002), deutonymph (JC.2086.02003), and protonymph (JC-2086.02004), respectively.

Palps: trochanter .230 to .243 by .125 to .133; femur .312 to .315 by .148 to .154; tibia .308 to .318 by .159 to .169; chela .599 to .626 (plus pedicel .631 to .669) by .213 to .218 broad and .213 to .218 deep; hand .303 to .317 long; fingers .300 to .312 long; total length of palp 1.481 to 1.545. Leg I: "miofemur" .230 by .081; tibia .164 by .059; tarsus .167 by .048; total length of leg I .561 to .603. Leg IV: "miofemur" .336 to .357 by .100 to .107; tibia .269 to .271 by .070 to

.075; tarsus .245 to .246 by .056 to .061; dorsal length of tarsus .180 to .184; tarsal base to sense dome .044 to .055, to tactile seta .139 to .144; tactile seta .077 to .082 long; total length of leg IV .853 to .871.

PROTONYMPH: The facies of this stage are very similar to those of the deutonymph, except in size and relatively more robust appendicular proportions. The following brief account of this stage is based on four specimens, JC-2086.02004 to 7.

Carapace with transverse furrows well developed, essentially as in later stages, except for minor details in proportions; fewer vestitural setae and a less well-developed sculpturation; chaetotaxy 4-6 (24 to 28).

Abdomen moderately oval, with character of tergal and sternal divisions, interscutal membranes, scutal characteristics, and sculpturation (left scutum of tergite 2 as shown in fig. 7F), and character of setae (strongly denticuloclavate dorsally, acuminate ventrally) essentially as in later nymphal stages. Differs essentially in the reduced chaetotaxy, in the complete absence of clavate setae on the terminal ventral scuta, in the nearly transverse character of the terminal segments (11 only slightly retracted, 10 scarcely recurved), but identical in the terminal abdominal tactile setae as compared to the adult and later nymphal stages (fig. 7H). Tergal chaetotaxy (segments 1 to 12, setae all strongly denticuloclavate):

$$6:6:6:6:6:6:6:6:6:6:\frac{2}{T-T}:2m$$

Sternal chaetotaxy (segments 2 to 12; setae all acuminate):

$$(0):(0)2(0):(1)4(1):6:6:6:6:6:6:\frac{TT}{T-T}:2m$$

Chelicerae of usual facies; flagellum four bladed as in adult and other nymphal stages; serrula exterior with 10 to 12 ligulate blades; galea (fig. 9C) reduced, with two or three, generally the latter, small terminal branches, chaetotaxy as in later stages, except for the absence of seta *sb* (or *b?*), all others present and acuminate.

Palps (fig. 7A) more robust and much smaller than in later nymphal stages and with the number of setae and the amount of sculpturation reduced; vestitural setae thickened to denticuloclavate as in later stages; proportions as follows (range, and mean in parentheses, of four specimens): trochanter 1.76 to 1.97 (1.85) times as long as broad; femur 2.02 to 2.17 (2.09) times as long as broad; tibia 1.84 to 2.14 (1.96) times as long as broad; chela 2.91 to 3.23 (3.09) times as long as broad, chela plus pedicel 3.05 to 3.35 (3.22) times as long as broad; hand 1.53 to 1.55 (1.54) times as long as broad; fingers .86 to .98 (.96) times as long as hand.

Chela as illustrated (fig. 8F); tactile setae ST, SB, B, EST, ESB, IT, IST, and ISB lacking, but with the accessory pseudotactile setae of the movable finger present as in the later nymphal and adult stages; accessory teeth completely lacking; nodus ramosus opposite the fifteenth to sixteenth marginal teeth of the movable finger; marginal teeth numbering 21 to 22 on the fixed and 23 to 24 on the movable fingers, respectively; sense spots apparently completely lacking.

Legs as in other nymphal stages, but more robust in their proportions; tactile seta of fourth tarsus present as in later nymphal and adult stages; sense dome of fourth tarsus apparently lacking. Approximate proportions as follows: Leg I (range, and mean in parentheses, of three specimens), "miofemur" 2.59 to 3.18 (2.83) times as long as deep; tibia 2.23 to 2.62 (2.40) times as long as deep; tarsus 3.04 to 3.81 (3.67) times as long as deep. Leg IV, "miofemur" 3.05 to 3.62 (3.30) times as long as deep; tibia 2.40 to 3.12 (2.86) times as long as deep; tarsus 3.83 to 4.27 (4.00) times as long as deep; tarsal tactile seta .64 to .67 (.66) of dorsal tarsal length from base of the segment; sense dome apparently absent (fig. 7R).

PROTONYPHAL MEASUREMENTS (MM.): (Observed extremes and means of four specimens except for leg I, which is for three specimens.) Total length 1.23 to 1.28 (1.25); abdominal breadth .48 to .66 (.57). Carapace: .43 long; about .15 to .23 (.19) broad across eye spots; .35 to .44 (.38) broad posteriorly; ocular disk .23 to .25 (.24) long; median disk .10 to .13 (.12) long; posterior disk .07 to .10 (.08) long. Palps: trochanter .173 to .180 (.178) by .088 to .102 (.096); femur .194 to .223 (.211) by .096 to .103 (.101); tibia .200 to .220 (.212) by .101 to .115 (.108); chela .431 to .459 (.445) by .137 to .148 (.144) broad and .134 to .148 (.142) deep, chela plus pedicel .451 to .476 (.463) long; hand .213 to .230 (.222) long; fingers .210 to .246 (.232) long; total length of palp, 1.026 to 1.099 (1.064). Leg I: "miofemur" .166 to .175 (.170) by .055 to .064 (.060); tibia .107 to .118 (.113) by .045 to .049 (.047); tarsus .147 to .167 (.158) by .040 to .046 (.043); total length of leg I, .420 to .461 (.441). Leg IV: "miofemur" .235 to .261 (.251) by .072 to .081 (.076); tibia .177 to .185 (.183)

TABLE 3

SUMMARY OF MEAN ABSOLUTE AND RELATIVE LENGTHS OF VARIOUS MORPHOLOGICAL PARTS  
FOR DIFFERENT STAGES OF *Dinocheirus sicarius*, NEW SPECIES

Stage	Palpal Length		Leg I Length		Leg IV Length		Av. Mean All Appen- dicular Ratios ♀ = 1	Carapace Length		Total Body Length		Ratio of Width of Left Scutum 2 ♀ = 1 <sup>a</sup>
	mm.	♀ Palp = 1	mm.	♀ Leg = 1	mm.	♀ Leg = 1		mm.	♀ = 1	mm.	♀ = 1	
Protonymph	1.064	.33	.441	.34	.622	.34	.34	.43	.46	1.25	.42	.34
Deutonymph	1.481	.46	.561	.43	.853	.46	.45	.51	.55	1.74	.59	.48
Tritonymph	2.255	.70	.898	.68	1.275	.69	.69	.72	.77	1.98	.67	.62
Female	3.226	1.00	1.314	1.00	1.850	1.00	1.00	.93	1.00	2.95	1.00	1.00
Male	3.254	1.01	1.282	.98	1.808	.98	.99	.89	.96	2.52	.85	—

<sup>a</sup> Taken from illustrations (figs. 6H; 7D, E, F).

by .059 to .077 (.064); tarsus .180 to .194 (.188) by .044 to .048 (.047); dorsal length of tarsus .132 to .144 (.137); tactile seta .085 to .096 (.090) from base of tarsus and about .070 long; total length of leg IV .592 to .640 (.622).

#### REMARKS ON METAMORPHOSIS IN *Dinocheirus sicarius*

It will be noted from the description and accompanying figures that metamorphosis involves, from protonymph to adult, primarily the following points:

1. Progressive and markedly discontinuous changes in the mean size of the body and its parts, both in an absolute and relative sense. These are shown by the accompanying illustrations and measurements, certain of which are summarized in table 3.

TABLE 4

METAMORPHOSIS IN *Dinocheirus sicarius*, NEW SPECIES, AS SHOWN BY THE CARAPACAL CHAETOTAXY

Stage	Mean Chaetotaxal Formula	Ratio Where Total Setae in Adult = 1
Protonymph	4-6 (24 to 28)	.25 ±
Deutonymph	6-8 (46)	.48 ±
Tritonymph	6-10.5 (70 to 80)	.79 ±
Adult	6-11.5 (90 to 100)	1.00

2. Progressive increase in the numbers of vestitural setae from protonymph to adult (e.g., compare figs. 6H and 7D, E, F) showing the chaetotaxy of the left scutum of tergite 2. Here the number of setae from protonymph to the adult female is as follows: 3-5-7-10. As will be noted the increase closely parallels size changes. A similar situation exists with the carapacal chaetotaxy, as is shown in table 4.

3. Progressive increase in the number of tactile setae of the chela as summarized in table 5 and as shown graphically in figures 8A-F and 9A.

4. Changes in the dentition of the chela as summarized in table 6 and as illustrated in figures 8A-F. As will be noted, the ratio of change is much greater for the accessory teeth than for the marginal teeth.

5. Slight changes in the complexity of the galea (see figs. 6E, F, I; 9C, D).

6. Many other individual measurements of metamorphosis can be given, although the foregoing are the principal ones. Among those that may be briefly noted, however, are the increasing number of abdominal vestitural setae (as an example); the increasing number of blades in the serrula exterior; the position of the nodus ramosus of the venom apparatus relative to the marginal teeth; the shifting ratio of the position of the tactile seta of tarsus IV (figs. 6G; 7Q, R) relative to the tarsal base, and the increasing number of clavate setae on the terminal sternites. These data are summarized in table 7.

TABLE 5

METAMORPHOSIS IN *Dinocheirus sicarius*, NEW SPECIES, AS SHOWN BY THE CHAETOTAXY OF THE CHELA

Stage	Tactile Seta of Chela											Total No. Setae	Ratio of Total Adult = 1	
	Movable Finger				Fixed Finger									
Protonymph	T	--	--	-	ET	---	---	EB	--	---	---	IB	4	.33
Deutonymph	T	--	--	B	ET	EST	---	EB	IT	---	ISB	IB	8	.67
Tritonymph	T	ST	--	B	ET	EST	ESB	EB	IT	---	ISB	IB	10	.83
Adult	T	ST	SB	B	ET	EST	ESB	EB	IT	IST	ISB	IB	12	1.00

TABLE 6

METAMORPHOSIS IN *Dinocheirus sicarius*, NEW SPECIES, AS SHOWN BY THE DENTITION OF THE CHELA

Stage	Total Marginal Teeth (Mean)	Total Accessory Teeth (Mean)	Ratio Marginal Teeth ♀ = 1	Ratio Accessory Teeth ♀ = 1
Protonymph	45	0	.51	.00
Deutonymph	56	1	.63	.05
Tritonymph	71	14	.80	.67
Adult female	89	21	1.00	1.00
Adult male	91	22	1.02	1.05

## CONSTANCY OF CERTAIN CHARACTERS IN VARIOUS INSTARS

From the standpoint of classification, the constancy of certain characters through various developmental stages is of paramount importance. The more important of these are as follows:

1. The constancy of the venom apparatus

(fig. 8A-F), which is developed normally in all stages and is restricted to the movable finger (a family character).

2. The constancy of the tactile setae of the terminal abdominal segments from protonymph to adult (fig. 7G-J), being characterized in all cases by the following general formula (tergite 11, 12 and sternite 12, 11):

$$\frac{n}{TnT} : 2m :: 2m : \frac{TT}{TnT}$$

This character is of generic value.

3. The constancy of the reduced eleventh segment and its tendency to retraction in the angle formed by the recurved tenth segment (fig. 7G-J). This character is of probably subfamily constancy.

4. The persistence of the accessory pseudotactile setae of the movable finger of the chela in all stages (fig. 8B-F).

5. The persistence of the same type of vestitural setae (denticuloclavate) on the dorsal portions of all sclerites. This character is of generic value at least.

6. The constant cheliceral chaetotaxy in

TABLE 7

METAMORPHOSIS IN *Dinocheirus sicarius*, NEW SPECIES, AS ILLUSTRATED BY MISCELLANEOUS CHARACTERS

Stage	Mean No. of Blades in Serrula Exterior	Mean Total Tergal Setae	Mean Position of Nodus Ramosus Relative to Marginal Teeth	Position of Tarsal Tactile Seta*	Mean No. of Sternal Clavate Setae
Protonymph	11	66	15.5	.66	0
Deutonymph	14	106	17.5	.78	2
Tritonymph	16	160	20.0	.84	25
Female	18	181	26.0	.86	56
Male	18	181	26.5	.85	52

\* Ratio of distance between tactile seta and base of tarsus to dorsal length of tarsus.

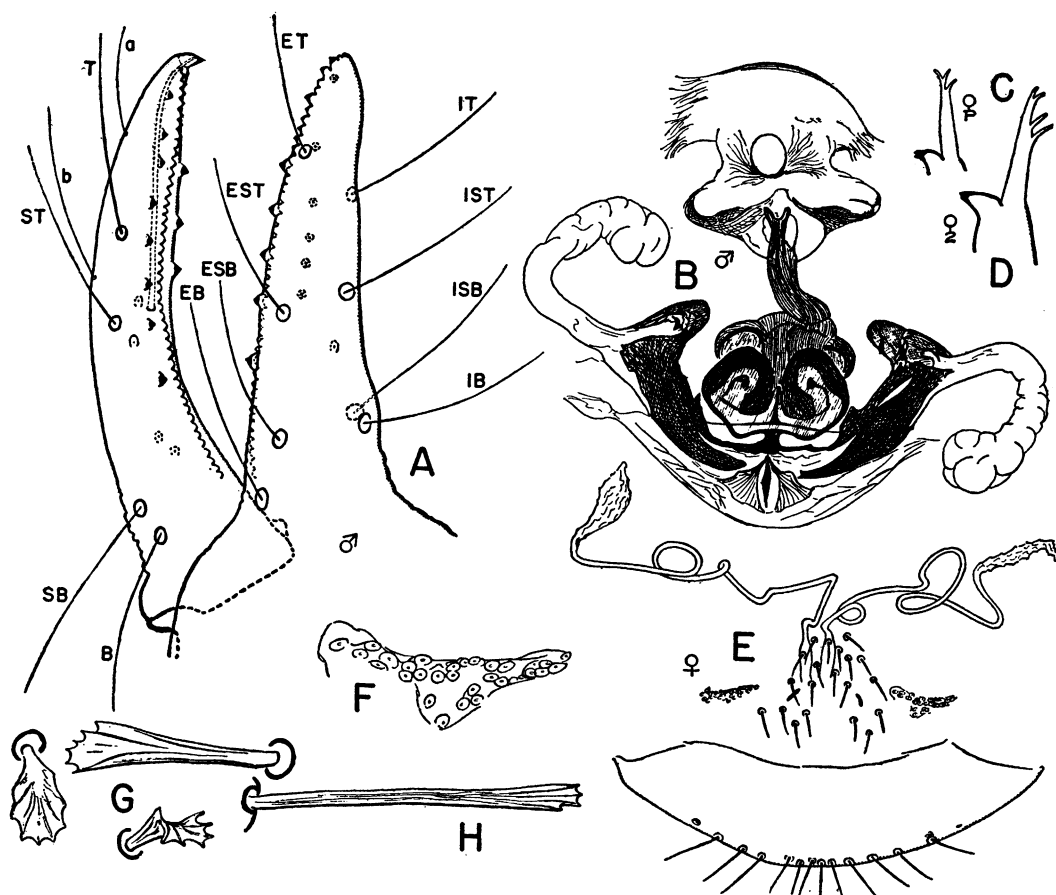


FIG. 9. *Dinocherius sicarius*, new species. A. Exterior aspect of fingers of male chela showing dentition, venom apparatus, and tactile setae (holotype). B. Semi-diagrammatic sketch of male genitalia, cleared in caustic potash (JC-0282.01001). C, D. Galea of protonymph (JC-2086.02004) and deutonymph (JC-2086.02003), respectively. E. Female genital area showing chaetotaxy, spermathecae, and cribriform plates (JC-2060.01001). F. Left cribriform plate, enlarged female (JC-2060.01001). G. Denticuloclavate tergal setae from various aspects; tergite 2 of female (JC-1225.03001). H. Slender denticuloclavate, lateral, discal seta from tenth sternite of female (JC-1225.03001).

all stages with the exception of the protonymph where *sb* (or *b*?) is absent. In all other stages both *b* and *sb* are present and *sb* is terminally denticulate—a character of generic value.

