Plant Quar


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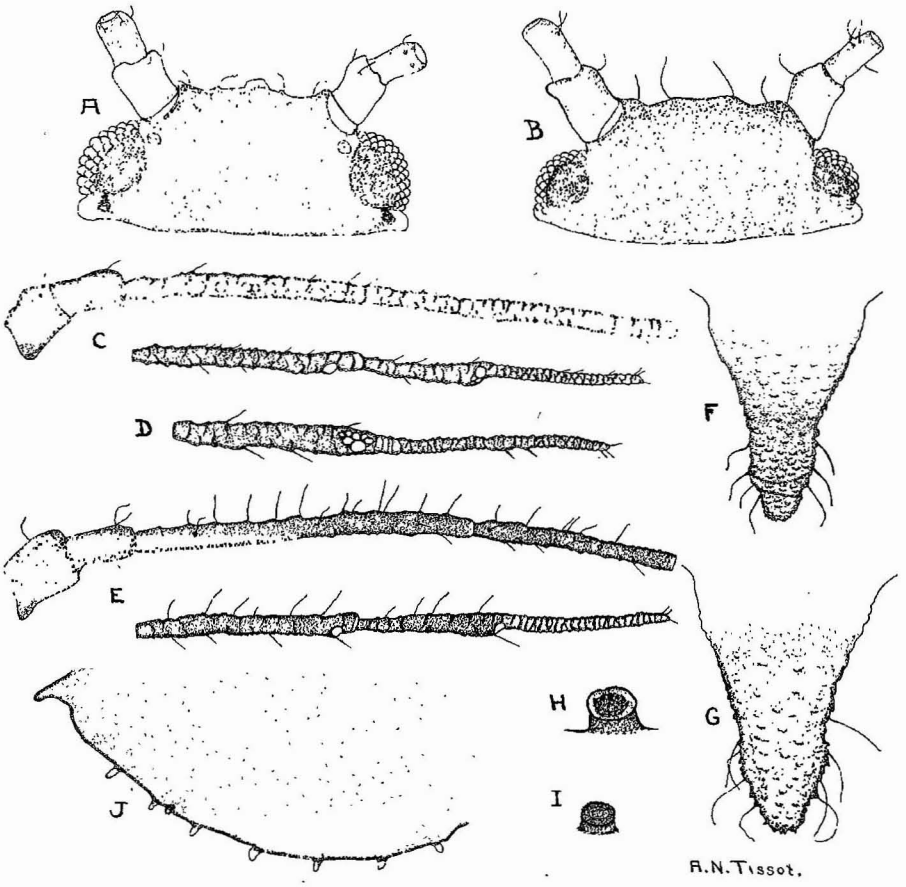
## A NEW DOGWOOD APHID FROM FLORIDA*


A. N. TISSOT


**Explanation of Plate**—A, head, C, antenna, D, sixth segment more enlarged showing group of small sensoria, F, cauda, H, cornicle, J, right side of abdomen showing lateral tubercles and cornicle of alate vivipara; B, head, E, antenna, G, Cauda, I, cornicle of apterous vivipara.

*Contribution from Department of Entomology, Florida Agricultural Experiment Station.


Published March 14, 1929

**Pergandeidia corni** n. sp.

Early in April 1928 a few colonies of this aphid were found feeding on the underside of the leaves and along the tender shoots of one of the small flowered dogwoods, *Cornus microcarpa* Nash. The aphids were confined to two or three plants growing in close proximity to each other and a careful examination of all other plants of this species growing within several rods of this area failed to reveal a single specimen of the aphids and they have never been found in any other locality. At this time about half of the mature individuals were winged and the rest wingless. For the next few weeks there was little change in the number of colonies or of the individuals in them but by early summer the number of insects decreased rapidly and by midsummer only a very few specimens could be found; however they were never entirely absent which would seem to indicate that they have no alternate food plant or at least that they can spend the entire time on the dogwood. When the weather became cool in the fall they began to increase in numbers and by the first of November there were a few flourishing colonies. At no time in the fall were any winged individuals or any with wing pads found. By February no sign of any sexual forms had appeared so it seems probable that this species reproduces parthenogenetically during the entire year in Florida.

The colonies are always covered with a woolly gray wax, the insects themselves often being completely hidden from view. They are not easily disturbed but when they move about they carry a mass of the woolly matter with them. On dropping the insects into alcohol or when mounting the live insects in balsam this waxy material instantly disappears.

These insects appear to be entirely independent of any other species of insects. Ants have never been observed attending the colonies and at no time have any parasites or predators been found. The feeding of the aphids has no apparent effect on the host plant except that the leaves bearing the colonies may be somewhat stunted in size. After all living aphids in a colony have disappeared some of the woolly material and cast skins often adhere to the under side of the leaf for several weeks or even months.

## **Pergandeidia corni** n. sp.*

**Apterous vivipara.**—Body covered with light-grayish waxy material. When this is removed the brown color of the body is revealed; this brown color uniform in all parts of the body with the exception of the mid-portion of the abdomen where the embryoes show through the body wall as lighter areas; length of body including cauda 1.71 to 2.11 m.m.; head rounded in front without antennal tubercles, eyes rather small, black; antennae brown, slightly shorter than the body, armed with a few rather prominent hairs, without sensoria except the primary apical one on the fifth segment and a group of small ones at the base of the spur of the sixth segment; antennal III, 0.35 to 0.42 m.m., IV, 0.20 to 0.25 m.m., V, 0.22 to 0.26 m.m., VI, 0.14 + 0.18 to 0.15 + 0.24 m.m.; rostrum extending to the third coxae; legs rather long and slender, uniformly brown in color; tibiae 0.88 to 1.00 m.m. long; thorax and abdomen with prominent lateral tubercles; cornicles very small and inconspicuous though visible in freshly mounted specimens, but usually invisible in specimens that have been mounted in balsam for some time, 0.022 m.m. long, scarcely as long as wide; cauda brown, long, broad and tapering with only a few (usually four on each side) rather prominent hairs; anal plate brown, almost hemispherical, with several hairs.

**Alate vivipara.**—Size 1.44 to 2.17 m.m. long; head olive-brown without antennal tubercles, rounded in front with very prominent median ocellus, eyes black with rather large ocular tubercles, rostrum brown reaching to third coxae, antennae uniformly brown thruout their length with a few minute hairs, first two segments thick remaining segments slender, antennal III, 0.35 to 0.41 m.m. long and armed with 7 to 10 more or less circular sensoria which are very irregular in size and arranged in a generally straight row extending most of the length of the segment; IV, 0.18 to 0.26 m.m. with 0 to 2 sensoria which may be located anywhere on the segment; V, 0.21 to 0.24 m.m. without sensoria except the apical primary one; VI, 0.13 + 0.17 to 0.14 + 0.22 m.m. with a group of several small seensoria at the base of the spur; prothorax reddish-brown with a prominent tubercle on each side, other two segments dark brown; legs long and slender uniformly brown except a small basal portion of the femora which is lighter brown; tibiae 0.82 to 1.04 m.m. long; wings hyaline, veins dark brown or black, stigma dusky, forewings considerably longer than the body 2.24 to 2.66 m.m. in length, rather narrow, the median vein twice branched the second fork usually being quite near the tip of wing, hind wing comparatively small and narrow, both media and cubitus present; abdomen a uniform reddish-brown except in the central portion where the embryoes show through the body wall as lighter colored areas, seven prominent lateral tubercles on each side; cornicles brown, inconspicuous, not easily visible in specimens that have been mounted in balsam for some time but more easily seen in freshly mounted specimens, 0.033 m.m. long, length about equal to the width; cauda large with 3 or 4 hairs on each side, dark brown; anal plate rounded with several slightly curved hairs.

