STUDIES IN AMERICAN TETTIGONIIDAE (ORTHOPTERA)
IV

BY JAMES A. G. REHN AND MORGAN HEBARD

A SYNOPSIS OF THE SPECIES OF THE GĔNUS ORCHELIMUM

For a number of years the species of the present genus have been greatly in need of study, the literature covering the same showing a considerable number of specific names the exact relationship of which was not known at all or only very indefinitely understood. The keys to the species which we possessed, *i. e.*, those of Redtenbacher, McNeill, Blatchley, and Karny, were based largely on characters the value of which our own studies show to be nil or but relative. The attempts made by many workers, ourselves among them, to use the previous keys have resulted in a great mass of misidentifications, due to the fact that the tables used, almost without exception, emphasized valueless or but secondary characters and entirely ignored those of greatest value. Another factor, which has contributed its share to the confusion in the past, has been the difficulty of positively locating some of the older names; a matter which has caused error on the part of everyone who has published at all on the genus.

The examination or possession of types and paratypes of the majority of the species has enabled us to straighten out the tangles and present a clear idea of the relationship of the forms, while much study and correspondence has permitted us to place to our own satisfaction practically all of the older names which caused trouble in the past. The present situation in Europe has precluded our securing certain desirable information concerning these older types, but we feel that anything further would be merely confirmatory and that we have carefully weighed and considered every possible source of information in the literature.

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From the Transactions of the American Entomological Society, xli, 11–83
Issued April 9, 1915

The characters used by us to differentiate the species are easily comprehended, and we feel that the student will have little difficulty in securing from the text, with the aid of the figures, an understanding of the species of the genus.

ORCHELIMUM Serville

1839. *Orchelimum* Serville, Hist. Nat. Ins., Orthopt., p. 522.
1891. *Xiphidium* Redtenbacher, Verhandl. k.-k. zool.-botan. Gesellschaft Wien, xli, p. 493. (In part; not restricted *Xiphidion* Serville, 1831.)
1907. *Orchelimum* Karny, Abh. k.-k. zool.-botan. Gesellschaft Wien, iv, heft 3, p. 82.

GENOTYPE. — *Orchelimum cuticulare* Serville = *glaberrimum* (Burmeister) (by designation of Kirby, 1906[1]).

Differential Generic Characters.—When compared with the related genus *Conocephalus* (*Xiphidium* of authors) the genus *Orchelimum* is found to differ not in one or several invariable characters, but instead can be distinguished by combinations of characters and a general complex not found in the other genus. In *Orchelimum* the stridulating field of the male tegmina is larger, broader and in general more extensive, with the lateral section more strongly produced and occasionally almost overhanging (in subgenus *Stenorhoptrum* less indicated and in *Metarhoptrum* little different from that found in *Conocephalus*). The male cerci are never strongly and sharply deplanate distad, instead of generally so as in *Conocephalus*; the dorsum of the same is occasionally carinate and almost invariably more or less excavate at or near the base of the median tooth (this never found in *Conocephalus*), while the cerci are also always unidentate instead of untoothed, unidentate or bidentate as in *Conocephalus*. The male subgenital plate has the distal margin almost always more or less V or U-emarginate, while in *Conocephalus* this portion is generally more or less truncate. The ovipositor has the ventral margin always arcuate in the distal half except in *militare*, while in *Conocephalus* the rule is to have the margins straight. In all the species the prosternum is bispinose instead of unarmed as is occasional in *Conocephalus*, while the distal tibial spurs always number three pairs, instead of less as is found in several subgenera of *Conocephalus*.

[1] Synon. Catal. Orthopt., ii, p. 271,(1906).

The features separating *Orchelimum* from *Teratura, Paraxiphidium, Odontoxiphidium, Xiphilimum* and *Karniella* are very decided and have been previously emphasized, so it seems unnecessary to discuss them at the present time.

Erroneously Referred Species.—Aside from the American species here treated, and to which we restrict *Orchelimum*, the genus has been considered by some authors to include two Old World species. The first of these, *senegalense* Krauss, is certainly distinct generically and we here separate it as a related but well characterized genus[2]. Karny[3] has placed the species *Xiphidium bituberculatum* Redtenbacher, from Australia, in the genus *Orchelimum*. This is undoubtedly not an *Orchelimum*, as the untoothed cercus shows. Just what its relationship to *Concephalus* (*Xiphidium* of authors) is, we cannot say, but that the species has no place in *Orchelimum* is certain.

Generic Distribution.—From southern Maine, southern Ontario and southern Manitoba (Ashdown) south to southern Florida (Homestead), the Gulf Coast and southern Texas (Brownsville), and in Mexico as far as Orizaba in the eastern part and the state of Jalisco in the west, in the United States west to northern California (Sisson). The genus is apparently absent from the whole desert region of the southwestern United States and also

[2] **THYRIDORHOPTRUM** new genus (Θυρις *window*, ῥοπτρον *tambourine*).
1877. *Orchelimum* Krauss (not of Serville), Sitzungsberichte k. Akad. Wissensch. Wien, Math.-Nat. Cl. lxxvi, p. 60.
GENOTYPE.—*Orchelimum senegalense* Krauss.

Related to *Orchelimum* but differing in the more abbreviate dorsum of the pronotum, which in the male sex has the caudal width subequal to the greatest length, in the very narrow lateral lobes of the pronotum, these in the male sex being distinctly deeper than the greatest length of same, in the extremely large stridulating field of the male tegmina, which has the speculum of great size and in width at least two-thirds that of the whole stridulating field, in the more ample tegmina of the male, the bidentate male cerci, the non-spinose character of the genicular lobes of the cephalic and median femora and in the broad fluting of the lateral faces of the ovipositor abruptly terminating shortly proximad of the apex.

Only species:

Thyridorhoptrum senegalense (Krauss)
1877. *Orchelimum senegalense* Krauss, Ibid., pl. I, figs. 12, 12a. [Bakel, Senegal.]

We have before us specimens representing both sexes of this interesting genus.

[3] Genera Insectorum, fasc. 135, Conocephalinae, p. 7, (1912).

from the Great Basin region, no specimens having been examined from southern California, Nevada, Utah, southern Idaho, western Wyoming and Colorado, or Arizona and New Mexico west of the Rio Grande.

The center of distribution of the genus is in the Middle Atlantic states, the greatest percentage of the forms occurring in the region comprising the states of Pennsylvania, New Jersey, Delaware, Maryland and Virginia, where in the northern end of the Coastal Plain no less than ten of the species of the genus occur. To the southward the number of forms decreases slightly and in the Mississippi Valley region there is a still further diminution, until but three forms are known to reach the region of the Rocky Mountains and of these but one is known to occur west of that uplift. In coastal and southern Texas the number of species is lower than in the Middle West and from the whole of Mexico we at present know of but two forms.

Variation.—An examination of certain characters which have been used by previous authors for differentiating the species of this genus shows that they are either entirely unreliable or only of occasional application. The first and most important of these is the number of spines on the ventro-external margins of the caudal femora. This character has been given a position of prime importance; as a matter of fact, as in *Conocephalus* (*Xiphidium* of authors), quite a few species show considerable individual variation in the presence or absence of these spines, while practically all the forms show great individual variation in the number of the same when they are present. In consequence we have not utilized the spination of the limbs as a major character in making our key, but under each species will be found a summary of the amount of variation in this feature.

The proportionate length of the tegmina and wings is another feature which is, in the majority of cases, of no diagnostic value. This genus, with many other Orthopterous genera, exhibits considerable individual variation in the length of these appendages, individuals taken at the same place and at the same time showing marked diversity in this respect. In over half the species of the genus we find a mesopterous type (*i. e.* with tegmina and wings little or not at all surpassing the apices of the caudal femora) and a macropterous type (with same very considerably surpassing the femoral apices). The extremes of these conditions often

look very different but a careful examination, particularly of the genitalia, will show them to be identical. We have given data on these features under the specific treatments. The width of the fastigium is occasionally variable within specific limits, as in the case of the very plastic *concinnum*. This, however, is quite exceptional, as the fastigial width is generally a constant character. In the stridulating field of the male tegmina we find some variation in the exact form of the speculum, the bounding veins varying somewhat in their exact curve or in their degree of divergence from the body axis when straight, but these differences are of secondary importance and the relative proportions of the speculum and direction of the stridulating vein remain the same. The peculiarly elongate form of the speculum in *volantum* and *bradleyi* is quite distinctive and in no way approached in the other species of the genus. The exact curve and relative length of the ovipositor show little individual variation except in the very plastic *concinnum*, where we have certain female individuals in certain localities and all the female individuals in other localities developing a much longer and relatively straighter ovipositor than usual. Between the two extremes of ovipositor form in this remarkable species we find numerous intermediates and we have gone into this question of ovipositor form quite fully under the specific treatment.

Synonymic Notes.—Two species have been referred to, or described under, this genus which have caused much difference of opinion. These are *Locusta agilis* DeGeer from Pennsylvania[4] and *Orchelimum gracile* Harris from Massachusetts.[5] The identity of the first as a species of the genus *Orchelimum* is universally admitted, but it has been variously considered the same as Harris' *vulgare*, Redtenbacher's *laticauda* and Scudder's *concinnum*. Several times DeGeer's species was correctly identified but it was never associated with the Redtenbacherian species, two of which (*spinulosum* and *nitidum*) are synonyms of it. Harris' *gracile* we are certain was correctly referred by Scudder when he synonymized it under *Conocephalus fasciatus* (DeGeer). The description fits that species, but unfortunately the figure

[4] Mém. Hist. Ins., iii, p. 457, pl. 40, fig. 3,(1773).
[5] Treat. Ins. New Eng. Inj. Veget., p. 131,(1841).

given in the Flint edition of Harris[6] shows an individual with a curved ovipositor (*i. e.* a true *Orchelimum* and probably *O. concinnum*). The figures in this edition were drawn under the direction of Agassiz, so the preface informs us, and the ovipositor character of the figure is belied by the text on the same page, this being a reprint of that of the original edition. It is quite evident that the specimen drawn was not the one described by Harris. The name *gracile* certainly does not properly apply to any form of *Orchelimum*. It has been considered to represent the pale-faced phase of *concinnum* by a few authors, but that it has no right to be so considered is very evident.

There has been so much irregularity in the use of the name *agile* that the records quoted under it are almost valueless in mapping the distribution of the species. In the majority of cases it is quite impossible to say which species the author who recorded "*agile*" had before him, and unless the material on which such records were based is definitely recognizable in the the series examined by us, we have felt compelled to ignore the indefinite records in our mapping work.

The other names, the application of which has given difficulty in the past or has given trouble to the present authors, are best discussed here. Burmeister's *glaberrimum* has been frequently recorded, but generally the specimens proved to be long-winged individuals of *vulgare*. We have carefully studied the very brief description, have studied the movements of Zimmermann who collected the specimens, eliminated the other forms occurring in the teritory where he collected at that time, and there is no doubt in our minds that we have properly located the form. An effort to locate the original specimen has met with no success other than the proof that it does not exist in the Halle collection. Serville described three species of the genus when he originally founded the same, *i. e.*, *cuticulare*, *glaucum* and *herbaceum*. The first of these undoubtedly equals Burmeister's *glaberrimum*, as a careful analysis of the description and comparison with all the known species shows. The second species, *glaucum*, just as certaily equals *agile* (DeGeer) when examined in the same fashion. The last name, *herbaceum*, has been generally placed as the same as *concinnum* Scudder, chiefly because Serville says it has a black

[6] Ibid., Flint Edit., p. 163,(1862).

area on its face above the clypeus. Unfortunately Serville says this is transverse, which is never true of *concinnum*, but frequently in drying out, individuals of a number of the species show black areas below the eyes and to a similar feature we feel he must refer. The other characters given for *herbaceum* are few and generally non-diagnostic, except that the ovipositor is twelve lines long and lightly concave dorsad, a condition occurring in but a few species. Of these *fidicinium* alone would at all answer the other points of the description and of the identity of the two we are not at all convinced, but we are placing the older name with a query under the more recent name, waiting for future examination of the original material, if such still exists, to determine the matter.

The description of Walker's *validum* we have examined very carefully, and have also had through the kindness of Mr. A. N. Caudell the notes made by the latter on the type of the species, which Kirby considered to be the same as *nigripes*. The original description is very insufficient and Mr. Caudell comments as follows on the specimen; "Last year I saw also his type of *validum*, but without material for comparison I could not definitely determine what it is. I am very sure it is not the same as our *nigripes*. The type is a unique female and the following note was hurriedly made regarding it while I was in London." We are unable to definitely say what the insect is, but it appears to be nearer *nigripes* than anything else. However, it seems best to await more complete study of the original material and we have provisionally placed the name with a query under *nigripes*.

Of the new species described by Redtenbacher in his paper on the subfamily, *i. e.*, *robustum*, *inerme*, *nitidum*, *spinulosum* and *laticauda*, we are able to easily dispose of three, these being *inerme*, *nitidum* and *spinulosum*. The first of these was admittedly proposed to replace *longipennis* Scudder, which equals *concinnum*. Regarding *nitidum* and *spinulosum* we had formed definite conclusions, when through the kindness of Mr. W. T. Davis we were placed in possession of copies of correspondence which passed between that gentleman, Mr. Caudell and Doctors Karny and Holdhaus relative to this subject. A portion of a series of specimens used by the latter gentlemen for comparison has also been placed in our hands so that we are thus able to

judge what *nitidum* and *spinulosum* are. Doctor Holdhaus states that, "*O. nitidum* and *spinulosum* differ externally only by the characters stated by Redtenbacher and may possibly prove forms of the same species." This is quite true, and the characters given by Redtenbacher are valueless in this genus while the size differences are due to locality as we show beyond. Both of these names equal the much older *agile* (DeGeer). The great difficulty encountered with the Redtenbacherian species concerns the other species, *robustum* and *laticauda*, the first of which, as discussed beyond, in all probability equals *nigripes* with abnormal or unassociated leg or legs. It is based on a unique female which in every feature of the description but the caudal limbs is typical *nigripes*. The other species, *laticauda*, appears to us to be the same as Davis's *pulchellum*, the author of which has gone over the description with us and agrees that it probably represents the same form. It was our intention to have material carefully compared in Vienna, particularly with regard to the important genital characters, but the unfortunate conflict now raging has made this impossible.

The present authors at one time very doubtfully determined as *O. cuticulare* Serville[7] a single male from Thomasville, Georgia. The specimen is not *cuticulare* as we now know it (=*glaberrimum*), but instead is an aberrant individual of *O. minor*.

Relation of the Genus.—Redtenbacher[8] considered *Orchelimum* but a subgenus of "*Xiphidium*," as the supposedly diagnostic features given by previous authors, *i. e.* the spined prosternum and the curved ovipositor were found by him to be present in "*Xiphidium*." Karny in his several papers on the group has allowed *Orchelimum* to retain generic rank and divided *Conocephalus* (*Xiphidium* of authors) into a number of subgenera. The latter author's position seems to us the most logical, but the characters separating the two genera are largely ones of degree and in consequence hard to express. It is necessary, as well, to divide *Orchelimum* into three subgenera, this being done below. As we will show in a future treatment of the genus *Conocephalus*, the characters separating the subgenera of that genus are as important as the characters separating *Orchelimum* s. s. from several of the subgenera of *Conocephalus*, but we find other groups which

[7] Proc. Acad. Nat. Sci. Phila., 1904, p. 796, (1905).

[8] Verh. k.-k. zool.-botan. Gesell. Wien, xli, p. 494, (1891).

are more related to *Orchelimum* than to *Conocephalus* occupying a more or less intermediate position, yet in themselves clearly cut divisions of equal rank to certain other aggregations of the subfamily Conocephalinae. We have been forced to realize that we have more groups in the *Orchelimum-Conocephalus* complex than have previously been recognized by name and the only solution appears to be to designate those divisions which are found to be distinguished by characters of comparative importance, and assemble them as subgenera under the two generic names *Orchelimum* and *Conocephalus* according to the extent of agreement or degree of development of certain features.

Subgenera and Specific Groups.—The three subgenera of *Orchelimum* which we here recognize can be distinguished as follows:

Stridulating field of male tegmina relatively large and broad, as large in area as dorsum of pronotum, speculum not elongate. Humeral sinus of lateral lobes of pronotum more or less distinctly indicated, rarely (*gladiator*) obsolete. Genicular lobes of caudal femora bispinose. Ovipositor with ventral margin regularly arcuate (except in *militare*).

Orchelimum s. s.

(Type—*O. cuticulare* Serville = *glaberrimum* Burmeister.)

Stridulating field of male tegmina relatively large, about as large in area as dorsum of pronotum, speculum decidedly elongate, narrow. Humeral sinus of lateral lobes of pronotum well indicated, arcuato-emarginate. Genicular lobes of caudal femora bispinose. Ovipositor with ventral margin gently arcuate or straight proximad, arcuate distad.

Stenorhoptrum [9] new subgenus

(Type—*O. volantum* McNeill.)

Stridulating field of male tegmina relatively small, not as large in area as dorsum of pronotum, speculum of normal shape but small (except in *superbum*) and *Conocephalus*-like in form. Humeral sinus of lateral lobes not at all or but weakly indicated. Genicular lobes of caudal femora unispinose. Ovipositor ? (female unknown)

Metarhoptrum [10] new subgenus

(Type—*Xiphidium unispina* Saussure and Pictet.)

[9] Στενος *narrow*, ῥοπτρον *tambourine*.

[10] Μετα *between*, ῥοπτρον *tambourine*. In allusion to the intermediate character of the male speculum.

The species of this genus fall into nine groups, which appear to be natural in character. One of these groups forms the new subgenus *Stenorhoptrum*, two constitute the other new subgenus *Metarhoptrum* and the remainder can be assembled under the restricted subgenus *Orchelimum*. The chief criteria which we have used in delimiting these groups are the number of caudal genicular spines and the general form of the male cercus, but we have also taken into consideration other features, as the form of the ovipositor of the female, form and general character of the stridulating field of the male tegmina, the form of the lateral lobes of the pronotum and the general build.

This group arrangement is as follows:

Orchelimum s. s.

GROUP A. (*agile*)

Cerci with simple, rect-divergent median tooth.	Ovipositor falcate.	Stridulating field of male tegmen normal.	Lateral lobes with deeply and broadly indicated humeral sinus.

GROUP B. (*glaberrimum, vulgare, gladiator, calcaratum*)

Cerci with simple to produced rect-divergent or subfalcate (distad) median tooth.	Ovipositor falcate or with nearly straight dorsal outline, occasionally very deep.	Stridulating field normal, but large proportionately.	Lateral lobes broad, with well indicated and broad to but little indicated humeral sinus.

GROUP C. (*bullatum, laticauda, nigripes*)

Cerci heavy, carinate dorsad, with median tooth directed more or less strongly proximad.	Ovipositor strongly falcate, broader mesad than proximad.	Stridulating field normal but broad.	Lateral lobes with humeral sinus hardly indicated, ventrad of same caudal margin is little arcuate.

GROUP D. (*minor*)

Cerci much as in group C but more incrassate and less carinate.	Ovipositor falcate, long, broad and heavy.	Stridulating field normal but broad.	Lateral lobes broad with well indicated and broad humeral sinus.

	GROUP E. (*concinnum, fidicinium*)		
Cerci elongate, thickened, tapering, tooth proximad and directed distinctly proximad.	Ovipositor moderately falcate, of variable length.	Stridulating field normal.	Lateral lobes with humeral sinus indicated quite distinctly and rather broadly.
	GROUP F. (*militare*)		
Cerci very elongate, incrassate, tapering, apex slightly incurved, tooth decidedly proximad and directed distinctly proximad.	Ovipositor straight, subequal in depth, elongate.	Stridulating field normal.	Lateral lobes with humeral sinus very shallowly indicated.

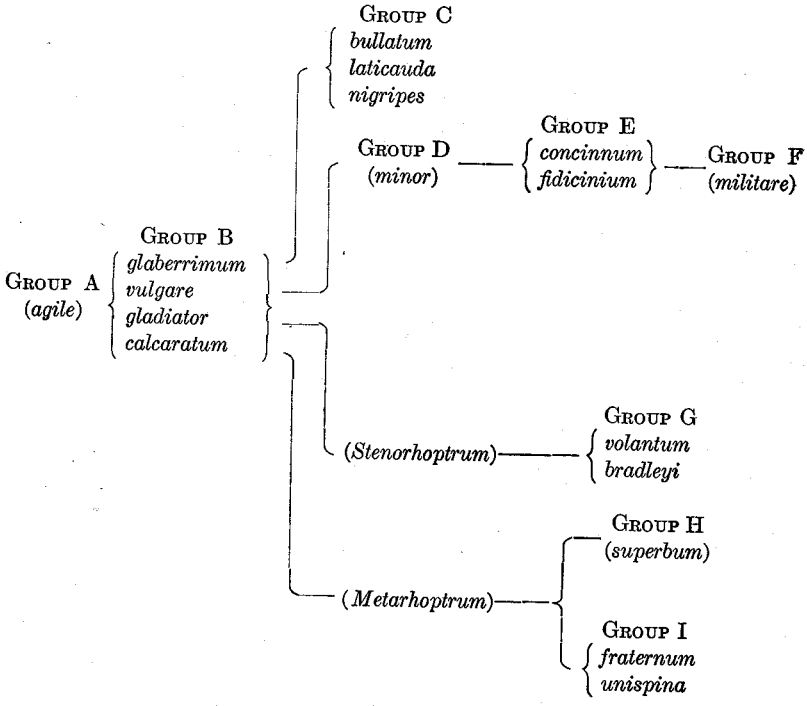
Stenorhoptrum new subgenus

	GROUP G. (*volantum, bradleyi*)		
Cerci elongate, thickened, tapering, tooth proximad and directed nearly at a right angle or decidedly curved and extending proximad in direction.	Ovipositor with ventral margin straight proximad or gently arcuate, dorsal margin straight.	Stridulating field of male tegmen narrow, with speculum greatly elongate.	Lateral lobes with humeral sinus moderately indicated, and broad but shallow.

Metarhoptrum new subgenus

	GROUP H. (*superbum*)		
Cerci much as in *bradleyi* of Group G but with distal portion heavier and thicker.	Ovipositor ? Genicular lobes of caudal femora unispinose.	Stridulating field of male tegmen narrow but of normal character.	Lateral lobes with no humeral sinus.
	GROUP I. (*fraternum, unispina*)		
Cerci with distal extremity tapering, tooth nearly median, not heavy, directed weakly proximad.	Ovipositor ? Genicular lobes of caudal femora unispinose.	Stridulating field small, stridulating vein very weak.	Lateral lobes with at most only a very shallow humeral sinus.

The probable relationship of these groups can be best expressed diagrammatically as shown herewith.



Group A is probably the most primitive member of the genus, as it certainly is the simplest type. Group B is less homogeneous than most of the other groups but its specific units are unquestionably of a common origin. While *gladiator* and *calcaratum* show a somewhat analogous development of the tooth of the male cercus and of the lateral lobes of the pronotum, it is also very evident that *gladiator* is in certain respects closer to *vulgare*, *i. e.*, in the presence of the peculiar node on the dorsal face of the male cercus and in the general character of the tegmina, while the ovipositor of *gladiator* in general type suggests more relationship to *glaberrimum*, which, however, has many features of difference. Taken as a whole the four members of the group are closely related in sum total of characters but specifically divergent in certain single characters. Group C is somewhat similar in complexion to group B but the relationship of *bullatum* and *laticauda* is close and *nigripes* is a divergent type, the peculiar

adpressed character of the cercal tooth giving it a rather unique position, although in general its relationship to the other two species is readily perceived. This group (C) is quite divergent from group B, its probable ancestral type. Group D is probably a link connecting groups B and E, but distinct enough in character from either of these to be given an independent position. In Groups E and F the elongation of the cercus is progressively pronounced, much resembling that found in one species of Group G and one of Group I, which, however, are members of other phyla of the genus. The ovipositor in these groups shows the extreme development of the elongate arcuate type. Group F was apparently derived from a Group E-like ancestor, and in it we find the extreme development of the cercus in elongation (equalled in *unispina* of Group I), this also being gently inbowed distad, the tooth proximal and distinctly directed proximad, while the ovipositor is straight and elongate. Group G is very distinct in character, being sharply defined by the peculiarity of the speculum of the male tegmina, and the straight dorsal margin of the ovipositor (this in *volantum* resembling that of *gladiator* of Group B, but this is probably due to convergence caused by the use of similar oviposition sites). In this group (G) the cercus is elongated, the tooth is distinctly proximal, although the direction of the tooth is different in the two included species. Group H occupies a peculiar position, showing a number of features of relationship to Group I and some apparently superficial resemblance to Group G, but the greater affinity is with Group I. Group I shows a decided tendency toward *Conocephalus*, but in general it is distinctly a member of the genus *Orchelimum*. The unispinose caudal genicular lobes of the species of Groups H and I readily separate them from those of the other groups. Group I has its extreme condition in *unispina* with its obsolete humeral sinus.

