

# THE GENERA OF THE TETTIGINIID INSECTS OF THE SUBFAMILY RHAPHIDOPHORINAE FOUND IN AMERICA NORTH OF MEXICO.

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The subfamily Rhaphidophorinae is represented in the United States and Canada by 12 genera. Many changes in the classification of the group have been made since the revisional work of Scudder, and the present nomenclature is quite different from that of Scudder's catalogue of 1900. One new genus and several new species have appeared since the beginning of the new century, and the present paper, which is based primarily on material in the United States National Museum, adds two more genera and seven species.

Besides the material in the United States National Museum there has been studied material from the Hebard collection, in Philadelphia, kindly loaned by the owner, and free access has been accorded the writer to the rich collections of the Academy of Natural Sciences in Philadelphia and of the Museum of Comparative Zoölogy in Cambridge, Massachusetts.

The only revisional work done on the Nearctic genera of Rhaphidophorinae was by Scudder in 1894,<sup>1</sup> where keys to the genera and species as then known are given. The group was not considered by Scudder as of subfamily rank, a standing now quite generally conceded, but was designated by him as a section of Stenopelmatinae, as was previously done by Brunner in his general monograph.<sup>2</sup>

In studying the structure of the posterior tibiae in the Rhaphidophorinae it is well to remember that there are three apical calcars on each side—one short ventral one, a longer median one, and an upper one. This upper calcar is sometimes wholly dorsal, and when, as is sometimes the case—as, for example, in *Rhachocnemis*—it is directed upward instead of more or less backward, as usual, there is little or nothing to distinguish it from the dorsal spurs. In such cases care must be taken to not mistake this upper calcar for a dorsal spur.

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<sup>1</sup> Proc. Acad. Arts and Sci., vol. 30, pp. 17-32.

<sup>2</sup> Verhandl. k. k. zool. bot. Ges., vol. 33, 1888, pp. 247-394, pls. 5-9.

Some writers term the apical dorsal spurs, as herein used, the upper calcars and the smaller lower calcars they call ventral spines.

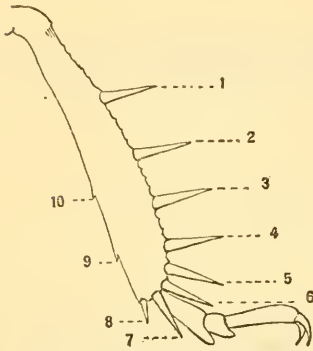


FIG. 1.—FIGURE SHOWING THE DORSAL SPURS, APICAL CALCARS, AND VENTRAL SPINES OF A TYPICAL HIND TIBIA. 1-5, DORSAL SPURS; 6-8, APICAL CALCARS; 9-10, VENTRAL SPINES.

The nomenclature of the typical hind tibial armature as used in the present paper is explained in figure 1.<sup>1</sup> This type of armature, however, especially as relating to the dorsal spurs, belongs only to *Ceuthophilus* and its closer relatives, i. e., *Pristoceuthophilus*, *Phrixocnemis*, *Rhachocnemis*, *Udeopsylla*, *Daihinia*, and *Hemiudeopsylla*. In these genera there are generally five pairs of dorsal movable spurs, but sometimes there are six or seven. The remaining genera of the group, *Tropidischia*, *Hadenococcus*, *Diastrammena*, *Cnemotettix* and *Gammarotettix*, have a different type of armature, the dorsal spurs being more numerous and, except in *Hadenococcus*, inarticulate and not strongly differentiated by greater size from the smaller dorsal spines or serrations.

The supraanal plate in the male is usually more or less concealed beneath the last dorsal segment of the abdomen, which is often somewhat produced and sometimes apically cleft.

The genera comprising this subfamily of apterous katydids may be separated by the following key:

KEY TO THE NEARCTIC GENERA OF RHAPHIDOPHORINÆ.

1. All the tibiae square in transverse section and similarly armed above and beneath on both outer and inner margins with short, heavy, close-set spines of equal length (fig. 2).....*Tropidischia* Scudder.  
None of the tibiae at all as described above.....2.
2. Basal segment of the hind tarsus truncate posteriorly above, or scarcely at all produced.....3.  
Basal segment of the hind tarsus produced posteriorly above into a stout spine, or tapering spinelike process (fig. 6).....4.
3. Legs very long and slender, the fore femora more than twice as long as the pronotum; (last palpal segment in dried specimens cleft beneath only apically).  
*Hadenococcus* Scudder.  
Legs shorter and stouter, the fore femora less than twice as long as the pronotum. .5.
4. Fore and middle femora with a long genicular spine on one or both sides; hind femora as long as, or longer than, the body; second segment of the hind tarsus about as long as the fourth segment exclusive of the claws, two or more times as long as the vertical depths (fig. 3).....*Diastrammena* Brunner.  
Femora without genicular spines, the hind femora distinctly shorter than the body; second segment of the hind tarsus barely one-half as long as the fourth, scarcely longer than the vertical depths (fig. 6).....*Gammarotettix* Brunner.

<sup>1</sup> The drawings illustrating this paper were made by Miss Mary Carmody.

- 5. Posterior tarsus with four distinct segments.....6.  
 Posterior tarsus with but three distinct segments (fig. 25)..... *Daihinia* Haldeman.
- 6. Second segment of the hind tarsus scarcely longer than the vertical depths, usually less than twice as long as the third segment (figs. 22-24).....7.  
 Second segment of the hind tarsus distinctly longer than the vertical depths, being usually two times as long as the third segment (figs. 9, 16, 20).....8.
- 7. Anterior tibiae armed above, about the middle, or a little beyond, on the inner margin with a distinct spine..... *Udeopsylla* Scudder.  
 Anterior tibiae unarmed above except toward the apex.....9.
- 8. Vertex between the antennae armed with a declivitous hornlike protuberance (fig. 20); abdomen of the male more or less tuberculate or spinose above, sometimes conspicuously so (fig. 15)..... *Pristoceuthophilus* Rehn.  
 Vertex between the antennae smooth or tuberculate but never with a declivitous hornlike projection as above; abdomen of the male never distinctly tuberculate or spinose above..... *Ceuthophilus* Scudder.
- 9. All dorsal spurs of hind tibiae short and inarticulate .... *Cnemotettix*, new genus.  
 Some dorsal spurs of hind tibiae longer and articulate.....10.
- 10. Last dorsal spur of the hind tibiae on the inner side separated from the preceding one by a distance two or more times as great as its own width (figs. 22, 23).....11.  
 Last dorsal spur of the hind tibiae on the inner side separated from the preceding by a distance no greater than its own width (fig. 25).... *Rhachocnemis*, new genus.
- 11. Posterior tibiae armed above, between each pair of movable spurs, with several, usually five or more, acute serrations..... *Ceuthophilus* Scudder.  
 Posterior tibiae unarmed above between the dorsal spurs, or armed with but a few tubercles or serrations, rarely with as many as five tubercles between one or two pairs of spurs, never with five or more serrations between each pair as in *Ceuthophilus* (figs. 22, 23)..... *Phrixocnemis* Scudder.  
 Unplaced..... *Hemiudeopsylla* Saussure and Pictet.

Genus TROPIDISCHIA Scudder.

*Tropodischia* SCUDDER, Bost. Journ. Nat. Hist., vol. 7, 1862, p. 440.

This genus differs so radically, especially in the armature of the legs, from all other genera of the subfamily that Scudder quite properly separated it as a distinct group. In general appearance it resembles somewhat *Diestrammena* and *Hadenoecus* but is really allied to neither.

Head moderate, as broad as the front portion of the pronotum; vertex between the antennae forming a pair of rounded-triangular, laterally flattened plates, not widely separated and about as long as the basal height; antennae moderately long and slender; palpi with the terminal segment about twice as long as the preceding one, one-fourth longer than the third, gently enlarged apically and cleft beneath only in the terminal fourth or less. Pronotum noticeably broader posteriorly than anteriorly, the disk smooth and passing gradually into the lateral lobes without a sign of lateral or median carinae; lateral lobes shallow, the lower margins straight and horizontal, no humeral sinus; disk of pronotum broadly rounded anteriorly, posteriorly truncate; meso- and meta-notum together about as long as the pronotum and as broad as the pronotum at its posterior margin, the lateral lobes equally deep as those of the pronotum, the lower margins rounded, very broadly so

in the matanotum. Legs very long and slender, the anterior femora about three times as long as the pronotum; all tibiae square in transverse section and similarly armed above and below on both outer and inner margins with short heavy close-set spines (fig. 2), the apical calcears short; fore femora without genicular spines, the others with short ones on the posterior side, all of them armed above on the posterior three-fourths on both the outer and inner margin with spines similar in arrangement and structure to those of the tibiae and beneath the hind and middle femora are armed on both margins with short, sharp spines separated by spaces usually as great as, or greater than, their own length, the fore femora similarly armed beneath on the inner margin only, the outer margin unarmed; tarsi slender, naked beneath, sparsely and microscopically pilose above, the second segment of all the tarsi three times as long as deep, the first and second segments of the hind feet prolonged posteriorly above in the form of an elongate heavy spine. Abdomen moderately heavy, as broad as the metathorax; subgenital plate of the male ample, the hind margin entire, rounded, furnished with two small styles consisting of a single bluntly conical segment; subgenital plate of the female broad and apically very broadly and shallowly notched; cerci simple in both sexes, cylindrical and gradually tapering in the female, in the male less tapered apically and longitudinally deeply concave in the apical two-thirds; ovipositor three times as long as the pronotum and moderately heavy, gently curved upward, the tip sharp and unarmed.



FIG. 2.—TRIPIDISCHIA XANTHOSTOMA. CROSS SECTION OF HIND TIBIA.

The type and only species of this genus is the *Tripidischia xanthostoma* of Scudder, described as *Rhaphidophora xanthostoma* in 1861.<sup>1</sup> Besides the type material of this species from California in the Scudder collection in Cambridge, Massachusetts, the following specimens have been examined:

One female and one nymph from Los Angeles County, California, in the collection of the Academy of Natural Sciences in Philadelphia.

One female from near Hoquiam, in the southwestern part of the State of Washington, in the collection of the United States National Museum.

One male and one female from British Columbia, taken by Harvey Hadden in 1911, in the British Museum in London.

One male from Vancouver Island, British Columbia, taken by E. M. Anderson, March 10, 1913, in collection of the United States National Museum.

The only localities hitherto published for this apparently rare insect are California and Oregon.

<sup>1</sup> Proc. Bost. Soc. Nat. Hist., vol. 3, p. 12.

## Genus HADENOECUS Scudder.

*Hadenoecus* SCUDDER, Bost. Journ. Nat. Hist., vol. 7, 1862, p. 439.

This genus of long-legged insects, of which *Rhaphidophora subterranea* Scudder is the type, comprises two species which may be separated by the following key:

## KEY TO THE SPECIES OF HADENOECUS.

- Ovipositor nearly or quite as long as the body; general color pale testaceous; living mostly in caves.....*subterraneus* Scudder.  
 Ovipositor considerably shorter than the body; general color dark brown; living mostly in and under the covers of wells.....*puteanus* Scudder.

## HADENOECUS SUBTERRANEUS Scudder.

The *Rhaphidophora cavernarum* of Saussure was established in a paper presented in 1860 but not published until January 22, 1862.<sup>1</sup> Scudder's *subterraneus* was published in 1861 and, as the two names have been found to apply to the same species, Scudder's name must be used as it is the earlier. This fact was not understood by Scudder, who sank his own name in favor of that of Saussure, which he dated from 1860 instead of 1862, as is actually the case.

