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A Revision of the Species of the Genus Nemobius (Orthoptera: Gryllidæ) found in North America north of the Isthmus of Panama.

BY

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From the Proceedings of The Academy of Natural Sciences of Philadelphia, June, 1913.

Issued August 19, 1913.

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A REVISION OF THE SPECIES OF THE GENUS NEMOBIUS (ORTHOPTERA: GRYLLIDÆ) FOUND IN NORTH AMERICA NORTH OF THE ISTHMUS OF PANAMA.

BY MORGAN HEBARD.

The genus *Nemobius* is typical of the group Nemobiites, the other genera of which are more or less aberrant. The group Nemobiites stands at the head of the subfamily Gryllinæ, which is the second division of the family Gryllidæ.

All of the species of *Nemobius* are of small size and are rather delicate in structure; their bodies are covered with long hairs. The plasticity in certain species, the lack of characters in the male genitalia and the great variability in size, wing length, and coloration, all combine to make the study of the genus difficult. Added to this, the many incorrect determinations and frequent synonyms have caused the task of correcting the nomenclature to be unusually complex. An effort is made in the present paper to afford sufficient information for subsequent workers to be able satisfactorily to determine material of either sex, but it is certain that, especially in the males of some species, no single specific character can be considered absolutely trustworthy, and careful consideration of all the specific differences must be made before a safe conclusion can be reached. The large series of different species before us show conclusively that, where some character may be safely relied upon in a large series of the same species from one region, that character is often obscure or unreliable in series from other portions of the insects range and in consequence can only be used to supplement the combination of characters found in that species.

Genus **NEMOBIUS** Serville.

1839. *Nemobius* Serville, Hist. Nat. Ins., Orth., p. 345. [Generic description.]
1869. *Argizala* Walker, Cat. Dermap. Saltat. Br. Mus., I, p. 60. [Generic description.]
1874. *Nemobius* Saussure, Miss. Sci. Mex., Rech. Zool., VI, p. 380. [Key to American species and descriptions of new species.]
1877. *Nemobius* Saussure, Mélang. Orth., II, Fasc. V, p. 236. [Full generic description, key to species of the world and many descriptions of new species.]

1896. *Nemobius* Scudder, Jour. N. Y. Ent. Soc., IV, p. 99. [Key to North American species and descriptions of new species.]
1896. *Nemobius* Pantel, Anal. Soc. Espan. Hist. Nat., XXV, p. 47. [Morphological studies.]
1896. *Nemobius* Scudder, Psyche, VII, p. 431. [Key to North American species and descriptions of new species.]
1897. *Nemobius* Saussure, Biol. Cent. Amer., Orth., I, p. 221. [Key to Central American species and descriptions of new species.]
1900. *Nemobius* Blatchley, Psyche, IX, p. 51. [The Indiana species with descriptions of new species.]
1903. *Nemobius* Blatchley, Orth. of Indiana, p. 419. [Numerous notes and description of one new species.]
1904. *Nemobius* E. M. Walker, Can. Ent., XXXVI, p. 181. [Numerous notes and descriptions of new species.]
1906. *Nemobius* Kirby, Synon. Catal. Orth., II, p. 13. [List of species.]

The genus included two species. GENOTYPE—*Nemobius* (*Nemobius*) *sylvestris* [*Acheta sylvestris*] (Bosc), selected by Kirby, 1906.

Generic Description.—Size small; form compact; body pubescent and sparsely clothed with long chætiform hairs. Head rounded, a little flattened in front; interantennal protuberance feeble, obtuse and rather large; eyes oval, rather protuberant; maxillary palpi with distal extremity of terminal joint very moderately oblique. Pronotum a little wider cephalad than the head; lateral lobes with ventral margin horizontal, the ventro-cephalic and ventro-caudal angles projecting about the same and similarly rounded. Tegmina complete or abbreviate; in the male furnished with a rather simple tambourine, having only a single ulnar (oblique) vein which is longitudinal, lengthened, developing from the angle of the stridulating (anal) vein; in the female the dorsal field is furnished with few but prominent longitudinal veins connected by transverse veinlets which are directed at right angles to the veins; the tegmina are always present in the North American species and are rounded at the apex; lateral field of tegmina occupied by five or six simple veins which are free from their bases. Wings strongly developed, abbreviate or absent. Ovipositor slender, long and straight, or shorter and very gently arcuate; apex very little enlarged, in all of the North American species the portion formed by the dorsal valves is armed with serrations or serrulations, the portion formed by the ventral valves is unarmed or supplied with minute, very widely spaced serrulations. Cerci of both sexes moderately long, tapering, and covered with hairs. Cephalic tibiæ supplied with a few long slender hairs, caudal face only bearing a distinct tympanum, corresponding portion of cephalic face slightly swollen. Caudal femora greatly dilated; caudal tibiæ with dorsal margin armed with a double row of extremely long, widely spaced, mobile spines (in the North American species,

four pairs are present on each tibia), and armed distad with three pairs of well developed spurs, the dorso-internal longer than any of the other distal spurs. Caudal metatarsus non-sulcate and unarmed dorsad, the distal extremity armed on both sides with long spines, of which the internal is much the longer, and above these are situated two minute teeth.

Morphological Notes.—In the present genus the spines and spurs of the caudal tibiæ are extremely interesting.

In the study of the North American species Mr. A. N. Caudell first pointed out to the author a character in the distal spurs of the caudal tibiæ which proves to be absolutely constant and of the greatest value. In four groups of North American species the internal disto-ventral spur is much longer than the external disto-ventral spur, in the remaining group these spurs are exactly equal in length.

In the males of all of the North American species the proximo-internal spine of the caudal tibia is highly specialized in structure. It differs from the other spines in being very short, large at the base, irregularly conical, suddenly attenuate and soft to the immediate apex which is sharply pointed. The enlarged base is hard, of dark color and polished, the soft portion is light in color and somewhat translucent, while the immediate apex is hard and rather dark in color. Frequently the hard apex is missing, and in such cases there is every indication that it has been broken off. Pantel[1] has carefully discussed this peculiar specialization in his interesting morphological studies in the present genus, and it has been casually noted in certain species by other authors.[2]

We find other interesting characters in the spines of the caudal tibiæ of the North American species of the genus. In all of the species having the disto-ventral spurs unequal in length the spines (with the exception of the proximo-internal spine in the males, which we have discussed above) are above rounded and hairy, below concave with the margins of this sulcation minutely serrulate. In all of the species having the disto-ventral spurs equal in length, the disto-internal spine in the males is somewhat swollen near its base and its shaft is appreciably bent; the other spines (likewise with the exception of the proximo-internal spine in the males) are above rounded and hairy, below concave, but with the margins of this sulcation smooth. The apices of all of the spurs and spines of the

[1] *Anal. Soc. Esp. Hist. Nat.*, XXV, p. 47, 1896.

[2] Saussure, *Mélang. Orth.*, II, Fasc. V, p. 267, pl. 11, fig. VII, 6i, 1877. Brunner, *Prodr. Europ. Orth.*, p. 424, 1882.

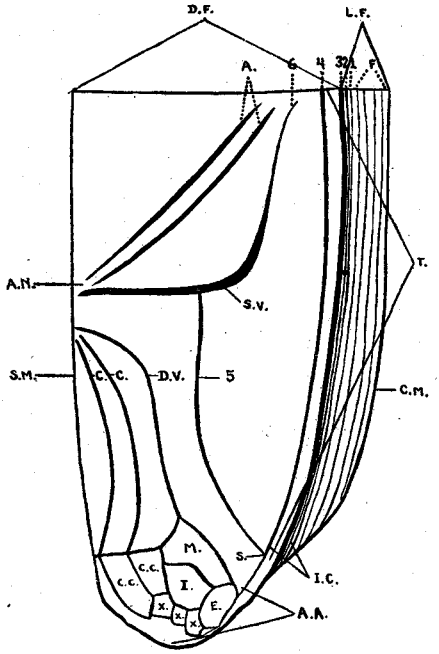

Fig. 1.

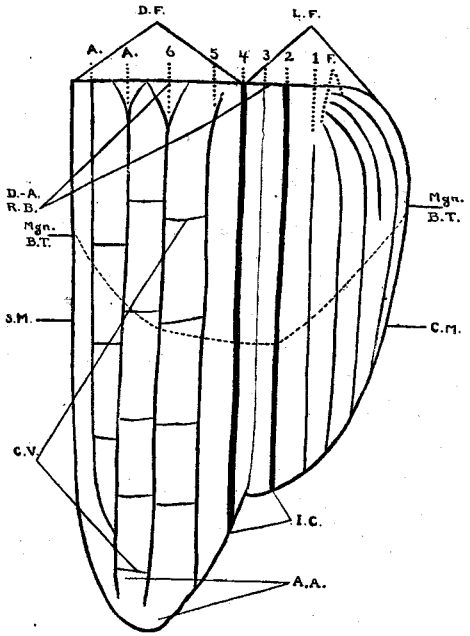

Fig. 2.

Diagrammatic sketches of venation of male (Fig. 1) and female (Fig. 2) tegmina of *Nemobius*.

1.....Mediastine Vein (Saussure and Brunner).
2.....Humeral Vein (Saussure) = Anterior Radial Vein (Brunner).
3.....Discoidal Vein (Saussure) = Posterior Radial Vein (Brunner).
4.....Median Vein = False Discoidal Vein (Saussure) = Ramus of Posterior Radial Vein (Brunner).
5.....Ulnar Vein = Oblique Vein (Saussure) = Anterior Ulnar Vein (Brunner).
6.....Anal Vein (Saussure) = Posterior Ulnar Vein (Brunner).
A.....Axillary Veins.
S. V.....Stridulating Vein.
C.....Cordes or Postaxillary Veins.
D. V.....Diagonal Vein.
F.....Free Veins of Lateral Field.
D.-A. R. B....Discoido-anal Root-basin.
C. V.....Cross-veinlets.
L. F.....Lateral Field.
D. F.....Dorsal Field (which includes Apical Area).
I. C.....Intermediate Channel.
T.....Tambourine.
A. N.....Anal Node, Musical Node, Node.
A. A.....Apical or Distal Area.
S. M.....Sutural Margin.
C. M.....Costal Margin.
Mgn. B. T....Approximate margin of Tegmina in brachypterous forms.
M.....Speculum or Mirror.
CC.....Cells formed by Cordes.
I.....Interior Cell of Speculum.
E.....Exterior Cell of Speculum.
X.....Cells of Apical Area.
S.....Stigma.

caudal tibiæ are uncinate; smooth, sharp, and hard. Pantel has also discussed the peculiarities of the distal (or fourth) internal spine of the caudal tibia in his paper, where he has also given an excellent figure of the spines and spurs of the caudal tibia in the male and female of *Nemobius lineolatus* Brullé.

In the species having the disto-ventral spurs equal in length, the internal dorsal and median spurs have lateral fringes of hairs on these spurs more prominent and regular than in the other species.

Comparison with Other Genera.—When compared with the genus to which it is most nearly related, *Paranemobius* Saussure, we find that *Nemobius* can be easily separated by the following characters: the lateral lobes of the pronotum are quadrate, not oblique; the tegmina of the male are provided with a tympanum; the vertex is slightly convex, not excavate and rostrate; the caudal tibiæ are each armed with six, not five, distal spurs. The genus of next nearest relationship is *Caconemobius* Kirby, which differs in the lateral lobes of the pronotum which are not quadrate, the organs of flight which are absent and the cephalic tibiæ which have no tympanum. From the other more nearly related genera, *Nemobius* may be readily separated by the characters found in the caudal tibiæ which are armed with long, mobile, pilose spines and in the caudal metatarsi which are neither sulcate nor serrate dorsad.

Distribution of the Genus in North America.—The northern boundary of the range of the genus is known to extend from Prince Edward Island westward across Canada to Calgary, Alberta; from the latter locality it has been found southward in the Yellowstone National Park and the Salt Lake Valley in Utah, these localities showing its extreme western distribution until southern Utah is reached, in which latitude it has been taken at St. George, Utah, Las Vegas, Nev., and the Panamint Valley in California to the Pacific coast at Los Angeles. The genus is apparently found everywhere else in the United States and Mexico south to the Isthmus of Panama, although the very few records from southern Mexico, Nicaragua, and Costa Rica may possibly indicate that in these southern regions the genus is very scarce. In the West Indies the genus has been taken in the Bahamas, Cuba, and Granada.

We consider the northern distribution of the genus in the Dominion of Canada probably limited by the spruce belt only, but so little work has been done so far north that nothing definite can at present be stated. No specimens have been taken in Arkansas, Oklahoma,

and on the majority of the West Indian islands, but careful work will show that the genus is well distributed in these regions with scarcely any doubt. No material is known from Yucatan, Honduras, Salvador and Panama, where the genus will almost certainly be found, though very possibly in few numbers.

History.—The important references to the genus which apply to the North American species have already been given.

Walker described the genus *Argizala* in 1869,[3] which genus is monotypic and was synonymized by Saussure in 1877[4] under *Nemobius*. We consider *Argizala* to be a valid subgenus, distinguished from the subgenus *Allonemobius* by the very large size, peculiar glossiness, much more transverse pronotum, longer spines of the caudal tibia and ovipositor with apex armed above with serrulations. This subgenus will probably be found to belong chiefly to the South American fauna when the species of the present genus from that continent have been carefully studied. *Nemobius brasiliensis*, the genotype, is the only species of this subgenus known from North America.

The following North American species have been wrongly referred to the genus *Nemobius*.

In 1842, De Haan in Temminck[5] recorded two species of the genus *Anaxipha* as *Gryllus* (*Nemobius*) *pulicarius* and *pumilus;* this caused Walker to refer the first of these species with a query to *Nemobius* in 1869.[6]

Scudder described *Nemobius circumcinctus* in 1868,[7] which name was used by Walker,[8] Thomas,[9] and Saussure[10] until 1896, when the species was correctly synonymized as *Prothacustes mexicana* Saussure by the original author of the synonym.[11]

In 1896,[12] Scudder described two species of Gryllidæ as *Nemobius distinguendus* and *ensifer*, and later in the same year[13] two more species as *Nemobius pictus* and *delicatus*. All four of these species unquestionably belong to the genus *Miogryllus*, as our examination of the types show. Saussure in the next year[14] followed Scudder

[3] *Cat. Dermap. Saltat. Br. Mus.*, I, p. 60.
[4] *Mélang. Orth.*, II, pp. 241, 255, 256.
[5] *Verhand. Natuur. Gesch. Nederl. Overz. Bezitt.*, Orth., p. 226.
[6] *Cat. Dermap. Saltat. Br. Mus.*, I, p. 111.
[7] *Proc. Bost. Soc. Nat. Hist.*, XII, p. 143.
[8] 1869. *Cat. Dermap. Saltat. Br. Mus.*, I, p. 57.
[9] 1870. *Am. Ent.*, II, p. 206.
[10] 1874. *Miss. Sci. Mex.*, Rech. Zool., VI, p. 385.
[11] *Jour. N. Y. Ent. Soc.*, IV, p. 99.
[12] *Jour. N. Y. Ent. Soc.*, IV, pp. 100, 101.
[13] *Psyche*, VII, pp. 431, 433, 434.
[14] *Biol. Cent. Amer.*, Orth., I, pp. 222, 224.

when quoting the latter's records of *distinguendus* and *ensifer*. In 1906,[15] Kirby followed Scudder in quoting *pictus* as a *Nemobius*, but two years later Rehn and Hebard[16] correctly quoted the species for the first time as a *Miogryllus*.

Kirby also gives *Nemobius exiguus* Say in his list,[17] though that species has long been known to belong to the genus *Anaxipha*.

Examination of the types shows that *Nemobius alleni* Morse,[18] belongs to a different genus.

An exotic species has been recorded as a North American species but once. In 1906, Caudell[19] recorded as *Nemobius fasciatus* from Sapucay, Paraguay, specimens of the South American species *Nemobius rufus*.

The following records cannot be determined without examination of the material.

Theresa of Bavaria's[20] record of *Nemobius exiguus* from Brazo de Loba, Lower Magdalena River, Colombia, South America, and Woodworth's[21] records of *Nemobius mexicanus* and *neomexicanus* from California.

We have omitted *Nemobius trinitatis* Scudder, owing to the fact that until additional material from Trinidad is secured little definite can be said of this insect. The type series is in bad condition, and we feel justified in stating only that the specimens belong to the subgenus *Eunemobius* and may prove to be an insular race of *Nemobius carolinus*. Though the type series are all from the South American fauna, the specimens recorded by Brunner[22] as *Nemobius cubensis* from Balthazar, Granada, have been examined and found to belong probably to this insect.

MATERIAL EXAMINED.—2,088 specimens: 890 males, 1,144 females and 54 nymphs.

In the preparation of the present work the types of the following species have been before us:—

(*Nemobius utahensis* Scudder, synonym of *Nemobius fasciatus* (De Geer).)
Nemobius fasciatus socius Scudder.
(*Nemobius canus* Scudder, synonym of *Nemobius fasciatus socius* Scudder.)
(*Nemobius aterrimus* Scudder, synonym of *Nemobius fasciatus socius* Scudder.)

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[15] *Synon. Catal. Orth.*, II, p. 17.
[16] *Proc. Acad. Nat. Sci. Phila.*, 1908, p. 401.
[17] 1906. *Synon. Catal. Orth.*, II, p. 19.
[18] 1905. *Psyche*, XII, pp. 21, 22.
[19] *Proc. U. S. Nat. Mus.*, XXX, p. 243.
[20] 1900. *Berl. Ent. Zeitschr.*, XIV, p. 258.
[21] 1902. *Univ. Cal. Agr. Exp. Sta. Bull.*, p. 142, fig. 7a.
[22] 1893. *Proc. Zool. Soc. London*, 1893, p. 609.

(*Nemobius hastatus* Saussure, synonym of *Nemobius fasciatus socius* Scudder.)
Nemobius fasciatus abortivus Caudell.
Nemobius maculatus Blatchley.
Nemobius griseus E. M. Walker.
Nemobius griseus funeralis Hart.
Nemobius ambitiosus Scudder.
Nemobius brasiliensis (F. Walker).
(*Nemobius melleus* Scudder, synonym of *Nemobius brasiliensis* F. Walker.)
Nemobius panteli n. sp.
Nemobius bruneri n. sp.
(*Nemobius volaticus* Scudder, synonym of *Nemobius cubensis* Saussure.)
Nemobius cubensis mormonius Scudder.
(*Nemobius comanchus* Saussure, synonym of *Nemobius cubensis mormonius* Scudder.)
Nemobius palustris Blatchley.
Nemobius palustris aurantius Rehn and Hebard.
Nemobius carolinus Scudder.
(*Nemobius angusticollis* E. M. Walker, synonym of *Nemobius carolinus* Scudder.)
Nemobius carolinus brevicaudus Bruner.
Nemobius carolinus neomexicanus Scudder.
Nemobius confusus Blatchley.

A large portion of the material is located in the author's collection, that of the Academy of Natural Sciences of Philadelphia and the Hebard Collection ex Bruner. We are deeply indebted to Mr. W. S. Blatchley, Dr. E. M. Walker, and Mr. Charles A. Hart for the loan of their types of the genus; to Dr. Samuel Henshaw, for the privilege of studying all of the types and other material in the Scudder Collection and to Mr. A. N. Caudell, for the opportunity of studying the types of *Nemobius* in the National Museum and the loan of that institution's entire collection of *Nemobius* with the exception of the types. Mr. W. T. Davis, Messrs. Sherman and Brimley, Professor A. P. Morse, Mr. J. Chester Bradley, Mr. Charles Schaeffer of the Museum of the Brooklyn Institute of Arts and Sciences, and Mr. Lutz of the American Museum of Natural History, have also been very kind and have aided us greatly in sending their collections of *Nemobius* for examination.

KEY OF THE NORTH AMERICAN SPECIES OF THE GENUS NEMOBIUS.

A.—Disto-ventral spurs of caudal tibia unequal in length. All spines of caudal tibia (excepting in the male the proximo-internal spine) concave below with margins of this sulcation minutely serrulate, the disto-internal spine not specialized. Ovipositor with ventral margin of apex unarmed.

B.—Ovipositor nearly rigidly straight; nearly as long as or longer than the caudal femur (excepting in the geographic races *Nemobius fasciatus socius* and *Nemobius griseus funeralis* and in the species *Nemobius panteli*).

C.—Ovipositor with dorsal margin of apex obliquely subtruncate, armed with teeth.....(Subgenus *Allonemobius*).

D.—Ovipositor with dorsal margin of apex armed with not very sharp teeth.

E.—Ovipositor distinctly longer than caudal femur (in occasional specimens this character does not hold).

F.—Size large to small for genus. Apex of ovipositor narrowly sublanceolate, enlarged portion longer. Coloration rusty black to dusky brown, rather immaculate, occiput obscurely striped..... *fasciatus* (De Geer).

FF.—Size medium to small for the genus. Apex of ovipositor sublanceolate, enlarged portion shorter. Coloration very dark, occipital stripes indistinguishable.....*fasciatus abortivus* Caudell.

EE.—Ovipositor as long as or shorter than caudal femur, (in occasional specimens this character does not hold). Coloration as in *fasciatus*..... *fasciatus socius* Scudder.

DD.—Ovipositor with dorsal margin of apex armed with very sharp teeth.

E.—Size medium, form robust. Ovipositor as long as caudal femur, this length constant.

F.—Ovipositor with rather heavy sublanceolate apex armed with rather heavy teeth. Coloration dark brown maculate with piceous, pale yellowish line about eyes excepting on infra-ocular portion of the genæ, no other striking markings on head..... *maculatus* Blatchley.

FF.—Ovipositor with similar but somewhat shorter apex armed with somewhat heavier serrations. Coloration dark brown, somewhat maculate with a darker shade, head very strikingly and characteristically marked.....*ambitiosus* Scudder.

EE.—Size somewhat smaller, form more slender. Ovipositor extremely variable in length. (Coloration of head below antennæ strikingly piceous, occiput obscurely striped.)

F.—Ovipositor usually much longer than caudal femur. Coloration light to dark brown with a grayish suffusion.....*griseus* E. M. Walker.

FF.—Ovipositor shorter than caudal femur. Coloration very dark brown with a grayish suffusion..... *griseus funeralis* Hart.

CC.—Ovipositor with dorsal margin of apex straight, armed with closely spaced serrulations.

D.—Pronotum with length considerably more than half the width. Ovipositor considerably shorter than caudal

femur. Size large, form compact. Coloration very dark brown, not iridescent.....
(Subgenus *Brachynemobius*)
panteli n. sp.

DD.—Pronotum with length approximately half the width. Ovipositor nearly as long as caudal femur. Size very large, form more graceful. Coloration very pale, cream buff to tawny olive, moderately iridescent.....
(Subgenus *Arigizala*)
brasiliensis F. Walker.

BB.—Ovipositor gently curved; about two-thirds as long as caudal femur.....(Subgenus *Neonemobius*).

C.—Ovipositor more decidedly curved, dorsal margin of apex armed with serrations. Form robust.

D.—Size large. Ovipositor heavier and very decidedly curved for the genus; apex armed with blunt serrations. Coloration chestnut, decidedly marked with very dark brown.....*toltecus* Saussure.

DD.—Size medium. Ovipositor less heavy and not as decidedly curved; apex armed with very sharp serrations. Coloration clay color, mottled and flecked with dark brown.....*bruneri* n. sp.

CC.—Ovipositor very gently curved, dorsal margin of apex armed with very fine serrulations. Form not so robust.

D.—Size small. Coloration not solid.

E.—Form quite slender. Coloration dark brown, very little mottled, without occipital darker line.....
cubensis Saussure.

EE.—Form not as slender. Coloration usually not as dark brown, frequently very much paler; more mottled and with an occipital darker line.....
cubensis mormonius Scudder.

DD.—Size very small. Coloration solid.

E.—Coloration of head, pronotum and limbs solid vandyke brown; tegmina and dorsal surface of abdomen dark clove brown.....*palustris* Blatchley.

EE.—Coloration of head, pronotum and limbs almost uniform ochraceous; tegmina and dorsal surface of abdomen black..... *palustris aurantius* Rehn and Hebard.

AA.—Disto-ventral spurs of caudal tibia equal in length. Disto-internal spine of caudal tibia specialized (in male only), all other spines (excepting in the male the proximal internal spine) concave below with margins of this sulcation smooth. Ovipositor with ventral margin of apex armed with minute, widely spaced serrulations.....(Subgenus *Eunemobius*.)

B.—Size medium. Maxillary palpi not immaculate, rather yellowish with tip of terminal segment darkened. Coloration rather pale brown, dorsal surface of female abdomen

with three rows of paler spots. Apex of ovipositor sublanceolate, armament of same heavy.

C.—Form rather stout.

D.—Coloration dark mummy brown, spots of dorsal surface of female abdomen moderate in size. Ovipositor more than half as long as caudal femur.....*carolinus* Scudder.

DD.—Coloration wood brown, spots of dorsal surface of female abdomen extremely large. Ovipositor less than half as long as caudal femur.....*carolinus brevicaudus* Bruner.

CC.—Form somewhat more slender. (Coloration usually considerably paler than in carolinus).....*carolinus neomexicanus* Scudd.

BB.—Size small. Maxillary palpi immaculate bone white. Coloration solid, very dark brown, dorsal surface of female abdomen immaculate. Apex of ovipositor lanceolate, armament of same very heavy.....*confusus* Blatchley.

The present key is of necessity somewhat involved owing to the difficulties found in the present genus and commented upon at the beginning of this paper.

In some species it may be seen that certain characters, which are of little or no value in the majority of species, are of great importance. The color pattern of the head is distinctive in *Nemobius maculatus, ambitiosus, griseus* and *griseus funeralis.* The coloration of the maxillary palpi is distinctive in *Nemobius carolinus* and its races and particularly so in *confusus.*

Certain important differences exist in the North American species of the genus which are of sufficient value to warrant the erection of four subgenera and the recognition of Walker's *Argizala* as another subgenus. A study of all the species of *Nemobius* of the world would probably show the advisability of considering some of these groups separate genera, while many other groups not found in North America would constitute still other genera and subgenera.

The genotype of *Nemobius* is *Nemobius sylvestris* of Europe, which species belongs to a group differing very widely from any of those here treated in the following combination of characters. Spines of caudal tibia unmodified in both sexes, disto-ventral spurs of same unequal, but not nearly as much so as in the North American species having this character. Ovipositor longer than caudal femur, nearly rigidly straight; apex very narrowly sublanceolate and wholly unarmed. Color pattern of head distinctive. *Nemobius sylvestris* bears a superficial resemblance to *Nemobius ambitiosus.*

Examination of other exotic species shows that the genus *Nemobius*

is divided into numerous natural groups everywhere in its distribution as in North America.

A number of species treated in the present paper are found in both brachypterous and macropterous forms, while others are known from brachypterous or macropterous individuals only. These facts have been treated under the Biological Notes for each species, as habit and environment appear to have been chiefly instrumental in such development. These differences are almost wholly without value as specific characters, and, since they have been frequently so used, have given rise to much confusion in the past literature.

Subgenus ALLONEMOBIUS n. subgen.

The subgenus includes four species and three geographic races from North America. TYPE of Subgenus—*Nemobius fasciatus* [*Gryllus fasciatus*] (De Geer).

Subgeneric Description.—Size large to small for the genus. Disto-ventral spurs of caudal tibia very unequal in length. Proximo-internal spine of caudal tibia in male specialized as described under Morphological Notes for the genus; other spines of caudal tibia below concave, with margins of this sulcation minutely serrulate in both sexes, the disto-internal spine not specialized. Ovipositor long and nearly rigidly straight; apex with margin of portion formed by dorsal valves obliquely subtruncate and armed with teeth, the portion formed by ventral valves unarmed.

Nemobius fasciatus (DeGeer).

1773. *Gryllus fasciatus* De Geer, Mem. l'Hist. Ins., III, p. 522, Pl. 43, fig. 5. (Original description.) [Pennsylvania.]
1775. *A[cheta] hospes* Fabricius, Syst. Ent., p. 281. (Description.) [America.]
1791. *Gryllus hospes* Olivier, Encycl. Meth., VI, p. 636. (First use of name.)
1835. *Acheta servilis* Harris, Hitch., Rept. Geol. Mass., 2d ed., p. 576. [Massachusetts.]
1841. *Acheta vittata* Harris, Ins. Inj. Veget., 1st ed., p. 123. (Description.) [Massachusetts.]
"1847. [23]*Acheta vittata* Fitch, Am. Jour. Agr. Sci., VI, p. 146. [New York.]"
1854. *Acheta vittata* Jaeger, No. Am. Ins., 1st ed., p. 160. [Brief notes on habits.]
1861. *Nemobius vittatus* Packard, Rept. Nat. Hist. Me., 1861, p. 376. [Chamberlain Farm, Maine.]
1862. *N[emobius] exiguus* Scudder (not *Acheta exigua* Say, 1825), Bost. Jour. Nat. Hist., VII, pp. 429, 430. [St. Louis, Missouri; Minnesota.]
1862. *N[emobius] vittatus* Scudder, Bost. Jour. Nat. Hist., VII, p. 430. [Massachusetts; Maine; Connecticut.]
1862. *N[emobius] fasciatus* Scudder, Bost. Jour. Nat. Hist., VII, pp. 430, 431. (In part.) [Massachusetts; Delphi, Indiana.]

[23] A reference in quotation marks indicates in the present paper that the author has been unable to see that paper, otherwise all of the references have been verified.

1863. *Acheta vittata* Rathvon, Rept. U. S. Dept. Agr., 1862, p. 380, Pl. fig. 16. [Lancaster, Pennsylvania.]
"1865. *Nemobius vittatus* Thomas, Trans. Ill. St. Agr. Soc., V, p. 443. [Illinois.]"
1868. *Nemobius fasciatus* S. I. Smith, Proc. Portl. Soc. Nat. Hist., I, p. 144. [Norway, Maine, at light; Treats Island near Eastport, Maine.]
1868. *Nemobius vittatus* S. I. Smith, Proc. Portl. Soc. Nat. Hist., I, p. 144. [Norway, Maine. Abundant over State.]
1868. *Nemobius vittatus* Scudder, Proc. Bost. Soc. Nat. Hist., XI, pp. 308, 309. [New England. Notes on stridulation.]
1869. *Nemobius fasciatus* Walker, Cat. Dermap. Saltat. Br. Mus., I, p. 56. (In part.) [North America.]
1869. *Nemobius vittatus* Walker, Cat. Dermap. Saltat. Br. Mus., I, p. 57, 114. [North America; Indiana; Nova Scotia.]
1870. *Nemobius vittatus* Riley, Am. Ent. and Bot., II, p. 373. [New Harmony, Indiana. Gnaws fruit.]
"1872. *Nemobius vittatus* Smith, Rept. Conn. Bd. Agr., 1872, pp. 353, 370."
"1872. *Nemobius fasciatus* Smith, Rept. Conn. Bd. Agr., 1872, pp. 354, 379."
1872. *Nemobius vittatus* Walker, Can. Ent., IV, p. 30. [Nova Scotia.]
1872. *Nemobius vittatus* Scudder, Final Rept. U. S. Geol. Surv. Nebr., p. 249. [Banks of Platte River, Nebraska.]
1872. *Nemobius vittatus* Glover, Illust. N. A. Ent., Pl. 3, figs. 9, 10. [Figures of ♂ and ♀.]
1872. *Nemobius fasciatus* Glover, Illust. N. A. Ent., Pl. 6, fig. 13. [Figure of ♀.]
1872. *Nemobius exiguus* Glover (not *Acheta exigua* Say, 1825), Illust. N. A. Ent., Pl. 7, fig. 18. [Figure of macropterous ♀.]
1874. *Nemobius vittatus* Scudder, Hitch. Rept. Geol. N. H., I, pp. 364, 365, fig. 48. [All over New Hampshire, even in White Mountain region.]
1874. *Nemobius fasciatus* Scudder, Hitch, Rept. Geol. N. H., I, p. 365. (In part.) [New Hampshire; Missouri.]
1876. *Nemobius vittatus* Provancher, Nat. Can., VIII, pp. 60, 61. [Better description. Quebec, Quebec. Very common everywhere in fields.]
1876. *Nemobius fasciatus* Provancher, Nat. Can., VIII, p. 61. [Better description. Quebec, Quebec.]
1877. *Nemobius fasciatus* Saussure, Mélang. Orth., II, p. 243. [Notes and measurements.]
1877. *Nemobius vittatus* C. E. Bessey, Bienn. Rept. Iowa Agr. Coll., VII, p. 206. [Central Iowa.]
1877. *Nemobius vittatus* Packard, Am. Nat., XI, p. 422. [Experiments on sense organs.]
1884. *Nemobius vittatus* Riley in Kingsley, Stand. Nat. Hist., II, p. 181. [Common in our fields and pastures, [Eastern United States].]
1885. *Nemobius vittatus* Bruner, Bull. Washb. Coll., I, p. 126. [Topeka; MacPherson and Barber Counties, Kansas.]
1886. *Nemobius vittatus* Caulfield, Can. Ent., XVII, p. 211. [Montreal, Quebec. Abundant.]
1886. *Nemobius fasciatus* Caulfield, Can. Ent., XVII, p. 211. [Montreal, Quebec. Not as abundant.]
1887. *Nemobius vittatus* Caulfield, Can. Rec. Sci., II, p. 393. [Toronto, Ontario. Common.]
"1888. *Nemobius fasciatus* Fernald, Ann. Rept. Mass. Agr. Coll., XXX, p. 100. [New England.]"
1889. *Nemobius vittatus* Davis, Ent. Am., V, p. 79. (In part.) [Staten Island, New York.]
1890. *Nemobius vittatus* Crane in Smith, Cat. Ins. N. J., p. 408. [Caldwell, New Jersey. Common.]
1890. *Nemobius fasciatus* Bruner in Smith, Cat. Ins. N. J., p. 408. [Jamesburg, New Jersey.]
1890. *Nemobius fasciatus* Smith, Bull, N. J. Exp. Sta., K, p. 41. [On cranberry bogs.]

