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STUDIES IN AMERICAN TETTIGONIIDAE
(Orthoptera)

by

James A. G. Rehn and Morgan Hebard

- I. A SYNOPSIS OF THE SPECIES OF THE GENUS SCUDDERIA.
- II. A SYNOPSIS OF THE SPECIES OF THE GENUS AMBLYCORYPHA FOUND IN AMERICA NORTH OF MEXICO.

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STUDIES IN AMERICAN TETTIGONIIDAE (ORTHOPTERA)¹

I and II

BY JAMES A. G. REHN AND MORGAN HEBARD

The present general title is selected to cover a somewhat connected series of systematic and geographic papers on the Tettigoniidae of the Americas. The authors have in hand for study very extensive collections of the group and in the determination of these series it has been, and in the future also will be, necessary to consult the other important collections of the order. In a number of cases it has proved necessary to analyze and even completely revise genera to properly locate our series, and it is our intention to bring out as parts under the present general title the results of these studies.

Unless otherwise specified, the material listed in these papers as having been collected by the authors, jointly or individually, is to be found in the Hebard Collection and that of the Academy of Natural Sciences of Philadelphia. The abbreviations used for the sources of other material are in general use and clearly intelligible. In the case of smaller collections and institutions the source has been given at sufficient length to be clear to all.

The color terms used in the descriptions are based on Ridgway's standards (Color Standards and Color Nomenclature, 1912).

I

A SYNOPSIS OF THE SPECIES OF THE GENUS SCUDDERIA

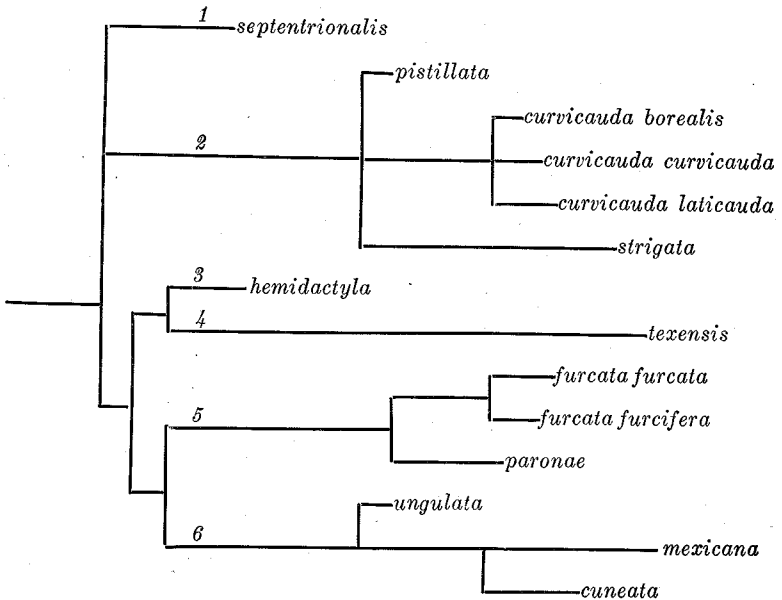
It has recently been necessary for the authors to record certain species of the present genus, and it was found impossible to do this correctly without study of all of the material before us. The present paper could be considered monographic, were it possible to include more complete data on the distribution of certain of

¹ Published with the aid of the Orthoptera Fund.

the very scarce forms, and on material from certain areas in the wide distribution of other well known species.

In 1898, Scudder revised the present genus, describing several new species and correcting certain mistakes in the nomenclature at that time in general use. In a number of places, however, his treatment is unsatisfactory, owing partly to the fact that the importance of geographic races was not appreciated by him. Other errors are attributable to that author's lack of knowledge of certain species; these included his misconception of *S. paronae* and his retention in the genus of the species *forcipata*, which latter insect is a member of the allied but very distinct genus *Chloroscirtus*.

The present work is based mainly upon the material in the Philadelphia collections and examination of the series in the Museum of Comparative Zoology, the Morse Collection and the United States National Museum. We are deeply indebted to the following gentlemen who have assisted us greatly in various ways during the preparation of the present paper: Prof. A. P. Morse, Mr. A. N. Caudell, Dr. Samuel Henshaw, Dr. J. Chester Bradley, Mr. William T. Davis and Dr. F. E. Lutz. The material before us includes all of the known species of the genus and has enabled us to correct a number of errors and ascertain more clearly the proper grouping of the species. This latter task is particularly difficult owing to the numerous lines of development found in the genus, as shown by the species which divide into numerous groups, each containing but very few forms. These groups are six in number: the first of these contains the primitive *septentrionalis*; the second, *pistillata*, the three races of *curvicauda* and the very aberrant *strigata*; the third, the anomalous and apparently rather primitive *hemidactyla*; the fourth, the specialized *texensis*; the fifth, the two races of *furcata* and *paronae* and the sixth *ungulata*, *cuneata* and *mexicana*. The correlation of these forms may be graphically demonstrated as follows:—



In some respects members of the different groups show a certain similarity to each other. Thus *septentrionalis* and *pistillata* both have coriaceous tegmina with heavier veinlets; all of the other species have the tegmina glossy, this being particularly marked in *hemidactyla*, due partially to the tegminal veinlets being reduced in this species to the minimum size found in the genus. A broadly and evenly arcuate ovipositor is found in *septentrionalis*, *hemidactyla* and *ungulata*, and the greatest bend in that organ is found in the most highly specialized species, *texensis*, *strigata* and *mexicana*. The male supra-anal plate is not strongly produced and compressed in *septentrionalis* and *hemidactyla* only. The tegmina are very broad in *pistillata*, broad in *curvicauda* and its races, *septentrionalis* and *ungulata*, and narrow to varying degrees in the other species, this attenuation decided in *texensis* and *mexicana* but reaching an extreme condition in *strigata*.

The species of the present genus have the genicular lobes of all the femora bispinose; the ventro-cephalic margins of the cephalic femora often bear a very few small spines or denticulations, the ventro-caudal margins of the same one or two, but these are fre-

quently absent, the ventral margins of the median femora are always smooth, those of the caudal femora usually bear a few small spines but in *hemidactyla* these latter margins are distinctive, bearing instead small teeth.

In the present paper the body length measurements are taken from the vertex to the apex of the subgenital plate in both sexes. The ovipositor length is taken from the ventral apex of the basal plica to the apex of the ovipositor.

We have had before us the types of *curvicauda borealis*, *strigata*, *hemidactyla*, *furcata furcifera*, *ungulata* and *cuneata*; all of which, excepting *cuneata*, are in the Philadelphia collections. We have corrected all of the erroneous determinations for the present genus which we have made in the past and also the evident mistakes which have been made by other authors, where it has been possible for us to do so. Under each species the synonymy alone is given, except in the case of *curvicauda laticauda*, where all previous correct references are given, and in *furcata furcifera* and *paronae*, where it has been thought best to give all previous references which apply to these previously little known species. In the specific treatment here no description of previously described species are given, but an effort is made in every case to emphasize the most important characters of the species. We have not recorded here any material which has been previously correctly recorded. We have examined nearly 2000 specimens, while the number of individuals here listed is 1139.

KEY TO THE MALES OF THE GENUS SCUDDERIA

A. Disto-dorsal abdominal segment subtriangular in outline with no median produced pistillate process. Subgenital plate not compressed distad. Cerci relatively long, not as strongly incurved distad with distal portion not, or but weakly, enlarged.

B. Sides of disto-dorsal abdominal segment decidedly bisinuate, convex, and immediate apex truncate and subangulate excavate, segment elsewhere simple. Cerci gently arcuate throughout with apex not enlarged. Tegmina broad, coriaceous and dull, with heavy veinlets.

septentrionalis (Serville)

BB. Sides of disto-dorsal abdominal segment weakly concave distad and apex bifid, V-emarginate, segment elsewhere complex. Cerci gently arcuate to apex which suddenly bent inward and weakly swollen, though not nearly as much so as in the majority of the species of the genus. Tegmina narrow, rather glossy, with very weak veinlets.

hemidactyla new species

- AA. Disto-dorsal abdominal segment with a median produced pistillate process. Subgenital plate compressed distad. Cerci relatively short, very strongly incurved distad with distal portion decidedly enlarged.
- B. Lateral angles of pronotum very broadly rounded. Tegmina extremely narrow, much narrower than length of pronotum. (Production of disto-dorsal abdominal segment furcate at apex, with lateral processes short and dorsal surface of same strongly declivent distad.).....**strigata** Scudder
- BB. Lateral angles of pronotum not broadly rounded. Tegmina not very narrow, width greater than length of pronotum.
- C. Production of disto-dorsal abdominal segment truncate at apex with a slight median projection and with strongly compressed vertical lateral flanges, which completely embrace and generally extend beyond the sides of the subgenital plate when in natural position.....**texensis** Saussure and Pictet
- CC. Production of disto-dorsal abdominal segment furcate at apex with no median projection.
- D. Furcate portion of production of disto-dorsal abdominal segment lobate, these lobes bearing ventrad small vertical longitudinal flanges.
- E. Lobes of furcate portion of production of disto-dorsal abdominal segment distinctly tapering distad when seen from above. (Tegmina very broad and short.)...**pistillata** Brunner
- EE. Lobes of furcate portion of production of disto-dorsal abdominal segment subequal in width when seen from above.
- F. Size small, form compact. Tegmina rather broad and short.
curvicauda borealis new subspecies
- FF. Size large, form less compact. Tegmina decidedly longer.
- G. Tegmina proportionately wider, lateral angles of pronotum decided.....**curvicauda curvicauda** (De Geer)
- GG. Tegmina proportionately narrower, lateral angles of pronotum less decided.....**curvicauda laticauda** Brunner
- DD. Furcate portion of production of disto-dorsal abdominal segment lobate, these lobes not bearing ventrad small vertical longitudinal flanges.
- E. Lobes of furcate portion of production of disto-dorsal abdominal segment not compressed laterad and not much longer than broad.
- F. Lobes of furcate portion of production of disto-dorsal abdominal segment decidedly swollen, broadest proximad when viewed from above.....**furcata furcata** Brunner
- FF. Lobes of furcate portion of production of disto-dorsal abdominal segment less decidedly swollen, broadest meso-proximad when viewed from above.
- G. Form less robust, limbs proportionately shorter. Antennae unicolorous.....**furcata furcifera** Scudder
- GG. Form more robust, limbs proportionately longer. Antennae annulate in typical material.....**paronae** Griffini

- EE. Lobes of furcate portion of production of disto-dorsal abdominal segment compressed laterad and at least twice as long as broad.
- F. Lobes of furcate portion of production of disto-dorsal abdominal segment not obliquely compressed, not emarginate mesad.
- ungulata** Scudder
- FF. Lobes of furcate portion of production of disto-dorsal abdominal segment obliquely compressed, emarginate mesad.
- G. Lobes of furcate portion of production of disto-dorsal abdominal segment very weakly emarginate mesad. Form moderate robust..... **cuneata** Morse
- GG. Lobes of furcate portion of production of disto-dorsal abdominal segment deeply emarginate mesad. Form exceedingly slender..... **mexicana** (Saussure)

Differential Characters found in the Ovipositor

Three species, *septentrionalis*, *hemidactyla* and *ungulata* have the ovipositor with both dorsal and ventral margins evenly and broadly arcuate, the latter species is further distinguishable by having the apex of this organ acute, not rounded as in all the other species of the genus. This broadly arcuate type of ovipositor is found in *curvicauda laticauda* also, but a suggestion of a sudden upward bend is shown in the dorsal margin; in this species the ovipositor is extremely broad with basal and mesal width subequal. This same type of ovipositor is found in *curvicauda curvicauda*, *curvicauda borealis* and *pistillata*, but in these the sudden upward bend of the dorsal margin is more decided and the ovipositor is not as broad, though with basal and mesal width subequal. In *furcata furcata*, *furcata furcifera*, *paronae* and *cuneata* a narrower ovipositor is found with a marked sudden upward bend of the dorsal margin and with the basal and mesal width subequal; in *furcata furcifera* the race develops an aberrational form in the southwestern United States in which the ovipositor is similar but very decidedly broader. In the remaining species, *texensis*, *strigata* and *mexicana*, not only is the dorsal margin of the ovipositor very suddenly and decidedly bent upward, but the shaft becomes narrower beyond this bend so that the ovipositor is much broader at the base than mesad.

When taken in conjunction with the differential characters of the various species it may be seen that females of all of the species are readily separable excepting those of *furcata furcata* and *cuneata*.

the difficulties involved in this case being fully discussed under the latter species.

Although Kirby² has referred *Locusta pallens* Fabricius,³ to *Scudderia*, we have omitted the species from the present treatment, as we are of the opinion that it does not belong to this genus.

The present genus is found from Nova Scotia to southern British Columbia, southward to the Isthmus of Panama, and in South America is known only from Trinidad (Caparo) and Dutch Guiana (Paramaribo). In the arid regions of the western United States and Mexico it is not to be found in the desert proper, but almost everywhere in the desert hills and mountains. The species of the genus are largely nocturnal, manifesting but little activity during the day. All but one of the species are normally uniform green in general coloration.