This species has been reported only from caves in the southeastern United States.

## HADENOECUS PUTEANUS Scudder.

This species is closely allied to the preceding, but the ovipositor is noticeably shorter and the general color is darker. It seems to occur in and under the coverings of wells and has been recorded from Georgia, Mississippi, and North Carolina. In the Hebard collection in Philadelphia there is a male from Corning, Pennsylvania, taken by Helen Cleland.

## Genus DIESTRAMMENA Brunner.

*Diestrammena* BRUNNER, Verhandl. k. k. zool. bot. Ges., vol. 38, 1888, p. 298.

This genus is represented in our fauna by two species, both introduced. These long-legged, short-bodied insects are not well known in the New World and a somewhat comprehensive description of the genus is therefore here presented.

Head as broad as the anterior portion of the pronotum; vertex between the antennae forming a pair of elongate conical tubercles, about twice as long as the basal width; antennae nearly or quite three times as long as the body and very slender beyond the enlarged first and second segments, the second segment about one-half the length and thickness of the first; palpi long and slender, the apical segment very gently enlarged distally, cleft beneath only apically and

<sup>1</sup> Ann. Soc. Ent. France, ser. 4, vol. 1, 1862, p. lvi, gives the dates of publication of the various parts of this volume.

nearly twice as long as the third or fourth segments, which are subequal in length. Pronotum slightly broader posteriorly than anteriorly, smooth and evenly rounded above, without sign of median or lateral carinae; lateral lobes distinctly longer than high, the lower margins broadly rounded, the posterior margin with a very broad and shallow humeral sinus; the pronotal disk is subtruncate anteriorly and broadly rounded posteriorly; meso- and metanotum together barely as long as the pronotum but equally as broad, the lateral lobes extending downward as far as those of the pronotum, the lower margins rounded. Legs long and slender, covered with short hairs, or pile; femora unarmed above, beneath unarmed except the posterior ones, which are sparsely armed on the lower inner margin with five or six short stout spines, the outer margin unarmed or armed with one or two spines; fore femora about one and one-half

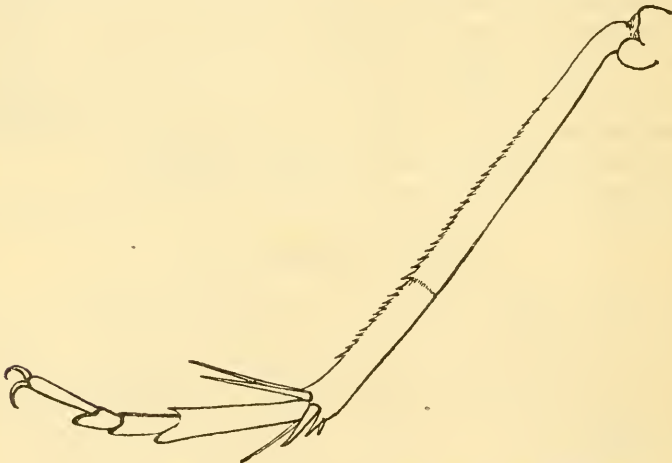


FIG. 3.—*DIESTRAMMENA MARMORATA*. HIND TIBIA AND TARSUS, OUTER SIDE.

times as long as the pronotum, armed on the posterior side only with a long movable genicular spine; middle femora with a long movable genicular spine on each side; fore and middle tibiae unarmed above, beneath armed with one or two movable spines besides the apical ones; hind tibiae unarmed beneath, above armed on both margins with short close-set spines of subequal length except one pair about the apical fourth which are noticeably longer than the others (fig. 3); the apical tenth or so of the hind tibiae has no spines except one pair at the tip; apical calcars of the hind tibiae long, the upper inner one about as long as the metatarsus, the upper outer one noticeably shorter than the corresponding inner one, the middle inner calcar about one-half as long as the upper inner one, the outer median one less than half as long as the outer upper one; ventral pair of apical calcars equal and short, about one-half as long as the outer median ones. Tarsi slender, the segments unarmed except the posterior metatarsus which

is prolonged posteriorly above as a short sharp spine (fig. 3); second segment of all the tarsi two or more times as long as deep; the tarsi are naked beneath on the second and third segments and the tip of the first, the rest covered with pile, as is the rest of the entire surface. Abdomen gently tapering posteriorly; subgenital plate of the male broad and short, apically truncate, the angles rounded and without styles, the whole plate deeply concave and often closing back over the tip of the abdomen like a lid; subgenital plate of the female subquadrate, narrowing behind, the apical margin triangularly notched; cerci simple, cylindrical, long and slender, tapering to a fine slender point; ovipositor about twice as long as the pronotum, gently curved upward in the apical half, the inner valves serrate apically beneath.

Of the two species of this genus represented in the fauna covered by this paper but one is at all well established. This is the *Diestrammena marmorata* of Haan, the type of the genus. This species has been recorded from greenhouses in Minnesota and Colorado and there are a number of both sexes in the United States National Museum from greenhouses in Springfield, Ohio, and Chicago, Illinois. The female specimen from Kansas recorded by Isley as probably *Ceuthophilus latens* Scudder<sup>1</sup> is really the present species and is the only record of this insect having been taken in this country outside of a greenhouse, this one having been collected outdoors near a sidewalk. The fragmentary and partially decayed condition of this single specimen made this doubtful determination, of which the present writer alone was responsible, almost if not quite excusable.

While the above species seems to be a fairly constant visitor with us, the second species, *Diestrammena unicolor* Brunner, is of rare occurrence, having been reported<sup>2</sup> but once, by A. P. Morse from greenhouses in Chicago, Illinois.

#### Genus GAMMAROTETTIX Brunner.

*Gammarotettix* BRUNNER, Verhandl. k. k. zool. bot. Ges., vol. 38, 1888, p. 304.

In this genus the legs are unusually short, the posterior femora being scarcely more than one-half as long as the insect itself. It is more closely allied to the short-legged species belonging to the following genera than to those belonging to the genera described above, but is very distinct from all. A fairly full description of this genus follows:

Head rather small, as broad as the anterior portion of the pronotum; vertex between the antennae forming a pair of tubercles about as long as the basal breadth and separated from each other by a distance as great as the length of one of them; antennae slender, the basal segment large and broad, vertically flattened; palpi very short, the

<sup>1</sup> Publ. Kans. Acad. Sci., 1905, p. 247.

<sup>2</sup> Psyche, vol. 11, 1904, p. 80.

terminal segment less than four times as long as the apical width, where it is considerably expanded and entire, not ventrally cleft; fourth segment of the palpi about one-half as long as the fifth, the third a little longer than the fourth, the first and second subequal in length with the fourth. Pronotum moderately broadening posteriorly, evenly rounded dorsally, wholly without carinae, fore and hind margins truncate, the lateral lobes longer than high, the sides parallel, without humeral sinus, the lower margin horizontal and very broadly rounded; meso- and metanotum together somewhat longer than the pronotum and slightly broader, the lateral lobes descending a little lower than those of the pronotum, the lower margins rounded and somewhat ascending posteriorly. Legs very short, the fore femora no longer than the pronotum and the posterior ones scarcely or barely reaching the tip of the abdomen; femora unarmed above and below, without genicular spines; fore and middle tibiae unarmed above and below except apically, the hind tibiae unarmed beneath but armed above on both margins for nearly the entire length with short spines of two grades, about every other spine being somewhat shorter than the others; apical calcars short, the longest barely longer than the longest of the dorsal spurs; tarsi short, the second segment of none of them longer than deep; posterior metatarsus produced above into a tapering pointed process about as long as the second segment (fig. 6). Abdomen large and plump, scarcely tapering posteriorly; subgenital plate of the male sunquadrate, apically sinuate by ventral sulcation, without styles; last dorsal segment; of the male cleft nearly to the base; subgenital plate of the female about as broad as long and apically divided into three pointed lobes; supraanal plate of the male nearly hidden beneath the last dorsal segment; of the female roundly triangular, centrally depressed above; carci of both sexes simple, cylindrical and very short and stout, straight in the female, in the male straight or recurved; ovipositor short, about as long as the pronotum, and stout, conspicuously armed below on the inner valves and above on the outer ones, which are moderately curved upward and slightly longer than the lower ones; the true inner valves are here as long as the true lower ones, usually called the inner ones, and unarmed.

Two species comprise this genus, *bilobatus* Thomas, the type of the genus, and *genitalis* new species, described herein. These two species may be separated as follows:

KEY TO THE SPECIES OF GAMMAROTETTIX.

- Cerci of male straight, about three times as long as the basal width (fig. 4); subgenital plate of the male with a transverse black band; subgenital plate of the female divided into three somewhat slender fingers (fig. 5).....*bilobatus* Thomas.  
 Cerci of the male curved backward and more than three times as long as the basal width (fig. 7); subgenital plate of the male unicolorous; subgenital plate of the female divided into three shorter triangular teeth (fig. 8)....*genitalis*, new species.



## GAMMAROTETTIX BILOBATUS Thomas.

This species was described in the genus *Ceuthophilus* by Thomas in 1872, and more than a decade later it was redescribed by Brunner

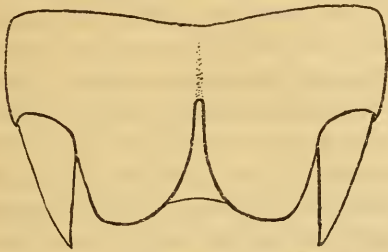


FIG. 4.—GAMMAROTETTIX BILOBATUS. LAST DORSAL SEGMENT OF THE ABDOMEN AND THE CERCI OF THE MALE.

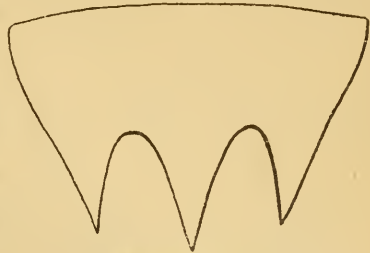


FIG. 5.—GAMMAROTETTIX BILOBATUS. SUBGENITAL PLATE OF THE FEMALE.

as a new genus and species under the name *Gammarotettix californicus*. Brunner's genus is good and stands, but his specific name falls before the older name *bilobatus* of Thomas. There is no question of this synonymy.

This species is known only from California but is recorded from various localities in the southern and middle portions of that State, and there are specimens in the United States National Museum from Humboldt County, in northern California. Some specimens from southern California recorded as this species very likely belong to the very distinct species described below.

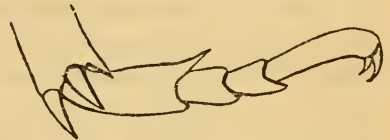


FIG. 6.—GAMMAROTETTIX BILOBATUS. HIND TARSUS.