7. The constant presence of the tactile seta of tarsus IV (figs. 6G; 7Q, R) and, except for its apparent absence in the protonymph, of the basal tarsal sense dome.

8. The constancy of the character of the flagellum which is four bladed and similarly dentate in all instars.

A further feature, worthy of note, is the relatively constant absolute size of the

areoles of the tactile setae of the chela (fig. 8G–J). Although there is an actual increase in absolute size, this is proportionally much less than where gross size is considered. Thus considering the areole size (diameter) as 1 in the adult, the relative size in the other instars is .88 for the tritonymph, .80 for the deutonymph, and .76 for the protonymph.

Much the same phenomenon is evident when the absolute size of homologous vestigial setae is considered. Thus in figure 7L–O is illustrated a seta from a homologous position on the caudal border of the carapace of each instar. The ratio of size in the various

instars is as follows, where the length of the seta in the female is taken as 1: tritonymph .67, deutonymph .67, and protonymph .49. This accounts for the relatively greater conspicuousness of setae and their areoles in the nymphal as compared to the adult stages.

GENUS **HESPEROCHERNES** J. C. CHAMBERLIN

**Hesperochnes mimulus**, new species

Figures 10-12

**MATERIAL:** Holotype, male (JC-2070.01004); allotype, female (JC-2070.01002); paratypes three males, six females, two nymphs (JC-2070.01001, 3, and 5-13); California, Frances Simes Hastings Natural History Reservation, collected in *Citellus* nest "F.E.D. #2045," January 7, 1943, by J. M. Linsdale. Additional paratype female (JC-1225.02001), same locality, collected on *Citellus beecheyi*, April 2, 1940 (J. M. Linsdale lot 459). Holotype and allotype deposited in the American Museum of Natural History.

**DIAGNOSIS:** Carapace slightly to distinctly longer than posterior breadth, with the two usual transverse furrows, both of which are broad, well defined, and laterally procurved; weak eye spots present; derm nearly smooth discally, finely and evenly granulate laterally; vestitural setae rather broadly denticuloclavate (fig. 10C); chaetotaxy irregular, about 6-12 or 13 (65-85).

Coxal area of usual facies; subapical seta of maxilla much longer than apical seta (fig. 12A).

Abdomen ovate, of usual chernetine facies, the eleventh segment reduced and partially enclosed by the recurved tenth segment (figs. 10F; 12I); pleural membrane densely stellately wrinkled or irregularly striate; interscutal and intersegmental membranes extensive and more or less hispidously wrinkled or tessellate. All tergites and sternites, except the reduced eleventh, divided by a broad, membranous, longitudinally densely striated stripe; vestitural setae of tergites denticuloclavate, those of genital area and anterior sternites acuminate, but thickened and more or less denticuloclavate on median and posterior sternites; abdominal tactile or pseudotactile setae completely lacking; derm of tergites weakly rugotessel-

late; sternites weakly tessellate and nearly smooth.

Tergal chaetotaxy in general uniseriate, except for the usual lateral discal setae; not sexually differentiated, except for the tendency of tergite 10 in the males to have only the lateral discal setae present, while several irregular, median discal setae frequently occur in the female; observed chaetotaxal range (five females, three males) as follows (all denticuloclavate in some degree, fig. 10B, including the anal microsetae of segment 12):

$$8 \text{ to } 10:10 \text{ to } 13:10 \text{ to } 12:\frac{2-0}{10 \text{ to } 16}:\frac{2-0}{11 \text{ to } 12}:\frac{2-0}{10 \text{ to } 12}:\frac{2-0}{10 \text{ to } 12}:\frac{2-0}{8 \text{ to } 11}:\frac{2-0 \text{ to } 4}{6 \text{ to } 10}:\frac{2 \text{ to } 4}{5 \text{ to } 8}:2m$$

Mean chaetotaxy (tergites 1 to 9 of both sexes):

$$9.6:11.4:11.0:\frac{2-0}{12.1}:\frac{2-0}{11.8}:\frac{2-0}{11.1}:\frac{2-0}{10.9}:\frac{2-0}{10.9}:\frac{2-0}{9.8}$$

Mean chaetotaxy of tergites 10 to 12:

$$\text{Of male: } \frac{2-0}{9.7}:\frac{3.3}{6.3}:2m$$

$$\text{Of female: } \frac{2-1.8}{8}:\frac{3.6}{6.4}:2m$$

Sternal chaetotaxy in general uniseriate; range in observed chaetotaxy of male (three specimens; segments 2 to 12):

$$\frac{7 \text{ to } 12, \text{ ee-ee, } 7 \text{ to } 12}{dd}:(2 \text{ or } 3)12 \text{ to } 14(1 \text{ to } 3):$$

$$(1)6 \text{ to } 8(1):11 \text{ to } 17; 14 \text{ to } 18; 15 \text{ to } 16;$$

$$\frac{2-0}{12 \text{ to } 13}:\frac{2-0}{9 \text{ to } 13}:\frac{2-0}{8 \text{ to } 9}:\frac{2}{5 \text{ to } 6}:2m$$

Range in observed chaetotaxy of female (five specimens):

$$(17-26):(3)8 \text{ to } 12(3):(1)4 \text{ to } 5(1):11 \text{ to } 17;$$

$$12-16;\frac{0 \text{ to } 2-0}{10 \text{ to } 17}:\frac{0 \text{ to } 2-0}{10 \text{ to } 16}:\frac{2-0}{9 \text{ to } 16}:\frac{2-0}{6 \text{ to } 9}:$$

$$\frac{2}{4 \text{ to } 5}:2m$$

Mean female chaetotaxy:

$$(19.8):(3)10.2(3):(1)4.2(1):14.6:14.8:$$

$$\frac{1.0-0}{14.0}:\frac{1.2-0}{13.4}:\frac{2-0}{11.8}:\frac{2-0}{7.6}:\frac{2}{4.4}:2m$$

The setae of the genital segments (2 to 4) of both sexes are acuminate as are the median

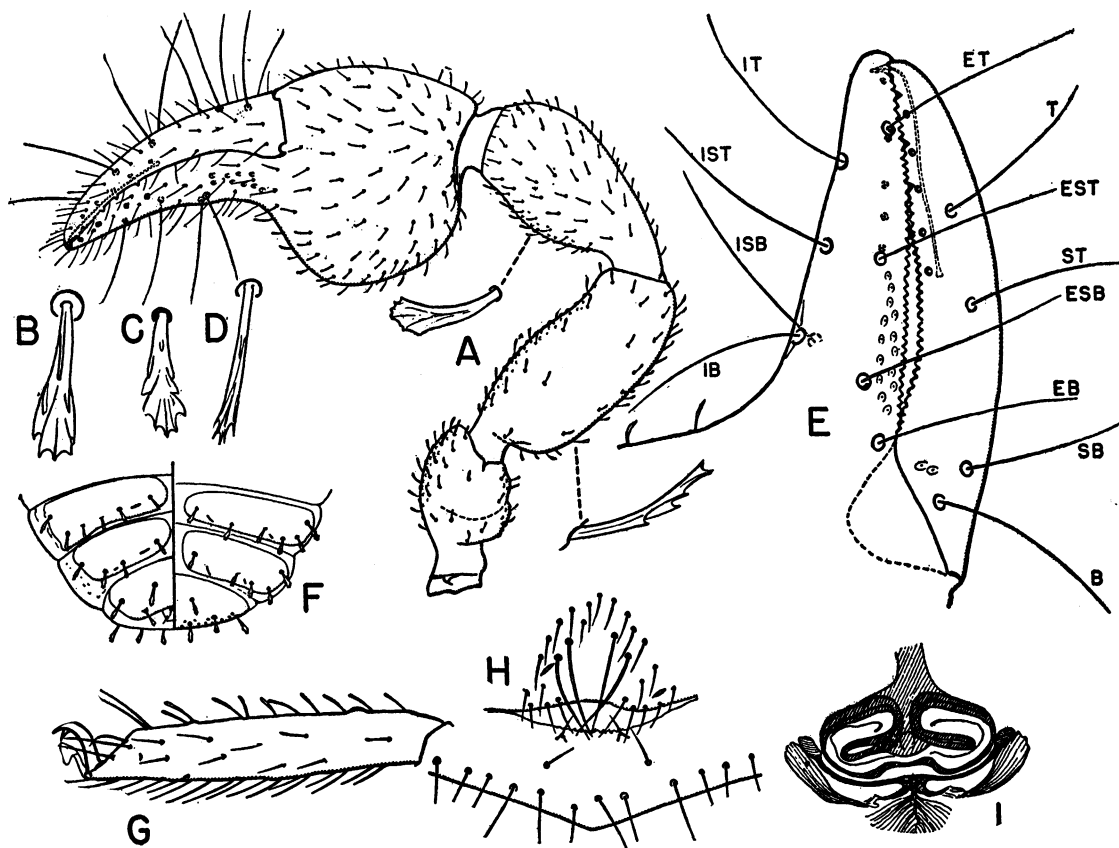


FIG. 10. *Hesperochnes mimulus*, new species. (All drawn from male JC-2070.01001.) A. Ventral aspect of palp; inserts show vestitural setae. B. Tergal seta. C. Carapacial seta. D. Seta from seventh sternite. E. Fingers of chela showing chaetotaxy, venom apparatus, and dentition. F. Tip of abdomen showing retraction of eleventh segment into recurved tenth segment and chaetotaxy. Note absence of tactile setae. G. Fourth tarsus. Note absence of tactile seta. H. Male operculum showing chaetotaxy. I. Diagrammatic sketch of male genitalic structures as seen in specimen untreated with KOH. Compare with figure 11E.

one or two setae of segment 5 (rarely 6) of the male, and the median two to five setae of segment 5, one to four setae of segment 6, and occasionally one or two median setae of segment 7 of the female; all other sternal setae in both sexes are thickened and dentate (fig. 10D) or denticuloclavate, except for the anal microsetae (segment 12) which are also acuminate.

Microlyrifissures occur sparingly, dorsally, and number about 18 to 20 on tergites 1 to 10 inclusive of both sexes (generally discally to some extent, but also in association with the marginal setae); the eleventh tergite and sternite of both sexes with 40 to 50 such structures, mostly along the caudal border; sternally microlyrifissures are more numerous

and occur in a distinct discal zone on sternites 4 to 8 of the male and on sternites 3 to 7 of the female; in one male the numbers were (segments 4 to 10) 28:54:48:31:22:0:0, while in one female (segments 4 to 10) they numbered 8:37:33:13:8:2 or 3:2 or 3.

Genital area of female as illustrated (fig. 11C); spermathecae tubular and very elongate, with terminal pyriform bulb (in one case with a subterminal pyriform enlargement, fig. 12G, but this is evidently abnormal or the result of a special physiological state at the time of death); asymmetrical, the left tubule longer than the right; cribriform areas diffuse, plates weakly sclerotized (fig. 11D); anterior opercular setae generally number 17 to 19, but in one case 26 were observed (fig.

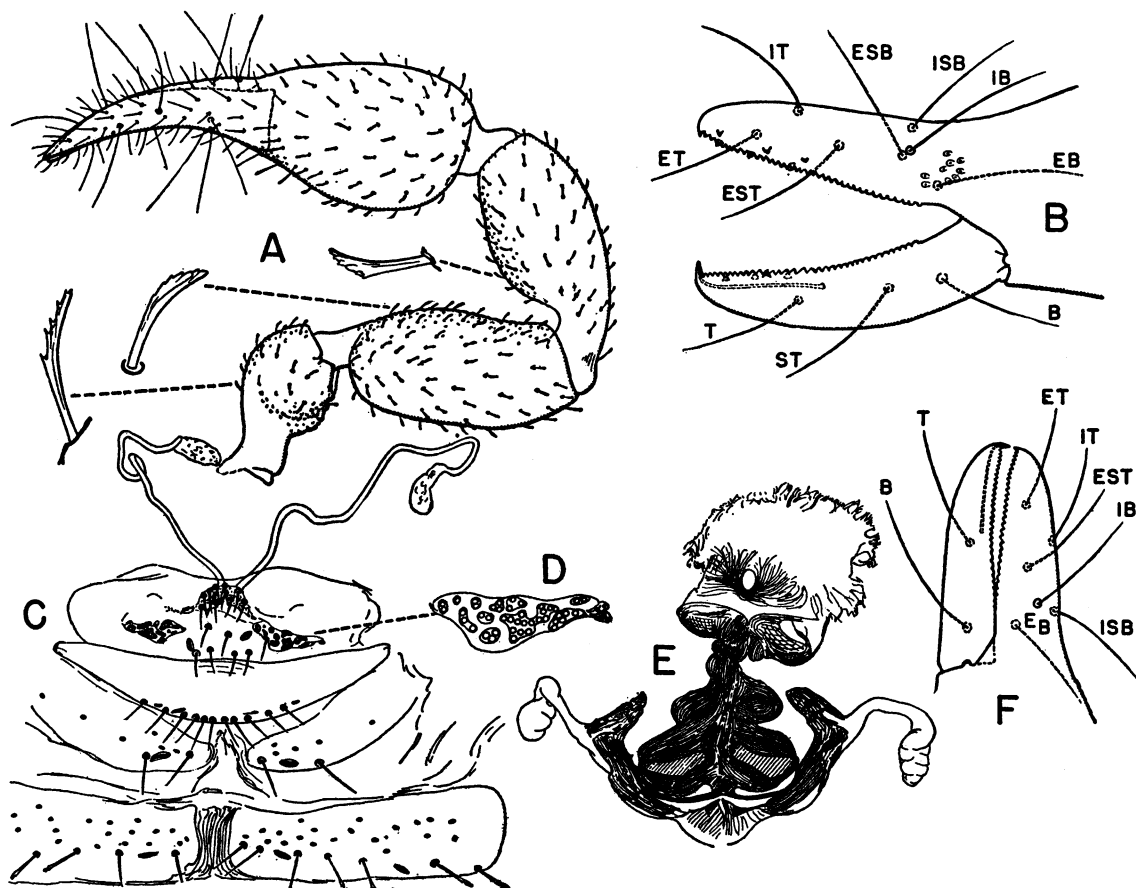


FIG. 11. *Hesperocharnes mimulus*, new species. A. Dorsal aspect of female palp; inserts show nature of vestitural setae (JC-2070.01002). B. Interior aspect of fingers of chela of tritonymph showing chaetotaxy and dentition (JC-2070.01008). C. Female genital area showing chaetotaxy, spermathecal receptacles, and cribriform plates. D. Detail of cribriform plate of female (JC-2070.01006). E. Sketch of male genital structures as seen in specimen treated with KOH (JC-2070.01003). Compare with figure 10I. F. Interior aspect of fingers of chela of deutonymph showing chaetotaxy, dentition, and venom apparatus (JC-2070.01009).