Key to the Species

The following key is largely artificial, particularly in the female sex, but it will be found to separate the majority of the species with little difficulty. Some few forms which are easily distinguishable in the male are difficult to separate in the opposite sex and vice versa. In case any difficulty is encountered in forming

a clear idea of the differential features of a certain form or forms, we would suggest that the figures given in this paper for the species involved be examined. With the aid of the figures we feel that proper identification can readily be made.

MALES

A. Cercus of average length, portion distad of insertion of median tooth not markedly longer than that proximad of same. General form relatively more robust.

B. Tooth of cercus distinctly longer than distal portion of cercal shaft and greatly produced, decidedly aciculate. (Humeral sinus hardly indicated; ventro-external margin of caudal femora armed.)

calcaratum new species

BB. Tooth of cercus not longer than distal portion of cercal shaft, not decidedly aciculate.

C. Dorsal surface of shaft of cercus without a very decided sinuate carination.

D. Cercus distinctly depressed, tooth particularly so. (Tooth of cercus directed at a right angle to general axis of cercal shaft, also moderately uncinate at apex. Humeral sinus well indicated.) **agile** (DeGeer)

DD. Cercus not distinctly depressed, tooth more or less thickened in its proximal half.

E. Dorsal surface of cercal shaft without a decided elevated "boss" or node between insertion of tooth and apex of shaft. Speculum of stridulating field more decidedly longitudinal. (Head more or less reddish.) **glaberrimum** (Burmeister)

EE. Dorsal surface of cercal shaft with a decided elevated "boss" or node between insertion of tooth and apex of shaft. Speculum of stridulating field subquadrate.

F. Tooth of cercus as long as distal half of shaft of same, apex of shaft blunt acute. Humeral sinus hardly indicated, ventro-caudal angle of lateral lobes rectangulate. **gladiator** Bruner

FF. Tooth of cercus not as long as distal half of shaft of same, apex of shaft bluntly rounded. Humeral sinus well indicated, ventro-caudal angle of lateral lobes obtusely rounded. **vulgare** Harris

CC. Dorsal surface of shaft of cercus with a very decided sinuate carination.

D. Tooth of cercus not strongly adpressed against proximal portion of sinuate carina. Caudal margin of lateral lobes of pronotum with humeral sinus appreciably indicated and remainder of margin weakly arcuate. Tibiae not blackish.

E. Fastigium relatively broader. Metazona occupying but little less than half of dorsal length of pronotum. Lateral lobes of pronotum relatively shorter, ventro-caudal angle

acute. (Ventro-external margin of caudal femora generally unarmed.) **bullatum** new species

EE. Fastigium relatively narrower. Metazona occupying distinctly less than half of dorsal length of pronotum. Lateral lobes of pronotum relatively broader, ventro-caudal angle less acute. (Ventro-external margin of caudal femora with from two to eight spines.)

laticauda Redtenbacher

D. Tooth of cercus strongly adpressed against proximal portion of sinuate carina. Caudal margin of lateral lobes of pronotum with little indication of humeral sinus and remainder of margin distinctly sinuate. All tibiae blackish. (Ventro-external margin of caudal femora armed.) **nigripes** Scudder

AA. Cercus moderately elongate or very elongate, portion distad of insertion of median tooth markedly longer than that proximad of same. General form relatively more slender.

B. Apex of cercus not decidedly acuminate. Tooth of cercus in position usual in genus, not dorsad or distinctly ventro-mesad in insertion or not strongly proximad in trend (except in *superbum*, which has the tooth distinctly ventro-mesad in insertion).

C. Lateral lobes of pronotum with no humeral sinus. Genicular lobes of caudal femora unispinose. **superbum** new species

CC. Lateral lobes of pronotum with more or less decided humeral sinus. Genicular lobes of caudal femora bispinose.

D. Lateral lobes of pronotum broad, slightly broader than deep. Ventro-external margin of caudal femora always armed. General coloration variegated. (Size small.) **minor** Bruner

DD. Lateral lobes of pronotum narrower, not quite as broad as deep. Ventro-external margin of caudal femora very rarely armed. General coloration, except face, more uniform. (Size small to large.) **concinnum** Scudder

BB. Apex of cercus decidedly acuminate (except in *superbum*). Tooth of cercus inserted on level with dorsal plane of cercus (*volantum*), diverging from ventro-internal face (*bradleyi* and *unispina*) or directed strongly proximad (*fidicinium*, *militare* and *fraternum*).

C. Speculum of stridulating field less elongate and narrow, but slightly longitudinal.

D. Stridulating area of tegmina of type usual in genus. Dorsal line of pronotum appreciably ascending dorso-caudad on metazona. Genicular lobes of caudal femora bispinose.

E. Lateral lobes of pronotum distinctly deeper than broad. Cercus relatively more slender. Fastigium broader.

militare Rehn and Hebard

EE. Lateral lobes of pronotum as broad as deep. Cercus relatively more robust. Fastigium narrower.

fidicinium Rehn and Hebard

DD. Stridulating area of tegmina of type more characteristic of *Conocephalus*, relatively smaller (except in *superbum*). Dorsal line of pronotum not appreciably ascending dorso-caudad on metazona. Genicular lobes of caudal femora unispinose.

E. Lateral lobes of pronotum relatively narrower, without a distinct humeral sinus.

F. Cercus very attenuate and not flattened distad. Speculum of stridulating field short, rather broad. (Size small.) **unispina** (Saussure and Zehntner)

FF. Cercus not attenuate but thick and somewhat flattened distad. Speculum of stridulating field rather narrow, elongate (not as extreme as in *bradleyi* and *volantum*). **superbum** new species

EE. Lateral lobes of pronotum relatively broader, with a distinct though shallow humeral sinus. **fraternum** new species

CC. Speculum of stridulating field decidedly elongate, very narrow, strongly longitudinal.

D. Tooth of cercus diverging on a plane with dorsum of cercal shaft, straight, tapering, slightly proximad in trend; distal portion of cercal shaft regularly tapering, quite acute, not strongly depressed when seen from lateral aspect. **volantum** McNeill

DD. Tooth of cercus diverging from ventro-internal face, projecting distinctly proximad; distal portion of cercal shaft subarcuate, moderately acute, strongly depressed when seen from lateral aspect. **bradleyi** new species

FEMALES

Females of *superbum*, *unispina* and *fraternum* are unknown.

A. Dorsal outline of ovipositor wholly or in greater portion straight. (Length of ovipositor always more than one-half that of caudal femur.)

B. Ovipositor not equal to two-thirds of length of caudal femur.

C. Ventral margin of ovipositor regularly arcuate, greatest depth approximately mesad. Ventro-caudal angle of lateral lobes more rounded. **volantum** McNeill

CC. Ventral margin of ovipositor straight for over half its length, proximal half of ovipositor subequal in depth, narrowing on distal half. Ventro-caudal angle of lateral lobes more acute. **bradleyi** new species

BB. Ovipositor equal to two-thirds or more of length of caudal femur.

C. Ovipositor very heavy, ensiform, ventral margin arcuate, greatest depth mesad. Humeral sinus not strongly indicated. **gladiator** Bruner

CC. Ovipositor narrow, elongate, subequal in depth, both margins straight for greater portion of their length. Humeral sinus strongly indicated. **militare** Rehn and Hebard

AA. Dorsal outline of ovipositor always regularly, but more or less decidedly, arcuate.

B. Ovipositor less than half as long as the caudal femur.
C. Ovipositor not deeper at some point distad of base than at base. (Lateral lobes of pronotum narrow.) **agile** (DeGeer)
CC. Ovipositor deeper at some point distad of base than at base.
D. Ovipositor with general form less arcuate.
E. Lateral lobes of pronotum broader, ventral portion of caudal margin of same considerably arcuate, convex callosity very broad. **glaberrimum** (Burmeister)
EE. Lateral lobes of pronotum narrower, ventral portion of caudal margin of same little arcuate, convex callosity comparatively narrower. **concinnum** Scudder (Part)
DD. Ovipositor with general form more arcuate.
E. Fastigium more robust. Caudal margin of lateral lobes of pronotum with deeply impressed humeral sinus. Ventro-external margin of caudal femora generally unspined. **vulgare** Harris
EE. Fastigium less robust. Caudal margin of lateral lobes of pronotum with but slight indication of humeral sinus. Ventro-external margin of caudal femora always spined. **calcaratum** new species
BB. Ovipositor more than half as long as the caudal femur.
C. Ovipositor strongly falcate.
D. Caudal margin of lateral lobes of pronotum sinuate or subsinuate ventrad of humeral sinus.
E. Ventro-cephalic angle of lateral lobes little indicated. Ventro-external margin of caudal femora generally unspined. Tibiae not blackish. **bullatum** new species
EE. Ventro-cephalic angle of lateral lobes more pronounced. Ventro-external margin of caudal femora spined. Tibiae blackish. **nigripes** Scudder
DD. Caudal margin of lateral lobes of pronotum gently arcuate ventrad of humeral sinus. (Ventro-external margin of caudal femora with 2 to 8 spines.) **laticauda** Redtenbacher
C. Ovipositor gently arcuate, never falcate in degree of curvature.
D. Lateral lobes of pronotum deeper than greatest breadth. Humeral sinus moderately indicated. **concinnum** Scudder (Part)
DD. Lateral lobes of pronotum broader than deep. Humeral sinus of average (*minor*) or decided (*fidicinium*) indication.
E. Ovipositor proportionately deeper, dorsal line straighter. Tegmen more coriaceous. (Coloration variegated.) **minor** Bruner
EE. Ovipositor proportionately shallower, dorsal line more arcuate. Tegmen more vitreous. (Coloration more uniform.) **fidicinium** Rehn and Hebard

Specimens Examined.—The total number of specimens listed in the present paper is 2590, of which almost one-half were collected by one or both of the present authors. In addition to the specimens listed in the present paper some hundreds of individuals which had been previously recorded by us were re-examined and used in forming the conclusions here reached by us. These, however, have not been treated in detail but will be found indicated by localities at the end of the individual summaries of material under the species.

The abbreviations used in tabulating specimens will, we feel, be perfectly clear to anyone using the paper, as they are of the general type which we have been uniformly using for some time. The present authors are indicated by their respective initials and the institutions by the initial letters of their names. In the case of other individuals the name is given in full. Specimens collected by the authors which are not indicated as in the collection of the Academy of Natural Sciences of Philadelphia or the Hebard Collection are to be understood as jointly the property of these two collections, between which they are to be divided.

The types of the following forms have been examined in the preparation of the present study.

O. molossum Rehn and Hebard = *agile* (DeGeer)
O. erythrocephalum Davis = *glaberrimum* (Burmeister)
O. gladiator Bruner
O. calcaratum new species
O. bullatum new species
O. pulchellum Davis = *laticauda* Redtenbacher
O. nigripes Scudder
O. minor Bruner
O. concinnum Scudder
O. longipennis Scudder = *concinnum* Scudder
O. gracile Bruner (*delicatum* Bruner) = *concinnum* Scudder
O. fidicinium Rehn and Hebard
O. crusculum Davis = *fidicinium* Rehn and Hebard
O. militare Rehn and Hebard
O. bradleyi new species
O. superbum new species
O. fraternum new species

In addition to these we have examined authentic material, labelled by the author, of *Orchelimum indianense, campestre* and *volantum* Blatchley.

Acknowledgments.—We wish to tender our thanks to Dr. Samuel Henshaw of the Museum of Comparative Zoology, Mr. A. N. Caudell of the United States National Museum, Mr. W. T. Davis of New Brighton, New York, and Prof. A. P. Morse of Wellesley, Massachusetts, for their courtesy in placing at our disposal the material of the genus in the collections under their charge or in their possession. To Mr. Davis, especially, we are under great obligation for not only material but numerous suggestions, as well as copies of important correspondence relative to the identity of certain species of the genus. Any call we have made on him has been cheerfully answered to the fullest extent of his ability.

Orchelimum agile (DeGeer) (Figs. 6, 18, 35, 36 and 69.)

1773. *Locusta agilis* DeGeer, Mém. Hist. Ins., iii, p. 457, pl. 40, fig. 3. [Pennsylvania.]

1839. *Orchelimum glaucum* Serville, Hist. Nat. Ins., Orth., p. 524. [North America.]

1891. *Orchelimum silvaticum* McNeill, Psyche, vi, p. 26. (February.) [Rock Island, Illinois.]

1891. *Xiphidium* (*Orchelimum*) *nitidum* Redtenbacher, Verh. k.-k. zool.-botan. Gesellschaft Wien, xli, pp. 494, 503. (July.) [Georgia.]

1891. *Xiphidium* (*Orchelimum*) *spinulosum* Redtenbacher, Ibid., pp. 495, 503. (July.) [North Carolina.]

1907. *Orchelimum molossum* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1907, p. 307, figs. 4 to 6. [Pablo Beach, Florida.]

While previously of the opinion that *agilis* of DeGeer was the same as Harris' *vulgare*,[11] we now feel that this view is erroneous and that the name properly belongs to the present species. Analyzing DeGeer's description and comparing it with females of the present species and *vulgare*, we find that in size (*i. e.*, of Pennsylvania material), in the relative length of the ovipositor, which Stål in discussing DeGeer's type says is "femoribus posticis plus dimidio breviore," in the several spines on the caudal femora and in the greenish costal edging of the tegmina the present species is in agreement with the description, while in the same features *vulgare* shows differences. The relative proportions of the head, pronotum and caudal limbs in the original figure are also those of the present species.

The remainder of the above synonymy has been established only after a careful study of the literature involved, typical mate-

[11] Proc. Acad. Nat. Sci. Phila., 1910, p. 640, (1911).

rial of *molossum* and the extensive representation of this species now in our hands. The description of *silvaticum* is brief and unsatisfactory, only non-essential characters being mentioned, but there is sufficient in the way of proportions and remarks on the relationship, supplemented later by McNeill's key, to enable us to place the name with some degree of certainty. In the synonymizing of *molossum* and *nitidum* we are compelled to reverse our previous definition of the latter[12], which name we formerly considered to belong to the species later named *pulchellum* by Davis, and for which we here use Redtenbacher's name *laticauda*. This reversal we feel is warranted, as we are now able to state that the species to which we then applied the name *nitidum* was before Redtenbacher when he described the latter and formed the basis of his *laticauda*. By changing our views we must place *molossum* in the synonymy. The name *spinulosum* was based on small, shorter winged individuals of *nitidum*; which had the dorsum of the pronotum infuscate or possessed paired pronotal bars, while the typical material of *nitidum* was unicolorous on the pronotum. This more or less varied infuscation of the dorsum of the pronotum with additional dark bars means nothing of diagnostic value in this or several other species of the genus, while our series shows greater range in general size and tegminal proportions than given in the descriptions of *nitidum* and *spinulosum* by Redtenbacher.

In size we find a general, or rather average, increase southward. In using the word "southward" it should here be qualified in meaning to designate the Austroriparian element which extends northward along the low coastal region, instead of mere southern latitude. However, this average southern increase is not invariable, as in numerous series, such as those from Tinicum, Lake Waccamaw, Tybee Island, Jacksonville, Ortega and Atlantic Beach, we find very considerable individual variation. In addition, local, probably environmental, factors seem to influence size, as the Atlantic Beach series averages appreciably smaller than the Jacksonville representation, while the Wrightsville and Tybee Island salt marsh specimens are as a whole decidedly smaller than specimens from the comparatively close localities of Winter Park and Cumberland Island respectively.

[12] Proc. Acad. Nat. Sci. Phila., 1907, p. 306, (1907).

Individuals with greatly produced tegmina and wings crop out unexpectedly in several of the series, there being one from Philadelphia, one from Cornwells, Pennsylvania, several from Washington, a number from Virginia, one from Raleigh, one from Wilmington, North Carolina, several from Winter Park, North Carolina, one from Albany, Georgia, and one from Live Oak, Florida.

The number of spines on the distal portion of the ventro–external margin of the caudal femora was found on the examination of thirty indiscriminately selected individuals in the largest series, *i. e.* that from Tinicum, Pennsylvania, to vary from 0 to 5. The exact figures are as follows: 0 and 3 spines, 1 specimen; 1 and 3 spines, 2 specimens; 2 and 2 spines, 3 specimens; 2 and 3 spines, 7 specimens; 3 and 3 spines, 10 specimens; 3 and 4 spines, 3 specimens; 3 and 5 spines, 1 specimen; 4 and 4 spines, 2 specimens; 4 and 5 spines, 1 specimen.

From this it is seen that in half the total the number of spines on the same margin of the caudal femora agrees, while in an equal number there is a more or less marked discrepancy. Very marked discrepancy is, apparently, not as frequent as a discrepancy of a single spine.

In the coloration of the dorsal surface of the head and pronotum we find every conceivable transition between one with that surface of the clear glass greenish of the lateral aspects and of the tegmina, to the other extreme with paired diverging dark brownish lines extending caudad at least to the principal transverse sulcus, between which lines the dorsum is more or less infuscate, occasionally so much so that these bordering lines are distinguished with difficulty.

Distribution.—Coastal Plain and adjacent portion of the Piedmont Region of the eastern states from as far north as southeastern Pennsylvania (Collegeville, Cornwells, Chestnut Hill, Philadelphia and Tinicum) and southern New Jersey (north as far as Westville and Ventnor) south to southern Florida, west as far as south-central Kansas (Wichita; Isely), Arkansas and the Mississippi Valley section of Louisiana (Buras and Milneburg), and north in the Mississippi Valley at least as far as northern Illinois (Rock Island; McNeill) and west central Indiana (Vigo County; Blatchley).

Specimens Examined: 519; 280 ♂, 231 ♀, 2 juv. ♂, 6 juv. ♀.

Collegeville, Pennsylvania, IX, 21 and 22, 1909, (H. Fox; meadow), 3 ♂, 8 ♀, [A. N. S. P.].

Cornwells, Pennsylvania, X, 1906, (R. & H.; in meadow land), 1 ♂, 1 ♀; IX, 7, 1914, (H.; in vegetation along river and in marsh), 17 ♂, 16 ♀.

Chestnut Hill, Pennsylvania, IX, 18, 1903, (H.), 4 ♂, 4 ♀.

Addingham, Pennsylvania, VIII, 8, 1914, (D. E. Culver), 1 ♂, 1 ♀, [A. N. S. P.].

Philadelphia, Pennsylvania, (Westcott), 1 ♀, [Hebard Cln.].

Gibson's Point, Philadelphia, Pennsylvania, VIII, 11, 1910, VIII, 19, 1911, (H. Fox), 13 ♂, 3 ♀, [A. N. S. P.].

Tinicum, Pennsylvania, VIII, 13, 1911, IX, 29, 1903 and 1913, IX, 9, 1904, (R. & H.; in meadow land), 71 ♂, 53 ♀.

Westville, New Jersey, VIII, 31, 1899, (G. M. Greene), 2 ♀, [A. N. S. P.].

Jericho, New Jersey, IX, 6, 1910, (H. Fox; in marsh), 1 ♂, 2 ♀, [A. N. S. P.].

Ventnor, New Jersey, VIII, 17 and 26, 1914, (H.; grasses and marshy spots as well as grassy clumps on the higher areas), 27 ♂, 20 ♀, 2 juv. ♂, 6 juv. ♀.

Canton, New Jersey, IX, 7, 1910, (H. Fox), 1 ♀, [A. N. S. P.].

Dorchester, New Jersey, IX, 4, 1910, (H. Fox; marsh), 3 ♂, 3 ♀, [A. N. S. P.].

Cedar Springs, New Jersey, VIII, 14 and 26, 1914, (H.; common in fresh marsh grasses and rushes along river), 19 ♂, 20 ♀.

Ocean View, New Jersey, IX, 4 and 6, 1909, (H. Fox; upland meadow bordering salt marsh), 6 ♂ 5 ♀, [A. N. S. P.].

Sea Isle City, New Jersey, VIII, 15, 1910, (H. Fox; in tall grasses and *Cyperis*), 11 ♂, 2 ♀, [A. N. S. P.].

Goshen, New Jersey, VIII, 22, 1910, VIII, 27, 1912, (H. Fox), 4 ♂, 3 ♀, [A. N. S. P.].

Avalon, New Jersey, VIII, 12 and 20, 1910, VIII, 12, 1911, (H. Fox; in sedge in dune depression), 6 ♂, 8 ♀, [A. N. S. P.].

Anglesea, New Jersey, IX, 6, (W. T. Davis) 1 ♂, 1 ♀, [Davis Cln.].

Near Town Bank, New Jersey, VIII, 15, 1912, (W. T. Davis), 1 ♂, [U. S. N. M.].

Erma, New Jersey, VIII, 19, 1912, (W. T. Davis), 1 ♀, [U. S. N. M.].

Cape May, New Jersey, IX, 24, 1910, (H. Fox), 2 ♂, 4 ♀, [A. N. S. P.].

Newcastle, Delaware, VIII, 6, 1911, (H. Fox), 1 ♂, [A. N. S. P.].

Montgomery Co., Maryland, IX, 23, 1911, (W. T. Davis), 1 ♂, 1 ♀, [Davis Cln.].

Chestertown, Maryland, VIII, 25, 1899, (E. G. Vanatta), 1 ♀, [A. N. S. P.].

Cedar Point, Morgantown, Maryland, VIII, 24, 1913, (W. L. McAtee), 1 ♂, 1 ♀, [U. S. N. M.].

Hyattsville, Maryland, IX, 17, 1911, (W. T. Davis), 1 ♂, [U. S. N. M.].

Washington, D. C., IX, 1883, 1 ♂, 3 ♀, [Hebard Cln.]; IX, 3 to 11, (A. N. Caudell), 5 ♂, 3 ♀, [U. S. N. M.]; VII and VIII, 1904 and 1909, (H. A. Allard), 3 ♂, 3 ♀, [U. S. N. M.].

Virginia, VIII, 14, X, 1, 1883, 3 ♂, 9 ♀, [Hebard Cln.].

Rosslyn, Virginia, IX, X, 20, (A. N. Caudell), 4 ♂, 2 ♀, [U. S. N. M.].

Addison, Virginia, X, 6, 1912, (A. N. Caudell), 1 ♂, 1 ♀, [U. S. N. M.].
Appomattox, Virginia, IX, 6, 1903, (Morse), 3 ♂, 6 ♀, [Morse Cln.].
Virginia Beach, Virginia, IX, 7, 1903, (Morse), 1 ♂, 1 ♀, [Morse Cln.].
Hamlet, North Carolina, X, 1906, (F. Sherman), 1 ♀, [N. C. Dept. of Agric.].
Lake Waccamaw, North Carolina, IX, 8, 1911, (R. & H.; in high weeds near lake shore), 9 ♂, 10 ♀.
Wilmington, North Carolina, VII, 23, 1905, (J. P. Spoon), 1 ♂, [N. C. Dept. of Agric.].
Winter Park, North Carolina, IX, 7, 1911, (R. & H.; in grasses in field), 2 ♂.
Wrightsville, North Carolina, IX, 7, 1911, (R. & H.; in weeds on barrier beach), 1 ♂.
Yemassee, South Carolina, IX, 4, 1911, (R. & H.; in grasses), 1 ♂, 3 ♀.
Thompson's Mills, Georgia, 1908, X, 1909, (H. A. Allard), 2 ♂, 1 ♀, [U. S. N. M.].
Stone Mountain, Georgia, IX, 12, 1913, (J. C. Bradley), 1 ♂, [Ga. State Cln.].
Albany, Georgia, VIII, 1, 1913, (R. & H.; attracted to light at night), 1 ♀.
Hebardville, Georgia, VIII, 28, 1911, (H.) 1 ♂.
Jesup, Georgia, IX, 1, 1911, (R. & H.; in swamp in pine woods), 1 ♂, 1 ♀.
Cumberland Island, Georgia, VIII, 31, 1911, (R. & H.; in weeds on beach), 3 ♂, 1 ♀.
Tybee Island, Georgia, IX, 2, 1911, (R. & H.; scarce in marsh grass), 3 ♂, 2 ♀.
Savannah, Georgia, VIII, 13 to 14, 1903, (Morse), 11 ♂, 8 ♀, [Morse Cln.].
Live Oak, Florida, VIII, 26, 1911, (R. & H.), 1 ♂.
Jacksonville, Florida, (Priddey), 3 ♂; VIII, 1885, (Ashmead), 2 ♂, 2 ♀, [Hebard Cln.].
South Jacksonville, Florida, IX, 28, 1913, (W. T. Davis), 1 ♀, [Davis Cln.].
Ortega, Florida, IX, 6, 1913, (W. T. Davis), 2 ♂, 3 ♀, [Davis Cln.].
Pablo Beach, Florida, IX, 27, 1913, (W. T. Davis), 1 ♂, [Davis Cln.].
Atlantic Beach, Florida, VIII, 24, 1911, (R. & H.; fairly common on high weeds in hammock jungle), 5 ♂, 2 ♀.
Hastings, Florida, VIII, 7 to X. 15, (A. J. Brown), 2 ♂, 4 ♀, [Morse Cln.].
Sanford, Florida, (G. B. Frazer), 2 ♂, [M. C. Z.].
Carrabelle, Florida, VIII, 9, 1903, (Morse), 1 ♂, [Morse Cln.].
Marianna, Florida, VIII, 6, 1903, (Morse) 1 ♂, [Morse Cln.].
Quincy, Florida, X, 27, 1905, (W. A. Hooker), 1 ♂, [U. S. N. M.].
Alabama, 1 ♂, [Hebard Cln.]; 1 ♂, [Morse Cln.].
Chattanooga, Tennessee, VIII, 24, 1903, (Morse), 3 ♂, 4 ♀, [Morse Cln.].
Lafayette, Indiana, X, 14, 1914, (H. Fox), 1 ♀, [Fox Cln.].
Southern Illinois, 1 ♀, [M. C. Z.].
Arkansas, 1 ♀, [U. S. N. M.].
Milneburg, Louisiana, VII, 22, 1905, (Morse), 7 ♂, 9 ♀, [Morse Cln.].
Buras, Louisiana, VII, 23, 1905, (Morse), 1 ♂, [Morse Cln.].