1891. *Nemobius fasciatus* McNeill, Psyche, VI, p. 6. [Rock Island, Illinois. Abundant everywhere.]
1891. *Nemobius vittatus* Osborn, U. S. Dept. Agr., Div. Ent., Bull. 23, p. 59. [Ames, Iowa. Completely covered the surface of the ground that year.]
1892. *Nemobius vittatus* Osborn, Proc. Iowa Acad. Sci., I, Pt. 2, p. 119. [Ames, Iowa, and State. Very common in meadows and especially hillsides with southern exposure.]
1892. *Nemobius fasciatus* Smith, Bull. N. J. Exp. Sta., XC, p. 31. [Not rare in New Jersey.]
1892. *Nemobius vittatus* Smith, Bull. N. J. Exp. Sta., XC, p. 31. [Not common in New Jersey.]
1892. *Nemobius vittatus* Blatchley, Proc. Ind. Acad. Sci., 1891, pp. 135, 136. [Enormous numbers in Indiana.]
1893. *Nemobius fasciatus* Bruner, Publ. Nebr. Acad. Sci., III, p. 32. [General and common in eastern half of Nebraska.]
1893. *Nemobius vittatus* Bruner, Publ. Nebr. Acad. Sci., III, p. 32. [About the same range in Nebraska as *fasciatus*.]
1894. *Nemobius fasciatus* Garman, Orth. of Ky., p. 6. [Very common everywhere in meadows and pastures in Kentucky. Brachypterous form much more common.]
1894. *Nemobius fasciatus* Beutenmüller, Bull. Am. Mus. Nat. Hist., VI, pp. 266, 267, Pl. 5, fig. 9. [New York, N. Y.]
1894. *Nemobius fasciatus vittatus* Beutenmüller, Bull. Am. Mus. Nat. Hist., VI, p. 267, Pl. 5, fig. 10. [New York, N. Y.]
1896. *Nemobius fasciatus* Scudder, Jour. N. Y. Ent. Soc., IV, pp. 100, 102, 103. (In part.) [Northern New England; Michigan; Manitoba; South Dakota; Big Horn Mountains and Pine Cliffs (Bluffs), Wyoming; South Bend, West Point, Sydney and Lincoln, Nebraska; Shawnee, Kansas; Virginia; Mount Graylock, Massachusetts; Decatur, Alabama.]
1896. *Nemobius utahensis* Scudder, Jour. N. Y. Ent. Soc., IV, pp. 100, 103, 104. (Description.) [Spring Lake and Salt Lake Valley, Utah.]
1896. *Nemobius cubensis* Scudder, Jour. N. Y. Ent. Soc., IV, p. 105. (In part.) [Ogle County, Illinois.]
1896. *Nemobius fasciatus* Pantel, Anal. Soc. Espan. Hist. Nat., XXV, p. 51. (Morphological studies.)
1896. *Nemobius fasciatus* Scudder, Psyche, VII, p. 432. (New key.)
1896. *Nemobius utahensis* Scudder, Psyche, VII, p. 432. (New key.)
1896. *Nemobius fasciatus* form *vittatus* Piers, Proc. and Trans. Nova Scotia Inst. Sci., IX, Pt. 2, pp. 210, 211. [Windsor and Halifax, Nova Scotia. Exceedingly abundant in fields. Notes on appearance.]
1897. *Nemobius fasciatus vittatus* Zabriskie, Jour. N. Y. Microsc. Soc., XIII, pp. 1, 5, Pl. 62, fig. 14. [Construction of musical rasps.]
1897. *Nemobius vittatus* Blatchley, Ins. in Gen. and Orth. Ind. in Particular, p. 23. [Indiana.]
1897. *Nemobius fasciatus* Blatchley, Ins. in Gen. and Orth. Ind. in Particular, p. 23. [Indiana.]
1897. *Nemobius fasciatus* Harvey and Knight, Psyche, VIII, p. 77. [Jackman, Maine.]
1897. *Nemobius fasciatus* Ball, Proc. Iowa Acad. Sci., IV, p. 236. [Iowa, in fields.]
1898. *Nemobius fasciatus* form *vittatus* Lugger, Orth. Minn., pp. 262, 263, fig. 170. [Minnesota.]
1898. *Nemobius fasciatus* Lugger, Orth. Minn., pp. 261, 262. [Minnesota.]
1898. *Nemobius fasciatus* Lochhead, Ann. Rept. Ent. Soc. Ont., XXVIII, p. 42, figs. 29, 30. [Studies.]
1898. *Nemobius vittatus* Lochhead, Ann. Rept. Ent. Soc. Ont., XXVIII, p. 42. [Studies.]
"1899. *Nemobius fasciatus vittatus* Blatchley, Gleanings, p. 227, fig. 56."
1900. *Nemobius fasciatus* Needham, Occ. Mem. Chicago Ent. Soc., I, p. 24.
1900. *Nemobius fasciatus* Blatchley, Psyche, IX, pp. 51, 52. [Indianapolis, Fort Wayne and other localities in northern Indiana.]

1900. *Nemobius fasciatus vittatus* Blatchley, Psyche, IX, p. 52. [Indiana, abundant everywhere.]
1900. *Nemobius fasciatus* Fogg, Proc. Manchester Inst. Arts and Sci., I, p. 46. [Manchester, New Hampshire.]
1900. *Nemobius fasciatus* Scudder, Psyche, IX, p. 104. [Common everywhere in New England.]
1900. *Nemobius fasciatus* Smith, Ins. of New Jersey, p. 164. [Staten Island, N. Y.; New Brunswick, N. J.]
1901. *Nemobius fasciatus* Pettit, Mich. St. Agr. Exp. Sta., Bull. 186, p. 39. [Au Train Falls, Mich.]
1902. *Nemobius fasciatus* Slosson, Ent. News, XIII, p. 8. [Summit of Mount Washington, N. H.]
1902. *Nemobius fasciatus* Fyles, 32d Ann. Rept. Ent. Soc. Ont., 1901, p. 92. [Quebec, Quebec. Common.]
1902. *Nemobius maculatus* E. M. Walker (not of Blatchley, 1900), 32d Ann. Rept. Ent. Soc. Ont., 1901, p. 109. [Tobermory, Ont.]
1903. *Nemobius fasciatus* Caudell, Proc. U. S. Nat. Mus., XXVI, pp. 808, 809. (In part.) [Fort Collins, Colo.]
1903. *Nemobius utahensis* Caudell, Proc. U. S. Nat. Mus., XXVI, p. 809. [Sedalia and Montevista, Colo.]
1903. *Nemobius fasciatus* Blatchley, Orth. of Indiana, pp. 420, 423. [Brachypterous from Terre Haute and all Indiana; macropterous from Round Lake in Whitley County, Indianapolis and Fort Wayne, Ind.]
1903. *Nemobius canus* Blatchley, Orth. of Indiana, pp. 420, 423, 424. [Sparingly in southern Indiana; Crawford County, Ind.]
1904. *Nemobius fasciatus* Mead, Dept. Zool. Ent. Ohio St. Univ., No. 19, p. 112. [Cedar Point, Ohio.]
1904. *Nemobius fasciatus* E. M. Walker, Can. Ent., XXXVI, pp. 182, 183. [Niagara Falls, Point Pelee, Arner, Chatham, Sarnia, Goderich, Southampton, Bruce Peninsula, Owen Sound, Hamilton, Toronto, Lake Simcoe, Severn River, Lake Muskoka, Algonquin Park, North Bay and Stony Lake in Peterboro County, Ont.]
1904. *Nemobius canus* E. M. Walker, Can. Ent., XXXVI, pp. 182, 184. [Arner, Ont.]
1904. *Nemobius maculatus* E. M. Walker (not of Blatchley, 1900), Can. Ent., XXXVI, pp. 182, 185. [Tobermory, Ont.]
1904. *Nemobius fasciatus* Rehn, Ent. News, XV, p. 269. [Pequaming, mainland opposite Pequaquawaming Point and Baraga County, Michigan. Great majority brachypterous.]
1904. *Nemobius fasciatus* Rehn, Ent. News, XV, p. 331. [Medford and Atsion, N. J.]
1904. *Nemobius carolinus* Rehn (not of Scudder, 1876), Ent. News, XV, p. 331. [Near West Creek and Atsion, N. J.]
1905. *Nemobius fasciatus* Isely, Publ. Kan. Acad. Sci., p. 248. [Hiawatha, Atchison, Fairview, Clearwater, Sedgwick and Wichita, Kan.]
1905. *Nemobius fasciatus* Forbes, Ill. St. Ent. 23d Rept., p. 214, figs. 225, 226. [Urbana, Ill.]
1905. *Nemobius fasciatus* form *vittatus* Kellogg, Am. Ins., p. 159, fig. 225. [Popular notes.]
1906. *Nemobius fasciatus* Hart, Ill. St. Lab. Nat. Hist. Descr. Syn. Ins. Coll., II, Orth., p. 89. [Illinois.]
1906. *Nemobius fasciatus vittatus* Hart, Ill. St. Lab. Nat. Hist. Descr. Syn. Ins. Coll., II, Orth., p. 89. [Illinois.]
1906. *Nemobius canus* Hart, Ill. St. Lab. Nat. Hist. Descr. Syn. Ins. Coll., II, Orth., p. 89. [Illinois.]
1906. *Nemobius fasciatus* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1906, p. 418. [Mammoth Hot Springs and Old Faithful Geyser, Yellowstone National Park, Wyo.; Salt Lake City, Utah; St. Louis, Mo.]

1907. *Nemobius fasciatus vittatus* Hart, Bull. Ill. St. Lab. Nat. Hist., VII, No. VII, pp. 235, 262. [Devils Neck, Moline Sand Hill and vicinity, Ill.]
1907. *Nemobius fasciatus* Tucker, Kan. Univ. Sci. Bull., IV, No. 2, p. 75. [Douglas County, Kan.]
1907. *Nemobius fasciatus* var. *vittatus* Tucker, Kan. Univ. Sci. Bull., IV, No. 2, p. 75. [Douglas County, Kan.]
1908. *Nemobius fasciatus* form *vittatus* Washburn, Press Bull. 32, Univ. Minn. Agr. Exp. Sta. [Eagle Bend, Minnesota. Devours eggs of *Melanoplus* [*bi*]*vittatus*.]
1908. *Nemobius fasciatus* Paxson, Ent. News, XIX, p. 328. [Devon, Pennsylvania. Numerous.]
1909. *Nemobius utahensis* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1909, p. 173. [Albuquerque, N. Mex.]
1909. *Nemobius fasciatus* E. M. Walker, Can. Ent., XLI, pp. 144, 211. [Bear Island and elsewhere in Temagami District, Ont.]
1910. *Nemobius canus* Allard, Proc. Ent. Soc. Wash., XII, p. 41. [Thompson's Mills, Ga.]
1910. *Nemobius fasciatus* Hebard, Ent. News, XXI, p. 184. [New Haven, Conn. Common.]
1910. *Nemobius fasciatus* Rehn in Smith, Ann. Rept. N. J. State Mus. 1909, p. 191. [Throughout New Jersey, most common in pine barrens.]
1910. *N*[*emobius*] *vittatus* Beutenmüller insert in Rehn in Smith, Ann. Rept. N. J. State Mus. 1909, p. 191. [More northern records.]
1910. *N*[*emobius*] *canus* Rehn in Smith, Ann. Rept. N. J. State Mus. 1909, p. 192. [Sumner and Whitings, N. J.]
1910. *N*[*emobius*] *maculatus* Rehn in Smith (not of Blatchley, 1900), Ann. Rept. N. J. State Mus. 1909, p. 192. [Mount Pleasant, N. J.]
1910. *Nemobius fasciatus* var. *vittatus* Allard, Ent. News, XXI, pp. 352, 355. [Oxford, Mass. Exceedingly common in fields.]
1910. *Nemobius palustris* Allard (not of Blatchley, 1900), Ent. News, XXI, pp. 352, 355. [Oxford, Mass. Cold damp places beneath leaves.]
1911. *Nemobius fasciatus* (*vittatus*) Allard, Ent. News, XXII, pp. 28, 32, 33, 37. [Oxford, Mass.]
1911. *Nemobius palustris* Allard (not of Blatchley, 1900), Ent. News, XXII, p. 37. [Misidentification first made in 1910.]
1911. *Nemobius fasciatus* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1910, pp. 645, 646. [Sulphur Springs and Mount Pisgah, N. C.; Bayville, Vir.]
1911. *Nemobius maculatus* Rehn and Hebard (not of Blatchley, 1900), Proc. Acad. Nat. Sci. Phila., 1910, p. 647. (In part.) [Sulphur Springs, N. C.]
1911. *Nemobius fasciatus* Hancock, Nature Sketches, p. 302, figs. [Lakeside, Berrien County, Mich. Attracted to light.]
1911. *N*[*emobius*] *fasciatus* Walden, Bull. 16, State Conn. State Geol. Nat. Hist. Surv., pp. 151, 152. [Throughout Connecticut. Very common, rarely macropterous.]
1911. *Nemobius fasciatus* Sherman and Brimley, Ent. News, p. 391. [Mountains of North Carolina.]
1911. *Nemobius fasciatus* Shull, Michigan Geol. and Biol. Surv., Publ. 4, Biol. Ser. 2, p. 229. [Huron County, Mich.]
1912. *Nemobius canus* Washburn, Jour. Econ. Ent., V, No. 2, p. 117. [Fergus Falls, Minn.]
1912. *Nemobius fasciatus* Washburn, Jour. Econ. Ent., V, No. 2, p. 117. [Fergus Falls, Minn.]

The present species finds its nearest relatives in *N. maculatus* and *N. griseus*. From *maculatus*, typical *fasciatus* may be separated by its larger size, more uniform general coloration, striped occiput,

longer and less decidedly truncate tegmina in both sexes and in the female by the teeth of the dorsal margin of the apex of the ovipositor, which in *fasciatus* are rather prominent but not very sharp, while in *maculatus* these teeth are as prominent and very sharp. The ovipositor in typical *fasciatus* is also longer and not so rigidly straight.

From *griseus* the present species may be readily distinguished by its more robust proportions in even the smallest race, *N. fasciatus abortivus*, the different general coloration, and also in characters of the ovipositor which in *griseus* are much as in *maculatus*. In *fasciatus* the lower face is never darker than the interocular portion of the same, while in *griseus* the lower face is strikingly darker than the other portions of the head.

Certain individuals of this plastic species approach *maculatus* closely in general appearance, and those before us from Tobermory, Ont., Mount Pleasant, N. J., and Sulphur Springs, N. C., recorded, respectively, by E. M. Walker, Rehn, and Rehn and Hebard as that species, do indeed bear it a close resemblance. There are a number of other specimens in the present series likewise differing from typical *fasciatus* in being small, highly colored and more or less tawny, from numerous localities extending from New Jersey to North Carolina. No specimens in this series, however, have the peculiar color pattern of *maculatus*, nor the compact structure and tegminal outline of that species. From the form here discussed to typical *fasciatus*, every gradation may be found in the material before us.

The series of specimens from Thompson's Mills, Ga., recorded by Allard as *N. canus* bear a resemblance to the aberrant individuals discussed above, but are considerably larger and still more highly colored as described in the color notes on the following page. These specimens in consequence have a general fasces very different from that of typical *fasciatus*.

TYPE: ♀; Pennsylvania. (M. Acrelius.) [De Geer Collection.]

We here describe a female from Philadelphia, Pa., taken August 22, 1898, as this city was probably the exact locality at which the type was captured.

Size large for the genus, form compact; head rather large, full and rounded, about as wide as the pronotum. Maxillary palpi with penultimate joint about half as long as terminal joint, the latter expanding very gently distad, gently obliquely truncate. Eyes broad-ovate, moderately protruding. Pronotum with length con-

tained about one and four-tenths times in greatest (caudal) dorsal width, narrowing slightly in the cephalic portion. Tegmina nearly as long as the caudal femora, apex of same dorsal in position, distal margin of dorsal field rotundato-rectangulate, longitudinal veins rather conspicuous, cross-veinlets faint. Wings very long, twice as long as tegmina. Supra-anal plate very short and strongly transverse, sharply and suddenly depressed mesad, the caudal margin almost straight but slightly produced mesad, separated by a pronounced transverse fold from the supra-anal plate, which plate is shield-shaped. Cerci long, evenly tapering, thickly covered with hairs. Ovipositor very long, longer than caudal femora, rigid, with a scarcely perceptible arcuation, apex of same very narrowly sublanceolate enlarged with that portion formed by the dorsal valves armed, the upper margin dentate, these teeth regular, heavy, sharply cut, but with their immediate apices blunt. Subgenital plate scoop-shaped, rectangulate-emarginate mesad with

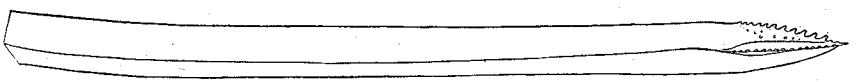

Fig. 3.—*Nemobius fasciatus.* Ovipositor. (Greatly magnified.)

the margins broadly rounded.[24] Caudal femora with greatest (meso-cephalic) width contained about three times in length.

A male bearing the same data as the female here described affords the additional characters given below.

Size very slightly smaller, proportions much as in female. The tegmina are translucent and when in repose the dorsal fields are hemi-elliptical in outline. Subgenital plate scoop-shaped, narrowing evenly but considerably caudad. The proximo-internal spine of the caudal tibia specialized as described under *Morphological Notes* in the generic discussion of the present paper.

The brachypterous form of the present species differs in having the apex of the female tegmina at the humeral angle, the distal margin of the dorsal field roundly oblique, arcuato-truncate, while the sutural margin passes into the distal margin without angulation.

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[24] In the present species the shape of the subgenital plate of the female varies from the present type to one similar to that of *maculatus*.

Measurements (in millimeters).

	Philadelphia, Pa. Specimens here described.[25]		[26]	
	♀	♂	♀	♂
Length of body	11.5	10.	9.5	10.6
Length of pronotum	2.3	2.	2.4	2.1
Caudal width of pronotum	3.	2.8	3.	3.
Length of tegmina	7.4	7.	4.1	6.1
Length of wings	15.	14.	.....	.....
Length of caudal femur	7.8	7.3	8.	7.6
Greatest width of caudal femur	2.7	2.4	2.7	2.7
Length of ovipositor	9.4	.....	8.4	.....

	Oxford, Mass.[27]		MacNab's Id., N. S.[28]	
	♀	♂	♀	♂
Length of body	8.	8.	9.	7.2
Length of pronotum	1.8	1.8	1.7	1.8
Caudal width of pronotum	2.1	2.3	2.6	2.3
Length of tegmina	3.8	4.9	3.7	4.4
Length of wings	.....	.....	.....	.....
Length of caudal femur	6.	5.7	6.6	5.7
Greatest width of caudal femur	1.9	1.8	2.1	2.
Length of ovipositor	6.8	.....	7.	.....

Specimens from Aweme, Man., show characters intermediate between *N. fasciatus abortivus* and *N. fasciatus.*

The upper dotted line includes all of the specimens of *N. fasciatus abortivus.*

The lower dotted line separates the majority of specimens of *N. fasciatus socius* (on the left) from the majority of specimens of *N. fasciatus* (on the right).

The diagonal line indicates the squares in which the length of the ovipositor is equal to that of the caudal femur.

From the table on page 413 the relative measurements of the ovipositor and caudal femur of *fasciatus* and its geographic races are shown to be of use as a character, though exceedingly variable. Typical *fasciatus* has the ovipositor usually considerably

[25] These specimens are examples of the largest macropterous form of the present species, from which form the type was unquestionably described as De Geer's figure shows.

[26] These specimens are among the largest of the series of brachypterous specimens which we have before us.

[27] These are among the smallest of the series of specimens which we have before us from the New England States.

[28] The specimens from Nova Scotia are typical of the species over the extreme northeastern portion of its range.

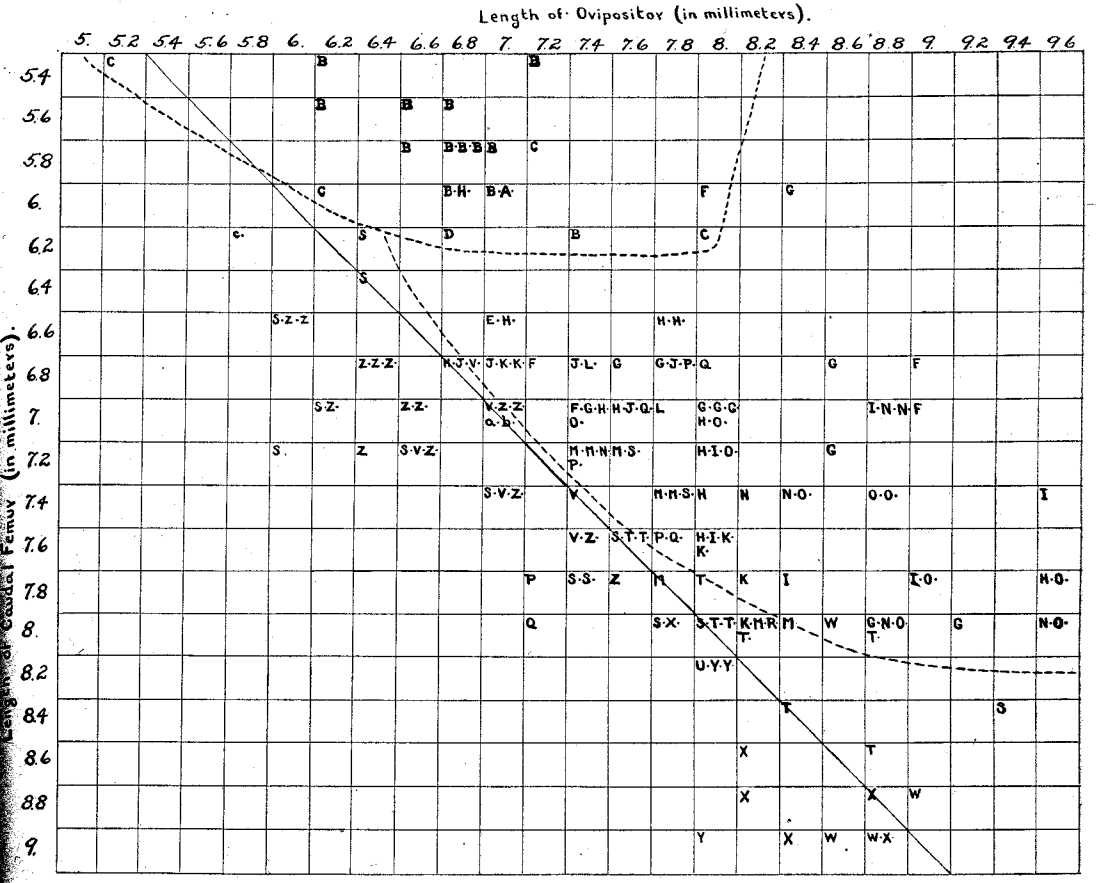

Fig. 4.—Relative length of ovipositor and caudal femur in *Nemobius fasciatus* and its races. The letters indicate the following localities:

Nemobius fasciatus abortivus Caudell.

A. Calgary, Alberta.
B. Moose Jaw, Saskatchewan.
C. Aweme, Manitoba.
D. Portal, North Dakota.

Nemobius fasciatus (De Geer).

E. MacNab's Island, Nova Scotia.
F. Pequaming, Michigan.
G. Duluth, Minnesota.
H. Oxford, Massachusetts.
I. Marion, Mass.
J. Pine Bluffs, Wyoming.
K. Lincoln, Nebraska.
L. La Junta, Colorado.
M. St. Louis, Missouri.
N. Castle Rock, Pennsylvania.
O. Tinicum Island, Pa.
P. Sulphur Springs, North Carolina.
Q. Mount Pisgah, N. C.
R. Thompson's Mills, Georgia.

Nemobius fasciatus socius Scudder.

S. Raleigh, North Carolina.
T. Fayetteville, N. C.
U. Dallas, Texas.
V. Galveston, Tex.
W. Yemassee, South Carolina.
X. Homerville, Georgia.
Y. Brunswick, Ga.
Z. Thomasville, Ga.
a. Pablo Beach, Florida.
b. Lakeland, Fla.
c. Tampa, Fla.

longer than the caudal femur and seldom under seven millimeters in length. The southern geographic race, *fasciatus socius*, has the ovipositor as short as or shorter than the caudal femur with scarcely an exception, while the northern prairie race, *fasciatus abortivus*, is distinguished from *fasciatus* by the usually shorter and differently shaped ovipositor and almost invariably shorter caudal femur. The letters indicating the distribution of *fasciatus socius* are S to c, while those of *fasciatus abortivus* are A to D.

Color Notes.—The specimens here described are typical in coloration of the majority of specimens of the species found about Philadelphia. General color of head and pronotum clove brown shading to very dark mummy brown on the abdomen, limbs, and exposed portions of the wings. Head with occiput very obscurely striped with four longitudinal lines which are very slightly lighter than the rest of the occiput, eyes very dark mummy brown. Maxillary palpi mummy brown, the terminal segment darker. Tegmina of male translucent mummy brown, in the almost transparent portions shading to burnt umber, discoidal vein ivory white, this marking being so narrow as to be inconspicuous; of female prouts brown, the longitudinal veins vandyke brown and the proximal portion of the intermediate channel vandyke brown. The postocular portion of the genæ and ventral margin of the lateral lobes of the pronotum are yellowish, these yellowish markings very obscure. Ovipositor very dark vandyke brown.

A few individuals from the same region are to be found of lighter coloration and in these the color pattern of the species is much more pronounced. In such the dorsal portion of the head, the eyes, and dorsum of the pronotum are prouts brown, the occipital stripes are distinct, while the interantennal protuberance is pale burnt umber shading to russet on the mouth parts. The last joint of the maxillary palpi is russet in these specimens for the proximal third, shading in the remaining portion to very dark brown. The upper portion of the lateral lobes of the pronotum is very dark brown, while the ventral margin of the same is prouts brown. The limbs and ventral surface of the abdomen are russet. This russet shade is frequently found to extend to the dorsal surface of the abdomen in such specimens of light coloration, when this is not the case that portion of the abdomen is clove brown.

Interesting differences in coloration of series of the present species are found over its entire range of distribution, the more important of which are here considered. A series of large pale individuals from

Dallas, Tex., is before us, upon which Scudder based his *N. canus;* these specimens belong to the race *fasciatus socius*, while specimens from places in the region where *fasciatus* and *fasciatus socius* apparently intergrade, Raleigh, N. C., and Crawford County, Ind., are of the same light coloration but somewhat more slender. Specimens of *fasciatus* proper from Long Island, N. Y., and Falls Church, Va., are equally pale, being russet in general coloration, but none are as robust as the individuals from Dallas, Tex. In all of these specimens as well as in a somewhat darker but very brilliantly colored series from Thompson's Mills, Ga., the males have the coloration of the discoidal vein more pronounced, while the area between this and the free veins of the lateral field is seal brown proximad and of that coloration to the end of the tegmen between the discoidal and mediastine veins. It is interesting to note that in such pale specimens of the present species as well as in those of very dark coloration the longitudinal stripes of the occiput are absent, while these stripes become more and more pronounced between the extremes of light and dark coloration until in the absolute intermediates[29] they are usually well defined.

Very dark individuals of *fasciatus* proper are to be found in almost every series, but this is much more pronounced in individuals from the more northern points of the species' distribution. In the material before us this is very noticeable in a series from Oxford, Mass., which are for the greater part small in size and very dark. In these specimens the light portion of the lateral lobes is much reduced and obscured while in the darkest specimens of the series it is absent, the yellowish coloration of the discoidal vein is scarcely perceptible to the naked eye. The few lighter specimens in this series, however, have the occipital stripes more pronounced than in any other specimens of the species before us.

Every conceivable intergradation between the extremes of the species is to be found in the present series not only in coloration, but also in size and in length of tegmina, wings, caudal femur, and ovipositor.

Distribution.—Typical *fasciatus* is to be found from Prince Edward Island across the Dominion of Canada westward to the prairie region in Manitoba, where its place is occupied by *fasciatus abortivus*. South of this country that geographic race gives place again to

[29] The intermediates here referred to are usually few in number, as by far the majority of individuals of the species approach the dark extremes more or less closely.

fasciatus proper in northern North Dakota and Montana, and true *fasciatus* is to be found as far west as the Yellowstone National Park in Wyoming, to the base of the Rockies in Colorado, and a few specimens have been taken at Spring Lake, Utah. Its southern limits are marked by the fall line in the southeastern United States, and west of the Appalachians it is found as far south as Tennessee, Arkansas, Oklahoma, and, without doubt, the Panhandle of Texas, to Roswell and Albuquerque, N. Mex. South of this as far west as the dry country of Texas, *fasciatus* is supplanted by the geographic race, *fasciatus socius*.

Biological Notes.—The present species is one of the most abundant of the North American Gryllidæ and is often found in great numbers over the greater part of its range. It flourishes not only in grassy uplands, but also in meadows and in the heavy grasses about marshes and swamps. It is also frequent along the borders of woodlands and is to be met with in open forests where the ground is somewhat grassy. It is particularly noticeable in areas of lush grasses about damp places in the northernmost portions of its range, where, as has been found in almost all insect life of the north, as numerous species disappear, those remaining and having a more northerly distribution are found in enormous numbers. The present species does not flourish under arid conditions, but its distribution is often extended into the arid west in many places where river bottoms and other watered spots afford a green vegetation well suited to this insect.

The majority of specimens seen of *fasciatus* are brachypterous, although at times macropterous individuals appear in countless numbers, and are then conspicuous, particularly about the lights at night. The writer has seen one flight which occurred in the fall of 1911 at Chestnut Hill, Phila., when, shortly after nightfall, the ground under the arc lights in that portion of Philadelphia swarmed with these crickets, although usually few if any specimens are to be found at that place attracted to light.

The song of the insect is shrill and has been described as "tiiii-tiiii-tiiii" or "ti-ti-ti-ti-ti-ti-ti-ti" by Allard, and as "creeeeeee" or "creee-creee-creee-creee" by Rehn and Hebard. Piers states that "the stridulation is produced by lifting the wing covers about forty-five degrees above the abdomen and then shuffling them together, producing a sound resembling the word plee-e-e-e plee-e-e-e plee-e-e-e or cree-e-e-e."

Morphological Notes.—An interesting variation in size is found in the present species. It appears that the insect decreases in size

northward from the centre of its distribution, but that occasional series of unusually small size are sometimes found in the central portion of its range. These smaller series would seem at first glance to belong to a different species, but close examination fails to disclose valid characters of any sort, which is also true of the occasional light colored specimens which have from time to time been referred to *canus*.

Synonymy.—The synonymy of the present species is much involved owing to the fact that it is one of the oldest recognized species of North American Orthoptera as well as one of the most abundant and variable over the greater portion of its range.

In 1775, Fabricius described *Acheta hospes* from America, this being a synonym based on the macropterous form of *fasciatus*.

Harris[30], in 1841, described the brachypterous form of the present species as *Acheta vittata*, which name since that time has been extensively used to designate the brachypterous form of the insect.

Scudder, in 1862, most unfortunately recorded macropterous specimens of the present species as *N(emobius) exiguus*, confusing Say's *Acheta exigua* with *fasciatus*, which former species belongs to the genus *Anaxipha*. This mistake was repeated by Glover in 1872, and the introduction of that name in the nomenclature of the genus *Nemobius* resulted in the greatest confusion in the work of many subsequent authors.

In 1896, Scudder described *Nemobius utahensis*, the type of which[31] cannot be distinguished from the brachypterous form of *fasciatus*, while since that time specimens of the present species have been referred by various authors to *Nemobius utahensis, canus*[32], *maculatus, cubensis, palustris*, and *carolinus*.[33]

Specimens Examined.[34]—641: 273 males, 353 females, and 15 nymphs.

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[30] In 1835 Harris included in his list of Massachusetts insects Say's manuscript name *Acheta servilis* based on the macropterous form of *fasciatus*, but, as there was no accompanying description, that name falls as a *nomen nudum*.

[31] We here select as single type a female specimen, taken at Spring Lake, Utah, in July, 1875, and now in the United States National Museum.

[32] See discussion of this name under the Synonymy of *Nemobius fasciatus socius*.

[33] The only other name probably applicable to the present species is *Nemobius marginata* of Murtfeldt, published in 1893 without description, hence a *nomen nudum*.

[34] The following abbreviations are used to differentiate the specimens here recorded: Lg., large size; med., medium size; sm., small size; b., brachypterous; m., macropterous; pl., pale in coloration; dk., dark in coloration; br., brilliantly colored; maj., majority of specimens; v., very; n., nymph.

Bothwell, Prince Edward Island, Aug. 24, 1912, (B. Long) 1 ♀ [A. N. S. P.]. Lg. b.

Souris, P. E. I., Aug. 24, 1912, (B. Long) 2 ♀ [A. N. S. P. and Hebard Collection]. Lg. b.

St. Andrews, P. E. I., Aug. 26, 1912, (B. Long) 1 ♀ [A. N. S. P.]. Lg. b.

Bunbury, P. E. I., Aug. 28, 1912, (B. Long) 1 ♀ [A. N. S. P.]. Lg. b.

Charlottetown, P. E. I., Sept. 1, 1912, (B. Long) 2 ♂, 2 ♀ [A. N. S. P. and Hebard Collection]. Med. b.

Malpeque Bay, P. E. I., Aug. 29, 1912, (B. Long) 1 ♂, 1 ♀ [Hebard Collection]. Med. b.

Cape Aylesbury, Malpeque Bay, P. E. I., Aug. 29, 1912, (B. Long) 2 ♀ [A. N. S. P.]. Med. b.

MacNab's Island, Halifax, Nova Scotia, Sept. 9, 1903, (Perrin) 1 ♂, 1 ♀ [Hebard Collection]. Med. b.

Château Richer, Ont., Sept., 1894, (E. M. Walker) 1 ♀ [University of Toronto]. Med. b.

De Grassi Point, Lake Simcoe, Ontario, Aug. 21, 13, 15, 1896, 1897, 1904, (E. M. Walker) 3 ♂ [University of Toronto]. Sm. high colored b., pair lg. b.

Isle d'Orleans, Ont., Aug. 24, 1904, (E. M. Walker) 1 ♂ [University of Toronto]. Sm. high colored b.

Toronto, Ont., Oct. 8, 1893, (E. M. Walker) 1 ♂, 1 ♀ [University of Toronto]. Sm. b.

Tobermory, Ont., Aug. 24, 1901, (E. M. Walker) 1 ♂ 1 ♀ [University of Toronto]. Sm. high colored b.

Southampton, Ont., Aug. 20, 1901, (E. M. Walker) 1 ♀ [University of Toronto]. Sm. pl. b.

Arner, Ont., Aug. 9, 1901, (E. M. Walker) 2 ♀]University of Toronto]. Both lg., 1 m.

Mount Washington, New Hampshire, 1 ♀ [Scudder Collection].

White Mountains, N. H., 1 ♂, 3 ♀ [Scudder Collection].

Franconia, N. H., 3 ♂, 3 ♀ [Scudder Collection].

Greylock Mt., Massachusetts, Aug., 1899, (Knab) 1 ♂, 1 ♀ [U. S. N. M.]. Med. dk. b.

Boston, Mass., (Scudder) 1 ♂ [Scudder Collection].

South Natick, Mass., Oct. 26, 1905, (Morse) 1 ♂ [Blatchley Collection]. Med. br. b.

Cape Cod, Mass., Sept., (Scudder) 1 ♀ [Scudder Collection].

Oxford, Mass., Oct., 1909, (Allard) 4 ♂, 12 ♀ [U. S. N. M.]. Maj. dk., ♂♂ sm. ♀♀ med., all b.

Marion, Mass., Aug. 30, 1905, (H.) 1 ♂, 6 ♀. Med. somewhat pl. b.

New Haven, Connecticut, Oct., 1909, (H.) 2 ♂, 2 ♀. ♂♂ sm. ♀♀ med., all b.