Scudderia septentrionalis (Serville) (Pl. IX, fig. 14; pl. X, fig. 29; pl. XI, fig. 31.)

1839. *Phaneroptera septentrionalis* Serville, Hist. Nat. Ins., Orthopt., p. 416. [North America.]

1894. *Scudderia truncata* Beutenmüller, Bull. Amer. Mus. Nat. Hist., vi, p. 252. [Vineland, New Jersey.]

Scudder in his revision of the Scudderidae,⁴ has incorrectly supposed Heer's name *Phaneroptera suturalis* to apply to the present species, and has sought to retain it for what from Heer's description, appeared to him to be a color form.

Heer described *Phaneroptera suturalis* from New Georgia,⁵ but in his treatment apparently mistook the locality for Georgia in the United States. The specimen was doubtless properly labelled "New Georgia," one of the Solomon Islands, since the description further shows the species to belong to the genus *Ducetia*, not agreeing at all with any species of *Scudderia*.

Lugger has given two excellent figures of the sexes of the present species from Minnesota unfortunately calling them *S. pistillata*,⁶ he had doubtless both species before him. This record is the first which applies, at least in part, to this species from west of the Appalachians. Bruner's material shows that it was this

² Syn. Catal, Orth., ii, p. 446, (1906).

³ Mant. Ins., i, p. 234, (1787).

⁴ Proc. Amer. Acad. Arts and Sci., xxxiii, p. 286, (1898).

⁵ Insektenfauna der Tertiargebilde von Oeningen und Radoboj, Abth. ii, p. 4, (1849).

⁶ Orth. of Minn., p. 220, figs. 144, 145, (1898).

species from West Point, Nebraska, to which he has referred without a name.⁷

The present insect is readily separated in the male sex from all others of the genus by the triangular and simple disto-dorsal abdominal segment, and in the female by its small size and dull leaf-like tegmina accompanied by an extraordinarily long and gently curved ovipositor. The tegminal veinlets are heavier than in the other species of the genus excepting *S. pistillata*, to which insect the present species shows some approach in this respect as well as in its short heavy structure.

Measurements (in millimeters)

	♂ Marion, Massachusetts	♂ West Point, Nebraska
Length of body.....	18.4	18
Length of pronotum.....	4.7	4.7
Length of tegmen.....	28	25.2
Greatest width of tegmen.....	7	7.3
Length of caudal femur.....	19.4	18.1
Length of subgenital plate.....	5.4	5 7

The present insect has been found on the Atlantic coast from Norway, Maine, to Vineland, New Jersey, and has been taken as far west as West Point, Nebraska. The species is unquestionably one of the very scarcest forms of North American Orthoptera having a distribution so extensive.

Specimens Examined.—In addition to 3 males and 2 females previously recorded: 3; 3 males.

Marion, Massachusetts, VIII, 1906, (H.; undergrowth in woods), 1 ♂.

Lone Rock, Wisconsin, VII, 27, 1906, (J. D. Hood), 1 ♂, [U. S. N. M.].

West Point, Nebraska, VII, 27, 1887, (L. Bruner; in woods), 1 ♂, [Herb. Cln.].

Scudderia pistillata Brunner (Pl. IX, fig. 8; pl. X, fig. 24; pl. XI, fig. 30.)
1878. *Sc[udderia] pistillata* Brunner, Monogr. Phaner., p. 240. [New York; New Hampshire.]

Lugger unfortunately confused this species with *S. septentrionalis* and his figures which are credited to the present species belong in fact to that insect.⁸ The male figure has again been used most unfortunately in Blatchley's treatment of *pistillata* in his Orthoptera of Indiana,⁹ but there it is accompanied by Scud-

⁷ Publ. Nebr. Acad. Sci., iii, p. 29, (1893).

⁸ Orth. of Minn., p. 220, figs. 144, 145, (1898).

⁹ Orth. of Indiana, p. 347, fig. 79, (1903).

der's larger figure of the male supra-anal plate of the present insect.

The present species is separable from all others of the genus by the much broader tegmina which are dull and very leaf-like, this partially due to the veinlets which are heavier than in any other species of the genus. This insect, though distinctive in this character also, has the production of the supra-anal plate of the male somewhat similar in general development to *S. curvicauda* and has been confused with that species by several of the early authors. The distal flanges of this production are produced ventrad in strongly compressed vertical flanges, deepest proximad at their arcuate bases which are situated at the bifurcation of the distal portion of the plate; *curvicauda* and its races have homologous flanges which are shorter, evenly arcuate in outline and occupy the proximal two-thirds of the distal flanges.

Females of *pistillata* bear a close general resemblance to females of *S. curvicauda borealis*, but in addition to the tegminal characters given above, the eyes of the present insect are very decidedly smaller and the caudal limbs very much shorter.

Measurements (in millimeters) of extremes

♂	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of subgenital plate
Great Cranberry Island, Maine.....	5.3-5.6	30.3-31.8	9.3-10.1	21.6-21.7	6.3-6.7
Saunderstown, Rhode Island.....	6	34.3	11	24.1	6.7
Pequaming, Michigan.....	4.7-5.7	30.2-33.2	9.3-10.4	21-21.8	6-6.3
Staples, Minnesota.....	4.8-5.4	29-29.3	9-9.5	21.5-22.1	5.8-6
Black Hills, South Dakota	5.7	31.7	9	22.4	6.6
♀	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of ovipositor
Great Cranberry Island, Maine.....	4.9	25.4	8	20	6.8
Pequaming, Michigan.....	4.9-5.4	25.7-28	7.8-8	20.2-21.1	6.2-6.7
Staples, Minnesota.....	5.3	27.3	8.3	19.7	6.4
Black Hills, South Dakota	5.3	26	7.9	20.9	6.7
Livingston, Montana.....	5.4	27	8.1	20.3	7.2

The present insect, which is found in greatest numbers in the southern portions of the Canadian Zone, is usually met with in clusters of low bushes, such as wild rose, hazel and alder, in the open. Males are least active of the species of the genus, taking wing much less often when disturbed. The females are even more secretive than the males and usually prove very hard to find. We have never seen this sex take wing.

The distribution of this insect is known to extend from Halifax, Nova Scotia, southward to Chester in northern New Jersey,¹⁰ and westward as far as Regina, Saskatchewan and Bozeman, Montana.

Specimens Examined: 46; 32 males, 13 females and 1 immature female.

Great Cranberry Island, Hancock County, Maine, VIII, 25, 1913, (H.; in wild rose tangle on edge of spruce forest), 4 ♂, 1 ♀.

Summit of Sargent Ridge, Mount Desert Island, Maine, VIII, 21, 1913, 850 feet, (H.; in huckleberry and other bushes on bare summit), 1 ♀ n.

Jaffrey, New Hampshire, IX, 4, 1896, (S. Henshaw), 1 ♂, [M. C. Z.].

Melrose Highlands, Massachusetts, VII, 21, 1908, (D. H. Clemons), 1 ♀, [U. S. N. M.].

Saunderstown, Rhode Island, IX, 3, 1913, (H.; open near shore in bayberry bushes), 1 ♂.

Weekapaug, Rhode Island, 1 ♀, [U. S. N. M.].

Honesdale, Wayne County, Pennsylvania, IX, 7, 1 ♂, [Pa. St. Dept. Zool.].

White Mills, Wayne County, Pennsylvania, VIII, 7 to 9, 1 ♀, [Bklyn. Inst. A. and S.].

Lopez, Sullivan County, Pennsylvania, VIII, 4 to 10, 1913, (W. Stone), 3 ♂, 1 ♀, [A. N. S. P.].

East Lansing, Michigan, (C. F. Baker), 1 ♂, [Morse Cln.].

Cranmoor, Wisconsin, VIII, 4 to IX, 16, 1909 and 1910, (C. W. Hooker), 6 ♂, [U. S. N. M.].

Lone Rock, Wisconsin, VIII, 9, 1906, (J. D. Hood), 1 ♂, [U. S. N. M.].

Beaver, Lake County, Minnesota, VIII, 11 to 12, 1912, (W. Stone), 1 ♀, [A. N. S. P.].

Waldo, Lake County, Minnesota, VIII, 1906, (W. Stone), 1 ♂, 2 ♀, [A. N. S. P.].

Wright, Carlton County, Minnesota, VII, 24, 1909, (H.; under pines in wild strawberry patch), 1 ♀.

Staples, Minnesota, VII, 24, 1909, (H.; in ditch overgrown with high weeds), 3 ♂, 3 ♀.

¹⁰ Saussure and Pictet record the present insect in the *Biologia Centrali-Americana* from Georgia. The species appears to be correctly determined, but the locality is certainly in error as the insect is not known to occur in the Appalachians south of northern Pennsylvania.

Mandan, North Dakota, VII, 25, 1909, (H.; along stream in rolling hills), 2 ♂.

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

Englewood, Black Hills, South Dakota, IX, (D. A. Haggard), 2 ♂, 1 ♀, [Hebard Cln.].

Custer, Black Hills, South Dakota, 1 ♂, [Hebard Cln.].

Livingston, Montana, VII, 29, 1909, 4500 feet, (R. & H.; beaten from bushes near river), 1 ♀.

Bozeman, Montana, (Wilcox), 1 ♂, [U. S. N. M.].

Newcastle, Weston County, Wyoming, VII, 25, 1909, 4300 to 4400 feet, (R.; hills covered with grasses and low plants), 1 ♂.

Fort Fetterman, Wyoming, 1 ♂, [U. S. N. M.].

Scudderia curvicauda borealis new subspecies (Pl. IX, fig. 9; Pl. X, fig. 27.)

1904. *Scudderia curvicauda* E. M. Walker, Can. Ent., XXXVI, p. 326. (In part.) [Toronto, Tobermory and Severn River, Ontario.]

1910. *Scudderia curvicauda* E. M. Walker, Can. Ent., XLII, p. 351. [Aweme, Manitoba.]

The records of *curvicauda* from "Boreal America" by F. Walker, Provancher, Thomas, Caulfield, Harvey and Knight and Scudder up to 1898, apply not to this race but to *S. pistillata*.

From the characters of the present geographic race a close resemblance to *S. pistillata* results, but that species may be readily separated by the smaller eyes, the much broader tegmina, shorter caudal limbs, much larger tympanal area of the male tegmina and excellent genital characters in that sex.

The measurements given below, when compared with those of *curvicauda curvicauda*, show the chief differences upon which this northern race is based.

Type—♀; Aweme, Manitoba. August 19, 1909. (N. Criddle; in tall dry vegetation.) [Hebard Collection.]

Description of Type.—Similar to *curvicauda curvicauda* but of smaller size and more compact structure. Pronotal disk broader in proportion to length with lateral angles somewhat more decided. Tegmina broader in proportion to length (width of same contained in length very slightly more than four times as an average), limbs proportionately shorter. Ovipositor very similar.

Allotype—♂; Aweme, Manitoba. August 22, 1909. (N. Criddle; on hillside.) [Hebard Collection.]

Description of Allotype.—Very similar in proportions to type. The produced portion of the supra-anal plate is similar to, but somewhat smaller than, that found in *curvicauda curvicauda*.

Measurements (in millimeters)

	Aweme, Manitoba				West Point, Nebr.	Whitneyville, Maine	
	♀ Type	♀♀ Paratypes	♂ Allotype	♂♂ Paratypes	♀	♂	♀♀
Length of body.....	20	18-20	20.5	18.2-21.2	19	22.3	20-20.4
Length of pronotum	5.3	5.2-5.4	5.2	5-5.3	5.3	5.4	5.1-5.3
Caudal width of pronotum.....	3.8	3.7-3.8	3.4	3.3-3.6	3.6	3.6	3.7-3.8
Length of tegmen...	26.1	25.2-26.8	28	27.5-28.3	29.7	29	26.3-27
Greatest width of tegmen.....	6.4	6-6.4	6.8	6.5-7	6.5	6.9	6.3-6.5
Length of caudal femur.....	22.4	20.8-22.6	21.8	21.8-22.4	22.2	22.7	21.3-21.9
Length of ovipositor	7.4	7-7.4			7		7-7.4
Length of subgenital plate.....			6.9	6.8-6.9		6.9	

When our measurements are compared with those given by E. M. Walker for material from Ontario, we find that some of the specimens from the Severn River show an even greater accentuation of the characters of the present race, while those from Toronto show some tendency toward *curvicauda curvicauda*. All of the material before us from Maine is typical. The single specimen from West Point, Nebraska, though not typical, shows a much closer resemblance to the present race than to *curvicauda curvicauda*.

In the series before us the decided lateral angles of the pronotum are in most cases weakly outlined in brownish white.

The present geographic race has a limited distribution which borders that of *curvicauda curvicauda* in the north and northwest; it is known from Whitneyville, Maine, to Aweme, Manitoba, being found typical only in the Canadian Zone.

Specimens Examined: 15; 6 males and 9 females.

Whitneyville, Maine, VIII, 12, 1913, (Morse; in bogs), 1 ♂, 2 ♀, [Morse Cln.].

Cherryfield, Maine, VIII, 8, 1913, (Morse; in bogs), 1 ♀, [Morse Cln.].