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*The writer wishes to express his thanks to Dr. P. W. Mason of the U. S. Bureau of Entomology and to Mr. G. F. Knowlton of the Utah Agricultural Experiment Station for their opinions concerning this form.

Described from numerous alate and apterous viviparous females. Color notes made from fresh specimens, measurements from specimens mounted in balsam.

All specimens were collected by the writer in the grounds of the Florida Agricultural Experiment Station at Gainesville.

In addition to the writer's collection, cotypes are in the collections of the Florida Agricultural Experiment Station, of the U. S. National Museum and of Mr. G. F. Knowlton.

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## A NEW JUNIPER APHID FROM UTAH
### WITH NOTES ON A FEW OTHER SPECIES
### PART II

GEORGE F. KNOWLTON
Utah Agricultural Experiment Station

**Chromaphis juglandicola** (Kaltenbach)

This small yellow aphid occurs on the underside of the leaves of English walnut, *Juglans regia* L. In Utah, it ordinarily occurs in small numbers, but during the summers of 1923 and 1925 it occasionally became abundant enough at Brigham City and at Salt Lake City to cause a slight smutting of the foliage.

**Euceraphis flava** Davidson

This aphid was collected in American Fork Canyon, Utah, on July 6, 1925. The winged female produces a woolly secretion over the body, and feeds on the underside of the leaves of the alder, *Alnus tenuifolia* Nutt. This collection was made at an elevation of 7000 feet.

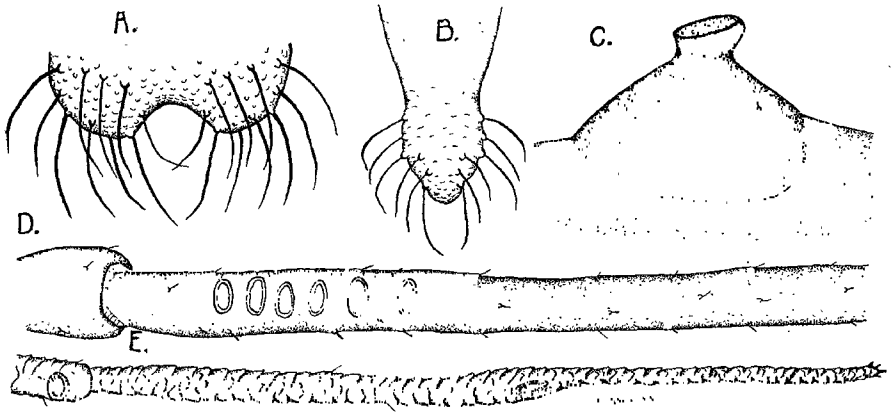


Fig. 2.—*Euceraphis flava* Davidson.—A, anal plate; B, cauda; C, cornicle; D, base of third antennal, showing sensoria; E, sixth antennal, all of alate female.

Described from numerous alate and apterous viviparous females. Color notes made from fresh specimens, measurements from specimens mounted in balsam.

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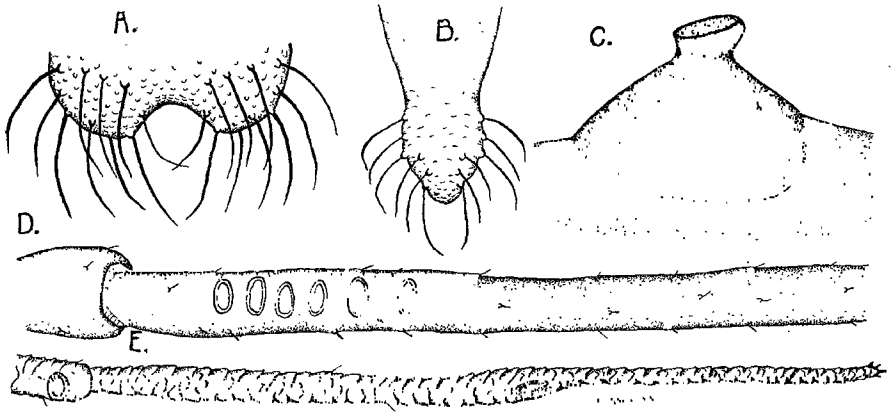


Fig. 2.—*Euceraphis flava* Davidson.—A, anal plate; B, cauda; C, cornicle; D, base of third antennal, showing sensoria; E, sixth antennal, all of alate female.

**Alate vivipara.**—Color whitish-yellow; covered with whitish waxy material; size 3 mm. long; rostrum short, not reaching second coxae; antennal tubercles moderately developed; antennae long and slender, with distal ends of III, IV, V, and all of VI dusky; antennal I, 0.13 mm. long, and rather thick; II, 0.07 mm.; III, 1.2 mm. long, and armed with 5 to 6 transversely oval sensoria on basal fourth of segment; IV, 0.75 mm.; V, 0.62 mm.; VI, 0.34 + 0.22 mm.; legs long and slender; hind tibia 2 mm. long; front wings fairly large, with media twice branched, stigma rather pale, veins slender and tan; hind wings with the media and cubitus present, veins pale; prothorax with a longitudinal dusky band on either side of the median line extending the length of this segment; abdomen elongate, narrow, and armed with dusky dorso-lateral tubercles on segments 2, 3 and 4, and with a smaller, lighter-colored pair on the segment back of the cornicles; cornicles blackish-brown, with broadly swollen bases; cauda with slight constriction but not knobbed; anal plate bilobed but not deeply divided.

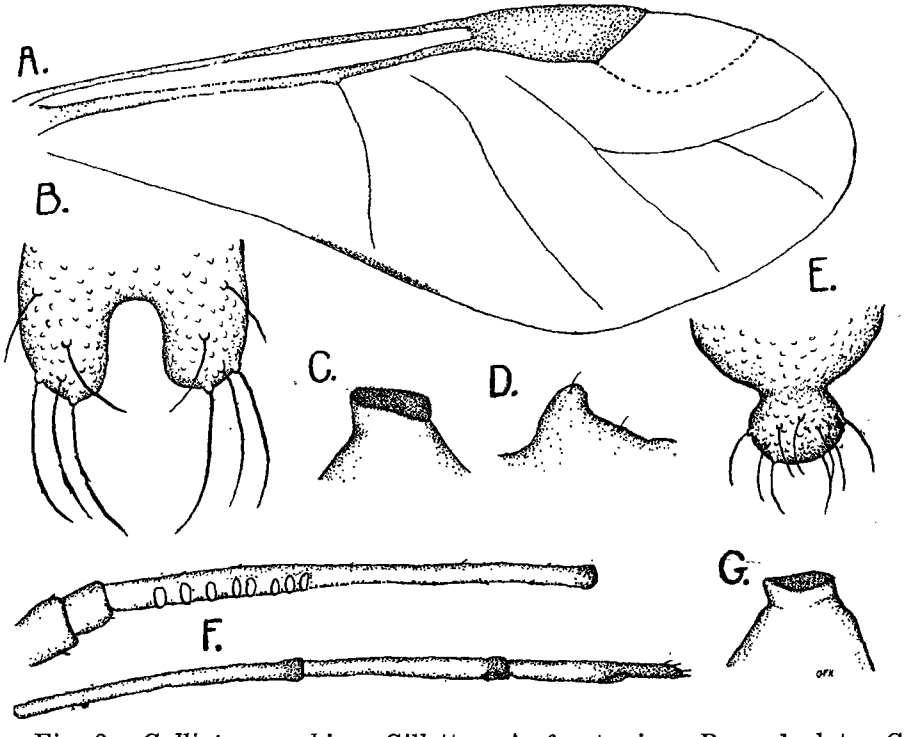


Fig. 3.—*Callipterus robinae* Gillette.—A, front wing; B, anal plate; C, cornicle; D, lateral tubercle; E, cauda; F, antenna; G, cornicle. All drawings of alate female.