## GAMMAROTETTIX GENITALIS, new species.

This species, which superficially resembles very closely the above, passed the scrutiny of Mr. Scudder without being recognized as a distinct species. But, as indicated by the genital characters cited in the above key, it is amply distinct from *bilobatus*. In addition to the diagnostic characters mentioned in the table, this species differs from *bilobatus* as follows: The last dorsal segment of the male (fig. 7) is more broadly notched posteriorly and distinctly different in shape

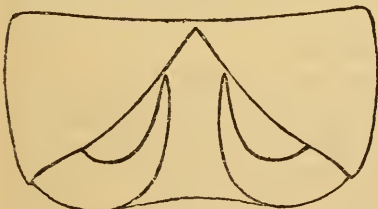


FIG. 7.—GAMMAROTETTIX GENITALIS. LAST DORSAL SEGMENT OF THE ABDOMEN AND THE CERCI OF THE MALE TYPE.

from that of *bilobatus* (fig. 4); in addition to the difference in color of the subgenital plate of the male, there are other colorational differences deserving mention, thus the diagonal infuscation of the meso- and metanotum, usually a conspicuous feature of *bilobatus* and rarely

wholly obliterated in that species, seems to be absent in *genitalis*; at least it is not represented in the material studied. The surface of the fastigium of the vertex between the fastigial tubercles is almost invariably blackish in *bilobatus*, while in the present species it is concolorous with the rest of the vertex.

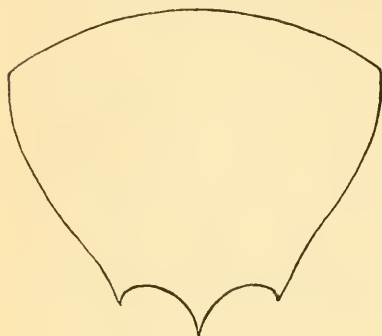


FIG. 8.—GAMMAROTETTIX GENITALIS. SUBGENITAL PLATE OF THE FEMALE TYPE.

Length, pronotum, male, 3 mm.; female, 3.5 mm.; posterior femora, male, 8 mm.; female, 8.5 mm.; ovipositor, 5 mm.; width, pronotum posteriorly, male and female, 4 mm.; hind femora at widest part, male and female, 2.25 mm.

*Holotype*.—Male, Los Angeles County, California, July; allotype, female, same locality, June. Holotype and allotype in United States National Museum. Catalogue No. 19407. These specimens are listed by Scudder<sup>1</sup> as *G. bilobatus*, and the specimens recorded at the same time from San Diego, California, will very likely be found to belong to this new species.

#### GENUS CEUTHOPHILUS Scudder.

*Ceuthophilus* SCUDDER, Can. Nat., vol. 7, 1862, p. 284; Proc. Amer. Acad. Arts Sci., vol. 30, 1894, p. 23.

*Machamala* WALKER, Cat. Derm. Salt. Brit. Mus., vol. 2, 1869, p. 209.—KIRBY, Syn. Cat. Orth., vol. 2, 1906, p. 130.

This, the dominant genus of the group, contains a large number of species as now considered, though there is very likely some synonymy among them. It is difficult to distinguish nymphs from adults and this will probably prove to be the cause of some duplication of specific names when the members of the genus are better known. In fact, this is already proven by the reference, on a later page of the present paper, of *Ceuthophilus henshawi* Scudder to the synonymy under *Pristoceuthophilus celatus* of the same author.

The more important differentiating characters of the species of this genus pertain mostly to the male sex, and these sometimes differ in immature and adult individuals. Thus the curved hind tibiae of the adult of some species are straight in immature specimens. Variation in the more available synoptic characters also contributes to the difficulties of a satisfactory classification.

No attempt is made in the present paper to construct a key to the species of this genus. The only comprehensive key published is that by Scudder,<sup>2</sup> and that is quite inadequate for the separation of the

<sup>1</sup> Proc. Amer. Acad. Arts Sci., vol. 30, 1894, p. 111.

<sup>2</sup> Idem, p. 23.

forms treated. A modern worker with the material of the larger American collections assembled temporarily before him for study of types and other authentic specimens might succeed in constructing a functional key. The following characters seem promising for use in a task such as the above: Structure of the vertex, whether flat or conical; structure of the cerci of the male, which in a few species are very remarkable (fig. 10); the structure of the subgenital plate of the male, the presence or absence of subgenital styles; the ovipositor, whether the inner valves are armed ventrally with more or less slender subapical teeth and furnished at the tip with an apical hook, or without apical hook and unarmed ventrally or furnished only with triangular serrations or undulations; the second segment of the hind tarsus, whether longer or shorter than the depths. A Mexican species, *C. macropus* Rehn, has the basal three segments of the posterior tarsi prolonged posteriorly above as a distinct spine-like projection.

The few species of *Ceuthophilus* in which the second segment of the hind tarsus is barely or no longer than deep, occasionally probably even slightly shorter than deep, are separable from the species of the genus *Phrixocnemis* only by the presence of several small teeth between each pair of large dorsal spurs of the hind tibiae.

The type of *Machamala* Walker, in the British Museum, has been examined and found to be a true *Ceuthophilus*. Kirby was evidently correct in relegating this species to the synonymy under *Ceuthophilus maculatus* Harris, the type of *Ceuthophilus*.

Following are remarks on the synonymy, etc., of some of our native species of this genus:

#### CEUTHOPHILUS NEOMEXICANUS Scudder.

The male specimen in the collection of the United States National Museum selected as the holotype of this species by Rehn and Hebard<sup>1</sup> is a member of the genus *Phrixocnemis* as used in the present paper, and is therefore included in that genus. The female specimen in the same collection, the only specimen of that sex included in the original description and therefore the allotype, is not congeneric with the holotype but is a true *Ceuthophilus*. If it is a distinct species or a synonym of another, is an unsolved question. It has five or more serrations between the dorsal spurs of the posterior tibiae and the second segment of the hind tarsus is distinctly longer than deep except in the left leg, which is deformed, where it is about as long as deep.

#### CEUTHOPHILUS VINCULATUS Scudder.

This species is very close to *californianus*. The types have been examined and material of both species, named by Scudder, are in the collection of the United States National Museum. The character used as diagnostic by Scudder, the presence or absence of raised

<sup>1</sup> Proc. Acad. Nat. Sci. Philad., 1912, p. 72.

points on the hind femora of the male, is not constant in authentic material named by him and the differentiating characters mentioned in his descriptions are very slight, the length of the ovpositor being apparently the only discernable difference.

CEUTHOPHILUS ALPINUS Scudder.

This species is also very close to *californianus* and in both these species as well as in *vinculatus*, *nodulosus* and a new species herein described as *C. genitalis*, and perhaps others, the second segment of the hind tarsus is no longer, or barely longer, than the vertical depth.

CEUTHOPHILUS GRANDIS Scudder.

This is inseparable from *C. gracilipes* Haldemann.

CEUTHOPHILUS STYGIUS Scudder.

This is but a variety of *gracilipes*, the only separating character seeming to be the proportional length of the legs and the armature of the hind femora, characters useless in this instance through variation. Typical *stygius* has the hind femora armed beneath with serrations only while in *gracilipes* they are armed with distinct spines. But a series of specimens shows a gradual variation from one form to the other. *Stygius* has been considered a cave dweller, but some years ago I took specimens beneath stones some distance from caves in Indiana that were inseparable from ones taken within the Wyandotte cave.

CEUTHOPHILUS ATER Scudder.

This species has a dorsal spine near the middle of the anterior tibiae, proving it a member of the genus *Useopsylla* where it is placed in the present paper, in synonymy under *U. nigra* Scudder.

CEUTHOPHILUS POLITUS Scudder.

This is also a member of the genus *Udeopsylla* and a synonym of *U. robusta* Haldemann.

CEUTHOPHILUS CELATUS Scudder.

This is not a *Ceuthophilus* but belongs to the allied genus *Pristoceuthophilus*, where it will be found in the present paper.

The species of *Ceuthophilus* recorded by Scudder from Victoria, British Columbia, as *C. celatus* was not this species, but *C. agassizi* Scudder. This fact was determined by examining a male in the Morse collection from the same catch as the female in the Scudder collection.

CEUTHOPHILUS DEVIUS Scudder.

This species belongs to *Udeopsylla* and is here transferred to that genus.

## CEUTHOPHILUS PALMERI Scudder.

This is very likely a composite species, as there is great diversity of size among the type material and the length of the ovipositor ranges from scarcely longer than the pronotum to more than twice as long.

## CEUTHOPHILUS TERRESTRIS Scudder.

This species is separable from most if not all of its allies by having the subgenital plate of the male undivided and without styles. This peculiarity is exhibited in a single authentic male specimen in the United States National Museum, and Mr. Rehn called my attention to the same thing in specimens in the collection of the Academy of Natural Sciences in Philadelphia.

## CEUTHOPHILUS UHLERI Scudder.

This species has a distinctly conical vertex, approaching the *Pristocephophilus* type.

## CEUTHOPHILUS SECLUSUS Scudder.

The vertex of this species is also distinctly tubercular, but scarcely so declivitous and hornlike as in *Pristocephophilus*.

## CEUTHOPHILUS NODULOSUS Brunner.

This is a remarkable species by reason of the brevity of the dorsal spurs and apical calcaria of the posterior tibiae of both sexes and the

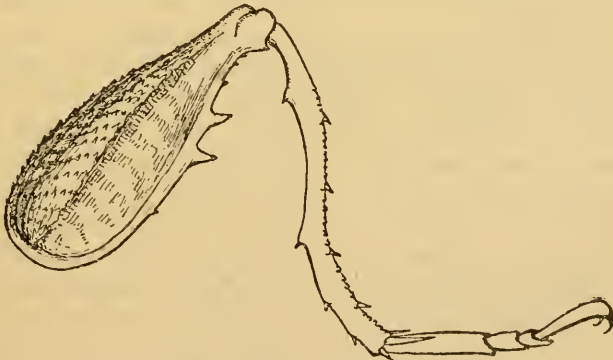


FIG. 9.—*CEUTHOPHILUS NODULOSUS*. HIND LEG OF MALE TYPE.

structure of the last dorsal abdominal segment and cerci of the male. Here the cerci are apically much expanded and inwardly deeply concave, the last dorsal segment is prolonged and shaped in an unusual manner and the subgenital plate is undivided, narrowed

apically, the tip rounded and with a subapical construction and without styles. These characters, which are unknown in any other species except the one immediately following, are shown at figures 9 and 10.

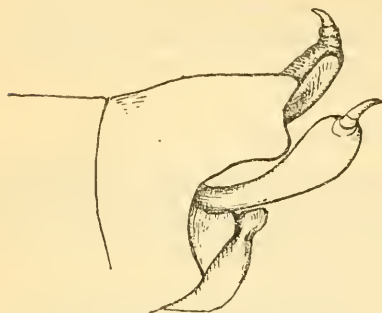


FIG. 10.—*CEUTHOPHILUS NODULOSUS*. END OF THE ABDOMEN OF THE MALE TYPE.

*CEUTHOPHILUS GENITALIS*, new species.