Glenville, Conn., Aug. 11, 1910, 1 ♂, 1 ♀, 2 ♀ n. [Am. Mus. N. H.]. Med. b.

North Elba, New York, Oct., (Davis) 1 ♂ [Davis Collection]. Sm. b.

Black Mtn., Lake George, N. Y., Aug. 21, 22, 23, 30, 1893, (Zabriskie) 2 ♂, 4 ♀, 1 ♀ n. [Am. Mus. N. H.]. Med. and sm. dk., but rather highly colored, b.

Clyde, N. Y., (Wood) 1 ♀ [U. S. N. M.]. Lg. b.

Goshen, N. Y., Sept. 7, 1910, 2 ♂, 3 ♀ [Am. Mus. N. H.]. ♂♂ sm. dk. ♀♀ med., all b.

De Brue, N. Y., Sept. 14, 1910, (Davis) 1 ♂, 3 ♀ [Davis Collection]. ♂ sm. ♀♀ med., all b.

Suffern, N. Y., Sept. 17, 1910, 2 ♂, 1 ♀ [Am. Mus. N. H.]. Med. dk. b.

Nyack, N. Y., 1886, (Zabriskie) 2 ♀ [Am. Mus. N. H.]. Med. b.; 1 ♀ [U. S. N. M.]. Lg. b.

Mosholu, N. Y., 3 ♂, 3 ♀ [Am. Mus. N. H.]. All med, 2 ♀ m.: Sept. 4, 6, Oct. 18, 1902, 1 ♂, 3 ♀ [Hebard Collection]. Med. b.

New York, N. Y., (Angus) 2 ♂, 9 ♀ [Am. Mus. N. H.]. Med. and lg. b.

Montauk, Long Island, N. Y., Sept. 23, 1910, (Davis) 2 ♂, 1 ♀ [Davis Collection]. 1 ♂ med., others lg., all b.

Calverton, L. I., Sept. 29, 1910, (Davis) 1 ♂ [Davis Collection]. Sm. b.

Yaphank, L. I., July, 1909, Sept. 5, 1910, (Davis) 1 ♂, 2 ♀ [Davis Collection]. Lg. b.

Rockaway, L. I., 1 ♂ [Am. Mus. N. H.]. Med. m.
Brooklyn, L. I., Sept., 1890, 2 ♀ [Am. Mus. N. H.]. Lg. b.
Flatbush, L. I., Sept. 11, 22, 30, Oct. 4, 10, 26, 1890, 93, 96, (Zabriskie) 6 ♂, 4 ♀ [Am. Mus. N. H.]. Med. b.
Staten Id., N. Y., Aug. 22, 26, 1905, (Davis) 2 ♂, 6 ♀ [Davis Collection]. ♂♂ lg. and 1 br. b., ♀♀ lg. m.
South Sterling, Pennsylvania, Sept. 13, 1906, (B. Long) 1 ♂, 1 ♀ [A. N. S. P.]. Lg. b.
N. E. Jamison City, Pa., Sept. 5, 1909, (Davis) 1 ♂ [Davis Collection]. Med. b.
Central, Pa., Sept. 4, 1909, (Davis) 1 ♀ [Davis Collection]. Med. b.
Greentown, Pa., Sept. 16, 1906, (B. Long) 1 ♀ [A. N. S. P.]. Lg. b.
Shady Nook, Pa., Aug. 6–7, 1908, (Stone) 1 ♀ [A. N. S. P.]. Lg. b.
Scotrun, Pa., Aug. 11, 1906, (B. Long) 1 ♀ [A. N. S. P.]. Lg. m.
Tobyhanna, Pa., Sept. 1, 1903, (H.) 1 ♂. Med. b.
Stroudsburg, Pa., Sept. 1, 1903, (H.) 1 ♂. Med. b.
Lehigh Gap, Pa., Oct. 5, 1903, (G. Greene) 1 ♀ [A. N. S. P.]. Lg. b.
Marysville, Pa., Oct. 6, 6 ♂, 8 ♀ [Pa. St. Dept. Zool.]. Med. b.
Rockville, Pa., July 29, 1 ♂ n., 1 ♀ n. [Pa. St. Dept. Zool.].
Harrisburg, Pa., Aug. 16, 19, 30, 2 ♂, 2 ♀ [Pa. St. Dept. Zool.]. Med. b.
Enola, Pa., Oct. 13, 8 ♂, 5 ♀ [Pa. St. Dept. Zool.]. Med. b.
Camphill, Cumberland Co., Pa., Oct. 19, 1 ♂ [Pa. St. Dept. Zool.]. Med. b.
Philadelphia, Pa., Aug. 22, 1898, (R.) 1 ♂, 1 ♀; Aug. 1, 1901, (R.) 1 ♀. Lg. m.
Cornwells, Pa., Oct., 1906, (R. and H.) 2 ♂, 1 ♀. 1 ♂ sm., pair v. lg. rather pl., all b.
Chestnut Hill, Pa., July 8, 1911, (H.) 3 ♂, 3 ♀. Lg. b.
Mount Airy, Pa., Sept. 18, 1903, (H.) 1 ♂. Lg. m.
Overbrook, Pa., Sept. 8, 1912, (G. Greene) 1 ♂, 1 ♀ [Greene Collection]. Lg. b.
Pink Hill, Delaware Co., Pa., July 9, 1908, (R. and H.) 3 ♀ n. pl.
Swarthmore, Pa., Sept. 13, 1906, (Cresson Jr.) 1 ♀ [A. N. S. P.]. Lg. b.
Castle Rock, Delaware Co., Pa., Sept. 19, 1909, (R. and H.) 3 ♂, 6 ♀; Sept. 2, 1912, (G. Greene) 1 ♂ [A. N. S. P.]. Med. b.
Fern Hill, Chester Co., Pa., Sept. 19, 1908, (R. and H.) 2 ♀. Lg. b.
Tinicum Id., Pa., Oct. 20, 1901, (G. Greene) 1 ♂ [A. N. S. P.]; Sept. 9, 19, 1904, 1908, (R. and H.) 12 ♂, 23 ♀. Lg., all b. except 1 m. ♀.
Cameron Co., Pa., Oct., 1905, (Fowler) 1 ♀ [A. N. S. P.]. Med. b.
Diamond Valley, Huntingdon Co., Pa., Sept. 10, 1905, (R.) 8 ♂, 9 ♀. Lg. b.
Chestnut Ridge, Westmoreland Co., Pa., (Brugger) 1 ♂, 1 ♀ [A. N. S. P.]. Lg. b.
Palisades, New Jersey, Aug. 25, (Davis) 1 ♂ [Davis Collection]. V. sm. b.
Newark, N. J., Sept. 11, 1880, (Rockwood) 1 ♀ [U. S. N. M.]. Lg. b.
Bear Swamp, Ramapo Hills, N. J., Oct. 8, 1909, (Davis) 1 ♂ [Davis Collection]. Lg. b.
Sandy Hook, N. J., (Davis) 1 ♀ [Davis Collection]. Lg. b.
New Brunswick, N. J., Oct. 6, 11, 2 ♂, 9 ♀ [Am. Mus. N. H.]. Med. b.
Jamesburg, N. J., Sept. 27, (Davis) 1 ♀ [Davis Collection]. Sm. b.
Trenton, N. J., Aug. 6, 1911, (Davis) 1 ♂, 1 ♀ n. [Davis Collection]. ♂ sm. b., n. lg.
Whitesville, N. J., Sept. 22, 1907, (R.) 1 ♂, 1 ♀. Med. rather pl. b.
Lakehurst, N. J., Aug. 17, 18, Sept. 3, 4, 5, 14, 15, Oct. 3, 6, 12, 18, 31, 1907, (Davis) 15 ♂, 5 ♀ [Davis Collection]. ♂♂ v. sm. and br., ♀♀ med. only one br.
Medford, N. J., Sept. 7, 1902, (Stone), 1 ♂ [A. N. S. P.]. Lg. b.
Riverton, N. J., Sept. 11, 1904, (G. Greene) 1 ♂ [A. N. S. P.]. Lg. b.
Sumner, N. J., Oct. 15, 1906, (B. Long) 1 ♂, 1 ♀ [A. N. S. P.]. Sm. and med. br. b.
Atsion, N. J., Oct. 8, 1903, (H.) 2 ♂, 1 ♀. Med. b., 1 ♀ sm. br.
Stafford's Forge, N. J., Sept. 16, 1905, (H.) 3 ♂, 3 ♀; Aug. 18, 26, 31, 1907, 08, 09, (R.) 3 ♂, 1 ♀. Rather sm. b., 2 ♂ br.
Near West Creek, N. J., Sept. 6, 1903, (R.) 1 ♂ [A. N. S. P.]. Sm. br. b.

Ocean View, N. J., Sept. 5, 1907, Aug. 11, 1908, (Fox) 1 ♂, 2 ♀ [A. N. S. P.]. Med. b., ♂ br.

Anglesea, N. J., Sept., 1 ♀ [Hebard Collection]. Med. dk. b.

Cape May Co., N. J., Aug., 1910, (Davis) 1 ♀ [Davis Collection]. Lg. b.

Mount Pleasant, N. J., Sept. 7, 1908, (Fox) 1 ♀ [A. N. S. P.]. Sm. br. b.

Cold Spring, N. J., Aug. 31, 1910, (Davis) 2 ♀ [Davis Collection]. Lg. b.

Delaware, 1 ♀ [A. N. S. P.]. Lg. b.

Chestertown, Maryland, Aug. 3, 10, 13, 20, 23, 1899, 1901, 04, (Vanatta) 7 ♂, 7 ♀ [A. N. S. P.]. 1 ♀ pl., all med. b.

Beltsville, Md., Sept. 26, 1911, (Davis) 1 ♂ [Davis Collection]. Med. br. b.

Montgomery Co., Md., Sept. 25, 1911, (Davis) 1 ♂ [Davis Collection]. Med. br. b.

Plummer's Island, Md., Sept. 2, Oct. 11, 1906, (Caudell) 3 ♂, 2 ♀ [U. S. N. M.]. Pair lg. m., others b. the ♂♂ sm. br.

Hyattsville, Md., Sept. 17, 1911, (Davis) 3 ♂, 1 ♀ [Davis Collection]. Med. dk. b.

Aurora, West Virginia, Aug., (Hirchman) 1 ♂, 1 ♀ [U. S. N. M.]. Sm. br. b., ♀ pl.

Washington, D. C., 1 ♂ [Hebard Collection]. Sm. b.; Sept. 20, 1911, (Davis) 1 ♂ [Davis Collection]. Med. dk. m.; Oct. 6, 1880, 3 ♀ [U. S. N. M.]; Sept. 9, Oct. 16, 1909, Nov. 8, 13, 1911, 12, (Caudell) 1 ♂, 7 ♀ [U. S. N. M.]. Lg. med. and sm. b.

Fairfax Co., Virginia, Sept. 21, 1911, (Davis) 3 ♂ [Davis Collection]. Sm. br. b.

Falls Church, Va., Sept. 4, Oct. 9, 1906, (Caudell) 9 ♂, 8 ♀ [U. S. N. M.]. Med. and sm. br. b.

Rosslyn, Va., Oct. 14, (Caudell) 1 ♂ [U. S. N. M.]. Med. br. b.

Bayville, Va., July 19, 1908 (R.) 1 ♀. Lg. b.

Jefferson, North Carolina, Aug., 1907, (Sherman) 1 ♀ [Coll. N. C. Dept. Agr.]. Med. b.

Cranberry, N. C., Oct. 2, 1907, (Sherman) 1 ♀ [Coll. N. C. Dept. Agr.]. Med. b.

Grandfather Mtn., N. C., Sept. 11, 1908, (Metcalf) 3 ♀ [Coll. N. C. Dept. Agr.]. Med. b.

Blowing Rock, N. C., Sept., 9, 10, 1908, (Metcalf) 3 ♂, 2 ♀ [Coll. N. C. Dept. Agr.]. ♂♂ sm., 1 br. b.; ♀♀ med. b.

Black Mts., N. C., Aug. 16–31, Sept., 1906, (Beutenmüller) 2 ♂, 1 ♀ [Am. Mus. N. H.]. Med. br. b.

Asheville, N. C., Sept. 24, 1904, (H.) 2 ♂, 5 ♀. Med. br. b.

Mt. Pisgah, N. C., Oct. 1, 1904, (H.) 5 ♂, 2 ♀. Med. rather br., but 1 b.

Balsam, N. C., Sept. 15–18, 1908, (Metcalf) 1 ♂, 2 ♀ [Coll. N. C. Dept. Agr.]. Med. b.

Waynesville, N. C., Sept. 19, 1908, (Metcalf) 1 ♂, 2 ♀ [Coll. N. C. Dept. Agr.]. Med. b.

Atlanta, Georgia, July 29, 1910, 2 ♂ [Collection State of Ga.]. Med. m.

Thompson's Mills, Ga., Oct., 1909, (Allard) 10 ♂, 1 ♀ [U. S. N. M.]. Lg. v. br. b.

Decatur, Alabama, (Shimek) 1 ♀ [Hebard Collection ex Bruner]. Med. m.

Pequaming, Michigan, July 21, 28, 31, Aug. 1, 5, 8, 9, 30, 1903, 04, (H.) 8 ♂, 6 ♀. All sm. and dk. but one ♀ pl.; all but one pair b.

La Salle Isle, Mich., Aug., 1899, (Blatchley) 1 ♂, 1 ♀ [Blatchley Collection.] Sm. dk. b.

Duluth, Minnesota, Aug., 1906, (Stone) 3 ♂, 17 ♀ [A. N. S. P.]. Med., 3 ♂, 13 ♀ m.

Beaver Dam, Wisconsin, Aug. 28, 1906, (W. E. Snyder) 3 ♂ [U. S. N. M.]. Med. dk. m.

Sheridan, Indiana, Aug. 20, 1907, (Caudell) 1 ♀ [U. S. N. M.]. Lg. b.

Buckeye Lake, Ohio, Sept. 28, 1912, 1 ♂ [Ohio State Univ. Collection].

Crawford County, Ind., Aug. 30, Sept. 4, Oct. 9, 1900, 1902, (Blatchley) 2 ♂, 3 ♀ [U. S. N. M. and Blatchley Collection]. Lg. very pl. b.

Ogle County, Illinois, 1 ♀ [Scudder Collection].

Chicago, Ill., Sept. 9, 1903, (H.) 1 ♂, 1 ♀. Med. b.
Moline, Ill., Aug. 24, 26, (McNeill) 1 ♂, 1 ♀ [Scudder Collection].
Urbana, Ill., Oct. 1, 1904, (Knab) 2 ♂, 1 ♀ [U. S. N. M.]. All b., pair med., one sm.
Effingham, Ill., Aug. 29, 1904, 1 ♂ n. [Hebard Collection]. Lg. pl.
Dallas County, Iowa, Aug., (Allen) 1 ♂ [Scudder Collection].
St. Louis, Missouri, Aug. 27, Sept. 4, 1904, (Heink; H.) 4 ♂, 9 ♀ [Hebard Collection]. All med. b. 1 ♀ m.; Aug. 8, Oct. 22, 1875, 76, 5 ♀ [U. S. N. M.]. Lg. b.
Nashville, Tennessee, (Shimek) 6 ♂, 1 ♀ [Hebard Collection]. Med. mod. pl. b.
Chattanooga, Tenn., (Shimek) 4 ♂ [Hebard Collection]. Med. mod. pl. b.
Bismarck, North Dakota, Aug. 9, 1885, 1 ♀ [Hebard Collection ex Bruner]. Med. mod. pl. b.
Billings, Montana, July 28, 1909, (R. and H.) 1 ♂, 2 ♀ n. ♂ med. dk. b.
Mammoth Hot Springs, Y. N. P., Wyoming, Aug. 5, 1904, (H.) 2 ♂, 2 ♀. Med. dk. b.
Upper Geyser Basin, Y. N. P., Wyo., Aug. 7, 1904, (H.) 1 ♂, 1 ♀. Med. dk. b.
Big Horn Mts., Wyo., Aug., 1894, (Bruner) 1 ♂ [Hebard Collection]. Med. dk. b.
Pine Bluffs, Wyo., (Bruner) 2 ♂, 6 ♀ [Hebard Collection]. Med. b.
Glen, Nebraska, Aug., 1903, (Bruner) 1 ♂ [Hebard Collection]. Med. dk. b.
West Point, Nebr., Aug.–Oct., 1880–1901, 15 ♂, 21 ♀ [U. S. N. M., Hebard Collection]. All med., 1 ♂, 5 ♀ m.
North Platte, Nebr., July 28, 1910, (R. and H.) 1 ♂, 1 ♂ n., 1 ♀ n. ♂ med. b.
Sidney, Nebr., 1 ♀ [Hebard Collection]. Med. pl. b.
Lincoln, Nebr., July 14–Sept. 3, 1889–1909, (Bruner), 4 ♂, 13 ♀ [Hebard Collection ex Bruner]. All med. mod. pl., 2 ♂, 10 ♀ m.
Falls City, Nebr., Aug. 30, 1910, 1 ♂ [Davis Collection]. Med. dk. b.
Fairview, Kansas, Aug., 1904, (Isely) 1 ♂, 2 ♀ [U. S. N. M.]. Lg., 1 ♀ m.
Topeka, Kan., (Cragin) 1 ♂ [Hebard Collection ex Bruner]. Lg. b.
Wichita, Kan., July 23, 1904, (Isely) 1 ♀ [U. S. N. M.]. Lg. b.
Dodge City, Kan., Sept. 13, 1909, (H.) 1 ♂, 2 ♀. Lg. b.
Barber Co., Kan., (Cragin) 1 ♀ [Hebard Collection ex Bruner]. Lg. b.
Ft. Collins, Colorado, Aug. 10, 1901, (Caudell) 1 ♂, 1 ♀ [U. S. N. M.]. Med. b.
Boulder, Colo., Oct. 7, 20, (Cockerell) 2 ♀ [U. S. N. M.]. 1 large and 1 med. b.
La Junta, Colo., Sept. 11, 1909, (R. and H.) 2 ♀. Med. m.
Montevista, Colo., Aug. 13, 1901, (Caudell) 1 ♂ [U. S. N. M.]. Med. b.
Salt Lake City, Utah, Aug. 13, 1904, (H.) 1 ♂. Med. dk. b.
Spring Lake, Utah, July, 1875, 1 ♂, 2 ♀, 1 ♂ n. TYPE, paratypes, *N. utahensis* Sc. [U. S. N. M., Hebard Collection ex Bruner]. Med. b.
Albuquerque, New Mexico, Sept. 14, 1907, (H.) 1 ♀. Med b.
Roswell, N. M., Aug., 1902, (Cockerell) 2 ♀ [A. N. S. P.]. Lg. m.

Nemobius fasciatus socius Scudder.

1862. *N[emobius] fasciatus* Scudder, Bost. Jour. Nat. Hist., VII, p. 431. (In part.) [Charleston, S. C.]
1869. *Nemobius fasciatus* Walker, Cat. Dermap. Saltat. Br. Mus., I, p. 56. (In part.) [St. Johns Bluff, Fla.]
1874. *Nemobius fasciatus* Scudder, Hitch. Rept. Geol. N. H., I, p. 365. (In part.) [Louisiana; Texas.]
1877. *Nemobius socius* Scudder, Proc. Bost. Soc. Nat. Hist., XIX, p. 37. (Original description.) [Georgia.]
1894. *Nemobius fasciatus* Ashmead, Ins. Life, VII, p. 25. [Utica, Miss.]
1896. *Nemobius canus* Scudder, Jour. N. Y. Ent. Soc., IV, pp. 100, 103. (Description.) [Dallas, Tex., and Texas.]
1896. *Nemobius socius* Scudder, Jour. N. Y. Ent. Soc., IV, pp. 100, 103. (In part.) [Sanford and Charlotte Harbor, Fla.; New Orleans, La.; Gulf coast of Texas.]

1896. *Nemobius aterrimus* Scudder, Jour. N. Y. Ent. Soc., IV, pp. 100, 105. (In part.) (Description of ♂.) [Jacksonville, Fla.]
1896. *Nemobius canus* Scudder, Psyche, VII, p. 432. (New key.)
1896. *Nemobius socius* Scudder, Psyche, VII, p. 432. (New key.)
1897. *Nemobius hastatus* Saussure, Biol. Cent. Amer., Orth., I, pp. 221, 222. (Description.) [Mexico City at 8,190 ft.]
1903. *Nemobius fasciatus* Caudell, Proc. U. S. Nat. Mus., XXVI, pp. 808, 809. (In part.) [Victoria, Tex. Large numbers at light.]
1905. *Nemobius maculatus* Rehn and Hebard (not of Blatchley, 1900), Proc. Acad. Nat. Sci. Phila., 1904, p. 799. [Thomasville, Ga.]
1905. *Nemobius socius* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1904, p. 800. [Thomasville, Ga.]
1905. *Nemobius socius* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1905, p. 50. [Tampa, Fla.]
1906. *Nemobius fasciatus vittatus* Hart, Ent. News, XVII, p. 159. [Brazos County, Tex.]
1906. *Nemobius socius* Hart, Ent. News, XVII, p. 159. [College Station, Brazos River Bottoms and Galveston, Tex.]
1907. *Nemobius socius* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1907, p. 316. [Pablo Beach, Gainesville, Bronson and Cedar Keys, Fla.]
1908. [*Nemobius*] *fasciatus* Brimley, Ent. News, XIX, p. 21. [Raleigh, N. C. Open fields.]
1908. [*Nemobius*] *canus* Brimley, Ent. News, XIX, p. 21. [Raleigh, N. C. Pine woods.]
1909. *Nemobius fasciatus* Tucker, Ent. News, XX, p. 297. [Plano, Tex.]
1911. *Nemobius fasciatus socius* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1910, p. 596. [Bainbridge, Ga.]
1911. *Nemobius fasciatus socius* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1910, p. 647. [Raleigh and New Berne, N. C.]
1911. *Nemobius canus* Sherman and Brimley, Ent. News, XXII, p. 391. [Raleigh, N. C.]
1911. *Nemobius fasciatus socius* Sherman and Brimley, Ent. News, XXII, p. 391. [Raleigh, N. C.]
1912. *Nemobius fasciatus socius* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1912, p. 273. [Miami, Fla.]

This geographic race can be distinguished from typical *fasciatus* solely by the proportions of the caudal femur and ovipositor; over its entire range there is an increase in the robustness of the caudal femur and in the female a decrease in the length of the ovipositor, which, when compared in length with the caudal femur, is found to be as short as or shorter than that member. So few exceptions are to be found to this that, in spite of the close affinity of these southern individuals to *fasciatus* in all other respects, they should certainly be considered to belong to a definite geographic race.

TYPE: ♀; Georgia. [Scudder Collection.]

Description of Type.—Agrees perfectly with typical *fasciatus*, except that the caudal femora are proportionately longer and heavier and the ovipositor shorter, in consequence the length of the caudal femur is equal to that of the ovipositor.

Males from the same State as the type do not differ from males of *fasciatus* except in their more robust caudal femora, and so great is the size variation in the species that, with no other than this differen-

tial character, scattered males unaccompanied by females of this southern geographic race are scarcely separable from those of true *fasciatus*.

Measurements (in millimeters).

	Thomasville, Ga. Average of a typical series.	
	♂♂	♀♀
Length of body	9.1 (8. –10.)	9.6 (9.3–10.)
Length of pronotum	1.8 (1.7– 2.)	2.1 (1.9– 2.3)
Caudal width of pronotum	2.5 (2.1– 2.7)	2.7 (2.3– 3.)
Length of tegmen	5.1 (4.2– 6.1)	4.6 (3.9– 6.)
Length of wing	.....	.....
Length of caudal femur	6.5 (5.8– 7.)	7.3 (7. – 7.8)
Greatest width of caudal femur	2.4 (2. – 2.7)	2.6 (2.3– 2.9)
Length of ovipositor	.....	6.4 (5.2– 7.1)

	Thomasville, Ga. Average of a typical series.		Georgia. Type.
	♂♂	♀♀	♀
Length of body	9.5 (8.8–10.)	9.7 (9.1–10.)	9.5
Length of pronotum	1.9 (1.8– 2.)	1.9 (1.8– 2.)	
Caudal width of pronotum	2.6 (2.1– 3.)	2.8 (2.4– 3.1)	
Length of tegmen	6.2 (5.8– 6.7)	6.3 (5.9– 6.9)	6.
Length of wing	13.8 (12.8–15.)	13.6 (13.4–14.)	
Length of caudal femur	6.6 (6.3– 7.)	7. (6.9– 7.2)	
Greatest width of caudal femur	2.2 (2.1– 2.4)	2.5 (2.1– 2.7)	
Length of ovipositor	.....	6.5 (6. – 6.8)	6.25

	Dallas, Texas.[35]				
	♂	♂	♂	♀	♀
Length of body	9.8	9.8	10.9	10.	10.2
Length of pronotum	2.2	2.	1.9	2.6	2.4
Caudal width of pronotum	3.4	2.7	3.	3.1	2.9
Length of tegmen	6.6	5.6	6.4	3.9	4.8
Length of wing	.....	.....	14.8	.....	.....
Length of caudal femur	.....	7.	7.3	8.6	8.2
Greatest width of caudal femur	.....	2.7	2.6	3.1	2.8
Length of ovipositor	.....	.....	.....	8.3	7.8

[35] The brachypterous individuals from this locality are part of the type series of Scudder's *Nemobius canus*, while the macropterous specimen bears Scudder's label "*N. socius.*"

	Bronson, Fla.	Bainbridge, Ga.	Raleigh, N. C.		Mexico City, Mex.
	♂	♀	♂	♀	♀
Length of body	11.1	12.	7.9	7.6	7.7
Length of pronotum	2.	2.4	1.7	1.8	1.6
Caudal width of pronotum	2.9	3.5	2.4	2.4	2.1
Length of tegmen	6.8	8.4	4.8	4.2	2.6
Length of wing	14.7	17.6	.....	.....	.....
Length of caudal femur	7.9	8.9	6.3	6.	5.2
Greatest width of caudal femur	2.6	2.7	2.	2.	2.1
Length of ovipositor	.....	8.9	.....	5.4	5.2

The series from Thomasville, Ga., is typical of *fasciatus socius* and shows the considerable variability in size found in a series of this geographic race from a single locality. The specimens from Dallas, Tex., average larger than any series before us from east of the Appalachians, but the male specimen from Bronson, Fla., and the female from Bainbridge, Ga., show that the largest individuals from the east considerably exceed in size those from Dallas, Tex. The majority of specimens before us from Raleigh, N. C., are of average size, but the series contains some of the smallest specimens of *fasciatus socius* before us, and the measurements of these are given above to show that extreme of the race.

Color Notes.—Specimens from the south Atlantic and Gulf coasts which were taken in damp or marshy situations are without exception very dark brown in coloration. Those from the undergrowth of the pine woods in the south Atlantic States are frequently cinnamon or russet in general coloration, while some of the males taken under such conditions have the markings of typical *fasciatus* very conspicuous. Individuals taken at various places in the semi-dry interior of Texas are quite as pale as these, but are not so tawny and the males do not have the darker markings so well defined and conspicuous. As in *fasciatus*, the occipital bars are absent in all very light or very dark specimens while most conspicuous in those which are slightly lighter than the average.

Distribution.—This geographic race is found over the southeastern United States, the northern limit of distribution being defined by the fall line. West of the Appalachians it is found from the Gulf of Mexico northward to Tennessee, Arkansas, and Oklahoma. These northern limits marking the line of intergradation into typical *fasciatus*. The most western localities at which *fasciatus socius* has

been taken are Victoria, Sarita, and Brownsville, Tex., and Mexico City.

Biological Notes.—Though often found in large numbers, this geographic race is seldom met with in the myriads in which true *fasciatus* is so frequently found. In southern Georgia and along the Gulf coast the insect is to be found adult at all seasons except during the coldest portions of January, February, and March, while in southern Florida it is found mature throughout the entire year.

The series before us indicates that more macropterous individuals are met with in this geographic race than in typical *fasciatus*.

Morphological Notes.—The variability of the present species is nowhere more striking than in series of *fasciatus socius* from various localities. Very light individuals are to be found and others with heads or tegmina of unusual size and shape. The specimens from Dallas, Tex., upon which Scudder based *N. canus*, are very pale, though but little tinged with russet, and have abnormally large heads. There are many specimens before us which show the unquestionable intergradation from the various series to typical *fasciatus socius* and also from one series to the other.

Synonymy.—In 1896 Scudder described *Nemobius canus* from a series of six males and ten females of which we here select a male from Dallas, Tex. (Boll.) [Scudder Collection], as the type. We unhesitatingly place this species in the synonymy under *fasciatus socius*, from which geographic race it can in no way be separated; the specimens upon which it was based, including the type here selected, are large and rather pale individuals of *fasciatus socius*. In his original description Scudder states that it is possibly only a geographic race of *fasciatus*, remarkable for its cinereous aspect and the striped appearance of the female tegmina. The series before us show that the cinereous aspect is found in pale specimens of both *fasciatus* and *fasciatus socius* in varying degrees over their entire range, and the different appearance of the tegmina is solely due to the fact that in light specimens of the present species the dark markings are often conspicuous.

In the same paper in which Scudder described *N. canus*, he also described *N. aterrimus*. This is a most unfortunate result of carelessness, for the unique male, which we here select as the type of *aterrimus*, is a medium-sized, dark, brachypterous specimen of *fasciatus socius*, while the unique female belongs to *N. cubensis*. A thoroughly brief and unsatisfactory description based on two specimens of different species can hardly have been expected to do other than mislead when opportunity was lacking to examine the types.

Saussure, in 1897, described *Nemobius hastatus*, basing that species on a single female from Mexico City.[36] Careful examination of this type proves it to be a synonym of the present geographic race of *fasciatus*. The specimen is of exceptionally small size, but Saussure's error was caused by his misconception of De Geer's *fasciatus* in the same paper, for the specimens which he there regards as that species belong in fact to the very different *brasiliensis* of Walker, and consequently he looked upon the specimen under consideration as new.

Specimens Examined.—274: 108 males, 157 females, and 9 nymphs.

Raleigh, North Carolina,[37] July 8 to Dec. 7, 1904–08, (Sherman, Brimley, Wolgum, Bentley) 20 ♂, 41 ♀ [N. C. Dept. Agr., U. S. N. M., Hebard Collection]. Nos. sm., maj. med., few lg., many pl. med.; 1 ♂ lg., 4 ♀, m.
New Berne, N. C., July 24, 1908, (R.) 1 ♂. Med. b.
Fayetteville, N. C., Sept. 9, 1911, (R. and H.) 6 ♂, 9 ♀. Med., 3 ♂, 4 ♀ pl.; all b.
Hamlet, N. C., late Oct., 1906, (Sherman) 3 ♂, 5 ♀ [N. C. Dept. Agr.]. Med. and lg. b.
Lake Waccamaw, N. C., Sept. 8, 1911, (R. and H.) 1 ♂, 2 ♀. Med. b.
Wilmington, N. C., Sept. 8, 1911, (R. and H.) 1 ♂, 1 ♀. Med. dk. b.
Winter Park, N. C., Sept. 7, 1911, (R. and H.) 1 ♂, 4 ♀. ♂ and 2 ♀ dk.; all med. b.
Southport, N. C., Oct., 1906, (Sherman) 1 ♀ [N. C. Dept. Agr.]. Med. b.
Smith Id., N. C., Oct., 1906, (Sherman) 1 ♂ [N. C. Dept. Agr.]. V. sm. b.
N. end Sullivan Id., South Carolina, Sept. 5, 1911, (R. and H.) 1 ♂. Med. b.
Yemassee, S. C., Sept. 4, 1911, (R. and H.) 6 ♂, 6 ♀, 1 ♀ n. All lg.; 1 ♀ m.
Tybee Id., Ga., Sept. 2, 1911, (H.) 1 ♂. Med. dk. b.
Brunswick, Ga., Aug. 30, 1911, (H.) 1 ♂, 3 ♀. Lg. b.
Cumberland, Id., Ga., Aug. 31, 1911, (R. and H.) 1 ♀. V. lg. m.
Billy's Id., Okefenokee Swamp, Ga., July, 1912, (Bradley) 1 ♀ [Cornell Univ. Collection]. Lg. b.
Homerville, Ga., Aug. 27, 1911, (R. and H.) 4 ♂, 8 ♀. Lg. b.
Thomasville, Ga., May 21 to Dec. 11, 1903, (H; for H.) 6 ♂, 18 ♀ [Hebard Collection]. Med.; some pl.; 1 ♂; 10 ♀ m.: Mar. 18, 21, 1904, (H.) 4 n.
Bainbridge, Ga., July 15–27, 1909, Sept. 2–7, 1910, (Bradley) 1 ♂, 4 ♀ [Collection State of Ga.]. Pair med., others v. large; all m.
Georgia, 1 ♀ TYPE. [Scudder Collection]. Med. b.
Atlantic Beach, Florida, Aug. 24, 1911, (R. and H.) 2 ♂, 1 ♀. Lg. b.
Pablo Beach, Fla., Aug. 11, 12, 1905, (R. and H.) 2 ♂, 4 ♀. Lg.; 2 ♀ m.
Jacksonville, Fla., (Slosson) 1 ♂ [Scudder Collection]; (Pridday) 1 ♂. TYPE, *N. aterrimus* Sc. [Hebard Collection ex Bruner]. Med. dk. b.
Gainesville, Fla., Aug. 18, 1905, (R. and H.) 1 ♀. Lg. b.
Bronson, Fla., Aug. 16, 1905, (R. and H.) 1 ♂. Lg. m.
Cedar Key, Fla., Aug. 17, 1905, (R. and H.) 1 ♂, 1 ♀. Med. b.
Sanford, Fla., 1 ♂ [Scudder Collection].
Orlando, Fla., Nov. 15, 1901, (Polk) 1 ♀ [U. S. N. M.]. Sm. dk. b.
Lakeland, Fla., Nov. 8, 1911, (Davis) 5 ♂, 2 ♀ [Davis Collection and U. S. N. M.]. Med. b., 1 ♂ m.
Tampa, Fla., Jan. 16, 1904, (H.) 1 ♀, 1 ♀ n. Sm. b.; 1 ♂, 2 ♀ [Collection State of Ga.]. Med. dk. m.

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[36] This locality is wrongly given with the original description in the *Biologia* as Ciudad in Durango.

[37] This large series is of particular interest owing to the great amount of variation shown not only in size, but also in color. As the locality would suggest, the present series contains many intermediates between *fasciatus* and *fasciatus socius*.