12G). Genital structures of male and chaetotaxy of genital operculum as illustrated (figs. 10H, I; 11E).

Chelicerae of usual facies (fig. 12D); flagellum four bladed (fig. 12C); setae *sb* and *b* terminally denticulate; galea slender, with about five or six terminal branches; serrula exterior with 16 to 18 (mean 17) ligulate teeth; lamina interior with dentate apical process and three dentate subapical lobes.

Palps robust and typically chernetine in both sexes, but with the hand of the chela of the male enormously swollen ventrally (figs. 10A, 11A, 12B); derm nearly smooth except for inner exterior and dorsal faces of

the trochanter; the inner faces of the femur and tibia and the inner face of the chela at the base of the fingers are weakly but distinctly granulate; vestitural setae thickened to denticuloclavate, except ventrally and on the fingers.

Palpal proportions of male (range, and mean in parentheses, of three specimens): trochanter 1.56 to 1.70 (1.66) times as long as broad; femur 2.35 to 2.48 (2.39) times as long as broad; tibia 2.33 to 2.54 (2.39) times as long as broad; chela 2.66 to 2.85 (2.76) times as long as broad, chela plus pedicel 2.90 to 3.05 (2.96) times as long as broad; chela 1.72 to 2.11 (1.89) times as long as

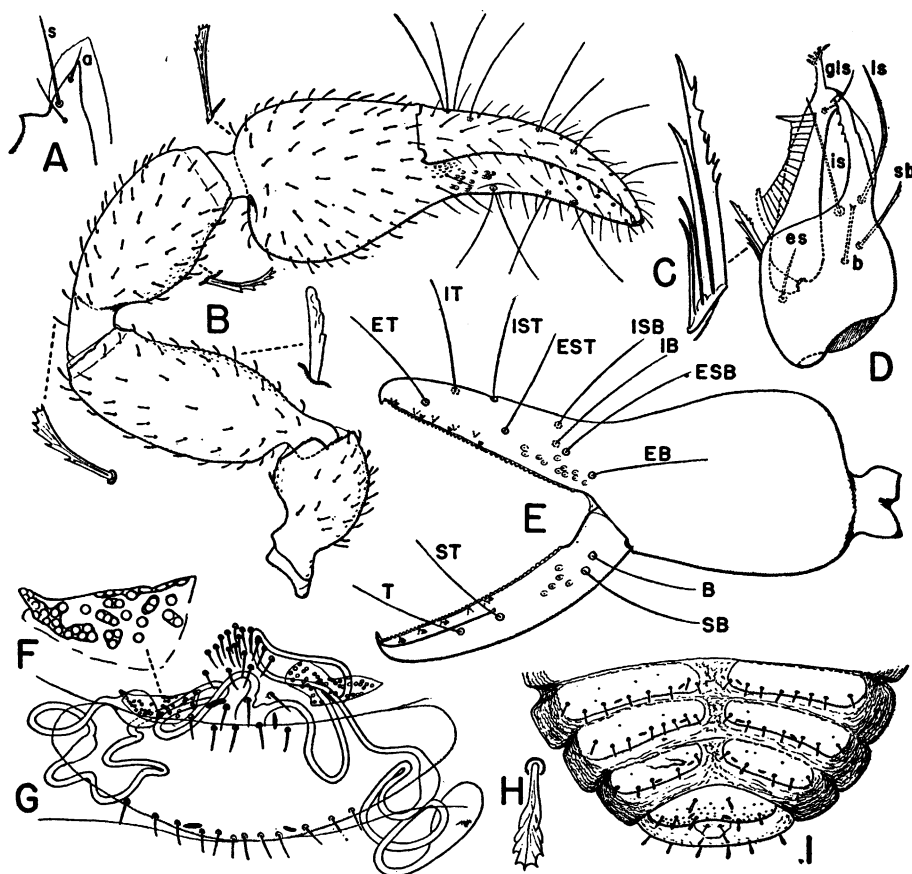


FIG. 12. *Hesperochernes mimulus*, new species, female paratype (JC-1225.02001). A. Apex of right maxilla showing apical and subapical setae (*a* and *s*, respectively). B. Ventral aspect of right palp. Inserts show character of vestitural setae. C. Flagellum. D. Interior aspect of right chelicera (lamina interior omitted). Setae are exterior and hence dotted. E. Exterior aspect of left chela. F. Cribriform "plate" or area. G. Female genital area showing opercular chaetotaxy, seminal receptacle, and cribriform areas. This may be an abnormal specimen. Compare with figure 11C. H. Vestitural seta from carapace. I. Ventral aspect of tip of abdomen (segments 8 to 12) showing reduction of eleventh segment and the chaetotaxy. Pleural membranes somewhat diagrammatic.

deep; hand .87 to .95 (.89) times as long as deep; depth of hand 1.35 to 1.55 (1.46) times the breadth; fingers 1.12 to 1.38 (1.26) times as long as the hand. Palpal proportions of female (range and mean of five specimens): trochanter 1.65 to 1.85 (1.74) times as long as broad; femur 2.20 to 2.47 (2.36) times as long as broad; tibia 2.29 to 2.48 (2.39) times as long as broad; chela 2.77 to 3.00 (2.84) times as long as broad and 2.60 to 2.66 (2.62) times as long as deep, chela plus pedicel 2.95 to 3.27 (3.07) times as long as broad;

hand 1.20 to 1.26 (1.24) times as long as deep; depth of hand 1.07 to 1.13 (1.08) times the breadth; fingers 1.15 to 1.29 (1.21) times as long as the hand.

Chela with dentition, chaetotaxy, venom apparatus and sense spots as illustrated (figs. 10E, male; 12E, female); strongly differentiated sexually, the hand of the male being greatly expanded ventrally and with the fingers distinctly gaping as compared to the non-specialized chela of the female. Dentition as shown in table 8.

TABLE 8  
DENTAL FORMULAS FOR CHELA OF *Hesperochoernes mimulus*, NEW SPECIES

MALE	
Observed Range in Three Specimens	
40-43	$\left[ \frac{(2-4) \ 3-4; 10-12; 14-16^*; 20\uparrow}{(4-7) \ 1-4; 8\uparrow; 10-11; 13-18; 19-20; 23\uparrow; 27\uparrow} \right]$
41-45	$\left[ \frac{(3-6) \ 5-6; 10-12^*; 19-20^*; 24^*}{(2-4) \ 11-12; 16-21; 23-24^*; 30\uparrow} \right]$ NR, 24-26
Mean of Three Specimens	
41.7	$\left[ \frac{(3.0) \ 3.7; 11.3; 15.2^*; 19.5\uparrow}{(5.0) \ 2.7; 8.0\uparrow; 10.7; 15.2; 19.8; 23.0\uparrow; 27.0\uparrow} \right]$
43.0	$\left[ \frac{(4.0) \ 5.7; 11.0^*; 15.0^*; 19.5^*; 24.0^*}{(3.0) \ 11.7; 18.7; 23.8^*; 30.0\uparrow} \right]$ NR, 25.0
FEMALE	
Observed Range in Five Specimens	
37-46	$\left[ \frac{(4-6) \ 3-5; 8-11^*; 12-15^*; 16-19; 22-25; 27\uparrow}{(3-6) \ 2-3; 8-11; 12-13^*; 17-18; 20-21\uparrow; 23^*} \right]$
43-47	$\left[ \frac{(3-5) \ 5-6; 9-13; 16\uparrow; 19-21^*; 25-30}{(2-4) \ 12-16; 18-20; 24-26^*; 29\uparrow} \right]$ NR, 26-30
Mean of Five Specimens	
41.8	$\left[ \frac{(5.0) \ 3.8; 9.2^*; 13.4^*; 17.6; 23.5; 27.0\uparrow}{(4.6) \ 2.2; 8.9; 12.4; 17.4; 20.5\uparrow; 23.0^*} \right]$
45.4	$\left[ \frac{(4.0) \ 5.5; 11.8; 16.0\uparrow; 19.8^*; 27.2}{(3.0) \ 13.2; 19.0; 24.9^*; 29.0\uparrow} \right]$ NR, 27.4

Sense spots are fairly numerous on the base of the fingers of the chela in both sexes. There are no clear-cut sexual differences. Observed distribution and numbers about as follows: Fixed finger in both sexes with a loose cluster of 13 to 22 (mean about 18) sense spots distributed in an irregular zone bounded by the dental margin of the finger and the tactile setae EST, ESB, and EB; interiorly (both sexes) with a loose cluster of 13 to 20 (mean about 17) sense spots caudad of setae IB and ISB, while in addition two or three spots sometimes occur adjacent to seta IST. Movable finger of female exteriorly with three to six (mean three or four) sense spots located in an irregular zone between seta SB and a point about halfway between setae SB and ST, male with none to two spots adjacent to seta SB. Sense spots are lacking from the interior face of the movable finger in either sex.

Legs of usual chernetine facies, moderately robust; vestitural setae denticuloclavate dorsally and laterally, acuminate ventrally.

Fourth tarsus (fig. 10G) lacking tactile or pseudotactile setae; subbasal sense dome present. Pedal proportions as follows (observed extremes and means for three males and five females): Leg I: Male, "miofemur" 2.98 to 3.12 (3.04) times as long as deep; tibia 3.79 to 3.92 (3.84) times as long as deep; tarsus 5.20 to 5.71 (5.45) times as long as deep. Female, "miofemur" 2.91 to 3.21 (3.07) times as long as deep; tibia 3.75 to 4.42 (4.05) times as long as deep; tarsus 5.30 to 5.98 (5.55) times as long as deep. Leg IV: Male, "miofemur" 3.63 to 3.98 (3.75) times as deep; tibia 5.02 to 5.12 (5.09) times as long as deep; tarsus 5.51 to 5.84 (5.75) times as long as deep; sense dome .21 to .31 (.26) of dorsal length of tarsus from its base. Female, "miofemur" 3.90 to 4.18 (4.08) times as long as deep; tibia 5.06 to 5.50 (5.26) times as long as deep; tarsus 5.89 to 6.20 (6.01) times as long as deep, tarsal sense dome .20 to .25 (.22) of dorsal tarsal length from its base.

MEASUREMENTS (MM.): Male (observed ex-

tremes, and mean in parentheses, for three specimens, JC-2070.01001, 3, and 4). Total length 2.12 to 2.21 (2.18); abdominal breadth 1.07 to 1.44 (1.22). Carapace: .66 to .79 (.73) long; ocular spot breadth .30 to .34 (.31); posterior breadth .61 to .67 (.65); ocular disk .39 to .47 (.44) long; median disk .16 to .18 (.17) long; posterior disk .11 to .14 (.12) long. Palps: trochanter .344 to .435 (.399) by .220 to .253  $\pm$  (.240); femur .528 to .656 (.598) by .213 to .279 (.250); tibia .541 to .672 (.619) by .213 to .287 (.259); chela .935 to 1.112 (1.016) by .328 to .399  $\pm$  (.368  $\pm$ ) broad and .443 to .590 (.538) deep, chela plus pedicel 1.000 to 1.178 (1.090) long; hand .423 to .513 (.481) long; fingers .582 to .667 (.606) long; total length of palp, 2.414 to 2.941 (2.706). Leg I: "miofemur" .377 to .459 (.420) by .123 to .154 (.138); tibia .312 to .387 (.353) by .082 to .102 (.092); tarsus .317 to .394 (.354) by 0.61 to .069 (.065); total length of leg I, 1.005 to 1.240 (1.127). Leg IV: "miofemur" .541 to .656 (.612) by .149 to .180 (.163); tibia .487 to .604 (.550) by .097 to .118 (.108); tarsus .385 to .467 (.431) by .066 to .080 (.075); dorsal length of tarsus .312 to .377 (.336); sense dome of tarsus .066 to .103 (.089) from base of segment; total length of leg IV 1.414 to 1.727 (1.593).

Female (observed extremes and mean in parentheses, for five specimens, JC-2070.-01002, 5, 6, 7, and 1225.02001). Total length 1.90 to 2.56 (2.19); abdominal breadth 1.08 to 1.44 (1.20). Carapace: .74 to .82 (.77) long; ocular spot breadth .33 to .38 (.35); posterior breadth .69 to .77 (.73); ocular disk .43 to .49 (.46) long; median disk .16 to .18 (.17) long; posterior disk .13 to .17 (.15) long. Palps: trochanter .382 to .408 (.399) by .213 to .248 (.229); femur .556 to .646 (.603) by .246 to .262 (.255); tibia .589 to .565 (.612) by .249 to .271 (.256); chela .968 to .1066 (1.002) by .331 to .380 (.353) broad and .369 to .407  $\pm$  (.383) deep, chela plus pedicel 1.046 to 1.148 (1.082) long; hand .443 to .500 (.473) long; fingers .541 to .620 (.571) long; total length of palp 2.573 to 2.859 (2.695). Leg I: "miofemur" .425 to .467 (.445) by .136 to .155 (.145); tibia .344 to .389 (.369) by .088 to .097 (.091); tarsus .350 to .377 (.361) by .063 to .067 (.065); total length of leg I 1.127 to 1.233 (1.175). Leg IV: "miofemur" .640 to .686 (.654) by .154 to .164 (.160); tibia .541 to .578 (.566) by .105 to

.110 (.108); tarsus .438 to .459 (.446) by .073 to .075 (.074); dorsal length of tarsus .354 to .377 (.364); tarsal sense dome .074 to .090 (.081) from base of segment; total length of leg IV 1.624 to 1.709 (1.666).

TRITONYMPH: Except for smaller size, the tritonymph has essentially the facies of the female. The following brief description is based on a single specimen (JC-2070.01008).

Carapace with transverse furrows; ocular spots and character of vestitural setae essentially as in the adult; chaetotaxy about 4-9 (57  $\pm$ ).

Abdomen of the same general facies as the adult; tergal and sternal divisions, pleural and interscutal membranes, and nature of vestitural setae as in the adult; segment 11 retracted within the angle formed by the recurved tenth segment. Tergal chaetotaxy (all setae including the microsetae of the twelfth segment dentate to denticuloclavate):

$$9:11:10:10:\frac{2-0}{10}:\frac{2-0}{10}:\frac{2-0}{10}:\frac{2-0}{10}:\frac{2-0}{8}:\frac{2-0}{7}:\frac{4}{6}:2m$$

Sternal chaetotaxy (segments 3-12):

$$(2)8(2):(1)5(1):11:12:10:11:10:6:\frac{2}{6}:2m$$

Sternal setae of segments 3 and 4, the median two or three setae of segments 5 and 6, and the paired microsetae of segment 12 are acuminate; all others terminally more or less spatulate to clavate and denticulate. Microlyrifissures fewer in number, but distributed as in the adult: 10 or 12 per tergite for segments 1 to 10; tergite 11 with 26 or 27 microlyrifissures along anal border; sternally the microlyrifissures number as follows (segments 3 to 11): 10:26:28:27:17:11:0:0:22.

Chelicerae essentially as in the adult; serrula exterior with 15 ligulate blades; galea with five terminal and subterminal branches; seta *sb* thickened and terminally denticulate; seta *b* acuminate (unlike the adult); flagellum four bladed as in the adult.

Palps essentially as in the adult female except for size. Proportions: trochanter 1.6 times as long as broad; femur 2.2 times as long as broad; tibia 2.0 times as long as broad; chela 2.9 (plus pedicel 3.1) times as long as broad and 2.7 times as long as deep; depth of hand 1.06 times as great as the breadth; hand 1.2 times as long as deep; fingers 1.2 times as long as the hand.