*Description*.—Head as broad as the front portion of the pronotum; vertex with a very broad and but little elevated tubercle; last segment of the palpi nearly twice as long as the preceding one and cleft beneath for most of its length. Pronotum slightly and gradually broadening posteriorly, the lower margin of the lateral lobes very broadly rounded, the anterior angle a little more rounded than the posterior one; meso- and metanotum as broad as the pronotum but, with the abdominal segments, tapering uniformly posteriorly; lateral lobes descending scarcely lower than those of the pronotum, the lower margins rounded. Abdomen with a few very minute inconspicuous granular tubercles scattered sparsely over the dorsal surface, visible only when examined under a lense; last dorsal abdominal segment and the cerci of the male essentially as figured under *C. nodulosus*, the preceding species, the anal segment a little more truncate apically; the subgenital plate of the male is also practically like that of *nodulosus*, being considerably constricted subapically, and then broadening to an apically rounded slightly transverse plate which, however, instead of being entire as in *nodulosus*, is apparently divided for fully half its length by a closed cleft, though this may be merely a fold, as it is very obscurely visible in the unique male studied; cerci of female simple, closely segmented and tapering. Ovipositor of same length as the pronotum, the inner valves armed apically beneath with teeth three or more times as long as the median width and with a terminal down-curved hook, the outer valves unarmed except with a terminal up-curved hook. Legs short; femora without genicular spines; fore femora about same length as the pronotum, armed beneath only with a single subapical spine on the inner margin; middle femora about as long as the anterior ones and very slightly more slender, armed beneath on both sides with a few short spines; hind femora about twice as long as the pronotum and stout, about one-third as broad basally as the entire length, tapering to near the apex and armed beneath on both margins in the female and on the inner margin in the male with acute triangular serrations, the lower outer margin in the male armed with four or five stout spines; the hind femora of the male has several minute acute tubercles on the dorsal surface; fore tibiae

unarmed above, beneath with three pairs of moderate sized spines in addition to the apical ones; middle tibiae armed above with two or three spines on each side, beneath as in the anterior ones; hind tibiae nearly straight in both sexes, very slightly curved in the male, the dorsal spurs decidedly shorter than the tibial depths, the interspurial serrations acute and seldom less than five between each pair of spurs; dorsal apical calcar on the inner side about twice as long as the apical dorsal spur, distinctly longer than the tibial depth, on the outer side not so long as on the inner side; median apical calcar slightly longer and considerably thinner than the ventral one, about the same size and length as the apical dorsal spur; beneath the hind tibiae are armed with three mesially located spines and usually a horizontal subapical pair, all on the apical half of the tibia; in the male there is a noticeable subbasal hump beneath the hind tibiae as illustrated in the figure of the posterior leg of *Ceuthophilus nodulosus* (fig. 9), but less prominent; all tarsi with the second segment short, barely or no longer than deep, a little more than twice as long as the third segment.

Color shining yellowish brown, slightly darker above, especially on the abdomen.

Length, both sexes, pronotum, 3.75 mm.; fore femora, 4 mm.; hind femora, 9.5 mm.; ovipositor, 3.75 mm.; width, hind femora at widest point, 3 mm.

*Holotype*.—Male, Queen, New Mexico, November 7, 1914. E. G. Holt, collector; allotype and paratype, female, same data as the holotype.

Holotype and allotype in United States National Museum. Catalogue No. 19413. Paratype in collection of Morgan Hebard in Philadelphia.

This species is structurally closely allied to *Ceuthophilus nodulosus* but superficially scarcely at all resembles that species. The smaller size, the apparently more compact form, and the nearly straight posterior tibiae of the male will serve to distinguish this new species from *nodulosus*. In *nodulosus* also the ventral spines of the hind tibiae are situated on more prominently elevated tubercles than in *genitalis* and the subbasal ventral hump is somewhat more prominent.

The short stout form and shining color of *genitalis* together with the short legs remind one of some species of *Phrixocnemis* and the short second segment of the tarsi shows a relationship with that genus.

If it were the accepted custom to base genera on purely secondary sexual characters, *nodulosus* and *genitalis* would deserve separation from *Ceuthophilus*, for the males of those species are certainly anomalous for that genus.

## Genus PRISTOCEUTHOPHILUS Rehn.

*Pristoceuthophilus* REHN, Trans. Amer. Ent. Soc., vol. 29, 1903, p. 17.

This genus is a development of *Ceuthophilus* and its divergence from that type is not sufficient to mark it a strongly characterized genus. The main differentiating character is the development of the fastigium of the vertex into a distinct acuteangulate hornlike projection directed forward and more or less downward. An important secondary sexual character is furnished by the dorsum of the abdomen of the male, which is ornamented by several more or less elevated tubercles or blunt spines, and sometimes with a few conspicuous smooth elevated areas (fig. 15). The unique type of the genus, *P. rhoadsi* of Rehn, an unique male from Mexico, has scarcely a trace of any dorsal roughness and the young stages of all the species, even those in which the dorsal armature is conspicuous in the adult, show few or no dorsal tubercles or elevations, especially in the earlier instars.

As a constant character in this genus, so far as known, is the inner valves of the ovipositor being furnished apically beneath with more or less rounded triangular serrations only, sometimes scarcely more than undulations, and without an apical hook. In *Ceuthophilus* the above is true only of immature specimens and of a portion only of the species in the adult form, the rest having the ovipositor armed beneath with several more or less slender subapical teeth and furnished at the tip with an apical hook.

There are seven species now referred to *Pristoceuthophilus* and other species now in *Ceuthophilus* may eventually be found to belong here. But in this connection it is well to observe carefully the fastigium of the vertex, the dorsal surface of the abdomen in the male and the ovipositor of adult females. If the vertex is smooth or furnished only with a tubercle, if the abdomen of the male is smooth above, or if the inner valves of the ovipositor of the adult is armed below with a slender subapical tooth or furnished with an apical hook, then the specimen is a *Ceuthophilus*. But if the vertex is developed into a hornlike declivitous projection, the abdomen of the male furnished above with tubercles or spines, or, usually, if the ovipositor of the adult female is unarmed beneath or furnished only with more or less rounded serrations or undulations and without an apical hook, then the specimen is a *Pristoceuthophilus*.

## KEY TO THE SPECIES OF PRISTOCEUTHOPHILUS (based on the male).

1. Dorsal surface of the abdomen with tubercles or spines and also with some elevated smooth areas..... 2.
- Dorsal surface of the abdomen without elevated smooth areas..... 3.
2. Dorsal surface of the abdomen with numerous rounded tubercles and four or five large elevated smooth areas, none of which are more than one-half as high; as broad; cerci as in figures 13 or 14..... *celatus* Scudder.



- Dorsal surface of the abdomen with numerous stout blunt spines and four elevated smooth areas, some of which are higher than broad (fig. 15); cerci as in figure 17..... *tuberculatus* Caudell.
3. Cerci as in figure 14..... *celatus* Scudder. (*nymph*).  
 Cerci as in figure 17..... *cercalis*, new species.  
 Cerci not as in either of the above..... 4.
4. Posterior femora armed beneath on the outer carina with distinct spines, or shaped as in figure 20..... 5.  
 Posterior femora armed beneath on the outer carina with serrations only, the serrated margin often terminating apically in a more or less elongate spinelike angle (fig. 18), never as in figure 20..... *marmoratus* Rehn.
5. Roughness of the dorsal surface of the abdomen consisting of a few small blunt tubercles situated mostly along the posterior borders of the segments commencing with the second or third from the base; color shining dark brown..... *salebrosus* Scudder.
- Roughness of the dorsal surface of the abdomen consisting of tubercles as above but present on all the segments and more generally distributed; color opaque yellowish brown..... *pacificus* Thomas.

PRISTOCEUTHOPHILUS CELATUS Scudder.

*Ceuthophilus celatus* SCUDDER, Proc. Amer. Acad. Sci. Arts, vol. 30, 1894, p. 48.  
*Ceuthophilus henshawi* SCUDDER, Proc. Amer. Acad. Sci. Arts, vol. 30, 1894, p. 97.

Of the synonymy of *henshawi* with *celatus* there is no doubt. The somewhat extensive series taken by the writer in British Columbia in 1903 and recorded as *henshawi* in the genus *Marsa* contained numbers of immature specimens of various sizes, some of the larger of which agree perfectly with the types of *celatus*, a fact not noticed until recently. It is unfortunate that the name *henshawi*, based on adult material, has to fall in synonymy under that of *celatus*, based on immature specimens, but accepted rules of nomenclature permit no other course.



FIG. 11.—PRISTOCEUTHOPHILUS CELATUS. HEAD, SHOWING THE VERTICAL HORN.

In this species the vertical cone is typical (fig. 11) and the dorsal surface of the abdomen of the immature male shows but a few scattered tubercles, very little elevated but distinct, but in the adult male these tubercles are very numerous and well elevated and in addition there are four or five transverse, smooth elevated areas about half as high as thick; in the full grown nymphs these elevated smooth areas are sometimes distinctly present but never conspicuous as in the adult. The structure of the cerci of the immature male differs decidedly from that of the adult; in the adult the cerci are scarcely less remarkable in form than those of *cercalis* and *tuberculata*, but very different. The cerci of the adult male is shown at figure 13 and that of the nymph at figure 14. The posterior femora is ampliate beneath and furnished with serrations only, the termination of the ampliation sometimes forming a spinelike angle (fig. 12).

In addition to authentic material named by Scudder from California and the series taken by the writer at Kaslo, British Columbia, the United States National Museum collection contains an immature

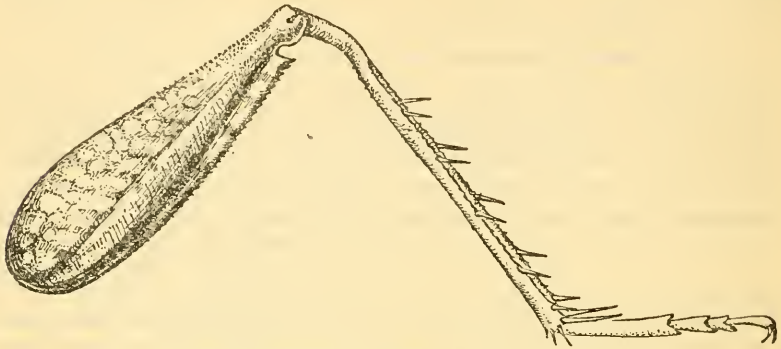


FIG. 12.—PRISTOCEUTHOPHILUS CELATUS. HIND LEG OF ADULT MALE.

pair from Dunsmuir, California, collected July 20, 1906, by Dyar and Caudell and formerly recorded as *Marsa pacifica*.

A series of two male and four female specimens of this species from the Hebard collection are labeled "Glendale, Douglas County, Ore-

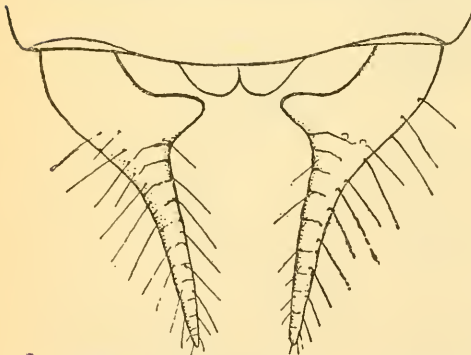


FIG. 13.—PRISTOCEUTHOPHILUS CELATUS. CERCI OF ADULT MALE.

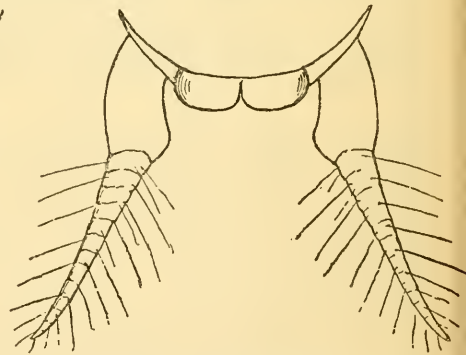


FIG. 14.—PRISTOCEUTHOPHILUS CELATUS. CERCI OF IMMATURE MALE TYPE.

gon; altitude, 1,500 feet, August 12, 1909." These were taken in the Rogue River Mountains and regarding them Mr. Hebard, the collector, writes as follows:

Found in two fir stumps under bark and in the large holes of borers in the slightly damp decayed portions of the sapwood. When exposed some remained motionless while others sprang wildly about and then as suddenly remained perfectly quiet. Such individuals were almost impossible to follow and their coloring made them almost indiscernable on the ground, in this way several escaping.