Orono, Maine, VIII, 30, 1913, (Morse; in bog), 1 ♀, [Morse Cln.].

Aweme, Manitoba, VIII, 19 to 22, 1909, (N. Criddle; sand hills, on hillside, dry prairie and in tall dry vegetation), 2 ♂, 3 ♀, *type, allotype, paratypes*; IX, 15, 1907, (N. Criddle), 3 ♂, 1 ♀, *paratypes*, [all Hebard Cln.].

West Point, Nebraska, (L. Bruner), 1 ♀, [Hebard Cln.].

Scudderia curvicauda curvicauda (DeGeer) (Pl. IX, fig. 7; pl. X, fig. 26.)

1773. *Locusta curvicauda* DeGeer, Mém. Hist. Ins., iii, p. 446, pl. 38, fig. 3. [Pennsylvania, probably Philadelphia.]

1841. *Phaneroptera angustifolia* Harris, Ins. Inj. Veget., 1st ed., p. 129. [Massachusetts.]

Lugger's figures of this species,¹¹ which he recorded from Minnesota as *S. furculata*,¹² are very poor, the figure of the entire insect is crude and the drawing of the genitalia in both this figure and that of the apex of the male abdomen is very incorrect.

Though structurally very distinct, the often similar appearing *S. texensis* is easily confused with the present insect in the female sex. The present senior author has once recorded this species as *S. texensis*¹³ from between Cedar Grove and Chatsworth, New Jersey. We find that *curvicauda curvicauda* is distinguishable from *texensis* in its somewhat more robust structure with proportionately shorter dorsum of the pronotum, wider tegmina and less glossy appearance; in the male the genitalia¹⁴ are very different and in the female the ovipositor is slightly less sharply bent upward and slightly more full toward the apex.

Measurements (in millimeters) of extremes

♂	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of subgenital plate
Gun Lake, Michigan..(6) ¹⁵	5.4-6	33.2-37.2	7-7.8	25.2-26.8	7.2-7.8
Rye Beach, New Hampshire.....(1)	5.5	33.3	7.4	26.4	7
Marion, Massachusetts.(3)	5.6-5.9	34-35.3	7.7-8.1	25.9-26	7-7.4
Yonkers, New York....(3)	6	32.8-36	7.7-8	27.4-29.5	7.5-7.6
Rockville, Pa.....(2)	6	35.9-36	8-8.1	27-29	7.5-7.6
Atsion, New Jersey....(9)	5.8-6	34.6-36.1	7.3-7.7	26-26.4	7.6-7.8

¹¹ Orth. of Minn., p. 217, figs. 139, 140, (1898).

¹² Though a synonym of *S. mexicana*, as has been shown by Scudder, *furculata* has not only been confused with *S. curvicauda*, but with *S. furcata* as well.

¹³ Entom. News, xv, p. 330, (1904).

¹⁴ In the discussion under *pistillata* and in the key, the characters of the disto-dorsal abdominal segment of the present species are fully described.

¹⁵ In the tables of measurements throughout the present paper, the figures in parentheses immediately after the localities indicate the number of specimens measured.

Measurements (in millimeters) of extremes—Continued

♀	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of ovipositor
Gun Lake, Michigan... (3)	5.6-5.9	32.4-34.9	7.2-8.3	25.3-28.7	7.6-8
Marion, Massachusetts. (2)	5.6-5.8	33-35	7.7-7.8	26.4-29	7.7-7.8
Yonkers, New York... (2)	5.7-6.2	33.3-35.6	7-7.4	27-29	7.7-8
Rockville, Pa..... (31)	5.7-6.3	34.4-37.2	6.9-7.7	26.5-31	8-8.4
Chestnut Hill, Pa..... (1)	6.1	36.4	7.7	30.8	8
Atsion, New Jersey... (10)	5.5-6.1	31.9-35.1	7-7.3	27.7-31	8-8.3

In the series before us the specimens from the Pine Barrens of New Jersey have in almost every case the lateral angles of the pronotum outlined in yellowish. This coloration is only found in a few other specimens of the present series.

This species is common and widely distributed through the undergrowth of the woods in the Pine Barrens of New Jersey, in this region *S. texensis* is common but is found only in marshes, swamps or bogs.

At Reega, New Jersey, a typical pine barren locality, adults were found, in 1914, to appear about the middle of July, reaching their greatest abundance by the first of August and being represented almost entirely by females toward the end of that month. The species was heard there in the daytime giving at long intervals a brief note "zzikk" much as has been observed in *S. pistillata*; at night it was often to be heard giving single or a succession of rather resonant and loud stridulations.

East of the Appalachians, the present race is found from Fryeburg, Maine, and Brandon, Vermont, to southernmost New Jersey and Pennsylvania. Further west it is widely distributed from a narrow area of intergradation with *S. c. borealis*, southward to the much broader area of intergradation with *S. c. laticauda*, indications of which are first found in material from the latitude of southern Kentucky.

Specimens Examined: 185; 79 males, 104 females and 2 female nymphs.

Jaffrey, New Hampshire, VIII, 15 to IX, 11, 1896, (S. Henshaw), 2 ♂, [M. C. Z.].

Rye Beach, New Hampshire, IX, 2, 1913, (H.), 1 ♂.

Marion, Massachusetts, IX, 1, 1905, (H.), 3 ♂, 2 ♀.

Northfield, Massachusetts, (Mrs. D. Pierson), 1 ♀, [U. S. N. M.].

Melrose Highlands, Massachusetts, VII, 15, 1908, (D. H. Clemons), 1 ♀, [U. S. N. M.].

- Milton, Massachusetts, VIII, 28, 1897, (F. H. Sprague), 1 ♂, 1 ♀, [M. C. Z.].
- Forest Hills, Massachusetts, VIII, 16 to 22, 1877, 3 ♀, [M. C. Z.].
- Wollaston, Massachusetts, VIII, 15 to IX, 1895, 1 ♂, 2 ♀, [M. C. Z.].
- Scituate, Massachusetts, VIII, 29, 1897, (F. H. Sprague), 1 ♀, [M. C. Z.].
- Walpole, Massachusetts, VIII, 1 to 30, 1897, (F. H. Sprague), 5 ♂, 3 ♀, [M. C. Z.].
- Lake Mahopac, New York, (T. D. O'Connor), 1 ♀, [Hebard Cln.].
- Yonkers, New York, VIII, 1910, (E. R. Casey), 3 ♂, 2 ♀, [Casey Cln.].
- Beaver, Pennsylvania, VIII, 1, 1 ♂, [Pa. St. Dept. Zool.].
- Beatty, Pennsylvania, (Brugger), 1 ♂, 3 ♀, [A. N. S. P.].
- Heckton Mills, Pennsylvania, VIII, 31, 1909, 1 ♀, [Pa. St. Dept. Zool.].
- Rockville, Pennsylvania, VII, 29 to VIII, 5, 22 ♂, 31 ♀, [Pa. St. Dept. Zool.].
- Rynryn, Pennsylvania, VIII, 18, 1 ♂, [Pa. St. Dept. Zool.].
- Orrtanna, Pennsylvania, IX, 4, 1 ♀, [Pa. St. Dept. Zool.].
- Chestnut Hill, Pennsylvania, IX, 13, 1903, (H.), 1 ♀.
- East Plains, Ocean County, New Jersey, VIII, 24, 1914, (R. & H.; ground oak and pine and various heaths), 1 ♂, 5 ♀.
- Atsion, New Jersey, VII, 30, 1911, (R. & H.), 8 ♂, 9 ♀; IX, 2, 1901, (R.; undergrowth in woods), 2 ♂.
- Parkdale, New Jersey, VII, 30, 1911, (R. & H.; undergrowth in woods), 9 ♂, 9 ♀.
- Stafford's Forge, New Jersey, VIII, 26 to 31, 1907, (R.), 4 ♀.
- Mays Landing, New Jersey, VIII, 29, 1914, (H.; in boggy pine barrens), 1 ♀.
- Reega, New Jersey, VII, 20 to VIII, 16, 1914, (H.; undergrowth in pine barrens), 8 ♂, 10 ♀, 2 ♀ n.
- Sea Isle Junction, New Jersey, VIII, 3 to 8, 1908, (H. Fox), 1 ♂, 7 ♀, [A. N. S. P.].
- Wildwood Junction, New Jersey, VII, 27, 1914, (H.; low plants in woods), 1 ♂, 1 ♀.
- Dias Creek, New Jersey, VII, 20, 1914, (H.; undergrowth in oak woods), 1 ♂.
- Cranmoor, Wisconsin, VIII, 6, 1909, (C. W. Hooker), 1 ♀, [U. S. N. M.].
- Gun Lake, Michigan, VII, 13 to 26, 1912, (M. A. Carriker, Jr.), 7 ♂, 2 ♀, [Hebard Cln.].
- Pawpaw, Michigan, VI, 1898, 1 ♀, [Hebard Cln.].
- Scudderia curvicauda laticauda** Brunner (Pl. IX, figs. 10 and 12; pl. X, fig. 25.)
1878. *Sc[udderia] laticauda* Brunner, Monogr. Phaner., p. 238. [Georgia.]
1897. *Scudderia laticauda* Saussure and Pictet, Biol. Cent. Amer., Orth., i, p. 330. (In part = 1st variety.) [Georgia.]
1907. *Scudderia laticauda* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1907, p. 300. [San Pablo and Gainesville, Florida.]

The present geographic race has been frequently recorded as *S. curvicauda* from the southeastern United States.

The characters given by Brunner in his description of *laticauda* are somewhat misleading. The lateral angles of the pronotum are only very slightly more rounded than in *c. curvicauda*, while the production and apical cleavage of the subgenital plate offers no differential factor. The lateral angles of the pronotum in *strigata* are very much more broadly rounded and it was Brunner's undue emphasis on this character which caused Scudder to name as a mere color form of the present insect that aberrant species, which can be further separated at a glance by the very decidedly narrower tegmina.

As *S. c. borealis* is the race of the extreme northern portions of the range of *curvicauda*, so *S. c. laticauda* is the race of the extreme southern portions of the range of that species. This race is chiefly distinguishable by its larger size, the proportionately narrower tegmina (by taking averages of the entire typical series before us we find that in *curvicauda curvicauda* the tegminal width is contained in the length of the same very little over $4\frac{1}{2}$ times, in *c. laticauda* nearly 5 times), slightly more rounded lateral angles of the pronotum, somewhat larger produced pistillate portion of the supra-anal plate of the male and decidedly larger ovipositor and subgenital plate of the female, with the former much more weakly bent upward and the ventral margin more broadly arcuate.

Measurements (in millimeters) of extremes

Material intermediate between *S. c. curvicauda* and *S. c. laticauda*

♂	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of subgenital plate
Orange, Virginia.....(1)	6.2	38.3	8.3	30.5	8.2
Charlotte, N. C.....(3)	6.4-6.5	37-38.7	7-8.1	30.6-32	8-8.2
Stone Mountain, Ga... (1)	6.3	40.2	8	31.6	8.4
Doucette, Texas.....(2)	6.2-6.3	37-37.4	7.4-7.7	30.9-31.1	7.9-8.1

Material intermediate between *S. c. curvicauda* and *S. c. laticauda*

♀	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of ovipositor
Petersburg, Virginia... (2)	5.9-6	34.7-36.2	6.9-7.3	29.8-30.4	8.8-9
Charlotte, N. C..... (3)	5.7-6	35.3-36.2	7.1-7.2	29.5-31.2	8.7-9.1
Stone Mountain, Ga... (1)	6.7	40	8.3	32.7	9.2
Doucette, Texas..... (1)	6.3	36.7	7.4	33.4	9

S. curvicauda laticauda

♂	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of subgenital plate
Winter Park, N. C..... (1)	6.7	36.9	7.7	31.8	8
Billy's Island, Ga..... (20)	6.4-7.3	35.8-39.7	8-8.3	32-32.7	8.2-8.7
Albany, Georgia..... (1)	6.1	33.2	7.1	28.7	8.1
Spring Creek, Georgia. (1)	6.3	39.1	7.8	32	8.7

♀	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of ovipositor
Wilmington, N. C..... (1)	7	39	7.6	33.4	10.2
Yemassee, S. C..... (3)	6.5-6.7	36.5-37.8	7.1-7.5	31.6-32.5	9.7-10.2
Billy's Island, Ga..... (13)	6.1-7.1	35.7-39	7.2-8.3	31.4-33	9.6-10.3
Albany, Georgia..... (3)	5.9-6.1	36.3-38.8	6.7-7.9	30.3-31.4	9.4-9.6
Jacksonville, Florida... (4)	7.7-8.3	36.3-40	7.7-8.3	29.8-35.2	10.1-11.1

The ovipositor in *c. laticauda* averages 3.3 mm. in both proximal and mesal width.

The material before us from all of the localities in Virginia and North Carolina (excepting Wilmington and Winter Park), from the Piedmont plain and mountains of South Carolina and Georgia, from the mountains of Alabama and Tennessee, from southern Arkansas and Oklahoma and from all of Texas as far west as the species is distributed, is not typical of the present race. The great majority of these specimens average nearer to it than to *curvicauda curvicauda*,¹⁶ this is least pronounced in the series from northern Virginia, southern Arkansas and Oklahoma and from Texas. The area of intergradation is consequently found to be very wide in the present case.