## **Callipterus robinae** Gillette

This tiny little yellow aphid occurs rather commonly in Utah, feeding on the leaves of locust, *Robina neomexicana* Gray. The winged individuals are very active, and either fly or drop at the slightest disturbance.

**Alate vivipara.**—Color lemon yellow to pale yellow; size 1.5 to 1.7 mm. long; rostrum short, not reaching the second coxae; head rounded in front, with a prominent median ocellus; antennae about the length of the body and pale except distal ends of segments III to VI, which are dusky; antennal III, 0.5 to 0.63 mm. long, and armed with 6 to 10 rather large, transversely oval sensoria, which are situated on the basal half of the segment; IV, 0.29 to 0.38 mm.; V, 0.24 to 0.33 mm.; VI, 0.11 + 0.06 to 0.13 + 0.07 mm.; legs moderately long; front wings with radial sector poorly developed; hind wings with veins rather transparent; cornicles truncate, much larger at base; cauda knobbed; anal plate bilobed.

On July 7, 1925, this aphid was quite abundant at Fillmore, Levan, and Meadow, Utah. Since that time specimens have been collected in Utah at Brigham City, Farmington, Mona, Provo, Salt Lake City, and Tremonton. The writer has also collected this form at Preston, Idaho.

### **Aphis gregalis** Knowlton

This rather common rabbit-brush aphid shows considerable variation as to the length and presence or absence of a bend in the cornicles. In the case of specimens taken at Lehi, the cornicles of both alate and apterous forms range from 0.11 to 0.13 mm. in length and are more noticeably bent in the winged forms. Individuals from Amalga, Smithfield, and Trenton had cornicles ranging in length from 0.11 to 0.19 mm. in the wingless and 0.1 to 0.13 mm. in length in winged forms. With the wingless forms the cornicles were usually slightly bent, but in some cases the cornicles were straight. The same variation occurs in forms from other parts of the state.

This species has been collected in Utah from the following additional localities: Brigham City, Castle Dale, Harper, and Huntington.

### **Forda olivacea** Rohrwer

The dark winged form of this species was collected at Cornish, Utah, on June 17, 1926. The host plant was sage brush, *Artemisia tridentata.* At Elsinore on July 27, 1927 another winged form was collected on rabbit brush, *Chrysothamnus parryi.* Both of these plants were probably accidental lighting places for this aphid, rather than regular hosts.

The greenish-yellow wingless females have been collected on grass roots in considerable numbers at Cedar Canyon, Logan, and Logan Canyon, in Utah. The writer also collected this form in Emigration Canyon, Idaho, on June 24, 1925.

The grasses upon which this insect has been collected in Utah include *Bromus marginatus, B. ciliatus, Eriocoma cuspidata, Hordeum* sp., *Phleum alpinum* and *Poa pratensis.*

This species has been reported as occurring on wheat, oats, barley, timothy,[4] and a number of other grasses.

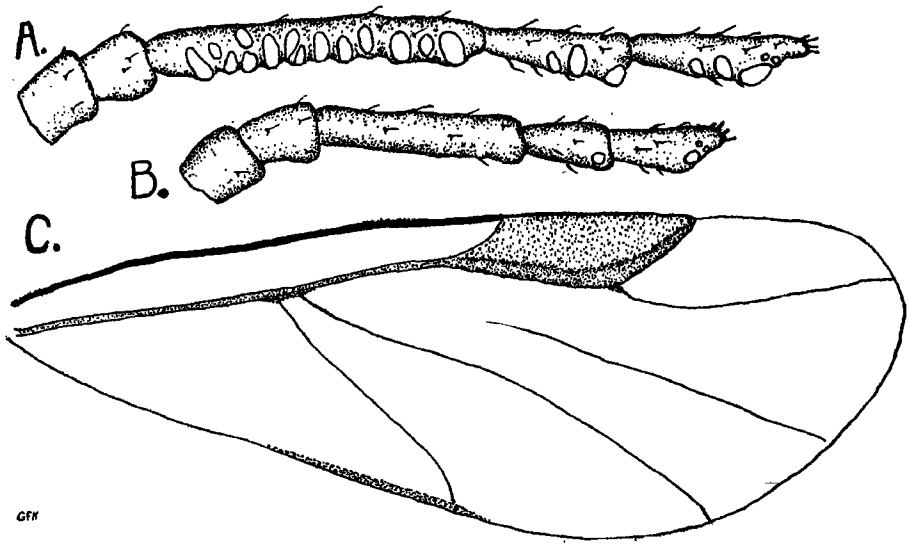


Fig. 4.—*Forda olivacea* Rohwer.—A, Antenna of alate female; B, antenna of apterous female; C, front wing of alate female.

### **Essigella fusca** Gillette and Palmer

A few of these active, small black aphids were collected in Logan Canyon, Utah, on June 23, 1925. Only wingless forms were taken, and these were feeding on the needles of lodgepole pine, *Pinus murrayand.*

### **Durocapillata utahensis** Knowlton

On August 16, 1927, the wingless forms of this species were very abundant on rabbit brush, *Chrysothamnus viscidiflorus,* in Emigration Canyon and northeast of Preston. The aphids were heavily attacked by syrphid larvae and ladybird beetles. The tip growth of affected plants was twisted in the manner found typically in Blacksmith Fork Canyon,[5] in Utah, where this insect commonly occurs.

This aphid presents a peculiar combination of Macrosiphini

[4]Gillette, C. P. Some Grass-Root Aphids (Hem., Hom.). *In* ENTOMOL. NEWS, Vol. XXIX (October, 1918), p. 284.

[5]Knowlton, G. F. A New Rabbit Brush Aphid From Utah. *In* Annals Ent. Soc. America, Vol. XX, No. 2, June 1927, pp. 229-231.

and Aphidini characters. In general body form and in the length of antennae, this form resembles the Aphidini. The body hairs, however, are apically enlarged and prominent, the antennal tubercles are somewhat developed, and migration occurs once a year, for distribution rather than having an alternate host relationship. The writer places this form with the Macrosiphini.

**Aphis oregonensis** Wilson

This species was collected at Brigham City, Utah, on May 23, 1927. Winged and wingless forms were present, feeding on sage brush, *Artemisia tridentata.*

Two very peculiar individuals were observed in this collection. The front wings were entirely absent, and apparently had not developed at all, while the hind wings were normal and well-developed.

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## TWO NEW SPECIES OF CEUTHOPHILUS FROM THE SOUTHEASTERN UNITED STATES

### WITH SYNONYMICAL NOTES ON OTHER SPECIES OF THE GENUS

(Orth., Tettigon., Rhaphidophorinae)

By THEODORE H. HUBBELL
University of Florida, Gainesville, Florida

The following descriptions and notes are published in advance of a general revision of the genus which I have in preparation, in order that the names may be available for use in a forthcoming list of the Orthoptera of North Carolina. Fuller discussion of the relationships of the new species and of the synonymy here indicated is reserved for the paper in which the results of the completed study will be presented.