#### PRISTOCEUTHOPHILUS TUBERCULATUS Caudell.

*Marsa tuberculata* CAUDELL, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 79.

This species, a very distinct one, has not been referred to since its original description in the genus *Marsa*. The structure of the cerci

of the male is essentially like that of *cercalis*, described and figured below (fig. 17). The dorsal surface of the abdomen of the male is

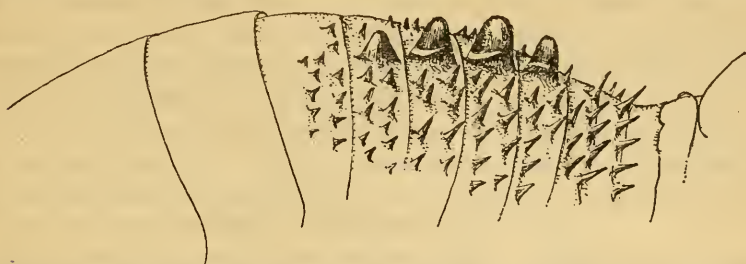


FIG. 15.—PRISTOCEUTHOPHILUS TUBERCULATUS. DORSUM OF ABDOMEN OF ADULT MALE TYPE.

characteristic in armature, being furnished with large stout spines and four conspicuous smooth elevated areas, some of which are higher than broad (fig. 15). The hind femora of this species are not

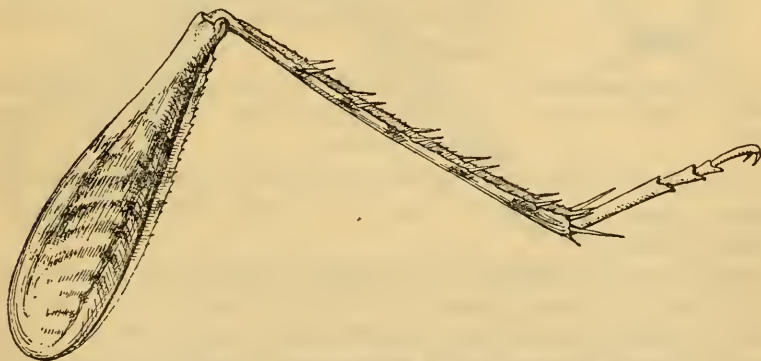


FIG. 16.—PRISTOCEUTHOPHILUS TUBERCULATUS. HIND LEG OF MALE TYPE.

distinctly ampliate beneath as in *celatus* but armed about the same as in that species (fig. 16).

PRISTOCEUTHOPHILUS CERCALIS, new species.

*Description.*—Head with the frontal horn very well developed, as characteristic of the genus, but scarcely as long and acute as in *celatus* (fig. 11); antennae not very long, apparently but little longer than the insect itself. Thoracic segments smooth in both sexes. Abdomen of the female smooth, of the male with all the segments, except one or two of the terminal retractile ones, densely covered above on the posterior half or more with large rounded tubercles. Legs moderately stout; hind femora unarmed above in both sexes and also beneath in the female except for a few very minute serrations, mostly on the inner margin; in the male the hind femora are armed ventrally on both margins with several distant short sharply pointed triangular serrations, with some much more minute ones between them, and one

large spine near the apex. Cerci of the adult male (fig. 17) differing from all other described species except *tuberculatus* in being slightly compressed basally and unsegmented to near the tip, where it is bent slightly inward and latero-apically depressed, from this depression arising a distinctly segmented terminal tapering projection consisting of about four segments; on the inner surface of the slightly inwardly inclined circus proper, at the apex opposite the depression from which the segmented apical portion arises, there is an oval elevated area covered with short pile; the cerci of the immature male are less flattened than in the adult, distinctly segmented

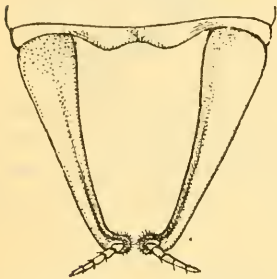


FIG. 17.—PRISTOCEUTHOPHILUS  
CERCALIS. CERCI OF ADULT MALE  
TYPE.

only toward the apex and with a slight shoulder at the point where the extreme modification in the adult is located; in the female the cerci are simple, cylindrical, and tapering, distinctly segmented apically. Ovipositor heavy, somewhat longer than the pronotum, the inner valves triangularly serrate apically beneath.

Color brown with more or less obscure mottlings of lighter color; ovipositor uniformly reddish brown.

Length, pronotum, male and female, 3 mm.; fore femora, male and female, 4 mm.; hind femora, male, 8.5 mm., female, 9 mm.; ovipositor, 5 mm.

*Holotype male*.—Yellow Bay, Flat Head Lake, Montana, August 18, 1913, Charles C. Adams, collector; allotype, same data as holotype; paratype *a*, male, *b*, *c*, females, same locality as type but date August 10; *d*, *e*, males, Mount Rainier, Washington, August 22, 1910, at Long Mire's Springs, elevation 7,200 feet; *f*, male, *g*, *h*, *i*, *j*, *k*, *l*, *m*, females, Mount Hood, Oregon, August 18–20, 1910, Cloud Cap trail, altitude, 6,000–7,000 feet, Hebard collector; *n*, male, *o*, *p*, female, Ashford, Oregon, August, 1906, Dyar and Caudell collectors.

The above material is distributed as follows:

Holotype, allotype and paratypes *c*, *e*, *l*, *m*, *n*, *o*, *p* in United States National Museum, Cat. No. 18379; *a*, *b* in collection of the University of Illinois; *d*, *f*, *g*, *h*, *i*, *j*, *k* in collection of Morgan Hebard in Philadelphia.

The paratypic material shows little variation in structure but considerable in size, the largest specimens having a pronotal measurement of 3.75 mm. in the male and 4.5 mm. in the female, while the posterior femora measure 9 mm. in length in the male and 11.5 in the female.

Regarding paratypes *f* to *m*, from Mount Hood, Oregon, Mr. Hebard, the collector, writes as follows:

In heavy conifer forest 5,300 feet, under stones and bark, many nymphs but adults scarce.

He adds that the specimens from Long Mires Springs, Washington, paratypes *d* and *e*, were taken in dense forest above the hotel, one under a boulder and one under a log.

Mr. Adams, the collector of the types of this species, writes that all his specimens were taken in woodland areas. Thus it appears as if this insect is partial to deep woodlands.

The eggs of this insect, one of which was taken from paratype *b*, are 2.5 mm. in length, one-half as broad as long and of a uniformly yellowish color.

**PRISTOCEUTHOPHILUS MARMORATUS** Rehn.

Among material in the United States National Museum determined by Scudder as *Ceuthophilus pacificus* Thomas are four specimens—2 adult males, 1 adult female, and 1 immature female—which belong



FIG. 18.—PRISTOCEUTHOPHILUS MARMORATUS. HIND LEG.

to this species. The only essential variation noticeable in this material and the type of *marmoratus*, which has also been examined, is the size of the toothlike angle terminating the lammellate ventral edge of the outer margin of the hind femora (fig. 18).

**PRISTOCEUTHOPHILUS SALEBROSUS** Scudder.

This species is now referred to the present genus for the first time. It was described from Washington, and there is a specimen referred to this species in the collection of the United States National Museum from San Francisco, California.

This insect is allied to *P. pacificus* Thomas, but the characters given in the above key indicate specific differences.

**PRISTOCEUTHOPHILUS PACIFICUS** Thomas.

This species is recorded from various places throughout nearly the whole length of California and from Nevada, and there is a male specimen referred to this species in the National Museum from Ainsworth, British Columbia.

There appears to be an unusual diversity of structure in the posterior limbs of the males of this species, indicating indeed a plurality of species. Some males seem to have the posterior femora

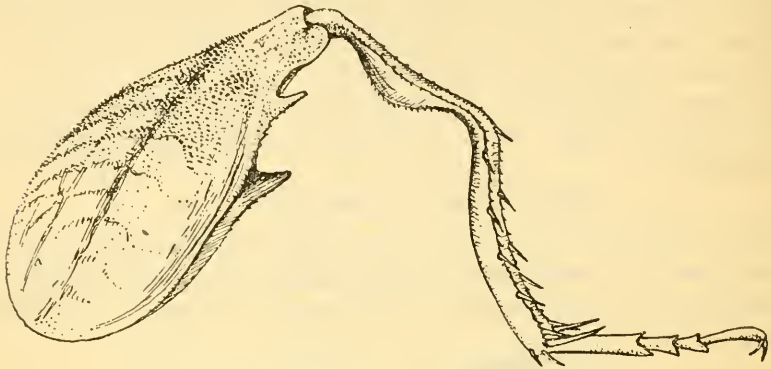


FIG. 19.—PRISTOCEUTHOPHILUS PACIFICUS. HIND LEG OF MALE TYPE.

unusually broad and heavy and armed with a single large tooth and several minute serrations on both ventral margins, as in the type specimen in the United States National Museum (fig. 19); others have

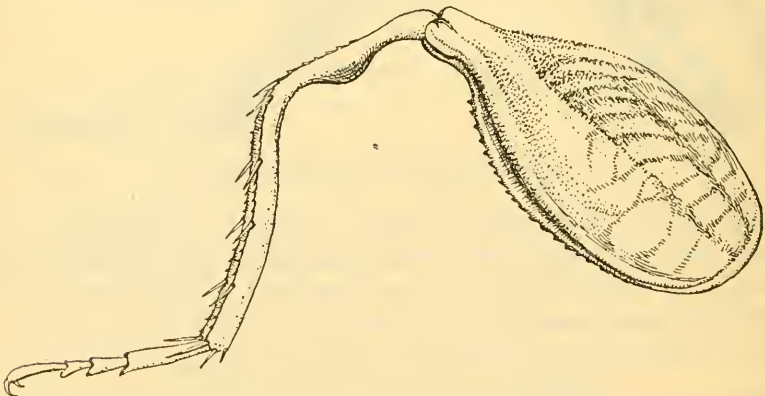


FIG. 20.—PRISTOCEUTHOPHILUS PACIFICUS. HIND LEG OF MALE IN THE SCUDDER COLLECTION.

these femora heavy, as above, but armed only with small serrations (fig. 20). A single male in the Scudder collection is the only one with this type of femora seen, and it may prove to be a distinct species.

#### Genus PHRIXOCNEMIS Scudder.

*Phrixocnemis* SCUDDER, Proc. Amer. Acad. Arts Sci., vol. 30, 1894, p. 102.

In this genus, the salient characters of which are set forth quite fully in the generic key, there are 10 species here included, 3 new species, 1 transferred from the genus *Ceuthophilus*, 2 from *Udeopsylla*, and 4 originally described in this genus, including *P. truculentus* Scudder, the designated genotype.