¹⁶ Such an intermediate individual is the female recorded by the authors from Raleigh, North Carolina, as *S. curvicauda*, Proc. Acad. Nat. Sci. Phila., 1910, p. 636, (1911).

A very few specimens in the series before us have the lateral angles of the pronotum weakly outlined in yellowish.

Typical *S. c. laticauda* is found from Wilmington, North Carolina to Sanford, Florida, and westward as far as Monticello, Mississippi; the fall line constituting a considerable portion of the northern boundary of its range.

Specimens Examined: 63; 26 males and 37 females. Intermediates: 67; 28 males, 37 females and 2 immature males.

Wilmington, North Carolina, IX, 8, 1911, (R. & H.), 1 ♀.

Winter Park, North Carolina, IX, 7, 1911, (R. & H.), 1 ♂.

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

Yemassee, South Carolina, IX, 4, 1911, (R. & H.; in long-leaf pine woods with clumps of oaks on higher ground), 3 ♀.

Albany, Georgia, VIII, 1, 1913, (R. & H.; scarce in undergrowth of pine woods), 1 ♂, 3 ♀.

Spring Creek near Bainbridge, Georgia, VI, 1911, (J. C. Bradley), 1 ♂, 8 ♀, [Ga. State Cln.].

Mixon's Hammock, Okefenokee Swamp, Georgia, VI, 16, 1912, (J. C. Bradley), 1 ♀, [Cornell Univ.].

Billy's Island, Okefenokee Swamp, Georgia, VI, VII, IX, 1912 to 1913, (J. C. Bradley), 20 ♂, 13 ♀, [Cornell Univ.].

Jacksonville, Florida, VIII, 25, 1911, (R. & H.), 2 ♀; VIII, 1885, (Ashmead), 1 ♀, [Hebard Cln.]; IX, 7, 1913, (W. T. Davis), 1 ♀, [Davis Cln.].

Atlantic Beach, Florida, VIII, 24, 1911, (R. & H.; in dense low undergrowth between pine woods and "hammock"), 1 ♀.

Live Oak, Florida, VIII, 10, 1903, (Morse), 1 ♂, [Morse Cln.].

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

Nugent, Mississippi, VII, 20, 1905, (Morse), 2 ♂, 1 ♀, [Morse Cln.].

Intermediate material between *S. curvicauda curvicauda* and *S. c. laticauda*

Glencarlyn, Virginia, VIII, 12, (Caudell), 2 ♂, 2 ♀, [U. S. N. M.].

Orange, Virginia, VII, 24, 1913, (R. & H.), 1 ♂.

Wytheville, Virginia, IX, 2, 1903, (Morse), 1 ♂, [Morse Cln.].

Petersburg, Virginia, VII, 23, 1913, (R. & H.; in green vegetation in pine woods and in swampy spot), 2 ♀.

Norfolk, Virginia, IX, 8, 1903, (Morse), 1 ♀, [Morse Cln.].

Weldon, North Carolina, VII, 24, 1913, (R. & H.; undergrowth of huckleberry and other sand-loving bushes in pine and oak woods), 2 ♀, 1 ♂ n.

Charlotte, North Carolina, VII, 27, 1913, (R. & H.; not scarce among tufts of very green grass in restricted areas in short-leaf pine woods), 3 ♂, 3 ♀.

Fayetteville, North Carolina, IX, 9, 1911, (R. & H.; in moist place in woods), 1 ♀.

Morganton, North Carolina, VII, 20, 1903, (Morse), 1 ♀, [Morse Cln.].

Lookout Mountain, Tennessee, VIII, 23, 1903, (Morse), 1 ♂, [Morse Cln.].

Spartanburg, South Carolina, VIII, 6, 1913, (H.), 3 ♂.

Columbia, South Carolina, VII, 28, 1913, (R. & H.), 1 ♀.

Sand Mountain, Georgia, VII, 9, 1905 and VIII, 25, 1903 (Morse), 3 ♂, 3 ♀, [Morse Cln.].

Jasper, Georgia, VIII, 5, 1913, (R.), 1 ♂ n.

Marietta, Georgia, VII, 27, 1903, (Morse), 2 ♂, [Morse Cln.].

Currahee Mountain, Georgia, VIII, 5, 1913, (H.; scarce in luxuriant mountain vegetation), 3 ♀.

Vicinity of Stone Mountain, Georgia, VIII, 3, 1913, (R. & H.; undergrowth in pine woods), 1 ♂, 1 ♀.

Warm Springs, Georgia, VIII, 9 to 10, 1913, (R.; scarce in luxuriant vegetation), 2 ♀.

Macon, Georgia, VII, 30 to 31, 1913, (R. & H.; undergrowth in short-leaf pine woods), 2 ♀.

Valley Head, Alabama, VII, 11, 1905, (Morse), 1 ♀, [Morse Cln.].

Mena, Arkansas, VII, 30 and 31, 1905, (Morse), 3 ♂, 3 ♀, [Morse Cln.].

Eagleton, Arkansas, VIII, 3, 1905, (Morse), 3 ♂, 4 ♀, [Morse Cln.].

Howe, Oklahoma, VIII, 4, 1905, (Morse), 1 ♀, [Morse Cln.].

Haileyville, Oklahoma, VIII, 6, 1905, (Morse), 1 ♀, [Morse Cln.].

South McAlester, Oklahoma, VIII, 7, 1905, (Morse), 2 ♂, 1 ♀, [Morse Cln.].

Dallas, Texas, (Boll), 1 ♂, [Hebard Cln.].

Bonita, Texas, VIII, 14, 1905, (Morse), 1 ♀, [Morse Cln.].

Doucette, Texas, VII, 24, 1912, (H.), 2 ♂, 1 ♀.

Scudderia strigata Scudder (Pl. IX, figs. 6 and 13; pl. X, fig. 18.)

1898. *Scudderia laticauda* form *strigata* Scudder, Proc. Am. Acad. Arts and Sci., xxxiii, p. 280, fig. 4. [Jacksonville, Florida.]

In describing *S. laticauda*, which is the southern geographic race of *S. curvicauda*, Brunner has certainly emphasized much too strongly the slightly more rounded lateral angles of the pronotum which are found in this race, and has given this character a prominent position in his key. Following this character only, Scudder determined the pair of specimens at present under consideration as *laticauda* (for these have very broadly rounded lateral angles of the pronotum), ignoring the other striking differences which exist between them and any other species of the genus. He, however, gave for the present specimens the name *strigata* to designate what appeared to him to be a mere color variety of *laticauda*, and briefly described the more prominent differences in coloration. As these two specimens represent an otherwise unknown and very distinctive species, showing nearest affinity to *S. curvicauda*, the name *strigata* must be used for this species.

The characters of distinctive differentiation are the very narrow

tegmina, very broadly rounded lateral angles of the pronotum, striking coloration and the genitalia in both sexes.

Described from a pair from the same locality.

Single Type here chosen.—♂; Jacksonville, Florida. (T. J. Priddey.) [Hebard Collection ex Bruner.]

Description of Type.—Size large, form decidedly slender. Eyes slightly more prominent than in *S. curvicauda*. Pronotum more slender than in that species with lateral angles very broadly and strikingly rounded (very much more so than in *S. c. laticauda* which has these angles slightly more rounded than in *curvicauda curvicauda*); lateral lobes with ventral portion of caudal margin almost straight to a broadly rounded obtuse angulation just below the humeral sinus. Tegmina extremely narrow, much narrower than the pronotal length. Production of disto-dorsal abdominal segment similar to that of *curvicauda* but with furcate portion short, truncate, with dorsal surface of same strongly declivent distad. Subgenital plate much as in *curvicauda*.

The unique female, bearing the same data as the type, is the *Allotype*.

Description of Allotype.—Slightly larger but with proportions similar to the type. Ovipositor approximately as long as in *curvicauda* but of wholly different shape, having the dorsal margin bent sharply upward proximad while the ventral margin is evenly but more strongly arcuate than in that species; beyond the bend the ovipositor becomes decidedly narrower.

Measurements (in millimeters)

	Jacksonville, Florida	
	♂	♀
Length of pronotum.....	5.3	5.7
Length of tegmen.....	33.4	34.2
Greatest width of tegmen.....	4.7	4.8
Length of wing.....	39.7	39.4
Length of subgenital plate.....	7.4	

We are unable to give the length of the caudal femora as these have been destroyed in both specimens. In the single female before us the ovipositor is 8.2 mm. in length, 2.7 mm. in width proximad, and 2.4 mm. in width mesad.

Both specimens are very strikingly and similarly marked. The general coloration is course green, much faded except on the tegmina, these appendages have the region of the anal vein and sutural margin bone brown, thus forming a heavy line from the base to the apex of the tegmen, the anal field is cinnamon with a

bone brown marking at the proximal portion of the free margins forming a single large median spot when the tegmina are closed. The lateral angles of the pronotum are pale yellowish with the lateral lobes just below these marked with an obscure band of brown. The abdominal segments are marked meso-laterad with maculations of bone brown forming a broad but interrupted stripe. The cephalic and median femora are speckled with bone brown and are further irregularly and narrowly biannulate with this color. In the female the distal portion of the cerci and proximal portions of the basal plicae of the ovipositor are unusually dark for the species of the genus.

Jacksonville, Florida, is the only locality known for this unusual and striking species, which must be considered one of the rarest, most local and probably least widely distributed species of North American Orthoptera.

Specimens Examined: 2; 1 male and 1 female.

Jacksonville, Florida, (T. J. Priddey), 1 ♂, 1 ♀, *type, allotype*, [Hebard Cln. ex Bruner].

Scudderia hemidactyla new species (Pl. IX, figs. 11, 15, 16 and 17; pl. X, fig. 22.)

A very distinct and anomalous species showing a certain amount of affinity to *S. septentrionalis* in the decided reduction of the supra-anal plate in the male and in the similar subgenital plate in the same sex, which is however less decidedly angulate-emarinate distad. The production of the supra-anal plate in the male bears distad small, strongly compressed, vertical lateral flanges; the greatest similarity in this character is found elsewhere in the genus in *S. texensis*, but in all other characters of this reduced but greatly specialized appendage the species is unique. The species is very glossy, with rather more prominent eyes than is usual in the genus, in these respects resembling *S. paronae*. Characters of the pronotum and armament of the caudal femora separate the species further from any other of the genus.

Type.—♂; Caparo, Trinidad, June, 1913. (S. M. Klages.) [Acad. Nat. Sci. Phila., Type No. 524.]

Description of Type.—Similar in size to typical *S. furcata furcifera* but with deeper lateral lobes of the pronotum, more attenuate tegmina and shorter limbs. Head similar to *S. paronae*, but with inter-fastigial suture narrower; inter-ocular space decidedly narrower and eyes larger so that when seen from above the inter-ocular space is not as wide as one of

the eyes; antennae uniform in coloration. Pronotum short with nearly parallel lateral angles rounding everywhere evenly (and more broadly than in other species of the genus except *S. strigata*) into the lateral lobes which are distinctly deeper than long, cephalic margin of lateral lobes very broadly rounded, passing through the ventro-cephalic angle into the oblique, nearly straight caudal margin, humeral sinus shallower than in the other species of the genus. Tegmina shining, similar to those of *paronae* but proportionately narrower with transverse veinlets sub-obsolete and the entire surface an intricate network of minute veinlets; wings as in *paronae*. Supra-anal plate with proximal width greater than length, triangularly produced with lateral margins weakly concave and apex bifid, V-emarginate. This apex when seen from below is found to be made up ventrad of two lateral perpendicular folds with crassate margins which curve out and around the tips of the incurved cerci ventro-proximad and then join mesad on the ventral surface of the plate; near the very apex of these folds distad spring out from their sides small strongly compressed vertical lateral flanges which are triangular with apex rounded, these would if brought in contact with the subgenital plate embrace the same. Cerci nearly intermediate between the type found in *S. septentrionalis* and the normal type found in the genus; crassate, becoming evenly and very weakly more attenuate with a slight arcuation to apex, which is suddenly bent inward and armed with a sharp black tooth directed at a right angle to the distal portion of the cercal shaft. Subgenital plate depressed throughout, acute-angulate emarginate distad to a depth about one-half the distal width of the plate. Cephalic and median limbs similar to those of *paronae*, caudal limbs shorter and more robust than in that species. Caudal femora distinctive in having both ventral margins armed with small teeth (not spines), caudal tibiae with all four margins thickly supplied with heavy spines.

Allotype.—♀; same data as the type.

Description of Allotype.—Very similar to type but larger with proportionately broader tegmina. Ovipositor gently arcuate, not at all bent, long and broad to the immediate apex which is more suddenly rounded than in the other species of the genus, distal half of dorsal valves and extreme distal portion of ventral valves margined with small, even and rounded teeth. Subgenital plate triangular with truncate apex, this plate unusually short for the genus, not extending to the juncture of the ventral valves of the ovipositor. Limbs and armament of same as in the type.