We have also recorded this species from Thomasville, Georgia, as *nitidum;* from Pablo Beach, Gainesville, Lakeland and Everglade, Florida, Edenton, Newbern and Raleigh, North Carolina and Rosslyn, Virginia, as *molossum*

and from Raleigh, North Carolina, and Chestnut Hill and Tinicum, Pennsylvania as *spinulosum*.

Orchelimum glaberrimum (Burmeister) (Figs. 7, 19, 37, 38 and 70.)

1838. *X[iphidium] glaberrimum* Burmeister, Handb. der Entom., ii, abth. ii, pt. 1, p. 707. [Georgetown, South Carolina.]

1839. *Orchelimum cuticulare* Serville, Hist. Nat. Ins. Orth., p. 523. [No locality.]

1905. *Orchelimum erythrocephalum* Davis, Canad. Entom., xxxvii, p. 288. [Lakehurst, Toms River and "Ocean Co.," New Jersey.]

We have traced out the movements of Zimmermann, who collected the material on which Burmeister founded the species, and find that Georgetown, South Carolina, is the only locality which he had visited in "South Carolina" up to the time Burmeister's work appeared. Accordingly we have selected that place as the type locality. An effort to locate the original material has been unsuccessful, the only thing positive being the assurance from Prof. O. Taschenberg that it does not exist in the Halle collections.

Regarding the synonymy of *cuticulare* with the present species, a careful study of the description of Serville's species shows conclusively that they are the same. The name *cuticulare* has been erroneously used by Redtenbacher for a species which we are here naming *calcaratum*. The lack of appreciation by some European workers of American geography and the settlement of the country is evidenced by the reference of a form described as long ago as 1839, to a species found only in a region which up to that time was largely the proverbial howling wilderness, traversed only by pioneers and strong government detachments.

Mr. Davis has been kind enough to place in our hands an extensive series of New Jersey, North Carolina and Florida specimens of this species, those from the first mentioned state being typical of his *erythrocephalum*. These confirm the previously expressed opinion of the authors regarding the synonymy of the two forms. The smaller size of the New Jersey specimens is explained when a series representing localities extending from that state to Florida is laid out, as the increase in size southward is in general regular, with, however, the usual amount and percentage of individual variation found in forms of this genus. Environment also is without doubt an influencing factor in regard to size. In no

case, however, is a New Jersey specimen as large as the average North Carolina individual.

As an index to the average amount of this geographic size variation we here present the proportions (in millimeters) of representative pairs of average dimensions for the series from that locality.

	Lakehurst, New Jersey		Fayetteville, North Carolina		Florence, South Carolina	
	♂	♀	♂	♀	♂	♀
Length of body	20.2	22.5	25	23.2	25.5	24.7
Length of pronotum	5.9	5.9	6.5	6.5	6.8	7
Length of caudal femur	17.3	18	19.8	20.5	20	21
Length of ovipositor	....	9.2	....	10.2	....	10

	Billy's Island, Georgia		South Jacksonville, Florida	
	♂	♀	♂	♀
Length of body	22.5	27	24	23.2
Length of pronotum	7	7.3	8	7.5
Length of caudal femur	21	21.8	23.3	22
Length of ovipositor	....	10	....	10

The body length is, as usual, unreliable on account of the frequent unnatural compression or extension.

The length of the tegmina and wings is as variable in this species as in *vulgare*, the caudate type of tegmen and wing appearing in any extensive series. We have before us specimens with the tegmina and wings considerably surpassing the apices of the caudal femora from Lakehurst, Chatsworth, Jamesburg, Parkdale and Atsion, New Jersey; Bayville, Virginia; Fayetteville and Lake Waccamaw, North Carolina; Florence and Yemassee, South Carolina; Albany, Groveland, Thomasville, Billy's Island, Tybee Island and Jesup, Georgia, and Jacksonville, South Jacksonville, Pablo Beach, La Grange and Cedar Keys, Florida.

An examination of one hundred and eleven specimens for the presence or absence of spines on the ventro-external margin of the caudal femora gives figures which support our former contention[13] regarding the variability of this feature. We are able here to go more fully into this matter and present details of the spine count. Twenty-one New Jersey specimens bear no spines on this margin, while fifty-three have one or more spines. Of this fifty-three, the combinations of spines and number for each are given below with the figures for series from four other localities.

[13] Proc. Acad. Nat. Sci. Phila., 1910, p. 639, (1911).

	Various New Jersey localities	Raleigh, North Carolina	Florence, South Carolina	Billy's Island, Georgia	South Jacksonville, Florida
0–0	21	1	3	2	1
0–1	8	2	0	2	1
0–2	7	0	0	0	0
0–3	1	0	0	0	0
1–1	7	0	1	2	1
1–2	9	0	2	1	0
1–3	3	0	1	1	1
2–2	7	0	0	1	3
2–3	6	1	1	1	2
2–4	0	1	0	0	0
3–3	0	1	0	0	0
3–4	4	0	0	0	2
3–5	0	1	0	0	0
3–6	0	1	0	0	0
4–4	1	0	0	0	0

In forty-two specimens from Lakehurst, New Jersey, we find thirty-two with the external margin of the caudal femora with one or more spines and ten without spines.

The red or reddish coloration of the head is almost invariably well marked in northern (*i. e.*, New Jersey) specimens, but in material from the southern portion of the range of the species this is not as decidedly indicated, being often of a paler shade, although occasionally individuals are just as highly, or rather deeply, colored as New Jersey specimens.

Distribution.—As shown by material before us, the range of this species extends over the greater portion of the Coastal Plain of the eastern United States from north-central New Jersey (Old Bridge, Helmetta and Jamesburg) south to southern Florida, inland at least as far as the western edge of the Pine Barren region in New Jersey, in North Carolina as far as Raleigh and in Georgia extending at least as far inland as Macon. Westward along the Gulf Coast we know the species ranges at least as far as southern Mississippi. Redtenbacher has also recorded it from Tennessee, Missouri, Texas and "Rocky Mountains, Colorado," the last certainly in error and the others possibly so. Ashmead has recorded *glaberrimum* from Utica, Mississippi and Allard credits it to Thompsons Mills, Georgia, but in the former case there may be some confusion with long-winged *vulgare*, and in the latter we find from the material this to be the case, so it seems most advisable to base our summary of the geographic

range of the species solely on the specimens examined by us. For comments on other records of *glaberrimum* see under the distribution of *vulgare*.

Specimens Examined: 247, 191 ♂, 48 ♀, 4 juv. ♂, 4 juv. ♀.

Ocean County, New Jersey, VIII, 25, 1 ♀, [Davis Cln.].

Lakehurst, New Jersey, VII, 16 to 30, VIII, 15 to 22, IX, 4 to 24, X, 18, (W. T. Davis), 40 ♂, 4 ♀, [Davis Cln.]. *Paratypes* of *Orchelimum erythrocephalum* Davis.

Jamesburg, New Jersey, VIII, 11, IX, 19 to 20, (W. T. Davis), 10 ♂, [Davis Cln.].

Old Bridge, New Jersey, X, 8, 1909, (W. T. Davis), 1 ♂, [Davis Cln.].

Cassville, New Jersey, VIII, 1910, (W. T. Davis), 2 ♂, [Davis Cln.].

South of Cassville, New Jersey, VIII, 12, 1911, (W. T. Davis), 1 ♂, [Davis Cln.].

Whitesville, New Jersey, VIII, 22, 1912, (W. T. Davis), 3 ♂, [Davis Cln.].

Chatsworth, New Jersey, VIII, 14 to 21, 1912, (W. T. Davis), 12 ♂, 2 ♀, [Davis Cln.].

High Bridge, Ocean County, New Jersey, VIII, 12, 1911, (W. T. Davis), 1 ♂, [Davis Cln.].

Toms River, New Jersey, VIII, 15, 1885, (W. T. Davis), 2 ♂, [Davis Cln., and Hebard Cln.].

Brown's Mills Junction, New Jersey, VIII, 4, 1905, (E. Daecke), 1 ♂, [Hebard Cln.].

Atsion, New Jersey, VII, 3, 1911, X, 8, 1903, (R. & H.), 1 ♂, 1 ♀, [Hebard Cln.]; VIII, 14, 1911, (W. T. Davis), 1 ♂, [Davis Cln.].

Parkdale, New Jersey, VII, 30, 1911, (R. & H.), 2 ♂, 1 ♀.

May's Landing, New Jersey, VIII, 26 and 29, 1914, (H.; moderately common in marshy area, singing loudly in afternoon, scarcely at all after dark), 15 ♂.

Reega, New Jersey, VIII, 20 and 29, 1914, (H.; in high grass in open glade in pine woods, immature individuals found on first date), 4 ♂, 1 ♀, 1 juv. ♀.

Between Woodbine and Belleplain, New Jersey, VIII, 21, 1912, (H. Fox), 1 ♂, [A. N. S. P.].

Belleplain, New Jersey, VIII, 21, 1912, IX, 2, 1909, (H. Fox; grassy area in pine woods), 3 ♂, [A. N. S. P.].

Great Cedar Swamp near Sea Isle Junction, New Jersey, VII, 29, 1911, VIII, 27, 1910, X, 15, 1910, (H. Fox), 15 ♂, [A. N. S. P.].

Cedar Swamp Bog, two miles east of North Dennisville, New Jersey, VIII, 18, 1908, (H. Fox), 1 ♂, [A. N. S. P.].

Virginia Beach, Virginia, IX, 7, 1903, (Morse), 1 ♀, [Morse Cln.].

Cape Henry, Virginia, IX, 7, 1903, (Morse), 1 ♀, [Morse Cln.].

Raleigh, North Carolina, X, 3 ♂, 7 ♀, [Davis Cln.].

Goldsboro, North Carolina, VII, 25, 1913, (R. & H.), 1 juv. ♀.

Fayetteville, North Carolina, IX, 9, 1911, (R. & H.; common in grasses and weeds), 1 ♂, 4 ♀.

Lake Waccamaw, North Carolina, IX, 8, 1911, (R. & H.), 2 ♂.

Wilmington, North Carolina, IX, 8, 1911, (R. & H.; in boggy area where Venus-fly-trap (*Dionea*) grew), 1 ♂, 1 ♀; VIII, 1, (G. P. Engelhardt), 1 ♂, [Davis Cln.].

Wrightsville, North Carolina, IX, 7, 1911, (R. & H.; in oak scrub), 1 ♂.

Smithville, North Carolina, XI, 22, 2 ♂, [M. C. Z.].

Florence, South Carolina, IX, 6, 1911, (R. & H.; in open space with high grass), 5 ♂, 3 ♀.

Ashley Junction, South Carolina, VIII, 15, 1913, (R.; in wet spots in pine woods), 1 juv. ♀.

Yemassee, South Carolina, IX, 4, 1911, (R. & H.; in green grasses along railroad), 3 ♂.

Denmark, South Carolina, VIII, 15, 1903, (Morse), 1 ♂, 1 ♀, [Morse Cln.].

Macon, Georgia, VII, 30 to 31, 1913, (R. &. H), 3 juv. ♂, 1 juv. ♀.

Tybee Island, Georgia, IX, 2, 1911, (H.; in high grasses along edge of tidal marsh), 2 ♂.

Savannah, Georgia, VIII, 14, 1903, (Morse), 4 ♂, 2 ♀, [Morse Cln.].

Groveland, Cannoche River, Georgia, VIII, 28, 1913, (J. C. Bradley), 1 ♂, [Ga. State Cln.].

Jesup, Georgia, IX, 1, 1911, (H.; in swamp in pine woods), 2 ♂, 1 ♀.

Billy's Island, Georgia, IX, 1 to 5, 1913, (J. C. Bradley), 10 ♂, 1 ♀.

Homerville, Georgia, VIII, 27, 1911, (R. & H.), 1 ♂.

Albany, Georgia, VIII, 1, 1913, (R. & H.; in tangles), 1 ♂.

Atlantic Beach, Florida, VIII, 24, 1911, (R. & H.; in marshy land on edge of hammocks), 1 ♂.

Pablo Beach, Florida, IX, 5, 1913, (W. T. Davis), 1 ♂, [Davis Cln.].

South Jacksonville, Florida, IX, 7 and 28, 1913, (W. T. Davis), 11 ♂, 2 ♀, [Davis Cln.].

Hastings, Florida, VIII, 7 to X, 15, (A. J. Brown), 16 ♂, 11 ♀, [Morse Cln.].

La Grange, Florida, IX, 9 & X, 1913, (W. T. Davis), 2 ♂, 1 ♀, [Davis Cln.].

Alabama, 1 ♂, 1 ♀, [Morse Cln.].

Flomaton, Alabama, VIII, 2, 1903, (Morse), 1 ♂, [Morse Cln.].

Nugent, Mississippi, VII, 20, 1905, (Morse), 1 ♀, 1 juv. ♀, [Morse Cln.].

Biloxi, Mississippi, VII, 19, 1905, (Morse), 1 ♂, [Morse Cln.].

Gulfport, Mississippi, VII, 18, 1905, (Morse), 1 ♂, [Morse Cln.].

In addition to these records Smith has reported the species from Tuckerton, New Lisbon and Lahaway, New Jersey; while the present authors have recorded specimens from Bayville, Virginia; Newbern and Winter Park, North Carolina; Thomasville and Waynesville, Georgia, and San Pablo, Jacksonville, Gainesville, Cedar Keys and Everglade, Florida. The present authors' record from Edenton, North Carolina, refers to *vulgare*, under which species it is corrected. Fox has erroneously recorded this species from Rockville, Pennsylvania, the material being *vulgare*, and from between Winslow and Folsom, New Jersey, the latter specimens belonging to our new *superbum*.

Orchelimum vulgare Harris (Figs. 8, 20, 39, 40 and 71.)

1841. *Orchelimum vulgare* Harris, Ins. Inj. Veget., p. 130. [Massachusetts.]

This species is very closely related to *O. glaberrimum* (Burmeister), but while the present form ranges over the Carolinian,

Transition and portions of the Canadian life zones, *glaberrimum* is chiefly restricted to the Austroriparian zone. The ranges of the two touch and possibly to a slight degree overlap, but there is no definite intergradation of the material, typical individuals of each occurring side by side at certain localities on the meeting ground of the two species.

The great difficulty in the past with these two names (*i. e.*, *glaberrimum* and *vulgare*) has been due to the failure of authors to comprehend the real characters separating them. Large specimens of *vulgare* and individuals of the same with caudate tegmina and wings were called *glaberrimum* regardless of the good structural characters which separate the two. All the *glaberrimum* records from the normal range of *vulgare* are probably these long-winged *vulgare*, but those records from the line where the species meet cannot be assigned without examination of the original material.

The general characters separating the two species are; the generally larger, frequently much larger, size of *glaberrimum*, the relatively broader and shallower fastigium of the same form, the broader lateral lobes of the pronotum of *vulgare*, the generally more elongate speculum of the stridulating field of the male tegmina of *glaberrimum*, the preapical node on the dorsal surface of the male cercus in *vulgare*, this being absent in *glaberrimum*, and the straighter and less falcate ovipositor of the female of *glaberrimum*.

In general size *vulgare* holds rather small northward, material from the more southern localities averaging larger, this being quite noticeable in specimens from North Carolina, Missouri, south-central Kansas, Oklahoma and Texas localities. However, like the other forms of this genus, individual variation at any one place is very considerable, and in series averaging large we will find small or medium sized individuals and vice versa. In no case, however, does this species reach the great size frequently attained by *glaberrimum*.

Individuals with elongate tegmina and wings, *i. e.*, these very considerably exceeding the tips of the caudal femora, occur in the material before us from all over the range of the species. The localities represented by this phase in the series before us are: North Saugus and Seekonk, Massachusetts; Port Allegany and Rockville, Pennsylvania; Delaware; Chestertown, Maryland;

Washington, District of Columbia; Virginia; Grant County, West Virginia; Linville, North Carolina; Thompsons Mills, Georgia; Indiana; Illinois; Clarksville, Tennessee; St. Louis, Missouri; Iowa City and Dallas County, Iowa; West Point, Kearney, Lincoln and Neligh, Nebraska; Topeka, Barber County, Hiawatha and Belpre, Kansas, and Dallas, Texas.

An examination of the series before us shows that normally the ventro-external margins of the caudal femora are unspined in this species, only occasional specimens having one or two spines. Forty-eight specimens from five representative localities show counts as follows:

Saunderstown, Rhode Island		Tinicum, Pennsylvania		Sulphur Springs, North Carolina		St. Louis, Missouri		West Point, Nebraska	
0–0	0–0	0–0	0–0	2–2	0–0	0–0	0–0	0–0	0–0
0–0	0–0	0–0	0–0	0–0	0–0	0–0	0–1	0–0	0–0
0–0	0–0	0–0	0–0	0–0	0–0	0–0	0–1	1–1	0–0
0–0	0–0	0–0	0–0	0–0	0–0	0–0	0–0	0–0	0–0
0–0		0–0	0–0	0–0		0–0	0–0	0–0	0–0

Distribution[14].—Extending from southern Maine (Norway; Smith), southern Quebec (Montreal; Caulfield), the Muskoka region of Ontario (Walker), north shore of Lake Superior (Caulfield) and Minnesota (Lugger), south in the east as far as northern Georgia (Thompsons Mills; Allard), north of the Carolinas extending eastward to the coast, in the Carolinas east as far as Raleigh (Brimley) and Edenton, in the interior south to at least Tennessee, northwest Arkansas (Fayetteville) and northeast Texas (Dallas), west to the foot of the Rocky Mountains in Colorado (Manitou) and eastern Wyoming (Thomas). Certainly the majority of the *glaberrimum* records from this region refer to long-winged *vulgare*, except in the Pine Barrens of New Jersey where *glaberrimum* reaches its northern limit, while it is possible some of the interior records refer to *gladiator* and *calcaratum*. The record of this species from Chokoloskee, Florida, by the present authors is erroneous, the material having been from elsewhere.

Specimens Examined: 467; 248 ♂; 195 ♀; 10 juv. ♂; 14 juv. ♀.
Montreal, Quebec, Canada, (Lyman), 1 ♀, [M. C. Z.].
Windsor, Ontario, Canada, IX, 1894, 3 ♂, [Cornell Univ.].

[14] Owing to the great confusion previously existing between the present species and *O. glaberrimum*, we are here considering as trustworthy only such records as our material gives reason to believe are correct.

Brunswick, Maine, IX, 2, 1913, (Morse), 1 ♂, [Morse Cln.].
Norway, Maine, (S. I. Smith), 4 ♂, 2 ♀, [M. C. Z.].
Vermont, 2 ♂, 1 ♀, [M. C. Z.].
Jaffrey, New Hampshire, IX, 5 to 18, 1896, (S. Henshaw), 4 ♀, [M. C. Z.].
Seabrook, New Hampshire, (A. A. Eaton), 1 ♂, [U. S. N. M.].
Cape Cod, Massachusetts, 1 ♂, 1 ♀, [M. C. Z.].
Provincetown, Massachusetts, 1 ♀, [M. C. Z.].
Chatham, Massachusetts, VIII, 1904, (Morse), 2 ♀, [Morse Cln.].
Seekonk, Massachusetts, (Mrs. Brigham), 1 ♂, [M. C. Z.].
North Saugus, Massachusetts, IX, 6, 1906, (C. C. Gowday), 1 ♀, [U. S. N. M.].
Truro, Massachusetts, IX, 4, 1904, (Morse), 1 ♂, [Morse Cln.].
Vicinity of Boston, Massachusetts, (Scudder), 1 ♀, [M. C. Z.].
Wollaston, Massachusetts, VII, 1896, VIII, 1895, (F. H. Sprague), 2 ♂, 4 ♀, [M. C. Z.].
Wellesley, Massachusetts, VII, 18, 1892, (Morse), 1 ♂, [Hebard Cln.].
Sharon, Massachusetts, VIII, 1, 1897, (F. H. Sprague), 1 ♂, [M. C. Z.].
Marion, Massachusetts, VIII, 1905, (H.), 3 ♂, 1 ♀.
Nantucket, Massachusetts, (Scudder), 5 ♂, 3 ♀, [M. C. Z.].
Saunderstown, Rhode Island, IX, 3 to 9, 1913, (H.), 5 ♂, 4 ♀.
Wesquage Beach, Rhode Island, IX, 8 and 10, 1913, (H.), 2 ♀.
Cattaraugus, New York, IX, 1894, 1 ♂, 3 ♀, [M. C. Z. and Cornell Univ.].
Clifton Springs, New York, 1 ♂, 3 ♀, [M. C. Z. and Cornell Univ.].
Ithaca, New York, VII, 27 to 30, 1885, VIII, 4 to 26, 1885, (O. E. Pearce), 19 ♂, 14 ♀, [M. C. Z. and Cornell Univ.]; VIII, 15 and 22, 1890 and 1891, 2 ♂, 1 ♀, [Morse Cln.].
Berkshire, New York, 1 ♂, [M. C. Z.].
Mosholu, New York, X, 18, 1 ♀, [Hebard Cln.].
Port Allegany, Pennsylvania, VIII, 1 to 8, 1904, (H. W. Fowler), 1 ♀, [A. N. S. P.].
Tobyhanna, Pennsylvania, IX, 2, 1903 (H.), 2 ♂, [Hebard Cln.].
Blairsville, Pennsylvania, VIII, 27, 3 ♂, 4 ♀, [Penna. State Dept. Zool.].
Diamond Valley, Huntington Co., Pennsylvania, IX, 10, 1905, (R.), 1 ♀, [A. N. S. P.].
Rockville, Pennsylvania, VIII, 5 to 29, 4 ♂, 4 ♀, 1 juv. ♀, [Penna. State Dept. Zool.].
Camphill, Pennsylvania, IX, 22, 1 ♀, [Penna. State Dept. Zool.].
Harrisburg, Pennsylvania, VII, 9, VIII, 2 to 18, 4 ♂, 4 ♀, 1 juv. ♀, [Penna. State Dept. Zool.].
Dauphin, Pennsylvania, IX, 15, 1 ♂, 1 ♀, [Penna. State Dept. Zool.].
Middletown, Pennsylvania, X, 19, 1 ♂, [Penna. State Dept. Zool.].
Highspire, Pennsylvania, VII, 28, 1 juv. ♀, [Penna. State Dept. Zool.].
Perkasie, Pennsylvania, VIII, 4, 1911, (H. Fox), 2 ♂, [A. N. S. P.].
Cornwells, Pennsylvania, IX, 7, 1914, (H.; scarce in marsh vegetation, common in clumps of weeds in fields), 4 ♂, 1 ♀.
Devon, Pennsylvania, IX, 14, 1905, 1 ♂, [A. N. S. P.].
Fern Hill, Pennsylvania, VII, 15, 1911, IX, 19, 1908, (R. & H.), 2 ♂, 1 ♀.
Castle Rock, Pennsylvania, IX, 19, 1908, (R. & H.), 1 ♂, 4 ♀.

Chestnut Hill, Pennsylvania, IX, 2, 1904, IX, 13 to 18, 1903, (H.), 4 ♂, [Hebard Cln.].

Mount Airy, Pennsylvania, VII, 15, VIII, 4, 1911, (H. Fox), 3 ♂, [A. N. S. P.].

Addingham, Pennsylvania, VIII, 8, 1914, (D. E. Culver), 2 ♂, 1 ♀, [A. N. S. P.]

Gibson's Point, Philadelphia, Pennsylvania, VII, 20, 1911, VIII, 1, 1912, VIII, 9, 1911, (H. Fox), 11 ♂, 4 ♀, [A. N. S. P.].

Tinicum, Pennsylvania, VIII, 13, 1911, IX, 9, 1904, IX, 19, 1908, IX, 29, 1903 and 1913, (R. & H.), 9 ♂, 21 ♀.