The forms referred to *Phrixocnemis* are, for the most part, rather closely allied, and three of them—*socorrensis*, *franciscanus*, and *serrata*—were described by Mr. Rehn from the Snow collection, in Kansas, where the types are deposited. Aside from the three above-mentioned species, the types of all our forms have been studied and the following key drawn up for their separation:

## KEY TO THE SPECIES OF PHRIXOCNEMIS.

1. Apical two dorsal spurs of the posterior tibiae about twice as long as the tibial depths and separated from each other by a distance scarcely one-half as great as the length of one of them.....*longispinosus*, new species.  
Apical two dorsal spurs of the posterior tibiae not or but little longer than the tibial depths and separated from each other by a distance about as great as, or greater than, the length of one of them (fig. 22).....2.
2. Upper outer calcar of the posterior tibiae apparently one-half or more longer than the tibial depths, by actual measurement fully twice as long.  
*obesus*, new species.  
Upper outer calcar of the posterior tibiae apparently not or barely longer than the tibial depths, by actual measurement sometimes as much as one and one-fourth as long.....3.
3. Posterior tibiae armed beneath with a single median spine near the tip; posterior femora of the male armed beneath with one or more distinct spines and the corresponding tibiae decidedly bowed.  
*truculentus* Scudder. (? *inhabilis* Rehn.)  
Posterior tibiae armed beneath with more than one spine, the apical two situated one on each side of the median line; posterior femora of the male armed beneath with serrations or tubercles only and the corresponding tibiae almost or quite straight.....4.
4. Ventral outer calcar of the posterior tibiae not or but little more than one-half as large in general bulk as the median one; the ventral spurs usually correspondingly small.....5.  
Ventral outer calcar of the posterior tibiae larger, in adults two-thirds or more as large in general bulk as the median one, the ventral spurs correspondingly larger.....*vierecki* Rehn.
5. Posterior femora of the male with some minute blisterlike tubercles on the outer face about and just beyond the middle and below the median line; ventral teeth on the outer margin of the hind femora of the male bluntly acute-conical.  
*oregonensis*, new species.  
Posterior femora of the male smooth on the outer face, the teeth of the lower outer margin sharply acute.....*neomexicanus* Thomas.  
Unplaced.....*socorrensis* Rehn, *franciscanus* Rehn, and *serratus* Rehn.

## PHRIXOCNEMIS LONGISPINOSUS, new species.

*Description*.—(Female, the male unknown.) Form moderately robust. Anterior tibiae unarmed above, armed beneath on both margins with four stout movable spurs and apically on each side with a similar spine situated laterally and near the dorsal surface; middle tibiae armed as in the anterior ones, and in addition armed above with three pair of spines similar to the ventral ones; hind tibiae armed beneath on the median line with a couple of small spines on the apical third, above armed with five spines on each margin and with a few smaller serrations between them, the last dorsal spur on

the inner side longer than the corresponding dorsal calcar<sup>1</sup> and separated from the preceding spur by a distance about twice its basal width. Fore femora unarmed above, beneath armed with one or two minute spines on each side; middle femora unarmed above except for a distinct genicular spine on the hind margin, beneath armed with two or three very minute spinules on each margin; posterior femora stout, about three times as long as the greatest width, abruptly tapering in the apical third to near the tip, the upper surface smooth, no raised points, the lower side armed on each margin in the apical part with a few very small backwardly directed, mostly distantly separated, serrations; no genicular spines on the hind femora. Ovipositor very short, about as long as the pronotum, gently upcurved, the teeth of the inner valves long and sharp; cerci about

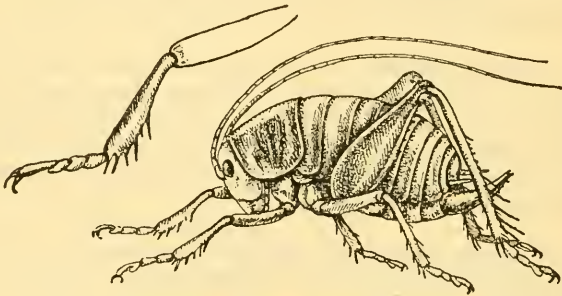


FIG. 21.—PHRIXOCNEMIS LONGISPINOSUS. ADULT FEMALE.

as long as the ovipositor, expanding to the middle of the apical third and from there tapering to the tip, sparsely covered with very long and exceedingly fine hairs.

General color yellowish with the sides of the thorax and the upper part of the abdomen and head blackish, the pronotum and mesonotum with a distinct yellowish dorsal stripe.

Length, head to the end of the abdomen, exclusive of the ovipositor, 12.5 mm.; pronotum, 3.5 mm.; fore femora, 4 mm.; hind femora, 9 mm.; ovipositor, 3.5 mm.; width, pronotum through the widest part, 4 mm.; hind femora at widest point, 3.25 mm.

*Holotype*.—Female, Govan, Washington, August 24, 1911, Mr. Hyslop collector. Type in the United States National Museum, Cat. No. 19461.

The above insect was being carried away by a predaceous wasp, *Larropsis dolosana* Rohwer.

In the long dorsal spurs of the posterior tibiae and in the lesser distance separating the two apical pair this species approaches somewhat the genus *Rhachoecnemis*.

Figure 21 shows the holotype of this species.

<sup>1</sup> This calcar shows some signs of injury, being more abruptly tapered apically than the others, and thus may really be longer than the last dorsal spur, or equally long. Only the left hind leg is present, the right one being broken off and lost.



## PHRIXOCNEMIS OBESUS, new species.

*Description*.—(Male, the female unknown.) Form robust; color shining dark brown above, merging into yellowish brown below. Head large and broad, the interocular space twice as broad as one of the eyes; palpi with the fifth segment a little longer than the third. Pronotum slightly broader than long, very broadly rounded above, the anterior margin very slightly and broadly concave, the posterior margin truncate, the lateral lobes with the lower margins nearly straight, the angles evenly rounded; meso- and metanotum together about as long as the pronotum and with the lateral lobes descending about the same distance as those of the pronotum, the lower margins broadly rounded. Abdomen smooth, broad anteriorly and narrowing gradually posteriorly; subgenital plate divided for nearly or quite its entire length; cerci medium in length and bearing numerous very fine long hairs. Anterior femora unarmed on the outer inferior margin, the inner margin armed for nearly the entire length with rounded tubercles, so densely set as to touch each other at the bases, and subapically with a single short movable spine; middle femora armed beneath on both margins with two or three short stout movable spines and several small triangular teeth; hind femora stout, about two and one-half times as long as the greatest width, armed on both ventral margins with acute teeth, above furnished with a few small acute granules; fore tibiae unarmed above, beneath armed with four moderately long stout movable spurs on each margin, the apical one the longest, and with one apical lateral spur on each side; median tibiae armed like the anterior ones and in addition have a single spur above at the apical third on the anterior side and two on the posterior side, one not quite opposite the one on the other side and one at about the basal third; posterior tibiae straight, with three or four acute triangular teeth between the dorsal spurs, which are about as long as the tibial depths, the apical one separated from the preceding by a distance a little greater than the length of one of them; apical calcears long, the outer ventral one but little less in general bulk than the median one, the upper one a third longer than the median one, being apparently one-third or more longer than the tibial depth, by actual measurement fully twice as long; beneath the hind tibiae are armed with a single preapical spur, situated mesially and of moderate size.

Length, pronotum, 6 mm.; fore femora, 6 mm.; hind femora, 12 mm.; width, hind femora at broadest point, 4.5 mm.

*Holotype*.—Alameda County, California. In the United States National Museum, Cat. No. 19462.

This specimen was determined by Scudder as *Ceuthophivus californianus*. It is apparently somewhat allied to *serrata* Rehn, but certain characters, especially the armature of the fore femora, seem

to sufficiently differentiate it from that species, as described by its author. Nor does it appear to agree with the other species unplaced in the above key.

PHRIXOCNEMIS TRUCULENTUS Scudder.

(?*Phrixocnemis inhabilis* Rehn.)

*Phrixocnemis truculentus* is the type of the genus, as selected by Rehn and Hebard, and is known to the writer only by the male type in the Scudder collection. The allotypic female is not conspecific with the holotype nor even congeneric, as stated farther on under the

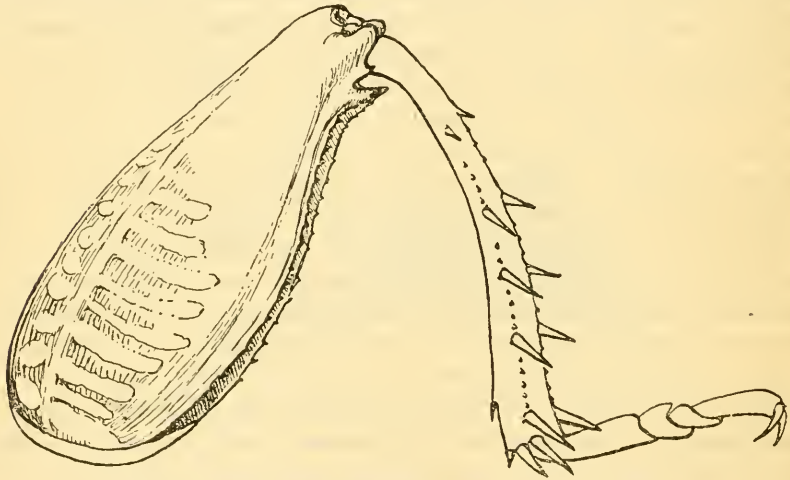


FIG. 22.—PHRIXOCNEMIS TRUCULENTUS. HIND LEG OF MALE TYPE.

treatment of *Rhachocnemis hostiferus* Rehn. The armature of the femora of the male and the distinctly curved hind tibiae of that sex will serve to separate *truculentus* from allied forms. The posterior leg of the holotype is shown at figure 22.

*Phrixocnemis inhabilis* Rehn, known only from the holotype, a female from Missouri in the Hebard collection, is very probably the female of *truculentus* Scudder.

PHRIXOCNEMIS VIERECKI Rehn.

This species was described in the genus *Udeopsylla*, but the absence of a dorsal spine on the fore femora precludes its admission to that genus. The holotype is a badly mutilated specimen found dead in Otero County, New Mexico. Besides this imperfect specimen the following material referred to this species has been examined:

One adult male, very similar to the holotype, Williams, Arizona, June 13. United States National Museum.

Two males, Jamez Hot Springs, New Mexico, July 6, 1911, and October 9, 1913, altitude 6,400 feet, John Woodgate, collector; one female, same data, but dated August 21, 1913. Hebard collection.

One male, New Mexico, the exact locality too poorly written for reading. United States National Museum.

One male, one female, adults, August 14, 1910, one male, one female, nymphs, April 13, 1910, and one female, nymph, July 27, 1910, Fort Wingate, McKinley County, New Mexico, John Woodgate collector. Hebard collection.

Two males, Williams, Arizona, March 31 and July, Barber and Schwarz collectors. United States National Museum.

One female, nymph, Flagstaff, Arizona, July 4, Barber and Schwarz collectors. United States National Museum.

The female is very similar to the male, even as to the armature of of the posterior femora and tibiae. The cerci of both sexes are long and simple and the ovipositor is about as long as the pronotum and the inner valves are armed apically beneath with four long teeth and a terminal hook. The anterior femora have one to three small spines on the lower inner margin, usually one, and the opposite margin unarmed.

There is considerable variation in the size of the specimens examined. A large female in the Hebard collection from Fort Wingate, New Mexico, shows the following measurements: Length, pronotum, 7 mm.; fore femora, 7 mm.; hind femora, 13 mm.; ovipositor, 7 mm. Other adult females are somewhat smaller.

PHRIXOCNEMIS OREGONENSIS, new species.