Chela with chaetotaxy as illustrated (fig. 11B), essentially as in the adult, except for the absence of setae ST and IST; dentition as follows:

$$\frac{34 \left[ \begin{array}{c} (3) \ 4; \ 10; \ 18 \\ (3) \ 3; \ 12; \ 18 \end{array} \right]}{38 \left[ \begin{array}{c} (3) \ 6; \ 11; \ 16 \\ (1) \ 13 \end{array} \right]} \text{NR, 22}$$

Sense spots apparently lacking completely from the movable finger; fixed finger exteriorly with a cluster of 11 or 12 spots in the area bordered by setae EST, ESB, EB, and the dental margin, interiorly with about eight spots caudad of setae ISB and IB plus an additional two or three median spots on the finger distad of seta ISB.

Legs essentially as in the adult. Proportions: Leg I, "miofemur" 2.7 times as long as deep; tibia 3.1 times as long as deep; tarsus 4.4 times as long as deep. Leg IV, "miofemur" 3.6 times as long as deep; tibia 4.2 times as long as deep; tarsus 4.8 times as long as deep; tarsal sense dome .2 of the dorsal length of the tarsus from its base.

TRITONYMPHAL MEASUREMENTS (MM.): Total length 1.80; abdominal breadth .90. Carapace: .62 long; "ocular spot" breadth .26; posterior breadth .56; ocular disk .34 long; median disk .15 long; posterior disk .13 long. Palps: trochanter .278 ± by .177; femur .426 by .197; tibia .426 by .212; chela .754 (plus pedicel .804) by .262 broad and .279 deep; hand .344 long; fingers .417 long; total length of palp 1.935. Leg I: "miofemur" .315 by .115; tibia .244 by .079; tarsus .279 by .064; total length of leg I .838. Leg IV: "miofemur" .476 by .133; tibia .387 by .092; tarsus .330 by .069; dorsal length of tarsus .262; sense dome .052 from the base of the tarsus; total length of leg IV 1.192.

DEUTONYMPH: Smaller than, but very similar in most essential respects to, the tritonymph. The following description is based on a single specimen (JC-2070.01009).

Carapace structurally as in the tritonymph chaetotaxy: 6-7 (28).

Abdomen structurally as in the tritonymph; tergal chaetotaxy (all setae denticuloclavate including the anal microsetae):

$$6:8:8:8:8:8:9:8: \frac{2-0}{6}: \frac{2-0}{5}: \frac{2}{6}:2m$$

Sternal chaetotaxy (segments 2 to 12):

$$(0):(1)4(1):(1)4(1):5:4:7:6:6:6: \frac{2}{4}:2m$$

All sternal setae denticulate or weakly denticuloclavate, except for those of segments 3 and 4, the median two or three setae of segments 5, 6, 7, 8, and 9, and the anal microsetae, all of which are acuminate. Microlyrifissures much fewer than in the tritonymph but distributed in essentially the same way. Tergite 11 with about 10 fissures; sternites with microlyrifissures as follows (segments 2 to 11):

$$0:4:10:15:10:9:6:0:0:11$$

Chelicerae similar to those of the tritonymph; serrula exterior with 13 or 14 ligulate blades; flagellum four bladed as in other stages; galea with three terminal and subterminal branches; *sb* thickened and terminally denticulate; seta *b* presumably acute, but lost from only available specimen.

Palps with same facies and structure as the tritonymph, but somewhat more robust and much smaller. Proportions: trochanter 1.7 times as long as broad; femur 2.2 times as long as broad; tibia 1.9 times as long as broad; chela 3.0 (plus pedicel 3.1) times as long as broad and 3.0 times as long as deep; hand 1.4 times as long as broad or deep; fingers 1.1 times as long as hand.

Chela of usual facies (fig. 11F); accessory teeth lacking, except for a single tooth situated opposite to and interior of the second marginal tooth of the fixed finger; marginal teeth number 26 on the fixed finger and 30 on the movable finger; nodus ramosus opposite the seventeenth marginal tooth of the movable finger; chaetotaxy typical of the instar, setae ST, SB, ESB, and IST lacking. Sense spots apparently completely lacking from both fingers.

Legs typical, but more robust in proportions than in later stages. Proportions: Leg I, "miofemur" 2.6 times as long as deep; tibia 2.5 times as long as deep; tarsus 3.8 times as long as deep. Leg IV, "miofemur" 3.3 times as long as deep; tibia 3.6 times as long as deep; tarsus 4.2 times as long as deep; tarsal sense dome .22 of the dorsal tarsal length from its base.

DEUTONYMPHAL MEASUREMENTS (MM.):

Total length 1.75; abdominal breadth .74. Carapace: .48 long; ocular spot breadth .23; posterior breadth .43; ocular disk .26 long; median disk .13 long; posterior disk .08 long. Palps: trochanter .202 by .121; femur .279 by .125; tibia .266 by .138; chela .531 (plus pedicel .558) by .179 broad and .179 deep; hand .256 long; fingers .287 long; total length of palp 1.304. Leg I, "miofemur" .204 by .080; tibia .155 by .061; tarsus .188 by .049; total length of leg I, .546. Leg IV: "miofemur" .320 by .096; tibia .243 by .067; tarsus .228 by .055; dorsal length of tarsus .172; sense dome of tarsus .037 from base of segment; total length of leg IV .791.

REMARKS: this form is sharply distinct from previously described members of this genus and superficially resembles species of the genus *Dinocheirus*.

#### FAMILY CHELIFERIDAE HAGEN

##### SUBFAMILY CHELIFERINAE SIMON

##### GENUS PARACHELIFER J. C. CHAMBERLIN

*Parachelifer* J. C. CHAMBERLIN, 1932, Canadian Ent., vol. 64, p. 19. BEIER, 1932, Das Tierreich, vol. 58, p. 237. CHAMBERLIN, 1934, Pan-Pacific Ent., vol. 3, no. 3, p. 128 (revised diagnosis). HOFF, 1946, Bull. Chicago Acad. Sci., vol. 7, no. 11, pp. 488-489 (in key to Cheliferinae; males only).

GENEROTYPE (ORTHOTYPE): *Chelifer scabriculus* Simon.

DIAGNOSIS (EMENDED): Cheliferine genus of typical facies; most closely related to *Chelifer*, from which it differs in the chaetotaxy of the chelicera (seta *sb* present, absent in *Chelifer*), in the chaetotaxy of the chela (seta IT median between setae ET and EST rather than twice or more as far from EST as from ET), and in the character of the male foretarsus, which has a well-developed terminal spine (absent in *Chelifer*).

Carapace of usual facies, about as broad posteriorly as long, median and posterior furrows prominent, delimiting well-defined ocular, median, and posterior disks; with one pair of true eyes, which are well developed and situated about their own diameter from the anterior carapacial margin; all sclerotic parts granular, but with scattered, larger, setiferous tubercles, which show specific variation in degree of development and

abundance; vestitural setae sparse, short, dentate, and strongly thickened to somewhat spatulate or clavate.

Abdomen short, broadly oval and much flattened; pleural membrane with closely parallel, wavy striations or plications; anus more or less subventral. Tergites sclerotic, rugose, squamosely tessellate, those of segments 3 to 10, at least, longitudinally divided into rectangular scuta by a linear stripe; tergites 1 and 2 generally weakly impressed or divided; tergite 11 partially divided and completely separated by membranous area from the partially divided eleventh sternite; with lateral crests well developed on the median and anterior tergites of the male. Anal opercula membranous, but each with a pair of microsetae, of which the sternal pair is much closer together than is the tergal pair; sternites 10 and 11 strongly sclerotic; 4 to 9 rather weakly sclerotic, all smooth but squamosely tessellate and divided as in the tergites. Tergal setae short, thickened to weakly clavate, and terminally denticulate; sternal setae short, acuminate. Tergites biseriately medially and caudally, at least, the discal series comprising four to six setae; sternites uniseriate, except for usual lateral discal seta. Tergite and sternite 11, each with a broad, moderately dense, posterior zone of microlyrifissures. Sternite 10 with a pair of short, sublateral, discal tactile setae; sternite 11 with a similar pair of submedian, marginal, tactile setae; terminal tergites completely lacking tactile setae.

Coxal area broadly triangular, broadest across the fourth coxae; markedly differentiated sexually. Fourth coxae of the male narrowed, strongly recurved, with strongly developed anterolateral spurs and with normally developed coxal sacs, which lack a differentiated atrium (fig. 14D).

Genital structures of both male and female of typical facies (fig. 14E, A, respectively); median cribriform plates of female paired, small, hemispherical, much smaller in diameter than the mean diameter of the anterior tracheal trunks (fig. 14B).

Chelicerae typical (fig. 14I); flagellum three bladed, the anterior blade with an anterior median series of five to eight slender denticles; with the normal complement of setae, *sb* and *b* both being present; seta *sb*

and *b* much shorter than *es*; setae *sb* and *b* both minutely denticulate; galea normally developed.

Palps of usual cheliferine facies, slender to moderately robust, more or less evenly granulate, particularly on the proximal segments; larger setiferous tubercles (fig. 13C) occur to some extent, particularly on the inner margins of the femur and tibia; vestitural setae, short, thickened, and terminally and subterminally denticulate.

Chela with chaetotaxal pattern as illustrated (fig. 13A); ET subterminal; EST and IST submedian and closely adjacent; IT about median between ET and EST, little if any closer to ET than to EST; EB, ESB, IB, and ISB basal in position; T about one-third of the finger length from its tip and nearly opposite the nodus ramosus of the movable finger; SB and B basal in position as is usual; ST submedian between T and SB, but tending to be slightly closer to T than to SB; the nodus ramosus of the fixed finger slightly caudad of seta IT; movable finger ventrally with two pseudotactile setae—one subapical and the other submedian (about opposite and ventrad of seta T). Marginal teeth of chela numerous, contiguous, and subequally developed on both fingers; sense spots few in number, those that occur being basal on the fingers.

Legs of usual cheliferine facies; tarsal claws bifid (fig. 14F, G); subterminal setae dentate (fig. 14F, J). Fore tarsus of male more or less swollen and terminated by a pronounced apical, subconical process or spine (fig. 14H, J); tarsal claws asymmetrical, the exterior one dorsally toothed. Fourth tarsus with a slender tactile seta immediately caudad of the apical setae (.90 to .93 of the dorsal tarsal length from its base).

REMARKS: Most species of *Parachelifer* are subcortical in habit, although some, such as *P. hubbardi* (Banks), are found in decaying cacti and in similar situations. Species of *Parachelifer* are typical inhabitants of both coniferous and deciduous forests, especially in the western United States. The known range of the genus extends from Canada to Mexico and from the Atlantic Ocean to the Pacific Ocean in North America. The preceding diagnosis is based primarily on the orthotype.

### *Parachelifer scabriculus* (Simon)

Figures 13 and 14

*Chelifer scabriculus* E. SIMON, 1878, Ann. Soc. Ent. France, ser. 5, vol. 8, p. 154. TULLGREN, 1907, Mitt. Mus. Hamburg, vol. 24, p. 29, pl. 1, fig. 2 (palp) (Mexico) (determination doubtful). ELLINGSEN, 1910, Mitt. Mus. Berlin, vol. 4, p. 386 (Mexico) (determination doubtful). CHAMBERLIN, 1931, Stanford Univ. Publ., univ. ser. biol. sci., vol. 7, no. 1, p. 149, fig. 40W (trifid subterminal tarsal seta); p. 160, fig. 42T, U, V (pretarsus of female, fore tarsus of male, and pretarsus of foreleg of male).

*Chelifer degeneratus* BALZAN, 1891, Ann. Soc. Ent. France, vol. 60, p. 532, pl. 11, fig. 24 (dorsal aspect of palp) (recorded from southern California).

*Chelifer scabrisculus* BANKS, 1895, Jour. New York Ent. Soc., vol. 3, p. 4; 1911, Pomona College Jour. Ent., vol. 3, no. 4, p. 637 (California and neighboring states).

*Parachelifer scabriculus* (Simon), CHAMBERLIN, 1932, Canadian Ent., vol. 64, p. 19. BEIER, 1932, Das Tierreich, vol. 58, p. 238, fig. 247 (palp).

MATERIAL: California, Frances Simes Hastings Natural History Reservation, female (JC-1223.01001) and tritonymph (JC-1223.02001), collected April 11, 1940, and January 18, 1939, respectively. Habitat not stated.

The present redescription is also based on the following California material: Stanford University, under eucalyptus bark collected January 21, 1922, by author (male and female, JC-1101.01001 and 2); Stanford University, under bark of dead pine, collected March 21, 1925, by F. Spruyt (two males and one female, JC-536.01001 to 3); same locality under bark of apple trees, collected February 17, 1920, by J. C. Chamberlin (five males and three females, JC-462.01005 to 12); Palo Alto, collected June 3, 1922, by R. D. Hartman (male, female, JC-1789.01001 and 2); Palo Alto, from oak logs in beetle emergence cage, collected April 24, 1922, by H. E. Burke (female, JC-1452.01001); Riverside (Box Springs Grade) under bark of sycamore, collected November 26, 1925, by author (male and female, JC-546.02001 and 2); Riverside, "under bark" collected 1924 or 1925 by author (female and male, JC-277.01002 and 3). Lot 462 deposited in American Museum of Natural History.

DIAGNOSIS (EMENDED): Carapace of usual

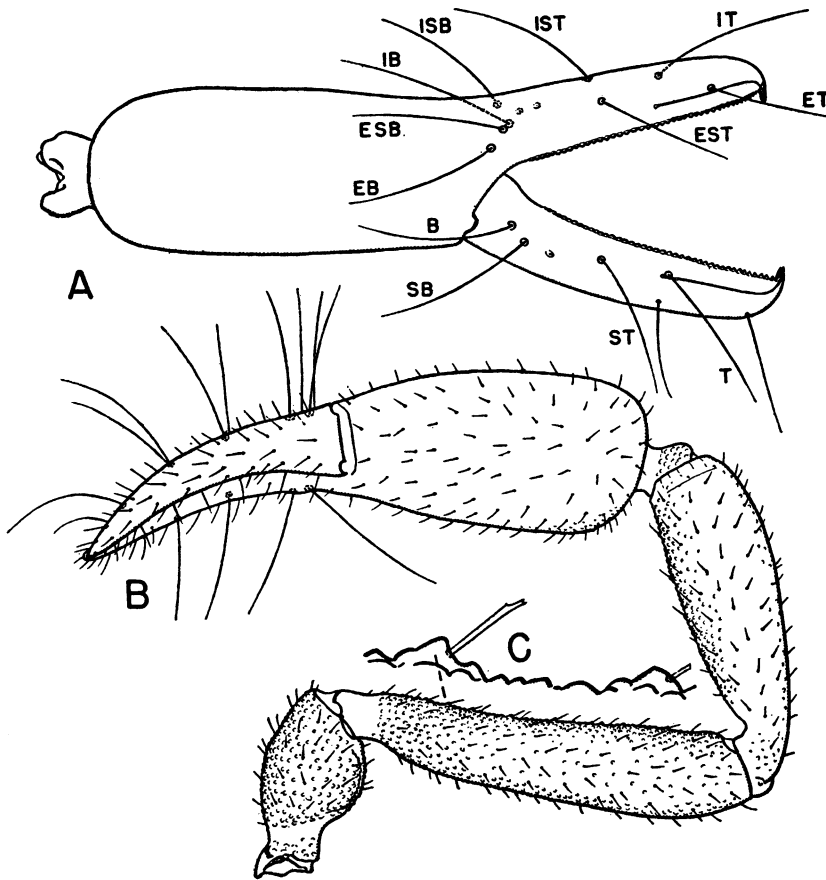


FIG. 13. *Parachelifer scabriculus* (Simon). A. Exterior lateral aspect of right chela of male (JC-536.01001). B. Ventral aspect of left palp of male (JC-536.01001). C. Detail of inner femoral "margin" showing the larger setiferous tubercles.

shape, eyes and transverse furrows normally developed; greatest length slightly less, on the average, than the posterior breadth; posterior disk tergiform, medially longitudinally impressed, and, in the male, with well-developed lateral crests. All setae borne on larger setiferous tubercles, which are moderately to conspicuously developed, especially laterally. Exact chaetotaxy not ascertained but approximately 4-12 to 14 ( $110-120 \pm$ ).