Essington, Pennsylvania, VII, 27, 1911, (H. Fox), 1 ♂, 3 ♀, [A. N. S. P.].

Riverton, New Jersey, X, 8, 1911, (H. Viereck), 1 ♀, [A. N. S. P.].

Washington Park, New Jersey, VIII, 11, 1911, (H. Fox), 2 ♂, 2 ♀, [A. N. S. P.].

Clementon, New Jersey, VII, 25, 1911, (H. Fox; in humid field), 1 ♀, [A. N. S. P.].

Canton, New Jersey, IX, 7, 1910, (H. Fox), 1 ♀, [A. N. S. P.].

May's Landing, New Jersey, VIII, 29, 1914, (H.), 2 ♂.

Reega, New Jersey, VII, 31, VIII, 10, 16 and 29, 1914, (H.; in undergrowth in pine woods), 8 ♂, 2 ♀, 1 juv. ♂, 2 juv. ♀, (immature individuals on the two earliest dates).

Pleasantville, New Jersey, VIII, 17, 1914, (H.), 1 ♂.

Ventnor, New Jersey, VIII, 6 and 11, 1914, (H.; in low bushes and heavy weeds and grasses), 6 ♂, 3 ♀, 2 juv. ♂, 2 juv. ♀, (two instars represented, taken on the first date).

Margate, New Jersey, VII, 24, 1914, (H.; in barrier dune vegetation), 2 juv. ♂, 1 juv. ♀, (former in different instars).

Tuckahoe, New Jersey, VIII, 26, 1914, (H.; in glade), 1 ♂.

Cedar Springs, New Jersey, VIII, 14 and 26, 1914, (H.; occasional in fresh-marsh with *agile* and *concinnum*), 3 ♂, 5 ♀.

Ocean View, New Jersey, IX, 7, 1908, (H. Fox), 1 ♂, [A. N. S. P.]; VII, 27, 1914, (H.; common in high grasses and in field), 3 ♂, 1 juv. ♂, 5 juv. ♀, (two instars).

Swainton, New Jersey, VIII, 8, 1914, (H.; occasional, in late afternoon with a low continuous buzzing with but few clicks, a quite different song from that of midday), 2 ♂, 1 juv. ♀.

Cape May Court House, New Jersey, VIII, 21, 1914, (H.; in high cattails and rushes, after dark), 1 ♂.

Wildwood Junction, New Jersey, VII, 27, VIII, 8 and 21, 1914, (H.; in open field), 3 ♂, 2 juv. ♂, 1 juv. ♀, (first adult on second date).

Mount Pleasant, New Jersey, IX, 5, 1904, (H. Fox), 2 ♀, [A. N. S. P.].

Sea Isle Junction, New Jersey, X, 2, 1909, X, 15, 1910, (H. Fox; in swamp), 2 ♂, [A. N. S. P.].

Chestertown, Maryland, VII, 31, 1904, VIII, 22, 1899, (E. G. Vanatta), 2 ♂, [A. N. S. P.].

Washington, District of Columbia, IX, (W. T. Davis, part), 3 ♂, 1 ♀, [Davis and Hebard Clns.]; VIII, 25 to X, 31, (A. N. Caudell), 5 ♂, 4 ♀, [U. S. N. M.].

Virginia, VIII, 14, X, 1, 1883, 1 ♂, 2 ♀, [Hebard Cln.].

Falls Church, Virginia, IX, 4, 1906, (A. N. Caudell), 1 ♀, [U. S. N. M.].
Dryden, Virginia, IX, 3, 1899, 1 ♂, [Morse Cln.].
Norfolk, Virginia, IX, 8, 1903, (Morse), 1 ♂, [Morse Cln.].
Wytheville, Virginia, IX, 5, 1903, (Morse), 1 ♂, [Morse Cln.].
Grant County, West Virginia, (Shaler), 1 ♂, [M. C. Z.].
Kanawha Station, West Virginia, VIII, 23, 1905, (A. D. Hopkins), 1 ♂, [U. S. N. M.].
Blowing Rock, North Carolina, VIII, 1906, (R. S. Woglum), 1 ♂, [North Carolina Dept. Agr. Cln.].
Blantyre, North Carolina, IX, 1906, (R. S. Woglum), 1 ♀, [North Carolina Dept. Agr. Cln.].
Linville, North Carolina, VIII, 30, 1903, (Morse), 1 ♂, 1 ♀, [Morse Cln.].
Raleigh, North Carolina, X, 10 and 29, 1900, (Sherman), 1 ♂, 1 ♀, [North Carolina Dept. Agr. Cln.].
Edenton, North Carolina, VIII, 20, 1908, (R.), 2 ♂, [A. N. S. P.][15].
Thompson's Mills, Georgia, X, 1909 and 1910, (H. A. Allard), 8 ♂, 2 ♀, [U. S. N. M.].
Gun Lake, Michigan, VII, 13 to 26, 1912, (M. A. Carriker, Jr.), 3 ♂, 1 ♀, [Hebard Cln.].
Tuscarawas City, Ohio, IX, 26, 1891, 1 ♀, [M. C. Z.].
Salineville, Ohio, IX, 4 to 10, 1892, 3 ♀, [Cornell Univ.].
Indiana, (Blatchley), 2 ♂, 2 ♀, [Hebard Cln.].
Sedan, Indiana, VIII, 29, 1905, (W. Phillips), 2 ♂, [U. S. N. M.].
Illinois, (McNeill), 2 ♂, 2 ♀, [Hebard Cln.].
West Northfield, Illinois, (Kennicott), 1 ♀, [M. C. Z.].
Urbana, Illinois, IX, 10, X, 17 and 19, 1904, (F. Knab), 1 ♂, 2 ♀, [U. S. N. M.].
Ogle County, Illinois, (Allen), 1 ♀, (M. C. Z.].
Peoria, Illinois, VII, 15, 1 ♂, [Cornell Univ.].
Roan Mountain Station, Tennessee, IX, 3, 1903, (Morse), 2 ♀, [Morse Cln.].
Chattanooga, Tennessee, VIII, 24, 1903, (Morse), 1 ♀, [Morse Cln.].
Clarksville, Tennessee, VIII, 15, 1912, (S. E. Crumb), 1 ♂, [U. S. N. M.].
Ramsey County, Minnesota, 1 ♀, [Hebard Cln.].
St. Peters, Minnesota, 1880, 1 ♂, [U. S. N. M.].
Dallas County, Iowa, VIII, 8 to 23, IX, 1 to 3, (Allen), 17 ♂, 12 ♀, [M. C. Z.].
Denison, Iowa, VII, 20, (Allen), 1 ♂, [M. C. Z.].
Jefferson, Iowa, VII, 20 to 24, (Allen), 2 ♂, 2 ♀, [M. C. Z.].
Iowa City, Iowa, (M. P. Somes), 1 ♀, [Hebard Cln.].
St. Louis, Missouri, IX, 25, 1876, X, 17, 1875, 4 ♂, 1 ♀, [U. S. N. M.].
Bushberg, Missouri, VIII, 1870, 1 ♀, [U. S. N. M.].
Kirkwood, Missouri, X, 1877, 1 ♂, [U. S. N. M.].
Fayetteville, Arkansas, IX, 5, 1905, (Morse), 1 ♂, 1 ♀, [Morse Cln.]; X, 1891, 1 ♂, 1 ♀, [Cornell Univ.].
Neligh, Nebraska, VIII, (Cary), 1 ♂, [Hebard Cln.].

[15] Previously recorded by us as *O. glaberrimum*: Proc. Acad. Nat. Sci. Phila., 1910, p. 639, (1911).

West Point, Nebraska, VIII, 17 and 19, IX, 1 and 5, (Bruner), 3 ♂, 13 ♀, [Hebard Cln.].

Albion, Nebraska, IX, 14, 1904, (Bruner), 2 ♀, [Hebard Cln.].

Kearney, Nebraska, VII, 27, 1910, (R. & H.), 5 ♂, 1 ♀.

Lincoln, Nebraska, VIII, IX, 3, 1909, X, 1, 1909, (L. Bruner and C. H. Gable), 5 ♂, 4 ♀, [Hebard Cln.].

South Bend, Nebraska, X, 15, 1910, 1 ♂, 2 ♀, [Hebard Cln.].

Weeping Water, Nebraska, IX, 24, 1909, (Bruner), 2 ♀, [Hebard Cln.].

Topeka, Kansas, (F. W. Cragin), 2 ♀, [Hebard Cln.].

Belpre, Kansas, IX, 13, 1909, (H.; stridulating high on tassel of corn), 2 ♂.

Zenith, Kansas, IX, 11, 1907, (H.), 1 ♀.

Hiawatha, Kansas, VIII, (F. B. Isely), 1 ♂, [U. S. N. M.].

Wichita, Kansas, IX, 7, 1904, (F. B. Isely), 1 ♂, 1 ♀, [U. S. N. M.].

Shawnee County, Kansas, (Cragin), 1 ♂, [Hebard Cln.].

Barbe County, Kansas, (Cragin), 1 ♂, [Hebard Cln.].

Wilburton, Oklahoma, VIII, 27, 1905, (Morse), 1 ♂, [Morse Cln.].

Ardmore, Oklahoma, VIII, 18, (F. C. Bishopp), 1 ♂, [U. S. N. M.].

Caddo, Oklahoma, VIII, 8, 1905, (Morse), 1 ♂, [Morse Cln.].

Denison, Texas, VIII, 11, 1905, (Morse), 1 ♀, 1 juv. ♀, [Morse Cln.].

Dallas, Texas, (Boll), 3 ♂, 1 ♂, [M. C. Z.].

Manitou, Colorado, VIII, 1887, 1 ♂, [Hebard Cln.].

The present authors or the senior author alone have previously recorded this species from West Creek and Atsion, New Jersey, and St. Louis, Missouri, as *vulgare*, and from Sulphur Springs and Raleigh, North Carolina, and Montgomery County, Virginia, as *agile*. Rehn has by error reported *vulgare* from Brownsville, Texas (probably *bullatum* but specimen not available), and Rehn and Hebard have credited it to Chokoloskee, Florida. The locality of the latter is unquestionably erroneous.

Orchelimum gladiator Bruner (Figs. 9, 21, 41, 42 and 72.)

1891. *Orchelimum gladiator* Bruner, Canad. Entom., xxiii, p. 71. [West Point, Nebraska.]

1910. *Orchelimum manitobense* E. M. Walker, Canad. Entom., xlii, p. 351, figs. 17 and 18. [Ashdown, Manitoba.]

On comparison of the female type of *gladiator*, now before us, with the available series and the description of *manitobense*, which was based on two males, the above synonymy is clearly evident. The failure of Bruner to mention the form of the lateral lobes of the pronotum, one of the few diagnostic characters shared by both sexes, probably was responsible for Walker's re-description of the species.

The present form has been mistaken by numerous students for *vulgare*, particularly in the male sex, and in consequence there are doubtless in the literature of *vulgare*, many erroneous determinations of material from the region in which both *gladiator*

and *vulgare* occur, which really refer to the present species. Unless the material on which the record is based is in existence there is, however, little probability of these errors being detected and corrected.

In the female sex the very robust ovipositor with a straight dorsal outline will readily separate this form from all the other species of the genus except *volantum*, which, however, has a less robust and less expanded form of the same, although the two species superficially resemble one another in this respect. The form of the cercus in the male sex is very distinctive. The shape of the lateral lobes of the pronotum, and to a lesser degree the shape of the fastigium, will aid in separating both sexes of the present species from *vulgare*.

As a rule this species has the ventro-external margin of the caudal femora unarmed, but in the series before us there are three specimens having a single spine on this margin and a single individual having two spines on the same.

There is an appreciable amount of variation in size in both sexes, but the diagnostic characters are quite constant.

Distribution.—Covering the grassland areas and bottom lands of the northern United States and southern Canada, extending from at least the vicinity of Montreal, southwestern Maine and eastern Massachusetts, west to the eastern slopes of the Cascades in west-central Washington (Ellensburg) and to northern California (Sisson), south as far as southwestern Connecticut (Stamford), southern New Jersey (Winslow Junction), Tennessee, northeastern Kansas (Douglas County), south-central Nebraska (North Platte) and south-central Montana (Billings).

Specimens Examined: 87; 53 ♂, 34 ♀.

Montreal, Quebec, Canada, VII, 15, (Caulfield), 1 ♂, [M. C. Z.].

Norway, Maine, (Smith), 1 ♂, [M. C. Z.].

Montgomery, Vermont, VII, 18, 1891, (Morse), 1 ♂, [Morse Cln.].

Stowe, Vermont, VII, 22, 1891, (Morse), 1 ♀, [Morse Cln.].

White Mountains, alpine and valleys, New Hampshire, (Scudder), 8 ♂, 3 ♀, [M. C. Z.]; IX, 8, 1889, (F. H. Sprague), 1 ♀, [M. C. Z.].

Faneuil Station, Massachusetts, VII, 22, 1892, (Morse), 1 ♂, [Morse Cln.].

Readville, Massachusetts, VII, 21, 1892, (Morse), 1 ♂, 2 ♀, [Morse Cln.].

Stamford, Connecticut, VIII, 22, 1894, (Morse), 1 ♂, [Morse Cln.].

Ithaca, New York, VII, 19, 1904, VIII, 16, 1890, 1 ♂, 1 ♀, [Morse Cln.]; VIII, 4, 1885, 3 ♂, [Cornell Univ.].

Winslow Junction, New Jersey, VII, 8, 1911, (H. Fox; in bog along tracks of Cape May division R. R.), 1 ♂, [A. N. S. P.].

Steuben County, Indiana, VIII, 6 and 8, 1902, (W. S. Blatchley), 2 ♀, [Hebard Cln. and A. N. S. P.].

Marshall County, Indiana, VII, 27 and 29, VIII, 15, 1902, (W. S. Blatchley), 1 ♂, 4 ♀, [Hebard Cln. A. N. S. P. and U. S. N. M.].

Gary, Indiana, VII, 26, 1906, 1 ♂, [Penna. State Dept. Zool.].

Southern Illinois, (Thomas), 1 ♂, [M. C. Z.].

Tennessee, 1 ♀, [M. C. Z.].

Cranmoor, Wisconsin, VIII, 16, 1909, (C. W. Hooker), 1 ♂, [U. S. N. M.].

Dallas County, Iowa, VIII, (Allen) 5 ♂, [M. C. Z.].

Staples, Minnesota, VII, 21, 1909, (H.; in ditch of high weeds), 6 ♂, 14 ♀.

Bismarck, North Dakota, VIII, 9, 1885, 1 ♂, [Hebard Cln.].

Mandan, North Dakota, VII, 25, 1909, (H.; from thistle), 1 ♂.

Glendive, Montana, VII, 26, 1909, (H.; from sage on river plain—extremely shy), 4 ♂, 1 ♀.

Billings, Montana, VII, 28, 1909, (R. & H.; in sedgy area in Yellowstone flood plain), 1 ♂.

North Platte, Nebraska, elev. 2,800 feet, VII, 28, 1910, (R. & H.; in swampy tracts in Platte flood plain), 3 ♂.

West Point, Nebraska, VIII, 1887, IX, 1 (L. Bruner), 1 ♂, 2 ♀, *type* and *paratype*, [Hebard Cln.].

Montana, 1 ♂, [U. S. N. M.].

Olmstead's, near Ellensburg, Washington, VII, 14 to 15, 1882, 1 ♂, [M. C. Z.].

Sisson, California, VII, (Dyar and Caudell), 1 ♂, [U. S. N. M.]; VIII, 29, 1897. (Morse), 1 ♀, [Morse Cln.].

Morse (Canad. Entom., XXXIII, p. 201) and Caudell (Proc. U. S. Nat. Mus., XXXIV, p. 78) have erroneously recorded this species as *O. agile* from Sisson, California, and Scudder (in Hitchcock, Geol. of New Hampsh., I, p. 368) reported it as *O. vulgare* from the White Mountains, New Hampshire, and in similar fashion from the same locality and also from Mt. Greylock, Massachusetts, 3500 feet (Appalachia, VIII, p. 317). The original material for these references has been examined by us.

Orchelimum calcaratum new species (Figs. 1, 22, 43, 44 and 73.)

1891. *Xiphidium (Orchelimum) cuticulare* Redtenbacher (not of Serville, 1839), Verh. k.-k. zool.-bot. Gesell., Wien, xli, pp. 495, 503. [Texas.]

A member of the same group as *glaberrimum*, *vulgare* and *gladiator*, but differing from all in the greatly elongate tooth of the male cercus, this being distinctly longer than the distal portion of the cercal shaft and aciculate in character, while in the female sex the species can be separated from *vulgare* by the less robust fastigium, by the very slight indication of a humeral sinus and by the always armed ventro-external margin of the caudal femora. The female is readily separable from *glaberrimum* and *gladiator* by the distinctly arcuate ovipositor, as well as by a number of other characters.

Type.—♂; San Antonio, Bexar County, Texas. August 15 to 16, 1912. (Rehn and Hebard.) [Hebard Collection Type No. 164.]

Description of Type.—Size medium (for the genus); form robust; surface moderately polished. Head with the fastigium gently ascending from the level of the occiput, the width of fastigium faintly greater than width of proximal antennal joint, the margins when seen from the cephalic aspect regularly but not strongly converging ventrad; eyes moderately prominent, faintly ovate in basal outline; antennae when in perfect condition nearly four times as long as the body. Pronotum very faintly sellate, this being due to the gently ascending character of the metazona, the line of the prozona nearly straight when seen from the side; greatest caudal width of the metazona contained one and one-third times in the entire pronotal length; cephalic margin subtruncate, caudal margin gently arcuate, metazona about two-thirds the length of the prozona, well separated from the latter by an appreciable transverse sulcus; lateral lobes of pronotum with their greatest dorsal length surpassing their depth, cephalic margin oblique subtruncate, ventro-cephalic angle very broadly rounded, ventral margin strongly oblique truncate, ventro-caudal angle rectangulate, caudal margin gently arcuate, humeral sinus hardly indicated, convex callosity subovate, with pointed extremities and moderately broad. Tegmina not reaching the tips of the caudal femora, in general form resembling those of *vulgare;* stridulating area subequal in extent to the dorsum of the pronotum, stridulating vein transverse, robust. Wings very slightly surpassing the tegmina. Disto-dorsal abdominal segment with the median emargination U-shaped, relatively broad and deep, the flanking processes considerably produced and recurved ventrad; cerci rather heavy, proximal half straight, rounded in form, subcolumnar, median tooth aciculate, placed immediately distad of the middle, elongate, but little shorter than the length of the entire shaft of the cercus, directed inwards and gently falcate distad, subdepressed proximad, distal portion of the shaft of the cercus tapering to a blunt point, depressed; subgenital plate with distal margin subrectangularly emarginate, styles short, subrobust, lateral margins regularly converging to the bases of the styles, venter of plate with distinct paired ridge-like carinae extending cephalad from the base of the styles, a much fainter median carina also present. Caudal femora robust, distal portion rather slender, ventro-external margin armed distad with three to four spines, ventro-internal margin unarmed, genicular lobes bispinose.

Allotype.—♀; Same data as type.

Description of Allotype.—Differing from the description of the type in the following respects. Dorsal line of pronotum nearly straight when seen from the side, not ascending on the metazona; greatest caudal width of metazona contained one and one-half times in entire pronotal length. Ovipositor slightly less than half the length of the caudal femora, regularly falcate, rather broad, ventral margin very faintly serrulate distad, subgenital plate of the form usual in the genus.

Paratypic Series.—We have selected as paratypic a series of twelve males and ten females having the same data as the type and allotype.

	Measurements (in millimeters)					
	♂ *Type*	♂ *Paratype*	♂ *Paratype*	♀ *Allotype*	♀ *Paratype*	♀ *Paratype*
Length of body (in ♀ exclusive of ovipositor)	19.6	20	23.2	18.3	17.1	20
Length of pronotum	6	5.2	6.2	5.8	5.6	6
Length of tegmen	17	15.7	18.9	17	16.5	18
Length of caudal femur	18.2	17	20.8	19.8	19.1	20
Length of ovipositor	....	....	....	9.1	9	9.6

Color Notes.—General color light turtle green to olivine, practically pure on the face, sides of the head, lateral lobes of the pronotum, pleura and sides of the abdomen, clearer turtle green on the limbs. Median line on the head, expanding caudad, weak vinaceous-rufous to ochraceous buff, continued over the dorsum of the pronotum and there more or less strongly bordered laterad on the prozona by lines of mahogany red to bay. These stripes gently diverge caudad and occasionally are entirely absent. Tegmina very faint glaucous, more or less weakly tinged with snuff brown on the dorsal aspect, particularly in the female. Stridulating field of male tegmina with three spots of blackish brown on each tegmen, placed in the same position as those found in *vulgare*, *i. e.*, one at base of anal vein, one at apex of arc of the same and the third on the sutural margin near the disto-sutural angle of the speculum. Abdomen of male generally with a broad median area of ferruginous on the dorsum of the apex, this frequently absent. Ovipositor chestnut brown. Eyes walnut brown.

Distribution.—Ranging from the Central Texan region, north to northeastern Kansas (Topeka and Hiawatha) and southeastern Illinois (Olney), extending south to Flatonia and San Antonio, Texas, east to Doucette, Texas, western Arkansas (Fayetteville and Magazine Mountain) and southeastern Illinois, and west to Colorado and west-central Texas (Kerrville).

Biological Notes.—This species is clumsy in its actions and comparatively easy to capture after being located. It was found in a great variety of situations, ranging from high grass to twelve feet above the ground in post oak. It was taken in grass among

cotton, in green weeds, in low bushes and in tall nettles, as well as in bushes in pine woods. The stridulation is not loud.

Morphological Notes.—An analysis of a portion of the series of the present species for constancy of spines on the ventro-external margin of the caudal femora gives the following results: 1–1, 2 specimens; 1–2, 3 specimens; 2–2, 3 specimens; 2–3, 7 specimens; 2–4, 2 specimens; 2–5, 1 specimen; 3–3, 3 specimens; 3–4, 4 specimens; 3–5, 2 specimens; 4–4, 3 specimens; 4–5, 1 specimen; 5–5, 1 specimen. Individuals lacking one caudal limb have not been considered. No specimens have been examined with these margins unspined. In all of the specimens before us the tegmina and wings do not surpass, and in but two instances reach, the tips of the caudal femora.

Synonymy.—Serville's *cuticulare* is clearly not this species but is a synonym of *O. glaberrimum*, the name having been used in error by Redtenbacher, who has been followed by subsequent authors.

Specimens Examined: 85; 42 ♂, 41 ♀, 2 juv. ♀.

Olney, Illinois, (R. Ridgway), 1 ♀, [U. S. N. M.].

Central Missouri, 1 ♂, [U. S. N. M.].

Hiawatha, Kansas, VIII, 1904, (F. B. Isely), 1 ♂, [U. S. N. M.].

Topeka, Kansas (F. W. Cragin), 1 ♂, [Hebard Cln.].

Zenith, Stafford County, Kansas, IX, 11, 1907, (H.), 1 ♂.

Wichita, Kansas, VII, 18, 1904, (F. B. Isely), 1 ♂, 1 ♀, [U. S. N. M.].

Fayetteville, Arkansas, IX, 5, 1905, (Morse), 1 ♂, [Morse Cln.].

Magazine Mountain, Arkansas, 2000 feet elev., VIII, 29, 1905, (Morse), 1 ♂, [Morse Cln.].

South McAlester, Oklahoma, VIII, 7, 1905, (Morse), 1 ♂, [Morse Cln.].

Shawnee, Oklahoma, VIII, 26, 1905, (Morse), 5 ♂, 3 ♀, [Morse Cln.].

Waurika, Oklahoma, X, 12, 1909, (F. C. Bishopp), 1 ♀, [U. S. N. M.].

Colorado, VIII, 1873, 2 ♀, [Morse Cln.].

Denison, Texas, VIII, 11, 1905, (Morse), 1 ♂, 1 ♀, [Morse Cln.].

Dallas, Texas, IX, 25 and 26, 1912, (R. & H.), 1 ♂, 1 ♀, [U. S. N. M.]; IX, 10, 1908, [F. C. Bishopp), 1 ♀, [U. S. N. M.]; (Boll), 4 ♂, 7 ♀, 1 juv. ♀, [M. C. Z.].

Plano, Texas, X, 1907, (E. S. Tucker), 1 ♀, [U. S. N. M.].

Weatherford, Texas, IX, 23, 1912, (R. & H.), 2 ♂.

Wichita Falls, Texas, VIII, 15, 1905, (Morse), 2 ♂, 2 ♀, [Morse Cln.].

Temple, Texas, IX, 24, 1912, (R. & H.), 3 ♂.

Terrell, Texas, VIII, 27, 1904, (on cotton), 1 ♀, [U. S. N. M.].