Measurements (in millimeters)

	Para- maribo, Dutch Guiana	Caparo, Trinidad	
	♂	♂ Type	♀ Allotype
Length of body.....	20.4	19.6	21
Length of pronotum.....	5.1	5	5.7
Caudal width of pronotum.....	3.3	3.1	3.8
Greatest depth of lateral lobes of pronotum.....	3.8	3.7	4
Greatest length of lateral lobes of pronotum.....	3.4	3.4	3.8
Length of tegmen.....	28.7	29.9	32.9
Greatest width of tegmen.....	5.8	5.7	6.9
Length of caudal femur.....	21.4	22.9	25.8
Length of subgenital plate.....	4.9	5.1	
Length of ovipositor.....			8.1, width 2.1

The specimen from Paramaribo is very similar to the type, the pronotum has the lateral angles more divergent caudad, showing that this character is variable in the present species. In this respect the allotypic female is nearly intermediate between the two specimens discussed above.

In coloration the specimens before us are shining serpentine green, probably faded from a much brighter shade, with the lateral angles of the pronotum unmarked.

Specimens Examined: 6; 4 males and 2 females.

Caparo, Trinidad, VI, 1913, (S. M. Klages), 3 ♂, 2 ♀, *type, allotype* and *paratypes*, [A. N. S. P.].

Paramaribo, Dutch Guiana, (K. Mayo), 1 ♂, [A. N. S. P.].

Scudderia texensis Saussure and Pictet (Pl. IX, fig. 5; pl. X, fig. 23.)

1897. *Scudderia texensis* Saussure and Pictet, Biol. Cent.-Amer., Orth., i, p. 330, pl. xv, figs. 18, 19. [Dallas, Texas.]

Saussure and Pictet failed to associate the sexes of the present species and figured the female as *S. laticauda*.¹⁷ The present species has been recorded from Miami, Florida by the authors as *S. curvicauda*¹⁸ and all of the material recorded by Bruner from Kansas and Nebraska as *S. curvicauda* belongs to this insect.

¹⁷ Biol. Cent.-Amer., Orth., i, p. 330, pl. xv, fig. 15, (1897).

¹⁸ Proc. Acad. Nat. Sci. Phila., 1905, p. 42, (1905).

This name had been generally used by authors for *texensis* until Scudder's revision of the genus in 1898, and the present species was so recorded by Lugger in that year.

Males of the present species are readily separated from other species of the genus by the characters given in the key. Females, however, might often be confused with females of *S. curvicauda* were the differential characters not carefully studied. *S. texensis* has a decidedly more glossy appearance than *curvicauda* and is a more attenuate insect with the dorsum of the pronotum slenderer and the lateral angles usually weakly but appreciably concavo-divergent caudad, these lateral angles are usually outlined in yellowish in the present species but frequent specimens are found in which this marking is subobsolete or wholly absent. The obscurity or absence of this marking is more often met with in southern and western material than in series from the northern Atlantic States. Females of *texensis* may be further separated from those of *curvicauda* by the ovipositor which is more sharply bent upward, more slender and armed with somewhat heavier teeth than in that species.

Measurements (in millimeters) of extremes

♂	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of subgenital plate
Saunderstown, R. I.... (6)	5.6-5.7	33-35.3	6.7-7.1	26-26.9	7.3-8
Tinicum Island, Pa... (19)	5.9-6.2	35.8-36.8	7.1-7.7	27.7-29	7.7-8
Yemassee, S. C..... (15)	5.4-5.9	32.4-33.3	6.1-6.7	27-29	7-7.3
Miami, Florida..... (2)	5.3-5.8	30.4-32	6.3-6.5	26.3-26.4	7-7.1
North Platte, Nebr.... (1)	6.5	37.6	7.4	29.2	7.9
La Marque, Texas.... (1)	6.1	34.5	7		7.8
♀	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of ovipositor
Saunderstown, R. I.... (3)	5.9-6	33-36.7	7-7.3	27-27.4	7.4-8
Tinicum Island, Pa... (11)	5.9-6	33.3-35.4	7-7.4	26.4-28	7-7.4
Yemassee, S. C..... (13)	5.2-6	28.8-32.7	5.8-6.4	26.4-29.3	6.7-7.1
Miami, Florida..... (1)	5.7	32	6.6	28.7	7
North Platte, Nebr.... (6)	6-6.3	34-38.2	7-8.2	26-29	7.8-8.4
La Marque, Texas.... (4)	5.7-5.8	31.7-35	6.3-6.4	27-29.9	6.9-7

It is evident, from the material which we have examined, that the present species decreases somewhat in size in its southern distribution, but even greater variation is sometimes found in a series from a single locality.

The species is almost invariably found in or near marsh, swamp or bog. It is one of the very few destructive Phaneropterids found in the United States, doing particular damage to cranberry crops.

During the summer of 1914 the species was frequently observed on the coast of New Jersey along the salt marshes, where, after dark, it would frequently be found locally abundant in areas of *Scirpus*, resting head down and motionless near the tips of these rushes and frequently beaded with dew. On bright warm afternoons it was observed in the taller vegetation near the border of the salt marshes, where the males were moving actively about emitting their rather prolonged and harsh stridulation.

This insect is known from Norway, Maine, to extreme southern Florida, while the westernmost localities at which it has been taken are¹⁹ Forsyth, Montana; Casper, Wyoming; Morton County, Kansas and Clarendon and Rosenberg, Texas.

Specimens Examined: 191; 104 males, 79 females, 5 immature males and 3 immature females.

Seabrook, New Hampshire, (H. A. Eaton), 1 ♂, [U. S. N. M.].

North Saugus, Massachusetts, IX, 12, 1906, (C. C. Gowdey), 1 ♂, [U. S. N. M.].

Melrose Highlands, Massachusetts, VII, 15, 1908, (D. H. Clemons), 1 ♂ n., [U. S. N. M.].

Saunderstown, Rhode Island, IX, 9, 1913, (H.; in bog), 6 ♂, 3 ♀.

Erie, Pennsylvania, 2 ♀, [Pa. St. Dept. Zool.].

Beaver, Pennsylvania, IX, 13, 1 ♂, [Pa. St. Dept. Zool.].

Indiana, Pennsylvania, VIII, 14, 1 ♂, [Pa. St. Dept. Zool.].

Duncannon, Pennsylvania, VIII, 8, 1 ♂, [Pa. St. Dept. Zool.].

Harrisburg, Pennsylvania, VIII, 8 to X, 15, 1909, 5 ♂, [Pa. St. Dept. Zool.].

Rockville, Pennsylvania, VII, 29 to VIII, 22, 3 ♂, 1 ♀, [Pa. St. Dept. Zool.].

Enola, Pennsylvania, IX, 7, 1909, 1 ♀, [Pa. St. Dept. Zool.].

Eberly's Mills, Pennsylvania, VIII, 27, 1909, 1 ♀, [Pa. St. Dept. Zool.].

Philadelphia Neck, Pennsylvania, IX, 21, 25, 1904, (H. W. Wenzel), 2 ♂, 2 ♀, [A. N. S. P.].

¹⁹ We feel certain that if Scudder's record for the species from Ogden, Utah, is correct, it is based upon an accidental importation of some sort.

- Cornwells, Bucks County, Pennsylvania, IX, 7, 1914, (H.), 1 ♂, 2 ♀; X, 1906, (R. & H.), 1 ♂, 1 ♀.
- Tinicum Island, Pennsylvania, VIII, 13 to IX, 29, 1904 to 1913, (R. & H.; in marsh), 19 ♂, 11 ♀.
- Pemberton, New Jersey, IX, 6, 1913, (H. B. Scammell), 1 ♂, 2 ♀, [U. S. N. M.].
- Stafford's Forge, New Jersey, IX, 16, 1905, (H.), 2 ♂.
- Ventnor, New Jersey, VIII, 5 to 17, 1914, (H.; in marshy depressions of sand areas and on bayberry bushes), 3 ♂.
- Margate City, New Jersey, VIII, 17 and 24, 1914, (H.; in salt marsh), 1 ♂ n., 2 ♀ n.
- Pleasantville, New Jersey, VIII, 17, 1914, (H.; in salt marsh), 1 ♂.
- Tuckahoe, New Jersey, VIII, 26, 1914, (H.; in fresh water marsh), 1 ♀.
- Cedar Springs, New Jersey, VIII, 26, 1914, (H.; in fresh water marsh), 3 ♂, 3 ♀.
- Ocean View, New Jersey, VII, 27, 1914, (H.; edge of salt marsh), 1 ♂.
- Dennisville, Cape May County, New Jersey, VIII, 8, 1908, (H. Fox; in tall grass on edge of salt marsh), 1 ♀, [A. N. S. P.].
- Peermont, Cape May County, New Jersey, VIII, 14, 1908, (H. Fox; open woods), 1 ♀, [A. N. S. P.].
- Plummers Island, Maryland, VIII, 27, 1909, (Caudell), 1 ♂ n., [U. S. N. M.].
- Virginia Beach, Virginia, VII, 2 and 4, 1903, (Morse), 1 ♂, 1 ♀, 1 ♀ n.; IX, 7, 1903, (Morse), 1 ♂, [all Morse Cln.].
- Selma, North Carolina, VII, 7, 1903, (Morse), 1 ♂, [Morse Cln.].
- Raleigh, North Carolina, VII, 9, 1903, (Morse), 1 ♀, [Morse Cln.].
- Wrightsville, North Carolina, IX, 7, 1911, (R. & H.; edge of salt marsh), 1 ♂, 3 ♀.
- Winter Park, North Carolina, IX, 7, 1911, (R. & H.), 1 ♂, 3 ♀.
- Yemassee, South Carolina, IX, 4, 1911, (R. & H.), 15 ♂, 14 ♀.
- Sand Mountain, Georgia, VII, 9, 1905, (Morse), 1 ♂, [Morse Cln.].
- Tybee Island, Georgia, IX, 2, 1911, (R. & H.; in low undergrowth on sand dunes), 2 ♂, 2 ♀.
- Jesup, Georgia, IX, 1, 1911, (R. & H.), 2 ♂, 2 ♀.
- Billy's Island, Okefenokee Swamp, Georgia, VI, 1912, IX, 1913, (J. C. Bradley), 7 ♂, [Cornell Univ.].
- Honey Island, Okefenokee Swamp, Georgia, VI, 1, 1912, (J. C. Bradley), 1 ♂, [Cornell Univ.].
- Albany, Georgia, VIII, 1, 1913, (R. & H.; in undergrowth of long-leaf pine woods where low swamp-loving plants were present), 1 ♀.
- Tifton, Georgia, IX, 8, 1910, (J. C. Bradley), 1 ♂, [Ga. State Cln.].
- Bainbridge, Georgia, IX to X, 1910, (J. C. Bradley), 1 ♂, [Ga. State Cln.].
- South Jacksonville, Florida, IX, 28, 1913, (W. T. Davis), 1 ♂, 1 ♀, [Davis Cln.].
- Atlantic Beach, Florida, VIII, 24, 1911, (R. & H.), 1 ♂ n.
- Live Oak, Florida, VIII, 26, 1911, (R. & H.), 1 ♂, 1 ♀ n.

- Newberry, Florida, XI, 19, 1911, (W. T. Davis), 1 ♀, [U. S. N. M.].
 Hastings, Fla., XII, 5, 1901, (A. J. Brown), 1 ♀, [Morse Cln.].
 Lake Maxinkuckee, Indiana, (Evermann), 1 ♂, [U. S. N. M.].
 Clarksville, Tennessee, X, 4, 1910, (S. E. Crumb; on tobacco), 1 ♂, [U. S. N. M.].
 Forsyth, Montana, VII, 27, 1909, (H.), 1 ♀.
 Casper, Wyoming, VIII, (McCook), 1 ♂, [Hebard Cln.].
 North Platte, Nebraska, VII, 28, 1910, 2800 feet, (R. & H.; marshy spots on river plain), 1 ♂, 6 ♀.
 Morton County, Kansas, VIII, 5, 1911, 2800 feet, (F. X. Williams), 1 ♂, [Univ. Kans. Cln.].
 Gulfport, Mississippi, VII, 21, 1905, (Morse), 1 ♂, [Morse Cln.].
 Buras, Louisiana, VII, 23, 1905, (Morse), 1 ♂, [Morse Cln.].
 Ashdown, Arkansas, VII, 27, 1905, (Morse), 1 ♀, [Morse Cln.].
 Base of Mount Sheridan, Oklahoma, VIII, 26, 1905, (Morse), 1 ♂, 3 ♀, [Morse Cln.].
 Cache, Oklahoma, VIII, 23, 1905, (Morse), 1 ♀, [Morse Cln.].
 Clarendon, Texas, VIII, 18, 1905, (Morse), 3 ♂, 1 ♀, [Morse Cln.].
 Denison, Texas, VIII, 12, 1905, (Morse), 1 ♂, [Morse Cln.].
 La Marque, Texas, VII, 23, 1912, (H.; areas of tall weeds on low prairie), 1 ♂, 4 ♀.
 Rosenberg, Texas, VII, 25, 1912, (H.; in area overgrown with coffee-bean), 1 ♂.