Abdomen of usual facies; tergites 2 to 10 and sternites 4 to 10 completely divided by a linear membranous stripe; tergite 1 longitudinally impressed but scarcely divided; tergite and sternite 11 partially divided anteriorly. Tergal crests of male prominently developed on segments 1 to 7, moderately

evident on segment 8, absent on segments 9 and 10.

Tergal chaetotaxy biseriate, at least caudally, and most conspicuously so in the female. The discal setae show sexual variation, while the marginal series number about the same in either sex. Discal tergal setae (including the usual lateral discal pair) of male numbering two to four on segments 1 to 4; four to six on segments 5 and 6, and six on segments 7 to 11. In the female the discal setae number three or four on segments 1 and 2; four to six on segment 3; and six (occasionally seven) on segments 4 to 11. The marginal setae (both sexes) number nine to 14 on segment 1; 12 to 17 on segments 2 to 8, and nine to 15 on segments 9 to 11.

Sternites uniseriate in both sexes, except

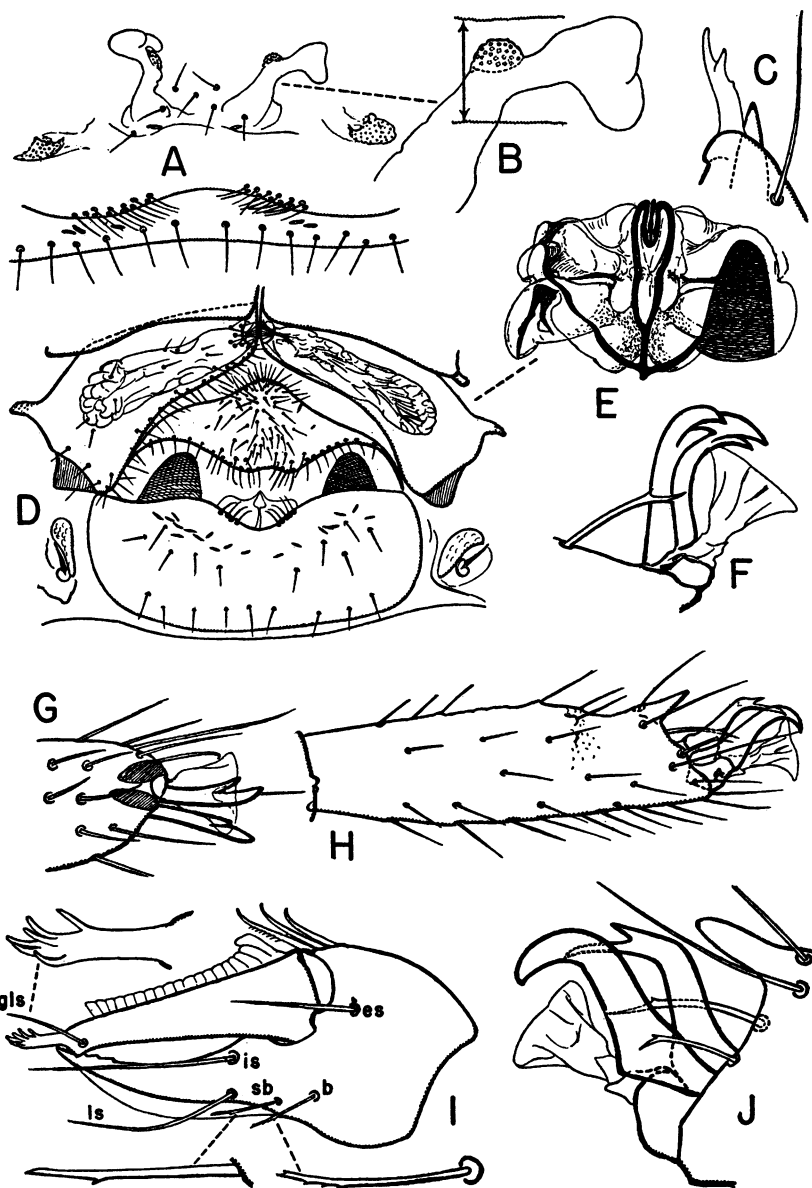


FIG. 14. *Parachelifer scabriculus* (Simon). A. Genital area of female showing opercular chaetotaxy superimposed on cribriform plates and spermathecae (JC-546.02002). B. Detail of left spermatheca of female showing cribriform plate in comparison with caliber of anterior tracheal trunk (indicated by arrow). C. Tip of male chelicera showing galea (specimen not recorded). D. Genital area of male showing chaetotaxy, sexually modified fourth coxae (note anterolateral spurs), and coxal sacs. Setae omitted from left coxa (JC-1789.01001). E. Sketch of male genitalia from ventral aspect (same scale as D). Genital sac (ramshorn organ) omitted from right side in order to show overlying structures (JC-1789.01001). F. Subterminal lateral aspect of pretarsus of leg II showing cleft tarsal claws and dentate subterminal seta (female, JC-536.01003). G. Pretarsus of left second leg showing cleft tarsal claws from ventral aspect (male, JC-277.01003). H. Anterior lateral aspect of male fore tarsus (JC-536.01001). I. Subventral aspect of right female chelicera (JC-546.02002). Note denticulations on setae *sb* and *b* and the six-branched galea (inserts). J. Anterior aspect of pretarsal portion of right fore tarsus of male (JC-546.02001). Note terminal spine and the asymmetrically developed claws and subterminal setae.

for the usual pair of lateral discal setae which occur on segments 5 to 11 in the female and on segments 6 to 11 in the male (occasionally the male also has lateral discal setae developed on segment 5). Marginal setae (both sexes) numbering 16 to 20 on sternites 5 to 8, 12 to 18 on sternite 9, 11 to 15 on sternite 10, and six to eight on sternite 11. Abdominal tactile setae as described for the genus.

Sexual structures and chaetotaxy of genital opercula of male typical, as sketched (figs. 14D, E); ramshorn organs and coxal sacs normally developed; fourth coxae with strongly developed anterolateral spurs. Female genital area and chaetotaxy of opercula as illustrated (fig. 14A, B); median cribiform plates much smaller in diameter than the diameter of the anterior tracheal trunks (fig. 14B). Mean diameter of median cribiform plate .0255 mm.; of anterior tracheal trunk .0475 mm.

Chelicera as illustrated (fig. 14I); serrula exterior with 17 to 20 ligulate blades; anterior blade of flagellum with six to eight submedian, anterior teeth, other blades nondentate; fixed finger with three large retrorse submedian teeth and three small, nearly apical microdenticles. Female galea short, with six short but distinct apical and subapical branches (fig. 14I, insert); male galea reduced, with two or three vestigial or abortive terminal and subterminal branches (fig. 14C).

Palps moderately robust, all segments evenly granular, except for the chela and under surface of the tibia which are smooth; palpal form as illustrated (fig. 13B); femur and tibia with a few larger setiferous tubercles on inner face (fig. 13C); palps moderately differentiated sexually, being more robust in the female than in the male.

Palpal proportions (observed extremes, and means in parentheses, of six specimens of each sex): Male: trochanter 1.84 to 2.00 (1.90) times as long as broad; femur 4.36 to 4.86 (4.56) times as long as broad; tibia 3.06 to 3.31 (3.20) times as long as broad; chela 3.32 to 3.61 (3.50) times as long as broad, chela plus pedicel 3.54 to 3.84 (3.73) times as long as broad; hand 1.80 to 2.02 (1.94) times as long as broad and 1.07 to 1.21 (1.15) times as long as the fingers.

Female: trochanter 1.71 to 2.01 (1.87) times as long as broad; femur 3.90 to 4.35 (4.17) times as long as broad; tibia 2.58 to 3.10 (2.92) times as long as broad; chela 3.16 to 3.30 (3.23) times as long as broad, chela plus pedicel 3.37 to 3.50 (3.44) times as long as broad; hand 1.74 to 1.94 (1.85) times as long as broad and 1.15 to 1.32 (1.22) times as long as the fingers.

Chela with chaetotaxy, dentition, and sense spots as illustrated (fig. 13A); marginal teeth number 37 to 42 on the fixed finger and 40 to 47 on the movable finger; sense spots few in number, comprising one exteriorly near base of movable finger, and two or three interiorly at base of fixed finger; movable finger with two ventral accessory or pseudo-tactile setae as illustrated.

Legs of usual cheliferine facies; pedal claws in both sexes bifid (fig. 14 F, G), except for one of the specialized claws of the male fore tarsus (fig. 14J); subterminal setae of both sexes bifid or obscurely trifid (fig. 14F, J). Male fore tarsus medially swollen, with a well-developed terminal spine; anterior claw larger than posterior claw and of nearly normal structure; posterior claw slender and with a conspicuous dorsal tooth (fig. 14H, J); inner or anterior subterminal seta reduced, conspicuously smaller than outer or posterior subterminal seta (fig. 14J).

Pedal proportions (observed range and mean of six examples of each sex). Leg I: Male, "miofemur" 2.94 to 3.26 (3.11) times as long as deep; tibia 3.24 to 3.65 (3.46) times as long as deep; miotarsus 3.40 to 3.98 (3.71) times as long as deep. Female, "miofemur" 2.99 to 3.19 (3.10) times as long as deep; tibia 3.52 to 3.91 (3.72) times as long as deep; miotarsus 4.60 to 5.03 (4.82) times as long as deep. Leg IV. Male, "miofemur" 3.02 to 3.27 (3.10) times as long as deep; tibia 4.24 to 4.65 (4.40) times as long as deep; miotarsus 4.63 to 5.40 (4.99) times as long as deep. Female, "miofemur" 2.99 to 3.40 (3.11) times as long as deep; tibia 3.99 to 4.56 (4.30) times as long as deep; miotarsus 4.62 to 4.97 (4.79) times as long as deep.

MEASUREMENTS (MM.): Male (observed extremes, and means in parentheses, of specimens JC-277.01003, 1101.01001, 536.01001 and 2, 1789.01001, and 546.02001). Total length 2.46 to 2.94 (2.76); abdominal breadth

1.10 to 1.38 (1.27). Carapace: .836 to .935 (.897) long; .443 to .508 (.467) broad across eyes and .902 to 1.017 (.967) broad posteriorly; mean ocular diameter .073; cucullus .098 long; ocular disk .402 to .467 (.443) long; median disk .279 to .328 (.304) long; posterior disk .139 to .164 (.148) long. Palps: trochanter .435 to .525 (.497) by .231 to .279 (.261); femur .886 to 1.082 (1.012) by .203 to .235 (.222); tibia .758 to .928 (.862) by .248 to .284 (.269); chela 1.240 to 1.569 (1.429) by .354 to .459 (.409) broad and .343 to .431 (.382) deep, chela plus pedicel 1.328 to 1.660 (1.525) long; hand .689 to .869 (.793) long; fingers .590 to .772 (.694) long; total length of palp 3.406 to 4.195 (3.895). Leg I: "miofemur" .541 to .607 (.573) by .166 to .197 (.184); tibia .410 to .453 (.434) by .114 to .136 (.126); tarsus .374 to .394 (.390) by .099 to .110 (.105); total length of leg I 1.345 to 1.453 (1.396). Leg IV: "miofemur" .707 to .853 (.798) by .216 to .279 (.255); tibia .541 to .631 (.598) by .121 to .145 (.136); tarsus .435 to .479 (.461) by .085 to .099 (.093); dorsal length of tarsus .358 to .382 (.367); tactile seta .328 to .351 (.338) from base of tarsus; total length of leg IV 1.707 to 1.963 (1.848).

Female (observed extremes, and means in parentheses, of six specimens): Total length 2.67 to 4.02 (3.30); abdominal breadth 1.35 to 1.80 (1.56). Carapace: .935 to 1.050 (.908) long; ocular breadth .476 to .525 (.502); posterior breadth .951 to 1.033 (.994); mean

ocular diameter .086; cucullus .098 long; ocular disk .459 to .525 (.481) long; median disk .312 to .361 (.338) long; posterior disk .148 to .164 (.161) long. Palp: trochanter .502 to .563 (.528) by .253 to .303 (.283); femur .995 to 1.139 (1.057) by .231 to .264 (.253); tibia .864 to .984 (.913) by .279 to .330 (.310); chela 1.432 to 1.630 (1.525) by .440 to .500 (.472) broad and .417 to .433 (.427) deep, chela plus pedicel 1.530 to 1.730 (1.623) long; hand .804 to .951 (.872) long; fingers .659 to .787 (.716); total palpal length 3.892 to 4.416 (4.122). Leg I: "miofemur" .558 to .626 (.592) by .175 to .204 (.191); tibia .410 to .476 (.441) by .109 to .131 (.119); tarsus .420 to .443 (.429) by .085 to .092 (.089); total length of leg I 1.391 to 1.545 (1.462). Leg IV: "miofemur" .820 to .943 (.880) by .246 to .315 (.284); tibia .608 to .689 (.647) by .136 to .169 (.151); tarsus .476 to .525 (.498) by .099 to .107 (.104); dorsal length of tarsus .377 to .415 (.394); tactile seta .346 to .387 (.364) from base of the tarsus; total length of leg IV 4.62 to 4.97 (4.79).

REMARKS: Balzan's species *Chelififer degeneratus*, described in 1891 (*loc. cit.*) from southern California ("Sud-Californie"), was synonymized with *P. scabriculus* by Tullgren in 1907 (p. 29). This synonymy was accepted by Beier in 1932, probably on Tullgren's testimony. It is probably correct, although the question should not be considered closed, pending a restudy of Balzan's type material.

TABLE 9  
SUMMARY OF PALPAL MEASUREMENTS (IN MILLIMETERS) OF *Parachelififer scabriculus* (SIMON)  
AS GIVEN BY VARIOUS AUTHORITIES

Authority	Femur		Tibia		Hand		Finger Length
	Length	Breadth	Length	Breadth	Length	Breadth	
Balzan, 1891 (sex ?)	1.25	.265	1.00	.325	1.15 <sup>a</sup>	.500	.70
Tullgren, 1907 (female ?)	1.58	—	1.30	—	1.19 <sup>a</sup>	—	1.10
Beier, 1932 (sex ?)	1.12	.25	.97	.33	1.07 <sup>a</sup>	.530	.77
Chamberlin (largest male)	1.08	.24	.93	.28	.87 <sup>b</sup>	.459	.77
(smallest male)	.89	.20	.76	.25	.69	.354	.59
Chamberlin (largest female)	1.14	.26	.98	.33	.95 <sup>c</sup>	.500	.79
(smallest female)	1.00	.23	.86	.28	.80	.440	.66

<sup>a</sup> These measurements apparently include the pedicel.

<sup>b</sup> Including the pedicel, .97 ±.

<sup>c</sup> Including the pedicel, 1.05 ±.

In my opinion there is a serious question as to whether the Mexican material, on which Tullgren based a partial redescription, is actually *scabriculus* or not. Tullgren's measurements do not agree at all well with the ones presented here, or with those published by Balzan or Beier. Beier's redescription of 1932 apparently agrees substantially with mine. Ellingsen's Mexican record of 1910 is also, in my opinion, open to suspicion, and the material on which it is based requires restudy. Bank's records, insofar as they pertain to California, at least, are probably correct, but the others should be regarded with some skepticism.