Doucette, Texas, VII, 24, 1912, (H.), 1 ♂.

Flatonia, Texas, VIII, 19 and 20, 1912, (R. & H.), 1 ♂, 5 ♀.

Victoria, Texas, VII, 26 and 27, 1912, (H.), 1 ♀.

San Antonio, Texas, VIII, 15 and 16, 1912, (R. & H.), 14 ♂, 12 ♀, 1 juv. ♀, *type, allotype* and *paratypes*; X, 29, 1905, (F. C. Pratt), 1 ♀, [U. S. N. M.].
Kerrville, Texas, VIII, 17 and 18, 1912, (R. & H.), 1 ♂.

Orchelimum buliatum new species (Figs. 2, 23, 45, 45, 46 and 74.)

1903. *Orchelimum longipenne* Caudell (not *Orchelimum longipennis* Scudder, 1862), Proc. U. S. Nat. Mus., xxvi, p. 806. ["Southern Texas."] (Part.)

A member of the same group as *laticauda* and *nigripes*, but separable from the former by the relatively broader fastigium, by the more extensive metazona of the dorsum of the pronotum and the shorter and marginally more acute lateral lobes of the same, while from *nigripes* the male is readily separated by the less strongly adpressed cercal tooth and the appreciably indicated humeral sinus of the lateral lobes of the pronotum. The female is separated from that of *nigripes* by the less angulate ventro-cephalic angle of the lateral lobes and the generally unspined caudal femora, while from *laticauda* the same sex differs in the sinuate ventral section of the caudal margin of the lateral lobes.

Type.—♂; Galveston, Galveston County, Texas. July 21, 1912. (Hebard.) [Hebard Collection Type No. 165.]

Description of Type.—Size very large (for the genus); form robust. Head with the dorsum of the occiput plane, hardly ascending to the fastigium, the latter subcompressed, not as thick as the proximal antennal joint and when seen from the facial aspect with its margins gently converging ventrad, with the extremity at the interfastigial suture distinctly truncate; eyes moderately prominent, subcircular in basal outline; antennae very elongate, when in perfect condition at least three times as long as the body. Pronotum subsellate, when seen from the lateral aspect the metazona is distinctly and in a subbullate fashion ascending dorso-caudad, when seen from the dorsal aspect the metazona is seen to be somewhat inflated laterad, its greatest width about five-sixths the length of the entire pronotum; length of the metazona about two-fifths the length of the entire pronotum, transverse sulcus deeply and broadly impressed on the dorsum; cephalic margin of disk weakly arcuato-emarginate mesad, caudal margin of disk strongly and regularly arcuate, no indications of lateral shoulders present on prozona, but on the metazona these are well indicated and slightly projecting though well rounded; lateral lobes of the pronotum with the greatest dorsal length subequal to the greatest depth, cephalic margin oblique, straight, ventro-cephalic angle rounded obtuse, ventral margin moderately oblique, ventro-caudal angle sharper than a right angle with the angle proper strongly rounded, caudal margin oblique sinuate, humeral sinus but faintly indicated, convex callosity well indicated but elongate and narrow. Tegmina surpassing the apices of the caudal femora by about the length of the pronotum, moderately broad, apex moderately rounded; stridu-

lating field quite ample, rather bullate, in area surpassing that of the dorsum of the head and pronotum, stridulating vein straight, transverse, crassate, speculum broader than usual in the genus. Wings surpassing the tegmina by nearly the pronotal length. Cerci robust, rather short, median tooth directed proximo-mesad and subdepressed, shaft of cercus with a sinuate medio-longitudinal carination on the dorsal surface, the distal section subacuminate when seen from the dorsum, tapering regularly when seen from the side; subgenital plate moderately produced, distal margin obtuse-angulate emarginate, styles brief, articulate, a moderately distinct and complete medio-longitudinal and distinct lateral carinae indicated. Caudal femora about four-fifths the length of the body, moderately inflated proximad, ventral margins unspined, genicular lobes bispinose.

Allotype.— ♀ ; Rosenberg, Fort Bend County, Texas. July 25 and 26, 1912. (Hebard.) [Hebard Collection.]

Description of Allotype.—The features here given are those of difference from the male sex. Size smaller than in the male sex; form more slender. Pronotum not at all sellate, when seen from the lateral aspect the dorsal outline is straight, greatest width of metazona about two-thirds the length of the whole pronotum; length of the metazona almost one-half the entire pronotal length, transverse sulcus well indicated on the dorsum but by no means so impressed as in the male; lateral shoulders not appreciably indicated anywhere. Tegmina slightly surpassing the apices of the caudal femora. Wings surpassing the tips of the tegmina by several millimeters. Ovipositor slightly more than half the length of the caudal femora, rather strongly falcate, comparatively broad, apex acute, ventral margin of ovipositor appreciably but very finely serrulate on distal half; subgenital plate of female shallowly and narrowly emarginate disto-mesad.

Paratypic Series.—We have selected as paratypes two males from Galveston, Texas, bearing the same data as the type, one male from Rosenberg, Texas, bearing the same data as the allotype and six males from Gregory, San Patricio County, Texas, July 30, 1912 (Hebard).

Measurements (in millimeters)

	♂ Galveston (*Type*)	♂ Galveston (*Paratype*)	♂ Rosenberg (*Paratype*)	♂ Gregory (*Paratype*)
Length of body	22	23.5	20	22.8
Length of pronotum	5.5	5.8	5.3	5.3
Greatest caudal width of pronotum	4.5	4.5	4.1	4.3
Length of tegmen	29	27	23.5	28.6
Greatest width of stridulating field of tegmen	4.7	4.9	4.5	4.6
Length of caudal femur	18.9	20	16.8	19
Length of ovipositor	....	....	....	....

	♂ Mission	♂ Brownsville	♀ Rosenberg (*Allotype*)
Length of body	17.5	20.2	19.5
Length of pronotum	4.9	4.9	4.8
Greatest caudal width of pronotum	3.9	4	3.6
Length of tegmen	24.2	23.5	21.7
Greatest width of stridulating field of tegmen	4.2	4.2	....
Length of caudal femur	15	16.8	17.3
Length of ovipositor	....	....	8.3

Color Notes.—General color ranging from light chalcedony yellow to clear dull green-yellow (Ridgway), occasionally embrowned by desiccation until it is nearly old gold, the greater portion of the tegmina more brilliant, varying from light oriental green to nearly dull citrine; dorsum of the head, pronotum and stridulating field of the male tegmina washed with cinnamon-buff to clay color. Occiput generally with indications of a pair of hessian brown lines diverging caudad; eyes ranging from rood's brown to seal brown; antennae ochraceous-buff to ochraceous-tawny, rather weakly annulate with darker. Pronotum with the dorsum bearing abbreviate diverging lines similar to but less frequently indicated than those on the occiput. Tegmina with three spots of seal brown always indicated in the male sex, one proximad, another at the apex of the arcuate portion of the anal vein at its junction with the speculum and the third near the other (toward the free margin) angle of the speculum. Limbs quite greenish, rarely quite brownish (sudan brown) on the caudal tibiae, a blackish mark between the slits of the tympana of the cephalic tibiae; all spines black, at least at the tips, on the caudal tibiae largely brownish black. Apex of the abdomen more or less yellow-ocher, the cerci ochraceous-orange to mars yellow. Ovipositor prout's brown.

Distribution.—This species is found from the coastal prairie region of Texas, south as far as the Brownsville region, north to northern Texas (Wichita Falls and Dallas). west as far as Comanche and Mission (Hidalgo County) in the same state, while to the eastward the species ranges as far as eastern Louisiana (Milneburg). It doubtless occurs in northeastern Mexico.

Biological Notes.—This species was found frequenting high grasses along streams or in depressions (Rosenberg), in areas of

marsh vegetation (Gregory) or in dense clumps of coffee bean (*Sesban macrocarpa*) growing from six to ten feet high on sandy soil back from the gulf beach (Galveston). Its note was a long buzzing *zeeeeeee*, somewhat resembling that of some cicadas, with but few interspersed clicking sounds. At Gregory the song was noticed to be especially loud during the morning, again increasing in volume at night, but in a more subdued tone and different key.

Morphological Notes.—The ventro-external margin of the caudal femora is usually unarmed, but in two specimens we find a single spine on one or the other margin, another has two spines on one margin and a third specimen has a single spine on one limb and three on the other.

The two Galveston paratypes and the Rosenberg pair have the tegmina and wings shorter than the remainder of the material, which have proportions about as in the type.

Specimens Examined: 25; 18 ♂, 7 ♀.

Milneburg, Louisiana, VII, 22, 1905, (Morse), 2 ♀, [Morse Cln.].

Dallas, Texas, (Boll), 1 ♀, [M. C. Z.].

Wichita Falls, Texas, VIII, 15, 1905, (Morse), 1 ♂, [Morse Cln.].

Comanche, Texas, VII, 22, 1909, (C. R. Jones; on cotton), 1 ♂, [U. S. N. M.].

Galveston, Texas, VII, 21, 1912, (H.), 3 ♂, *type* and *paratypes*.

Rosenberg, Texas, VII, 25 and 26, 1912, (H.), 1 ♂, 1 ♀, *allotype* and *paratype*.

Victoria, Texas, VI, (Caudell), 1 ♂, 1 ♀; VII, 22, (W. E. Hinds), 1 ♀; VI, 19, 1908, (E. S. Tucker on corn), 1 ♂, [U. S. N. M.].

Gregory, Texas, VII, 30, 1912, (H.), 6 ♂, *paratypes*.

Mission, Texas, VIII, 5 and 6, 1912, (H.), 1 ♂.

Brownsville, Texas, VII, 31 to VIII, 5, 1912, (H.), 2 ♂.

Coast of Texas (Aaron), 1 ♂, 1 ♀, [M. C. Z.].

This is in part the *Orchelimum longipenne* recorded by Caudell from "southern Texas," as material before us so labelled shows.

Orchelimum laticauda Redtenbácher[16] (Figs. 10, 24, 47, 48 and 75.)

1891. *X[iphidium] (Orchelimum) laticauda* Redtenbacher, Verh. k.-k. zool.-bot. Gesell. Wien, xli, pp. 495, 504. [New Orleans, Louisiana.]

1909. *Orchelimum pulchellum* Davis, Canad. Entom., xli, p. 33. [Dennisville, Helmetta and Trenton, New Jersey.]

A careful study of Redtenbacher's description has resulted in our placing *pulchellum* as a synonym of *laticauda*. Mr. Davis

[16] The present authors or the senior author alone have erroneously recorded this species as *O. nigripes* (Entom. News, xiii, p. 315; Proc. Acad. Nat. Sci. Phila., 1904, p. 796 and Rep. N. J. State Mus., 1909, p. 189) and as *O. nitidum*

has gone over the ground with us and agrees that the description fits large Florida specimens, which are specifically identical with his New Jersey material. Through the kindness of the same gentleman we have before us eight of his typical New Jersey specimens of *pulchellum* for comparison.

Redtenbacher has given as one of the main characters of this species the presence of spines on the ventro-internal margin of the caudal femora. This we find occurs in but few specimens, the vast majority having the internal margin unarmed. The number of spines on the ventro-external margin varies from two to eight.

Davis was correct in giving *nigripes* as the closest relative of this species, the present authors' comment on this point[17] being due to a misconception of *nigripes*.

The average size of specimens from the northern portion of the range of the species is distinctly under that of individuals from the southern states, but this is by no means an absolute rule, as series show very considerable individual variation, which almost or quite equals the geographic averages. Female specimens from Tinicum, Pennsylvania, and Florence, South Carolina, show the following extremes in size (measurements in millimeters).

	Tinicum, Pennsylvania		Florence, South Carolina	
Length of body (exclusive of ovipositor)	18.3	22.8	20	20
Length of pronotum	4.2	5.3	5	5.7
Length of tegmen	18.7	28.3	21.9	26.3
Length of caudal femur	15.3	19.2	18.3	19.2
Length of ovipositor	9	10.7	10.3	11.2

The intensity of the coloration and the brilliancy of certain shades varies considerably in the series before us.

Distribution.—Covering the Atlantic Coastal Plain region from north central New Jersey (Helmetta, Spotswood and Jamesburg) south to southern Florida, westward to New Orleans, Louisiana; in the eastern states occurring at suitable valley

(Proc. Acad. Nat. Sci. Phila., 1904, p. 796 (Part); Ibid., 1905, p. 48 and Ibid., 1907, p. 306). The first misidentification was due to the fact that true *nigripes* was not at hand for examination, and the second was due first to the confusion of two species and later, when this was found to be the case, error was made in restricting *nitidum* to the wrong component. The present species has also been erroneously recorded as *nigripes* by Smith, Brimley and Allard.

[17] Proc. Acad. Nat. Sci. Phila., 1910, p. 642, (1911).

localities in the Piedmont region above the fall-line (Chestnut Hill, Pennsylvania, Montgomery County, Maryland, and Thompson's Mills, Georgia).

Specimens Examined: 219, 120 ♂, 97 ♀, 1 juv. ♂, 1 juv. ♀.

Chestnut Hill, Philadelphia, Pennsylvania, IX, 18, 1903, (H.; in cattails), 2 ♂, 3 ♀.

Cornwells, Pennsylvania, X, 1906, (R. & H.; in cattails), 2 ♂, 1 ♀, IX, 7, 1914, (H.; in great numbers in tall plants along river and in marsh vegetation), 18 ♂, 26 ♀.

Tinicum, Pennsylvania, VIII, 13, 1911, IX, 9 to 29, 1903 to 1913, (R. & H.; in numbers in cattails and high reeds), 46 ♂, 28 ♀, 1 juv. ♂.

Riverton, New Jersey, IX, 11, 1904, (G. M. Greene), 1 ♂, 1 ♀, [A. N. S. P.].

Spotswood, New Jersey, IX, 22, 1909, (W. T. Davis), 1 ♂, [Davis Cln.].

Helmetta, New Jersey, IX, 21, 1909, (W. T. Davis), 4 ♂, [Davis Cln.].

Paratypes of *Orchelimum pulchellum* Davis.

Jamesburg, New Jersey, IX, 23, 1909, (W. T. Davis), 1 ♂, [Davis Cln.]; 1 ♂, 1 ♀, [U. S. N. M.].

Maple Shade, New Jersey, X, 10, 1914, (B. Long), 1 ♂, 2 ♀, [A. N. S. P.].

Dennisville, New Jersey, IX, 5, 1909 (W. T. Davis), 1 ♂, [U. S. N. M.].

Paratype of *Orchelimum pulchellum* Davis.

Near Town Bank, Cape May County, New Jersey, VIII, 15, 1912, 1 ♂, [Davis Cln.].

Anglesea, New Jersey, IX, 6, 1 ♂, 1 ♀, [Hebard Cln.].

Tolchester, Maryland, VIII, 30, 1 ♂, [U. S. N. M.].

Plummer's Island, Maryland, IX, 2, (A. N. Caudell), 1 ♂, [U. S. N. M.].

Montgomery County, Maryland, IX, 25, 1911, (W. T. Davis), 1 ♂, [Davis Cln.].

Hyattsville, Maryland, IX, 17, 1911, (W. T. Davis), 1 ♂, [Davis Cln.].

Washington, D. C., VIII, 1883, 1 ♂, 2 ♀, [Hebard Cln.]; VIII, 23, 1878, IX, 27, 1896, X, 21, 1902, 1 ♂, 2 ♀, [U. S. N. M.].

Anolostan Island, Virginia, IX, 6, 1912, (A. N. Caudell), 3 ♀, [U. S. N. M.].

Rosslyn, Virginia, IX, (A. N. Caudell), 1 ♂, 3 ♀, [U. S. N. M.].

Fredericksburg, Virginia, VII, 20, 1913, (R. & H.; in tall weeds along river), 1 ♂.

Weldon, North Carolina, VII, 24, 1913, (R. & H.), 1 juv. ♂.

Newbern, North Carolina (Ardway), 2 ♀, [M. C. Z.].

Lake Waccamaw, North Carolina, IX, 8, 1911, (R. & H.; among low swamp plants in timbered swamp), 2 ♂, 5 ♀.

Florence, South Carolina, IX, 6, 1911, (R. & H; in swamp grasses along branch in open spot in deciduous woods), 4 ♂, 8 ♀.

Thompson's Mills, Georgia, X, 1909, (H. A. Allard), 2 ♂, 1 ♀, [U. S. N. M.].

Jesup, Georgia, IX, 1, 1911, (H.; among bullrushes in pond in pine forest), 1 ♂.

Billy's Island, Georgia, VI and VII, 1912, (J. C. Bradley), 2 ♂, 1 ♀.

Atlantic Beach, Florida, VIII 24, 1911, (R. & H.; in hammock land and saw-grass and reed marsh), 1 ♂, 5 ♀.

Jacksonville, Florida, (Priddey), 2 ♂, 1 ♀, [Hebard Cln.].

South Jacksonville, Florida, IX, 7 and 28, 1913, (W. T. Davis), 3 ♂, [Davis Cln.].

Ortega, Florida, IX, 6 and 27, 1913, (W. T. Davis), 3 ♂, [Davis Cln.].

Sanford, Florida, (G. B. Frazer), 2 ♂, [M. C. Z.].

In addition to these localities we have already recorded the species as *nigripes*, *nitidum* and as the synonymous *pulchellum* from Belleplain, Riverton, Lucaston, Gloucester, Clementon, West Creek and Sea Isle City, New Jersey; Edenton and Raleigh, North Carolina; Thomasville, Georgia, and Jacksonville, Palatka, Detroit, Lakeland and Chokoloskee, Florida.

Orchelimum nigripes Scudder (Figs. 11, 25, 49, 50 and 76.)

?1869. *Xiphidium validum* Walker, Catal. Derm. Salt. Brit. Mus., ii, p. 277. [No locality.]

1875. *Orchelimum nigripes* Scudder, Proc. Boston. Soc. Nat. Hist., xvii, p. 459. [Dallas, Texas.]

1891. *X[iphidium] (Orchelimum) robustum* Redtenbacher, Verh. k.–k. zool.-bot. Gesell. Wien, xli, pp. 494, 499. [New Orleans, Louisiana.]

We have examined the type of the present species in the collection of the Museum of Comparative Zoology. It is a male from Dallas, Texas, bearing labels reading, "Scudder's Type 1875, Orchelimum nigripes Scudd.," also, "Boll's no. 21." The measurements of the type are as follows: length of body, 17 mm.; length of pronotum, 5; greatest caudal width of pronotum, 3.5; length of tegmen, 21; length of caudal femur, 16.6.

Through the kindness of Mr. A. N. Caudell we have before us notes which he made from the type of Walker's *validum*. Taken with the characters given in the original description of the same the combination appears to fit the present form better than any other in the genus, this being the position assigned *validum* by Kirby. However, there is nothing really conclusive in the agreement of these features and Mr. Caudell's comment is, that, while he had time to make but a hurried examination of the specimen, he is "very sure it is not the same as our *nigripes*." Taken altogether it seems best to give the name *validum* a queried position under this species, leaving for the future the exact determination of its status.

The above synonymy is evident after carefully studying the literature. Redtenbacher's *robustum* is certainly *nigripes* with the exception of the caudal limbs, these in all probability not belonging to the specimen. Their size, *i. e.*, length of the femora, is distinctly less than that normal for specimens of the genus of

similar body bulk to the single female of *robustum*, while their spineless character shows they in all probability belong to a smaller individual of a different species of the genus. The color of the cephalic and median tibiae and all of the other color features of *robustum* are those of *nigripes*, while the peculiar features of the lateral lobes of the pronotum of this species are well described.

This species is closely related to *O. laticauda*, which it replaces throughout the central valley and prairie region of the United States. The eastern species, *laticauda*, has on numerous occasions been mistaken for *nigripes* and so recorded, but there need be no confusion of the two forms after they have once been compared. The shape of the lateral lobes of the pronotum alone serves as a ready means for separating the species. We have seen two specimens of this species from Lafayette, Indiana, which show practically no black on the tibiae.

In size this species shows much the same features as *laticauda*, averaging smaller in the northern portion of its range and larger in the southern, but individual variation is everywhere evident. The caudate winged type is typically represented by two females, one from Lincoln, Nebraska, and the other from Victoria, Texas. In addition a number of both sexes have the tegmina and wings more elongate than in the majority of the series. Two specimens in the present series have the caudal femora spined on the ventro-internal margin.

Distribution.—The central valleys and prairies of the United States, from as far north as the shores of the Mississippi in Minnesota (Lugger), south to New Orleans (Redtenbacher) and Victoria, Texas, east to Point Pelee, southern Ontario (E. M. Walker), Columbus, Ohio, and Clarksville, Tennessee, west as far as Gering, on the Platte River, in western Nebraska and Denver and "Rocky Mountains" (Redtenbacher), Colorado.

Specimens Examined: 68; 23 ♂, 43 ♀, 2 juv. ♀.

Columbus, Ohio (C. M. Mead), 1 ♀, [Hebard Cln.].

Indiana, (W. S. Blatchley), 3 ♂, 4 ♀, [Hebard Cln. and Morse Cln.].

Lafayette, Indiana, X, 14, 1913, (H. Fox), 18, 1 ♀, [A. N. S. P.].

Vigo County, Indiana, (W. S. Blatchley), 1 ♂, 1 ♀, [Morse Cln. and U. S. N. M.].

Goose Pond, Indiana, IX, 6, 1892, (Blatchley), 1 ♀, [U. S. N. M.].

Illinois, 1 ♂, [M. C. Z.].

Clarksville, Tennessee, X, 1, 1913, (S. E. Crumb; feeding on tobacco), 1 ♂, 2 ♀, [U. S. N. M.].

Lone Rock, Wisconsin, VIII, 23, 1906, 1 ♀, [Penna. State Dept. Zool.].

Ames, Iowa, VIII, 28, 1897, 1 ♀, [M. C. Z.].

Iowa City, Iowa, (Shimek), 1 ♂, 10 ♀, [Hebard Cln.].

Omaha, Nebraska, 1 ♂, [Hebard Cln.].

Lincoln, Nebraska, IX, 3, 1909, IX, 15, IX, 1888, 2 ♂, 7 ♀, [Hebard Cln.]; IX, (Bruner), 1 ♀, [Cornell Univ.].

Weeping Water, Nebraska, IX, 24, 1909, (Bruner), 1 ♀, [Hebard Cln.].

Gering, Nebraska, 1 ♀, [Hebard Cln.].

Shawnee County, Kansas, 1882, 1 ♂, 1 ♀, [Hebard Cln.].

Topeka, Kansas, (Cragin), 1 ♂, [Hebard Cln.].

Wichita, Kansas, X, 3, 1909, (F. B. Isely), 1 ♂, 1 ♀, [U. S. N. M.].

Fayetteville, Arkansas, IX, 5, 1905, (Morse), 1 ♂, 2 ♀, [Morse Cln.].

De Queen, Arkansas, VII, 29, 1905, (Morse), 1 ♂, [Morse Cln.].

Arkadelphia, Arkansas, IX, 13, 1914, (C. B. Jones), 1 ♀, [U. S. N. M.].

Denver, Colorado, 2 ♀, [M. C. Z.].

Denison, Texas, VIII, 11, 1905, (Morse), 1 ♂, [Morse Cln.].

Dallas, Texas, (Boll), 1 ♂, [M. C. Z.], *type;* IX, 10, 1909, (E. S. Tucker; on *Polygonum* blossoms), 1 ♂, [U. S. N. M.].

Wichita Falls, Texas, VIII, 16, 1905, (Morse), 1 ♂, [Morse Cln.].

Beaumont, Texas, VII, 23, 1912, (H.; swampy land), 3 ♂, 2 ♀, 2 juv. ♀.

Victoria, Texas, VII, 26 to 27, 1912, (H.; high weeds in "Branch"), 2 ♂, 1 ♀.

Orchelimum minor Bruner (Figs. 3, 26, 51, 52 and 77.)

1891. *Orchelimum minor* Bruner, Canad. Entom., xxiii, p. 72. [District of Columbia.]

1905. *Orchelimum cuticulare?* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1904, p. 796. [Thomasville, Georgia.]

An examination of the present series of specimens of both sexes of this rare species shows that the number of spines on the ventro-external margin of the caudal femora varies from two to seven, one individual possessing two on one limb and six on the other.

In general size there is some variation which may be geographic, as the largest individual is from the most southern point from which the species has been recorded, although the series in hand is not sufficient to more than call attention to this feature.

The male cerci show some variation in the length of the distal portion of the shaft, this being most apparent in the large Thomasville specimen. This, like the size extreme of the same individual, may possibly be explained on geographic grounds.

The speculum of the stridulating field of the male tegmina varies to an appreciable degree in the exact ratio of length and

breadth, in fact more so than in any other form except *O. concinnum*, but an exact expression of this variation is hardly possible, as, while tangible and apparent to the eye after study of the genus, it is relatively so slight that a satisfactory and convincing measurement of it is hard to secure.