Scudderia furcata furcata Brunner (Pl. IX, figs. 1 and 2; pl. X, fig. 19.)

1878. *Sc[udderia] furcata* Brunner, Monogr. Phaner., p. 239, fig. 72a. [Maine; Texas.]

1894. *Scudderia fasciata* Beutenmüller, Bull. Amer. Mus. Nat. Hist., vi, p. 251. [West Woodstock, Connecticut.]

Scudder has correctly recognized *fasciata* as a color variation of the present insect. Such color variations, having no specific or racial importance, we do not consider of sufficient value to receive name designation and we consequently place the name *fasciata* in the synonymy here.

Decided geographic variation within the species, close relationship to *S. paronae* and great similarity of females of the present insect and *S. cuneata* over a large area in the southeastern United States, make the treatment of *S. furcata* unusually complex.

The large series at present before us gives ample evidence that not only does a valid geographic race of the present species exist in Mexico, but that two other races are being evolved at the present time, one in the desert mountains of the southwestern United States and the other on the northern Pacific coast of that country.

The area of intergradation between *furcata furcata* and typical *f. furcifera* in the United States comprehends the Rio Grande plain in Texas, and atypical *f. furcifera* is found further west from the Pecos River in western Texas northward to the vicinity of Fort Collins, Colorado, and westward across the southern portions of Utah and Nevada to southern California. This latter material we term atypical *f. furcifera* since in the form of the male supra-anal plate closer affinity to that race than to *f. furcata* is shown, but the females have a heavier and larger ovipositor than typical females of either of the above races. It is this character and the somewhat different proportions of this material which we believe indicates the incipient formation of a geographic race. In the northward distribution of this type the ovipositor shows a gradual decrease in size.

The Pacific coast material from British Columbia to south-central California (Santa Clara County) is perfectly typical of *furcata furcata* except that in the males the supra-anal plate is very much more decidedly enlarged apically. No other differential characters exist in either sex and we do not consider this material worthy of racial distinction but we do feel that again evidence of another incipient geographic race is present.

It may be noted that the material of *f. furcifera* from near the Mexican line in the southwestern United States (Chisos Mountains, Texas; Chiricahua, Huachuca and Baboquivari Mountains, Arizona and Los Angeles, California), though atypical, approaches that race more closely than does any other material from the United States, but as stated above the ovipositor is heavier and larger and besides the insects are usually large. Referring to *S. paronae* it may be seen that, although typically quite distinct from typical *f. furcifera*, Mexican material of *paronae* closely resembles the material here being discussed, as it is very much like typical *f. furcifera* but larger and having in the females a longer (but in this case proportionately shallower) ovipositor. The characters separating typical material of the races of this species and its nearest ally, *S. paronae*, are given in the key.

This insect varies geographically in size as follows, the tegminal length in males being given here, as it is approximately the best dimensions for showing such variation since very little tegminal variation in abbreviation or production is present in

this species. In New England the species is small (average about 28), in southward distribution along the Atlantic coast a moderate increase in size is found (average on Georgia coast about 31). In the latitude of New England little variation in size is found westward to the edge of the Great Plains, in southward distribution in the middle west an even greater increase in size is found from southern Kansas to northern Texas (average about 32) than on the Atlantic coast. From Georgia westward to the area of intergradation with *f. furcifera* scarcely any variation is to be found but the intermediate material is very slightly smaller (average about 29). West of these regions the species is almost wholly confined to the mountains and has been found from western Idaho to British Columbia and southward to south-central California; material from these regions is somewhat aberrant, slightly more robust than is usual in eastern material and not large (average about 29 mm.).

The length of the ovipositor by the greatest breadth of the same in females from the following localities is as follows. Marion, Massachusetts, 6.3 by 1.9 to 6.7 by 2; Saunderstown, Rhode Island, 6 by 2 to 6.1 by 1.8; Chestnut Hill, Pennsylvania, 6.2 by 1.8 to 6.4 by 2; Washington, District of Columbia, 6 by 2 and 6.2 by 1.8; Isle of Hope, Georgia, 6.8 by 2 to 6.9 by 2.1; Thomasville, Georgia, 7 by 2; St. Louis, Missouri, 6.5 by 2 to 6.7 by 1.9; Dallas, Texas, 7.3 by 2.1; Weatherford, Texas, 7.1 by 2.2; Beaumont, Texas, 6.2 by 2; Pullman, Washington, 6.5 by 2.1 to 6.7 by 2; Santa Clara Co., California, 6.9 by 2.1. Intermediate material between *f. furcata* and *f. furcifera*, Brownsville, Texas, 6.1 by 2.1 to 6.7 by 2.

Though normally uniform green in general coloration a number of specimens in the large series before us are more or less suffused with brown and in a single specimen the general coloration is russet marked with much darker brown. Only occasional specimens of the present species have the lateral angles of the pronotum outlined in yellowish. Nymphs of the species are frequently highly colored with strongly annulate antennae.

The present species appears in New Jersey (and probably in other regions as well) over a month later in the season than *S. curvicauda*. The present insect is somewhat more common than

that species in the pine barrens but does not reach the adult condition until after the middle of August.

Typical *S. furcata* is known from Brunswick, Maine south to Lakeland, Florida; around the Gulf coast to the vicinity of Corpus Christi, Texas, thence northward to Uvalde and Sweetwater, Texas; Glen, Nebraska, and Hot Springs, South Dakota. Other northernmost records are Cranmoor, Wisconsin; North Bay, Ontario and Montreal, Quebec. The distribution of the slightly atypical form found on the Pacific Coast and the area of intergradation with *S. f. furcifera* is discussed above.

Specimens Examined: 308; 171 males, 124 females, 10 immature males and 3 immature females. Atypical: 26; 14 males, 11 females, 1 immature female. Intermediates: 63; 37 males, 25 females, 1 immature female.

Seabrook, New Hampshire, (A. A. Eaton), 1 ♂, [U. S. N. M.].

Jaffrey, New Hampshire, IX, 14, 1896, (S. Henshaw), 2 ♀, [M. C. Z.].

Berkshire County, Massachusetts, 1887, 1 ♂, [Hebard Cln.].

Marion, Massachusetts, VIII to IX, 1905, (H.), 3 ♂, 3 ♀.

Saunderstown, Rhode Island, IX, 3 to 9, 1913, (H.; very common in clumps of bayberry growing along shore), 12 ♂, 9 ♀, 2 ♂ n., 1 ♀ n.

Wesquage Beach, Rhode Island, IX, 8, 10, 1913, (H.; few in bushes along beach dunes), 2 ♂, 1 ♀.

Lake Mahopac, New York, (T. D. O'Connor), 1 ♂, [Hebard Cln.].

Nyack, New York, (Zabriskie), 1 ♀, [U. S. N. M.].

Lakehurst, New Jersey, IX, 30, 1906, 1 ♀, [Hebard Cln.].

Woodbury, New Jersey, X, 2, 1907, (C. B. Hardenberg), 1 ♀, [A. N. S. P.].

Manahawkin, New Jersey, IX, 8, 1906, (B. Long), 2 ♂, [A. N. S. P.].

West Creek, New Jersey, VIII, 28, 1914, (R.; in pine barrens), 2 ♂.

Stafford's Forge, New Jersey, VIII, 12 to IX, 5, 1907, 1908, 1914, (R.; in pine barrens), 9 ♂, 6 ♀.

Eagleswood Bog, Ocean County, New Jersey, VIII, 28, 1914, (R.; in pine barrens), 1 ♀.

Margate City, New Jersey, VIII, 17, 1914, (H.; in barren dune forest), 2 ♂ n.

Reega, New Jersey, VII, 31 to VIII, 29, 1914, (H.; in pine barrens), 1 ♂, 5 ♂ n., 1 ♀ n.

Formosa Bogs, Cape May County, New Jersey, IX, 9, 1908, (H. Fox), 1 ♀, [A. N. S. P.].

Swainton, New Jersey, VIII, 21, 1914, (H.; undergrowth in pine woods), 1 ♂, 1 ♂ n.

Pittsburg, Pennsylvania, 1 ♀, [Pa. St. Dept. Zool.].

Beatty, Pennsylvania, (Brugger), 1 ♂, [A. N. S. P.].

Sulphur Springs, Pennsylvania, 1 ♂, [U. S. N. M.].

South Sterling, Pennsylvania, IX, 17, 1906, (B. Long), 1 ♂, 1 ♀, [A. N. S. P.].

Tobyhanna, Pennsylvania, IX, 1903, (H.; in burning, overgrown with low bushes), 1 ♂.

Newport, Pennsylvania, VIII, 8, 1 ♂, [Pa. St. Dept. Zool.].

Catawissa, Pennsylvania, IX, 4, 1 ♀, [Pa. St. Dept. Zool.].

Harrisburg, Pennsylvania, VIII, 6 to IX, 8, 4 ♂, 2 ♀, [Pa. St. Dept. Zool.].

Dauphin, Pennsylvania, IX, 15 to X, 3, 2 ♂, 1 ♀, [Pa. St. Dept. Zool.].

Marysville, Pennsylvania, VIII, 15, 1909, 1 ♀, [Pa. St. Dept. Zool.].

Camphill, Cumberland County, Pennsylvania, VIII, 18 to IX, 29, 2 ♂, 4 ♀, [Pa. St. Dept. Zool.].

Paxtang, Pennsylvania, X, 1, 1 ♀, [Pa. St. Dept. Zool.].

Orrtanna, Pennsylvania, IX, 4, 1 ♀, [Pa. St. Dept. Zool.].

Fites Eddy, Pennsylvania, 1 ♂, [A. N. S. P.].

Honesdale, Pennsylvania, IX, 25, 1 ♂, [Pa. St. Dept. Zool.].

Cornwells, Pennsylvania, IX, 7, 1914, (H.; edge of river in plants and vines), 1 ♂, 1 ♀.

Edgehill, Pennsylvania, IX, 25, 1906, (B. Long), 1 ♀, [A. N. S. P.].

Chestnut Hill, Pennsylvania, IX, 13, 1903, (H.; low bushes, sweet fern, etc.), 2 ♂, 2 ♀.

Castle Rock, Delaware County, Pennsylvania, IX, 19, 1909, (R. & H.; undergrowth of deciduous forest), 2 ♂.

Tinicum Island, Pennsylvania, IX, 9, 1904, (R. & H.), 1 ♂.

Swarthmore, Pennsylvania, VIII, 22, 1899, (R.), 1 ♂, 1 ♀, [A. N. S. P.].

Collingdale, Pennsylvania, VIII, 24, 1899, (R.), 1 ♂, 1 ♀, [A. N. S. P.].

Chestertown, Maryland, VIII, 26, 1909, (E. G. Vanatta), 2 ♂, [A. N. S. P.].

Cabin John, Maryland, IX, 2, 1907, (F. Knab), 1 ♂, [U. S. N. M.].

Plummers Island, Maryland, VIII, 29 to X, 11, 1906 to 1912, (Caudell, Fisher), 4 ♂, 10 ♀, [U. S. N. M.].

Washington, District of Columbia, VIII, 1883, 3 ♂, 2 ♀, [Hebard Cln.].

Pimmit Run, Virginia, IX, 6, 1908, (F. Knab), 1 ♀, [U. S. N. M.].

Peaks of Otter, Virginia, (Wm. Palmer), 1 ♀, [U. S. N. M.].

Linville, North Carolina, VIII, 30, 1903, (Morse), 3 ♂, 1 ♀, [Morse Cln.].

Topton, North Carolina, VIII, 21, 1903, (Morse), 3 ♂, 1 ♀, [Morse Cln.].

Governor Island, North Carolina, VIII, 20, 1903, (Morse), 1 ♀, [Morse Cln.].

Fayetteville, North Carolina, IX, 9, 1911, (R. & H.; common in short-leaf pine undergrowth), 4 ♂.

Wrightsville, North Carolina, IX, 7, 1911, (R. & H.), 1 ♀.

Lake Waccamaw, North Carolina, IX, 8, 1911, (R. & H.), 3 ♂, 1 ♀.

Tryon, North Carolina, (H. A. Dyar), 1 ♂, [U. S. N. M.].

Highlands, North Carolina, IX, 1906, (F. Sherman, Jr.), 1 ♂, [U. S. N. M.].

Yemassee, South Carolina, IX, 4, 1911, (R. & H.), 2 ♂.

Sand Mountain, Georgia, VIII, 25, 1903, (Morse), 1 ♂, [Morse Cln.].

Rome, Georgia, VIII, 21, 1910, 1 ♂, [Ga. State Cln.].

Stone Mountain, Georgia, IX, 12, 1913, (J. C. Bradley), 1 ♀.

Isle of Hope, Georgia, IX, 3, 1911, (R. & H.; heavy undergrowth of green plants and vines in gray-bark pine forest), 2 ♂, 1 ♀.

Albany, Georgia, VIII, 1, 1913, (R. & H.; heavy undergrowth in long-leaf pine woods near river), 1 ♀.

Spring Creek, Georgia, (J. C. Bradley), 2 ♂, [Ga. State Cln.].

Jacksonville, Florida, IX, 6, 7, 1913, (W. T. Davis), 2 ♂, 1 ♀, [Davis Cln.].