Certain terms used in this paper should first be explained. In many—possibly in most—of the species of the genus Ceuthophilus great variation in adult size is found in series from the same locality; especially is this true of the male sex. Not only do the males vary in size, but they show great differences in the relative size, form, and armature of the caudal femora, and to a less extent in the form of caudal tibiae; these differences are correlated to a considerable degree with the size of the body, but not entirely so. In order to facilitate discussion of these

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Certain terms used in this paper should first be explained. In many—possibly in most—of the species of the genus Ceuthophilus great variation in adult size is found in series from the same locality; especially is this true of the male sex. Not only do the males vary in size, but they show great differences in the relative size, form, and armature of the caudal femora, and to a less extent in the form of caudal tibiae; these differences are correlated to a considerable degree with the size of the body, but not entirely so. In order to facilitate discussion of these

variations, I have designated one extreme as the *robustifemoral* type, the other as the *gracilifemoral* type, since these terms are somewhat descriptive of the two conditions. In males of the extreme robustifemoral type the caudal femora show the maximum development for the species, being relatively broad, stout, and often having the proximal portion swollen or apparently inflated; the number and size of the spines arming the ventral carinae are increased, and in many species the dorsal and dorsointernal surfaces are roughened with numerous chitinous spinules. The caudal tibiae are frequently curved and distorted, sometimes laterally compressed and vertically broadened subproximad. This condition is generally associated with large size, though not always; whatever their size, the insects exhibiting it are usually distinctly more robust in habitus than those of the gracilifemoral type. In the latter the caudal femora are comparatively slender, often appearing more elongate in consequence; the spine development is relatively weak, and the dorsal surface nearly or quite smooth. The caudal tibiae are usually straight and of nearly equal diameter throughout, of the same type as those of the female. Examples of these two conditions in males of *C. walkeri* may be seen in figures 12 and 13 of the accompanying plate. Failure to recognize the extent of such variation is one of several causes for the confusion which exists in the classification of this genus.

Another term coined for the purposes of this study, but which may be serviceable in the general taxonomy of the Orthoptera, is *pseudotelson.* This I use to designate the depressed mesal projection of the 10th tergite, which extends ventrad between the paraprocts, forming the so-called supra-anal plate. In Ceuthophilus (and other genera) the true supra-anal plate, or telson, as has been shown by E. M. Walker,[1] is attached to the distal end of the pseudotelson, and, in the genus Ceuthophilus, may either be visible as a triangular flap above the anus (as illustrated in Walker's figures), or be folded back beneath the distal margin of the pseudotelson. In the latter case the margin of the pseudotelson usually overgrows the point of juncture so that the true telson is completely concealed in the normal resting position. An occasional specimen will be found in which the telson was exposed at the time of death, probably through the

[1]1922. The terminal structures of Orthopteroid Insects: A phylogenetic Study. Part II. Ann. Ent. Soc. Amer., xv, 18, and figs. 26, 27.

act of defecation, causing the distal margin of the pseudotelson to be bent upward and to project dorso-caudad as a ridge, and thus changing the appearance of the terminal portion of the abdomen. In Ceuthophilus the telson shows no useful taxonomic characters, while the form of the pseudotelson is of great importance in delimiting groups and in characterizing species.

Lastly, the term *pseudosternite* is used, following Walker (l.c.:5), for the arched, chitinized plate dorsad of the penis-lobes and ventrad of the anus, which has been variously named the epiphallus (Chopard) or peronea (MacGillivray). It varies greatly in form, often bearing lobes or spinous processes, and is of the utmost importance in the classification of the species of this genus, although never heretofore used.

**Ceuthophilus crassifemoris** n. sp. (Figs. 1-6).

1911. *C. spinosus* Sherman and Brimley (not of Scudder 1894), Ent. News, xxii, 390. (Southern Pines, N. Car.)

1916. *C. spinosus* Rehn and Hebard (not of Scudder 1894), Proc. Acad. Nat. Sci. Phil., lxviii, 275. (In part—citation of above record.)

Related to *spinosus* Scudder, but distinguishable from that species by the following characters: Pseudosternite of male of the same general type, but larger and more strongly developed, with the cephalic lobe larger and differently shaped, and the dorsal margin of arch much more strongly explanate; cephalic femora shorter relative to pronotal length (1.21 in male type of *spinosus*, .95 to 1.13, average 1.05 in *crassifemoris)*; caudal femora shorter relative to pronotal length (3.0 in *spinosus*, 2.5 to 2.8, average 2.64 in *crassifemoris)*, broader and more robust in form; spurs and calcars of caudal tibiae distinctly longer in proportion to depth of tibia and to length of caudal metatarsus; caudal tibiae armed disto-ventrad with a single small subdistal median spinule in addition to the distal pair in *crassifemoris*, with two such spinules in *spinosus*. Female of *spinosus* unknown, so that comparison cannot be made with that sex. The relationship of these two species is very close, and study of large series from South Carolina and northern Georgia may reveal intermediate forms, and thus reduce *crassifemoris* to racial status. Resemblance is also shown to *davisi* Blatchley (= *rehebi* Blatchley—see note below), but males are at once separable by the differences in form of the pseudosternite, the caudal femora, and the presence (normally) of two subdistal median ventral spinules on the caudal tibiae of *davisi*, while females may be distinguished by the latter character and by the longer, more slender ovipositor of *crassifemoris*.

**Description of holotype male:** Southern Pines, N. Car., Aug. 5, 1915 (A. H. Manee). (Robustifemoral type.) (In Hebard Collection.)

*Size* large, form exceptionally robust, limbs short and very stout. Head large; frontal prominence low, terminating ventrad in a small, laterally

compressed, obtuse-angulate cone with abruptly rounded apex; eyes broadly subpyriform, not prominent; antennae short, basally stout, about twice the length of body. *Thoracic tergites* of form shown in figure; entire dorsum smooth and polished, with microscopic wrinklings subparallel to the margins of the tergites, and a few minute rounded nodules on the abdomen. Spine of cephalic coxae large, acuminate; ventro-cephalic angle of median coxae laminate-produced, forming an acute-angulate, distally rounded lobe. *Cephalic* and *median femora* short, unusually stout; cephalic femora armed on ventro-cephalic carina with a stout subdistal spur as long as breadth of proximal antennal joint, and with a smaller spur at distal two-thirds of length; median femora armed on ventro-cephalic carina with three (left) or four (right) stout spurs, about equally spaced, increasing in length distad; ventro-caudal margin armed with a long, stout genicular spur, and proximad with three shorter ones. Ventral and distal spurs of cephalic and median tibiae stout, the former decreasing in length distad; dorsal spurs of median tibiae as long as tibial depth. *Caudal femora* greatly incrassate, the proximal four-fifths swollen, subovate in outline, the margins narrowing strongly distad, the distal one-fifth subequal in breadth; the medio-longitudinal groove of external pagina distinctly impressed, the portion below it strongly tumid. Ventro-cephalic carina broadly explanate, with thickened margin, that of left leg armed as shown in figure, of right similar, except that the spine proximad of the middle is closer to and only a little smaller than the large mesal spine. Ventro-caudal carina armed throughout its course, except at extreme base, with 14 to 15 stout, conical, disto-ventrally directed teeth, subequal in size and irregularly spaced. Distad of the middle the dorsal surface of the caudal femora is roughened with numerous small, sharp-pointed, distally directed denticulations, which extend onto the upper portion of the internal face, and arise from the dark scalariform markings on the dorsal portion of the external pagina; they are especially numerous along the ridge separating the dorsal from the internal surface, and follow this line proximad for some distance. Low rounded nodules are scattered over the darker portions of the middle and lower sections of the external pagina, and these areas everywhere have a somewhat roughened surface. Ventral sulcus broad. *Caudal tibiae* equal in length to caudal femora, stout, laterally compressed in proximal portion, and broadened dorso-ventrally at proximal fourth of their length, the ventral margin convex-sinuate at this point;[2] tibial spurs stout, elongate, gently incurved at tips; longest calcar of cephalic side distinctly surpassing end of metatarsus; corresponding calcar of caudal side reaching end of third tarsal joint; ventral face of caudal tibiae armed with a single subdistal median spinule in addition to the distal pair. *Cephalic* and *median* tarsi short, stout, cephalic metatarsus 2.3 times as long[3] as greatest breadth, second tarsal joint as broad as long; claws more than 1.5 times as long as second joint. *Caudal tarsi* stout, metatarsus 2.75 times as long as broad, second joint 1.3 times as long as broad, claws slightly longer than second joint. Caudal margin of eighth abdominal tergite faintly thickened and elevated in medio-dorsal line; ninth with caudal margin mesally