The type of the species, a female, is now before us and measurements of it have never been published. We here give these and the proportions of several representative males as well as the large Thomasville individual of the same sex.

Measurements (in millimeters)

	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur	Length of ovipositor
♂					
Atsion, New Jersey.....	16	4.4	15	13.2	
Sulphur Springs, North Carolina.....	15.9	4.2	16	13.2	
Thomasville, Georgia....	20.8	4.8	15.6	15.6	
♀					
District of Columbia *Type*.....	15.4	4.2	16.2	14.5	11

Synonymy.—In the prefatory remarks (p. 18) we have already commented upon our queried determination of this species as *O. cuticulare*. The specimen so named had lost all of its original coloration, was of larger size than the average of the species and had the cerci rather longer than usual. The true *cuticulare* of Serville, as we have shown elsewhere in this paper, equals the earlier *glaberrimum* and the form called *cuticulare* by Redtenbacher is the very different *calcaratum*.

Distribution.—The Coastal Plain of the eastern United States from central New Jersey (Helmetta and Lakehurst), south to southern Georgia (Thomasville), west as far as the mountain valleys of North Carolina (Sulphur Springs) at an elevation of 2500 feet and the vicinity of Washington. To the localities from which the species has been recorded we may add Florence, South Carolina, where its note was heard coming from about twelve feet up in a short-leaf pine.

Specimens Examined: 47; 33 ♂, 8 ♀, 1 juv. ♂, 5 juv. ♀.

Almost all of the material before us has been previously recorded, but we are listing it here to show the sources of information for the present study.

Brown's Mills Junction, New Jersey, X, 6, 1907, (E. Daecke), 1 ♀, [Hebard Cln.].

Lakehurst, New Jersey, IX, 6, X, 19, (W. T. Davis), 1 ♂, 1 ♀, [Davis Cln.].

Stafford's Forge, New Jersey, IX, 16, 1905, (H.), 1 ♂, [Hebard Cln.].

Atsion, New Jersey, X, 8, 1903, (H.), 2 ♂, [Hebard Cln. and A. N. S. P.].

Reega, New Jersey, VIII, 10, 1914, (H., undergrowth in pine barrens), 1 juv. ♂, 4 juv. ♀; VIII, 29, 1914, (H.; common in pines, males continuing to sing after dark), 1 ♂, 1 ♀, 1 juv. ♀.

Maryland opposite Plummer's Island, IX, 6, 1909, (H. A. Allard; on pine), 3 ♂, 1 ♀, [U. S. N. M.].

District of Columbia, IX, 15, 1884, 1 ♀, *type*, [Hebard Cln.].

Sulphur Springs, North Carolina, IX, 2 and X, 6, 1905, (H.), 3♂, [Hebard Cln. and A. N. S. P.].

Raleigh, North Carolina, IX, 20, 1904, (Brimley), 1 ♀, [Hebard Cln.].

Thompson's Mills, Georgia, 1908, X, 1909 and 1910, (H. A. Allard), 20 ♂, 2 ♀, [Hebard, Cln., A. N. S. P., and U. S. N. M.].

Hoschton, Georgia, X, 5, 1908, (H. A. Allard), 1 ♂, [U. S. N. M.].

Thomasville, Georgia, VIII, 28, 1903, 1 ♂, [Hebard Cln.].

Orchelimum concinnum Scudder (Figs. 12, 27, 53, 54, 78 and 79.)

1862. *O[rchelimum] concinnum* Scudder, Boston Journ. Nat. Hist., vii, p. 452. [Cape Cod, Massachusetts.]

1862. *O[rchelimum] longipennis* Scudder, Ibid., p. 453. [Texas.]

1891. *Orchelimum gracile* Bruner (not *Orchelimum gracilis* Harris), Canad. Entom., xxiii, p. 70. [West Point and Lincoln, and Wheeler, Garfield and Holt Counties, Nebraska.]

1891. *X[iphidium] (Orchelimum) inerme* Redtenbacher, Verh. k.-k. zool.-bot. Gesell. Wien, xli, pp. 495, 501 [Texas; Kansas.].

1892. *Orchelimum delicatum* Bruner, Entom. News, iii, p. 265. [New name for *O. gracile* Bruner, not of Harris.].

1893. *Orchelimum indianense* Blatchley, Canad. Entom., xxv, p. 90. [Kewanna, Fulton County, Indiana.].

1893. *Orchelimum campestre* Blatchley, Ibid., p. 91. [Vigo and Fulton Counties, Indiana.].

1899. *Xiphidium gracilinum* Griffini, Miscell. Entom., vii, p. 96. [New name for *Orchelimum gracile* Bruner, not of Harris.]

The present species is probably the most variable, as it is the most widely distributed, form in the genus and the above synonymy illustrates the difficulty previous authors have encountered in endeavoring to determine material belonging to it. The present authors have given more time and consideration to it than to any other member of the genus, and after the most critical examination of the specimens in hand and a careful testing of the evidence on which the numerous synonyms were erected, we are thoroughly convinced that *concinnum* is a very variable form, showing decided geographic size variation, probable environmental adaptations in ovipositor characters in the female and

certainly great individual variation in certain structural and several color features.

We have examined eleven specimens of the original Cape Cod series on which Scudder based *concinnum*. Ten of these are now in the Museum of Comparative Zoology and one, a male, is in the United States National Museum. Of the former lot we select as lectotype a male labelled: "*O. concinnum*, Cape Cod," with an additional round red paper label. The single type of *O. longipennis*, a female, is in the Museum of Comparative Zoology labelled: "Texas. A. Agassiz. O. longipennis Scudd.," with an additional red type label.

The type and paratypes of *Orchelimum gracile* Bruner (*Orchelimum delicatum* Bruner) are now before us and the only tangible character to separate them from pale faced eastern specimens of *concinnum* is the longer, straighter ovipositor, which is discussed beyond. Redtenbacher's *inerme* was proposed merely to replace *longipennis*, which name was preoccupied in the genus *Xiphidium* in which he placed it. The description of *inerme*, when examined, is also seen to be based on the same condition of this species as that to which Scudder gave the name *longipennis*. Blatchley's *indianense* is absolutely inseparable from dark faced *concinnum*, while *campestre* is the pale faced condition of this species, paratypes of both forms, now before us, demonstrating this very clearly.

Taking up the features of variation in this species, we find they can readily be classified under three headings, *i. e.*, geographic and individual size variation, ovipositor variation and general color and structure variation.

Individual size variation at any one locality is less pronounced in this species than in most of the other forms of the genus, but the geographic size variation is very great. Material from New England is minimum in size, southward along the east coast the bulk increasing until individuals from the southeastern states are very decidedly larger than those from New Hampshire. Specimens from Indiana and Iowa are larger than New England individuals but not greatly so, while in eastern Nebraska and eastern Kansas the size is in general as great as in representatives from the coast of Georgia; southward in Texas and northern New Mexico the bulk regularly increases, until on the central Gulf coast of

Texas we find maximum sized individuals nearly twice as large as New England specimens and at first glance apparently very different. From west central Nebraska northward to south central Montana we find the species holds a fairly uniform size.

The most puzzling variation feature is in the length and curve of the ovipositor. Over almost the entire range of the species there is little variation in the relative size and curve of the ovipositor, which shows only very minor variations in depth, etc. In the central area, however, and to a lesser degree in Montana, we find a part or all of the females from certain localities possessing ovipositors far longer, more robust and straighter than the average type. This is the form called *delicatum* (*gracile*) by Bruner and it and the more normal *concinnum* type were both taken by him at West Point and Lincoln, Nebraska, while numerous female specimens from Neligh, Kearney, North Platte and Haigler, Nebraska, and Billings, Montana, are nearer this type than average *concinnum*, or intermediate between the two. No other structural character stands the tests for correlation with this ovipositor feature and it is impossible to sort the males before us into two species, those, fourteen in number, for instance, from Billings, a locality having no typical *concinnum* ovipositor among its sixteen females, being quite inseparable from more eastern specimens, while the males from West Point and Lincoln are certainly one species, the male type of *delicatum* being the same as dozens of others which are undoubted *concinnum*. The explanation of this ovipositor development should, we think, be looked for in the immediate environment in which the long ovipositor individuals occur, the fact that both have been taken at one locality strongly suggesting this.

Among the general structural variations we find the width of the fastigium and the degree of divergence of the margins of the same, when seen from the cephalic aspect, to be quite variable, while the degree of straightness or arcuation of the ventrocaudal margin of the lateral lobes of the pronotum and the degree of angulation of the caudal margin of the same are inconstant, varying in nearly every series from a single locality. The form of the stridulating field of the male tegmina is rather plastic, while the male cerci show certain variational features in length, degree of slenderness of the distal extremity and the strength of the

dorsal carination. In the present species the majority of the specimens are decidedly long-winged, *i. e.*, having the tegmina and wings strongly surpassing the apices of the caudal femora, while in a number of specimens, these outnumbering the more usual type in the eastern Nebraska representation, the tegmina and wings are extremely elongate, surpassing the caudal femora by from one-half to two-thirds their length. The long-winged type is that to which Scudder gave his name *longipennis*. The tegmina and wings average shorter in the specimens from Kearney, Neligh, North Platte and Haigler, Nebraska, and Billings, Montana, than in those from any other locality. Every one of seven specimens collected at electric lights at Lincoln, Nebraska, by Prof. Bruner is of the very long-winged type, while of thirty specimens from Billings, all taken in a sedgy area, but two are of the very long-winged form.

The color variation is chiefly in that of the dorsum of the pronotum and of the face. The former area may be uniform with the general body color or may be supplied with a pair of brownish diverging lines, the area between these may or may not be infuscate or washed with ferruginous, while the extent and depth of these lines and the embrownment of the enclosed area on the occiput is variable in the same proportion as on the pronotum. The face may be concolorous with the remainder of the head or supplied with a more or less distinct median vertical bar, which in the more intensely colored specimens is almost blackish and generally considerably expanding ventrad, although it may be nearly subequal in width. Interior specimens do not show this dark bar, as far as our material goes, except in the case of the Indiana material called *indianense* by Blatchley and of a single female labelled "Colorado," but from the coastal sections this form generally outnumbers the pale faced type which occurs in exactly the same situations. In the coastal area of Texas the pale faced type is proportionately more numerous than in the eastern coastal section. The occasional presence of a similar facial bar has also been noted by us in *O. militare*.

From observations made in New Jersey by the junior author during the summer of 1914, it is evident that the young of the present species found in the eastern coastal region exhibit two color forms, one with a striped face, the other with a uniformly

green face. The striped face form retains that condition through the ecdyses to the adult condition, the other reaches the adult condition without acquiring the barred face, but within a few days after becoming adult, as the chitin thoroughly hardens the stripe develops and becomes as prominent as in the other type. This was ascertained by keeping specimens under observation from the immature stages to that of thoroughly hardened adults. It is very probable that green face adult specimens from New Jersey were taken before they had fully acquired their permanent adult coloration.

Measurements (in millimeters) of a number of average pairs from representative localities are here presented.

	Rye Beach, New Hampshire		Chestnut Neck, New Jersey		Wrightsville, North Carolina		Tybee Island, Georgia	
	♂	♀	♂	♀	♂	♀	♂	♀
Length of pronotum	3.7	4.2	4.1	4.1	4.1	4.1	4.4	4.8
Length of tegmen	19	16.7	21.1	20	21.5	21.2	22.4	23
Length of caudal femur	13.2	13.5	14.8	15	16.5	15.7	16.6	17.5
Length of ovipositor	....	7.5	....	7.8	....	8.2	....	8.1

	Homestead, Florida		Vigo Co., Indiana (*Paratypes* of *O. campestre*)		West Point, Nebraska (*O. delicatum*) (*type*)	(*paratype*)	West Point, Nebraska	
	♂	♀	♂	♀	♂	♀	♂	♀
Length of pronotum	4.1	4.5	4.2	4.2	3.9	3.8	4.2	4.7
Length of tegmen	21.4	22.5	22.8	20.8	18	18.2	22.7	23.2
Length of caudal femur	14.5	17	16	15.6	14	14.5	16.5	18.5
Length of ovipositor	....	8.1	....	7.5	....	10.5	....	7.5

	Lincoln, Nebraska	North Platte, Nebraska		Billings, Montana		Texas (*Type* of *O. longipennis*)
	♀	♂	♀	♂	♀	♂
Length of pronotum	4.5	4.5	4.3	4.6	4.6	5
Length of tegmen	26.2	19.8	20.2	22	21.3	29.6
Length of caudal femur	17.1	14.5	14.7	15.7	16.2	19
Length of ovipositor	13	....	9	....	9	8.5

	Virginia Point, Texas		Gregory, Texas	Del Rio, Texas		Beulah, New Mexico	
	♂	♀	♂	♂	♀	♂	♀
Length of pronotum	4.9	5	5.2	5.5	4.9	4.6	5
Length of tegmen	25	25.5	30.7	23.9	20	24.7	26.8
Length of caudal femur	17.8	18.6	18.9	18.5	16	17	17.5
Length of ovipositor	....	9	....	....	8.4	....	11.2

Normally this species has the ventro-external margin of the caudal femora unspined, an occasional specimen, however, having

a single adventitious spine on one limb and much more rarely two spines on but a single limb. We have examined no specimen with spines on both caudal femora. Curiously all individuals noticed to have any spines at all are from localities west of the Mississippi (Iowa, Missouri, Nebraska and Texas).

Distribution.—In the eastern United States apparently restricted to the general vicinity of the coast, generally in or near salt marsh, and distributed from New Hampshire (Rye Beach) south to southern Florida (Homestead); in the interior ranging from extreme southern Ontario (five localities reported by Walker), northern peninsula of Michigan (Menominee), southeastern Minnesota (see Lugger) and south-central Montana (Billings) south to the Gulf Coast of Florida and Mississippi, to at least south-central Texas (Gregory and Del Rio), west to at least Billings, Montana, eastern Colorado (La Junta and Julesburg) and Albuquerque, New Mexico. The vertical range of the species is easily the greatest in the genus, extending from sea-level to approximately 8000 feet (Beulah, New Mexico). From the eastern states we know of no correct record of the occurrence of the species at a locality away from the general vicinity of the coast. Allard has reported *longipenne* from Thompson's Mills, Georgia, but the material, which we have seen collected by him and so labelled, is referable to *O. agile*.

Specimens Examined: 472; 235 ♂, 212 ♀, 13 juv. ♂, 12 juv. ♀.

Rye Beach, New Hampshire, IX, 1 and 2, 1913, (H.; in salt marsh grass), 3 ♂, 4 ♀.

Vicinity of Boston, Massachusetts, (Scudder), 2 ♂, [M. C. Z.].

Cape Cod, Massachusetts, (Scudder), 9 ♂, 2 ♀, *type* and *paratypes*, [M. C. Z.; U. S. N. M.].

Scituate, Massachusetts, VIII, 29, 1897, (F. H. Sprague), 2 ♀, [M. C. Z.].

Wesquage Beach, Rhode Island, IX, 8 to 10, 1913, (H.; in salt marsh grass), 1 ♂.

Stony Creek, Connecticut, IX, 2, 1904, (H. L. Viereck), 1 ♀, [A. N. S. P.].

Saybrook, Connecticut, VII, 27, 1904, (H. L. Viereck), 1 ♂, [A. N. S. P.].

Lighthouse Point, New Haven, Connecticut, IX, 27, 1904, (B. H. Walden), 1 ♀, [Hebard Cln.].

Spray Beach, New Jersey, IX, 6, 1906, (Bayard Long), 2 ♂, [A. N. S. P.].

Mullica River meadows near New Gretna, New Jersey, VIII, 24, 1914, (H.; in short grass far out on flats and in bordering rush swamp), 19 ♂, 20 ♀, 1 juv. ♂, 1 juv. ♀.

Chestnut Neck, New Jersey, VII, 16, 1911, (R. & H.; in salt marsh grass), 2 ♂, 6 ♀.

Canton, New Jersey, IX, 7, 1910, (H. Fox); 1 ♂, [A. N. S. P.].

Ventnor, New Jersey, VIII, 5 to VIII, 26, 1914, (H.; abundant in marshy depression in sand), 40 ♂, 28 ♀, 6 juv. ♂, 7 juv. ♀.

Margate City, New Jersey, VIII, 24, VIII, 17, 1914, (H.; scarce in salt marsh chiefly of *Panicularia fluitans*), 2 ♂, 2 ♀.

Pleasantville, New Jersey, VIII, 17, 1914, (H.; shore margin of salt meadow), 1 ♂.

Ocean City, New Jersey, VIII, 14, 1914, (H.; middle of salt marsh), 1 ♂.

Tuckahoe, New Jersey, VIII, 26, 1914, (H.; in freshwater marsh), 1 ♂.

Cedar Springs, New Jersey, VIII, 14 and 26, 1914, (H.; in fresh marsh grasses and rushes), 13 ♂, 7 ♀.

Between Woodbine and Belleplain, New Jersey, VIII, 21, 1912, (H. Fox; in wet bog of *Juncus canadensis*), 2 ♂, 3 ♀, [A. N. S. P.].

Ocean View, New Jersey, VII, 30, 1908, VII, 16, 1911, IX, 8, 1911, (H. Fox), 7 ♂, 9 ♀, [A. N. S. P.]; VII, 27, 1914, (H.; in upland field and on edge of salt marsh), 1 ♂, 1 ♀, 1 juv. ♀.

Sea Isle City, New Jersey, X, 9, 1910, (H. Fox), 1 ♂, [A. N. S. P.].

Piermont, New Jersey, VIII, 26, 1909, (H. Fox; salt marsh), 2 ♂, 1 ♀, [A. N. S. P.].

Avalon, New Jersey, VIII, 12, 1911, (H. Fox), 3 ♂, 4 ♀, [A. N. S. P.].

Swainton, New Jersey, VIII, 8, 1914, (H.; in swampy field), 1 ♀.

Cape May Court House, New Jersey, VII, 20, VIII, 14 and 21, 1914, (H.; common in salt marsh of *Spartina patens* and *Distichlis spicata*), 2 ♂, 5 ♀, 6 juv. ♂, 2 juv. ♀, (immature individuals on the earliest date).

Anglesea, New Jersey, IX, 5, 3 ♂, 5 ♀, [A. N. S. P.].

Cold Spring, New Jersey, IX, 4, 1907, (Bayard Long), 2 ♀, [A. N. S. P.]; VIII, 28, 1912, (H. Fox), 2 ♀, [A. N. S. P.].

Cape May, New Jersey, VII, 22, 1910, (H.; in salt marsh), 1 ♂.

Chestertown, Maryland, VIII, 4, 1912, VIII, 24, 1900, (E. G. Vanatta), 1 ♂, 2 ♀, [A. N. S. P.].

Virginia, VIII, 14, 1 ♀, [Hebard Cln.].

Ocean View, Virginia, VIII, 9, 1904, (A. N. Caudell), 1 ♂, 2 ♀, [U. S. N. M.].

Virginia Beach, Virginia, VIII, 31, 1903, (E. S. G. Titus), 1 ♂, 1 ♀, [U. S. N. M.].

Wrightsville, North Carolina, IX, 7, 1911, (R. & H.; fairly abundant in high grasses growing on edge of dry land), 6 ♂, 6 ♀.

Smith Island, North Carolina, X, 1906, (F. Sherman), 1 ♀, [U. S. N. M.].

Tybee Island, Georgia, IX, 2, 1911, (R. & H.; very common in salt marsh), 24 ♂, 14 ♀; VIII, 12, 1903, (Morse), 5 ♂, 3 ♀, [Morse Cln.].

Warrington, Florida, VIII, 4, 1903, (Morse), 2 ♂, 1 ♀, [Morse Cln.].

Fort Barrancas, Florida, VIII, 3, 1903, (Morse), 4 ♂, 3 ♀, [Morse Cln.].

Biloxi, Mississippi, VII, 19, 1905, (Morse), 1 ♂, 1 ♀, [Morse Cln.].

Buras, Louisiana, VII, 23, 1905, (Morse), 1 ♀, [Morse Cln.].

Crowley, Louisiana, IX, 23, 1911, (E. S. Tucker; in rice field), 2 ♂, 2 ♀, [U. S. N. M.].

Cleveland, Ohio, VIII, 19, 1 ♂, [M. C. Z.].

Cedar Point, Ohio, VIII, 1912, (W. J. Kostir), 1 ♀, [U. S. N. M.].

Gypsum, Ohio, VIII, 20, (J. L. King), 1 ♂, [U. S. N. M.].

Menominee, Michigan, IX, 5, 1904, (E. S. G. Titus), 1 ♂, [U. S. N. M.].

Vigo County, Indiana, VIII, 27 and IX, 8, 1893, (Blatchley), 2 ♂, 2 ♀, [Hebard Cln., and U. S. N. M.]. *Paratypes* of *O. campestre.*

Kewannee, Indiana, IX, 24, 1892, X, 7, 1893, (Blatchley) 3 ♂, 1 ♀, [Hebard Cln. M. C. Z. and U. S. N. M.]. *Paratypes* of *O. indianense.*

Starke County, Indiana, VIII, 11, 1904, VIII, 15, 20 and 21, 1902, (Blatchley), 2 ♂, 4 ♀, [Hebard Cln., A. N. S. P., and U. S. N. M.].

Marshall County, Indiana, VII, 29, 1902, X, 5 and 15, 1904, (Blatchley), 2 ♂, 4 ♀, [Hebard Cln., A. N. S. P., and U. S. N. M.].

Lake Maxinkuckee, Indiana, VIII, 17, 1893, (Blatchley), 1 ♂, [Morse Cln.].

Steuben County, Indiana, VIII, 6 and 8, 1902, IX, 8, 1902, (Blatchley) 5 ♂, 1 ♀, [Hebard Cln., A. N. S. P., and U. S. N. M.].

Kosciusko County, Indiana, VIII, 8 and 27, 1902, (Blatchley), 1 ♂, 1 ♀, [A. N. S. P. and U. S. N. M.].

Fulton County, Indiana, IX, 24, 1892, (Blatchley), 1 ♂, 1 ♀, [U. S. N. M.].

Lake County, Indiana, IX, 1, 1902, (Blatchley), 2 ♀, [A. N. S. P., and U. S. N. M.].

Moline, Illinois, VIII, 4, (McNeill), 1 ♀, [M. C. Z.].

Lawn Ridge, Illinois, (A. Agassiz), 1 ♀, [M. C. Z.].

Arkansas, 1 ♀, [U. S. N. M.].

Fort Dodge, Iowa, VIII, 27, 1910, (M. P. Somes), 1 ♀, [Hebard Cln.].

Dallas County, Iowa, VIII, 20 to 23, (Allen), 1 ♀, [M. C. Z.].

Hollister, Missouri, VIII, 12, 1912, (H. H. Knight), 2 ♂, 1 ♀, [Cornell Univ.].

West Point, Nebraska, VII, 1884, VIII, 17, IX, 4 and 5, (L. Bruner), 8 ♂, 7 ♀ [Hebard Cln.]; VIII, 17, (L. Bruner), 1 ♂, 1 ♀, [Cornell Univ.]. *Type* and five *paratypes* of *gracile* Bruner.

Lincoln, Nebraska, VII, VIII, (L. Bruner), 7 ♂, 6 ♀, [Hebard Cln., and U. S. N. M.].

Burnham, Nebraska, VIII, 30, 1911, (L. Bruner), 1 ♂, [Hebard Cln.].

Cedar Bluffs, Nebraska, 2 ♀, [Hebard Cln.].

Neligh, Nebraska, VIII, (M. Cary), 2 ♀, [Hebard Cln.].

Kearney, Nebraska, VII, 27, 1910, (R. & H.; in grassy patch), 1 ♀.

North Platte, Nebraska, VII, 28, 1910, (R. & H.; in marshy tract), 6 ♂, 8 ♀.

Haigler, Nebraska, VIII, 10, 1901, (L. Bruner), 1 ♀, [Hebard Cln.].

Clearwater, Kansas, VIII, 30, 1904, (F. B. Isely), 1 ♂, [U. S. N. M.].

Billings, Montana, VII, 28, 1909, (R. & H.; in marshy area of sedges), 14 ♂, 16 ♀, 1 juv. ♀.

Julesburg, Colorado, VII, 29, 1910, (R. & H.; in grasses in river bottom), 1 ♂, 1 ♀.

Near La Junta, Colorado, IX, 11, 1909, (R. & H.; in Arkansas River bottom land), 1 ♂.

Barber County, Kansas, (F. W. Cragin), 2 ♂, [Hebard Cln.].

Dallas, Texas, (Boll), 1 ♀, [M. C. Z.].

Virginia Point, Texas, VII, 21, 1912, (H.; in luxuriant salt marsh vegetation), 5 ♂, 7 ♀.

Victoria, Texas, VI, (A. N. Caudell), 1 ♀, [U. S. N. M.].

Gregory, Texas, VII, 30, 1912, (H.; in fresh marsh vegetation), 1 ♂.