Sarasota, Fla., Jan. 29, Mar. 1, 1911, (Blatchley) 1 ♂, 2 ♀ [Blatchley Collection]. Med. b.
Charlotte Harbor, Fla., 1 ♀ [Scudder Collection].
Fort Myers, Fla., Mar. 12, 1911, (Blatchley) 1 ♂ [Blatchley Collection]. Med. b.
Miami, Fla., Mar. 28, 1910, (H.) 1 ♂. Med. dk. m.
Homestead, Fla., July 10, 12, 1912, (R. and H.) 1 ♂. Sm. dk. b.
New Orleans, Louisiana, Nov.–Dec., 1882, (Shufeldt) 1 ♂ [U. S. N. M.]. Med. b.
De Kalb, Texas, Sept. 1, 1904, (C. R. Jones) 1 ♂ [U. S. N. M.]. Med. pl. m.
Dallas, Tex., (Boll) 5 ♂, 7 ♀, 2 — n.[38] [Scudder Collection, Hebard Collection ex Bruner, U. S. N. M.]. Med. and lg., pl.; 1 ♂ m.
College Station, Tex., Dec. 27–29, 1905, (Hart) 5 ♂, 2 ♀ [Ill. State Lab. Nat. Hist.] Med. b.
Beaumont, Tex., July 23, 1912, (H.) 10 ♂, 8 ♀. Med., 5 ♂, 4 ♀ m. (at light).
Columbus, Tex., June 10, 1879, 1 ♀ [U. S. N. M.]. Med. pl. b.
Galveston, Tex., July 19–21, 1912, (H.) 9 ♂, 7 ♀; Jan. 3, 1906, (Hart) 1 ♀ [Ill. State Lab. Nat. Hist.]. Med. b.
Virginia Point, Tex., July 21, 1912, (H.) 1 ♂. Med. b.
Webster, Tex., July 19, 1912, (H.) 1 ♀. Med. b.
Rosenberg, Tex., July 25–26, 1912, (H.) 1 ♀. Lg. b.
Victoria, Tex., June, 1902, (Caudell) 1 ♂, 2 ♀ [U. S. N. M.]. Med. pl. m.
Sarita, Tex., Dec. 5, 1911, (Hart) 1 ♀ [Ill. State Lab. Nat. Hist.]. Lg. dk. b.
Brownsville, Tex., July 31–Aug. 5, 1912, (H.) 1 ♀ n.; (Townsend) 1 ♂. Med. m.
Mexico City, Mexico, 8,190 feet, (Forrer) 1 ♀. TYPE, *N. hastatus* Sauss. [Br. Mus.]. V. sm. dk. b.

Nemobius fasciatus abortivus Caudell.

1904. *Nemobius fasciatus* var. *abortivus* Caudell, Can. Ent., XXXVI, p. 248. (Original description.) [Moose Jaw, Saskatchewan.]
1906. *Nemobius fasciatus* var. *abortivus* E. M. Walker, Can. Ent., XXXVIII, p. 59. [Common everywhere on prairies, Manitoba, Assiniboia (Saskatchewan), Alberta.]
1908. *Nemobius fasciatus abortivus* Caudell. Proc. U. S. Nat. Mus., XXXIV, p. 81. [Calgary, Medicine Hat, Moose Jaw, Canada; Portal, N. Dak.]
1910. *Nemobius fasciatus abortivus* E. M. Walker, Can. Ent., XLII, p. 355. [Aweme, Elkhorn, Manitoba; Yellow Grass, Moosomin, Vonda, Saskatchewan.]
1911. *Nemobius fasciatus* form *abortivus* Rehn and Hebard, Ent. News, XXII, p. 10. [Aweme, Manitoba.]
1911. *Nemobius fasciatus abortivus* E. M. Walker, Can. Ent., XLIII, p. 304. [Ft. William, Ont.]
1912. *Nemobius fasciatus abortivus* Caudell and Hebard, Proc. Acad. Nat. Sci. Phila., 1912, p. 168. (Single type fixation.)

Individuals of the present geographic race of *N. fasciatus* are found to differ from typical specimens of the species in their much smaller size, very dark coloration, extreme abbreviation of the tegmina, and, in the female, by differences in the ovipositor, the apex of which is fully as much enlarged but for a less distance than in *fasciatus*, being more obliquely subtruncate, and is provided with more pronounced teeth.

[38] All belong to the type series of the synonymous *Nemobius canus* Scudder, with the exception of the macropterous specimen, which is labelled *N. socius* by Scudder.

Though resembling *N. maculatus* closely in size and somewhat in form, individuals of this race may be separated by the absence of light markings on the head, immaculate and dark coloration, less sharply truncate tegmina in both sexes, more shiny appearance in the males, and different apex of the ovipositor in the females.

TYPE: ♂; Moose Jaw, Saskatchewan. In grass along borders of draw on prairie. August 24, 1903. (Caudell) [U. S. N. M. Collection.]

Description of Type.—Size smallest of the races of *fasciatus*, similar to *N. maculatus* in size, but form not quite so robust. Head, eyes, and pronotum as in *fasciatus*. Tegmina not as long as the caudal femur, translucent and rather abruptly rounded distad, though not as sharply truncate as in typical *maculatus*. Wings absent. Abdominal appendages and first proximal internal spine of caudal tibiæ as in *fasciatus*. Limbs as in *fasciatus*.

Allotypic ♀, here selected, bears the same data as the type.

Description of Allotype.—Size larger, but proportions much as in the type. Tegmina much shorter than the caudal femur, broadly rounded distad, though not as much so as in typical *maculatus*, longitudinal veins rather conspicuous, cross veinlets faint. Wings absent. Ovipositor long, longer than caudal femur, rigid, with a scarcely perceptible arcuation, apex of same sublanceolate, enlarged for a shorter distance than in *fasciatus* and more obliquely subtruncate than in that species, with that portion formed by the dorsal valves armed, the upper margin dentate, these teeth rather irregular, heavy, and sharply cut.

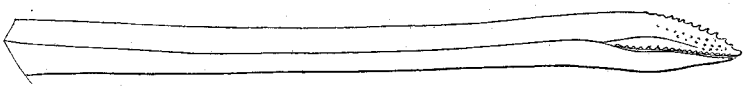

Fig. 5.—*Nemobius fasciatus abortivus*. Ovipositor. (Greatly magnified.)

Measurements (in millimeters).

	Allotype.	TYPE.	Average of paratypic series.	
	♀	♂	♀ ♀	♂ ♂
Length of body	9.	7.4	8.2 (7.3–9.)	7.3 (6.7–8.)
Length of tegmina	3.5	4.8	3.6 (3.1–4.6)	4.9 (4.3–5.8)
Length of caudal femur	5.4	5.1	5.8 (5.4–6.2)	5.2 (4.9–5.5)
Greatest width of caudal femur	1.8	1.7	1.9 (1.8–2.1)	1.8 (1.7–1.9)
Length of ovipositor	6.2	.....	6.8 (6.2–7.4)	.....

The above measurements show that when compared with the smallest individuals of *fasciatus*, the length of the caudal femur of

this race averages considerably less, while the length of the ovipositor is also less in the majority of cases.

The small dark form of *fasciatus* found in eastern Ontario and Michigan, of which Walker speaks,[39] is, as he has stated, but a degenerate and does not, as Caudell has supposed,[40] belong to the present geographic race. From this it may be separated by the general coloration, which although dark, is not as nearly black as in *fasciatus abortivus*, and the ovipositor which is exactly as in *fasciatus*. Intermediates between such individuals and *fasciatus abortivus* will undoubtedly be found frequently in the area of intergradation between *fasciatus* and the present geographic race. The individuals from Aweme, Man., before us, do not show the characters which define the geographic race as distinctly as do the specimens from the type locality, all of the other specimens here treated are typical.

Color Notes.—The males of the present geographic race appear to be shiny black to the naked eye, but under a Zeiss binocular are found to be shiny dark clove brown in general coloration. The maxillary palpi are darker than in typical *fasciatus*. The yellow line of the discoidal vein of the males is extremely narrow, and the yellowish markings of the postocular portion of the genæ and ventral margin of the lateral lobes are absent or very greatly reduced and obscured in both sexes. The tegmina of the females have the dorsal field sepia in general color with the longitudinal veins tinged with tawny and the median vein distinctly outlined in clove brown, which is also the color of the entire lateral field with the exception of the intermediate channel which is of the same color as the dorsal field. Several of the females of *fasciatus abortivus* before us have a general coloration which is somewhat less dark, and in these specimens the dorsal surface of the insect approaches sepia with a faint tawny cast and in one or two individuals the pale stripes of the occiput are faintly indicated.

Distribution.—This geographic race is found over the prairie region of Manitoba, Saskatchewan, and Alberta in the Dominion of Canada, and in the adjacent portions of the United States. It has also been taken as far east as Fort William, in extreme western Ontario.

Biological Notes.—Caudell has found this race plentiful in the grass along the borders of a draw on the prairie at Moose Jaw, Sask., while Walker states that it is common everywhere on the prairies of Manitoba, Saskatchewan, and Alberta. The latter author

[39] *Can. Ent.*, XXXVI, p. 184.
[40] *Can. Ent.*, XXXVI, p. 248.

when at Fort William, Ont., noted that its song differed from that of *fasciatus* and described it as "a low continuous trill." No macropterous specimens have been taken.

Specimens Examined.—48: 19 males, 29 females.

Aweme, Manitoba, Aug. 8, 24, 25, 30, Sept. 22, Oct. 5, 6, 1904–09, (Criddle) 4 ♂, 7 ♀ [Hebard, University of Toronto, and A. N. S. P. Collection].
Portal, North Dakota, Aug. 25, 26, 1906, (Caudell) 1 ♂, 1 ♀ [U. S. N. M.].
Moose Jaw, Saskatchewan, Aug. 24, 1903, (Caudell) 9 ♂, 14 ♀, TYPE, allotype, paratypes; August, 1906, (Caudell) 4 ♂, 4 ♀ [U. S. N. M., Blatchley and Hebard Collection].
Medicine Hat, Alberta, August, 1906, (Caudell) 2 ♀ [U. S. N. M.].
Calgary, Alta., August, 1906, (Caudell) 1 ♂, 1 ♀ [U. S. N. M.].

Nemobius maculatus Blatchley.

1900. *Nemobius maculatus* Blatchley, Psyche, IX, pp. 52, 53. (Original description.) [Marion and Vigo Counties, Ind. In small numbers.]
1903. *Nemobius maculatus* Blatchley, Orth. of Indiana, pp. 420, 424, 425. [Marion and Vigo Counties, Ind. Low open woods, near and under logs.]
1903. *Nemobius confusus* Blatchley, Orth. of Indiana, pp. 421, 428, 429. (In part.) (Description of ♂.) [Tippecanoe Lake, Kosciusko County, Ind. Low damp woods.]
1904. *Nemobius maculatus* Mead, Dept. Zool. Ent. Ohio State Univ., No. 19, pp. 110, 112. [Franklin County, O.]
1906. *Nemobius maculatus* Hart, Ill. State Lab. Nat. Hist., Descr. Syn. Ins. Coll., II, Orth., p. 89. [Illinois. About logs and dead wood in sparse woods and near streams.]
1908. [*Nemobius*] *maculatus* Brimley, Ent. News, XIX, p. 21. [Raleigh, N. C. Mixed woods.]
1911. *Nemobius maculatus* Sherman and Brimley, Ent. News, XXII, p. 391. [Raleigh and Jefferson, N. C.]

The long straight ovipositor of the present species having the dorsal margin of its apex obliquely subtruncate and armed with teeth places it at once in the first of the North American subgenera, *Allonemobius*, of which *fasciatus* is the type.

From typical *N. fasciatus* it is possible to distinguish *maculatus* by its smaller size and more compact structure, the different markings on the head and maxillary palpi and more mottled general color pattern, the short tegmina which are more quadrate in the male and more nearly squarely truncate in the female, and the shorter more rigid ovipositor which is armed with very sharp teeth.

From *N. griseus* it may be distinguished by all the characters which separate that species from all other species of the subgenus.

A general superficial resemblance to *N. ambitiosus* is noticeable, but examination at once reveals the many differential characters of that aberrant species.

Described from one male and nine females from two localities.

SINGLE TYPE here designated: ♀; Marion County, Indiana, in low open woods. October 6, 1895. (Blatchley.) [Blatchley Collection.]

We here describe a female paratype bearing the same data as the type, excepting the date, which is September 10, 1895, in the United States National Museum.

Size medium for the genus, form robust; head rather large, full and rounded, about as wide as the pronotum. Maxillary palpi of much the same form as in *fasciatus*, but with joints not quite as much produced as in that species. Eyes broad-ovate, moderately protruding. Pronotum, when compared with that of *fasciatus*, slightly less transverse, narrowing very slightly cephalad. Tegmina not half as long as caudal femur, apex at humeral angle broadly but distinctly obtuse-angulate, sutural margin passes into distal margin with a distinct angulation, longitudinal veins rather conspicuous, cross-veinlets very weak. Wings absent. Supra-anal plate and cerci as in *fasciatus*. Ovipositor long, equal to the caudal femur in length, rigid, almost straight, apex similar to that of *fasciatus*, but armed with very sharp teeth.[41] Subgenital plate scoop-shaped, caudal margin arcuato-truncate, briefly cleft mesad.[42] Caudal femora slightly more robust than in *fasciatus*.

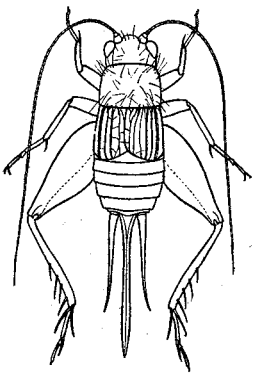

Fig. 6.—*Nemobius maculatus*. Dorsal view of female here described. (× 3.)

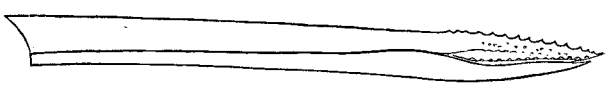

Fig. 7.

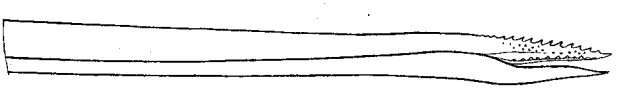

Fig. 8.

Figs. 7, 8.—*Nemobius maculatus*. Ovipositor; normal (Fig. 7) and distorted (Fig. 8). (Greatly magnified.)

A topotypic male taken October 16, 1904, by Blatchley, and in the Blatchley Collection, affords the additional data given below.

[41] The series of specimens before us show that, when the ovipositor has received usage, these teeth become blunt, and in some cases have been worn down until their bases alone remain.

[42] The degree of truncation and division of the subgenital plate is variable in this species as well as in *fasciatus*.

Size slightly smaller, proportions much as in the female. The tegmina are translucent, and when in repose the dorsal fields are quadrate in outline, with the caudal margin broadly arcuato-truncate. Subgenital plate as in *fasciatus*. Proximo-internal spine of caudal tibia as described under *Morphological Notes* in the generic discussion of the present paper.

Measurements (in millimeters).

	Marion County, Ind.		
	Paratype.	Average of series.	
	♀	♂♂	♀♀
Length of body	8.3	7.3 (6.5–8.4)	8.3 (7.7–9.)
Length of pronotum	1.9	1.8	2. (1.9–2.2)
Caudal width of pronotum	2.7	2.5 (2.3–2.7)	2.7 (2.4–2.8)
Length of tegmen	2.7	3.8	2.9 (2.5–3.1)
Length of caudal femur	6.1	5.6 (5.2–5.9)	6.5 (6.1–6.8)
Greatest width of caudal femur	2.3	2.	2.4 (2.2–2.6)
Length of ovipositor	6.	.....	6.4 (5.9–6.8)

	Cabin John Run, Md.		Chestnut Hill, Pa.	
	Average of series.			
	♂♂	♀♀	♂	♀
Length of body	7.5 (7. –8.)	8.4 (7.6–9.1)	8.2	9.
Length of pronotum	1.8 (1.7–1.9)	1.9 (1.8–2.1)	1.9	2.
Caudal width of pronotum	2.5 (2.4–2.7)	2.5 (2.4–2.7)	2.4	2.6
Length of tegmen	3.8 (3.5–4.)	2.5 (2. –3.1)	4.3	3.2
Length of caudal femur	5.8 (5.6–6.)	6. (5.4–6.4)	5.7	6.1
Greatest width of caudal femur	2.1 (2. –2.2)	2.2 (2. –2.6)	2.1	2.1
Length of ovipositor	.....	6. (5. –6.8)	.....	5.8

As in other characters, there is very much less variation in the size and proportions of the present species than in *fasciatus*. In the entire series before us there are no specimens noticeably larger or smaller than those whose measurements are given above.

Color Notes.—The specimens here described are typical in coloration of the great majority of specimens of the species before us. General color bistre with a tawny suffusion, the dorsum of the pronotum dotted, and the caudal limbs mottled with darker brown. Head with a narrow pale yellowish line about the eyes except on the infra-ocular portion of the genæ, a medio-longitudinal line of the same color faintly indicated on the occiput. Maxillary palpi, of male with proximal portion of penultimate segment pale, of female with penultimate segment and proximal portion of terminal segment

russet.[43] Lateral lobes of pronotum broadly barred with clove brown, the immediate ventral margin of the general coloration of the insect. Tegmina with dorsal field of male translucent bistre, with discoidal vein narrowly outlined in ivory white; dorsal field of female bistre with a tawny suffusion, the median vein pale yellowish; lateral field in both sexes clove brown. Ovipositor very dark vandyke brown.

As has been noted, the males are usually darker than the females and in consequence have the abdomen wholly clove brown, while in the females this portion of the body is usually bistre, more or less suffused with tawny. In a few of the specimens of darkest coloration the light markings on the head are, as would be expected, considerably obscured.

Distribution.—The present species is distributed over the Upper Austral Zone of the eastern United States and has been taken from Flatbush, L. I., N. Y., southward through New Jersey, Pennsylvania, Maryland, and Virginia, as far as Raleigh, N. C., and westward through Ohio and Indiana to Illinois.

Biological Notes.—This is a secretive species which is almost always found among leaves and about logs in woods, particularly in damp situations. In such places colonies of considerable size are sometimes to be found, but unless special effort is made to locate these, the little insects in most cases wholly escape the notice of the collector.

This is one of the species of *Nemobius* in which the reduction of the tegmina has reached an advanced stage, and we are consequently not surprised to find no macropterous individuals in the series of specimens before us.

Synonymy.—No synonyms of the present species have been erected. Specimens of the diminutive and peculiarly colored type of *fasciatus* discussed under that species have been referred by Walker on Scudder's identification, and by Rehn and Hebard to the present species.

Specimens Examined.—81: 27 males, 53 females, and 1 nymph.

Flatbush, Long Island, New York, Sept. 30, 1890, (Zabriskie) 1 ♀ [Am. Mus. Nat. Hist.] Normal.
Staten Island, N. Y., Sept. 19, (Davis) 1 ♂, 1 ♀ [Davis Collection]. Normal.

[43] This difference of coloration is due to the fact that the female is lighter than the male, this is usually the case in the present species. The series before us indicates that, in *maculatus* as in *fasciatus*, the lightest portion of the maxillary palpi is the proximal portion of the penultimate segment. In pale specimens the light coloration extends from the apex of the segment which precedes the penultimate to the base of the terminal segment.

Camphill, Cumberland Co., Pennsylvania, Oct. 19, 1 ♂ [Pa. St. Sept. Zool.]. Normal.

Chestnut Hill, Pa., Oct. 4, 1903, (H.) 2 ♂, 4 ♀. Few somewhat rufous.

Cabin John Run, Maryland, Sept. 19, 1911, (Davis) 7 ♂, 18 ♀, 1 ♂ n. [Davis Collection]. Rather.

Plummers Island, Md., Oct. 6, 10, 1906, 1909, (Caudell, Fisher, Barber) 2 ♂, 6 ♀ [U. S. N. M.]. Normal and somewhat rufous.

Washington, D. C., Sept. 20, 1911, (Davis) 1 ♂ [Davis Collection]; Oct., 1909, (Caudell) 1 ♀ [U. S. N. M.]. ♂ normal, ♀ very rufous.

Fairfax County, Virginia, Sept. 21, 1911, (Davis) 1 ♂, 2 ♀ [Davis Collection]. Normal.

Alexandria County, Va., Sept., 1911, (Davis) 1 ♂, 10 ♀ [Davis Collection]. Rather dark.

Cherrydale, Va., Oct. 9, 1908, (Caudell) 1 ♂, 2 ♀ [U. S. N. M.]. Pale rufous.

Dead Run, Va., Aug. 12, 1912, (Caudell) 1 ♂ [U. S. N. M.]. Rather dark.

Raleigh, North Carolina, Oct. 30, 1905, (Brimley) 1 ♂, 2 ♀ [Brimley and Hebard Collection]. Very pale, rufous.

Tippecanoe Lake, Kosciusco County, Indiana, Aug. 26, 1902, (Blatchley) 2 ♂. Part of type series of *N. confusus*. [Blatchley Collection]. Dark.

Marion County, Ind., Sept. 10, 1895, (Blatchley) 1 ♀. Paratype [U. S. N. M.]; Oct. 16, 1904, (Blatchley) 3 ♂, 4 ♀ [A. N. S. P., U. S. N. M., Hebard Collection]. 1 ♂, 3 ♀ rather rufous.

Vigo County, Ind., (Blatchley) 1 ♀. Paratype [Hebard Collection].

Buckeye Lake, Ohio, Sept. 12, 1912, 1 ♂ [Ohio State Univ.].

Sugar Grove, Ohio, Sept. 28, 1912, 1 ♂ [Ohio State Univ.].

Cincinnati, Ohio, Oct. 19, 1912, 1 ♂ [Ohio State Univ.].

Nemobius griseus E. M. Walker.

1900. *Nemobius cubensis* Blatchley (not of Saussure, 1874), Psyche, IX, p. 54. [Terre Haute, Ind. Sandy canal.]

1903. *Nemobius cubensis* Blatchley (not of Saussure, 1874), Orth. of Indiana, pp. 420, 425. (Material recorded in 1900.)

1904. *Nemobius griseus* E. M. Walker, Can. Ent., XXXVI, pp. 181, 182. (Original description.) [High Park at Toronto, Sarnia, and de Grassi Point on Lake Simcoe, Ontario. On sandy soil.]

The present insect is an aberrant member of the subgenus *Allonemobius*, typical individuals of which may be distinguished from the other species by the proportionately longer ovipositor, which usually exceeds the length of the caudal femur by about one-quarter, the more grayish general coloration and the distinctive coloration and marking of the head which is deep shining piceous below the antennæ, and grayish or brownish gray above, with two or three usually distinct dark narrow longitudinal stripes on the occiput.

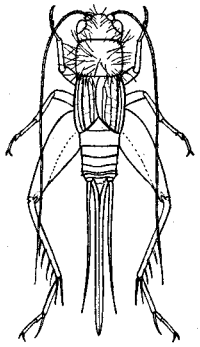

Fig. 9. — *Nemobius griseus*. Dorsal view of female. (× 3.)

Described from twelve males and thirteen females from three localities.

SINGLE TYPE here designated: ♀; High Park, Toronto, Ontario. On sandy soil. September 8, 1902. (E. M. Walker.) [University of Toronto Collection.]

Description of Type.—Size medium for the genus; form moderately slender; head rather

large, full and rounded, about as wide as the pronotum. Maxillary palpi much as in *fasciatus* in general form, but with joints not as much produced. Eyes not as prominent as in that species, somewhat more broadly ovate. Pronotum, when compared with that of *fasciatus*, slightly less transverse, narrowing very slightly cephalad. Tegmina more than half as long as caudal femora, apex at humeral angle nearly rectangulate and sharply rounded, sutural margin passes into distal margin with an appreciable angulation, longitudinal veins very conspicuous, cross-veinlets numerous but very faint. Wings absent. Ovipositor very long, exceeding the length of the caudal femur by about one-quarter, nearly straight, stout, apex of same of

Fig. 10.

Fig. 11.

Figs. 10 and 11.—*Nemobius griseus*. Cephalic (Fig. 10) and dorsal (Fig. 11) aspect of color pattern of head. (× 4.)

the *fasciatus* type but slightly shorter and heavier, with dorsal margin armed with prominent, sharp, regularly spaced teeth.

Allotypic male, here selected, bears the same data as the type excepting that it was taken August 16, 1902; it is also in the University of Toronto Collection.

Description of Allotype. Size considerably smaller; form more slender than the type. Tegmina are translucent and when in repose the dorsal fields have the sides subparallel with the caudal margin arcuato-truncate. Spines of caudal tibiæ somewhat more slender than in *fasciatus*.

Measurements (in millimeters).

	Toronto, Ont.					
	Type.	Allotype.	Paratypes.			
	♀	♂	♀	♀	♀	♂
Length of body	8.2	7.3	8.	8.6	7.8	7.5
Length of pronotum	1.9	1.6	2.1	1.7	1.6	1.5
Caudal width of pronotum	2.5	2.1	2.4	2.3	2.2	2.
Length of tegmina	4.	4.	3.	4.9	2.9	4.1
Length of wings	.....	.....	.....	10.9	.....	.....
Length of caudal femur	6.9	5.2	6.8	6.3	5.8	5.
Greatest width of caudal femur	2.3	1.7	2.1	2.	2.	1.7
Length of ovipositor	8.9	.....	8.3	8.2	8.	.....

	de Grassi Point, Ont.			Terre Haute, Ind.	Crawford Co., Ind.
	Paratype.				
	♀	♂	♂	♂	♂
Length of body	7.6	6.8	6.8	7.	8.
Length of pronotum	1.6	1.4	1.4	1.6	1.8
Caudal width of pronotum	2.1	2.1	1.9	2.2	2.5
Length of tegmina	2.9	4.	4.	4.2	4.9
Length of wings	.....	.....	.....	.....	.....
Length of caudal femur	5.7	5.	4.9	5.3	6.
Greatest width of caudal femur	2.	1.8	1.7	1.9	2.
Length of ovipositor	7.2	.....	.....	.....	.....

The measurements of all the specimens before us of the present species are given above, these indicate that there is considerable variation in the proportions of *griseus*, but in other respects the specimens are very similar.

Color Notes.—The specimens we have examined are quite similar in coloration. General color, in pale specimens, hair brown; in dark specimens, clove brown washed with grayish. Head below the antennæ deep shining piceous, above of the general coloration with two or sometimes three usually distinct, dark, narrow, longitudinal stripes on the occiput. Eyes wood brown. Maxillary palpi with

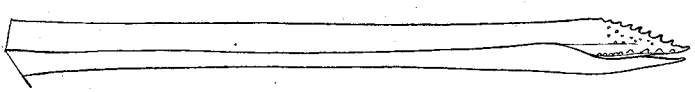

Fig. 12.—*Nemobius griseus*. Ovipositor. (Greatly magnified.)

penultimate segment the palest, terminal segment very dark. Dorsum of pronotum, dorsal surface of abdomen and of caudal femora of the general coloration, excepting that the first segments of the abdomen, concealed beneath the tegmina, are shining black, while the exposed segments have each a small dark median spot. Lateral lobes of pronotum broadly banded with clove brown, the ventral margin narrowly marked with buff, which marking is, in the majority of specimens, a mere line. Tegmina translucent; male with dorsal field of the general coloration, the discoidal vein narrowly outlined in buff, lateral fields clove brown becoming pale toward the costal margin; female with dorsal field broccoli brown, in some specimens somewhat tinged with rufous, intermediate channel somewhat paler with a black line on the dorsal margin bordering the median vein, lateral field similar in coloration to the dorsal field with the exception of a dark area between the humeral and mediastine veins, which in

pale specimens is seal brown and in dark specimens black. Ventral surface of body, caudal femora and sometimes other limbs wood brown, more or less suffused with russet in the males, and all but the median portion obscured with dark brown in one female. Cephalic and median limbs and caudal tibiæ clove brown maculate with a paler shade.

Distribution.—This insect is known from the type localities in the central portion of eastern Ontario and from southwestern Indiana.

Biological Notes.—The insect has been found only on sandy soil among scant vegetation. Dr. Walker tells us that its pale colors render it very inconspicuous against the sand. Thirty specimens of the present species have now been recorded, of which but one is macropterous.

Synonymy.—No synonyms of the present species exist. Blatchley, however, was led to record specimens of this insect as *N. cubensis* in 1900 and 1903, owing to Scudder's incorrect determination.

Specimens Examined.—13: 7 males, 6 females.

De Grassi Point, Lake Simcoe, Ontario, Sept. 15, 1901, (E. M. Walker) 1 ♀. Paratype; Aug. 14, 1904, (E. M. Walker) 2 ♂, 1 ♀ [University of Toronto and U. S. N. M.].

High Park, Toronto, Ont., Aug. 16, Sept. 8, 1902, (E. M. Walker) 3 ♂, 3 ♀. TYPE, Allotype, Paratypes. [University of Toronto and A. N. S. P.].

Terre Haute, Indiana, Oct. 9, 1893, (Blatchley) 2 ♂ [Blatchley Collection].

Crawford County, Ind., Sept. 4, 1902, (Blatchley) 1 ♂ [Blatchley Collection].

Nemobius griseus funeralis Hart.

1906. *Nemobius funeralis* Hart, Ent. News, XVII, p. 159. (Description.) [College Station, Tex.]

The present interesting insect is very different from any of the other species found in Texas, but, although known from the unique type only, comparisons with the type and other specimens of Walker's *N. griseus* show without question that it is a geographic race of that species differing only in the darker coloration, more obscure color pattern and much shorter ovipositor. Material from the country which intervenes between the type locality and the range of typical *griseus* will doubtless show intermediates much as those found between *N. fasciatus* and its southern race *N. fasciatus socius*, although in the present race the differentiation appears to have reached a more advanced degree.

TYPE: ♀; College Station, Brazos County, Texas. December 26, 1905. (Charles A. Hart) [Illinois State Laboratory of Natural History Collection.]

Description of Type.—Size and form similar to that of smaller individuals of *N. griseus*. Head, maxillary palpi, eyes, pronotum,

and tegmina[44] as in that species. Wings absent. Ovipositor[45] precisely as in *griseus*, but very much shorter, little over three-quarters the length of the caudal femur.

Measurements (in millimeters).

	TYPE, ♀. College Station, Tex.
Length of body	7.9
Length of pronotum	1.7
Caudal width of pronotum	2.
Length of tegmina	2.7, 2.9
Length of caudal femur	5.6
Greatest width of caudal femur	1.8
Length of ovipositor	4.[46]

Color Notes.—The type is much darker than the series of *N. griseus* before us, being in general coloration very dark clove brown (almost black) washed with grayish, but the distinctive markings of that insect are all present in this dark specimen although less prominent. The portion of the head below the antennæ is deep shining piceous, exactly as in *griseus*, while the occipital stripes though faint are clearly discernible under a Zeiss binocular. Eyes clove brown and maxillary palpi of the same color, the distal portion of the third segment and the entire penultimate segment somewhat paler. Pronotum wholly of general coloration excepting in the cephalic portion which is somewhat paler, particularly so on the lateral lobes. Tegmina with dorsal field broccoli brown faintly tinged with rufous, intermediate channel of same coloration with the black line of the dorsal margin (often striking in *griseus*) very narrow; lateral fields black. Femora and ventral surface of body black; other portions of limbs bistre.

Distribution.—The present insect is known only from College Station, in central southeastern Texas.

Specimens Examined.—1: 1 female.

College Station, Texas, Dec. 26, 1905, (Hart) 1 ♀. TYPE *N. funeralis* Hart. [Ill. State Lab. Nat. Hist.] b.

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[44] The right tegmen of the type is slightly shrivelled.

[45] The ovipositor of the type has the dorsal and ventral valves considerably separated at their extremities as is so frequently found in *N. bruneri*.

[46] Hart gives in the original description 3.5 mm. for this length, probably because he measured the length of the exposed ventral surface of the shaft. The measurements given throughout the present paper for this length are taken from the base of the ovipositor, within the subgenital plate, to the apex of the ovipositor.

Nemobius ambitiosus Scudder.

1877. *Nemobius ambitiosus* Scudder, Proc. Bost. Soc. Nat. Hist., XIX, pp. 81, 82. (Original description.) [Fort Reed, Fla.]
1896. *Nemobius ambitiosus* Scudder, Jn. N. Y. Ent. Soc., IV, pp. 99, 104. [Fort Reed, Charlotte Harbor, Sandford, Indian River, and Jacksonville, Fla.]
1896. *Nemobius ambitiosus* Scudder, Psyche, VII, p. 432. [New key.]
1902. *Nemobius ambitiosus* Blatchley, A Nature Wooing, pp. 40, 223. [Ormond, Fla.]
1905. *Nemobius ambitiosus* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1904, p. 800. [Thomasville, Ga., Leon County, Fla. In pine straw.]
1905. *Nemobius ambitiosus* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1905, p. 50. [Miami, Tampa, Fla. In dead leaves.]
1907. *Nemobius ambitiosus* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1907, p. 317. [Pablo Beach, San Pablo, and Gainesville, Fla. Undergrowth in pine woods and in palmetto scrub.]
1909. *Nemobius ambitiosus* Hebard, Ent. News, XX, p. 115. [Thomasville, Ga. Frequent in pine woods. December.]
1911. *Nemobius ambitiosus* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1910, p. 596. [Bainbridge, Ga.]
1911. *Nemobius ambitiosus* Allard, Ent. News, XXII, p. 156. [Thompson's Mills, Ga. One of the commonest and earliest species.]
1912. *Nemobius ambitiosus* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1912, p. 273. [Miami and Homestead, Fla. Undergrowth in pine woods.]

This trim insect may be immediately distinguished from all other North American species of the genus by the very striking markings of the head and the usually distinctly striped caudal femora. Moreover, in the males, the evenness of the dorsal field of the tegmina, which is bounded by a pale narrow line not only laterad, but caudad as well, gives this sex a very clean-cut appearance, while the scarcely

Fig. 13.

Fig. 14.

Figs. 13 and 14.—*Nemobius ambitiosus*. Cephalic (Fig. 13) and dorsal (Fig. 14) aspect of color pattern of head. (× 4.)

enlarged apical portion of the ovipositor in the opposite sex is distinctive.

The insect is a very aberrant member of the subgenus *Allonemobius*. Although a small amount of variation exists in size, proportions, and tone of general coloration, the peculiarly striking color pattern is constant in the present species.

Described from a series of eleven specimens from a single locality.

SINGLE TYPE here designated: ♀ ; Fort Reed, Florida. April 20–22, 1876. (Comstock.) [Scudder Collection.]

We here describe a female from Gainesville, Fla., taken August 16, 1905, in the undergrowth of the pine woods by Rehn and Hebard.

Size medium for the genus, form robust; head rather large and rounded, but considerably flattened in front. Maxillary palpi much as in *N. griseus*, but with the penultimate segment much more decidedly constricted in the proximal portion. Eyes broad-ovate, not at all protruding. Pronotum as in *griseus*. Tegmina less than half as long as caudal femora, apex at humeral angle very broadly and roundly obtuse-angulate, distal margin of dorsal field oblique, passing into the sutural margin arcuately without angulation, the intermediate channel not conspicuous and forming part of the dorsal field, longitudinal veins very heavy and straight, cross-veinlets numerous but very faint. Wings absent. Ovipositor slightly longer than the caudal femora,[47] rigidly straight, apex of same scarcely enlarged, dorsal margin of apex armed with an even series of heavy, sharp teeth. Subgenital plate scoop-shaped, shorter than in *N. fasciatus*, with caudal margin straight. Caudal femora with greatest width (meso-cephalic) contained less than three times in the length. Spines of caudal tibiæ stiff, covered with very short hairs, margins very finely serrate; caudal metatarsus furnished on dorsal and ventral margins with unusually heavy bristles.