For convenience of reference the palpal measurements for this species, as cited by different authors, are summarized in table 9. As will be noted, only Tullgren's measurements deviate significantly from the largest measurements secured in the present study. Some of the variation is no doubt due to somewhat different methods of measurement. Simon published no measurements in his original description, and hence measurements of the type cannot be included.

#### GENUS *HAPLOCHELIFER* J. C. CHAMBERLIN

*Haplochelifer* J. C. CHAMBERLIN, 1932, Canadian Ent., vol. 64, p. 20. BEIER, 1932, Das Tierreich, vol. 58, p. 228. ROEWER, 1932, in Bronn, Klassen und Ordnungen des Tierreichs, vol. 5, div. 4, book 6, pp. 311-312 (in key and list; no new data). HOFF, 1946, Bull. Chicago Acad. Sci., vol. 7, no. 11, pp. 488-489 (in key; male only).

GENEROTYPE (ORTHOTYPE): *Chelifer philipi* J. C. Chamberlin.

DIAGNOSIS (EMENDED): Cheliferine genus of typical facies, not closely allied to any other described genus. Peculiar in that the males normally lack the usual coxal sacs, while the females are characterized by relatively very large, ovate, median cribriform plates, the largest diameter of which is at least as great as the diameter of the anterior tracheal trunks.

Carapace of usual facies, truncately subtriangular, with the posterior breadth subequal to the length; both transverse furrows distinct and sharply differentiating well-marked ocular, median, and posterior disks; posterior disk tergiform; true eyes present and distinct; all sclerotic parts evenly granu-

lar, with the short thickened vestitural setae borne on relatively inconspicuous larger tubercles.

Abdomen relatively short, broadly oval, and much flattened; pleural membrane reticulately or irregularly longitudinally striate; anus nearly terminal. Tergites sclerotic, squamosely tessellate; longitudinally more or less completely divided by a nearly linear suture; male tergites with lateral crests only weakly developed (nearly vestigial). Anal opercula (twelfth segment) membranous, but each operculum with the usual dorsal and ventral pair of microsetae; sternites sclerotic and squamosely tessellate but smoother than tergites; tergite 11 completely distinct and separated by a linear membranous conjunctiva from sternite 11. Tergal vestitural setae short and thickened to weakly clavate, as on carapace; sternal vestitural setae short and rather bluntly acuminate, somewhat thickened posteriorly. Sternite 10 with a short, submedian, pseudotactile seta on each scutum; sternite 11 with a relatively short but typically slender tactile seta submedially on each scutum; tergite 11 with a similar, nearly marginal, submedian tactile seta on each scutum. Anterior two or three tergites irregularly uniseriate; median and posterior tergites distinctly biseriate; sternites essentially uniseriate, except for 8 to 10 which are irregularly biseriate.

Coxal area roughly triangular; sexually differentiated, the fourth coxae of the male being strongly arcuate and very slender; coxal spurs and coxal sacs absent (fig. 15A).

Genital area of male typically cheliferine in facies (pl. 20, fig. 7); ramshorn organs typically developed (pl. 20, fig. 6). Genital area of female typical, but distinguished by unusually prominent, oval, median cribriform plates of large size (fig. 15B, pl. 20, fig. 2), the maximum diameter equaling or exceeding the diameter of the anterior tracheal trunks.

Chelicerae typical; flagellum three bladed, the anterior blade with an anterior median series of denticles, the other blades untoothed; with the normal complement of setae, *sb* and *b* both present and acuminate; galea small and weakly branched in both sexes; serrula exterior normal, with about 16 to 18 ligulate blades; serrula interior with a slender, dentate, terminal spine, and

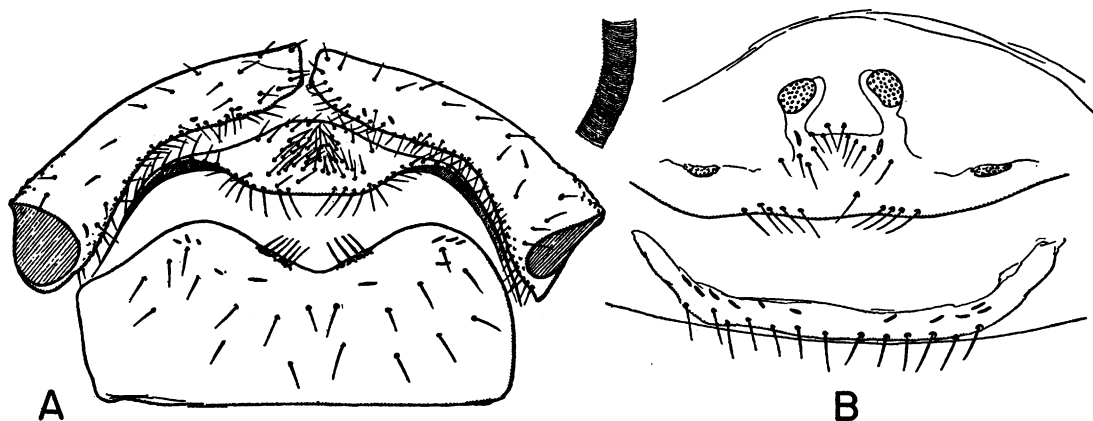


FIG. 15. *Haplochelifer philipi* (Chamberlin). A. Fourth coxae and male genital opercula showing chaetotaxy (JC-2098.01001). Coxal sacs and coxal spurs absent. Chaetotaxal formula:

$$\frac{(42)}{(40)} : (0) \frac{6-4}{19} (0)$$

B. Female genital area showing chaetotaxy, seminal receptacles, cribriform plates, and a section of the anterior tracheal trunk (JC-1785.01004). Indicated chaetotaxy:

$$\frac{(13)}{5-5} : (0) 13(0)$$

Note size of median cribriform plates relative to trachea.

three dentate subapical lobes, velum normal.

Palps slender, of typical cheliferine facies, more or less evenly granulate; larger granules few or inconspicuous; vestitural setae very short, inconspicuous but thickened and denticulate.

Chela with chaetotaxal pattern as illustrated (pl. 19, figs. 1, 2); ET subterminal, much distad of nodus ramosus and slightly distad of IT; EST and IT nearly submedian and approximately opposite; ESB, EB, ISB, and IB basally clustered on the finger; T nearly opposite the nodus ramosus of the movable finger; ST submedian between SB and B, which are rather closely, longitudinally paired, and nearly basal in position; movable finger with two subterminal, ventral pseudotactile setae, one nearly opposite seta T, the other opposite the sixth to eighth marginal teeth (not shown in pl. 19, fig. 1); marginal teeth numerous, contiguous, and well developed from tip to base of fingers; sense spots few in number, those present being basal on the fingers.

Legs of usual cheliferine facies; tarsal claws scimitar-like, simple, and untoothed; subterminal seta arcuate but non-dentate; arolium simple, shorter than claws; tarsus

IV with short, nearly terminal, tactile seta, which is .82 to .89 (.86) of the dorsal tarsal length from the base of the segment (pl. 20, fig. 3). Leg I of male (pl. 20, fig. 4) slightly specialized as is normal in the subfamily; tarsus scarcely swollen, expanding gently from base to apical setae, but lacking a subterminal spine; tarsal claws scarcely asymmetrical, the exterior one with a weakly developed, grooved dorsal tooth (pl. 20, fig. 5).

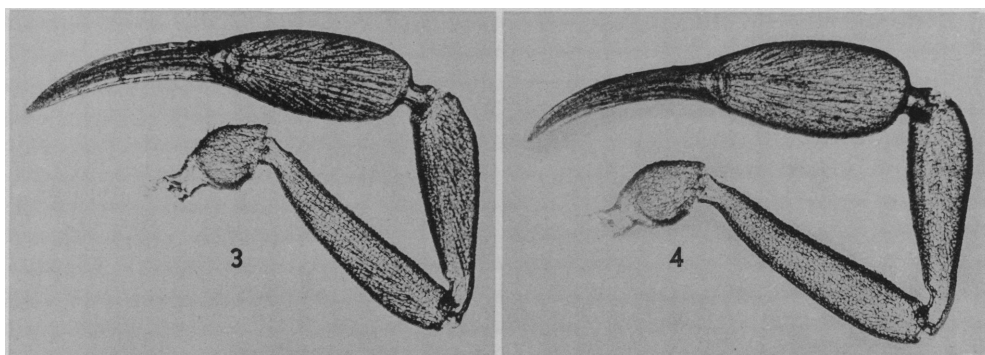
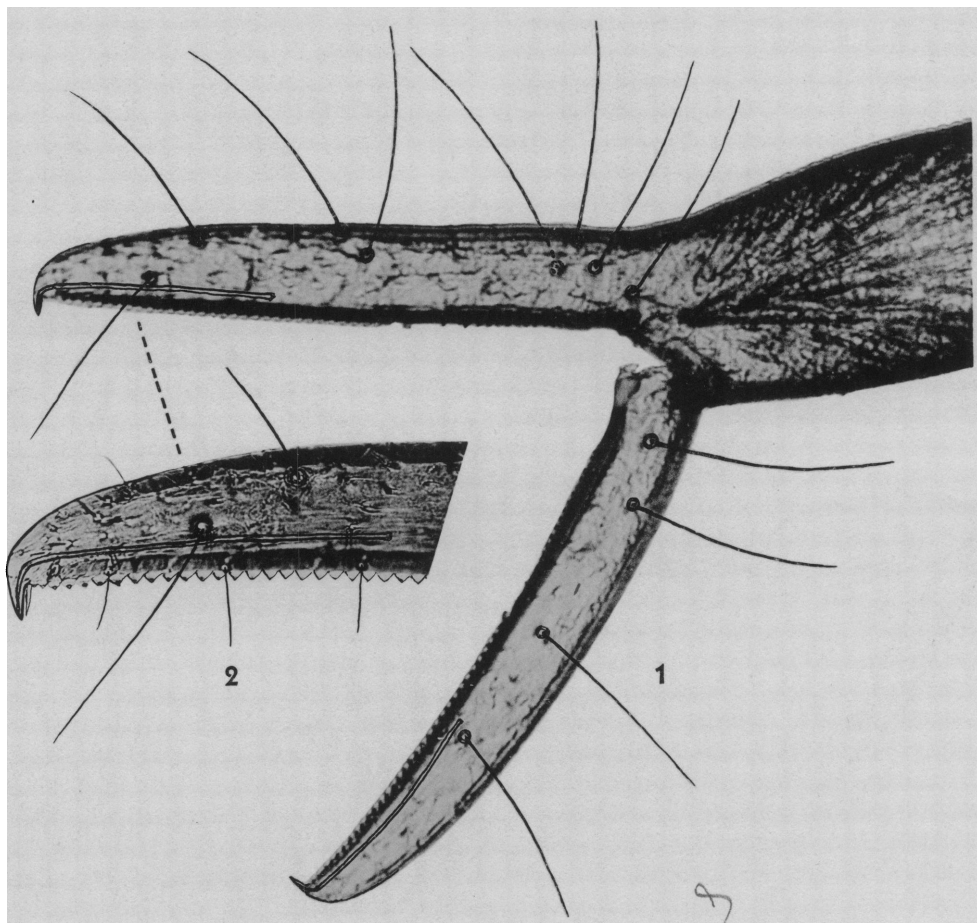
REMARKS: The range of this genus and its one included species is restricted, as far as known, to the United States west of the Rockies.

#### *Haplochelifer philipi* (J. C. Chamberlin)

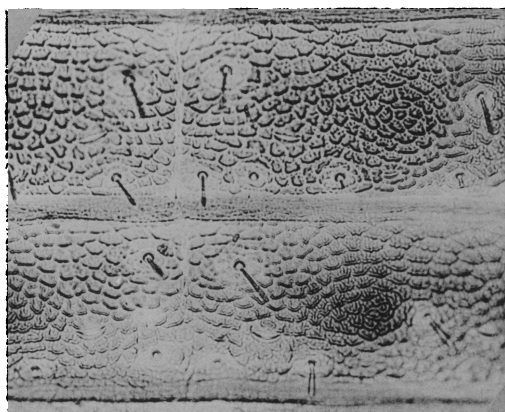
Plates 19, 20; text figure 15

*Chelifer philipi* J. C. CHAMBERLIN, 1923, Proc. California Acad. Sci., ser. 4, vol. 12, p. 374, pl. 2, fig. 8 (female palp); pl. 3, fig. 19 (fourth coxae of male); pl. 3, fig. 21 (tip of male fore tarsus); pl. 3, fig. 26 (median cribriform plates of female).

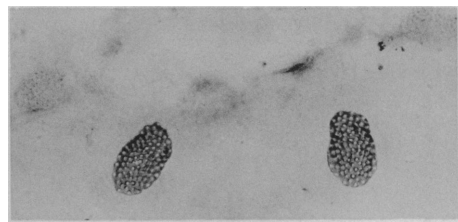
*Haplochelifer philipi* (J. C. Chamberlin), CHAMBERLIN, 1932, Canadian Ent., vol. 64, pp. 17, 18, 20. BEIER, 1932, Das Tierreich, vol. 58, p. 228. ROEWER, 1937, in Bronn, Klassen und Ordnungen des Tierreichs, vol. 5, div. 4, book 6, p. 312 (listed).