Del Rio, Texas, VIII, 22 and 23, 1912, (R. & H.; in heavy grasses in Rio Grande bottom), 2 ♂, 1 ♀.

Albuquerque, New Mexico, VII, 13 and 16, (Oslar), 2 ♂, 1 ♀, [A. N. S. P.]; IX, 14, 1907, (H.; in cultivated ground), 1 ♂, [Hebard Cln.].

Beulah, New Mexico, VIII, 17, (H. Skinner), 1 ♂, 2 ♀, [A. N. S. P.].

The present authors or the senior author alone have already recorded this species from Atlantic City, New Jersey and Punta Gorda, Fort Myers, South Bay of Lake Okeechobee, Chokoloskee and Homestead, Florida, and as *longipenne* from Hannibal, Missouri.

Orchelimum fidicinium Rehn and Hebard (Figs. 13, 28, 55, 56 and 80.)

?1839. *Orchelimum herbaceum* Serville, Hist. Nat. Ins. Orth., p. 524. [North America.]

1907. *Orchelimum fidicinium* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1907, p. 309, figs. 7 to 9. [Cedar Keys and Gainesville, Florida.]

1908. *Orchelimum crusculum* Davis, Journ. N. Y. Entom. Soc., xvi, p. 223. [Tuckerton, New Jersey; Staten Island and Rockaway, New York.]

As we have already stated in the preliminary remarks on the genus, Serville's *herbaceum*, which has generally been associated with Scudder's *concinnum*, seems to resemble this species more closely in the length and form of the ovipositor than any other of which we know the female, except the long ovipositor type of *concinnum*. The latter condition, however, as far as known, occurs only in a region which at that time was almost unexplored and there is little possibility of it having been in Serville's possession, particularly as he says the specimen came from Latreille, who died in 1833. The character of the facial marking described by Serville is not normally found in any form known to us, that is no form has an "almost transverse" black spot on the face. A similar condition is found below the eyes in specimens of a number of species which have discolored in drying. However, we have no definite proof that *herbaceum* is the same as *fidicinium*, and, until we have some positive information of this sort, we do not care to replace a well understood name by another of doubtful status. We have endeavored to locate Serville's type and have the same examined, but unfortunately without success.

The synonymy of *crusculum* is evident on comparison of typical material of the same, kindly loaned to us by Mr. Davis, with the typical series of *fidicinium*.

As in other species of the genus there is a general increase in size southward, but in the Cumberland Island series we find a

very considerable amount of individual variation in this respect in both sexes. The smaller New Jersey individuals, however, are very appreciably smaller than the smallest Cumberland Island specimens.

The ovipositor curve varies somewhat, in one extreme this appendage being straighter than in others, with its dorsal margin but little arcuate, while the more usual condition has the whole ovipositor with its margins more regularly but not strongly arcuate. The distal section of the ventro-external margin of the caudal femora is either unarmed or supplied with from one to five spines. An examination of thirty specimens, taken at random, for the number of these spines shows the following:

Cape May, New Jersey	Wrightsville, North Carolina	Cumberland Island, Georgia		
1–0	4–1	1–2	1–2	2–1
1–0	0–0	1–2	3–3	1–0
0–0	0–1	3–3[18]	1–0	4–4
0–0	1–1	1–2	1–1	5–3
2–1	3–2	3–2	3–2	2–1
		3–2	1–1	1–1
		2–4	1–1	

There is a great amount of variation in the depth of the general coloration, but in the vast majority the dark dorsal band is indicated. The Cumberland Island and numerous New Jersey specimens average dark in general tone, with generally strongly contrasted pattern. When fresh many specimens from these localities were distinctly thalassine in tone.

Distribution.—Salt marsh and maritime region from western Long Island, New York (Rockaway) to southern Georgia (Cumberland Island) and western Florida (Cedar Keys). It has been recorded inland in but a single instance, that from Gainesville, Florida, although two females labelled "Swansea, South Carolina," a locality approximately one hundred miles inland, are now in hand. We feel very doubtful, with our personal knowledge of the habits of this species, as to the correctness of these two records. The Gainesville one was reported by us when our knowledge of the insect was by no means as full as at present, and in all probability the specimen reported was secured the previous day at Cedar Keys and accidentally confused in labelling.

[18] The ventro-internal margins of the caudal femora have a single spine instead of being unarmed as usual.

Specimens Examined: 248; 112 ♂, 117 ♀, 6 juv. ♂, 13 juv. ♀.

Tuckerton, New Jersey, IX, 1, (W. T. Davis), 1 ♂, 1 ♀, [U. S. N. M.]. *Paratypes* of *O. crusculum* Davis.

Ventnor, New Jersey, VIII, 24, 1914, (H.; common in and about tall fringing borders of *Spartina stricta* far out on tidal flats), 15 ♂, 17 ♀, 4 juv. ♂, 2 juv. ♀.

Ocean City, New Jersey, VIII, 14, 1914, (H.; middle of salt marsh), 5 ♂, 5 ♀.

Townsend's Inlet, New Jersey, VIII, 10, 1908, (H. Fox; in grassy marsh and grassy meadow), 2 ♀, [A. N. S. P.].

Avalon, New Jersey, VIII, 14, 1908, (H. Fox; in *Scirpus* near beach), 1 ♀, [A. N. S. P.]; VIII, 20, 1910, VIII, 12, 1911, VIII, 26, 1912, (H. Fox; in *Spartina* in salt marsh), 5 ♂, 16 ♀, 1 juv. ♀, [A. N. S. P.].

Ocean View, New Jersey, VIII, 12, 1908, VIII, 29, 1910, (H. Fox; grassy places in salt marsh), 1 ♂, 5 ♀, [A. N. S. P.].

Sea Isle City Turnpike, New Jersey, VIII, 12, 1911, VIII, 15, 1910, (H. Fox; in *Spartina* in salt marsh), 10 ♂, 11 ♀, 1 juv. ♂, 9 juv. ♀, [A. N. S. P.].

Goshen, New Jersey, VIII, 22, 1910, (H. Fox), 1 ♀, [A. N. S. P.].

South Dennisville, New Jersey, VIII, 27, 1912, (H. Fox; in *Spartina glabra*), 3 ♂, 1 ♀, [A. N. S. P.].

Cape May Court House, New Jersey, VIII, 14, 1914, (H.; in salt marsh in *Spartina stricta*), 1 ♂, 1 ♀.

Anglesea, New Jersey, IX, 8, 1 ♀, [A. N. S. P.].

Cape May, New Jersey, VII, 22, 1910, (H.; in salt marsh), 4 ♂, 3 ♀; VIII, 8, 1914, (H.; out on salt marsh in *Spartina stricta*), 3 ♂, 2 ♀.

Ocean View, Virginia, VIII, 9, (Caudell), 7 ♂, 1 ♀, 1 juv. ♂, 1 juv. ♀, [U. S. N. M. and A. N. S. P.].

Wrightsville, North Carolina, IX, 7, 1911, (R. & H.; scarce in marsh grass), 5 ♂, 10 ♀.

Swansea, South Carolina, VIII, 7, 1911, (F. Knab), 2 ♀, [U. S. N. M.].

Coast of South Carolina, 1 ♂, [A. N. S. P.].

Savannah, Georgia, VIII, 20, 1895, (A. Oemler), 1 ♀, [U. S. N. M.].

Tybee Island, Georgia, VII, 26, 1913, (J. C. Bradley), 2 ♂, 1 ♀, [Ga. State Cln.]; VIII, 13, 1903, (Morse), 8 ♂, 3 ♀, [Morse Cln.].

Cumberland Island, Georgia, VIII, 31, 1911, (H.; in high salt marsh grass growing between high and low tide beach lines on boggy ground), 41 ♂, 32 ♀.

The species has been recorded previously from Cedar Keys (and Gainesville, incorrectly) Florida; Rockaway and Staten Island, New York, and Tuckerton, Ocean View, Townsend's Inlet and Anglesea, New Jersey.

Orchelimum militare Rehn and Hebard (Figs. 14, 29, 57, 58 and 81.)

1907. *Orchelimum militare* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1907, p. 311, figs. 10 and 11. [Gainesville, Florida.]

This very distinct species has some relationship to *O. fidicinium*, but the sum total of its characters give it an isolated position.

In size it answers to the general rule of the genus, in that the smaller individuals are more frequent at the more northern local-

ities and the average size southward is greater, but the Florence series is sufficient to show that the individual size variation is very great.

As with *glaberrimum* this species occasionally develops a reddish coloration of the head, as rich and decided as in the most extreme individual of the larger species, while other specimens of *militare* have a vertical facial bar ranging in color from pale reddish to walnut brown, which condition is quite similar to that frequently found in *O. concinnum*. This facial marking occasionally spreads out laterad over the ventral portion of the genae and again in some few specimens the infra-ocular and infra-antennal regions are quite blackish.

The number of spines on the distal portion of the ventro-external margin of the caudal femora either varies from one to two or the margin is unarmed. A count of twenty specimens shows the following results:

Florence, South Carolina		Winter Park, North Carolina	
0–0	0–0	0–0	0–2
2–2	1–1	0–0	1–0
2–1	2–1	1–0	0–0
0–0	1–1	0–0	0–0
0–0	0–1	0–0	1–1

Distribution.—Coastal Plain region, Gulf coast and Florida, ranging from south-central New Jersey (Speedwell) south to southern Florida (Detroit), west at least as far as southern Mississippi (Nugent) and southeastern Louisiana (Buras). The known limits of its range inland toward the Piedmont region are Florence, South Carolina, and Tifton, Georgia.

Specimens Examined: 74; 45 ♂, 28 ♀, 1 juv. ♀.

Speedwell, New Jersey, VIII, 31, 1905, (Witmer Stone), 1 ♂, [A. N. S. P.][19].

Winter Park, North Carolina, IX, 7, 1911, (R. & H.; in green grasses on edge of field), 12 ♂, 2 ♀.

Lake Waccamaw, North Carolina, IX, 8, 1911, (R. & H.; in high weeds near lake shore), 1 ♂, 2 ♀.

Florence, South Carolina, IX, 6, 1911, (R. & H.; in open places in short-leaf pine or oak woods, in grasses several feet high), 15 ♂, 10 ♀.

Jesup, Georgia, IX, 1, 1911, (H.; in bulrushes in swamp in pine woods)[20], 2 ♀.

[19] This specimen was recorded by Smith (1909 List of New Jersey Insects) under *O. herbaceum*.

[20] This specimen was seen to dive off of the rushes into the water and swim swiftly to a leaf under which it clung, being perfectly concealed an inch or more under water.

Waycross, Georgia, VIII, 11, 1903, (Morse), 2 ♂, 2 ♀, [Morse Cln.].
Jordan's, Billy's Island, Georgia, VIII, 31, 1913, (J. C. Bradley), 1 ♂, 1 ♀.
Homerville, Georgia, VIII, 27, 1911, (R. & H.), 1 juv. ♀.
Tifton, Georgia, IX, 8, 1910, (J. C. Bradley), 1 ♂, [Ga. State Cln.].
Bainbridge, Georgia, IX, 17 to X, 19, 1910, (J. C. Bradley), 1 ♀, [Ga. State Cln.].
Jacksonville, Florida, (Priddey), 1 ♂; VIII, 1885, (Ashmead), 1 ♂, [Hebard Cln.].
Atlantic Beach, Florida, VIII, 24, 1911, (R. & H.; swampy area on edge of hammock), 1 ♀.
Hastings, Florida, V, 22 to X, 15, (A. G. Brown), 8 ♂, 4 ♀, [Morse Cln.].
Nugent, Mississippi, VII, 20, 1905, (Morse), 1 ♂, 3 ♀, [Morse Cln.].
Buras, Louisiana, VII, 23, 1905, (Morse), 1 ♂, [Morse Cln.].

We have previously recorded this species from Gainesville and Detroit, Florida; Okeefenokee Swamp, Georgia, and Winter Park, North Carolina.

Orchelimum volantum McNeill (Figs. 15, 30, 59, 60 and 82.)

1891. *Orchelimum volantum* McNeill, Psyche, vi, p. 26. [Rock River near Cleveland, Henry County, Illinois.]
1893. *Orchelimum bruneri* Blatchley, Canad. Entom. xxv, p. 92. [Vigo County, Indiana.]

The above synonymy has been established by Blatchley after the examination of typical material on which the two names were based.[21] The paired dark lines on the dorsum of the head and pronotum are indicated in the majority of the specimens, occasionally, however, entirely absent.

The ventro-external margin of the caudal femora shows from one to four spines present distad, eight specimens, which possess one or both caudal limbs, showing the following formulae; 3–4, 2–4, 2–4, 2–1, 2–3, 2–3, 3–?, 3–?.

Distribution.—North-central Mississippi and lower Missouri valleys, southern Great Lake region; from south-central Ontario (Niagara River) and northern Ohio (Cedar Point), west to eastern Nebraska (Cedar Bluffs) and Kansas (Douglas County), the latter and Vigo County, Indiana, being the most southern localities, while Sarnia, Ontario is the most northern point from which it is known.

Specimens Examined: 15; 4 ♂, 11 ♀.
Point Pelee, Ontario, VIII, 8, 1901, (E. M. Walker), 1 ♂, 1 ♀, [A. N. S. P.].
Lake Maxinkuckee, Indiana, VIII, 17, 1893, (W. S. Blatchley), 1 ♂, 2 ♀, [Morse Cln., U. S. N. M. and M. C. Z.]. *Paratypes* of *O. bruneri* Blatchley.

[21] Orthopt. of Indiana, p. 391, (1903).

Vigo County, Indiana, VIII, 17 and 18, IX, 28 and X, 1, 1893, (W. S. Blatchley), 1 ♂, 5 ♀, [Hebard Cln. and U. S. N. M.]. *Paratypes* of *O. bruneri*.
Iowa City, Iowa, (Shimek), 3 ♀, [Hebard Cln.].
Cedar Bluffs, Iowa, 1 ♂, [Hebard Cln.].

Orchelimum bradleyi new species (Figs. 4, 31, 61, 62 and 83.)

1911. *Orchelimum volantum* Rehn and Hebard (not *Orchelimum volantum* McNeill, 1891), Proc. Acad. Nat. Sci. Phila., 1910, p. 595. [Okefenokee Swamp, Georgia.]

1911. *Orchelimum volantum* Sherman and Brimley (not McNeill, 1891), Entom. News, xxii, p. 391. [Wilmington, North Carolina.]

The acquisition of male individuals of this striking species, and the ability to judge the constancy of the ovipositor characters previously pointed out (vide supra), enable us to differentiate the present form from its nearest ally, the interior *volantum*. While the general form is very similar the new species is distinctly the larger, the cephalic and median femora are more distinctly tapering and the caudal femora are slightly more inflated proximad. In the male sex the differential characters are cercal, the new form having the cercus more attenuate distad, mesad more inflated on the dorsal surface and with the median tooth decidedly proximal in position and directed more ventro-proximad. Another cercal feature in the new form is the decided depression at the base of the tooth. In the female sex the ovipositor of *bradleyi* is similar in general character and dorsal curve to that of *volantum*, but it is narrow disto-mesad with the ventral margin regularly and gently arcuate.

Type.—♂; Chase Prairie, Okeefenokee Swamp, Georgia. September 5, 1913. (J. Chester Bradley.) [Acad. Nat. Sci. Phila., Type no. 5242.]

Description of Type.—Size medium; form elongate, slender. Head with the fastigium roundly and appreciably elevated dorsad of the occiput, as in *volantum* regularly rounding, when seen from the lateral aspect, to the interfastigial suture, narrow, ventral portion with the adjacent facial fastigium strongly compressed; eyes subovate in basal outline, moderately prominent when seen from the dorsum; antennae at least two and one-half times as long as the body. Pronotum with the dorsal outline of the metanotum moderately ascending caudad; cephalic margin of the pronotum emarginato-truncate, caudal margin moderately arcuate; prozona slightly more than one and one-half times the length of the metazona, greatest dorsal width of metazona four-fifths the dorsal length of the entire pronotum; lateral lobes of the pronotum with the greatest dorsal length of the lobes subequal to their greatest depth, ventro-cephalic angle obtusely-rounded, ventral margin oblique, straight, ventro-cephalic

angle rotundato-obtuse-angulate, caudal margin arcuate but slightly flattened ventrad, humeral sinus distinct, broad, convex callosity of lateral lobes broad, elliptical. Tegmina nearly one and one-half times as long as the caudal femora, elongate lanceolate, moderately acute; structure of the stridulating field as in *volantum*. Wings surpassing the tegmina by about half the pronotal length. Cerci elongate, robust, distal portion tapering, internal tooth place distinctly proximad of the middle, the tooth depressed, directed ventro-proximad and moderately acute, the distal portion of the tooth alone tapering, the proximal portion subequal in width, dorsal surface of cercal shaft inflated dorso-mesad, this developed proximad into a carinate ridge which curves around the base of the tooth, distal portion of shaft depressed, tapering and with the apex gently incurved; subgenital plate full, lateral margins arcuate, distal margin very shallowly obtuse-angulate emarginate, styles articulate, slender. Cephalic and median femora very appreciable tapering distad; caudal femora considerably inflated proximad, very slender distad, distal portion of ventro-external margins armed with two to three spines.

Allotype.— ♀ ; Same data as the type.

Description of Allotype.—Differing from the description of the male in the following features. Ovipositor very slightly longer than half the caudal femoral length, rather heavy, dorsal margin nearly straight, ventral margin straight proximad, gently arcuate distad, apex very acute, width subequal in proximal five-eighths. Subgenital plate simple, narrowly emarginate disto-mesad.

Paratypic Series.—We have in addition to the type and allotype a paratypic series of four males from the type locality.

Measurements (in millimeters)

	♂ Chase Prairie, Georgia			
	(*Type*)	(*Paratype*)	(*Paratype*)	(*Paratype*)
Length of body	23.2	24	25	23.2
Length of pronotum	4.9	4.8	4.8	5
Length of tegmen	26.8	25.7	26	27.7
Length of wing distad of tegmen	2.7	3	2.8	2.6
Length of caudal femur	20	19.5	19	19.2

	♀ Wilmington, North Carolina	Chase Prairie, Georgia (*Allotype*)	Okeefenokee Swamp, Georgia	Jacksonville, Florida
Length of body	18[22]	23.2	21.5	23.6
Length of pronotum	5.2	5	4.9	5
Length of tegmen	28.9	26	26.1	28.6
Length of wing distad of tegmen	1.6	broken	2.5	2.7
Length of caudal femur	21.2	18.9	20.2	19.2
Length of ovipositor	11.3	10.4	10.7	11.5

[22] Greatly shrivelled.

Color Notes.—General color (in well preserved specimens) light paris green to light oriental green, becoming more biscay green on the caudal limbs. Dorsum of head occasionally, and of pronotum and stridulating field of tegmina always, more or less ochraceous-buff; as far as the present material goes always bearing on the prozona a pair of brownish (russet to bone-brown) lines, which become weakened on the metazona and there diverge; these lines are rarely present on the occiput. Eyes chocolate. Antennae ochraceous-orange, each joint uni-annulate with bone brown. Abdominal appendages of male washed with honey yellow. Ovipositor weakly washed with kaiser brown or unicolorous with the body. Tibial spines black tipped.

Morphological Notes.—The number of spines on the ventro-external margins of the caudal femora varies from one to four.

Biological Notes.—Dr. J. Chester Bradley, in whose honor we have named the species and who collected the typical material, has supplied us with the following notes on the habits of these insects. "In the eastern half of the Okeefenokee Swamp are extensive so-called prairies. These are really inundated plains grown up with sawgrass, maiden-cane, or in places open shallow lakes covered with a multitude of water plants. The natives of the Okeefenokee told us of diving grasshoppers which lived on these prairies, and in making a trip to the Chase Prairies in September 1913, I found these grasshoppers in great abundance in the grasslike plants growing out of the water or growing along the banks of the old canal. As the boat approached them they jumped from the grass into the water, completely disappearing, and so quick were they to do this when alarmed that it was only after some difficulty that we succeeded in catching a series of specimens."

Distribution.—Extending from southeastern North Carolina (Wilmington) south to northern Florida (Jacksonville and Tallahassee), inland as far as the Okeefenokee Swamp, southern Georgia.

Specimens Examined: 10; 6 ♂, 4 ♀.

Wilmington, North Carolina, VIII, 1, 1 ♀, [Davis Cln.].

Okeefenokee Swamp, Georgia, IX, 10, (J. C. Bradley), 1 ♀, [A. N. S. P.].

Chase Prairie, Okeefenokee Swamp, Georgia, IX, 5, 1913, (J. C. Bradley), 5 ♂, 1 ♀, [A. N. S. P., Hebard Cln. and Cornell University]. *Type, allotype* and *paratypes.*

Jacksonville, Florida, (Priddey) 1 ♀, [Hebard Cln.].
Tallahassee, Florida, (T. Glover), 1 ♂, [M. C. Z.].

Orchelimum superbum new species (Figs. 5, 32, 63 and 64.)

1914. *Orchelimum glaberrimum* Fox, (not of Burmeister, 1838), Proc. Acad. Nat. Sci. Phila., 1914, p. 526. (Part.) [Between Winslow and Folsom, New Jersey.]

A very distinct species belonging to the same subgenus as *fraternum* and *unispina*, but also showing tendencies toward *bradleyi*. In the unispinose genicular lobes of the caudal femora it shows affinity to *fraternum* and *unispina*, but the much greater size, form of the stridulating field of the male tegmina and other features remove it from their immediate vicinity. Of the two it is nearer *unispina*, which, however, also differs from *superbum* in having acuminate cerci in the male. It resembles *bradleyi* somewhat in general plan of the stridulating field but the details are quite different and the cerci and lateral lobes of the pronotum as well as the caudal genicular spines are different from those found in *bradleyi*. The female sex is not known.

Type.—♂; Winslow Junction, Camden County, New Jersey. July 8, 1911. (Henry Fox; in bog toward Folsom along Cape May Division of Atl. City R. R.) [Acad. Nat. Sci. Phila., Type no. 5266.]

Description of Type.—Size moderately large; form subcompressed, elongate. Head with the plane of the occiput and fastigium horizontal, the latter well rounded into the outline of the moderately retreating face when viewed from the lateral aspect; fastigium moderately broad, arcuate dorsad in transverse section, cephalic outline blunt arcuate, the lateral margins, when seen from the cephalic aspect, moderately concavo-arcuate convergent ventrad, the ventral point truncate and closely in contact with the fastigium of the face; eyes nearly circular in basal outline, which is fairly flattened cephalad, the depth of the eye but faintly more than half that of the infra-ocular portion of the genae, when viewed from the dorsum the eyes are not prominent and are appreciably flattened; antennae at least twice as long as the body, proximal joint with a very distinct distal rounded lobe on the internal face. Pronotum faintly sellate, the dorsal line, when seen from the lateral aspect, horizontal on the prozona and faintly ascending on the metazona, the greatest dorsal width of disk of pronotum contained one and one-half times in the length of same; cephalic margin of pronotal disk very faintly arcuato-emarginate, caudal margin of pronotal disk regularly arcuate; prozona constituting slightly less than two-thirds the length of the pronotal disk, separated from the metazona by a weakly impressed transverse depression, a weak medio-longitudinal sulcus faintly indicated on the caudal section of the prozona and somewhat more strongly on the metazona; lateral lobes of the pronotum broadly rounding into

the prozonal disk and separated from the dorsal surface by a distinct but rounded shoulder on the metazona, in outline the lobes are as deep as the greatest dorsal length of the same, cephalic margin broadly rounding into the straight and very oblique ventral margin, ventro-caudal angle narrowly rounded acute-angulate, caudal margin extending slightly ventro-cephalad in direction but nearly vertical, straight with a very faint sinuosity, no distinct humeral sinus present, convex callosity elongate, narrow. Tegmina elongate, sublanceolate, surpassing the apex of the abdomen by the combined length of the head and pronotum, distal half of the tegmina appreciably narrower than the proximal portion, apex narrowly rounded; stridulating area shorter than the dorsum of the pronotum, no wider than the same, stridulating vein nearly transverse, strongly thickened toward the humeral trunk, the greatest width of the speculum, *i. e.*, along the stridulating vein, contained nearly one and one-half times in the greatest length of the same. Wings very briefly surpassing the tips of the tegmina. Cerci with the portion proximad of the tooth short and relatively slender, the median portion very robust and inflated, the distal extremity subdepressed, an indication of a carina is present on the dorsal surface proximad of the tooth, the latter internal in position and ventro-cephalic in trend, in length subequal to the section of the cercal shaft proximad of the tooth, tapering, the immediate apex sharply acuminate and uncinate, median inflation of shaft bulbous, apex of shaft very bluntly narrowing, slightly directed inwards, internal margin of that portion faintly arcuato-concave, the plane of depression tilted ventro-laterad; subgenital plate obtuse-angulate emarginate, styles rather short, slightly tapering, ventral surface of plate moderately tricarinate, the median one much stronger than those extending from the style bases. Cephalic and median tibiae each with six pairs of spines. Caudal femora equal to about three-fourths of the tegminal length, considerably inflated proximad but passing evenly and gradually into the slender distal portion, genicular lobes unispinose, ventral margins unarmed; caudal tibiae with margins well spined.