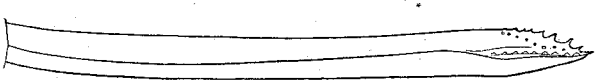

Fig. 15.—*Nemobius ambitiosus*. Ovipositor. (Greatly magnified.)

A male bearing the same data as the female here described furnishes the additional information given below.

Size slightly smaller, form similar to female. The tegmina are translucent and shiny, with the dorsal field when in repose having the sides subparallel and the caudal margin broadly and very evenly arcuate. Subgenital plate similar to that of *N. fasciatus*.

Measurements (in millimeters).

	Thompson's Mills, Ga. Averages of series.	
	♂♂	♀♀
Length of body	7.2 (6.6–7.8)	7.5 (6.9–8.)
Length of pronotum	1.6 (1.5–1.7)	2. (1.9–2.1)
Caudal width of pronotum	2.1 (1.9–2.3)	2.4 (2.3–2.5)
Length of tegmina	4.4 (4.2–4.5)	2.9 (2.7–3.1)
Length of caudal femur	5.6 (5.4–6.)	6. (5.7–6.3)
Greatest width of caudal femur	2.2 (2.1–2.4)	2.3 (2.2–2.4)
Length of ovipositor		5.2 (4.9–5.6)

[47] Examination of the large series before us shows that the length of the ovipositor is variable in the present species and the average measurements show that it is usually not as long as the caudal femora.

Thomasville, Ga.
Averages of series.

	♂♂	♀♀
Length of body	6.8 (6.1–7.8)	7.1 (6.1–8.2)
Length of pronotum	1.7 (1.6–1.9)	1.8 (1.7–2.)
Caudal width of pronotum	2.2 (2.1–2.4)	2.2 (2. –2.4)
Length of tegmina	4.2 (4. –4.5)	2.8 (2.6–3.3)
Length of caudal femur	5.4 (4.8–5.8)	5.6 (5.2–6.)
Greatest width of caudal femur	2. (1.8–2.3)	2.1 (1.8–2.4)
Length of ovipositor	.....	4.5 (3.9–4.8)

Gainesville, Fla.
Extremes of series.

	♂	♂	♀	♀
Length of body	5.9	8.	6.	7.4
Length of pronotum	1.2	1.7	1.6	1.8
Caudal width of pronotum	1.9	2.3	2.	2.6
Length of tegmina	3.2	3.9	2.2	2.8
Length of caudal femur	4.8	6.	4.9	6.1
Greatest width of caudal femur	1.7	2.3	1.7	2.4
Length of ovipositor	.....	.....	4.2	6.4

Homestead, Fla.

	♂	♂	♂	♀	♀
Length of body	6.3	6.1	6.5	7.7	7.6
Length of pronotum	1.6	1.7	1.8	1.8	2.
Caudal width of pronotum	2.	2.	2.2	2.2	2.5
Length of tegmina	3.7	3.6	3.8	2.4	2.7
Length of caudal femur	5.6	5.2	5.5	5.9	5.8
Greatest width of caudal femur	2.	2.	2.1	2.2	2.4
Length of ovipositor	.....	.....	.....	4.8	6.1

Although the variation in size and proportions is well demonstrated by the above measurements, we find the species to vary but little in its distinctive color pattern and tegminal structure. Over the distribution of *ambitiosus* there is no gradual increase or decrease in size, local conditions governing such variation; this is shown by the extremes given for the series from Gainesville, Fla., which series averages rather large, but contains not only the largest, but also the smallest specimens before us.

Color Notes.—The general coloration ranges from cinnamon to clove brown tinged with tawny, frequently more or less flecked with a darker shade and occasionally with grayish, which gives to certain females a rather close superficial resemblance to *N. maculatus*. Both extremes are represented by numerous specimens in the series

before us, those of cinnamon coloration having in almost every case been taken in the undergrowth of the pine woods.

The coloration of the specimens here described is as follows. Occiput and vertex mars brown; face shining piceous, sharply delineated from the vertex by a paler edging of the latter and crossed by a very striking but narrow supra-ocellar band; post-ocular region pale russet. Maxillary palpi with proximal segments cinnamon, terminal segment dark, shading abruptly from cinnamon to clove brown in the proximal fifth. Pronotum mars brown with ventro-caudal angle of lateral lobes clove brown, the immediate margin at this point very pale. Dorsal surfaces of limbs russet, flecked with darker brown; external face of caudal femora, however, strikingly marked with two narrow longitudinal bands of clove brown tinged with tawny. Tegmina of male shining piceous, discoidal vein cream color, which coloration is continued as a narrow distal border to both dorsal and lateral fields, thereby giving the insect a very trim appearance; of female shining piceous, the intermediate channel buffy. Dorsal surface of abdomen of male clove brown tinged with tawny; of female mars brown, that portion hidden by the tegmina piceous in both sexes. In both sexes the ventral surface of the body and limbs is cinnamon.

A number of females before us have the entire dorsal fields of the tegmina of the same paler coloration as the intermediate channel and in such specimens this surface is usually flecked with darker brown. Some specimens have the lateral lobes of the pronotum unicolorous, dark or light brown, and the pale coloration of the margin of the ventro-caudal angle is often much reduced or entirely absent. In a very few of the palest colored specimens the striking markings of the external faces of the caudal tibiæ are absent. The striking cephalic markings are always distinct and are an excellent specific character.

Distribution.—The present species is known to range from Florence, South Carolina, and Gwinnett County in northern Georgia, southward over that State and throughout the mainland of Florida.

Biological Notes.—Allard states that the present species is the first to appear at Thompson's Mills in north Georgia, and describes its song as a very brief, high-pitched, and shrill "tiiiiiiii-tiiiiii-tiiiiiiiii-tiiiiiiii." He further remarks, "It is one of the commonest species of *Nemobius* in this vicinity and begins to stridulate as soon as spring opens in March and April. In April, 1910, very cold periods of weather with considerable sleet and snow completely silenced these

hardy crickets. Notwithstanding this inclement weather, these crickets were always in active stridulation as soon as the days became warmer." The present author has often noticed the same hardiness of this species at Thomasville, Ga., during the winter months, and from there southward the insects are found adult throughout the year. It seems singular that a species showing such hardy habits is so limited in northward distribution. It is our opinion that no macropterous form of the present species exists.

Specimens Examined.—161: 76 males, 73 females, and 12 nymphs.

Florence, South Carolina, Sept. 6, 1911, (R. and H.) 1 ♂, 1 ♀.
Thompson's Mills, Gwinnett County, Georgia, April 17, 1910, (Allard) 3 ♂, 4 ♀, 2 ♂ n., 1 ♀ n. [U. S. N. M.].
Jesup, Ga., December, (H.) 1 ♂; Sept. 1, 1911, (R. and H.) 3 ♀.
Spring Creek near Bainbridge, Ga., June 7–23, 1911, July, 1912, (Bradley) 2 ♀ [Cornell Univ.].
Thomasville, Ga., Feb., Mar., Apr., Oct., Nov., Dec., 1903, 1904, (H. and for H.) 16 ♂, 8 ♀.
Homerville, Ga., Aug. 27, 1911, (R. and H.) 4 ♂, 4 ♀.
Lot 328, 12th Distr., Ware County, N. edge Okefenokee Swamp, Ga., Aug. 28, 1911, (R. and H.) 2 ♂, 2 ♀.
Billy's Island, Okefenokee Swamp, Ga., June, 1912, (Bradley) 1 ♂, 1 ♀, 1 ♂ n. [Cornell Univ.].
Honey Island, Okefenokee Swamp, Ga., June, 1912, (Bradley) 1 ♀ [Cornell Univ.].
St. Simon's Island, Ga., Aug. 30, 1911, (R. and H.) 5 ♂, 6 ♀.
Cumberland Island, Ga., Aug. 31, 1911, (R. and H.) 6 ♂, 5 ♀.
Leon County, Georgia State Line, Florida, Spring of 1903, (H.) 1 ♂.
Live Oak, Fla., Aug. 26, 1911, (R. and H.) 3 ♀.
Jacksonville, Fla., Nov., 1885, (Ashmead) 2 ♂ [Hebard Collection ex Bruner]; (Pridday) 1 ♀ [Hebard Collection ex Bruner]; Nov. 3, 5, 1911, (Davis) 3 ♂, 3 ♀ [Davis Collection].
Atlantic Beach, Fla., Aug. 24, 1911, (R. and H.) 1 ♀.
Pablo Beach, Fla., Aug. 12, 1905, (R. and H.) 1 ♀ n.
San Pablo, Fla., Aug. 13, 1905, (R. and H.) 1 ♀.
Ormond, Fla., Mar. 26, Apr. 9, 1899, (Blatchley) 2 ♂, 2 ♀ [Hebard Collection, A. N. S. P.].
Gainesville, Fla., Aug. 16, 1905, (R. and H.) 15 ♂, 14 ♀.
Indian River, Fla., (Pridday) 1 ♂ [Hebard Collection ex Bruner].
Lakeland, Fla., Nov. 8, 9, 10, 1911, (Davis) 1 ♂, 4 ♀ [Davis Collection].
Tampa, Fla., Jan. 16, 17, 1904, (H.) 1 ♂, 1 ♀.
Sarasota, Fla., Feb. 16, 21, 22, 1911, (Blatchley) 3 ♂, 3 ♀ [Blatchley Collection].
Punta Gorda, Fla., Nov. 12, 14, 1911, (Davis) 1 ♂, 1 ♀, 1 ♂ n. [Davis Collection, U. S. N. M.].
Miami, Fla., Feb. 6, 7, 1904, Mar. 20, 28, 1910, (H.) 4 ♂, 1 ♀, 4 ♂ n., 2 ♀ n.
Homestead, Fla., Mar. 17–19, 1910, (H.) 2 ♂, 2 ♀; July 10–12, 1912, (R. and H.) 1 ♂.

Subgenus BRACHYNEMOBIUS n. subgen.

The subgenus is monotypic. TYPE of subgenus—*Nemobius panteli* n. sp.

Subgeneric Description.—Size large for genus. Disto-ventral spurs of caudal tibia very unequal in length. Proximo-internal spine of caudal tibia in male specialized as described under *Morphological*

Notes for the genus; other spines short and heavy, below concave, with margins of this sulcation minutely serrulate in both sexes, the disto-internal spine not specialized. Ovipositor moderately long, nearly rigidly straight; apex with the margin of that portion formed by the dorsal valves straight and armed with serrulations, the portion formed by the ventral valves unarmed.

The present subgenus finds its nearest relationship in the North American subgenera to *Allonemobius*, from which it differs in the shorter heavier spines of the caudal tibiæ, the ovipositor which has the apex with that portion formed by the dorsal valves not obliquely subtruncate or armed with teeth and a more robust general appearance.

Nemobius panteli n. sp.

1896. *Nemobius mexicanus* Scudder (not of Walker, 1869), Jour. N. Y. Ent. Soc., IV, p. 107. (In part.) [Mescico, Mex.]

This species appears to be related more nearly to *Nemobius fasciatus socius* than to any of the other North American species of the genus. It differs distinctly from that species in the characters given in separating the present subgenus from the subgenus *Allonemobius* as well as in certain important characters of color pattern.

A certain relationship is shown to *Nemobius brasiliensis* in the characters of the apex of the ovipositor, but in other respects these species differ very widely.

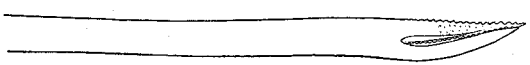

Fig. 16.—*Nemobius panteli.* Ovipositor. (Greatly magnified.)

TYPE: ♀; Mescico, Mexico. (E. Palmer.) [Scudder Collection.]

Description of Type.—Size large, form robust; head large, very full and rounded, about as wide as the pronotum. Maxillary palpi much as in *N. fasciatus*, and eyes and pronotal proportions likewise similar. Tegmina not as long as caudal femora, apex at humeral angle less broadly obtuse-angulate than in most species, sutural margin passes into distal margin with scarcely any angulation, longitudinal veins not heavy, cross-veinlets very faint. Wings absent. Ovipositor considerably shorter than the caudal femur, nearly rigidly straight, stout; apex with that portion formed by the dorsal valves straight and armed with serrulations. Spines of caudal tibiæ distinctive, as given in description of subgenus.

The allotype bears the same data as the type and is also in the Scudder Collection.

Description of Allotype.—Very similar to female. Tegmina similar to those of *N. fasciatus*. Wings absent. Proximo-internal spine of caudal tibia as in *fasciatus*. Spurs and spines of caudal tibiæ distinctive, as given in description of subgenus.

Measurements (in millimeters).

	Mescico, Mex.		San José, Costa Rica.
	Type ♀.	Allotypic ♂.	♂
Length of body	9.2	8.4	7.5
Length of pronotum	1.9	1.9	1.9
Caudal width of pronotum	2.4	2.3	2.3
Length of tegmina	4.	5.2	4.4
Length of caudal femur	6.	6.	6.
Greatest width of caudal femur	2.3	2.3	2.1
Length of ovipositor	4.7	.....	.....

Color Notes.—General coloration of head, pronotum, tegmina, and abdomen clove brown; the dorso-caudal portion of the occiput is russet, this marking extending on the sides of the head as a narrow line which borders the caudal margin of the eyes, the remaining post-ocular portion of the genæ being of the darker general coloration. In front of the paler marking of the occiput there is an indication of four very narrow and faint longitudinal lines of this color and the dorsum of the pronotum is also minutely dotted with russet. In the female the intermediate channel of the tegmina is broccoli brown, in the male wood brown. The limbs are bistre in the female, drab in the male. Ovipositor dark burnt umber.

The specimen from Costa Rica was taken when it had recently reached the adult condition; this specimen shows scarcely any cephalic markings.

Distribution.—The present species is known only from Mescico, Mex., and San José, Costa Rica.

Synonymy.—It is surprising that Scudder, in 1896, considered his specimens of this aberrant species to be the same as the very different *Nemobius cubensis mormonius*, which insect he then erroneously believed to be *Nemobius mexicanus* Walker.

Specimens Examined.—13: 6 males and 7 females.

Mescico, Mexico (near), (E. Palmer) 5 ♂, 7 ♀. Type, Allotype, Paratypes. [Scudder Collection.]

San José, Costa Rica (border of river Maria Aguilar), June, 1905, (P. Biolley) 1 ♂ [A. N. S. P.].

Subgenus ARGIZALA Walker.

The subgenus is monotypic. Type of subgenus—*Nemobius brasiliensis* [*Argizala brasiliensis*] (Walker).

Subgeneric Description.—Size very large for the genus. Pronotum with width almost twice the length, much more transverse than in the other North American subgenera. Disto-ventral spurs of caudal tibia very unequal in length. Proximal-internal spine of caudal tibia in male specialized as described under *Morphological Notes* for the genus; other spines very long, below concave, with margins of this sulcation minutely serrulate in both sexes, the disto-internal spine not specialized. Ovipositor long, nearly rigidly straight; apex with the margin of that portion armed by the dorsal valves straight and armed with serrulations, the portion formed by the ventral valves unarmed. The glossiness of the only known North American species of this subgenus is very striking.

The present subgenus finds its nearest relationship in the North American subgenera to *Allonemobius* and *Brachynemobius*. In form it is perhaps somewhat nearer the former, while the shape and armament of the apex of the ovipositor is similar to that found in the latter subgenus.

Nemobius brasiliensis (Walker).

1869. *Argizala brasiliensis* Walker, Cat. Dermap. Saltat. Br. Mus., I, p. 61. (Original description.) [Santarem, Brazil, and Brazil.]
1877. *Nemobius brasiliensis* Saussure, Mélang. Orth., II, pp. 241, 255, 256. [Brazil.]
1884. *Nemobius fasciatus* Bolivar (not *Gryllus fasciatus* De Geer, 1773), Viaje al Pacifico., Neur. y Ort., p. 107. [Huasco, Peru.]
1895. *Nemobius longipennis* Bruner (not of Saussure, 1874), Bull. Lab. Nat. Hist. Univ. Iowa, III, Pt. 3, p. 67. [Castillo, Nicaragua. In deep woods.]
1896. *Nemobius melleus* Scudder, Psyche, VII, pp. 432, 434. (Description.) [San Rafael, Vera Cruz, Mex.]
1897. *Nemobius fasciatus* Saussure (not *Gryllus fasciatus* De Geer, 1773), Biol. Cent. Amer., Orth., I, p. 243. [San Juan Bautista, Teapa, Tabasco, Mex.]
1906. *Nemobius melleus* Caudell, Proc. U. S. Nat. Mus., XXX, p. 243. [Sapucay, Paraguay.]

This insect is distinguished from all other species of the genus *Nemobius*, excepting *N. major*, by its very large size, peculiar color pattern and glossiness, and ovipositor with the straight dorsal margin of the apex armed with serrulations.

Without being able to examine the type of *major*, we do not feel warranted in considering it a brachypterous individual of the present species. Saussure's description shows *major* to be very closely allied to *brasiliensis*, differing from it in the less transverse pronotum, with bands on either side of the same, and the longer ovipositor.

Based on two females from Brazil.

SINGLE TYPE here designated: ♀; Santarem, Brazil. (Bates) [British Museum].

We here describe a female taken at Medellin, Vera Cruz, Mex., in September, 1895, and in the Hebard Collection.

Size very large for the genus; form compact; head rather large and rounded but a little flattened in front. Maxillary palpi of much the same form as in *N. fasciatus*. Pronotum extremely transverse with length contained nearly twice in greatest (caudal) dorsal width, narrowing evenly and considerably cephalad and with a slight medio-longitudinal sulcus in the cephalic portion. Tegmina nearly as long as the caudal femora, apex of the same dorsal in position, distal margin of dorsal field rotundato-acute-angulate, longitudinal veins conspicuous, cross-veinlets numerous and heavy, faint cross-veinlets are also present in the intermediate channel and traces of such are to be found even between the veins of the lateral fields. Wings very long, considerably more than twice as long as the tegmina. Ovipositor long though shorter than the caudal femur, rigid, straight, apex of same very narrowly sublanceolate, with the margin of that portion formed by the dorsal valves straight and armed evenly with serrulations. Subgenital plate scoop-shaped, more elongate than in *N. fasciatus*, with a deep acute-angulate emargination mesad. Caudal femora with greatest (meso-cephalic) width contained over three times in the length.[48] Spines of caudal tibiæ very long, covered with long hairs and having the margins armed with serrulations which are more than usually conspicuous. Caudal tibiæ and tarsi heavily supplied with fine short hairs.

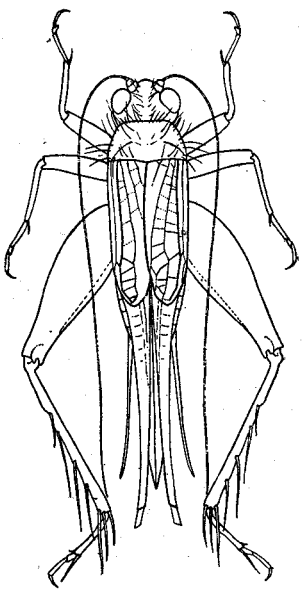

Fig. 17. — *Nemobius brasiliensis*. Dorsal view of female. (× 3.)

A male from Castillo, Nicaragua, taken in February, 1893, by B. Shimek and now in the Hebard Collection ex Bruner, affords the additional characters given below.

Size considerably smaller; proportions much as in the female. Tegmina transparent and when in repose the dorsal fields are hemi-

[48] In the Paraguayan specimens this character does not hold.

elliptical in outline. Subgenital plate and first proximal internal spine of caudal tibia much as in *fasciatus*.

Measurements (*in millimeters*).

	Castillo, Nicaragua.	Medellin, V. C., Mexico.	San Rafael, V. C., Mexico.	Sapucay, Paraguay.	
	♂	♀	♀	♀	♀
Length of body	9.	11.4	11.7	11.6	11.1
Length of pronotum	1.4	1.8	1.8	1.9	1.9
Greatest width of pronotum	2.7	3.4	3.5	3.7	3.2
Length of tegmen	5.6	6.4	6.8	6.9	6.9
Length of wings	11.6	14.1	15.9	15.1	16.5
Length of caudal femur	6.5	8.3	8.3	7.7	7.5
Greatest width of caudal femur	2.	2.7	2.7	2.7	2.8
Length of ovipositor	.....	6.4	7.1	6.	7.7

The specimens before us indicate that there is a moderate amount of size variation in the present species, particularly in the length of the ovipositor, but the specimens from Mexico and Paraguay are surprisingly similar for material from localities so widely separated.

Color Notes.—The specimens before us are very similar in coloration; those from Nicaragua, Brazil, and Paraguay are slightly darker than the Mexican individuals. General color glossy cream-buff or

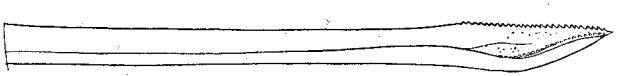

Fig. 98.—*Nemobius brasiliensis*. Ovipositor. (Greatly magnified.)

very pale glossy tawny-olive, the underparts somewhat paler. Head of general coloration, the occiput distinctly striped with three longitudinal lines of mummy brown, eyes bistre. Maxillary palpi covered with short dark hairs, of general coloration with the exception of the extreme apex of the terminal segment which is bistre. Pronotum of general coloration with a large meso-dorsal maculation of mummy brown, the caudo-lateral portions of this maculation are of somewhat darker coloration and remain as two dark dots in the palest specimens in which the dark markings are very much reduced. In the palest specimens the tegmina and wings are of the general coloration, with the exception of a very small dark area at the discoido-anal root basin of the tegmina which in the darker specimens is greatly expanded and the entire exposed portions of the tegmina and wings are suffused with mummy brown; intermediate channel very slightly paler than

lateral fields of tegmina. Ovipositor russet, the apex burnt umber. The glossy and characteristic coloration combined with the large size and certain different proportions give the present insect a very distinctive appearance.

Distribution.—Though known from few specimens, the present species has the widest distribution of any American species of the genus, being found from the state of Vera Cruz in Mexico southward through Nicaragua and Brazil to Paraguay and westward to the province of Atacama in Chile.

Biological Notes.—No brachypterous specimens of the present species are known.

Synonymy.—Scudder, in 1896, described *Nemobius melleus* from a single specimen from San Rafael, Vera Cruz, Mex., apparently omitting comparison with or reference to the South American species of the genus. We here place this species in the synonymy under *brasiliensis*, for after careful examination of the types of the two species we find that no differential characters exist.

Specimens Examined.—7: 1 male, 6 females.

San Rafael, Vera Cruz, Mexico, (Townsend) 1 ♀. TYPE, *N. melleus* Sc. [Hebard Collection ex Bruner].
Medellin, V. C., Mex., Sept., 1895, 1 ♀ [Hebard Collection].
San Juan Bautista, Teapa, Tabasco, Mex., Jan., (H. H. Smith) 1 ♀[49] [Br. Mus.].
Castillo, Nicaragua, Feb., 1893, (B. Shimek) 1 ♂ [Hebard Collection ex Bruner].
Santarem, Brazil, (Bates) 1 ♀, TYPE [Br. Mus.].
Sapucay, Paraguay, Feb. 10, 24, 1901, (W. T. Foster) 2 ♀ [U. S. N. M.].

Subgenus NEONEMOBIUS n. subgen.

This subgenus includes four species and two geographic races from North America. TYPE of Subgenus—*Nemobius cubensis* Saussure.

Subgeneric Description.—Size medium to very small for the genus. Disto-ventral spurs of caudal tibia very unequal in length. Proximo-internal spine of caudal tibiæ in male specialized as described under *Morphological Notes* for the genus; other spines of caudal tibiæ below concave, with margins of this sulcation very minutely serrulate in both sexes, the disto-internal spine not specialized. Ovipositor short, about two-thirds the length of the caudal femur, gently curved[50]

[49] This specimen was unfortunately recorded as *N. fasciatus* by Saussure in the Biologia.

[50] We find the species *Nemobius bruneri* to be a somewhat aberrant member of this subgenus, having a more decidedly curved and slightly heavier ovipositor than in the other species, the apex of which has the dorsal margin armed with serrations.

The species *Nemobius toltecus* shows all of these aberrations to an even greater degree. Both of these species are considerably more robust than the other species of the present subgenus.

and more slender than in the species having a more rigid ovipositor; apex with margin of portion formed by dorsal valves nearly straight or obliquely subtruncate and armed with serrulations or serrations, the portion formed by the ventral valves unarmed.

Nemobius toltecus Saussure.

1859. *N[emobius] toltecus* Saussure, Rev. et Mag. Zool., 2e Ser., XI, p. 316. (Original description.) [Mexico.]
1869. *Nemobius mexicanus* Walker, Cat. Dermapt. Saltat. Br. Mus., I, p. 57. (Description.) [Oajaca, Mex.]
1874. *Nemobius toltecus* Saussure, Miss. Sci. Mex., Rech. Zool., VI, pp. 386, 387. [Oajaca, Mex. From notes, probably on material originally described. Type lost.]
1897. *Nemobius toltecus* Saussure, Biol. Cent. Amer., Orth., I, pp. 223, 224. [Omilteme in Guerrero, Mex. Scudder's incorrect localities also given.]

This striking species has a decided superficial resemblance to the Old World *N. sylvestris*, from which species it differs in being a little smaller and in having the ovipositor curved and armed and the tegmina not obliquely truncate.

From the North American species it may be separated readily by its color pattern combined with the characters of the ovipositor which is considerably heavier and more curved than in any of these.

TYPE: ♀; Mexico (probably State of Oaxaca). [Type lost.]

We here describe a female from Omilteme, Guerrero, Mex., taken in July at an elevation of 8,000 feet by H. H. Smith and now in the British Museum.

Size large (for the genus), form heavy and compact; head rather large, full and rounded, about as wide as the pronotum. Pronotum with length contained not quite one and four-tenths times in greatest (caudal) dorsal width, narrowing slightly cephalad. Tegmina very short, not half as long as the caudal femora; distal margin of dorsal field almost transverse, very broadly arcuato-truncate; intermediate channel distinctly depressed; longitudinal veins rather heavy; cross-veinlets faint. Wings absent. Ovipositor very heavy, length contained about one and one-half times in that of the caudal femora, distinctly arcuate (decidedly so for the genus), apex of same narrowly sublanceolate enlarged with that portion formed by the dorsal valves armed, the upper margin serrate, these serrations small, short and blunt (heavier than in any of the other North American species having a curved ovipositor). Caudal femora heavy, greatest (meso-cephalic) width contained slightly more than two and one-half times in length.

The male of the present species is unknown.

Measurements (in millimeters).

	Oajaca (?), Mexico.	Omilteme, Guerrero, Mexico.
	♀	♀
Length of body	9.	10.
Length of pronotum	.....	2.
Caudal width of pronotum	.....	2.7
Length of tegmina	.....	2.7
Length of caudal femur	6.	6.4
Greatest width of caudal femur	.....	2.5
Length of ovipositor	4.5	4.3

Color Notes.—The coloration of this species shows a similarity to that of the European *N. sylvestris*. Head and dorsum of pronotum chestnut, maxillary palpi yellowish with distal portion of ultimate joint dark brown. Dorsal field of tegmina straw color, lateral lobes of pronotum and lateral field of tegmina very dark brown. Body and limbs brown, somewhat tinged with reddish.

Distribution.—The present species is known from probably but three specimens, these taken in the states of Guerrero and Oaxaca, Mex.

Biological Notes.—All of the known specimens of the present species are brachypterous.

Synonymy.—In 1869, Walker very inadequately described *N. mexicanus* from Oaxaca, Mex., which species Saussure, in 1874, synonymized with his *N. toltecus* (described in 1859 from Mexico, probably Oaxaca). Scudder, however, in 1896, resurrected *mexicanus* without having examined the type, and the specimens so recorded at that time were so quoted in the *Biologia* by Saussure the following year, without doubt because Scudder's recent revision of the North American species of *Nemobius* should have indicated that his knowledge of the North American members of the genus was superior to that of others. It is the opinion of the present author that Saussure was entirely correct in synonymizing *mexicanus* with his *toltecus*, and in the present paper the opinion which he held in 1874 is followed. We have not been able to find the type of *mexicanus* Walker, but we have before us the series of specimens which Scudder considered *mexicanus*, and it is our opinion that these do not fit Walker's original description, but that that description agrees much better with the description and the specimen examined of *toltecus*. We are further strengthened in this opinion by the series of *Nemobius* which Scudder considered *toltecus* in the same paper of 1896, but which in fact belong to the very different *N. carolinus neomexicanus*, which series is now before us.

Specimens Examined.—1: 1 female.

Omilteme, Guerrero, Mex., July, 8,000 feet, (H. H. Smith) 1 ♀ [Br. Mus.].

Nemobius bruneri n. sp.

1885. *Nemobius* sp. Bruner, Bull. Washb. Coll. Lab. Nat. Hist., IV, No. 4, p. 126. [Topeka, Kan. In woods among fallen leaves.]
1893. *Cyrtoxyphus ? variegatus* Bruner, (Mss.), Publ. Nebr. Acad. Sci., III, p. 32. (Without description.) [West Point, Nebr.]
1897. *Nemobius carolinus* Blatchley (not of Scudder, 1877), Ins. in Gen. and Orth. Ind. in Particular, p. 23. [Indiana.]
1900. *Nemobius carolinus* Blatchley (not of Scudder, 1877), Psyche, IX, p. 53. [Vigo, Putnam, and Monroe Counties, Ind. Rather common. Grass-covered banks of streams and in open spaces in woods. Description.]
1903. *Nemobius carolinus* Blatchley (not of Scudder, 1877), Orth. of Indiana, pp. 421, 427. [Localities previously given. Description.]
1905. *Nemobius carolinus* Isely (not of Scudder, 1877), Publ. Kan. Acad. Sci., p. 248. [Dale's Pond, Wichita, Kan.]

This species is related to *N. toltecus* in the shape and armament of the ovipositor, but differs in being smaller, of very different color pattern and having a much less heavy ovipositor.

It may be readily separated from all other North American species by its head markings and peculiar color pattern which gives it a dotted and speckled appearance, and also by the characters of the ovipositor. The insect is in no way nearly related to any other species of *Nemobius* found north of the Rio Grande, but some of the more mottled specimens of *N. cubensis mormonius* from Texas bear it a certain amount of superficial resemblance.

TYPE: ♂; West Point, Cuming County, Nebraska, September 1. (Bruner.) [Hebard Collection ex Bruner.]

Description of Type.—Size medium; form a little robust; head large, full, and rounded, about as wide as the pronotum. Maxillary palpi not as attenuate as in *N. fasciatus*. Eyes broad ovate, very moderately protruding. Pronotum with length contained about one and three-tenths times in greatest (caudal) dorsal width, narrowing very slightly cephalad, with a slight medio-longitudinal sulcus in the cephalic portion. Head and pronotum supplied with rather long, bristly, black, scattered hairs. Tegmina with length but little inferior to that of caudal femora (.8 mm.), translucent, almost transparent, when in repose hemi-elliptical in outline. Wings absent. Subgenital plate scoop-shaped, narrowing somewhat roundly but rather decidedly caudad. Caudal femora short and heavy, having the greatest (meso-cephalic) width contained less than three times in length.

Allotypic ♀. Putnam County, Indiana, August 25, 1901. (Blatchley.) [United States National Museum Collection.]

Description of Allotype.—Size larger than male; form robust. Head, maxillary palpi, eyes, and pronotum much as in the type. Tegmina almost equal in length to caudal femora, apex at humeral angle broadly but distinctly obtuse-angulate, sutural margin passes into distal margin with a distinct sharply rounded obtuse-angulation, longitudinal veins very conspicuous, cross-veinlets faint. Wings absent. Supra-anal plate and cerci much as in *fasciatus*. Ovipositor

Fig. 19.

Fig. 20.

Figs. 19 and 20.—*Nemobius bruneri*. Cephalic (Fig. 19) and dorsal (Fig. 20) aspect of color pattern of head. (× 4.)

moderately heavy, a little over half as long as the caudal femora, slightly but noticeably curved, apex of same very narrowly sub-lanceolate[51] with that portion formed by the dorsal valves armed, the upper margin serrate, these teeth regular, heavy, with immediate apices very sharp. Subgenital plate scoop-shaped, very acute-angulate emarginate mesad with margins broadly rounded.

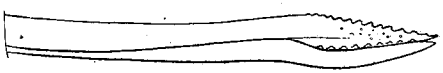

Fig. 21.—*Nemobius bruneri*. Ovipositor. (Greatly magnified.)

Measurements (in millimeters).

	West Point, Nebr.		Putnam Co., Ind.	
	♂ Type.	♂	♂	♀ Allotype.
Length of body	6.8	6.4	6.5	7.4
Length of pronotum	1.4	1.4	1.5	1.9
Caudal width of pronotum	1.8	1.8	2.	2.1
Length of tegmina	4.	4.1	4.1	3.
Length of caudal femur	4.8	4.7	5.	6.
Greatest width of caudal femur	1.7	1.8	2.	2.1
Length of ovipositor	.....	.....	.....	3.8

[51] This specimen, as well as all but two of the others of the present species before us, has the dorsal and ventral valves of the ovipositor considerably separated at their extremities; the two specimens mentioned also indicate this cleavage, but to a much less degree. We have noted this peculiarity to be very rare in other species of *Nemobius*, and in all cases the irregularity of its proportions and the distorted appearance of the apices of the valves prove it to be an abnormality. It is quite probable that peculiarities in the oviposition of the insects has brought about this result, and a study of these habits in this and other species should prove most interesting.

	Wichita, Kan.			Washington, D.C.		Cabin John Run, Md.
	♂	♀	♀	♂	♀	♀
Length of body	7.5	9.1	9.4	7.	6.6	9.1
Length of pronotum	1.7	1.9	2..	1.6	1.9	2.
Caudal width of pronotum	2.1	2.1	2.7	2.	2.2	2.4
Length of tegmina	4.4	3.1	3.6	3.9	2.8	3.9
Length of caudal femur	5.6	6.	6.4	5.	5.2	6.7
Greatest width of caudal femur	2.1	2.4	2.5	2.	2.	2.5
Length of ovipositor	.....	3.4	3.5	.....	3.7	4.1

There is considerable variation in proportion and size in the series before us, large and small individuals being found in the same region as the measurements of the Washington and Cabin John Run specimens show. The majority of specimens from the Atlantic coast are about intermediate in size between the extremes.