Detroit, Michigan, IX, 1 ♂, [U. S. N. M.].

West Spring Green, Wisconsin, (C. W. Hooker), VIII, 13, 1906, 1 ♂, [Pa. St. Dept. Zool.].

Cranmoor, Wisconsin, IX, 18 to 21, 1909, (C. W. Hooker), 1 ♂, 1 ♀, [U. S. N. M.].

Columbus, Ohio, (C. M. Weed), 1 ♂, [Hebard Cln.].

Wyandotte, Indiana, VIII, 1905, (Caudell), 1 ♀, [U. S. N. M.].

St. Louis, Missouri, IX, 25 to X, 22, 1904, (C. L. Heink), 3 ♂, 3 ♀, [Hebard Cln.].

Pineville, Kentucky, 1 ♂, [Hebard Cln.].

Roan Mountain Station, Tennessee, VIII, 31 to IX, 3, 1903, (Morse), 2 ♂, 1 ♀, [Morse Cln.].

Morristown, Tennessee, VIII, 27, 1903, (Morse), 1 ♂, 2 ♀, [Morse Cln.].

Lookout Mountain, Tennessee, VIII, 23, 1903, (Morse), 1 ♂, [Morse Cln.].

Clarksville, Tennessee, IX, 19, 1910, (on tobacco), 1 ♀, [U. S. N. M.].

Selma, Alabama, IX, 11, (eating cotton leaves), 1 ♂, [U. S. N. M.].

Homer, Louisiana, XI, 8, 1907, (F. C. Pratt), 1 ♀, [U. S. N. M.].

Baton Rouge, Louisiana, XII, 12, 1899, 1 ♀, [U. S. N. M.].

Hot Springs, South Dakota, X, 1888, 1 ♂, 1 ♀, [Hebard Cln.].

Glen, Sioux County, Nebraska, VIII, 6 to 20, 1903, (L. Bruner), 1 ♂, 1 ♀, [Hebard Cln.].

Weeping Water, Nebraska, IX, 1909, (L. Bruner), 1 ♂, [Hebard Cln.].

Lincoln, Nebraska, IX, 4, 1893, (L. Bruner), 3 ♀, [Hebard Cln.].

Douglas County, Kansas, IX, 1 ♂, [A. N. S. P.].

Barber County, Kansas, (F. W. Cragin), 1 ♂,²⁰ [Hebard Cln.].

Independence, Kansas, VIII to IX, 1902, (A. Birckfield), 1 ♂, 2 ♀, [U. S. N. M.].

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

Winslow, Arkansas, IX, 2 to 4, 1905, (Morse), 8 ♂, 3 ♀, [Morse Cln.].

Van Buren, Arkansas, IX, 1, 1905, (Morse), 4 ♂, 1 ♀, [Morse Cln.].

Magazine Mountain, Arkansas, 2600 feet, VIII, 29, 1905, (Morse), 1 ♀, [Morse Cln.].

Blue Mountain Station, Arkansas, VIII, 28, 1905, (Morse), 1 ♂, 1 ♀, [Morse Cln.].

Dardanelle, Arkansas, VIII, 31, 1905, (Morse), 1 ♂, [Morse Cln.].

²⁰ This specimen is referred by Bruner to the present species with a question, Bull. Washb. Coll., i, p. 127, (1885). Material of the present species has been frequently recorded as *S. furculata*, which name is correctly a synonym of *S. mexicana* as established by Scudder.

- Ola, Arkansas, VIII, 30, 1905, (Morse), 2 ♂, [Morse Cln.].
- Little Rock, Arkansas, IX, 17, 1910, (E. S. Tucker), 1 ♀, [U. S. N. M.].
- Haileyville, Oklahoma, VIII, 6, 1905, (Morse), 1 ♂, [Morse Cln.].
- Wilburton, Oklahoma, VIII, 27, 1905, (Morse), 1 ♂, [Morse Cln.].
- South McAlester, Oklahoma, VIII, 7, 1905, (Morse), 2 ♂, [Morse Cln.].
- Wewoka, Oklahoma, VIII, 27, 1905, (Morse), 1 ♀, [Morse Cln.].
- Shawnee, Oklahoma, VIII, 26, 1905, (Morse), 5 ♂, 4 ♀, [Morse Cln.].
- Mount Sheridan summit, Oklahoma, = 2600 feet, VIII, 24, 1905, (Morse), 1 ♀, [Morse Cln.].
- Mount Sheridan base, Oklahoma, VIII, 24, 1905, (Morse), 1 ♂, 3 ♀, [Morse Cln.].
- Cache, Oklahoma, VIII, 23, 1905, (Morse), 2 ♀, [Morse Cln.].
- Caddo, Oklahoma, VIII, 9, 1905, (Morse), 1 ♂, 1 ♀, [Morse Cln.].
- Paris, Texas, VIII, 21, 1904, (F. C. Bishopp), 1 ♂, [U. S. N. M.].
- Denison, Texas, VIII, 11, 1905, (Morse), 1 ♂, 1 ♀, [Morse Cln.].
- Wichita Falls, Texas, VIII, 16, 1905, (Morse), 1 ♂, 2 ♀, [Morse Cln.].
- Sweetwater, Texas, IX, 20, 1912, (R. & H.; in burdock and high weeds in depressions), 1 ♂, 1 ♀.
- Weatherford, Texas, IX, 23, 1912, (R. & H.; common in weeds especially about oak groves and on oaks), 6 ♂, 1 ♀.
- Sagamore Hill, Texas, IX, 27, 1912, (R. & H.; moderately common in oaks), 3 ♂, 3 ♀.
- Dallas, Texas, IX, 25, 26, 1912, (R. & H.; locally common in weeds, oaks and mesquite), 5 ♂, 1 ♀; IX, 10 and 15, 1908 and 1909, (E. S. Tucker, on blossoms of *Polygonum* sp.; F. C. Bishopp, on sycamore), 2 ♀, [U. S. N. M.].
- Mineola, Texas, X, 1, 1906, (F. C. Bishopp), 1 ♂, [U. S. N. M.].
- Shovel Mount, Texas, VII, 10 to X, 4, 1901, (F. G. Schaupp), 2 ♂, 1 ♀, [A. N. S. P.].
- Temple, Texas, IX, 24, 1912, (R. & H.; in weeds along stream border), 1 ♂, 2 ♀.
- Calvert, Texas, (G. H. Harris), 1 ♂, [U. S. N. M.].
- Columbus, Texas, 1 ♂, [U. S. N. M.].
- San Antonio, Texas, VIII, 16, 1912, (R. & H.; near water hole in tall nettles and weeds), 1 ♂.
- Doucette, Texas, VII, 24, 1912, (H.), 1 ♀.
- Beaumont, Texas, VII, 23, 1912, (H.; on swampy ground in mainly deciduous forest), 1 ♂, 2 ♀.
- Dickinson, Texas, VII, 20, 1912, (H.; in green plant on edge of stream in pine woods), 1 ♂.
- Uvalde, Texas, VIII, 21 to 22, 1912, (R. & H.), 1 ♀.
- S. furcata* showing atypical tendencies.
- Evergreen, Washington County, Idaho, VIII, 12, 1910, (R. & H.; in dry wild rose bushes in forest of bull pine), 1 ♀.
- Diamond Springs, Washington County, Idaho, VIII, 13, 1910, 3000 feet, (R. & H.), 1 ♀.
- Pullman, Washington, (C. V. Piper), 4 ♀, [U. S. N. M. and Hebard Cln.].

- Olympia, Washington, VI, 17, 1897, 1 ♀, [U. S. N. M.].
 Council Crest, Portland, Oregon, VIII, 9, 1909, (H.), 1 ♀ n.
 Shasta County, California, 1885, (J. Behrens), 5 ♂, 1 ♀,²¹ [Hebard Cln.].
 Mount Shasta, California, VIII, 14, 1909, 4500 feet, (R.; in open chaparral), 1 ♂.
 Tehama, California, VIII, 16, 1909, (H.; in weedy field), 1 ♂.
 Colfax, California, VIII, 27, 1910, 2450-2800 feet, (R. & H.), 1 ♂.
 Marble Valley, Eldorado County, California, VII, 15, 1885, (in grape vines), 1 ♀ [U. S. N. M.].
 Menlo Park, California, I, 1905, (F. Hornung), 1 ♂, [U. S. N. M.].
 Santa Clara County, California, IV, 1902, (Coleman), 1 ♀, [Hebard Cln.].
 Visalia, California, (Culbertson), 1 ♂, [A. N. S. P.].
 Lindsay, California, VI, 4 to VIII, 25, 1898 to 1911, (J. R. Horton and C. E. Pemberton; on orange trees), 4 ♂, 1 ♀, [U. S. N. M.].
 Intermediates between *S. f. furcata* and *S. f. furcifera*.
 San Diego, Texas, V, 27, (E. A. Schwarz), 1 ♂, 1 ♀, [U. S. N. M.].
 Benavides, Texas, VIII, 9, 10, 1912, (R. & H.), 2 ♀.
 Laredo, Texas, XI, 24, 1905, (F. C. Pratt), 1 ♀, [U. S. N. M.].
 Lyford, Texas, VIII, 6, 7, 1912, (R. & H.), 7 ♂, 7 ♀, 1 ♀ n.
 Laguna del Gato, Hidalgo County, Texas, VIII, 6, 1912, (R. & H.), 1 ♂.
 Brownsville, Texas, VII, 31 to VIII, 5, 1912, (R. & H.; common in vegetation along river and very plentiful at night about lights in town), 26 ♂, 12 ♀.
 Piper Plantation near Brownsville, Texas, VIII, 3, 1912, (R. & H.; in heavy jungle), 2 ♂.
 Point Isabel, Texas, VIII, 2, 1912, (H.), 1 ♀.
 Matamoros, Tamaulipas, Mexico, VIII, 1, 1912, (H.), 1 ♀.

Scudderia furcata furcifera Scudder (Pl. X, fig. 20.)

1898. *Scudderia furcifera* Scudder, Proc. Amer. Acad. Arts and Sci., xxxiii, p. 282, fig. 7. (In part.) [Medellin and Venis Mecas, Mexico.]
 1903. *Spilacris maculatus* Rehn and Cockerell, Proc. Acad. Nat. Sci. Phila., 1903, p. 630. [Pecos, New Mexico.]
 1905. *Scudderia curvicauda* (not *Locusta curvicauda* DeGeer, 1773) Rehn in Baker, Inv. Pac., Orth., ii, p. 78. [San Marcos, Nicaragua.]
 1906. *Scudderia furcata* Rehn, Ent. News, xvii, p. 288. [Beaver City, Utah.]
 1906. *Scudderia furcata* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1906, p. 415. [Manitou, Colorado.]

We here select a male as single type and a female as allotype, which specimens were taken by the Rev. T. Heyde at Medellin,

²¹ This series was referred to by Bruner as belonging to a new species, Bull. Washb. Coll., i, p. 127, (1885), as his labels on the specimens indicate. They are all of the usual somewhat aberrant type found in that region which we have discussed under the present form, but further characters to separate them from *S. furcata furcata* are wanting.

Vera Cruz, Mexico, and are in the Hebard Collection ex Bruner. Unfortunately a series of dried alcoholic specimens of the closely related *S. paronae* from Tepic, Mexico, was confused with this insect by Scudder and included in his type series.

Rehn and Cockerell's *Spilacris maculatus* was based upon a specimen in one of the earlier stages of development, determinable as an atypical example of the present race from the fact that it is very brilliantly colored with annulate antennae (as found in the early stages of *furcata* alone of the northern species), and was taken in a region where this race alone represents the genus.

The relationship of this geographic race to *S. furcata furcata* and to *paronae* is discussed under *f. furcata*. The intergradation between the present race and *f. furcata* is also discussed there, and the atypical development of the race in the mountain regions of the southwestern United States is commented upon.