[2]Not well shown in figure.
[3]All tarsal measurements taken along dorsal side.

subtruncate and thickened, semimembranous, for a distance slightly less than proximal breadth of pseudotelson. The latter linguiform, broadly depressed mesad, the lateral margins convex-convergent distad, the apex subtruncate, shallowly emarginate mesad between the faintly tumid, paired distal callosities. Cerci moderately stout. *Pseudosternite* distinctive in form; the cephalic, semimembranous lobe more heavily chitinized than usual, broad, its sides straight and moderately convergent to the truncate cephalic margin; the dorsal margin of the arch produced as a laminate curved plate, about as broad laterad as mesad, its dorsal surface concave in a caudo-cephalic direction; in caudal view it forms a projecting hood-like rim to the dorsal portion of the arch. *Subgenital plate* cleft to base; the free dorsal margins of its lobes extending dorso-caudad from the point of juncture with the tenth tergite, until they are produced as short rounded lobate processes on either side of the small mesal notch; a pair of faintly indicated lateral ridges are comparable to those of *davisi,* but are very much less prominent than in that species.

**Description of allotypic female:** Southern Pines, N. Car., July 19, 1915 (A. H. Manee). (In Hebard collection.)

Agrees with the male described above except in the following respects: Size slightly smaller, and form a little less robust; cephalic and median limbs, and especially the tarsi, more slender; caudal femora short and unusually robust for this sex, but much more slender than in the male; their ventro-cephalic carina less expanded, armed only with four or five minute denticulations on distal half; distal two-thirds of ventro-caudal carina armed with nine or ten small, widely spaced spinules; dorsal face of caudal femora roughened with minute denticulations as described for the male, but the area covered is smaller, the denticles more minute and less numerous. Caudal tibiae more slender, approximately one-tenth longer than femora; longest calcar of cephalic side barely surpassing metatarsus, of caudal side slightly surpassing end of second joint; tarsi more elongate and slender. Ovipositor similar to that of *davisi,* with only four teeth, but longer and more slender than in that species.

*Coloration:*[4] Dorsum highly polished, varying through Haye's russet, kaiser brown and hazel; in many specimens the dorsum is darkened by fuscous suffusion, which is especially marked along the caudal margins of the tergites; front, lower half of lateral lobes of pronotum, limbs and venter cinnamon-rufous to ochraceous-tawny, the caudal femora marked with a scalariform pattern varying from cinnamon-brown to mummy-brown. Antennae ochraceous-tawny to sayal brown. In recessively colored specimens a pattern similar to that often seen in *davisi* is more or less faintly indicated, consisting of lighter markings on the pronotum and rounded spots and dashes on the meso- and metanota and abdominal tergites.

*Variation:* The present series shows slight variability. All the males are of the robustifemoral type, but some variation in the relative length and breadth of the caudal femora may be noted. In one paratype, on one

[4]The color terms used are those of Ridgeway's Color Standards and Color Nomenclature, Washington, 1912.

side, there are two large mesal spines instead of the usual one, the caudal being slightly the larger. The number of teeth on the ovipositor in this small series is constant, Further data on variation in this species and its allies will be given in the revisionary study soon to be published.

MEASUREMENTS IN MILLIMETERS

| | Length Pronotum | Length Cephalic Femora | Length Caudal Femora | Breadth Caudal Femora | Length Ovipositor |
|---|---|---|---|---|---|
| MALE | | | | | |
| *Spinosus* | | | | | |
| holotype* | 5.1 | 6.2 | 15.2 | 5.0 | ..... |
| *Crassifemoris* | | | | | |
| holotype† | 7.2 | 7.0 | 17.9 | 7.3 | ..... |
| paratype‡ | 6.5 | 7.2 | 17.2 | 6.0 | ..... |
| paratype | 7.1 | 7.5 | 18.5 | 7.4 | ..... |
| paratype | 7.0 | 7.3 | 19.2 | 7.0 | ..... |
| paratype | 6.8 | 7.7 | 19.1 | 7.3 | ..... |
| paratype | 7.3 | 7.5 | 18.7 | 6.8 | ..... |
| FEMALE | | | | | |
| *Crassifemoris* | | | | | |
| allotype§ | 6.4 | 6.7 | 15.4 | 5.3 | 8.7 |
| paratype | 6.5 | 6.1 | 15.7 | 5.4 | 8.0 |
| paratype | 7.0 | 7.0 | 17.2 | 5.9 | 7.8 |
| paratype | 7.0 | 7.1 | 17.2 | 5.5 | 8.6 |
| paratype | 6.8 | 6.7 | 16.2 | 5.6 | 8.0 |
| paratype | 6.7 | 6.9 | 16.8 | 6.7 | 8.9 |

| | *Spinosus* Holotype* | Holotype† | *Crassifemoris* Paratype‡ | Allotype§ |
|---|---|---|---|---|
| Breadth of cephalic femora | 1.25 | 1.8 | 1.6 | 1.5 |
| Length of median femora | 6.2 | 6.8 | 7.0 | 6.4 |
| Breadth of median femora | 1.1 | 1.4 | 1.3 | 1.2 |
| Length of caudal tibiae | 16.2 | 17.9 | 17.3 | 17.2 |
| Breadth of caudal tibiae— | | | | |
| at middle | .67 | .9 | .8 | .8 |
| at subproximal expansion | .87 | 1.4 | 1.0 | ..... |
| Length of external tibial spurs | 1.45 | 2.2 | 2.1 | 2.0 |
| Length of longest internal calcar of caudal tibiae | 3.1 | 4.0 | 4.4 | 3.6 |
| Length of caudal metatarsus | 2.5 | 2.2 | 2.3 | 2.3 |
| Length of second joint of caudal tarsi | 1.25 | 1.2 | 1.2 | 1.1 |
| Breadth of second joint of caudal tarsi | .67 | .9 | .8 | .8 |
| Length of distal joint of caudal tarsi | 1.7 | 2.0 | 1.4 | 1.8 |

**Material examined:** In addition to the holotype and allotype, the following paratypic material: Southern Pines, N. Car., (A. H. Manee), July 20 to Aug. 16, 1915, 3 males, 1 female; May

27 to July 7, 1916, 3 males, 3 females (in Hebard collection and Univ. Mich. Mus. Zool.); Southern Pines, N. Car., (Manee) 1 male; January, 1904, (F. Sherman) 1 female (in U. S. Nat. Mus.). The following immature material has also been studied: Southern Pines, N. Car., (A. H. Manee), May 3 to July 4, 1916, 5 juv. males, 12 juv. females; June 30, 1915, 1 juv. male (all in Hebard collection); Meredith, S. Car., June 17, 1926, (O. Cartwright), 1 juv. female (in Clemson College coll.).