*Description—Male.*—Form moderately stout. Color a glistening yellow brown, with faint darker mottling above. Head as broad as the front part of the pronotum, the interocular space twice as broad as one of the eyes; palpi with the fifth segment a little longer than the third. Pronotum about as long as the mesial width, truncate anteriorly and posteriorly, the lateral lobes with the ventral margins nearly straight, the angles uniformly rounded; meso- and metanotum together about as long as the pronotum, the lateral lobes descending about as far as those of the pronotum, the lower margins broadly rounded. Abdomen smooth, tapering posteriorly; subgenital plate apparently broadly notched; cerci long and slender, bearing very fine long hairs. Fore femora without genicular spines, armed beneath on the inner margin only with one to three short movable spurs; middle femora with three or four short movable spurs beneath and a genicular spine on the posterior side only; hind femora about two and one-half times as long as broad, without genicular spines, furnished on the outer face about and just beyond the middle below the median line with some minute blisterlike tubercles, armed beneath

on the outer carina in the apical two-thirds with bluntly acute conical teeth, mostly separated by distances about equal to their own basal width, the inner carina similarly armed, the teeth slightly more acute; fore and middle tibiae just as described under *P. obesus*, except the middle ones are armed above with two or three spurs on each side instead of with two on one side and one on the other; hind tibiae barely perceptibly bowed in the apical half, the dorsal spurs no longer than the tibial depth, the apical pair separated from the preceding by a distance equal to about the length of one of them; between each of the apical four pairs of dorsal spurs there are from three to four acutely conical teeth, between the two basal pairs there being two or three more; apical calcars moderate, the ventral outer one no more than one-half as great in general bulk than the median one; dorsal calcar a little longer than the median one, slightly longer than the apical dorsal spur, the inner one the longer, the outer one a little longer than the tibial depth, by actual measurement being about one-fourth longer; beneath the hind tibiae are armed with three very small spurs situated in the apical third on the median line.

Length, pronotum, 4.5 mm.; fore femora, 4.5 mm.; hind femora, 12 mm.

*Female*.—Known only from the nymph and showing no essential differences from the male. The very short ovipositor of this specimen, which is apparently in the last instar, indicates a corresponding shortness in the adult.

*Holotype*.—Male, Mount Hood, Oregon, Cloud Cap Inn, altitude 5,837 feet, August 19, 1910, Morgan Hebard collector; allotype, female, immature, Hood River, Oregon, June, 1890, Washburn collector.

Holotype in Hebard collection; allotype in collection of the United States National Museum, Cat. No. 19463.

In the large number of serrations between the dorsal spurs of the hind tibiae this species approaches quite closely the species of the genus *Ceuthophilus*, more so than any other species of *Phrixocnemis* known to me.

Regarding the type-specimen of the present species, Mr. Hebard, the collector, writes as follows:

Under bark of log among scattered conifers near timber line, elevation 6,300 feet.

PHRIXOCNEMIS NEOMEXICANUS Scudder.

This species, as stated under *Ceuthophilus*, the genus under which it was described, is a true *Phrixocnemis*. Besides the holotype, the United States National Museum possesses two immature females, apparently almost full grown, one bearing the same data as the holotype and the other from Durango, Colorado, June 26, 1899, E. J. Osler collector; a female, also immature, from Albuquerque,

New Mexico, and one male from Williams, Arizona, May 27, Barber and Schwarz collectors. These female specimens show the armature and structure of the posterior limbs to be the same as in the male, except the ventral serrations of the femora are probably somewhat smaller; between the dorsal spurs of the hind tibiae of both sexes there are usually no serration, but sometimes there is one or two, and the second segment of the corresponding tarsi is shorter than deep

Figure 23 shows the posterior tibia and tarsus of the holotype.

*PHRIXOCNEMIS SOCORRENSIS* Rehn.

*PHRIXOCNEMIS FRANCISCANUS* Rehn.

These two species are apparently true *Phrixocnemis*, but are unplaced in the key, as the types are not available for study at this time. Specimens in the collections in Philadelphia show little structural differences from *P. vierecki*, but are smaller.

*PHRIXOCNEMIS SERRATA* Rehn.

The remarks on the above species also apply here. This species was described in the genus *Udeopsylla*, but the absence of a dorsal spine on the anterior femora excludes it from that genus. Its true generic position is clear from material determined by Rehn in the collection of the Philadelphia Academy of Sciences.

*PHRIXOCNEMIS*, species.

In the Hebard collection is a single male specimen of a dark-brown color and with a reddish stripe above, which runs out in the key of species to *P. neomexicanus*, but is too large, and the color is not as in the known specimens of that species. The pronotum of this specimen is 5 mm. long and the hind femora measures 11 mm. in length. The locality is West Point, Nebraska, and the date May 20. It probably represents a new species, but until more material is available for study it is thought best to not describe it as such.

*RHACHOCNEMIS*, new genus.

This genus is allied to *Phrixocnemis* Scudder, but the long, close-set dorsal spurs of the posterior tibiae impart a very different general appearance. These spines are long and heavy, those toward the tip on the inner margin being twice as long as the tibial depths at the point of attachment and separated by a distance no greater than the width of one of them (fig. 24). The upper apical calcar is situated dorsally and directed upward, thus differing scarcely at all from the dorsal spurs. The tarsi are typically all four segmented, but in



FIG. 23.—*PHRIXOCNEMIS NEOMEXICANUS*. HIND TIBIA AND TARSUS OF MALE TYPE, INNER SIDE.

*R. hostiferus* Rehn the anterior tarsi have but three segments. The general structure of the head and body is as in *Ceuthophilus*. The subgenital plate of the male is apically deeply divided, the angles elongate, of the female apically entire; cerci of both sexes cylindrical and tapering gradually to a point.

Besides *R. validus* Scudder, type of the genus, there is to be referred to this genus the allied *Phrixocnemis bellicosus* of Scudder and the somewhat aberrant *Phrixocnemis hostiferus* of Rehn. This last species is distinguished most remarkably by having the anterior tarsi with but three segments, as mentioned above in the generic diagnosis. The only other members of this subfamily with three segmented anterior tarsi, so far as known to me, are the two species of *Daihinia*, where, however, the hind tarsi are also three-jointed. Another character in which *hostiferus* differs from the more typical members of this genus is the structure of the posterior tarsal segments, which are prolonged posteriorly beneath as very long acute angles (fig. 24).

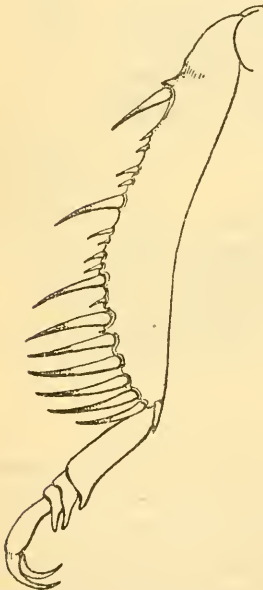


FIG. 24.—RHACHOCNEMIS HOSTIFERUS. HIND TIBIA AND TARSUS OF FEMALE TYPE, INNER SIDE.

A male specimen in the United States National Museum from Colorado Springs, Colorado, which I have referred to *R. hostiferus* with some doubt, is somewhat larger than the female holotype, and the posterior femora are armed beneath at the apical third on the outer carina with a single very long heavy spine with a few black-tipped serrations following it, the inner carina armed on the apical three-fourths with several similar serrations. This armature is very different from that of either of the other two known species of the genus.

The allotype of Scudder's *Phrixocnemis truculentus*, a single female from Colorado, is not conspecific nor congeneric with the male holotype from Nebraska, but is a *Rhachocnemis* and a synonym of *R. hostiferus* Rehn, with which it agrees, except that one of the spines of the outer ventral carina of the hind femora is decidedly larger than the others, while in the holotype of *hostiferus*, which is in the United States National Museum, there is no such inequality. The fact that the anterior tarsi of *hostiferus* are three jointed evidently escaped the notice of both Scudder and Rehn, as neither make mention of this peculiarity.

*Type of the genus.*—*Rhachocnemis validus* Scudder.

## Genus DAIHINIA Haldeman.

*Daihinia* HALDEMAN, Proc. Amer. Assoc. Adv. Sci., vol. 2, 1850, p. 346.

This genus is remarkable in the structure of the fore and hind tarsi, where there are only three segments developed instead of four, as in all other known genera of the subfamily. The fastigium of the vertex is not tuberculate and the antennae are not very long; the palpi are short, the third and fifth segments of about equal length, the fifth sulcate ventrally in the apical half, fourth segment a little shorter than the third or fifth, the first and second not or barely more than half as long as the third, the first the shorter. Pronotum truncate before and behind; lateral lobes subquadrate or slightly longer than high, the lower margins horizontal and broadly rounded; meso and metanotum together approximately as long as the pronotum, the lateral lobes descending about as far as those of the pronotum, their lower margins rounded. The posterior femora are armed beneath in the type-species, *brevipes*, and unarmed in *phrixocnemoides* Caudell; hind tibiae armed above on both margins with about half a dozen very large spines, those on the inner margin somewhat longer, a few small serrations between some of the longer spines, especially on the basal half of the tibia. Ovipositor moderately stout and somewhat longer than the pronotum, the inner valves in the adult armed beneath with four long subapical teeth and terminated by an apical hook; subgenital plate of the male deeply fissured apically.

There are two species referred to this genus and they may be separated as follows:

## KEY TO THE SPECIES OF DAIHINIA.

- Posterior femora of both sexes armed beneath; hind tibiae with the large dorsal spurs naked and the apical four on the inner margin mostly separated by spaces fully as great as their own width (fig. 25); claws of hind tarsi scarcely more than one-half as long as the segment from which they arise ..... *brevipes* Haldeman
- Posterior femora of female, and probably also of the male, unarmed beneath; large dorsal spurs of the hind tibiae distinctly pilose and the apical four or five mostly separated by distances scarcely as great as their own width; claws of hind tarsi almost as long as the segment from which they arise ..... *phrixocnemoides* Caudell.

## DAIHINIA BREVIPES Haldeman.

This species, the type of the genus, is a large robust brown insect occurring from Louisiana, the type-locality, north to Wyoming and North Dakota. In size it varies moderately, adults before me measuring as follows:

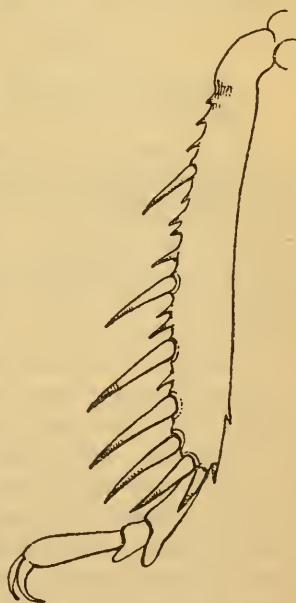


FIG. 25.—DAIHINIA BREVIPES. HIND TIBIA AND TARSUS OF FEMALE, INNER SIDE.

Length, males and females, pronotum, 6-7 mm.; hind femora, 12-15 mm.; ovipositor, 10-11 mm.

The males have remarkably heavy posterior femora, which are as broad as or broader than the pronotal length, tapering but very moderately at either end and armed beneath on the apical half of the outer carina with three or four heavy spines, the inner carina with several small tubercles.