Color Notes.—The coloration of the specimens here described is typical of the series before us, the only variation shown being a small amount of intensification or diminution of the color pattern in a few specimens. General coloration clay color mottled and flecked with mummy brown. Head below and including the interantennal space shining vandyke brown, above cinnamon more or less maculate with mummy brown above the interantennal space and on the base of the occiput, the broad occipital bar of cinnamon thus formed usually rather conspicuous, eyes dark bistre. Maxillary palpi clay color, the distal portion of the terminal segment mummy brown. Pronotum clay color, more or less mottled and flecked with mummy brown, this mottling often heavy in the median portion of the dorsum, and particularly so on the lateral lobes. Tegmina of male sepia, discoidal vein cream color but usually very inconspicuous, discoido-anal root-basin and upper portion of lateral field bistre; of female bistre, with veins and intermediate channel clay color. Dorsal surface of abdomen of male (concealed by tegmina) clove brown; of female cephalic portion (concealed by tegmina) clove brown, exposed portion clay color more or less maculate with clove brown. Ovipositor burnt umber. Ventral surface of body clay color. Limbs clay color tinged with russet and more or less mottled and flecked with prouts brown.

The specimens from Wichita, Kan., differ from the rest of the series in having the lower portion of the head cinnamon instead of vandyke brown, and the intermediate channel of the female tegmina

is more decidedly defined in the paler color than in the other specimens. In every other respect, however, these specimens are typical.

Distribution.—The present species is known from the vicinity of the District of Columbia, west-central Indiana, northeastern Nebraska, and northeastern and south-central Kansas.

Biological Notes.—No macropterous specimens of this insect are known.

Synonymy.—The history of the present species is a succession of unfortunate occurrences. In 1885, Bruner recorded specimens of *Nemobius* sp. from Topeka, Kan., which belong to this species; later, in 1893, he drew up a description of the species which was never published, hence his *Cyrtoxyphus ? variegatus* Bruner (Mss.), an unidentifiable name from the literature, but the material before us from the Bruner Collection shows it to be this species.

Before 1897, Blatchley sent a series of Indiana specimens of *Nemobius* to Scudder for determination, and the present species was inexcusably identified for him as *N. carolinus* Scudder, hence his subsequent misconception of that species, and Caudell upon seeing specimens of Blatchley's material so labelled followed him in this error; thus material sent him for determination by Isely was likewise recorded as *carolinus*.

Specimens Examined.—19: 10 males, 9 females.

Cabin John Run, Maryland, Sept. 23, 1911, (Davis) 1 ♀ [Davis Collection].
Plummer's Island, Md., Oct. 11, 12, 1906, (Caudell) 1 ♂, 1 ♀ [U. S. N. M.].
Washington, D. C., Oct. 5, (Caudell) 3 ♂, 3 ♀ [U. S. N. M.].
Glencarlyn, Virginia, Sept. 6, (Caudell) 2 ♂ [U. S. N. M.].
Putnam County, Indiana, Oct. 7, 1894, Aug. 25, 1901, (Blatchley) 1 ♂, 1 ♀. ♀ Allotype [U. S. N. M.].
Fairview, Kansas, Aug. 15, 1904, (Isely) 1 ♀ [U. S. N. M.].
Wichita, Kan., June, 1904, (Isely) 1 ♂, 2 ♀ [U. S. N. M.].
West Point, Nebraska, Sept. 1, (Bruner) 2 ♂. TYPE, Paratype [Hebard Collection].

Nemobius cubensis Saussure.

1874. *Nemobius cubensis* Saussure, Miss. Sci. Mex., Rech. Zool., VI, pp. 384, 385, Pl. 7, fig. 5. (Original description.) [Cuba; Mexico; Brazil.]
1877. *Nemobius volaticus* Scudder, Proc. Bost. Soc. Nat. Hist., XIX, pp. 36, 37. (In part.) (Description of ♂.) [Georgia.]
1888. *N[emobius] cubensis* Bolivar, Mém. Zool. Soc. France, I, p. 156. [Cuba.]
1891. *Nemobius cubensis* Gundlach, Ent. Cuba, II, p. 367. [Cardenas, Cuba.]
1893. *Nemobius cubensis* Brunner, Proc. Zool. Soc. London, 1893, p. 609. (In part.) [Costa Rica.]
1895. *Nemobius cubensis* Bruner, Bull. Lab. Nat. Hist. Univ. Iowa, III, pt. 3, p. 67. [Castillo, Nicaragua.]
1896. *Nemobius carolinus* Scudder, Jour. N. Y. Ent. Soc., IV, p. 107. (In part.) [Lake Worth, Fla.]

1896. *Nemobius cubensis* Scudder, Jour. N. Y. Ent. Soc., IV, pp. 99, 105, 106. (In part.) Lake Worth, Sanford, and Capron, Fla.]
1896. *Nemobius aterrimus* Scudder, Jour. N. Y. Ent. Soc., IV, pp. 100, 105. (In part.) (Description of ♀.) [Jacksonville, Fla.]
1896. *Nemobius cubensis* Pantel, Anal. Soc. Espan. Hist. Nat., XXV, p. 51. (Morphological studies.)
1896. *Nemobius aterrimus* Scudder, Psyche, VII, p. 432. (In part.) (New key.)
1896. *Nemobius cubensis* Scudder, Psyche, VII, p. 432. (New key.)
1905. *Nemobius aterrimus* Rehn and Hebard (in part of Scudder, 1896), Proc. Acad. Nat. Sci. Phila., 1905, p. 50. [Tampa, Fla.]
1909. *Nemobius cubensis* Rehn, 2d Rept. Centr. Exp. Sta. Rep. Cuba, p. 218. [Cayamas, Cuba.]
1911. *Nemobius cubensis* Sherman and Brimley, Ent. News, XXII, p. 391. [Raleigh, N. C.]
1912. *Nemobius cubensis* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1912, p. 273. [Homestead, Fla.]

The large series of the present species, which is the type of the subgenus *Neonemobius*, before us shows that a very close relationship exists to *N. palustris*, although typical *N. cubensis* looks very different from that species, being larger, of less dark and solid coloration, with tegmina almost always much less abbreviate. A careful study of the material at hand shows that there are, however, specimens in the series of *cubensis* which can scarcely be separated from *palustris*. These few extreme individuals are as small and of much the same form as *palustris*, with wings lacking and tegmina quite as abbreviate as in that species. Almost every one of these specimens, however, is not as solid in coloration, and all but two are more pale in general coloration. The majority of specimens of *cubensis* wanting wings have the tegmina considerably less abbreviate than in *palustris*, a number of these having the tegmina quite as well developed as in those specimens having the longest wings. In summing up the differences between the two species we may add that, in addition to the other differential characters, *cubensis* usually has the under portions of the body quite pale, much paler than is normal in *palustris*.

From typical specimens of the western race, *N. cubensis mormonius*, typical individuals of the present species may be readily separated by their less robust build and more solid coloration without the characteristic cephalic and tegminal markings of that race. In fact, so different are typical specimens of the two that, were it not for the very large series before us which reveals the vast amount of variability found in these insects, we should certainly have considered them distinct species.

Small dark macropterous males of *N. fasciatus* have been mistaken for this species, but the heavier build and less smooth appearance

of that species should always distinguish readily even the most aberrant males from *cubensis*, while the ovipositor characters of the females show the two species to belong to different subgenera.

Little has apparently been known of the life history of the present species, and it is probably due to the fact that the majority of specimens collected have been taken flying to lights at night that so few brachypterous specimens have been previously recorded.

TYPES: 4 ♂, 5 ♀; Cuba. (Poey.) [Saussure Collection.]

We here describe a female from Cuba, taken by Gundlach, and now in the Scudder Collection.

Size small, form slender for the genus; head small but full and rounded, wider than cephalic width of pronotum. Maxillary palpi of much the same form as in *N. fasciatus*, but with joints not quite as much produced. Eyes broad-ovate, very mildly prominent, though somewhat more so than in *N. palustris*. Pronotum of much the same

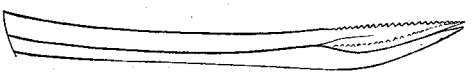

Fig. 22.—*Nemobius cubensis*. Ovipositor. (Greatly magnified.)

proportions as in *fasciatus*, but of smaller relative size to rest of body. Tegmina long, extending beyond end of abdomen, apex of same dorsal in position, distal margin of dorsal field rotundate acute-angulate, longitudinal veins not very prominent, cross-veinlets very faint. Wings absent. Ovipositor more than two-thirds as long as caudal femur, distinctly though very feebly arcuate; apex of same very narrowly sublanceolate, with that portion formed by the dorsal valves armed, the upper margin serrulate, these serrulations very closely arranged, regular, minute, sharp. Caudal femora with greatest (meso-cephalic) width contained about three times in length. Spines of caudal tibiæ more slender than in *fasciatus*, not quite as slender as in *palustris*.

A male in the Scudder Collection, bearing the same data as the female here described, affords the following additional information.

Size very slightly smaller, proportions very much the same. The tegmina are translucent, and when in repose the dorsal fields are hemi-elliptical in outline. Wings very long. Proximo-internal spine of caudal tibiæ similar to that of *fasciatus*.

Measurements (in millimeters).

	Cuba.		Homestead, Fla. Macropterous extremes.		Homestead, Fla. Brachypterous extremes.	
	♂	♀	♂♂	♀♀	♂♂	♀♀
Length of body	7.	7.2	7. – 7.1	6.9– 7.4	5.7–6.6	5.6–7.
Length of pronotum	1.6	1.4	1.4– 1.4	1.3– 1.5	1.2–1.7	1.6–1.7
Caudal width of pronotum	2.4	2.3	2.2– 2.4	2.2– 2.3	1.9–2.2	2. –2.2
Length of tegmina	4.6	4.7	4.1– 4.3	4.4– 4.9	3.9–4.	2.9–3.1
Length of wings	11.	.....	10.3–10.7	10.4–11.4	.....	.....
Length of caudal femur	5.3	5.4	5.1– 5.4	5.3– 5.1	4.2–5.1	5. –5.2
Greatest width of caudal femur	1.5	1.7	1.6– 1.7	1.8– 1.8	1.8–1.9	1.7–1.9
Length of ovipositor	.....	.4	.....	3.8– 3.8	.....	3.6–4.

	Raleigh, N. C. Brachypt. extremes.	Washington, D. C. Macropt. extremes.	Staten Island, N. Y.
	♀♀	♀♀	♀
Length of body	6.6–8.	6.8– 7.4	7.4
Length of pronotum	1.7–1.7	1.4– 1.6	1.7
Caudal width of pronotum	2.1–2.3	2.1– 2.2	2.3
Length of tegmina	2.9–3.4	4.6– 4.8	4.5
Length of wings	.....	10.7–10.4	11.
Length of caudal femur	5.4–5.6	5.1– 5.6	5.4
Greatest width of caudal femur	2. –2.	1.6– 2.	1.8
Length of ovipositor	3.4–3.9	3.9– 4.	3.7

	Vera Cruz, Mex. Macropt. extremes.		Castillo, Nicaragua.
	♂	♀♀	♀
Length of body	7.1	6. –6.9	7.
Length of pronotum	1.2	1.3–1.6	1.4
Caudal width of pronotum	2.	2. –2.1	2.1
Length of tegmina	4.8	4. –4.4	4.1
Length of wings	9.6	8.9–9.7	9.4
Length of caudal femur	4.6	4.7–5.	4.7
Greatest width of caudal femur	1.6	1.7–1.8	1.7
Length of ovipositor	.....	2.7–2.9	2.8

It is evident that the variation in the present species and its races is further emphasized by the measurements given above. It is true that the specimens from Vera Cruz, Mexico, and Castillo, Nicaragua, have in the female sex ovipositors very much shorter than are found in any of the other specimens before us. These specimens are also different in being the only ones at hand having the lower portion of the head much paler than the upper portion, and the maxillary palpi pale with only the distal portion of the terminal segment very dark. In other respects these specimens agree almost perfectly with typical *cubensis*, and after a careful consideration of the variation in the species, these differences do not warrant considering this material worthy of racial distinction.

Color Notes.—The specimens here described agree well with other macropterous specimens of the species before us in the coloration here given. General color very dark vandyke brown, glossy, shading to burnt umber on limbs and tegmina. Head and pronotum very dark vandyke brown, immaculate, shining; eyes equally dark. Maxillary palpi[52] vandyke brown, the terminal segment very dark. That portion of the head which fits under the pronotum may be seen to be a very little paler than the other parts of the head when examined closely. Tegmina translucent, shading from vandyke brown in the proximal portion to burnt umber on the greater part of both dorsal and lateral fields; intermediate channel very faintly defined in burnt umber. Dorsal surface of abdomen shining black. Exposed portion of wings burnt umber, concealed portion very white when folded. Limbs and ventral surface of insect immaculate, limbs above prouts brown, ventral surface pale, but varying considerably in depth of coloration.

We have but one large series of brachypterous specimens of *cubensis* before us, these from Homestead, Fla., the majority of which specimens are not of as solid coloration and are of somewhat lighter shade than the specimens described above. In these the penultimate segment of the maxillary palpi is mummy brown, the other segments of the very dark general coloration. Pronotum a little maculate with mummy brown, tegmina marked with the same color, the intermediate channel quite distinctly defined in the lighter color in several specimens. Limbs prouts brown, maculate to a slight degree with darker shades.

[52] In some very dark specimens before us, the penultimate segment of the maxillary palpi is nearly white, while the other segments are very dark; in a few of the other specimens only the distal portion of the terminal segment is very dark.

Other brachypterous specimens before us are even darker than the normal coloration, being colored very similarly to *N. palustris*, but in almost all cases having much longer tegmina, and in the one or two cases where this is not true they are larger than the largest specimens of that species.

Distribution.—The present species is known from Staten Island, N. Y., south along the Atlantic coast to the extreme southern portion of the mainland of Florida, and also from Cuba, Vera Cruz in Mexico, Nicaragua and Costa Rica to Brazil. Its western distribution in the United States appears to be limited by the fall-line. The records given by Scudder and Blatchley for Illinois and Indiana pertain to other species.

Biological Notes.—Though seldom numerous, the present insect appears to be always much more plentiful near the sea than elsewhere; the writer has found it in large numbers but once, in the high grass of the everglades. Of all the North American species of *Nemobius* it develops in the macropterous form proportionately the longest tegmina and wings. The majority of macropterous specimens taken have been captured flying to lights at night; about such places we have never found this insect anything but very scarce. Considering the usual extreme development of the tegmina and wings in the present species, it is surprising to find some brachypterous specimens with tegmina quite as much aborted as in *N. palustris*.

Synonymy.—In 1877, Scudder described *Nemobius volaticus*, which species he himself placed in the synonymy under *cubensis* in 1896. We here select a male of that series from Georgia in the Scudder Collection as single type.[53]

In Scudder's 1896 paper on the North American species of the genus, he unfortunately created confusion by misidentifying much material, one instance of which was the crediting of specimens of the present species from Lake Worth, Fla., to *N. carolinus* and another in taking a small dark brachypterous female of *cubensis* as the basis of the description of that sex of his new and doubly invalid *N. aterrimus*.

In 1905, Rehn and Hebard, at a loss to fathom the literature, credited a pair of dark *cubensis*, having long tegmina but no wings, from Tampa, Fla., to *aterrimus*.

Specimens Examined.[54]—67: 14 males, 52 females, and 1 nymph.

[53] The female before us is a macropterous specimen of *N. carolinus*.

[54] The following abbreviations are used to differentiate the specimens here recorded: b., brachypterous; m., macropterous; l. teg. only, long tegmina only; med., medium; v., very.

Staten Island, New York, Aug. 22, (Davis) 1 ♀ [Davis Collection]. m.
Cape May County, New Jersey, Aug., 1910, (Davis) 1 ♀ [Davis Collection]. V. b.
Montgomery County, Maryland, Sept. 25, 1911, (Davis) 1 ♀ [Davis Collection]. V. b.
Washington, D. C., Aug. 24, 29, (Havenstein) 9 ♀ [U. S. N. M.]. m. but 1 l. teg. only.
Raleigh, North Carolina, Aug. 15, 16, 17, Sept. 6, 12, 1905, 06, 08, 09, (Brimley) 6 ♀ [Brimley Collection]. med. b. but 1 m.
Florence, South Carolina, Sept. 6, 1911, (R. & H.) 1 ♂. b.
Georgia, 1 ♂. TYPE *N. volaticus* Sc.
Jesup, Ga., Sept. 1, 1911, (R. & H.) 1 ♀. l. teg. only.
Jacksonville, Florida, Nov., 1885, (Ashmead) 1 ♀. Paratype *N. aterrimus* Sc. [Hebard Collection ex Bruner]. V. b.
Sanford, Fla., (Frazer) 1 ♂, 1 ♀ [Scudder Collection].
Capron, Fla., Jan. 16, Apr. 12, 3 ♀ [U. S. N. M. and Scudder Collection]. m.
Tampa, Fla., Jan. 17, 1904, (H.) 1 ♂, 1 ♀. l. teg. only.
Lake Worth, Fla., (Slosson) 1 ♂, 1 ♀ [Scudder Collection]. V. b.
Miami, Fla., Feb. 4, 1903, (H.) 1 ♂. m.
Homestead, Fla., Mar. 17–19, 1910, (H.) 7 ♂, 14 ♀, 1 n.; July 10–12, 1912, (R. & H.) 1 ♀. med. b., 3 ♂, 2 ♀ m.
Cuba, (Gundlach) 2 ♂, 3 ♀ [Scudder Collection]. m.
Vera Cruz, Vera Cruz, Mexico, (Knab) 1 ♂, 8 ♀ [U. S. N. M.]. m. but 1 l. teg. only.
Castillo, Nicaragua, Feb., 1893, (Shimek) 1 ♀ [Hebard Collection ex Bruner]. m.

Nemobius cubensis mormonius Scudder.

1893. *Nemobius* sp. Bruner, N. Amer. Fauna, VII, p. 266. [Death Valley region (Panamint Valley) and Los Angeles, Cal.]
1893. *Nemobius cubensis* Brunner, Proc. Zool. Soc. London, 1893, p. 609. (In part.) [New Orleans, La.]
1896. *Nemobius carolinus* Scudder, Jour. N. Y. Ent. Soc., IV. p. 107. (In part.) [Texas.]
1896. *Nemobius mexicanus* Scudder (not of Walker, 1869), Jour. N. Y. Ent. Soc., IV, pp. 100, 106, 107. (In part.) [Mexico, Jalapa, Orizaba and Minatitlan, Mex.]
1896. *Nemobius mormonius* Scudder, Jour. N. Y. Ent. Soc., IV, pp. 101, 106. (Original description.) [St. George, Utah.]
1896. *Nemobius neomexicanus* Scudder, Jour. N. Y. Ent. Soc., IV, p. 104. (In part.) [Sierra el Taste, Lower Cal.]
1896. *Nemobius mormonius* Scudder, Psyche, VII, p. 433. (New key.)
1896. *Nemobius cubensis* Scudder, Jour. N. Y. Ent. Soc., IV, p. 106. (In part.) [San José del Cabo, Lower Cal.]
1896. *Nemobius mexicanus* Scudder (not of Walker, 1869), Psyche, VII, p. 433. (New key.)
1897. *Nemobius cubensis* Saussure, Biol. Cent. Amer., Orth., I, p. 222. [Teapa, Tabasco, Mex.]
1897. *Nemobius comanchus* Saussure, Biol. Cent. Amer., Orth., I, pp. 221, 222. (Description.) [Durango and (or) Sinaloa, Mex.]
1897. *Nemobius mexicanus* Saussure, Biol. Cent. Amer., Orth., I, pp. 221, 224. (Scudder's wrong characters and records given.)
1906. *Nemobius mexicanus* Hart (not of Walker, 1869), Ent. News, XVII, p. 160. [College Station, Tex.]
1907. *Nemobius* sp. Rehn, Ent. News, XVIII, p. 212. [Brownsville, Tex.]
1909. *Nemobius cubensis* Tucker, Ent. News, XX, p. 297. [Plano, Tex.]
1910. *Nemobius mormonius* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1909, p. 483. [Las Vegas, Nev.]

The present geographic race varies widely in general appearance, owing probably to the facts that its range includes a great variety of territory, and that as this range includes so much of the semiarid

and desert regions of the West, it is found more or less isolated at a great number of localities. Brachypterous individuals somewhat outnumber the macropterous. Though the specimens in each respective series from Texas, from Nevada, and from Vera Cruz, Mex., are quite similar, each series has a decidedly distinctive appearance; intermediates between these are, however, always to be found.

The general resemblance to *N. carolinus neomexicanus* is sometimes so very close that, were it not for the fact that in this species the disto-dorsal spurs of the caudal femora are unequal, while in *carolinus neomexicanus* they are equal, it would be impossible to distinguish some of the males of the two, though the females are readily separable by the very different characters of the ovipositor as well.

So different are individuals from the Texan region, the arid Southwest and southern Mexico, that there is little wonder that several synonyms of the present insect exist, and it would seem advisable to recognize at least three geographic races, were it not for the fact that practically all of the differences are due to coloration, probably caused by the immediate environment and, as would be expected in such a case, every conceivable intergradation is found in the large series before us.

The insect differs from *N. cubensis* in being less slender, in having

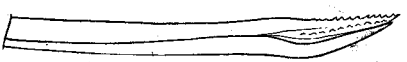

Fig. 23.—*Nemobius cubensis mormonius.* Ovipositor of specimen from Texas. (Greatly magnified.)

a different color pattern, and in being more mottled and almost always considerably paler in general coloration. The color pattern and its variations, consequently important in determining the present insect, is fully treated in the Color Notes.

Described from two females and a nymph from a single locality.

SINGLE TYPE here designated: ♀; St. George, Utah. April. (Palmer.) [Scudder Collection.]

We here describe the paratypic female now in the Hebard Collection ex Bruner.

Size small; form not as slender as in *N. cubensis*, rather compact; head small, full, and rounded, wider than cephalic width of pronotum. Eyes and maxillary palpi much as in *cubensis*. Pronotum with length almost equal to caudal width, narrowing very little cephalad. Tegmina short, covering little over half of abdomen, three-fifths the

length of the caudal femora; apex at humeral angle very broadly and roundly obtuse-angulate, distal margin of dorsal field almost transverse, very broadly arcuato-truncate, sutural margin passes into distal margin with a distinct, rather sharply rounded angulation at an angle of slightly more than ninety degrees; intermediate channel not conspicuously depressed and forming part of the dorsal field, this field rounding very slightly; longitudinal veins few but conspicuous, cross-veinlets[55] exceedingly faint. Wings absent. Ovipositor[56] a little more than two-thirds as long as the caudal femur,

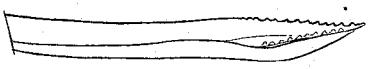

Fig. 24.—*Nemobius cubensis mormonius.* Ovipositor of specimen from Vera Cruz, Mex. (Greatly magnified.)

distinctly though feebly arcuate, form and armament much as in *cubensis*. Caudal femora and spines of caudal tibiæ much as in that species.

We here select as allotype, a male from Las Vegas, Nevada, taken Sept. 2, 1909, by Rehn and Hebard, and in the Hebard Collection.

Description of Allotype.—Size smaller than female, proportions much the same. The tegmina are translucent and when in repose the dorsal fields are hemi-elliptical in outline. Wings absent.

Measurements (in millimeters).

	St. George, Utah.		Las Vegas, Nev.		
	Type	Paratype	Allotype		
	♀	♀	♂	♂♂	♀♀
Length of body	7.5	7.	7.	7. (6.6–7.4)	7.4 (6.6–8.2)
Length of pronotum	2.2	1.9	1.6	1.6 (1.4–1.8)	1.7 (1.6–1.9)
Caudal width of pronotum	2.3	2.1	2.1	2.1 (2.1)	2.2 (2.1–2.3)
Length of tegmina	3.	2.9	4.1	4.1 (3.9–4.3)	2.9 (2.7–3.)
Length of caudal femur	5.	5.	5.	4.9 (4.8–5.)	5.2 (5.1–5.3)
Greatest width of caudal femur	2.	2.	2.	1.9 (1.7–2.)	2. (2.)
Length of ovipositor	3.8	.....	.....	.....	3.8 (3.5–4.)

[55] These cross-veinlets are so faint in some specimens as to be scarcely visible under a Zeiss binocular.

[56] As the ovipositor of the paratype before us is broken, we have drawn up this portion of the description from the type.

	Beaumont, Tex.			
	♂♂	♀♀	♂	♀
Length of body	6.7 (5.3–7.5)	7.6 (7.1–8.)	7.2	7.1
Length of pronotum	1.6 (1.3–1.8)	1.7 (1.6–1.8)	1.4	1.6
Caudal width of pronotum	2. (1.9–2.1)	2. (1.9–2.1)	2.4	2.3
Length of tegmina	4.5 (4.2–4.8)	3.7 (3. –5.)	4.4	5.6
Length of wings	.....	.....	9.4	10.8
Length of caudal femur	5. (4.7–5.3)	5.3 (5. –5.6)	5.1	5.6
Greatest width of caudal femur	1.9 (1.8–2.)	2. (2.)	2.	2.
Length of ovipositor	.....	3.9 (3.6–4.2)	.....	3.4

	Durango or Sinaloa, Mex.[57]	Orizaba, Mex.		Cordoba, Mex. (Extremes).	
	♀	♂	♀	♂♂	♀♀
Length of body	8.5	7.6	6.5	6.8– 7.9	7.1– 7.9
Length of pronotum	1.8	1.6	1.8	1.4– 1.5	1.4– 1.9
Caudal width of pronotum	2.3	2.1	2.1	2.1– 2.4	2.1– 2.2
Length of tegmina	5.6	4.1	2.9	4.6– 5.	4.4– 5.
Length of wings	12.4	.....	.....	10.2–10.4	10. –11.1
Length of caudal femur	5.8	5.	5.1	5. – 5.2	5.1– 5.5
Greatest width of caudal femur	2.3	2.	2.	1.8– 2.	2. – 2.1
Length of ovipositor	4.2	.....	3.6	.....	4. – 4.

Averages in Ovipositor Length.

Galveston, Tex.	3.5 (3.4–3.7)
Brownsville, Tex.	3.8 (3.5–4.1)
Uvalde, Tex.	3.6 (3.2–3.9)
Fort Yuma, Cal.	3.7
Los Angeles Co., Cal.	3.8
Tia Juana, Cal.	3.6
Jalapa, Mex.	3.7

Though some amount of variation is shown in each of the series before us, there appears to be little difference in the size and proportions of specimens from the various natural divisions of the range of the present insect. As has been noticed in other species, macropterous specimens always are found to have the pronotum more widened caudad.

Color Notes.—The great majority of specimens from Texas are of

[57] This specimen is the type of *N. comanchus* Saussure.

the type of coloration here described. General color mummy brown, inconspicuously marbled with sepia and bistre. Head raw umber, a very narrow line of darker shade extending across the occiput from the caudal margin of the eyes, the remaining caudal portion of the occiput and postocular portion of the genæ somewhat paler than the rest of the head. Eyes prouts brown. Maxillary palpi raw umber, the distal half of the terminal segment clove brown. Pronotum mummy brown clouded with bistre, under a Zeiss binocular small dots of wood brown are apparent. Tegmina translucent; of male with dorsal field a very dark shade of bistre particularly pronounced in the proximal portion, discoidal vein obscurely outlined in cream color, lateral fields clove brown; of female bistre much suffused with raw umber, the longitudinal veins of the dorsal field, the intermediate channel and ventral margin of lateral fields raw umber, remaining portion of lateral fields clove brown. Dorsal surface of abdomen of males and macropterous females (concealed beneath tegmina) shining black; of brachypterous females, proximal (concealed) portion of the same color, remaining portion black somewhat maculate with raw umber and covered with hairs of the same color. Ovipositor vandyke brown. Limbs tawny olive slightly mottled with raw umber, the outer face of the caudal femora marked with two faint longitudinal bars of the latter color.

The material before us from the state of Vera Cruz, Mex., resembles these specimens, but the majority are somewhat darker with a more russet suffusion, and the markings which give most of the specimens from Texas a somewhat marbled appearance are considerably reduced. The distinctive markings of the head are[58], however, in most cases more pronounced. This type of coloration, as well as intermediates between it and the normal Texan type, is represented by a number of specimens from Texas.

The majority of specimens from Fort Yuma, Cal., and Lower California, are of a very pale desert type of coloration. So pale are these that the color pattern has in most cases almost disappeared. General color wood brown, faintly marked with a darker shade. Head mars brown, a paler caudal portion of the occiput only detectable under the Zeiss binocular. Disk of pronotum of general color

[58] Scudder, in his treatment of the specimens which are now before us, and which he wrongly considered *N. mexicanus*, gave these color characters very well in his key, "longitudinal markings of head interrupted at the crown, the whole back portion immaculate, sharply defined from the portions in front at the summit, which is feebly subcarinate transversely."

marbled with a darker shade, lateral lobes heavily marked with very dark bistre. Tegmina mummy brown marked cephalad with dark bistre. Ovipositor burnt umber. Limbs and ventral surface of body wood brown tinged with russet, the longitudinal markings on the outer surface of the caudal femora very faintly indicated. Intermediates between this and the normal Texan type are to be found in specimens from San José del Cabo, L. Cal., Las Vegas, Nev., and Brownsville, Tex.

The typical series from St. George, Utah, all of the Californian specimens except those from Fort Yuma, and almost the entire series from Las Vegas, Nev., belong to a color phase closely resembling that of the specimens from Vera Cruz, excepting that these specimens are not so much tinged with russet, the usually distinctive cephalic markings are very obscure (practically absent in many cases), while the females have the intermediate channel of the tegmina strikingly cream colored. Intermediates between this type of coloration and that of the Mexican series are at hand, but in none of the Texan series is a close approach to this to be found. In all other respects, however, the specimens are inseparable and consequently not worthy of even racial distinction.

Distribution.—The present geographic race is known to range from Biloxi, Miss., to the Pacific coast, and southward as far as the state of Tabasco, Mex. The most northern localities at which it has been taken are St. George, Utah, Las Vegas, Nev., and the Panamint Valley, Cal.

Biological Notes.—In the desert regions of the southwestern United States this insect is but very occasionally met with in the short grasses growing near streams and other restricted damp areas, but in the semiarid mesquite region of Texas it is widely distributed in the short grasses which are there so frequently encountered; and its range extends still further eastward, where it is found in the typical undergrowth of the long-leaf pine forests. A few macropterous specimens have been taken at light at Beaumont, Brownsville, and Del Rio, Tex.; other than at light this long-winged form has scarcely ever been encountered.

Morphological Notes.—It is the opinion of the author that the considerable amount of variation found in the present insect is due to its frequent isolation together with its very extensive distribution. Though ranging over all the desert regions of the southwest, this insect, like all other North American *Nemobius*, is never found unless a certain amount of moisture is present. In its desert distribution

there are consequently often hundreds of square miles utterly unfit for the insect, since it is only found where some dampness is derived from a river or stream, a lake, or some subterranean water supply. There is little variation in any of the specimens from the heavier portion of the Texan mesquite belt where its range is not discontinuous.

Synonymy.—When the present geographic race was described in 1896, Scudder wrongly believed a series of specimens of this insect from the state of Vera Cruz, Mex., to belong to the poorly described *N. mexicanus* of Walker, and he also failed to recognize as such pale specimens of the same from Texas and Lower California which he determined as *N. carolinus* and *N. neomexicanus* (both belonging to the subgenus *Eunemobius*, which has the disto-ventral spurs of the caudal tibiæ equal and the apex of the ovipositor armed above and below).

In 1897, Saussure, supposing Scudder to be correct in his statements, followed him in quoting the records of what Scudder supposed to be *mexicanus*, but without seeing the material, and so a single specimen of the pale color form of *cubensis mormonius* in his possession from Durango or Sinaloa, Mex., was to him apparently new and so described as *N. comanchus*. In the same paper Saussure considered specimens from Tabasco, Mex., to be *N. cubensis*.

Hart recorded this insect as *N. mexicanus* in 1906.

Specimens Examined.—131: 66 males, 61 females, and 4 nymphs.

Biloxi, Mississippi, March 11, (F. M. Jones) 1 ♂ [A. N. S. P.]. b.
Texas, (Belfrage) 2 ♂ [Scudder Collection]. 1 m.
College Station, Tex., Dec. 23, 1905, (Hart) 1 ♂ [Ill. State Lab. Nat. Hist.]. b.
Beaumont, Tex., July 23, 1912, (H.) 9 ♂, 6 ♀, 1 n. 1 ♂, 2 ♀, m.
Webster, Tex., July 19, 1912, (H.) 1 ♂. b.
Dickinson, Tex., July 20, 1912, (H.) 7 ♂, 4 ♀. b.
Galveston, Tex., July 19–21, 1912, (H.) 7 ♂, 6 ♀, 1 n. 1 ♀ m.
Rosenberg, Tex., July 25, 26, 1912, (H.) 1 ♀. b.
Columbus, Tex., Dec. 15, 1878, (Schwartz) 2 ♂, 2 ♀ [U. S. N. M.]. Under old leaves near Brazos River. Sm. b.
Kerrville, Tex., Aug. 17, 18, 1912, (R. and H.) 1 ♂. b
Victoria, Tex., Aug. 8, 1902, (W. E. Hinds) 1 ♀ [U. S. N. M.]. Lg. m.
Brownsville, Tex., June, (Snow) 2 ♀ [A. N. S. P.]. m.; May 1, 4, 1904, (Barber) 3 ♀ [U. S. N. M.]. sm. m.; July 31–Aug. 5, 1912, (R. and H.) 7 ♂, 6 ♀, 1 n. 2 ♀ m.; June 23, 1908, Nov. 21, 24, Dec. 19, 1910 (Hart) 3 ♂, 7 ♀. 1 n. [Ill. State Lab. Nat. Hist.]. 1 ♂, 3 ♀ m.
Piper Plantation, Brownsville, Tex., Aug. 3, 1912, (R. and H.) 1 ♂, 2 ♀. ♀ ♀ m.
Esperanza Plantation, Brownsville, Tex., May 3, 1903, (Schaeffer) 1 ♀ [Bklyn. Inst. A. and S.]. b.
Uvalde, Tex., Aug. 21, 22, 1912, (R. and H.) 5 ♂, 4 ♀. b.
Del Rio, Tex., Aug. 22, 23, 1912, (R. and H.) 2 ♂, 1 ♀. m.
St. George, Utah, April, (Palmer) 2 ♀, 1 n. TYPE and Paratypes [Scudder and Hebard Collection ex Bruner]. Dk. b.