**Ceuthophilus walkeri** n. sp.[5] (Figs. 7-14).

1908. *C. uhleri* Brimley (not of Scudder 1862), Ent. News, xix, 20. (Raleigh, N. Car.)

1916. *C. spinosus* Rehn and Hebard (not of Scudder 1894), Proc. Acad. Nat. Sci. Phil., lxviii, 274. (In part—Raleigh, N. Car.)

1920. *C. spinosus* Blatchley (not of Scudder 1894), Orth. Northeastern Amer., 628. (Dunedin, Florida—in open pine woods.)

The above synonomy is based on examination of the original material, and comparison with the type of *C. spinosus* Scudder, except in the case of Blatchley's Dunedin male; the description furnished by him, and the study of other Florida material furnish sufficient evidence to warrant the placing of his reference under this species. Scudder's type is a very different insect, closely related to *C. crassifemoris* described above. None of the material treated by Rehn and Hebard in 1916 is referable to *spinosus,* their records being based on material of *C. davisi* (= *rehebi), C. crassifemoris,* and the present species.

A member of the Divergens-Sallei group, distinguishable in the male sex from all other species of the genus by the form of the pseudosternite, and from members of the related Davisi group by the elongate caudal limbs; in the female sex separable from the species of the Uhleri group by the polished dorsal surface, without pilosity, from the species of the Davisi group by the slender, 5-toothed ovipositor, and from the remaining members of the Divergens-Sallei complex by the size, the slender, elongate limbs, and the slender, rather elongate ovipositor, with its less strongly aciculate teeth.

[5]Named in honor of Mr. F. W. Walker, in recognition of his exceptional ability as a collector and field student of the Orthoptera, and of the important contributions he has made to the knowledge of the Orthopteran fauna of Florida and Colombia.

**Description of male holotype:** Gainesville, Alachua Co., Florida, Dec. 2, 1924 (T. H. Hubbell). (Robustifemoral type.) (In coll. Univ. Mich. Mus. Zool.)

*Size* large, form moderately robust, limbs elongate. *Head* broad; frontal prominence a low, declivent cone, abruptly rounded and somewhat laterally compressed at apex; eyes as described for *crassifemoris;* maxillary palpi slender, elongate; antennae moderately slender, more than twice as long as body. *Thorax* broad in dorsal view, lateral outlines of thoracic segments as shown in figure; surface of thoracic tergites strongly, of abdominal tergites weakly polished. Cephalic and median coxae as described for *crassifemoris. Cephalic* and *median femora* slender, moderately elongate; cephalic femora 1.35 times pronotal length, ventro-cephalic carina bearing a slender, elongate pregenicular spur, and a very minute spinule mesad; median femora armed with three slender spurs on ventro-cephalic carina, increasing in length distad, ventro-caudal carina with one small spur mesad, and on right side a second minute spinule, in addition to the long genicular spur. Cephalic and median tibiae slender and elongate, the spines more slender, but otherwise as described for *crassifemoris. Caudal femora* elongate, considerably longer than body, marked with a distinct dark scalariform pattern, the surface of which is roughened; dorsal surface and upper portions of external and internal paginae covered with minute sharp denticles, as described for *crassifemoris,* but these more numerous and more closely spaced than in that species. Ventro-cephalic carina moderately explanate, bearing a series of spines as shown in figure, the bases of the larger ones slightly swollen. Ventro-caudal carina armed with a series of twenty-two (right) or twenty (left) stout spinules, irregularly spaced and directed distad, most of which are longer than their proximal breadth. Ventral sulcus wide. *Caudal tibiae* distinctly curved, scarcely at all broadened and only faintly sinuate proximad, slightly longer than the femora; tibial spurs slender, elongate, more widely separated than in *crassifemoris;* tibial margins bearing 5 to 7, usually 6 or 7, sharp serrations between the spur bases. Longest calcar of cephalic side slender, elongate, slightly surpassing metatarsus; of caudal side scarcely reaching end of second joint. Disto-ventral face of caudal tarsi armed with a single median spinule in addition to the distal pair. Caudal tarsi elongate, metatarsus 4.1 times as long as broad, second joint 1.9 times as long as broad; claws as long as second joint. Caudal margin of ninth abdominal tergite subtruncate, with somewhat thickened margin dorsad. *Pseudotelson* shield-shaped, depressed mesad, with a pair of small rounded distal projections separated by a shallow notch. Cerci rather slender, longer than the distance between outer margins of eyes. *Pseudosternite* with cephalic semimembranous lobe narrower and shorter in caudal view than that of *crassifemoris,* its cephalic margin broadly parabolic; dorsal margin of arch explanate as a nearly vertical, transverse lamina, its truncate upper margin rounding rather abruptly into the sides, the whole lying nearly in one plane. *Subgenital plate* similar to that of *crassifemoris,* but showing no trace of lateral ridges, and the disto-mesal projections of the lateral lobes less produced.

MEASUREMENTS IN MILLIMETERS

| | Length Pronotum | Length Cephalic Femora | Length Caudal Femora | Breadth Caudal Femora | Length Caudal Tibiae | Ratio Length to Breadth Caudal Femora |
|---|---|---|---|---|---|---|
| MALE | | | | | | |
| Holotype* | | | | | | |
| Gainesville, Fla. (R)[6] | 6.1 | 8.3 | 20.0 | 6.3 | 21.8 | 3.18 |
| Paratypes | | | | | | |
| Gainesville, Fla. (R) | 6.0 | 7.6 | 19.1 | 5.9 | 20.8 | 3.24 |
| Gainesville, Fla. (G) | 4.4 | 5.8 | 13.0 | 3.5 | 15.0 | 3.72 |
| Florida (G) | 4.6 | 6.3 | 14.4 | 3.8 | 16.2 | 3.79 |
| Raleigh, N. Car. (R) | 6.1 | 7.5 | 18.0 | 6.5 | 18.8 | 2.77 |
| Raleigh, N. Car. (R) | 5.6 | 6.7 | 16.1 | 5.4 | 17.8 | 2.98 |
| Raleigh, N. Car. (G) | 4.1 | 5.2 | 12.3 | 3.7 | 12.8 | 3.33 |
| Raleigh, N. Car. (G) | 3.4 | 4.2 | 9.4 | 2.8 | 10.2 | 3.35 |
| FEMALE | | | | | | Length ovipositor |
| Allotype† | | | | | | |
| Gainesville, Fla | 5.6 | 6.8 | 16.0 | 4.4 | 18.1 | 7.6 |
| Paratypes | | | | | | |
| Gainesville, Fla. | 5.3 | 6.5 | 14.8 | 4.2 | 16.5 | 7.2 |
| Gainesville, Fla. | 5.1 | 6.0 | 14.3 | 4.1 | 15.1 | 6.9 |
| Ocala, Fla. | 5.1 | 5.8 | 13.6 | 4.1 | 14.0 | 6.5 |
| Raleigh, N. Car. | 5.3 | 5.9 | 13.7 | 4.2 | 15.0 | 6.2 |
| Raleigh, N. Car. | 5.0 | 5.6 | 12.7 | 3.8 | 14.1 | 5.8 |

[6]Robustifemoral and gracilifemoral individuals are indicated by (R) and (G).

*Length cephalic metatarsus 2.0; 2nd joint 1.0; claws 1.2; length caudal metatarsus 3.3; 2nd joint 1.5; claws 1.4; length longest calcar of caudal tibiae 4.2; length external spurs caudal tibiae 2.2; depth caudal tibiae 0.7.