**DAIHINIA PHRIXOCNEMOIDES** Caudell.

This species, which was described from a single female specimen from New Mexico, has been sent in to the United States National Museum

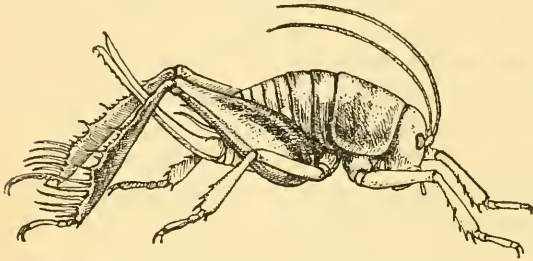


FIG. 26.—*DAIHINIA PHRIXOCNEMOIDES*. FEMALE TYPE.

from Pony, Texas, by Mr. Pryor Mapes, with the statement that they occur in that locality in injurious numbers, the damage done being the cutting off of plants at night. Specimens of both sexes were received in February and April,

1914, but unfortunately all were immature. The males, so far as shown by this material, do not differ materially from the females. Figure 26 shows the holotype.

**Genus UDEOPSYLLA** Scudder.

*Udeopsylla* SCUDDER, Can. Nat. and Geol., vol. 7, 1862, p. 284.

*Marsa* WALKER, Cat. Derm. Salt. Brit. Mus., vol. 2, 1869, p. 253.

The presence of a dorsal spine about or just beyond the middle of the anterior tibiae on the inner side will serve to readily separate this genus from allied forms in which the second segment of the hind tarsi is no longer than deep. Rarely one or both anterior tibiae will have two dorsal spines instead of a single one, and I have seen one specimen, a female in the Hebard collection, with two on one tibiae and three on the other.

A study of the unique male type of *Marsa arcuata* Walker in the British Museum, made by the writer in 1913, showed without doubt that it is a synonym of the type species of the genus *Udeopsylla*, the *Phalangopsis (Daihinia) robusta* of Haldeman. Thus the genus *Marsa* Walker falls into the synonymy under *Udeopsylla* Scudder.

The posterior femora of the male *Udeopsylla* have the same heavy broad shape as described under *Daihinia*, but lack the heavy spines on the lower outer carina as present in that genus, here this carina being armed only with a number of sharp triangular serrations, the inner margin with longer ones, forming short stout spines.

There appears to be but a single species referable to *Udeopsylla*. This is the *U. robusta* of Haldeman, the type of the genus. It is a large, robust insect exhibiting unusual variation in both size and color.



A large black male specimen in the Scudder collection has the pronotum 9 mm. long and the posterior femora 23 mm. Black and brown ones almost as large are in the collection of the United States National Museum, while other apparently fully grown males are much smaller. The posterior femora vary considerably in comparative length, ranging from two and one-half to three times the length of the pronotum, but this variation is correlated with neither habitat nor color. The insects vary in color from the uniform black, through various shades of dark brown to a nearly uniform yellowish brown. There seems to be a complete gradation in this variation of both size and color. The extremes occupy common ground and are evidently of no racial distinctness, though certain forms may be designated as color varieties. The color varieties thus recognizable may be separated by the following key:

KEY TO THE COLOR VARIETIES OF *UDEOPSYLLA ROBUSTA*.

1. General color black, top of thorax and legs sometimes lighter. . . . . *nigra* Scudder.  
General color ranging from dark brown to medium or light reddish or yellowish brown. . . . . 2.
2. General color ranging from dark brown to medium reddish brown, sometimes noticeably marked with blackish . . . . . *robusta* Haldeman.  
General color an almost uniform light yellowish brown. . . . . *devius* Scudder.

*UDEOPSYLLA ROBUSTA* Haldeman.

*Udeopsylla robusta* HALDEMAN, Proc. Amer. Assn. Adv. Sci., vol. 2, 1850, p. 346.

*Marsa arcuata* WALKER, Cat. Derm. Salt. Brit. Mus., vol. 2, 1869, p. 254.

*Udeopsylla compacta* BRUNER, Can. Ent., vol. 23, 1891, p. 38.

*Ceuthophilus politus* SCUDDER, Proc. Davenport Acad. Sci., vol. 9, 1902, p. 56.

This, the most common form, and the typical variety, occurs in various shades of brown and reddish brown connecting the black *nigra* with the yellowish-brown *devius*. In the synonymy under this form is to be placed the *Ceuthophilus politus* of Scudder,<sup>1</sup> the type of which has been studied and found structurally the same as *robusta* and agreeing in color. Scudder states that the anterior femora of *politus* are unarmed beneath on the inner margin, but it really has a distinct preapical spine.

*Udeopsylla compacta* Bruner is correctly listed in the synonymy under *robusta*.

As stated under the discussion of the genus, the type of *Marsa arcuata* Walker was examined and found to be a *Udeopsylla* referable to the synonymy under the present variety. The unique male type measures as follows: Pronotum, 7 mm.; fore femora, 8.5 mm.; hind femora, 14 mm. The color of this specimen is lighter than usual, varying toward the unicolorously light-yellowish variety *devius*. The pronotum is margined anteriorly and posteriorly with darker color, as are also the meso- and metathorax posteriorly.

<sup>1</sup> Proc. Davenport Acad. Sci., vol. 9, 1902, p. 56.

## UDEOPSYLLA NIGRA Scudder.

*Udeopsylla nigra* SCUDDER, Can. Nat. and Geol., vol. 7, 1862, p. 284.

*Ceuthophilus niger* SCUDDER, Bost. Journ. Nat. Hist., vol. 3, 1862, p. 437.

*Daihinia gigantea* BRUNER, Bull. Washb. Coll., vol. 1, 1885, p. 127.

*Ceuthophilus ater* SCUDDER, Proc. Davenp. Acad. Sci., vol. 9, 1902, p. 57.

This form is distinguished by the general black color. The blackish color of *Udeopsylla gigantea* Bruner, originally described in the genus *Daihinia*, indicates that it should be placed here and *Ceuthophilus ater* Scudder, as determined from a study of type material, is but a nymph of this insect. *Ater* is nothing but a still younger and darker specimen than *Ceuthophilus politus*, placed above in the synonymy under the typical form *robusta*.

*Ceuthophilus niger* Scudder is a synonym of *Udeopsylla nigra* and was described in November, six months later than *U. nigra*.

## UDEOPSYLLA DEVIUS Scudder.

*Ceuthophilus devius* SCUDDER, Proc. Amer. Acad. Arts Sci., vol. 30, 1894, pp. 30, 99.

The type of this species has been examined and found to be a true *Udeopsylla* and separable from the typical form only by the almost uniform light yellowish brown color. It is therefore here transferred to this genus and designated a color variety of *robusta*.

## Genus HEMIUDEOPSYLLA Saussure and Pictet.

*Hemiudeopsylla* SAUSSURE and PICTET, Biol. Cent. Amer., Orth., vol. 1, 1897, p. 300.

This genus seems very closely allied to, if not identical with, *Ceuthophilus*. The type-specimen of the genotypic species, *H. genicularis* Saussure and Pictet, a single male with the posterior tibiae missing, was seen in 1913 at a time when more than a casual glance was impossible, and a note written at that time states that it looks like a *Ceuthophilus* with the hind femora finely serrated beneath. This same note states that the type material of *H. forreriana* Saussure and Pictet, consists of a small female and a minute legless male, probably also a *Ceuthophilus*.

Two species of this genus have been recorded from the region covered by the present paper, *H. platyceps* Saussure and Pictet and a species named and recorded by Saussure and Pictet as *Hemiudeopsylla californiana* Scudder, under the impression that it was the insect described under that specific name by Scudder in the genus *Ceuthophilus*. But, as pointed out by Scudder,<sup>1</sup> their description does not at all fit this species. From the structure of the vertex as described by Saussure and Pictet it seems probable that the specimen

<sup>1</sup> Canadian Entomologist, vol. 31, 1899, p. 121.

described by them is a species of *Pristoceuthophilus*. A photograph of this specimen was kindly sent the writer some years ago by the director of the Musée d'Histoire Naturelle of Geneva and an outline drawing made from this photograph is here reproduced (fig. 27).

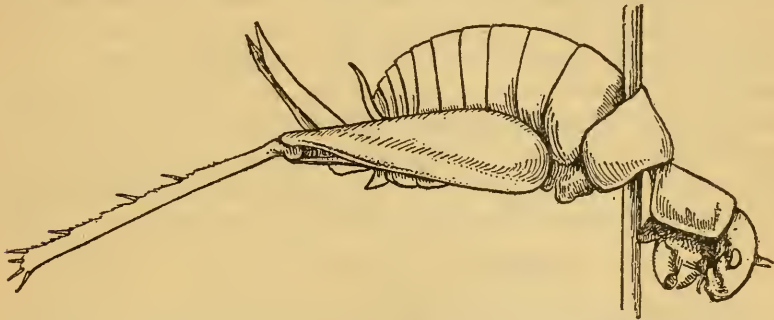


FIG. 27.—HEMIUDEOPSYLLA CALIFORNIANA. ADULT FEMALE TYPE, FROM PHOTOGRAPH.

This photograph, considerably enlarged though it is, fails to show sufficient details to enable the correct placing of the species. If, upon examination of the specimen, this insect proves distinct from any described form, a new name will be necessary for it.

Together with the above-mentioned photograph was received one of the second United States species, *H. platyceps* Saussure and Pictet.

An outline drawing of the hind tibia and tarsus made from this photograph is also here reproduced (fig. 28).

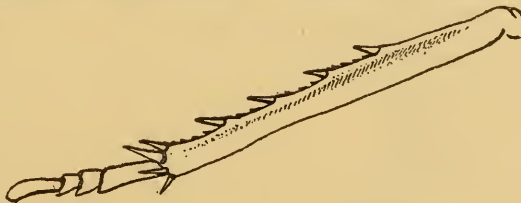


FIG. 28.—HEMIUDEOPSYLLA PLATYCEPS. HIND TIBIA AND TARSUS OF MALE TYPE, FROM PHOTOGRAPH.

#### CNEMOTETTIX, new genus.

The material upon which this genus is based was found in a neglected lot of alcoholic specimens after the page proof of this article was received and only a brief discussion of its characters can therefore be inserted. The vertex is entire and the legs short, the hind femora scarcely as long as the body, but the most important characters lie in the tibiae and tarsi. The tarsi have more or less well-developed pulvilli beneath, double on the metatarsus, the fore tibiae are without hearing organs, and the hind tibiae are armed above with a series of stout elongate-triangular inarticulate spurs of which about every alternate one is approximately twice as large as the others, the

longest scarcely more than half as long as the tibial depth; fore tibiae unarmed above except apically. Ovipositor twice as long as the pronotum, decidedly curved upward and entirely unarmed.

This genus is structurally allied to *Gammarotettix* and the presence of pulvilli in both genera indicates that they might better be referred to the subfamily Stenopelmatinae. The new genus is readily distinguishable from *Gammarotettix* by the undivided vertex and the possession of much longer apical calcears of the hind tibiae. *Diestrammena* and *Tropidischia* share with the present genus and *Gammarotettix* the character of inarticulate dorsal spurs on the hind tibiae, but those long-legged insects have no indication of pulvilli.

*Type of the genus.*—*Cnemotettix pulvillifer*, new species.

CNEMOTETTIX PULVILLIFER, new species.

In general appearance this species resembles those of the genus *Phrixocnemis*. The general color is yellowish brown mottled with darker brown. The head is marked on each side above and below the eyes with a narrow black streak and the frontal costa between the antennae is infuscated.

Length, pronotum, male, 3.5 mm., female, 4 mm.; hind femora, male, 10 mm., female, 12 mm.; ovipositor, 9 mm.

Described from one adult and two immature males and one adult female from San Clemente Island, California, T. L. Casey, collector. Holotype here selected, adult male. Catalogue No. 19965 U.S. Nat. Museum.