Las Vegas, Nevada, Aug. 10, 1907, (H.) 2 ♂, 1 ♀. b.; Sept. 2, 1909, (R. and H.) 5 ♂, 7 ♀. Dk. b.
Fort Yuma, California, (Wickham) 1 ♂, 2 ♀ [Hebard Collection ex Bruner]. V. pl. m.
Panamint Valley, Cal., (Koebele) 1 ♂ [Hebard Collection ex Bruner]. Dk. b.
Tia Juana, Cal., Aug. 16, 1907, (H.) 1 ♀. Dk. b.
Los Angeles County, Cal., (Coquillett) 1 ♀ [U. S. N. M.]. Dk. b.
Mexico, (Sumichrast) 2 ♂, 1 ♀ [Scudder Collection]. b.
Sierra el Taste, Lower California, 1 ♀ [Hebard Collection ex Bruner]. V. pl. m.
San José del Cabo, L. Cal., 1 ♂, 3 ♀ [Hebard Collection ex Bruner]. Lg. m.
Durango or Sinaloa, Mexico, (Forrer) 1 ♀. TYPE of *N. comanchus*. [Biologia Collection in Br. Mus.]. Lg. v. pl. b.
Jalapa, Vera Cruz, Mex., 1 ♀ [Hebard Collection ex Bruner]. b.
Medellin, V. C., Mex., 2 ♂ [Hebard Collection ex Bruner]. 1 m.
Orizaba, V. C., Mex., Nov., 1887, (Bruner) 1 ♂, 1 ♀ [Hebard Collection ex Bruner]. b.
San Rafael, V. C., Mex., (Townsend) 1 ♂ [Hebard Collection ex Bruner]. m.
Minatitlan, V. C., Mex., Feb. 1, 1892, 1 ♀ [Hebard Collection ex Bruner]. b.
Teapa, Tabasco, Mex., (H. H. Smith) 1 ♂ [Biologia Collection in Br. Mus.]. b.

Nemobius palustris Blatchley.

1896. *Nemobius carolinus* Scudder, Jn. N. Y. Ent. Soc., IV, p. 107. (In part.) [South Kent and Canaan, Conn.]
1900. *Nemobius palustris* Blatchley, Psyche, IX, p. 53. (Original description.) [Northern Indiana. Tamarack swamps and cranberry bogs.]
1903. *Nemobius palustris* Blatchley, Orth. of Indiana, pp. 421, 427, 428. [Marshall, Fulton, and Starke Counties, Ind. In sphagnum mosses of swamps and bogs.]
1904. *Nemobius palustris* E. M. Walker, 34th Ann. Rept. Ent. Soc. Ont., No. 19, p. 97. [Algonquin Park, Ont. In sphagnum moss of floating cranberry bog.]
1904. *Nemobius palustris* E. M. Walker, Can Ent., XXXVI, pp. 182, 185. [Ragged Lake, Algonquin Park, Ont. In sphagnum swamp. Recorded material.]
1906. *Nemobius palustris* Morse, Psyche, XIII, p. 158. [Wellesley, Dover, and Natick, Mass. Sphagnum moss of bogs and wet meadows.]
1909. *Nemobius palustris* Davis, Jn. N. Y. Ent. Soc., XVII, p. 188. [Lowlands of Lakehurst and at Lake Hopatcong, N. J.]
1910. *Nemobius palustris* Rehn in Smith, Ann. Rept. N. J. State Mus., 1909, p. 192. [Stafford's Forge, N. J.]
1911. *Nemobius palustris* Walden, Bull. 16, State of Conn., St. Geol. and Nat. Hist. Surv., pp. 151, 152, 153. [Salisbury, Lyme, and New Haven, Conn. Swampy places, often in sphagnum moss.]

This species, the smallest of the North American members of the genus, may be separated from the other North American species of *Nemobius* belonging to the subgenus *Neonemobius* by its very small size, slender build, and very dark solid coloration.

The species resembles *N. confusus* closely in general appearance, but examination quickly shows that species to belong to the subgenus *Eunemobius*.

The closest affinity is found in *N. cubensis*, from which species it differs in being smaller in the great majority of cases, of darker and more solid coloration, without tegminal markings of any kind. In the male the tegmina are almost always less broad, and in the female are usually more abbreviate.

Described from an unspecified series of specimens from northern Indiana.

SINGLE TYPE here designated: ♀; Fulton County, Indiana. October 5, 1898. (Blatchley.) [Blatchley Collection].

Description of Type.—Size very small and form slender for the genus, head small, but full and rounded, wider than the cephalic width of the pronotum. Maxillary palpi of much the same form as in *N. fasciatus*, but with segments not as much produced. Eyes broad-ovate, not prominent. Pronotum[59] of much the same proportions as in *fasciatus*, but of smaller relative size to the rest of the body. Tegmina very slightly more than half as long as the caudal femora; apex at humeral angle, very broadly and roundly obtuse-angulate; distal margin of dorsal field very slightly oblique, very broadly arcuato-truncate; sutural margin passes into distal margin with a distinct but broadly rounded angulation at an angle of slightly more than ninety degrees; intermediate channel not conspicuously depressed and forming part of the dorsal field, this field unusually evenly rounded; longitudinal veins very conspicuous, cross-veinlets very few and extremely obscure. Wings absent. Ovipositor about two-thirds as long as caudal femora, distinctly though feebly arcuate; apex of same narrowly sublanceolate, with that portion formed by the dorsal valves armed, the upper margin serrulate,

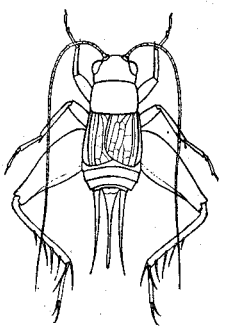

Fig. 25.—*Nemobius palustris.* Dorsal view of type, female. (× 3.)

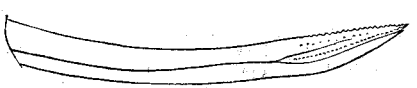

Fig. 26.—*Nemobius palustris.* Ovipositor. (Greatly magnified.)

these serrulations regular, minute, sharp, as closely arranged as in *N. cubensis.* Caudal femora with greatest (meso-cephalic) width contained slightly more than three times in the length. Spines of caudal tibiæ considerably more slender than in *fasciatus* and supplied with fewer hairs.

[59] The series of the present species before us shows that though the majority have the pronotum narrowing very slightly cephalad, some few have the cephalic and caudal width of the same subequal, while in other specimens the pronotum narrows decidedly cephalad.

A male in the Blatchley Collection, bearing the same data as the type, is here selected as the allotype.

Description of Allotype.—Size smaller, proportions somewhat more slender than in the female. The tegmina are translucent and when in repose the dorsal fields are very narrowly hemi-ellipitical in outline. Wings absent.

Measurements (in millimeters).

	Fulton County, Ind.			
	Type. Allotype.		Average of topotypes.	
	♀	♂	♀ ♀	♂ ♂
Length of body	6.2	5.8	6.1 (5.9–6.4)	5.7 (5.2–6.2)
Length of pronotum	1.4	1.2	1.5 (1.3–1.6)	1.3 (1. –1.5)
Caudal width of pronotum	2.	1.9	2. (1.8–2.1)	1.9 (1.6–2.1)
Length of tegmen	2.5	4.	2.4 (2.1–2.8)	3.9 (3.8–4.)
Length of caudal femur	4.8	4.6	4.6 (4. –4.9)	4.6 (4.2–5.)
Greatest width of caudal femur	1.6	1.6	1.7 (1.4–1.8)	1.6 (1.3–1.7)
Length of ovipositor	3.4	.....	3.2 (3.1–3.4)	.....

	Ragged Lake, Algonquin Park, Ont.		Natick, Mass.	Dover, Mass.	Wilmington, N. C.	
	♀	♂	♀	♂	♀	♂
Length of body	6.	5.3	6.8	6.2	6.8	5.7
Length of pronotum	1.	1.	1.6	1.4	1.9	1.4
Caudal width of pronotum	1.8	1.6	1.9	1.9	2.4	2.
Length of tegmen	2.7	3.4	3.2	3.7	3.1	3.9
Length of caudal femur	4.1	3.9	4.6	4.8	5.4	4.8
Greatest width of caudal femur	1.3	1.4	1.7	1.7	2.1	1.8
Length of ovipositor	3.6	.....	3.7	.....	3.8	.....

The specimens from Ontario are the smallest before us, while those from North Carolina are the largest. Additional material at hand bears out this evidence that the species increases in size very gradually from north to south over its range. Comparatively little variation is shown, however, in the present species.

Color Notes.—The types here described are of the same coloration as the majority of topotypic specimens before us. The head, pronotum, and limbs are solid vandyke brown. Maxillary palpi vandyke brown with the exception of the terminal joint which is wholly clove

brown. Tegmina and dorsal surface of abdomen dark clove brown. Ovipositor dark vandyke brown.

The majority of specimens not from Indiana are, however, somewhat differently colored. These specimens have the entire dorsal surface of the body dark clove brown, while underneath the usual coloration is raw umber. In such specimens the maxillary palpi usually have the third joint a rather light brown, the penultimate joint considerably paler and the terminal joint wholly clove brown. Both males and females of the present species have a rather shiny appearance.

Distribution.—The present species has been found on the Atlantic coast from Natick and Dover, Mass., to Wilmington and Lake Waccamaw, N. C., and inland has been taken as far north as Algonquin Park, Ont., and as far west as Starke County, Ind.

It is a swamp and bog inhabiting species, and is consequently very local in distribution.

Biological Notes.—The present species is extremely secretive, living in the recesses of swamps and bogs, usually in and about sphagnum mosses. In such situations *palustris* may sometimes be found in very large numbers, but the peculiar habitat combined with the small size and sombre coloration of the insects themselves, explains their usual scarcity in collections. When disturbed, individuals of *palustris* leap about vigorously and then burrow into the sphagnum mosses or hide under roots or débris. Dr. Walker describes the song of this species as "a continuous and rather feeble trill" and notes a similarity to that of *carolinus*.

No macropterous specimens of the species have been taken, and it is our opinion that such do not occur, owing to the fact that in the present species the reduction of the tegmina has reached a rather advanced stage and is found to vary to an extremely small degree.

Synonymy.—No synonyms of the present species have occurred, but Allard has unfortunately recorded small dark specimens of *N. fasciatus* as this species.

Specimens Examined.—56: 28 males, 28 females.

Ragged Lake, Algonquin Park, Ontario, Aug. 18, 1903, (E. M. Walker) 2 ♂, 3 ♀ [University of Toronto and Blatchley Collection].

Fulton County, Indiana, Oct. 5, 1898, (Blatchley) 2 ♂, 2 ♀. TYPE, Allotype, Paratypes. [Blatchley Collection, U. S. N. M.]; Aug. 15, 1902, (Blatchley) 5 ♂, 6 ♀ [U. S. N. M., A. N. S. P., Hebard Collection].

Natick, Massachusetts, Oct. 16, 1905, (from Morse) 3 ♀ [Hebard Collection].

Dover, Mass., Oct. 11, 1905, (from Morse) 3 ♂, 1 ♀ [Hebard and Blatchley Collection].

New Haven, Connecticut, Aug. 18, 1910, (Walden) 1 ♂, 1 ♀ [Hebard Collection].

Lake Hopatcong, New Jersey, Aug. 30, 1908, (Davis) 1 ♂ [Davis Collection].
Lakehurst, N. J., Sept. 3, 14, 1907, (Davis) 2 ♂, 2 ♀ [Davis Collection].
Stafford's Forge, Ocean County, N. J., Sept. 16, 1905, (H.) 4 ♂.
Stroudsburg, Pennsylvania, Sept., 1903, (H.) 2 ♀.
Tinicum Island, Pa., Sept. 19, 1908, (R. and H.) 1 ♀.
Washington, D. C., Sept. 23, 1911, (Davis) 1 ♂ [Davis Collection].
Fayetteville, North Carolina, Sept. 9, 1911, (R. and H.) 3 ♂, 2 ♀.
Lake Waccamaw, N. C., Sept. 8, 1911, (R. and H.) 1 ♂.
Wilmington, N. C., Sept. 8, 1911, (R. and H.) 3 ♂, 5 ♀.

Nemobius palustris aurantius Rehn and Hebard.

1905. *Nemobius carolinus* (not of Scudder, 1877) Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1905, p. 801. [Thomasville, Ga. In beds of sphagnum.]
1911. *Nemobius palustris aurantius* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1911, p. 597. (Original description.) [Same material as 1905.]
1912. *Nemobius palustris aurantius* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1912, p. 109. (Single Type fixation.)

The present insect is in all probability a southern race of *N. palustris*, distinguished only from that species by its peculiar and striking coloration. Unsuccessful efforts have been made to obtain additional material from the region in which the type series was taken, and until this can be done it is, in our opinion, advisable to consider the present insect a geographic race, although it may eventually prove to be a mere color variety.

TYPE: ♂; Thomasville, Georgia. In sphagnum. December 6, 1903. (Hebard.) [Hebard Collection.]

Description of Type.—The head, pronotum, and ventral surface of the insect is ochraceous-rufous, the limbs almost uniform ochraceous, and the tegmina and dorsal portion of the abdomen shining black. The maxillary palpi are pale yellowish, with the exception of the last segment, which is darker at the base, shading to clove brown in the apical half.

The female allotype, here selected, bears the same data as the type and is in the same collection; it is slightly larger than the type, but of the same coloration.

Measurements (in millimeters).

	Thomasville, Ga.			
	TYPE. ♂	Allotype. ♀	Average of paratypic series. ♂♂	♀♀
Length of body	6.5	7.	6.2 (6. –6.5)	6.2 (5.9–6.7)
Length of pronotum	1.2	1.5	1.1 (1. –1.2)	1.4 (1.3–1.5)
Caudal width of pronotum	1.8	1.9	1.7 (1.6–1.8)	1.9 (1.8–2.1)
Length of tegmina	3.8	3.2	3.9 (3.8–4.)	2.6 (2.1–3.)
Length of caudal femur	4.2	4.8	4.3 (4.1–4.6)	4.6 (4.4–5.)
Greatest width of caudal femur	1.4	1.8	1.6 (1.4–1.8)	1.8 (1.7–1.9)
Length of ovipositor	.....	3.5	.....	3.6 (3.2–3.9)

Color Notes.—The contrasting and solid coloration given in the description is distinctive and varies but little in tone in the series.

Distribution.—The insect is known only from Thomasville, in southwestern Georgia.

Biological Notes.—The series was taken near the town in a small area of moist ground where the pine woods gave way to the magnolias and beeches of the "branch" forest growth. All of the specimens were captured in sphagnum growing among the roots of these latter trees. The entire series is brachypterous.

Specimens Examined.—13: 5 males, 8 females.

Thomasville, Ga., December 6, 1903, (H.) 5 ♂, 8 ♀. TYPE, allotype, paratypes. [Hebard and A. N. S. P. Collection.]

Subgenus EUNEMOBIUS n. subgen.

This distinctive subgenus includes two species and two geographic races from North America. TYPE of subgenus—*Nemobius carolinus* Scudder.

Subgeneric Description.—Size medium for the genus. Disto-ventral spurs of caudal tibia equal in length. Proximal and distal internal spines of male specialized as described under *Morphological Notes* for the genus; other spines of caudal tibia below concave, with margins of this sulcation smooth in both sexes. Ovipositor very short, almost always less than two-thirds the length of the caudal femur, gently curved; apex with dorsal margin armed with heavy teeth, ventral margin armed with minute, widely spaced serrulations. Ventral segments of abdomen in male broadened, extending outward and upward on sides of abdomen above the normal dorsal segments, thus making the abdomen unusually broad and its entire dorsal surface concave.

The present subgenus is widely separated from the other North American subgenera by the majority of the characters given above.

Nemobius carolinus Scudder.

1876. *Nemobius exiguus* Provancher (not *Acheta exigua* Say, 1825), Nat. Can., VIII, p. 61. [Province of Quebec, Can.]
1877. *Nemobius carolinus* Scudder, Proc. Bost. Soc. Nat. Hist., XIX, p. 36. (Original description.) [North Carolina.]
1877. *Nemobius volaticus* Scudder, Proc. Bost. Soc. Nat. Hist., XIX, p. 36. (In part.) (Description of ♀.) [Georgia.]
1877. *Nemobius* (*Anaxipha*) *septentrionalis* Provancher, Nat. Can., IX, p. 292. (Correction of name used in 1876.)
1877. *Nemobius* (*Anexipha*) *septentrionalis* Provancher, Faune Ent. Can., II, p. 24. (Description.) (Records of 1876.)
1887. *Nemobius* (*Anexipha*) *septentrionalis* Caulfield, Can. Rec. Sci., II, p. 393. [Montreal, Quebec and Rat Portage, Can.]

1889. *Nemobius vittatus* Davis, Ent. Am., V, p. 79. (In part.) [Staten Island, N. Y. "Small form generally included."]
1892. *Nemobius exiguus* Blatchley (not *Acheta exigua* Say, 1825), Proc. Ind. Acad. Sci., 1891, p. 136. [Indiana. Very common.]
1893. *Nemobius exiguus* (?) Bruner (not *Acheta exigua* Say, 1825), Publ. Nebr. Acad. Sci., III, p. 32. [Eastern half of Nebraska. Not at all rare.]
1893. *Nemobius volaticus* (?) Bruner (In part of Scudder, 1877), Publ. Nebr. Acad. Sci., III, p. 32. [Timbered district of eastern Nebraska.]
1894. *Nemobius affinis* Beutenmüller, Bull. Am. Mus. Nat. Hist., VI, pp. 249, 250, 267, Pl. 5, fig. 11. (Description.) [New York, N. Y.]
1896. *Nemobius carolinus* Scudder, Jn. N. Y. Ent. Soc., IV, pp. 100, 107. (In part.) [Jackman and Norway, Me.; Blue Hill, Milton, and Adams, Mass.; Ithaca, N. Y.; Orange, N. J.; Maryland; Vigo County, Ind.; District of Columbia; Virginia; Lake Worth and Lake Okechobee, Fla.; New Orleans, La.; Texas; Lincoln, West Point, and South Bend, Nebr.]
1896. *Nemobius cubensis* Scudder, Jour. N. Y. Ent. Soc., IV, p. 105. (In part.) [Ogle County and Chicago, Ill.; Norway, Me.; Charlotte Harbor and Indian River, Fla.]
1896. *Nemobius carolinus* Scudder, Psyche, VII, p. 433. (New key.)
1869. *Nemobius carolinus* Davis, Proc. Nat. Sci. Assn. Staten Id., V, p. 96. (Notes, nomenclatural and on stridulation.)
1897. *Nemobius carolinus* Ball, Proc. Iowa Acad. Sci., IV, p. 236. Iowa. Common in woods.
1897. *Nemobius carolinus* Blatchley, Ins. in Gen. and Orth. Ind. in Particular, p. 23. [Indiana.]
1898. *Nemobius socius* Lugger (not of Scudder, 1877), Orth. Minn., p. 263. [St. Paul, Minn.]
1898. *Nemobius exiguus* Lugger (not *Acheta exigua* Say, 1825), Orth. Minn., p. 268. [Minnesota.]
1900. *Nemobius exiguus* Blatchley, Psyche, IX, pp. 53, 54. (Description.) [Indiana. Half as common as *N. fasciatus*.]
1900. *Nemobius carolinus* Scudder, Psyche, IX, p. 104. [Connecticut. Not common in New England.]
1900. *Nemobius cubensis* Scudder (not of Saussure, 1874), Psyche, IX, p. 104. (Previous incorrect record.)
1900. *Nemobius affinis* Smith, Ins. of New Jersey, p. 164. [Staten Island, N. Y. Common.]
1902. *Nemobius palustris* E. M. Walker (not of Blatchley, 1900), 32d Ann. Rept. Ent. Soc. Ont., 1901, No. 19, p. 109. [Lake Simcoe, Sarnia, Southampton and Owen Sound, Ont.]
1903. *Nemobius exiguus* Blatchley, Orth. of Indiana, pp. 420, 426. (General information.)
1904. *Nemobius confusus* E. M. Walker (not of Blatchley, 1903), 34th Ann. Rept. Ent. Soc. Ont., 1903, No. 19, p. 97. (Wrong correction.)
1904. *Nemobius angusticollis* E. M. Walker, Can. Ent., XXXVI, pp. 182, 186. (Description.) [Toronto, de Grassi Point on Lake Simcoe and Severn River, Ont.] (Correction 1902 and 1904 records.)
1904. *Nemobius carolinus* Rehn, Ent. News, XV, p. 331. [Atsion and West Creek, N. J.]
1904. *Nemobius exiguus* Mead, Dept. Zool. Ent. Ohio State Univ., No. 19, p. 112. [Ohio.]
1905. *Nemobius exiguus* Isely, Trans. Kansas Acad. Sci., p. 248. [Fairview, Clearwater, and Wichita, Kans. Under stones in wet places.]
1905. *Nemobius carolinus* Isely, Trans. Kansas Acad. Sci., p. 248. [Dale's Pond, near Wichita, Kan.]
1905. *Nemobius exiguus* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1904, p. 800. [Thomasville and Ocklockonee River (Thomas County), Ga.]
1905. *Nemobius cubensis* Rehn and Hebard (not of Saussure, 1874), Proc. Acad. Nat. Sci. Phila., 1904, p. 800. [Thomasville, Ga.]
1906. *Nemobius carolinus* Hart, Ent. News, XVII, p. 160. [Brazos River bottoms near College Station and Houston, Tex.]

1906. *Nemobius palustris* Morse, Psyche, XIII, p. 158. (In part.) (Scudder's incorrect 1896 records given.)
1906. *Nemobius janus* Kirby, Synon. Catal. Orth., II, p. 19. (New name proposed.)
1907. *Nemobius carolinus* Hart, Bull. Illinois State Lab. Nat. Hist., VII, No. VII, p. 235. [Thompson Lake, Ill. In damp woods.]
1908. (*Nemobius*) *exiguus* Brimley, Ent. News, XIX, p. 21. [Raleigh, N. C. Lowland and upland in damp places.]
1908. (*Nemobius*) *carolinus* Brimley, Ent. News, XIX, p. 21. [Raleigh, N. C.]
1909. *Nemobius carolina* Hebard, Ent. News, XX, p. 115. [Thomasville, Ga. In "branch."]
1909. *Nemobius carolinus* E. M. Walker, Can. Ent., XLI, pp. 144, 211. [Temagami District, Ont. Common.]
1910. *N(emobius) affinis* Insert by Smith in Rehn in Smith, Ann. Rept. N. J. State Mus., 1909, p. 192. (New Jersey notes.)
1910. *N(emobius) carolinus* Rehn et al. in Smith, Ann. Rept. N. J. State Mus., 1909, p. 192. [Mahwah, Ft. Lee, Cranford, Brookside, Lakehurst, Jamesburg and Stafford's Forge, N. J.; Staten Island, N. Y.]
1910. *N(emobius) janus* Rehn in Smith, Ann. Rept. N. J. State Mus., 1909, p. 192. [National Park, N. J.]
1911. *Nemobius janus* Allard, Ent. News, XXII, p. 37. [Washington, District of Columbia.]
1911. *Nemobius aterrimus* Rehn and Hebard (not of Scudder, 1896), Proc. Acad. Nat. Sci. Phila., 1910, p. 596. [Bainbridge, Ga.]
1911. *Nemobius cubensis* Rehn and Hebard (not of Saussure, 1874), Proc. Acad. Nat. Sci. Phila., 1910, p. 596. [Bainbridge, Ga.]
1911. *Nemobius carolinus* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1910, p. 647. [Balsam and Raleigh, N. C.]
1911. *Nemobius janus* Allard, Ent. News, XXII, p. 157. (Additional notes.)
1911. *N(emobius) carolinus* Walden, Bull. 16, State Conn. State Geol. Nat. Hist. Surv., pp. 151, 152. [West Woodstock and Lyme, Conn. Not common. Sunny spots in open woods.]
1911. *Nemobius carolinus* Sherman and Brimley, Ent. News, XXII, p. 391. [Raleigh westward in North Carolina.]
1912. *Nemobius carolinus* Washburn, Jn. Econ. Ent., V, No. 2, p. 117. [Fergus Falls, Minn.]
1912. *Nemobius carolinus* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1912, p. 273. [Homestead, Fla.]

This species, type of the subgenus *Eunemobius*, is very different from *N. confusus*, the only other known North American species belonging to that subgenus. The present insect is almost invariably larger in size, has a more robust structure, less glossy appearance, different color pattern and usually paler coloration; it has also differently colored maxillary palpi and a very different ovipositor in the female. The coloration of the maxillary palpi is of the greatest value as a certain and ready character for the separation of the two species.

Like *N. cubensis*, the present species has a widely distributed paler western race, but, unlike that species, the great majority of macropterous individuals are found in the western series.

Based on an unspecified series from North Carolina.

SINGLE TYPE here designated: ♂; North Carolina. [Scudder Collection.]

We here describe a female taken at Lake Waccamaw, N. C., September 8, 1911, by Rehn and Hebard and in the Hebard Collection.

Size medium, form rather stout, head small but prominent and wider than cephalic width of pronotum, interantennal projection moderate. Eyes small but prominent, broad-ovate, proportionately broader than in *N. fasciatus*, moderately protruding. Maxillary palpi of much the same form as in that species, but less attenuate. Pronotum with length contained nearly one and two-fifths times in width, narrowing very slightly cephalad, but more abruptly in cephalic third; with a median impressed line more noticeable in the cephalic portion. Tegmina[60] very slightly more than half as long as caudal

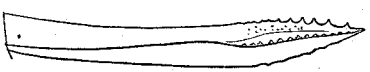

Fig. 27.—*Nemobius carolinus*. Ovipositor. (Greatly magnified.)

femur; longitudinal veins decided, not as conspicuous as in *N. confusus*, cross-veinlets very faint. Wings absent. Ovipositor slightly less than two-thirds the length of the caudal femur, distinctly though feebly arcuate; apex of same narrowly sublanceolate, with both dorsal and ventral margins armed, the former with heavy, rather widely separated teeth, the latter with minute very widely spaced serrulations. Limbs delicate, spines of caudal tibiæ rather slender.

We here describe a male bearing the same data as the female described above.

Slightly smaller but proportionately broader, particularly in the abdominal portion. Tegmina transparent and delicate, very broad and completely enveloping all but the ventral surface of the peculiarly broadened abdomen; when in repose the dorsal fields are very flat and hemi-elliptical in outline, the lateral margins slightly bowed, subparallel. Wings absent. The ventral segments of the abdomen are extremely broadened and extend outward and upward on the sides of the abdomen above the normal dorsal segments, thus making the abdomen unusually broad and its entire dorsal surface deeply concave.

[60] The form of the female tegmina is useless as a character in the present species owing to its variability. We have before us brachypterous specimens ranging from those which have the distal margins of the dorsal field transverse, to those which have these margins decidedly oblique, the degree of angulation of the tegmina also varying considerably.

Measurements (in millimeters).

	North Carolina Type ♂	Lake Waccamaw, N. C. ♂♂	Lake Waccamaw, N. C. ♀♀
Length of body	7.6	8.5 (8.2–8.8)	7.2 (6.3–8.4)
Length of pronotum	2.	1.8 (1.7–2.)	1.9 (1.6–2.)
Caudal width of pronotum	2.7	2.7 (2.5–2.9)	2.4 (2. –2.7)
Length of tegmina	5.2	5.4 (5. –5.8)	3. (2.9–3.4)
Length of wings	.....	.....	.....
Length of caudal femur	6.2	6.1 (5.9–6.4)	5.8 (5. –6.4)
Greatest width of caudal femur	2.3	2.2 (2. –2.5)	2.1 (1.9–2.2)
Length of ovipositor	.....	.....	3.5 (2.6–3.8)

	Chestnut Hill, Pa. ♂♂	Chestnut Hill, Pa. ♀♀	♂	♀
Length of body	7.4 (6.9–7.8)	7.2 (6.4–7.8)	7.7	6.7
Length of pronotum	1.8 (1.7–2.)	1.7 (1.6–1.9)	1.6	1.7
Caudal width of pronotum	2.6 (2.1–2.8)	2.4 (2.1–2.7)	2.6	2.7
Length of tegmina	5.1 (4.8–5.4)	3.5 (3.3–3.7)	5.	4.4
Length of wings	.....	.....	9.2	10.4
Length of caudal femur	5.5 (5.8–6.)	5.4 (5. –6.)	5.5	5.7
Greatest width of caudal femur	2. (1.9–2.1)	2.1 (2. –2.3)	1.9	2.
Length of ovipositor	.....	3.5 (3.2–3.8)	.....	3.5

	Averages in ovipositor length.	Extremes in female tegminal length.
De Grassi Point, Ont.	3.7 (3.6–3.9)	3.5–3.7
Raleigh, N. C.	3.2 (3. –3.4)	3. –3.4
Florence, S. C.	3.5 (3.1–3.7)	3. –3.8
Thomasville, Ga.	3.1 (3. –3.2)	2.4–3.
Beaumont, Tex.	3.2 (3.1–3.4)	3. –3.2

The specimens before us indicate that there is a certain amount of decrease in both ovipositor and tegminal length in female specimens of the present species southward in its distribution. In size the species is somewhat variable over its entire range, the smallest specimens before us being found in series from Ontario, Pennsylvania, Georgia, and Florida. Macropterous specimens are exceedingly scarce in the north, almost all of the long-winged specimens before us are from Georgia and Florida.

Color Notes.—The individuals here described are typical of the majority of the specimens at hand. Head very dark mummy brown, the faintest kind of longitudinal lineation barely suggested on the caudal portion of the occiput, which portion is slightly paler than

the rest of the head. Eyes very dark brown. Maxillary palpi cream color, the first three segments and base of the fourth much suffused with very dark brown, terminal segment cream color with the immediate apex very dark brown. Pronotum very dark mummy brown, shading to almost black on the lateral lobes. Tegmina of both sexes dark mummy brown, shining, transparent; intermediate channel of the same color as the other portions. Limbs raw umber, above very slightly maculate with mummy brown. Under portions of limbs and body raw umber. Entire dorsal surface of abdomen of male (concealed) and concealed portion of same in female very dark brown, polished; exposed portion of same in female very dark mummy brown marked with four regular rows of small raw-umber spots.

In the large series of specimens before us there are many somewhat paler or darker than those here described. In the lighter specimens the dark lateral lobes of the pronotum are usually much more noticeable and the spots on the exposed dorsal surface of the abdomen in the female are more distinct. The pale color of the maxillary palpi is more yellowish.

The darker specimens are often almost black on the dorsal surface, the ventral surface mummy brown. The spots on the exposed dorsal surface of the abdomen in the female are greatly reduced or wholly absent. The pale color of the maxillary palpi is almost always white with no yellowish suffusion.

The markings of the maxillary palpi in this species varies from a type having the apical half of the ultimate joint darkened, to one which bears only a trace of this dark coloration at the extreme apex; this trace of darker coloration is never missing, however, and serves as a character to separate this species from *N. confusus*.

Distribution.—This insect is known from the province of Quebec to the most southern portion of the mainland of Florida, and west to the great plains and the mesquite region of Texas.

Aside from *N. fasciatus* and its southern race, this species is the most abundant of the genus over almost its entire range. Only in extreme southern Florida is this not true, where *N. cubensis* is the most plentiful of the species of the genus. The present insect may be found in a great variety of situations; it appears to prefer thick grasses growing along the edges of woodlands, the leaf-covered almost bare ground about streams and ponds in heavy woods, dark swamps, or marsh land under cat-tails. The song is a high-pitched and continuous trill, more pleasant to the ear than that of *N. fasciatus*. The majority of southern macropterous

specimens before us were taken when attracted to light at night. Specimens taken on the border of woodlands and in marshlands are, as would be expected, usually pale, while those from the other situations mentioned are almost always dark; no other differences of any kind exist between these.

Biological Notes.—We find that the peculiarly developed abdomen of the males of the present species acts as a sounding-board for the tympanum. The tegmina fit tightly over the raised margins of the concave dorsal surface of the abdomen in this sex, their apex just covering and fitting closely to the distal extremity of the abdomen.

Small, dark macropterous specimens of this species from the southern United States have been recorded as *N. cubensis* owing to their great superficial resemblance to that species, which, however, belongs to a different subgenus having very different characters. Over the greater portion of the range of this species, macropterous individuals are exceedingly scarce.

Synonymy.—In 1776, Provancher recorded the present species as *Nemobius exiguus.* This was doubtless due to the fact that at that time Scudder had not properly placed Say's *Acheta exigua,*[61] which species is now known to belong to the genus *Anaxipha,* for Scudder had used the name *Nemobius exiguus* to record specimens which he realized later belonged in fact to *N. fasciatus.*

In 1877, Scudder, described *Nemobius volaticus,* the males of which are macropterous specimens of *N. cubensis,* the females macropterous specimens of *N. carolinus,* as an examination of the types clearly shows.

In October of 1877, Provancher corrected his 1876 record, using *Nemobius* (*Anaxipha*) *septentrionalis,* as suggested by Scudder (who did not realize that his own species, described the previous April as *Nemobius carolinus,* was the same) but without describing the species; the next month, however, he described the insect under that name.

This name was again used by Caulfield in 1887, and first placed in the synonymy under the present species by E. M. Walker in 1909, though Davis recognized this fact as early as 1896.

In 1890, Smith wrongly used the name *Nemobius exiguus* in giving Davis' correct record of *Anaxipha exigua.*[62]

In 1892, Blatchley used the name *Nemobius exiguus,* and in 1900, considering it a new species, he gave under the same name a full description, but, as he was unable to validate a name based originally

[61] 1825. *Jour. Acad. Nat. Sci. Phila.,* IV, p. 309.
[62] *Am. Nat.,* XXII, p. 1148.

by Scudder on a misidentification, this name could not stand even if Blatchley's species were not an absolute synonym of Scudder's *N. carolinus*, as a comparison of a topotypic series of the former from Blatchley with the type of the latter shows us beyond the slightest doubt. Blatchley cannot in any way be criticised for believing the species undescribed, for Scudder, having examined specimens for him, identified individuals of *Nemobius bruneri* (described in the present paper and then known only by the latter from specimens bearing Bruner's invalid name *Cyrtoxyphus* (?) *variegatus*) as *Nemobius carolinus*, and advised him to describe specimens of true *Nemobius carolinus*, Scudder's own species, as new. This great carelessness resulted in *Nemobius carolinus* being recorded as *Nemobius exiguus* by Bruner (with a query) in 1893, Lugger in 1898, Blatchley in 1903, Mead in 1904, Isely and Rehn and Hebard in 1905, and Brimley in 1908.

In 1893, Bruner recorded the species as *N. volaticus* with a query.

In 1894, Beutenmüller described *Nemobius affinis*, which species was two years later correctly placed in the synonymy under *carolinus* by Scudder, but which name was used by Smith in 1900 and 1910.

In 1896 and 1900, Scudder recorded specimens of *N. cubensis* and *N. palustris* as the present species, specimens of which latter he also recorded as *N. cubensis*. His discussion of Provancher's "*Nemobius* (*Anaxipha*) *septentrionalis*" in the former paper is incorrect.

Lugger's 1898 record of *N. socius* should probably apply to the present species.

In 1902, E. M. Walker misidentified a large series of the present species from Ontario as *N. palustris*, and in 1904 believing these records wrong corrected the name to *N. confusus*.

The same year he described *Nemobius angusticollis*, placing the specimens from which the above incorrect records were given in the typical series. This name is an absolute synonym of *N. carolinus*, as was first stated by E. M. Walker himself in 1909.