†Length cephalic metatarsus 1.9; 2nd joint 0.9; claws 1.1; length caudal metatarsus 3.0; 2nd joint 1.4; claws 1.4; length longest calcar of caudal tibiae 4.1; length external spurs caudal tibiae 2.0; depth caudal tibiae 0.6.

**Description of female allotype:** Gainesville, Alachua Co., Florida, Jan. 1, 1929 (T. H. Hubbell—In "high oak" habitat—woods of *Quercus catesbaei* and scattered long-leaf pines, on sandy soil). (In coll. Univ. Mich. Mus. Zool.)

Agrees with holotype male except as follows: Size slightly smaller, form less robust. Frontal prominence less compressed at apex. All spines of cephalic and median limbs somewhat shorter and more slender. Caudal femora less robust, proportionately shorter, the ventro-cephalic carina armed only with seven very minute denticulations, the caudal carina with twenty slightly larger ones; mesal portion of dorsal and dorso-caudal surfaces denticulate as in the male, but the teeth smaller, much fewer in

number, and more widely spaced. Ovipositor slender, more elongate than that shown in figure, dorsal valves obliquely truncate, disto-dorsal angle acutely produced, but less aciculate than in the paratypic female figured; teeth of lower valves five in number, the proximal two a little more widely separated than the others, slender and acute, but shorter and less aciculate than in the figured specimen.

*Variation:* The males of this species exhibit great variation in size, and the extremes of the robustifemoral and gracilifemoral types differ so much in appearance that were it not for the characteristic genital structures it would appear unlikely that they represented the same species. The extremes of the two conditions, as represented in the Raleigh series, are illustrated by figures 12 and 13. *C. walkeri* exhibits geographical variation in limb length, all the North Carolina specimens having proportionately shorter legs than those from Florida. The material available for study is insufficient to determine the significance of this variation. The caudal tibiae normally bear a single subdistal median spinule, as is the rule in other members of the Divergens-Sallei complex; but in a single specimen, the male illustrated in figure 12, the left tibia bears two such spinules, the right the usual single one. It has been found that the number and position of these spinules are useful, within limits, in characterizing species and groups of species; the character is subject to considerable individual variation, which is so great in some cases that the number of spinules is valueless as a taxonomic character, while in other instances it falls within certain definite limits, and the number of spinules may be so used.

*Coloration:* Similar to that of *crassifemoris*, but usually lighter in color; a dorsal pattern of lighter markings is faintly distinguishable on the types and some of the paler individuals, but is seldom pronounced, and often completely obscured.

**Specimens examined:** In addition to the holotype and allotype, the following paratypic material: Gainesville, Alachua Co., Fla., Jan. 5-March 2, 1929 (T. H. Hubbell) 3 males, 6 females (Univ. Mich. Mus. Zool. and Hebard colls.); Florida, 1 male (Scudder coll.); Ocala, Fla., Nov. 15, 1915 (R. T. Jackson) 1 female (U. S. Nat. Mus.); Raleigh, N. Car., Feb. 9, 1904 (under log in pine woods) 1 female (Hebard coll.); Nov. 1-11, 1904 (G. M. Bentley) 1 male, 2 females (N. Car. State coll., U. S. Nat. Mus. and Univ. Mich. Mus. Zool.); Dec. 9, 1904 (G. M. Bentley) 1 male (U. S. Nat. Mus.); Nov. 18-30, 1904 (C. S. Brimley) 2 males, 1 female (U. S. Nat. Mus., Hebard and N. Car. State colls.); early Nov., 1909 (Z. P. Metcalf) 1 male, 1 female (N. Car. State and Univ. Mich. Mus. Zool. colls.). The following immature material has also been studied: Gainesville, Alachua Co., Fla., Aug. 16, 1921, 1 juv. female; Oct. 14, 1925, (T. H. Hubbell) 1 juv. female (Univ. Mich. Mus. Zool.).

**Ceuthophilus davisi** Blatchley 1920.

1916. *C. spinosus* Rehn and Hebard (not of Scudder 1894), Proc. Acad. Nat. Sci. Phil., lxviii, 274-275. (In part—all records from Maryland, Virginia, and District of Columbia, and probably the Georgia females).

1920. *C. rehebi* Blatchley, Orth. Northeastern Amer., 626. (Yaphank and Staten Island, N. Y.)

Blatchley designated no types for any of the species described in his "Orthoptera of Northeastern America," so that all the material studied by him ranks as cotypic. The material from which the two species *davisi* and *rehebi* were described was collected by Mr. W. T. Davis, and of the series which Blatchley had before him in describing the species the portions remaining in the Davis collection are now in my hands for study. From this material I hereby designate the following lectotypes, which will remain in the Davis collection.

*Ceuthophilus davisi* Blatchley: Lectoholotype, an immature male, "Reeds Valley, Staten Island, N. Y., Aug. 1917 (W. T. Davis) trapped in molasses jar)," and bearing the notes "Seen by Blatchley" and, apparently in Blatchley's handwriting, "Note podigal plates." This specimen agrees with Blatchley's diagnosis in the key, and with the original description. It is an immature male of the species described on the next page as *C. rehebi.* The differential characters emphasized by Blatchley, such as the form of the paraprocts or podigal plates, are not specific, being more or less characteristic of immature males of all the species of this section of the genus. Of all the eastern species, the only ones having prominent paraprocts in the adult condition are *C. maculatus* (Harris) and *C. tenebrarum* Scudder, and in these they are specialized and of distinctive form. The remaining males of the type series of *davisi* are likewise immature *"rehebi,"* with the exception of a single very small adult specimen of *uhleri* of the extreme gracilifemoral type. All of the females of the type series are *uhleri,* likewise very small and dark for the species; the portions of Blatchley's description pertaining to this sex apply to *uhleri* only. I have made this assignment of the type on account of the fact that the characters emphasized in the key and description are those of the immature male *"rehebi"* specimens, rather than the quite different characters of the small individuals of *uhleri;* and for the further rea-

son that of the two names it seems preferable to retain *davisi* rather than the hybrid *rehebi.*

*Ceuthophilus rehebi* Blatchley: Lectoholotype, a mature male, Yaphank, N. Y., Aug. 25, 1916 (W. T. Davis); Lectoallotype, a female with the same data. The female specimen recorded by Blatchley from Lexington, Kentucky was one of Scudder's cotypes of *latebricola,* taken in association with adult males of the same type series. Examination of this material, in the University of Kentucky collection, shows that the males are *C. tenebrarum* Scudder, typical of the species. The female in question shows no differences from the other females of this series not attributable to individual variation, except that it has only four teeth on the lower valves of the ovipositor. However, in another female of *tenebrarum* from Lexington (not part of the above series), almost complete fusion of the two distal teeth of the ovipositor has taken place, showing that a tendency toward reduction of the number of teeth exists in this species. In view of these facts, and especially since in the large collection assembled in my hands no other material referable to *davisi* is found from west of the Alleghenies, I believe Blatchley to have been in error in his determination.