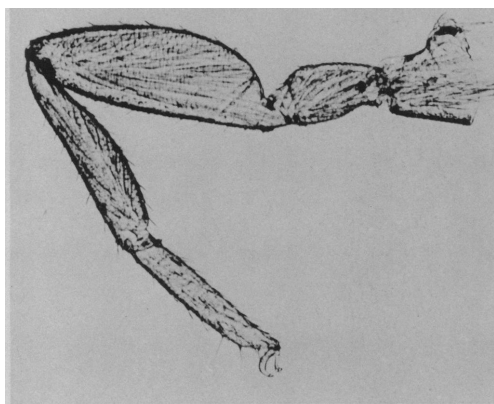
*Haplochelifer philipi* (Chamberlin). 1. Lateral aspect of male chela (JC-1885.01001).  
 2. Tip of fixed finger of chela (female, JC-1485.01002). 3. Male palp (JC-1911.01001).  
 4. Female palp (JC-1327.01001)



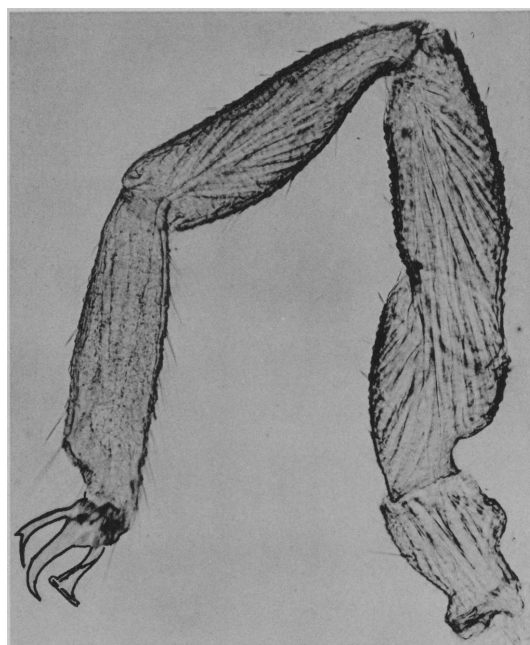
1



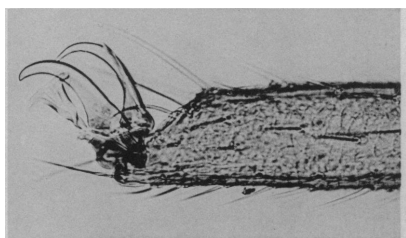
2



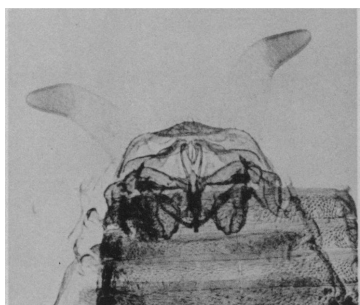
3



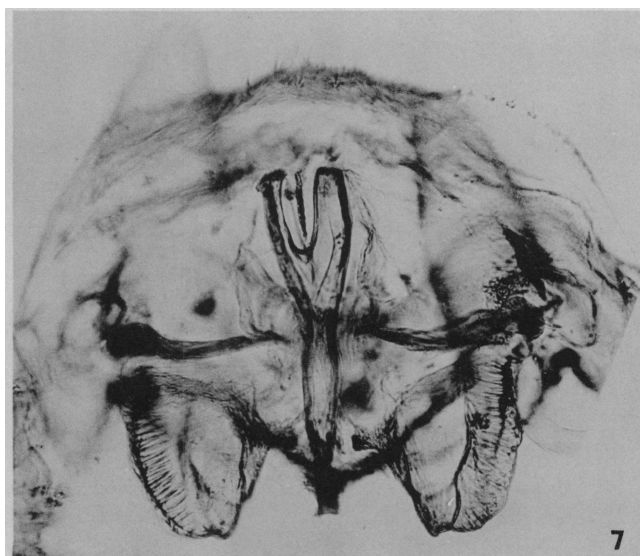
4



5



6



7

*Haplochelifer philipi* (Chamberlin). 1. Tergal skin structure (male, JC-1885.01001). 2. Female genital area showing paired cribriform plates. Less conspicuous, lateral cribriform plates also vaguely visible (JC-1327.01001). 3. Leg IV of male (JC-1911.01001). 4. Fore leg of male at larger magnification than 3 (JC-1911.01001). 5. Terminal structure of male fore tarsus (JC-1485.01001). 6. Male genital structures *in situ* (cleared) showing ramshorn organs (JC-1933.01001). 7. Male genitalia (cleared); ramshorn organs obscured as they are out of focus (JC-1315.02001)

**MATERIAL EXAMINED:** California, Frances Simes Hastings Natural History Reservation, male (JC-2088.01001) from leaves under a live oak, March 8, 1946 (J. M. Linsdale); female (JC-2096.01001), same locality, in dried oak leaves at main gate, March 23, 1946, and female (JC-1269.01001), same locality, under lava rock, April 25, 1941 (J.M. Linsdale).

In addition to the foregoing material, the following redescription is based on a restudy of the following Californian specimens: holotype and allotype (JC-654.01001 and 3), and one male (JC-654.01007) and two female paratypes (JC-1130.01001 and 653.01001), all from Stanford University, collected during 1920 and 1921 under bark of eucalyptus trees or stumps (close to ground); one male (JC-1132.01001) from under stone, Mayfield; one male and one female (JC-488.01003 and 4) from Crystal Springs Lake, San Mateo County, collected in dry leaves of manzanita, December, 1928, by Carl and Neva Duncan; one male (JC-1131.01001) from decaying oak stump, Jasper Ridge, San Mateo County, November 4-5, 1923, collector Edith Lang; one male (JC-403.01001) from Clear Lake (near Lake Port) from dry leaves of manzanita, September, 1928, collector J. C. Chamberlin; and one male and two females (JC-1785.01002 to 4) from Stanford University (R. V. Chamberlin).

**DIAGNOSIS (EMENDED):** (Both sexes unless otherwise specifically noted.) Slender cheliferine form of typical facies; carapace evenly granulate with short, thickened, semi-denticuloclavate setae borne on scattered larger granules, which are especially conspicuous laterally; tergiform posterior disk of male with vestigial lateral crests (obsolete in female); chaetotaxy about 4-8 to 11 (75 to 95).

Abdomen broadly oval; tergites and sternites longitudinally impressed or divided by a nearly linear suture into large rectangular scuta; tergites 1 and 2 scarcely divided but distinctly impressed; tergites 3 to 11 more or less distinctly divided; tergal scuta sclerotic, densely squamosely granulate (pl. 20, fig. 1); vestitural setae rather broadly denticuloclavate, except for the acuminate pair of anal microsetae, which are more widely spaced than the corresponding pair of sternal, anal, microsetae; sternal scuta squamotessellate

but less sclerotic than the tergites except caudally; vestitural setae slender and acuminate, except on caudal segments where they become thickened and only bluntly acuminate. Abdominal chaetotaxy summarized in table 10.

Tergal crests only weakly developed in the male but clearly evident on segments 1 to 6 or 7 and distinguishable on segments 7 to 8 and sometimes on segment 9; absent in the female.

Microlyrifiatures of abdomen relatively few and inconspicuous, except on eleventh tergite and sternite, each of which is characterized by an irregular zone of fissures bordering their caudal margins; numbering about 40 to 60 on the tergite and 80 to 100 on the sternite.

Structure of male genitalia typical of subfamily, as illustrated (pl. 20, figs. 6, 7; text fig. 15A); female genitalia typical, but characterized by the unusually large size of the variably shaped, but generally oval, median cribriform plates (pl. 20, fig. 2; text fig. 15B) of which the greatest diameter equals or exceeds the diameter of the anterior tracheal trunks. Greatest diameter of cribriform plates (range, and mean in parentheses, of eight specimens, including the allotype): .052 to .074 (.059) mm.; greatest diameter of corresponding anterior tracheal trunk .033 to .052 (.040) mm.

Chelicerae of typical facies; flagellum three bladed, anterior blade subdistally denticulate, serrula exterior with 16 to 19 ligulate blades; chaetotaxy normal, setae *sb* and *b* short and generally bluntly acuminate but *sb* sometimes with a couple of minute terminal teeth; galea weakly developed in both sexes, short and with two to three or four very small and weakly recurved terminal branches in the female; scarcely more than a stylet, with no more than vestigial indications of branching in the male.

Palps slender, as illustrated (pl. 19, figs. 3, 4); female palps with distinctly more robust proportions than the male but otherwise very similar; all segments dorsally and laterally evenly granulate, with setiferous tubercles scarcely larger than ordinary granules; ventral surfaces of the femur, tibia, and hand only weakly granulate to nearly smooth; vestitural setae short and inconspicuous but thickened and minutely denticulate except

TABLE 10

CHAETOTAXY OF MALE AND FEMALE SPECIMENS OF *Haplochelifer philipi*

MALE, TERGAL CHAETOTAXY	
Approximate Observed Range in Five Specimens, Including Holotype	
10 to 13:10 to 12:	$\frac{0 \text{ to } 2-0 \text{ to } 2}{9 \text{ to } 12} : \frac{2-0 \text{ to } 2}{10 \text{ to } 12} : \frac{5 \text{ to } 6}{7 \text{ to } 10} : \frac{5 \text{ to } 6}{8 \text{ to } 11} : \frac{6}{7 \text{ to } 11} : \frac{6}{8 \text{ to } 12} : \frac{6}{9 \text{ to } 12} : \frac{6 \text{ to } 7}{9 \text{ to } 10} :$
$\frac{1 \text{ or } 2 \text{ T } 2 \text{ or } 3 \text{ T } 1 \text{ or } 2}{2 \text{ or } 3} : 2m$	
Mean of Five Specimens	
11.4:11.0:	$\frac{1.2-.6}{11.4} : \frac{2.0-.4-1.4}{10.6} : \frac{5.0}{8.2} : \frac{5.8}{9.4} : \frac{6.0}{9.2} : \frac{6.0}{10.2} : \frac{6.0}{10.4} : \frac{6.2}{9.4} : \frac{1.6 \text{ T } 2.4 \text{ T } 1.4}{2.6} : 2m$
FEMALE, TERGAL CHAETOTAXY	
Approximate Range in Five Specimens, Including Allotype	
9 to 12:10 to 13:	$\frac{1 \text{ or } 2-1 \text{ or } 2}{8 \text{ to } 12} : \frac{5 \text{ to } 6}{7 \text{ to } 12} : \frac{5 \text{ to } 6}{6 \text{ to } 12} : \frac{6}{6 \text{ to } 12} : \frac{6}{7 \text{ to } 12} : \frac{6}{8 \text{ to } 13} : \frac{5 \text{ to } 6}{9 \text{ to } 11} : \frac{6}{8 \text{ to } 12} : \frac{1 \text{ T } 2 \text{ T } 1}{3 \text{ to } 4} : 2m$
Mean of Five Specimens	
10.4:	$\frac{.2-.8}{10.4} : \frac{2.0-1.8}{9.2} : \frac{5.8}{9.0} : \frac{5.8}{8.0} : \frac{6.0}{8.0} : \frac{6.0}{8.8} : \frac{5.6}{9.4} : \frac{5.8}{10.0} : \frac{6.0}{9.8} : \frac{1 \text{ T } 2 \text{ T } 1}{3.8} : 2m$
MALE, STERNAL CHAETOTAXY	
Approximate Observed Range in Five Specimens, Including Holotype, Segments 2-12 Inclusive	
$\frac{(34 \text{ to } 42 \pm)}{(30 \text{ to } 44 \pm)} : (0) \frac{3 \text{ to } 7-2 \text{ to } 5}{18 \text{ to } 22} (0) : (1) 6 \text{ to } 10(1) : 7 \text{ to } 10 : 9 \text{ to } 12 : 9 \text{ to } 11 : \frac{2-0}{7 \text{ to } 11} : \frac{2-0}{8 \text{ to } 12} :$	
$\frac{2-0}{2 \text{ to } 3 \text{ T } 2 \text{ T } 2 \text{ to } 3} : 2 \text{ or } 3 \text{ T } 3 \text{ or } 4 \text{ T } 1 \text{ to } 3 : 2m$	
Mean of Five Specimens	
$\frac{(38.2)}{(36.8)} : (0) \frac{4.2-3.4}{19.2} (0) : (1) 8.0(1) : 9.0 : 10.4 : 10.2 : \frac{2-0}{9.4} : \frac{2-0}{9.6} : \frac{2-0}{2.6 \text{ T } 2.0 \text{ T } 2.6} : 2.4 \text{ T } 3.2 \text{ T } 2.2 : 2m$	
FEMALE, STERNAL CHAETOTAXY	
Approximate Range in Five Specimens, Including Allotype, Segments 2-12 Inclusive	
$\frac{(12 \text{ to } 15)}{(4 \text{ to } 6-4 \text{ to } 6)} : (0) 11 \text{ to } 13(0) : (1) 6 \text{ to } 8(1) : 7 \text{ to } 10 : 8 \text{ to } 12 : 8 \text{ to } 10 : \frac{2-0}{6 \text{ to } 10} : \frac{2-0}{7 \text{ to } 13} :$	
$\frac{2-0}{3 \text{ or } 4 \text{ T } 2 \text{ T } 2 \text{ to } 4} : 2 \text{ to } 3 \text{ T } 2 \text{ to } 5 \text{ T } 2 \text{ to } 3 : 2m$	
Mean of Five Specimens	
$\frac{(13.2)}{(5.0-5.0)} : (0) 11.6(0) : (1) 7.0(1) : 8.2 : 9.4 : 9.2 : \frac{2-0}{8.0} : \frac{2-0}{9.2} : \frac{2-0}{3.2 \text{ T } 2.0 \text{ T } 3.2} : 2.4 \text{ T } 3.0 \text{ T } 2.4 : 2m$	

ventrally where they are acute.

Palpal proportions of male (observed extremes, and mean in parentheses, of seven specimens, including holotype): trochanter 1.88 to 2.04 (1.98) times as long as broad; femur slightly but invariably longer than tibia and 4.68 to 4.86 (4.79) times as long as broad; tibia 3.76 to 3.97 (3.89) times as

long as broad; chela 4.46 to 4.76 (4.61) times as long as broad, chela plus pedicel 4.72 to 5.04 (4.91) times as long as broad; breadth of hand slightly but consistently greater than its depth [1.03 to 1.07 (1.05) times greater]; hand 2.13 to 2.30 (2.23) times as long as broad; fingers 1.08 to 1.15 (1.12) times as long as the hand.

Palpal proportions of female (observed extremes, and means in parentheses, of eight specimens, including the allotype): trochanter 1.73 to 2.08 (1.87) times as long as broad; femur slightly but consistently longer than the tibia and 4.37 to 4.89 (4.63) times as long as broad; tibia 3.63 to 4.02 (3.83) times as long as broad; chela 4.02 to 4.53 (4.23) times as long as broad, chela plus pedicel 4.30 to 4.76 (4.48) times as long as broad; hand 1.96 to 2.23 (2.06) times as long as broad; breadth of hand slightly but consistently greater than the depth [1.03 to 1.06 (1.05) times as great]; fingers 1.06 to 1.18 (1.10) times as long as the hand.

Chela with chaetotaxy, dentition, and venom apparatus as illustrated (pl. 19, figs. 1, 2); marginal teeth well developed on both fingers from base to tip, numbering 45 to 55 (mean 51 to 52) on both the fixed and the movable fingers of both sexes; the nodus ramosus lies opposite the twentieth to twenty-sixth (mean twenty-second to twenty-third) marginal teeth on the fixed finger and opposite the twenty-second to twenty-sixth (mean twenty-third to twenty-fourth) marginal teeth of the movable finger. In addition to the usual true tactile setae, an accessory pseudotactile seta occurs ventrad and opposite seta T, and subdistally ventrad and opposite the sixth to eighth marginal teeth (not shown in pl. 19, fig. 1). Sense spots few in number, erratic in their distribution, and inconspicuous, numbering three or four exteriorly on the basal half of the fixed finger; one or two (rarely more) exteriorly on the basal half of the movable finger, and about three to six or eight interiorly between setae IST and ISB-IB on the fixed finger; none or rarely one interiorly on the movable finger.

Legs of the usual cheliferine facies; pedal claws of both sexes (except for one of the male fore claws) simple and untoothed; subterminal setae strongly curved but untoothed; fourth tarsus of both sexes with a slender, subterminal tactile seta (pl. 20, fig. 3), which is .82 to .89 (.86) of the dorsal tarsal length from the base of the segment. Fore tarsus of male slightly enlarged from base to apical setae but lacking a terminal spine (pl. 20, figs. 4, 5); fore claws asymmetrical, anterior claw nearly normal; untoothed, posterior claw more slender and with a weakly developed, somewhat grooved dorsal tooth

(pl. 20, fig. 5).

Pedal proportions: Leg I: Male (observed extremes, and means in parentheses, of six specimens), "miofemur" 3.40 to 3.55 (3.50) times as long as deep; tibia 3.42 to 3.89 (3.61) times as long as deep; tarsus 4.44 to 4.78 (4.62) times as long as deep. Female (observed extremes, and means in parentheses, of six specimens), "miofemur" 3.38 to 3.67 (3.48) times as long as deep; tibia 3.91 to 4.31 (4.14) times as long as deep; tarsus 6.11 to 6.51 (6.27) times as long as deep. Leg IV: Male (observed extremes, and means in parentheses, of six specimens), "miofemur" 3.20 to 3.31 (3.25) times as long as deep; tibia 4.99 to 5.34 (5.15) times as long as deep; tarsus 5.06 to 6.29 (5.87) times as long as deep; tarsal tactile seta .84 to .89 (.86) of dorsal tarsal length from the base of the segment. Female (observed extremes, and means in parentheses, of six specimens), "miofemur" 3.31 to 3.57 (3.44) times as long as deep; tibia 4.84 to 5.45 (5.17) times as long as deep; tarsus 5.39 to 5.88 (5.78) times as long as deep; tarsal tactile seta .82 to .88 (.86) of dorsal tarsal length from the base of the segment.