Rehn and Hebard, in 1905 and 1911, mistook macropterous specimens of this insect for *N. cubensis* and so recorded them.

Morse, in 1906, repeated Scudder's incorrect records of 1896 of the present species under *N. palustris*.

The same year Kirby, realizing Blatchley's name *N. exiguus* invalid, proposed as a new name *Nemobius janus*; this name was used by Rehn in 1910 and twice by Allard in 1911.

Specimens Examined.—418: 185 males, 225 females, and 8 nymphs.

Château Richer, Ontario, Sept., 1904, (E. M. Walker) 1 ♂, 1 ♀ [U. S. N. M. and University of Toronto]. b.

Owen Sound, Ont., Aug. 31, 1901, (E. M. Walker) 1 ♂, 1 ♀ [U. S. N. M. and University of Toronto]. b.

de Grassi Point, Ont., Sept. 14, 1901, (E. M. Walker) 1 ♂, 2 ♀ [A. N. S. P. and University of Toronto]. b.

Franconia, New Hampshire, (Slosson) 1 ♀ [Scudder Collection]. b.

Wollaston, Massachusetts, Aug. 16, Sept. 1, 1895, 96, (F. H. Sprague) 1 ♂, 1 ♀ [Scudder Collection]. b.

South Natick, Mass., Oct. 22, 1905, (Morse) 1 ♀ [Blatchley Collection]. b.

Oxford, Mass., Oct., 1909, (Allard) 2 ♂, 2 ♀ [U. S. N. M.]. b.

Ramapo, New York, Oct. 1, 1905, (Davis) 2 ♂, 1 ♀ [Davis Collection]. b.

Suffern, N. Y., Oct. 6, (Davis) 1 ♀ [Davis Collection]. b.

Bronxville, N. Y., Aug. 23, 1908, (Davis) 1 ♂, 1 ♀ [Davis Collection]. b.

New York, N. Y., Sept. 29, 1907, (Davis) 1 ♀ [Davis Collection]. b.

Staten Island, N. Y., Aug. 22, 26, Sept. 2, 5, 19, Oct. 3, 8, 1896–1906, (Davis) 9 ♂, 8 ♀, 1 n. [Davis Collection]. Pair m.

Springs, Long Island, N. Y., Sept. 21, 1910, (Davis) 1 ♀ [Davis Collection]. b.

Lakehurst, New Jersey, Oct. 6, 1906, (Davis) 1 ♀ [Davis Collection]. b.

Cranford, N. J., Aug. 27, (Davis) 2 ♂, 1 ♀ [Davis Collection]. b.

Jamison City, Pennsylvania, Sept. 5, 1909, (Davis) 2 ♂, 2 ♀ [Davis Collection]. b.

Harrisburg, Pa., Aug. 21, 1 ♀ [A. N. S. P.]. m.

Cornwells, Pa., Oct., 1906, (R. and H.) 1 ♂, 1 ♀. b.

Chestnut Hill, Pa., July 8, Aug. 7, Sept. 9, 19, 1904, 08, 11, (H.) 28 ♂, 29 ♀. Pair m.

Wissahickon Creek, White Marsh Valley, Pa., Sept. 20, 1903, (H.) 2 ♂, 4 ♀. b.

Tinicum Island, Pa., Aug. 13, Sept. 9, 19, 1904, 08, 11, (R. and H.) 13 ♂, 14 ♀. b.

Diamond Valley, Huntingdon County, Pa., Sept. 10, 1905, (R.) 1 ♀. b.

Chestnut Ridge, Westmoreland County, Pa., (Brugger) 1 ♀ [A. N. S. P.]. b.

Cabin John Run, Maryland, Sept. 19, 1911, (Davis) 14 ♂, 11 ♀, 1 n. [Davis Collection]. b.

Plummer's Island, Md., Oct., 1909, (Barber) 2 ♀ [U. S. N. M.]. b.

Washington, D. C., Aug. 16, 29, Oct. 5, 16, Nov. 9, 1883–1909, (Caudell et al.) 3 ♂, 7 ♀ [U. S. N. M.]. 3 ♀ m.

Alexandria County, Virginia, Sept., 1911, (Davis) 1 ♂, 5 ♀ [Davis Collection]. b.

Dead Run, Va., Aug. 29, 1912, (Caudell) 2 ♂ [U. S. N. M.]. b.

Rosslyn, Va., Sept. 26, Oct. 20, Nov. 3, 1901, (Caudell) 3 ♂, 1 ♀ [U. S. N. M.]. b.

Fairfax County, Va., Sept. 21, 1911, (Davis) 1 ♀ [Davis Collection]. b.

Falls Church, Va., Sept. 4, 1906, (Caudell) 7 ♂, 9 ♀, 4 n. [U. S. N. M.]. b.

North Carolina, 1 ♂, 1 ♀. TYPE, Allotype [Scudder and Blatchley Collection]. b.

Raleigh, N. C., Aug. 4, 21, Sept. 5, 9, 15, 28, Oct. 10, 12, 28, 30, Nov. 2, 13, 19, 30, 1904–1908, (Brimley, Sherman, Bentley) 11 ♂, 15 ♀ [Brimley, N. C. Dept. Agr. and Hebard Collection]. 2 ♂ m., 1 at light.

Fayetteville, N. C., Sept. 9, 1911, (R. and H.) 1 ♂, 1 ♀. b.

Lake Waccamaw, N. C., Sept. 8, 1911, (R. and H.) 3 ♂, 8 ♀. b.

Blowing Rock, N. C., Aug. 29, 1902, (Sherman) 1 ♂ [N. C. Dept. Agr.]. b.

Newton, N. C., Aug., 1906, (Sherman) 1 ♂ [N. C. Dept. Agr.]. m.

Black Mountains, N. C., Sept., (Beutenmüller) 1 ♂, 2 ♀ [Am. Mus. Nat. Hist.]. b.

Balsam, N. C., Oct. 7, 1905, (H.) 1 ♂, 2 ♀. b.

Highlands, N. C., Sept., 1906, (Sherman) 4 ♂, 1 ♀ [N. C. Dept. Agr.]. b.

Florence, South Carolina, Sept. 6, 1911, (R. and H.) 10 ♂, 11 ♀, 2 n. b.

Swansea, S. C., June, 1908, (C. C. Craft) 1 ♀ [U. S. N. M.]. m.

North end Sullivan Island, N. C., Sept. 5, 1911, (R. and H.) 1 ♀. b.

Georgia, 1 ♀. From type series *N. volaticus* Sc. [Blatchley Collection]. m.

Thompson's Mills, Ga., Oct., 1909, (Allard) 1 ♂ [U. S. N. M.]. b.

Brunswick, Ga., May 2, 1911, 1 ♀ [Collection State of Ga.]. m.

Bainbridge, Ga., June–Sept., 1909–11, (Bradley) 4 ♂, 1 ♀ [Cornell Univ.]. m.

Thomasville, Ga., Jan. 1, Mar. 18, 21, 29, May 19, June 13, 15, 23, Nov. 23, Dec. 1, 11, 13, 14, 17, 18, 22, 1903–08, (H. and for H.) 21 ♂, 30 ♀. 1 ♂, 6 ♀ m.
Daytona, Florida, Sept. 16, 1911, (Englehardt) 1 ♂, 1 ♀ [Bklyn. Inst. A. and S.]. m.
Indian River, Fla., (Pridday) 1 ♂ [Hebard Collection ex Bruner]. m.
Lakeland, Fla., Nov. 10, 1911, (Davis) 1 ♀ [Davis Collection]. m.
Sarasota, Fla., Jan. 31, Feb. 14, 23, 25, Mar. 3, 1911, (Blatchley) 2 ♂, 5 ♀ [Blatchley Collection]. b., 1 ♀ l. teg. only.
Charlotte Harbor, Fla., (Slosson) 1 ♂ [Scudder Collection]. m.
Lake Worth, Fla., (Slosson) 1 ♀ [Scudder Collection]. m.
Biscayne Bay, Fla., (Slosson) 4 ♂, 1 ♀ [Scudder Collection]. 3 ♂, 1 ♀ m.
Homestead, Fla., Mar. 17–19, 1910, (H.) 1 ♂. b.; July 10–12, 1912, (R. and H.) 1 ♂, 1 ♀. b.
Olivier, Louisiana, (E. S. G. Titus) 1 ♂ [U. S. N. M.]. b.
Doucette, Texas, July 24, 1912, (H.) 1 ♂. b.
Beaumont, Tex., July 23, 1912, (H.) 3 ♂, 6 ♀. 1 ♀ m.
College Station, Tex., Dec. 29, 1905, (Hart) 1 ♀ [Ill. State Lab. Nat. Hist.]. b.
Houston, Tex., Jan. 5, 1906, (Hart) 1 ♀ [Ill. State Lab. Nat. Hist.]. b.
Columbus, Ohio, Oct. 2, 1903, (Mead) 1 ♂, 1 ♀ [Ohio State Univ.]. b.
Cedar Point, Ohio, Aug. 21, 1912, 3 ♂, 3 ♀ [Ohio State Univ.]. Pair m.
Sugar Grove, Ohio, Sept. 12, 1912, 1 ♂, 1 ♀ [Ohio State Univ.]. b.
Cincinnati, Ohio, Oct. 19, 1912, 1 ♀ [Ohio State Univ.] b.
Kosciusko County, Indiana, Aug. 17, 1903, (Blatchley) 2 ♀ [A. N. S. P.]. b.
Marion County, Ind., Oct. 30, 1904, (Blatchley) 1 ♂, 2 ♀ [U. S. N. M.]. b.
Vigo County, Ind., Oct. 5, 1894, (Blatchley) 1 ♂, 1 ♀ [U. S. N. M.]. b.
Knox County, Ind., Nov. 5, 1903, (Blatchley) 1 ♂ [U. S. N. M.]. b.
Crawford County, Ind., Sept. 8, 1903, (Blatchley) 1 ♂ [A. N. S. P.]. b.
Ogle County, Illinois, (Allen) 1 ♀ [Scudder Collection]. L. teg. only.
Chicago, Ill., (Palmer) 1 ♀ [Scudder Collection]. L. teg. only.
Dallas County, Iowa, (J. A. Allen) 1 ♀ [Scudder Collection]. m.
West Point, Nebaska, Oct. 16, 1 ♂ [Hebard Collection ex Bruner]. b.
Lincoln, Nebr., Sept., 1894, (Bruner) 2 ♀ [Hebard Collection ex Bruner]. 1 m. at light.
South Bend, Nebr., Oct., 1889, 1 ♂, 1 ♀ [Hebard Collection ex Bruner]. b.
Clearwater, Kansas, Aug., 1904, (Isely) 1 ♀ [U. S. N. M.]. b.
Atchison, Kan., Aug. 1, 1904, (Isely) 1 ♂ [U. S. N. M.]. b.
Fairview, Kan., Aug., 1904, (Isely) 2 ♂, 2 ♀ [U. S. N. M.]. b., 1 ♀ l. teg. only.

Nemobius carolinus brevicaudus Bruner.

1904. *Nemobius brevicaudus* Bruner, Bull. 94, Agr. Exp. Sta. Colo. Agr. Coll., p. 57. (Original description.) [Fort Collins, Colo.]
1912. *Nemobius brevicaudus* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1912, p. 122. (Single type fixation.)

This insect is known from the types only, which specimens show it to be very near *N. carolinus*. From that species this geographic race differs in being very pale in coloration, with the spots on the dorsal surface of the female abdomen greatly enlarged. The types are also as robust as the largest specimens of *carolinus* before us, while the ovipositor is very short.

TYPE: ♀; Fort Collins, Colorado. October 4, 1901. [Hebard Collection ex Bruner.]

Description of Type.—Size medium, form robust. Similar to *N. carolinus* except in the paler coloration, exaggerated color pattern

and in the ovipositor which is short (probably[63] similar to that of *N. carolinus neomexicanus* in normal specimens).

We here describe the unique allotypic male which bears the same data as the type.

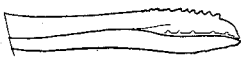

Fig. 28.—*Nemobius carolinus brevicaudus.* Malformed ovipositor of type. (Greatly magnified.)

Description of Allotype.—Similar to female in size and proportions. Differing from *N. carolinus* in coloration and pattern as given in above description.

Measurements (in millimeters).

	Fort Collins, Colo.	
	Type ♀	Allotype ♂
Length of body	9.	8.2
Length of pronotum	1.8	1.8
Caudal width of pronotum	2.4	2.5
Length of tegmina	3.2	4.6
Length of caudal femur	5.6	5.8
Greatest width of caudal femur	1.9	2.
Length of ovipositor	2.2	.....

As has been noted, the ovipositor in this specimen is malformed, the apex being misshapen as the figure shows.

Color Notes.—General color wood brown washed with russet. Head with the faint occipital markings described under *carolinus* more pronounced and extending as far as the vertex, the lighter color wood brown, the darker wood brown washed with russet. Eyes clove brown. Maxillary palpi wood brown, the terminal portion of the last segment vandyke brown. Pronotum with dorsal surface and lateral lobes wood brown, somewhat maculate with pale russet. Tegmina transparent wood brown. Dorsal surface of abdomen in male (concealed) and concealed portion of same in female vandyke brown; exposed portion of same in female with four rows of pale spots as in *carolinus*, but with these spots greatly enlarged, the narrow medio-longitudinal portion between the two median rows of spots

[63] In this specimen, the only known female, the ovipositor is clearly malformed as indicated in Fig. 28.

vandyke brown, the other narrow interstices between the spots russet. Ovipositor burnt umber. Limbs and ventral surface of insect of general coloration.

Distribution.—Though known only from Fort Collins, Colo., it is probable that this insect will be found rather widely distributed in favorable localities over the great plains.

Specimens Examined.—2: 1 male and 1 female.

Fort Collins, Colo., October 4, 1901, 1 ♂, 1 ♀. Allotype, TYPE. [Hebard Collection ex Bruner].

Nemobius carolinus neomexicanus Scudder.

1896. *Nemobius neomexicanus* Scudder, Jour. N. Y. Ent. Soc., IV, pp. 100, 104. (Original description.) (In part.) [Las Cruces, New Mex. Los Angeles (County), Cal.; Comondu, Lower Cal.]
1896. *Nemobius toltecus* Scudder (not of Saussure, 1859), Jour. N. Y. Ent. Soc., IV, pp. 101, 106. [Orizaba and Jalapa, Vera Cruz, Mex.; Tepic, (Tepic), Mex.]
1896. *Nemobius neomexicanus* Scudder, Psyche, VII, p. 432. (New key.)
1896. *Nemobius toltecus* Scudder (not of Saussure, 1859), Psyche, VII, p. 433. (New key.)
1896. *Nemobius neomexicanus* Cockerell, Ent. News, VII, p. 297. [Las Cruces, Mesilla and Colorado, New Mexico.]
1897. *Nemobius neomexicanus* Saussure, Biol. Cent. Amer., Orth., II, p. 223. [Durango and (or) Sinaloa, Mex.; Teapa, Tabasco, Mex.]
1897. *Nemobius denticulatus* Saussure, Biol. Cent. Amer., Orth., II, pl. II, fig. 25. (Figure name only.)
1902. *Nemobius neomexicanus* Scudder and Cockerell, Proc. Davenp. Acad. Sci., IX, p. 59. [Las Cruces and Mesilla, New Mex. Common. Attracted to light.]
1904. *Nemobius neomexicanus* Rehn, Proc. Acad. Nat. Sci. Phila., 1904, p. 575. [Florence, Ariz.]
1904. *Nemobius neomexicanus* Caudell, Mus. Bklyn. Inst. Arts and Sciences, I, No. 4, p. 115. [Esperanza Ranch, near Brownsville, and Brownsville, Tex.]
1907. *Nemobius neomexicanus* Rehn, Proc. Acad. Nat. Sci. Phila., 1907, p. 65. [Douglas, Ariz.]
1907. *Nemobius neomexicanus* Rehn, Ent. News, XVIII, p. 212. [Brownsville, Tex.]
1907. *Nemobius neomexicanus* Rehn in Snow, Trans. Kansas Acad. Sci., XX, pt. II, p. 39. [San Bernardino Ranch, Ariz.]
1908. *Nemobius neomexicanus* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1908, p. 399. [Tucson and Yuma, Ariz.]
1908. *Nemobius neomexicanus* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1909, p. 172. [Alamogordo, New Mex.]

The present geographic race differs from typical *Nemobius carolinus* in being usually of paler coloration over the arid or semiarid portions of its distribution, while in these specimens the great majority are somewhat more slender.

The series from the state of Vera Cruz, Mex., differs from *carolinus* in being more russet in general coloration, the dorsal abdominal spots of the females being, moreover, very large.

In all of these series the ovipositor is almost invariably considerably shorter than in *carolinus* and consequently shows even less curvature.

Based on a series of five specimens of both sexes from four localities.[64]

SINGLE TYPE here designated: ♀; Las Cruces, New Mexico. (Cockerell) [Hebard Collection ex Bruner].

Description of Type.—Size, form, and structure much as in *N. carolinus*. Tegmina nearly as long as caudal femur. Wings more

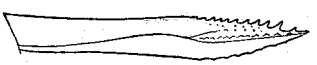

Fig. 29.—*Nemobius carolinus neomexicanus*. Ovipositor of Type. (Greatly magnified.)

Fig. 30.—*Nemobius carolinus neomexicanus*. Ovipositor of specimen from Vera Cruz, Mexico. (Greatly magnified.)

than twice as long as tegmina. Ovipositor a little more than half the length of the caudal femur, very feebly arcuate, almost straight, distal third narrowly sublanceolate and armed as in *carolinus*.

The allotype here selected bears the same data as the type and is in the Scudder Collection.

Description of Allotype.—Size smaller, but very similar to female in general proportions. Tegmina of same character and abdomen likewise peculiarly developed as in *carolinus*.

Measurements (in millimeters).

	Las Cruces, N. M.		Shovel Mtn., Tex.	
	TYPE ♀	Allotype ♂	♀	♂
Length of body	7.7	7.	8.3	6.9
Length of pronotum	1.6	1.5	1.4	1.4
Caudal width of pronotum	2.3	2.	2.3	2.3
Length of tegmina	4.8	4.8	4.2	4.5
Length of wings	11.	10.8	9.7	9.8
Length of caudal femur	5.1	4.8	4.5	4.7
Greatest width of caudal femur	1.7	1.7	1.7	1.7
Length of ovipositor	2.7	.....	2.4	.....

[64] One specimen, a female from Sierra el Taste, Lower California, does not belong to this geographic race, but to *N. cubensis mormonius*.

	Brownsville, Tex. (Extremes.)		Alamogordo, N. Mex.	
	♀ ♀	♂ ♂	♀	♂
Length of body	7. – 8.	6.3– 8.3	7.1	7.6
Length of pronotum	1.4– 1.6	1.3– 1.7	1.7	1.7
Caudal width of pronotum	2.4– 2.1	2.3– 2.7	2.1	2.4
Length of tegmina	4.2– 4.8	4.1– 5.2	3.4	5.1
Length of wings	10. –10.9	9.9–11.4	.....	.....
Length of caudal femur	4.8– 5.	4.7– 5.2	4.7	5.1
Greatest width of caudal femur	1.7– 1.8	1.7– 1.9	2.1	1.8
Length of ovipositor	2.9– 3.	.....	2.8	.....

	Los Angeles Co., Cal.	Orizaba, V. C., Mex. (Extremes.)		Motzorongo, V. C., Mex.	
	♀	♀ ♀	♂ ♂	♀	♂
Length of body	8.4	5.8–7.3	5.2–8.1	7.8	7.2
Length of pronotum	1.8	1.6–1.8	1.2–1.9	1.8	1.5
Caudal width of pronotum	2.6	2.1–2.3	2. –2.3	2.3	2.5
Length of tegmina	4.8	2.7–3.	3.6–5.4	2.7	4.4
Length of wings	11.3	.....	.....	.....	.....
Length of caudal femur	5.8	4.8–5.4	4.6–5.7	5.	5.
Greatest width of caudal femur	1.9	1.8–2.1	1.6–2.1	1.9	1.9
Length of ovipositor	2.9	2.8–3.	.....	3.1	.....

Extremes in Ovipositor Length.

Columbus, Tex.	2.9–3.3
Carrizo Springs, Tex.	2.5–2.8
Yuma, Ariz.	2.9–3.1
Comondu, L. Cal.	2.6–2.9
Trinidad	2.8
Costa Rica	3

The considerable variation in the present insect does not seem to be affected by distribution, the extremes of the species before us being found in both series from Brownsville, Tex., and Orizaba, Mex. The greatest ovipositor length is seen to about equal the minimum found in *N. carolinus*, though rare exceptions are found in that species where the length of the ovipositor is less than even the average of the present race.

Color Notes.—We here describe the coloration of the type. Head, pronotum and tegmina mummy brown shading to raw umber on

the limbs and with intermediate channel of tegmina and exposed portions of wings tawny olive. Under portions of insect pale tawny olive. Maxillary palpi yellowish, the extreme apex of the terminal segment very narrowly marked with very dark brown. The majority of the specimens from the arid and semiarid portions of the range of the insect are somewhat darker than the type, the general color being vandyke brown, and in some of these individuals the occipital markings described under *carolinus* are faintly apparent. There are very few brachypterous females from this portion of the distribution of the race, and all of these but one are in a poor state of preservation. The specimen from Brownsville, Tex., in good condition, shows the color pattern of the exposed dorsal surface of the abdomen similar to that of typical *carolinus*.

The majority of the specimens from the state of Vera Cruz resemble *carolinus* closely in coloration and color pattern, but are almost without exception more russet. The few specimens from that region, which differ from these in coloration, are colored much as in typical *carolinus neomexicanus*, and all have the ovipositor as is typical in that race.

With scarcely an exception, the limbs of the specimens before us are immaculate. The maxillary palpi have the dark marking of the apex of the ultimate joint invariably exceedingly narrow.

Distribution.—The present insect is known from the more arid regions of the western United States, southward to the state of Vera Cruz, Mex., and Costa Rica. The most northern localities at which it has been taken are Shovel Mountain, Tex., Jemez Hot Springs[65], New Mex., and Florence, Ariz. From Shovel Mountain, Tex., it is found south to the Gulf coast and is checked in its eastern distribution by this boundary. The most southern locality is Costa Rica, while it appears to be only limited in its western distribution by the Pacific coast.

Biological Notes.—All we know of the life of the present race has been learned from material taken in the southwestern United States. There the species appears to enjoy a wide but rather local distribution. It was very seldom found by us in any numbers, and occasional macropterous specimens attracted to light were the usual indication of the presence of the species. We have found it but once in the brachypterous form, then it was not extremely scarce, but very difficult to capture, in low irrigated grass near the station at

[65] These specimens are intermediates between this race and typical *N. carolinus*.

Albuquerque, New Mex. Occasional trills from this grass plot indicated the presence of the insects in the afternoon, specimens could doubtless have been taken there with ease after nightfall. The series before us suggests that the species is far more plentiful in the region discussed during June than later in the season. The same conditions which govern the distribution of *N. cubensis mormonius* are applicable to the present species as well.

Synonymy.—In 1896, Scudder incorrectly recorded the series of specimens of the present insect from the state of Vera Cruz, Mex., as *N. toltecus*, in the same paper in which he described *neomexicanus*. That year that name was again used by him for the same specimens in his key in *Psyche*.

Saussure, in 1897, finding that a species which he was describing for the *Biologia* was the same as the present insect, corrected the name in the text, but accidentally left his name *Nemobius denticulatus* as the name for the figure.

Specimens Examined.—121: 61 males, 59 females, and 1 nymph.

Shovel Mountain, Texas, July 9, 10, Sept. 5, Oct. 4, 1901, (Schaupp) 3 ♂, 3 ♀ [A. N. S. P.]. m.
Columbus, Tex., Sept. 7, 2 ♀ [U. S. N. M.]. m.
Victoria, Tex., (W. E. Hinds) 1 ♂ [U. S. N. M.]. m.
Carrizo Springs, Tex., Oct., 1884, (Wadgymar) 2 ♀ [Hebard Collection ex Bruner]. m.
San Diego, Tex., (Schwarz) 1 ♂ [U. S. N. M.]. m.
Brownsville, Tex., June, 1904, (Barber) 3 ♂, 2 ♀; June, (Snow) 1 ♂, 2 ♀; 6 ♂, 4 ♀ [Bklyn. Inst. A. and S., A. N. S. P., U. S. N. M.]. m.: Apr. 11, (Dohrner) 1 ♀; June 23, 1908, Nov. 21, Dec. 20, 1910 (Hart) 17 ♂, 12 ♀ [Ill. State Lab. Nat. Hist.]. All but 1 ♀, m.
Los Borregos, Brownsville, Tex., June 5, 6, 1904, (Barber) 4 ♂, 2 ♀ [U. S. N. M.]. m.
Esperanza Ranch, Brownsville, Tex., (Schaeffer) 3 ♂ [Bklyn. Inst. A. and S.]. m.
Jemez Hot Springs, New Mexico, Sept. 7, 1911, (Woodgate) 2 ♀ [Hebard Collection]. b.
Colorado, N. M., (Cockerell) 2 ♂, 2 ♀ [Scudder Collection].
Alamogordo, N. M., July 16, 1907, (H.) 1 ♂, 1 ♀, 1 n. b.
Las Cruces, N. M., (Cockerell) 1 ♂, 1 ♀. Allotype, TYPE [Scudder and Hebard Collection ex Bruner]. m.
Mesilla, N. M., (Cockerell) 1 ♂, 1 ♀ [Scudder and U. S. N. M. Collection]. m.
Florence, Arizona, July, 1903, (Biederman) 1 ♀ [A. N. S. P.]. m.
Tucson, Ariz., July 23, 1907, (R. and H.) 1 ♀. m.
Yuma, Ariz., July 28, 1907, Oct. 1, 1910, (R. and H.) 2 ♂, 4 ♀. m.
Los Angeles County, California, July, (Coquillett) 2 ♀ [Paratype in Hebard Collection ex Bruner; 1 ♀, U. S. N. M.]. m.
Comondu, Lower California, Mar., 1889, (C. D. Haines) 3 ♀ [Paratype in Scudder Collection; 2 ♀, Hebard Collection ex Bruner]. m.
San José del Cabo, L. Cal., 1 ♂, 1 ♀ [Hebard Collection ex Bruner]. m.
Venis Mecas,[66] Mexico, Jan. 6, 1878, (Palmer) 1 ♂ [Scudder Collection]. b.
Monterey, Nuevo Leon, Mex., July 3, 1908, 1 ♀ [Ill. State Lab. Nat. Hist.]. m.
Durango or Sinaloa, Mex., (Forrer) 1 ♂, 1 ♀ [Br. Mus.]. b.

[66] We are at present unable to find the exact location of this place.

Tepic, Mex., 1 ♂ [Hebard Collection ex Bruner]. b.
Jalapa, Vera Cruz, Mex., 1 ♀ [Hebard Collection ex Bruner]. b.
Medellin, V. C., Mex., 1 ♀ [Hebard Collection ex Bruner]. m.
Presidio, V. C., Mex., (Forrer) 1 ♀ [Br. Mus.]. b.
Orizaba, V. C., Mex., Jan., 1892, 7 ♂, 4 ♀ [Hebard Collection ex Bruner]. b.
Motzorongo, V. C., Mex., Feb., 1892, 2 ♂, 1 ♀ [Hebard Collection ex Bruner]. b.
San Rafael, V. C., Mex., (Townsend) 1 ♀ [Hebard Collection ex Bruner]. m.
Teapa, Tabasco, Mex., March, (H. H. Smith) 2 ♂ [Br. Mus.]. b.
Costa Rica, (Carriker) 1 ♀ [Hebard Collection]. m.

Nemobius confusus Blatchley.

1903. *Nemobius confusus* Blatchley, Orth. of Indiana, pp. 421, 428, 429. (In part.) (Original description of ♀.) [Tippecanoe Lake and Posey County, Ind. In low damp woods.]
1908. *Nemobius confusus* Brimley, Ent. News, XIX, p. 21. [Raleigh, N. C. Damp places near water.]
1911. *Nemobius confusus* Sherman and Brimley, Ent. News, XXII, p. 391. [Raleigh, N. C.]

This species, which also belongs to the subgenus *Eunemobius*, is one of the most distinctive of the North American species of the genus *Nemobius*. In the original description the supposed male of the present species was in fact *N. maculatus*, and in consequence that composite description is highly misleading. There is a superficial resemblance of this species to *N. palustris*, but examination shows that it belongs to a different subgenus, since in *confusus* the disto-ventral spurs of the caudal tibiæ are equal in length and the ovipositor is of the shorter type, armed at the apex above with heavy teeth, below with widely spaced serrations.

The bone-white maxillary palpi in both sexes distinguish the present species from all other North American members of the genus. The nearest relationship is found in *N. carolinus*, from which species *confusus* differs widely in the different color pattern, much darker general coloration and ovipositor which is different in shape and armament.

Based on a series of specimens from two localities in Indiana.

SINGLE TYPE here designated: ♀; Tippecanoe Lake, Kosciusko County, Indiana, August 26, 1902. (Blatchley) [Blatchley Collection].

Description of Type.—Size small, form graceful; head small, not as full and with interantennal projection not as prominent as in *carolinus*, wider than the cephalic width of the pronotum. Maxillary palpi similar to those of *carolinus*. Eyes broad ovate, not at all prominent. Pronotum with proportions much as in *carolinus*, narrowing slightly cephalad and with a medio-longitudinal impressed line more noticeable in the cephalic portion. Tegmina half as long

as caudal femora, resembling those of *N. palustris* excepting that in the present species the humeral vein is more conspicuous and the tegmina are divided by this vein into less rounded dorsal (here including the intermediate channel) and more nearly perpendicular lateral fields. Wings absent. Ovipositor slightly more than half as long as the caudal femora, feebly arcuate, distal third of same heavy, lanceolate; with both dorsal and ventral margins of apex armed, the former with rather widely spaced, very heavy, and somewhat recurved teeth, the latter with widely spaced serrulations. The limbs are somewhat more delicate than in *carolinus ana*, the spines of the caudal femora somewhat more slender than in that species.

Fig. 31.—*Nemobius confusus.* Ovipositor of type. (Greatly magnified.)

The allotypic male, here selected, taken at Dead Run, Virginia, August 29, 1912, by Caudell and in the United States National Museum, furnishes the additional data given below.

Description of Allotype.—Smaller but very similar to female in general appearance. Tegmina transparent and very delicate; of same character as in *carolinus* but not as much wider than abdomen as in that species, when in repose the lateral margins of the dorsal field are more nearly straight, subparallel. Wings absent.

Measurements (in millimeters).

	Tippecanoe Lake, Ind.		Dead Run, Va.		
	Type		Allotype	Average of series.	
	♀	♀	♂	♂♂	♀
Length of body	7.	6.8	6.3	6.2 (6. –6.6)	7.3
Length of pronotum	1.9	1.9	1.4	1.5 (1.4–1.7)	1.7
Caudal width of pronotum	2.2	2.3	2.	1.9 (1.8–2.1)	2.1
Length of tegmina	3.	2.9	4.	4.1 (3.8–4.8)	3.1
Length of caudal femur	5.3	5.	4.7	4.7 (4.6–4.9)	5.3
Greatest width of caudal femur	2.	1.9	1.8	1.7 (1.6–1.9)	1.8
Length of ovipositor	2.9	2.9	.....	.....	2.6

	Cabin John Run, Md.	
	Average of series.	
	♂♂	♀♀
Length of body	6.4 (5.7–7.)	6.7 (6.6–6.9)
Length of pronotum	1.6 (1.4–1.7)	1.7 (1.4–1.8)
Caudal width of pronotum	2. (1.9–2.1)	2.1 (1.9–2.3)
Length of tegmina	4.2 (4. –4.4)	2.9 (2.8–3.)
Length of caudal femur	4.4 (4.1–4.7)	4.9 (4.8–5.3)
Greatest width of caudal femur	1.7 (1.6–1.8)	1.9 (1.8–2.)
Length of ovipositor		2.7 (2.5–2.8)

The extremes in size found in the material before us are given in the above measurements. Although the series are not large, it is possible to see that there is but little variation in the species. The eastern specimens average somewhat smaller than those from Indiana. In the original description the measurements for the male sex are, as has been stated, taken from a specimen of *N. maculatus*, while those of the female are, unfortunately, in almost every case exaggerated.

Color Notes.—All of the specimens before us are of very much the same coloration. Head, pronotum, and tegmina shining piceous, the latter transparent in the male, nearly transparent in the female. Maxillary palpi with proximal segments piceous, last two segments white and very striking. Dorsal surface of abdomen dark bistre; in the specimens of somewhat lighter coloration, bistre with the margins of the segments darker. Limbs and ventral surface of body immaculate raw umber; in dark specimens mummy brown. Both males and females of the present species have a very shiny appearance.

Distribution.—The present species has been taken on the Atlantic coast from a few miles northwest of Washington, D. C., to Raleigh, N. C. The only other known point of distribution is the type locality in northern Indiana.

Biological Notes.—Among the secretive species of *Nemobius*, this species is at present one of the least known. We learn from Blatchley that it was first found, "quite common in some low, damp woods bordering Tippecanoe Lake . . . . living among the fallen leaves and beneath small chunks and chips." No macropterous specimens are known, but it is probable that a long-winged form of the present species exists.

Synonymy.—It is strange that although Blatchley found this insect plentiful when the type series was taken, he apparently secured no males, but having taken males of *N. maculatus* in the same locality, unfortunately supposed these to be males of the new species.

The result is that the original description is a composite of the two species. We have at present before us two males and two females of the type series which bear this out fully, as the males are both *maculatus*.

E. M. Walker has noted that Professor Morse pronounced the males of Blatchley's *confusus* a different species from the females, but that writer incorrectly surmised that the females were probably synonymous with *N. carolinus* Scudder.

Specimens Examined.—32: 8 males, 22 females, and 2 nymphs.

Cabin John Run, Maryland, Sept. 19, 1911, (Davis) 3 ♂, 3 ♀ [Davis Collection].

Plummer's Island, Md., Sept. 4, 11, 1902, 03, (Barber) 2 ♀ [U. S. N. M.]

Dead Run, Virginia, Aug. 29, 1912, (Caudell) 4 ♂, 2 ♀, 2 ♀ n., including ♂ Allotype [U. S. N. M.].

Falls Church, Va., Sept. 2, 4, 1906, (Caudell, Banks) 1 ♂, 6 ♀ [U. S. N. M.]

Alexandria County, Va., Sept., 1911, (Davis) 4 ♀ [Davis Collection].

Raleigh, North Carolina, Sept. 25, 1907, (Brimley) 2 ♀ [Brimley Collection, U. S. N. M.].

Tippecanoe Lake, Indiana, Aug. 26, 1902 (Blatchley) 2 ♀. TYPE and Paratype [Blatchley Collection].

Kosciusko County, Ind., Oct. 29, 1902, (Blatchley) 1 ♀. Paratype [U. S. N. M.].