**Ceuthophilus lapidicola** (Burmeister) 1838.

This species has been for the most part confused with *latens* Scudder, although the two have been distinguished and the fact of their close relationship pointed out by Rehn and Hebard (l.c.:272-274) and by Morse.[7] Examination of large series of both species, and study of Scudder's material in the Museum of Comparative Zoology show that Rehn and Hebard were correct in placing E. M. Walker's species *pallidipes* as the same as the species which they, following Scudder, have identified as *lapidicola.* In case it is decided that Burmeister's name is really unidentifiable, as Blatchley contends it to be, *pallidipes* must be used in its place. Blatchley has placed both *pallidipes* E. M. Walker and *lapidicola* as used by Scudder and by Rehn and Hebard in synonymy under *Ceuthophilus gracilipes* (Haldeman), which is incorrect. *Lapidicola* and *latens* are both members of the Gracilipes group, as is shown by the form of the pseudosternite, the subgenital plate, and the specializations of the 9th

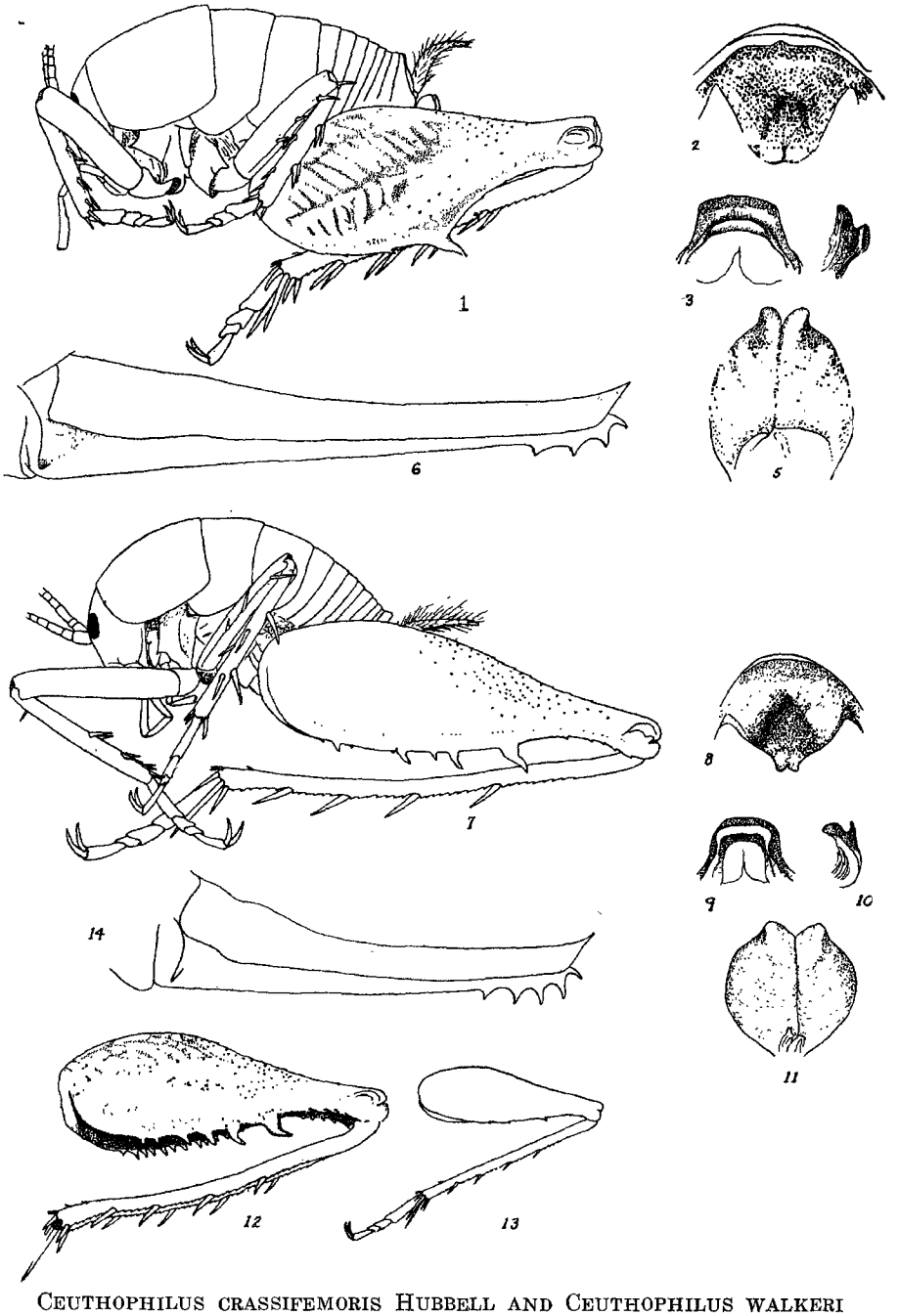
[7]1920. Manual of the Orthoptera of New England. Proc. Bost. Soc. Nat. Hist., xxxv, No. 6, pp. 381-382.

and 10th abdominal tergites; but they are much more closely related to each other than to *gracilipes*. In this connection it may be stated that in spite of the confusion which at present exists concerning the status of *gracilipes, stygius* and *lapidicola,* these species and three other members of the Gracilipes group are distinct and easily separated on the basis of male genital characters.

**Ceuthophilus brevipes** Scudder 1862.

1894. *C. terrestris* Scudder, Proc. Amer. Acad. Arts & Sci., xxx (N. S. xxxii), 46. (Lectotypic male designated by Rehn and Hebard, 1912—Nahant, Mass.—Not found in Mus. Comp. Zool. 1928.)

Study of the type series of *brevipes* in the Scudder collection at Cambridge shows that *terrestris* is a synonym of the earlier described species. Scudder's material from Grand Manan Island, New Brunswick (not Maine), on the basis of which he described *brevipes,* is all immature, and the specimens were dried from alcohol; they are in consequence light in color and somewhat abnormal in appearance. Comparison with large series of *terrestris,* both adult and immature, including specimens from near the type locality of *brevipes,* has sufficiently demonstrated the identity of the two. Color pattern, limb proportion (allowing for distortion due to the mode of preservation), spine arrangement, and other features are the same as those of immature *terrestris.* The probability of this synonymy is increased by the fact that while *terrestris* is the most common species in the region from which *brevipes* was described and the only one with which it could be easily confused, *brevipes* has remained unrecognized. The material recorded by Scudder (1894: 50) and by Blatchley (1920: 624) from St. Johns, New Brunswick, consists of two immature males of *maculatus* (Harris) and one immature male and two immature females of *terrestris.* The characters used by Blatchley (l.c.: 618, 624) and by Morse (l.c.: 381) for distinguishing males of *brevipes* are worthless, since they are based in part on features common to immature individuals of many species, and in part on features due to shrinkage and change of color, brought about by preservation in alcohol and subsequent drying.




CEUTHOPHILUS CRASSIFEMORIS HUBBELL AND CEUTHOPHILUS WALKERI HUBBELL

## EXPLANATION OF PLATE

**Ceuthophilus crassifemoris** Hubbell

Fig. 1, Lateral view of male holotype, Southern Pines, N. Car. Fig. 2, Caudal view of pseudotelson of holotype. Fig. 3, Caudal view of pseudosternite of holotype. Fig. 4, Lateral view of pseudosternite of holotype. Fig. 5, Caudal view of subgenital plate of holotype. Fig. 6, Ovipositor of female allotype, Southern Pines, N. Car.

**Ceuthophilus walkeri** Hubbell

Fig. 7, Lateral view of male holotype, Gainesville, Fla. Fig. 8, Caudal view of pseudotelson of holotype. Fig. 9, Caudal view of pseudosternite of holotype. Fig. 10, Lateral view of pseudcsternite of holotype. Fig. 11, Caudal view of subgenital plate of holotype. Fig. 12, Caudal leg of robustifemoral male, Raleigh, N. Car. Fig. 13, Caudal leg of gracilifemoral male, Raleigh, N. Car. Fig. 14, Ovipositor of paratypic female, Raleigh, N. Car.

All figures from camera lucida sketches. Figs. 1, 7, 12 and 13 two and one-half times natural size, the others eight and one-half times natural size.