MEASUREMENTS (MM.): Males (observed range, and means in parentheses, of seven central California specimens, including the holotype unless otherwise indicated): Total length 1.97 to 2.30 (2.15); abdominal breadth .87 to 1.07 (.99). Carapace: length .69 to .76 (.73); ocular breadth .34 to .39 (.37); posterior breadth .69 to .77 (.72); cucullus .07 to .08 (.074) long; ocular diameter .07 to .08 (.071); ocular disk .34 to .39 (.37) long; median disk .22 to .26 (.25) long; posterior disk .11 to .12 (.11) long. Palps: trochanter .366 to .410 (.390) by .180 to .216 (.197); femur .731 to .853 (.810) by .154 to .177 (.169); tibia .705 to .804 (.763) by .180 to .205 (.196); chela 1.132 to 1.279 (1.209) by .246 to .285 (.262) broad and .238 to .276 (.252) deep, chela plus pedicel, 1.214 to 1.353 (1.286); hand .541 to .623 (.584) long; fingers .623 to .689 (.655) long. Total length of palp 3.053 to 3.415 (3.248). Legs (observed range and means in parentheses, of six specimens, excluding holotype): Leg I, "miofemur" .436 to .492 (.466) by .125 to .141 (.133); tibia .328 to .385 (.368) by .096 to .107 (.102); tarsus .344 to .394 (.374) by .074 to .085 (.081). Total length of leg

TABLE 11

SUMMARY OF BIOMETRIC DATA FOR REPRESENTATIVE SPECIMENS OF *Haplochelifer philipi*  
FROM ALL KNOWN LOCALITIES  
(COLORADO, ARIZONA, UTAH, IDAHO, NEVADA, OREGON, AND CALIFORNIA)

Number, or Proportion, as Applicable	Males (27 Specimens)		Females (50 Specimens)	
	Range	Mean	Range	Mean
Total length	1.74 - 2.46	2.18	1.85 - 3.36	2.69
Abdominal breadth	.89 - 1.18	1.03	1.10 - 1.67	1.41
Carapace length	.69 - .85	.75	.74 - .93	.84
Ocular breadth	.34 - .39	.37	.37 - .46	.42
Posterior breadth	.67 - .88	.75	.72 - .98	.87
Pedipalps				
Trochanter, length	.362- .426	.397	.387- .508	.454
Trochanter, breadth	.177- .230	.203	.189- .269	.241
Femur, length	.730- .886	.810	.804- 1.046	.927
Femur, breadth	.151- .190	.172	.167- .228	.202
Tibia, length	.672- .836	.764	.703- .981	.871
Tibia, breadth	.174- .213	.200	.192- .262	.229
Chela plus pedicel, length	1.197- 1.427	1.299	1.317- 1.719	1.518
Chela less pedicel, length	1.127- 1.345	1.222	1.230- 1.604	1.427
Chela, breadth	.221- .294	.267	.279- .382	.334
Chela, depth	.213- .280	.257	.262- .367	.318
Hand, length	.531- .656	.584	.590- .771	.686
Fingers, length	.590- .731	.668	.656- .892	.776
Leg IV				
Dorsal tarsal length	.320- .382	.351	.335- .443	.391
Dist. tactile seta from tarsal base	.272- .328	.303	.298- .390	.339
Chela (dentition) (19 males; 43 females)				
Fixed finger (no. teeth)	45-57	51.2	45-60	51.7
Movable finger (no. teeth)	44-57	52.5	47-61	52.5
Nodus ramosus FF (pos. rel. marg. teeth)	20-25	22.5	20-26	22.4
Nodus ramosus MF (pos. rel. marg. teeth)	21-27	24.2	21-27	23.8
Cribriform plate (med.) (females only)				
Length	— —	—	.043- .101	.0609
Breadth	— —	—	.029- .052	.0395
Trachea, anterior (max. diameter)	— —	—	.029- .053	.0416
Pedipalps				
Trochanter L ÷ B	1.78 - 2.13	1.96	1.73 - 2.08	1.88
Femur L ÷ B	4.40 - 4.92	4.70	4.30 - 5.13	4.59
Tibia L ÷ B	3.56 - 3.99	3.82	3.49 - 4.13	3.80
Chela plus pedicel L ÷ B	4.62 - 5.53	4.88	4.14 - 5.18	4.54
Chela less pedicel L ÷ B	4.35 - 5.24	4.58	3.88 - 4.89	4.27
Hand L ÷ B	2.01 - 2.43	2.19	1.86 - 2.35	2.05
Hand B ÷ D	1.02 - 1.08	1.05	1.00 - 1.12	1.05
Finger L ÷ hand L	1.06 - 1.24	1.14	1.06 - 1.26	1.13
Leg IV				
Pos. tactile seta ÷ dorsal tarsal length	.83 - .88	.86	.82 - .95	.87

I 1.108 to 1.254 (1.208). Leg IV: "miofemur" .626 to .705 (.677) by .195 to .215 (.208); tibia .525 to .590 (.567) by .103 to .115 (.110); tarsus .415 to .462 (.440) by .066 to .085 (.075); dorsal length of tarsus .336 to .380 (.357); tactile seta of tarsus .131 to

.164 (.144) long and situated .284 to .325 (.308) from base of segment. Total length of leg IV 1.566 to 1.757 (1.684).

Females (observed range, and means in parentheses, of eight central California specimens, including the allotype, except as indi-

cated): Total length 2.25 to 3.02 (2.56); abdominal breadth 1.10 to 1.64 (1.31). Carapace: length .74 to .89 (.82); ocular breadth .37 to .44 (.41); posterior breadth .72 to .90 (.82); cucullus .07 to .10 (.08) long; ocular diameter .06 to .08 (.075); ocular disk .38 to .47 (.42) long; median disk .25 to .28 (.26) long; posterior disk .11 to .15 (.13) long. Palps: trochanter .394 to .492 (.433) by .189 to .262 (.231); femur .817 to .994 (.888) by .167 to .212 (.192); tibia .763 to .935 (.838) by .192 to .233 (.219); chela 1.263 to 1.499 (1.369) by .279 to .358 (.324) broad and .262 to .338 (.309) deep, chela plus pedicel 1.328 to 1.607 (1.453) long; hand .623 to .738 (.670) long; fingers .681 to .812 (.737) long. Total length of palp 3.310 to 4.028 (3.612). Legs (observed range and mean for six specimens, not including the allotype): Leg I, "miofemur" .433 to .535 (.490) by .118 to .155 (.141); tibia .328 to .415 (.377) by 0.81 to .097 (.091); tarsus .385 to .435 (.414) by .063 to .070 (.066). Total length of leg I 1.146 to 1.376 (1.282). Leg IV, "miofemur" .672 to .820 (.756) by .197 to .233 (.220); tibia .563 to .659 (.615) by .107 to .125 (.119); tarsus .459 to .508 (.474) by .079 to .085 (.082); dorsal length of tarsus .360 to .435 (.388); tactile seta of tarsus .148 to .159 (.150) long and situated .312 to .377 (.334) from base of the segment. Total length of leg IV 1.694 to 1.987 (1.845).

REMARKS AND ADDENDA: In the course of the present study a considerable quantity of additional material was examined and identified as this species. A summary of the observations (principally palpal measurements and proportions, with additional data on the dentition of the chela and the position of the tactile seta of the fourth tarsus) made in connection with these determinations is presented in condensed form in table 11. From these data it will be seen that the species is indeed more variable than most chelonethid species (rightly or wrongly) have been usually considered to be. Nevertheless no satisfactory evidence was found to indicate that more than a single real species was involved, although the possibility remains that several closely allied subspecific or racial forms may be concerned. Available material is inadequate, however, to permit a definite conclusion in the matter.

The following collections (all in addition

to those previously noted) were determined as *H. philipi* in the course of this supplementary study:

California: Stanford University, three males, seven females (JC-1785.01001 to 10) (R. V. Chamberlin); Stanford University (San Francisquito Creek), one female and one nymph (276.02001 and 2) from moist leaf mold at base of willow tree December 17, 1927 (J. C. Chamberlin); Swartout Canyon (San Bernardino County), one female (JC-552.01001) from under stone in yellow pine forest, April 24, 1926 (J. C. Chamberlin); "Sud California (Morr. 81) (5.912)," one female (597.01001) (loan from Museum Nationale d'Histoire Naturelle, Paris); Berkeley, two males and two females (JC-651.01001 to 4) and two females and one nymph (JC-1781.01001 to 3), January, 1920 (C. Crosby); Oakland, one female (652.01001), March 20, 1922 (E. C. Van Dyke); 48 miles north of Willets, one female (JC-1079.01001) sifted from dead leaves in stand of madrone, laurel, fir, and redwoods, March 4, 1938 (J. C. Chamberlin); Sausalito, one female (JC-1588.01001), September 5, 1947 (R. V. Chamberlin); Laguna Beach, one male and one nymph (1628.02001 and 2), July 22, 1931 (W. Ivie), and two females (JC-1748.01001 and 2), December 28, 1932 (W. Ivie); Montrose (Los Angeles County), one nymph (1772.01001), December 31, 1932 (W. Ivie); Mt. Herman, Santa Cruz Mountains, one male and one female (JC-1793.01001 and 2), July 1922 (F. E. Blaisdell); Aliso Canyon (near Laguna Beach), one female (JC-1796.01001), July 1, 1931 (W. Ivie); Marin County, two females (JC-1726.01001 and 2), January 14, 1920 (Dietrich).

Oregon: Sucker Creek (between Homedale and Jordan Valley, Malheur County), one male (JC-1566.01001), June 15, 1931 (W. Ivie); 11 miles north of Grants Pass in dead leaves of pine and manzanita on dry slope, one male and one nymph (JC-1885.01001 and 2), January 8, 1937 (J. C. Chamberlin); county line between Medford and Grants Pass, two males and seven females (JC-1911.01001 to 11) sifted from dry leaves and bark flakes under madrone, April 6, 1937 (J. C. Chamberlin); 11.4 miles west of Medford, six males, three females, and five nymphs (JC-1933.01001 to 14) in debris at base of shrubs (mixed pine and madrone),

April 18, 1937 (J. C. Chamberlin); Klamath County, 7.5 miles east of Dairy, three males, two females, and five nymphs (JC-1941.01001 to 10) in bark of dead chunk of juniper wood in mixed stand of juniper and mountain mahogany, April 7, 1937 (J. C. Chamberlin).

Idaho: Badlands west of Grandview, one male, one female (JC-803.01001 and 2) under stone at base of *Grayia spinosa*, May, 1931 (J. C. Chamberlin and R. L. Piemeisel); Kendrick, two males, three females (JC-1083.01001 to 5) from pea weevil hibernation cage at base of ponderosa pine, August 13, 1938 (T. A. Brindley); Moscow, eight females and one nymph (JC-1174.01001 to 9), July 20, 1938 (T. A. Brindley); first stream east of Sinkers Creek (Owyhee County), two nymphs (JC-1104.02001 and 2) sifted from debris under service berry on stream bank, May 23, 1931 (J. C. Chamberlin and R. L. Piemeisel); 18.4 miles from Battle Creek, one female (JC-1108.01001) under stone, possibly with ants, May 23, 1931 (J. C. Chamberlin); Shoshone Falls, one female (JC-1117.02001) under board on ground, May 2, 1931 (David E. Fox); in foothills of Shoshone Basin east of Rogerson, one female (JC-1152.01001) in nest of ant (*Formica subpolita*), April 17, 1932 (A. C. Cole); Shoshone Canyon, one male (JC-1154.01001) in nest of ant (*Formica subpolita*), March 31, 1932 (A. C. Cole); Gimlet, one nymph in molting cocoon (JC-1331.01001) under stone at base of Douglas fir, August 24–25, 1941 (J. C. Chamberlin and R. L. Piemeisel); Gimlet, two nymphs (JC-1345.01001 and 2) under stones in talus slope, August 24, 1941 (J. C. Chamberlin and R. L. Piemeisel).

Nevada: East side of Lake Tahoe, one male (JC-1315.02001) under stone in sparse stand of *Pinus*, August 9, 1941 (J. C. Chamberlin); Lake Tahoe, one female (JC-1327.01001), July 16, 1934 (W. Ivie).

Utah: St. George, nine specimens (JC-245.06001 to 9) March 19, 1924 (V. M. Tanner), and one male (JC-1226.01001), 1926 (A. M. Woodbury); Zion National Park, one female (JC-373.02001), 1927 (A. M. Woodbury); Pine Crest Inn (Emigration Canyon), two males, two females, and three nymphs (JC-788.02001 to 7) under stones on steep dry slope under sage, mountain mahogany, and other shrubs, August 25–26, 1931 (J. C. Chamberlin); mouth of Logan Canyon,

one male (JC-1147.01001) under stone, March 25, 1933 (G. F. Knowlton); Logan Canyon, two males (JC-1213.01001 and 2), April 6, 1935 (C. F. Smith and T. O. Thatcher); Logan Canyon (Tony Grove), two females (JC-1214.03001 and 2), April 21, 1935 (T. O. Thatcher); Providence Canyon, one male, two females (JC-1216.01001 to 3), April 19, 1935 (C. F. Smith and W. L. Thomas); Blanding, one female, one male (JC-1195.01001 to 2), from stomach of sage brush swift (*Sceloporus graciosus*), July 13, 1934 (G. F. Knowlton); Mill Creek Canyon (Rattlesnake Fork), two nymphs (JC-1313.01001 and 2) under stones, August 13, 1941 (J. C. Chamberlin); Mill Creek Canyon, one nymph (JC-1314.01001), April 25, 1938 (W. Ivie); Big Cottonwood Canyon (Storm Mountain), one female (JC-1378.01001), October 22, 1939 (W. Ivie); Dry Canyon (Salt Lake County), one female (JC-1595.01001), one male (JC-1691.01001), July 26, 1932, and two males and four nymphs (JC-1720.01001 to 6) sifted from oak leaves, October 22, 1932 (W. Ivie); Grouse Creek, one male, one female (JC-1639.01001 and 2), September 5, 1932 (R. V. Chamberlin and W. Ivie); Salt Lake City ("probably"), one nymph (JC-1649.01001) and one female (JC-1723.01001) (R. V. Chamberlin); American Fork Canyon (Timpanogos Park), one female (JC-1662.01001), June 13, 1941 (W. Ivie); Salt Lake County, one nymph (JC-1705.01001) (R. V. Chamberlin); mouth of Bells Canyon, one male, two females (JC-1709.01001 to 3), May 6, 1934 (W. Ivie); City Creek Canyon (near Salt Lake City), one male, two females (JC-1719.01001 to 3), July 7, 1940 (W. Ivie), and two females (JC-1724.01001 and 2), May 13, 1931 (R. V. Chamberlin).

Colorado: "Colorado (Morr.) 2.960" (loan from the Museum Nationale d'Histoire Naturelle, Paris), one female (JC-595.01001).

Arizona: Ten miles south of Fredonia, one female (JC-1091.01001), under stone in grove of pines and mountain mahogany, August 21, 1930 (J. C. Chamberlin); 20 miles south of Flagstaff, one female (JC-1363.01001), April 12, 1935 (W. Ivie).

Unknown locality (possibly California): One female (JC-1485.02001) and one female (JC-1536.02001), no collection data (R. V. Chamberlin).