Paratypic Series.—We have selected the type from a series of four males bearing the same data and one male from Sewell, Gloucester County, New Jersey, taken July 10, 1910, by Dr. Henry Fox. The four specimens other than the type we indicate as paratypes.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur
Winslow Junction, New Jersey....*Type*.....	24.6	6	24.4	18
Winslow Junction, New Jersey....*Paratype*.....	24.5	6.1	25.4	18.2
Winslow Junction, New Jersey....*Paratype*.....	23	6	25	17.5
Sewell, New Jersey....*Paratype*.....	19.6	5	22	15.9

Color Notes.—General color ranging from lime green to light cress green, the discoidal and stridulating fields of the tegmina weakly washed with wood brown, the usual longitudinal expanding bar on the dorsum of the head and pronotum hazel to russet on the pronotum, becoming obsolete on the metazona and intensified on the head, the paired bordering lines on the pronotum bone brown, sharply pencilled, moderately broad and slightly converging caudad on the metazona, contrasted laterad by a yellowish wash, the dark lines subobsolete on the head. Tegmina with the veins of the costal section of the marginal field sulphate green, the distal section of the same field toward the humeral trunk, including the mediastine vein, lined in similar fashion with acajou red, area of the humeral trunk weakly lined with buff-yellow. Abdomen with a broad subequal medio-longitudinal bar of claret brown of variable intensity, this bordered laterad by distinct but narrow lines of buff-yellow, these varying in intensity and continuity. Eyes auburn to chestnut. Antennae with the proximal joint of the general color, the remainder washed with auburn to bay, becoming stronger distad. Cerci pale ochraceous-orange, more or less washed distad and mesad with ferruginous. Caudal tibiae washed with russet, the spines black with pale bases.

Distribution.—The species is only known from two localities in or along the western edge of the Pine Barren area of southern New Jersey.

Biological Notes.—All the material known of this species was taken in bogs or reedy swamps. At Sewell, according to information with the specimen taken at that locality, several individuals were heard singing.

Morphological Notes.—The specimens examined are quite uniform in structure, the only variation being in size and this is probably geographic, as those individuals from the type locality are of very similar size, while that from Sewell is distinctly smaller.

Specimens Examined: 5 ♂.

Sewell, New Jersey, VII, 10, 1910, (H. Fox; in reedy swamp), 1 ♂, *paratype*, [A. N. S. P.].

Winslow Junction, New Jersey, VII, 8, 1911, (H. Fox; in bog), 4 ♂, *type* and *paratypes*, [A. N. S. P.].

Orchelimum fraternum new species (Figs. 16, 33, 65 and 66.)

As shown in the key this is a species related to *O. unispina*, differing in the possession of a distinct though shallow humeral sinus to the lateral lobes of the pronotum, in the relatively greater width of the same lateral lobes; in the relatively broader convex callosity of the lobes and in the relatively blunter and less attenuate cerci of the male.

Type.—♂; Guadalajara, State of Jalisco, Mexico. (D. L. Crawford.) [Acad. of Nat. Sci. Phila., Type no. 5269.]

Description of Type.—Size medium; form moderately robust, subcompressed. Head with the line of the occiput and fastigium on a plane with that of the dorsum of the pronotum when seen from the side, the fastigial outline well rounding into the subarcuate and but moderately retreating facial outline; fastigium heavy, when viewed from the dorsum appreciably thicker than the width of the proximal antennal joint, when seen from the facial aspect the lateral margins of the fastigium are strongly arcuato-concave convergent ventrad, rather narrowly in contact with the facial fastigium, the interfastigial suture arcuate, the fastigium of the face narrow; eyes subcircular in basal outline, this flattened cephalad, in depth the eyes are equal to about one and one-half times that of the infra-ocular portion of the genae, when viewed from the dorsum the eyes are but little prominent and somewhat flattened; antennae at least twice as long as the body, proximal joint with a distinct rounded projection distad on the internal margin. Pronotum when seen from the side with the dorsal line nearly straight, very faintly ascending caudad on the metazona, greatest dorsal width (caudad) of pronotal disk contained about one and two-fifths time in the dorsal length, on the prozona the disk rounds laterad into the lateral lobes but is separated on the metazona by distinct though rounded shoulders; cephalic margin of pronotal disk faintly emarginate, caudal margin of pronotal disk arcuate, slightly flattened mesad, prozona nearly twice the length of the metazona, separated by a distinct but not very deep transverse impression, faint indications of a medio-longitudinal sulcus present on the prozona, this being continuous though slight on the metazona; lateral lobes of the pronotum with their greatest dorsal length slightly surpassing the greatest depth of the lobes, cephalic margin of lobes moderately oblique, truncate, passing into the sinuato-truncate ventral margin by a well rounded obtuse angle, ventro-caudal angle narrowly rounded, rectangulate, caudal margin oblique truncate, with a distinct and broad though shallow humeral sinus, convex callosity distinct, elongate elliptical, with its greatest width contained about three times in its length. Tegmina decidedly surpassing the apex of the abdomen and falling short of the apices of the caudal femora by about the same distance, elongate lanceolate, the margins regularly converging in their distal two-thirds, apex acuminate with the extremity very narrowly rounded; stridulating field relatively small, distinctly shorter than the pronotal disk and not quite as wide as the greatest width of the same, stridulating vein nearly straight, slender, subequal in width. Wings slightly surpassing

the tegminal apices. Prosternum bispinose. Cerci acuminate, straight, the section of the shaft proximad of the tooth more slender than the median portion, which is subinflated, tooth placed at about the proximal third on the internal face and directed cephalo-laterad, the tooth being subequal in length to the proximal portion of the shaft, greatly thickened at the base and with a very slender and subspiniform apex, median portion of shaft subequal in width, the distal third tapering with the immediate apex blunt; subgenital plate with the distal margin subtruncate, styles small, slender and tapering, ventral surface of plate with a weak median and much thicker paired lateral carinae. Caudal femora slightly shorter than the body length, slightly surpassing the tips of the wings, strongly inflated in the proximal half and regularly tapering to the slender distal portion, ventral margins unarmed, genicular lobes very briefly and rather bluntly unispinose.

The type specimen is unique.

Measurements of Type (in millimeters).—Length of body, 18.2; length of pronotum, 4.9; length of tegmen, 16.6; length of caudal femur, 16.1.

Color Notes.—General color on the lateral lobes of the pronotum and on the abdomen kildare green, passing into mignonette green on the limbs and chrysolite green on the face and genae, the apex of the abdomen passing into chamois. Dorsum of the fastigium, occiput and dorsum of pronotum snuff brown, becoming tawny-olive on the middle of the pronotal disk, a fine median dividing line of the general color present on the head, while on the pronotum the distinct dark bordering margins of the area and a continuation of the dividing line of the head are seal brown, the lateral bordering sections regularly arcuato-convex and thus converging caudad as well as cephalad. Cerci weakly washed distad with indian red. Dorsal tibial spines black for the greater portion of their length, ventral tibial spines with black less extensive. Eyes vinaceous-tawny. Antennae, except the two proximal joints, ferruginous, sparsely annulate with seal brown.

Distribution.—This species is only known from the type locality in western Mexico-Guadalajara, state of Jalisco.

Remarks.—This species is quite close to *O. unispina* and additional material may show them to be inseparable specifically, but at the present writing we have found no indications elsewhere in the genus, of variation sufficiently decided to cover the differences in the character of the humeral sinus and of the cerci seen in these two forms. There is no alternative to our present course but to arbitrarily consider them to be the same form, which would not be warranted by our knowledge of the general fixity within

the genus, of the features here given as diagnostic of this form. The species is, however, from a locality at which *unispina* also occurs.

Specimens Examined: 1 ♂.

Guadalajara, Jalisco, Mexico, (D. L. Crawford), 1 ♂, *type*, [A. N. S. P.].

Orchelimum unispina (Saussure and Pictet) (Figs. 17, 34, 67 and 68.)

1898. *Xiphidium unispina* Saussure and Pictet, Biol. Cent.-Amer., Orth., i, p. 398. [Jalisco and Orizaba, Mexico.]

This species was originally described as a species of *Xiphidium* (=*Conocephalus* as at present restricted), but it is clearly a member of the genus *Orchelimum*, although belonging to a subgenus which approaches *Conocephalus*. Saussure and Pictet described only the male sex, but by a lapsus calami they give the sex of the measured material as female.

It is evident that this species shows considerable variability in tegminal and wing length, the original material having had the tegmina surpassing the caudal femora and the wings surpassing the tegmina, while the only adult seen by us has the tegmina decidedly failing to reach the tips of the caudal femora and the wings subequal to the tegmina distad.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur
Jalisco or Orizaba, Mexico. (Ex Saussure and Pictet) *Types*	17	4	20	15
Guadalajara, Mexico	18.2	4.5	14	13.7

We have before us a male in the second instar preceding maturity, and this shows that the cerci do not develop their characteristic structure until the last or next to the last ecdysis.

This species is known only from central and south central Mexico, the records being from Orizaba, state of Vera Cruz, and the state of Jalisco, and specifically Guadalajara and Ocotlan in the latter state.

Specimens Examined: 2; 1 ♂, 1 juv. ♂.

Guadalajara, Jalisco, Mexico, (D. L. Crawford), 1 ♂, [A. N. S. P.].

Ocotlan, Jalisco, Mexico, 5000 feet elevation, VIII, 29 to IX, 1, 1906, (P. P. Calvert), 1 juv. ♂, [A. N. S. P.].

EXPLANATION OF PLATES

Plate I

Fig. 1.—*Orchelimum calcaratum.* Lateral outline of *type.* San Antonio, Texas. (× 2)

Fig. 2.—*Orchelimum bullatum.* Lateral outline of *type.* Galveston, Texas. (× 2)

Fig. 3.—*Orchelimum minor.* Lateral outline of male. Stafford's Forge, New Jersey. (× 2)

Fig. 4.—*Orchelimum bradleyi.* Lateral outline of *type.* Chase Prairie, Georgia. (× 2)

Fig. 5.—*Orchelimum superbum.* Lateral outline of *type.* Winslow Junction, New Jersey. (× 2)

Outlines of lateral lobe of pronotum of male. (× 3)

Fig. 6.—*Orchelimum agile.* Tinicum, Pennsylvania.

Fig. 7.—*Orchelimum glaberrimum.* Florence, South Carolina.

Fig. 8.—*Orchelimum vulgare.* Marion, Massachusetts.

Fig. 9.—*Orchelimum gladiator.* West Point, Nebraska.

Fig. 10.—*Orchelimum laticauda.* Washington, D. C.

Fig. 11.—*Orchelimum nigripes.* Victoria, Texas.

Fig. 12.—*Orchelimum concinnum.* Rye Beach, New Hampshire.

Plate II

Outlines of lateral lobe of pronotum of male. (× 3)

Fig. 13.—*Orchelimum fidicinium. Type.* Cedar Keys, Florida.

Fig. 14.—*Orchelimum militare. Type.* Gainesville, Florida.

Fig. 15.—*Orchelimum volantum.* Cedar Bluffs, Nebraska.

Fig. 16.—*Orchelimum fraternum. Type.* Guadalajara, Mexico.

Fig. 17.—*Orchelimum unispina.* Lateral outline of male. Guadalajara, Mexico. (× 2)

Outlines of stridulating field of male. (× 3)

Fig. 18.—*Orchelimum agile.* Tinicum, Pennsylvania.

Fig. 19.—*Orchelimum glaberrimum.* Florence, South Carolina.

Fig. 20.—*Orchelimum vulgare.* Marion, Massachusetts.

Fig. 21.—*Orchelimum gladiator.* West Point, Nebraska.

Fig. 22.—*Orchelimum calcaratum. Type.* San Antonio, Texas.

Fig. 23.—*Orchelimum bullatum. Type.* Galveston, Texas.

Fig. 24.—*Orchelimum laticauda.* Washington, D. C.

Fig. 25.—*Orchelimum nigripes.* Victoria, Texas.

Fig. 26.—*Orchelimum minor.* Stafford's Forge, New Jersey.

Fig. 27.—*Orchelimum concinnum.* Rye Beach, New Hampshire.

Fig. 28.—*Orchelimum fidicinium. Type.* Cedar Keys, Florida.

Fig. 29.—*Orchelimum militare. Type.* Gainesville, Florida.

Fig. 30.—*Orchelimum volantum.* Cedar Bluffs, Nebraska.

Fig. 31.—*Orchelimum bradleyi. Type.* Chase Prairie, Georgia.

Fig. 32.—*Orchelimum superbum. Type.* Winslow Junction, New Jersey.

Fig. 33.—*Orchelimum fraternum. Type.* Guadalajara, Mexico.

Fig. 34.—*Orchelimum unispina.* Guadalajara, Mexico.

Plate III

Dorsal (first) and lateral (second) outlines of left cercus of male. (× 10)

Figs. 35 and 36.—*Orchelimum agile.* Tinicum, Pennsylvania.
Figs. 37 and 38.—*Orchelimum glaberrimum.* Florence, South Carolina.
Figs. 39 and 40.—*Orchelimum vulgare.* Marion, Massachusetts.
Figs. 41 and 42.—*Orchelimum gladiator.* West Point, Nebraska.
Figs. 43 and 44.—*Orchelimum calcaratum. Type.* San Antonio, Texas.
Figs. 45 and 46.—*Orchelimum bullatum. Type.* Galveston, Texas.
Figs. 47 and 48.—*Orchelimum laticauda.* Washington, D. C.
Figs. 49 and 50.—*Orchelimum nigripes.* Victoria, Texas.
Figs. 51 and 52.—*Orchelimum minor.* Stafford's Forge, New Jersey.
Figs. 53 and 54.—*Orchelimum concinnum.* Rye Beach, New Hampshire.
Figs. 55 and 56.—*Orchelimum fidicinium. Type.* Cedar Keys, Florida.
Figs. 57 and 58. *Orchelimum militare. Type.* Gainesville, Florida.

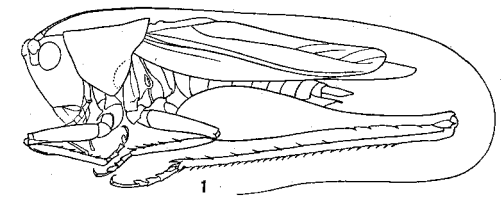
Plate IV

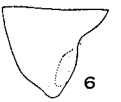
Dorsal (first) and lateral (second) outlines of left cercus of male. (× 10)

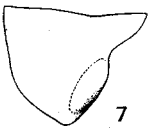
Figs. 59 and 60.—*Orchelimum volantum.* Cedar Bluffs, Nebraska.
Figs. 61 and 62.—*Orchelimum bradleyi. Type.* Chase Prairie, Georgia.
Figs. 63 and 64.—*Orchelimum superbum. Type.* Winslow Junction, New Jersey.
Figs. 65 and 66.—*Orchelimum fraternum. Type.* Guadalajara, Mexico.
Figs. 67 and 68.—*Orchelimum unispina.* Guadalajara, Mexico.

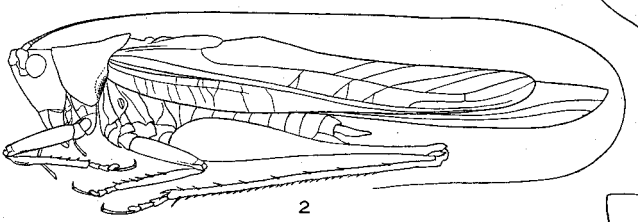
Outlines of ovipositor of female. (× 2)

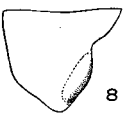
Fig. 69.—*Orchelimum agile.* Tinicum, Pennsylvania.
Fig. 70.—*Orchelimum glaberrimum.* Florence, South Carolina.
Fig. 71.—*Orchelimum vulgare.* Marion, Massachusetts.
Fig. 72.—*Orchelimum gladiator. Type.* West Point, Nebraska.
Fig. 73.—*Orchelimum calcaratum. Allotype.* San Antonio, Texas.
Fig. 74.—*Orchelimum bullatum. Allotype.* Rosenberg, Texas.
Fig. 75.—*Orchelimum laticauda.* Tinicum, Pennsylvania.
Fig. 76.—*Orchelimum nigripes.* Lincoln, Nebraska.
Fig. 77.—*Orchelimum minor. Type.* District of Columbia.
Fig. 78.—*Orchelimum concinnum.* Rye Beach, New Hampshire.
Fig. 79.—*Orchelimum concinnum.* Lincoln, Nebraska.
Fig. 80.—*Orchelimum fidicinium. Allotype.* Cedar Keys, Florida.
Fig. 81.—*Orchelimum militare. Allotype.* Gainesville, Florida.
Fig. 82.—*Orchelimum volantum.* Vigo County, Indiana.
Fig. 83.—*Orchelimum bradleyi. Allotype.* Chase Prairie, Georgia.

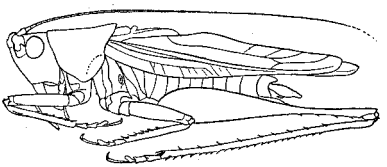


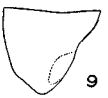


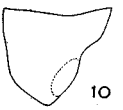


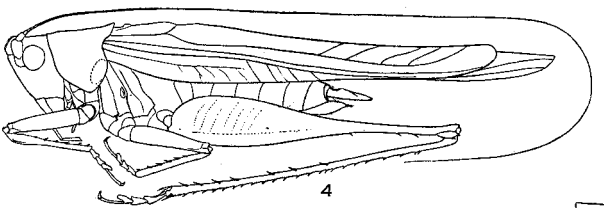


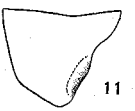


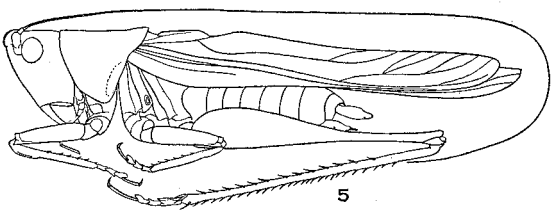


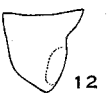




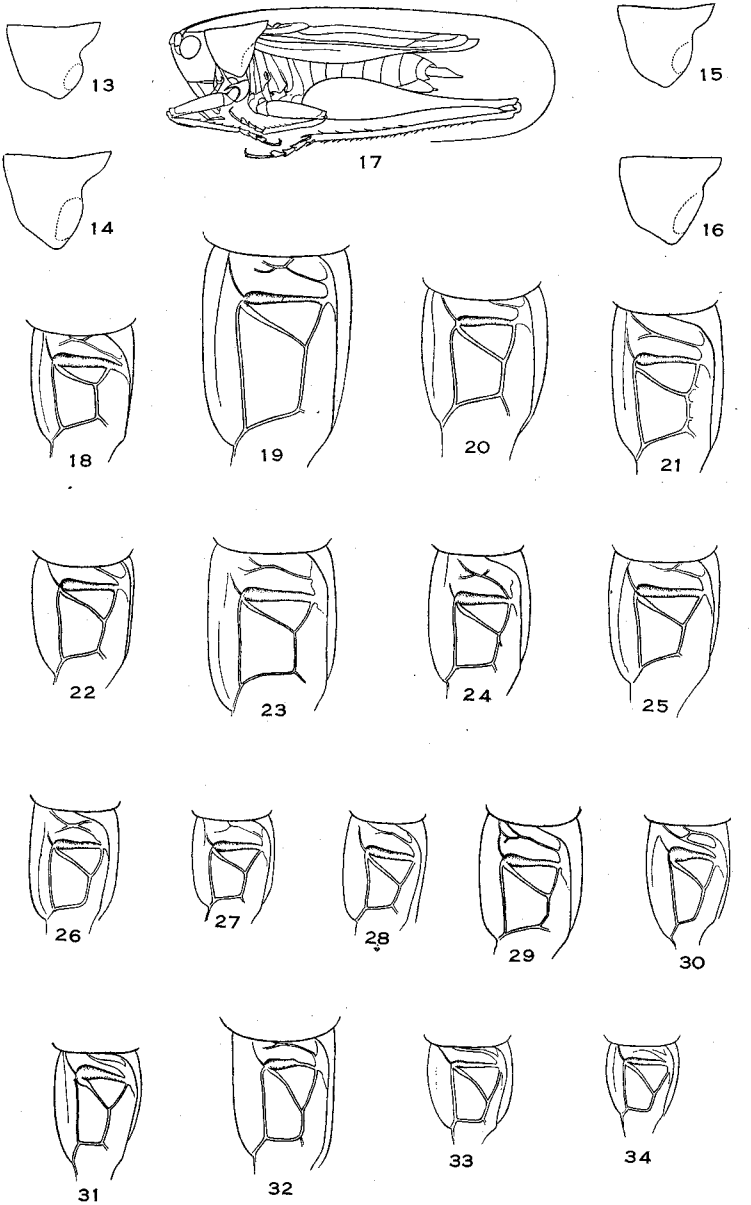








REHN AND HEBARD—AMERICAN TETTIGONIIDAE



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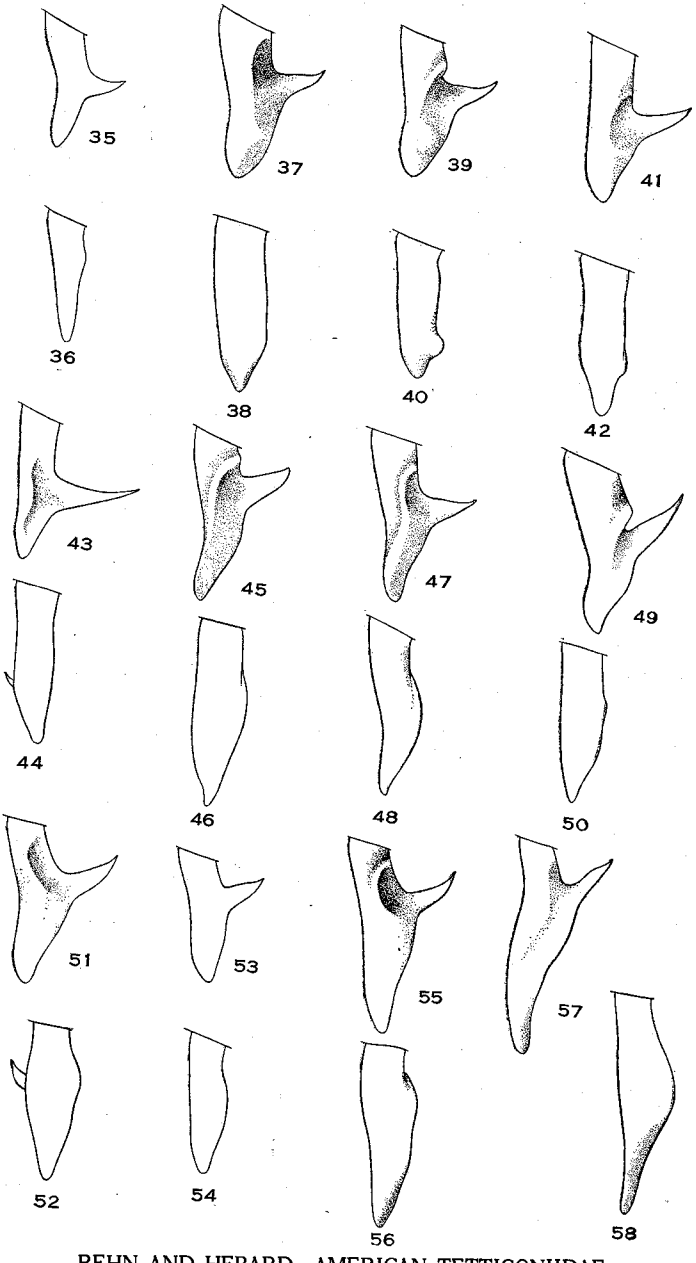

REHN AND HEBARD—AMERICAN TETTIGONIIDAE


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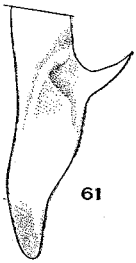
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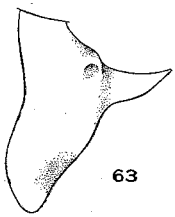
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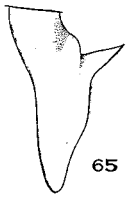
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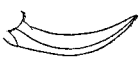
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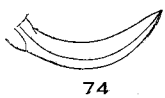
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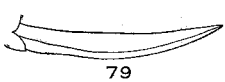
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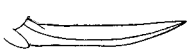
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REHN AND HEBARD—AMERICAN TETTIGONIIDAE