Measurements (in millimeters) of extremes
S. furcata furcifera showing atypical tendencies

♂	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur
Sycamore Canyon, Arizona..... (2)	6-6.2	34.8-35	6.9-7.1	25.9-26.8
Carr Canyon, Arizona..... (4)	5.8-6	34.7-36.2	7-7.3	24.3-25.9
Jemez Hot Springs, N. M..... (1)	5.8	32	6.7	24
Manitou, Colorado..... (2)	5.3-5.7	32.6-33.4	7-7.1	23.1-23.3
Denver, Colorado..... (1)	5.4	34.6	7.2	24
♀	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur
Sycamore Canyon, Arizona..... (1)	5.6	32.2	6.8	25.1
Carr Canyon, Arizona..... (8)	5.7-5.8	34-34.8	6.8-7.2	25-25.3
Jemez Hot Springs, N. M..... (1)	5	30	6.3	22.4
Beulah, New Mexico..... (1)	5.1	33	6.8	22.8
Manitou, Colorado..... (3)	5.4-5.6	31-31.3	6.8-6.9	22.9-23.2
Lost Mine Peak, Texas..... (1)	5.9	31.6	6.7	25

S. furcata furcifera typical material

♂	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur
Medellin, Vera Cruz, Mexico. <i>Type</i>	5	29	6.6	23.7
Medellin, Vera Cruz, Mexico.... (4)	4.8-5.4	29-29.7	6.4-7	22.8-23.7
Vera Cruz, Vera Cruz, Mexico. (1)	5.1	30	6.7	23.7
Orizaba, Vera Cruz, Mexico.... (2)	4.8-5	29.4-30.7	6.7-6.8	21.6-22

S. furcata furcifera typical material

♀	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur
Medellin, Vera Cruz, Mex. <i>Allotype</i>	5.1	31.1	6.7	25
Medellin, Vera Cruz, Mexico... (2)	5.1-5.3	30.7-31.2	6.6-6.7	24.4-25.3
Vera Cruz, Vera Cruz, Mexico... (2)	5.1-5.3	30.2-31	6.3-7	24.2-25.1
Orizaba, Vera Cruz, Mexico.... (5)	4.9-5.1	29.5-31	6.4-6.9	22.6-23.6

The length by the greatest breadth of the ovipositor in females from a number of localities is as follows. Atypical *f. furcifera*. Lost Mine Peak, Texas, 7.7 by 2.6; Sycamore Canyon, Arizona, 7.3 by 2.4 mm.; Hot Springs, New Mexico, 7 by 2.4; Jemez Hot Springs, New Mexico, 6.7 by 2.3; Caliente, Nevada, 7.1 by 2.3; Manitou, Colorado, 6.6 to 7 by 2.3 to 2.4. Typical *f. furcifera*. Medellin, Mexico, 6.2 to 6.4 by 1.8 to 1.9; Vera Cruz, Mexico, 6.7 to 7 by 1.8 to 1.9; Orizaba, Mexico, 6.3 to 6.7 by 1.8 to 1.9 mm.

Typical material of the present geographic race is known only from San Marcos, Nicaragua; Cacao Trece Aguas, Guatemala; Merida, Yucatan; Rincon Antonio, Oaxaca, and a number of localities in the state of Vera Cruz, Mexico. The distribution in Mexico of the atypical form found in the southwestern United States is entirely unknown.

Specimens Examined: 26; 11 males and 15 females. Atypical: 16; 7 males, 8 females and 1 immature female.

Cacao Trece Aguas, Alta Vera Paz, Guatemala, 900 feet, (Barber), 1 ♂, [U. S. N. M.].

Merida, Yucatan, Mexico, (Gaumer), 1 ♂, [Hebard Cln.].

Rincon Antonio, Oaxaca, Mexico, VI, 25, 1905, (F. Knab), 1 ♀, [U. S. N. M.].

Vera Cruz, Vera Cruz, Mexico, (T. Heyde), 1 ♂, 2 ♀, [Hebard Cln.].

San Rafael, Vera Cruz, Mexico, (Townsend), 1 ♂, [Hebard Cln.].

Medellin, Vera Cruz, Mexico, (T. Heyde), 5 ♂, 3 ♀, *type* and *allotype*, [Hebard Cln.].

Atoyac, Vera Cruz, Mexico, XII, 1887, (L. Bruner), 2 ♀, [Hebard Cln.].

Cordoba, Vera Cruz, Mexico, VI, 6, 1905, (F. Knab), 2 ♀, [U. S. N. M.].

Orizaba, Vera Cruz, Mexico, XI, 1887, (L. Bruner), 2 ♂, 5 ♀, [Hebard Cln.].

S. furcata furcifera showing atypical tendencies.

Lost Mine Peak, Chisos Mountains, Texas, IX, 6, 1912, 5800 feet, (R. & H.), 1 ♀.

Fort Wingate, New Mexico, VIII, 18, 1910, (J. Woodgate), 1 ♀, [Hebard Cln.].

Las Vegas, New Mexico, VIII, 8, (Barber and Schwarz), 2 ♂, [U. S. N. M.].

Hot Springs, New Mexico, 7000 feet, 2 ♀, [Hebard Cln.].

Jemez Hot Springs, New Mexico, VIII, 6, 1911, (J. Woodgate), 1 ♀ n.; IX, 23, 30, 1912, (J. Woodgate), 1 ♂, 1 ♀, [Hebard Cln.].

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

Glenwood Springs, Colorado, IX, 9, 1909, 6000 feet, (R. & H.; in low herbage under junipers on mountain slopes), 1 ♂.

Denver, Colorado, (Beale), 1 ♂, [Hebard Cln.].

Fort Collins, Colorado, VIII, 1898, 1 ♀, 1 ♀ n., [U. S. N. M.].

Chiricahua Mountains, Arizona, VIII, 10, 1907, 8000 feet, (J. L. Webb), 1 ♀, [U. S. N. M.].

Huachuca Mountains, Arizona, VIII, 18, 1903, (Osler), 1 ♀, [U. S. N. M.].

Sycamore Canyon, Baboquivari Mountains, Arizona, X, 6 to 9, 1910, 4700 feet, (R. & H.; in grasses on hillsides), 2 ♂, 1 ♀.

Grand Canyon of the Colorado, Arizona, VII, 11, 1892, 1 ♀, [Hebard Cln.].

Caliente, Nevada, IX, 3, 1909, 4600 feet, (R. & H.; on mountain side covered with scattered growth of sage and other bushes), 1 ♀.

Los Angeles, California, 1 ♂, [Hebard Cln.].

Scudderia paronae Griffini

1896. *Scudderia paronae* Griffini, Boll. Mus. Zool. Univ. Torino, xi, No. 232, p. 11. [Colon, Panama.]

1897. *Scudderia curvicauda* Saussure and Pictet (not *Locusta curvicauda* DeGeer, 1773), Biol. Cent.-Amer., Orth., i, p. 331, pl. xv, fig. 20. [Orizaba and Atoyac, Vera Cruz, Mexico; Teapa, Tabasco, Mexico.]

1898. *Scudderia mexicana* Scudder, Proc. Amer. Acad. Arts and Sci., xxxiii, p. 280. (In part.) [Orizaba, Mexico.]

1898. *Scudderia furcifera* Scudder, Proc. Amer. Acad. Arts and Sci., xxxiii, p. 283. (In part.) [Tepic, Mexico.]

Scudder carelessly included the two males before him from Orizaba in his series of *S. mexicana* and confused his series of the present insect from Tepic, Mexico, with the closely related *S. f. furcifera*, this latter error due to the fact that he had never seen typical *paronae* and that the material from Tepic is dried alcoholic.

Typical *paronae* differs from *f. furcifera* in the somewhat larger size, slightly more prominent eyes, and antennae which are marked with broad and widely spaced pale annuli; the males have very similar genitalia but the females have a longer but proportionately slenderer ovipositor.

Allotype here selected: ♀; Ancon, Canal Zone Panama. November 16, 1913. (M. Hebard.) [Hebard Collection.]

Description of Allotype.—Similar to the male type as described by Griffini, the following characters being worthy of emphasis. Antennae at base of the general green coloration for a distance of nearly 4 mm., distad paler,

then brown for 3.4 mm., followed by a greenish white annulus 1.1 mm. in length, again brown for 7.1 mm., and with an annulus of similar coloration 1.9 mm. in length, then brown for 10 mm., with a similar annulus 1.1 mm. in length distad of this brown.²² Dorsum of pronotum rounding sharply into lateral lobes without decided lateral angles, except caudad at the humeral sinus. Ovipositor long and rather slender, curved and but weakly bent.

Although the only large series before us (Tepic) exhibits a very great amount of individual variation, the following measurements show that in the present species an increase in size takes place in its northward distribution. The females from Tepic average near the maximum measurements given below.

Measurements (in millimeters)

♂	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of subgenital plate
Ancon, Panama.... ²³ (1)	5.4	30.7	6.6	25.4	5.5
Guatel, Costa Rica..(2)	5.2-5.4	30.1-31.3	6.2-7	23.6-24.9	5-5.3
Tepic, Mexico.....(1)	5.7	32.8	7	24.8	5.7
♀	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length by width of ovipositor
Ancon, Panama. <i>Allo-</i> <i>type</i>	5.3	30	6.3	26	7 by 1.9
Guatel, Costa Rica..(1)	5.3	33.3	6.3	24.8	7.1 by 1.8
Atoyac, Mexico....(1)	5.7	33	7.2	27.7	7.3 by 2
Orizaba, Mexico....(1)	5.8	34.8	7	27.4	7.3 by 2
Tepic, Mexico.....(11)	5.3-6.7	31.3-37.6	6.4-7	25.2-31.2	6.1 by 1.6 to 7.2 by 1.9

In the present species the annuli of the antennae, so striking in typical material from Panama, appear to decrease rapidly in intensity in the northward distribution of the species. The specimens from Costa Rica have these annuli weakly indicated, while those from the state of Vera Cruz have them obsolete. This condition may be considerably emphasized in the material before us through these latter specimens being but indifferently

²² The male before us from Ancon has the antennae similarly marked.

²³ The type is somewhat smaller than this male.

preserved. In the Tepic series, which is dried alcoholic, practically all coloration is lost and only a few specimens show faint traces of antennal annuli.

The present species is known to range from Colon and Ancon, Panama, northward to Orizaba, Cuernavaca and Tepic, Mexico.

Specimens Examined: 24; 6 males, 15 females; 1 immature male and 2 immature females.

Culebra, Canal Zone, Panama, 1910, (H. H. Rousseau), 1 ♂, 1 ♂ n., 1 ♀ n., [U. S. N. M.].

Ancon, Canal Zone, Panama, XI, 16, 1913, (H.; in marshy spot at foot of hill in tall grasses), 1 ♂, 1 ♀. *Allotype*.

Guatel, Costa Rica, IV, 20 to 22, 1902, 2 ♂, 1 ♀, [Hebard Cln.].

Zacapa, Guatemala, I, 22, 1905, (C. C. Deam), 1 ♀ n., [U. S. N. M.].

Cuernavaca, Morelos, Mexico, (W. L. Tower), 1 ♂, [Am. Mus. Nat. Hist.].

Atoyac, Vera Cruz, Mexico, XII, 1887, (L. Bruner), 1 ♀, [Hebard Cln.].

Orizaba, Vera Cruz, Mexico, XI, 1887, (L. Bruner), 1 ♀, [Hebard Cln.].

Tepic, Tepic, Mexico, 1 ♂, 11 ♀, [Hebard Cln.].

Scudderia ungulata Scudder

1898. *Scudderia ungulata* Scudder, Proc. Amer. Acad. Arts and Sci., xxxiii, p. 280, fig. 6. [Tepic, Mexico.]

The present species is one of the largest and most robust of the genus. The males are readily separable from other species by the characters of the production of the supra-anal plate, in which relationship to *S. mexicana* is shown, but in the present insect this plate is much more simple. The females are distinguished by having much the largest ovipositor of any species of the genus, with the apex of the same much less rounded. This ovipositor is gently curved and not at all bent, a condition found elsewhere in the genus only in the apparently more primitive species *S. septentrionalis* and *S. hemidactyla*.

We here select as single type the female described by Scudder from Tepic, Mexico, and now in the Hebard Collection. The described male is consequently the allotype; it is in the same collection.

All of the material from Tepic is dried alcoholic but the series of seven specimens (six in A. N. S. P.) from Guadalajara shows the normal coloring of the species of the genus with lateral angles of the pronotum immaculate and both tegmina and antennae unicolorous, green and brown respectively.

Scudder's discussion as to the relationship of this species to *S. paronae* was due to the fact that at that time the female of that species was unknown in the literature, he had never recognized male specimens of that insect and the alcoholic condition of his types of the present species was confusing. The two species are very widely separated.

The median compressed lamina dependent between the cerci had been destroyed by pests in the male specimen described by Scudder (allotype), in the other males before us this part is quite as in the other species of the genus.

Measurements (in millimeters) of extremes

♂	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of subgenital plate
Tepic, Mexico <i>Allotype</i> ...	6.2	37.6	7.8	28.4	8
Tepic, Mexico.....(1)	6.1	37.8	7.8		8.1
Guadalajara, Mexico... (4)	6-6.3	35.6-38.2	7.4-7.9	28.8-29.6	7.7-8
♀	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of ovipositor
Tepic, Mexico <i>Type</i>	6.1	35.6	7.2	27.7	10.7
Tepic, Mexico.....(4)	6-6.2	34.7-36.8	7-8	28.7-29.4	10.7-11.4
Guadalajara, Mexico... (3)	5.9-6.1	33.4-34.8	6.8-7.1	29.1-29.4	10.6-10.8

The ovipositor in the type has the proximal width 2.8 and the mesal width 2.4 mm., in the other females the proximal width of the ovipositor is 2.8 and the mesal width 2.4 to 2.6 mm.

The above measurements for material from Tepic, and those given for the described pair by Scudder, are as nearly correct as can be taken from dried alcoholic material. Scudder's ovipositor length is less than ours, as he measured from the dorsal margin of the base to the apex of the ovipositor, while our measurements are all taken from the ventral apex of the basal plica to the apex of the ovipositor.

The present striking species is known as yet only from Guadalajara, Jalisco, and Tepic, Tepic, Mexico.

Specimens Examined: 15; 4 males and 11 females.

Guadalajara, Jalisco, Mexico, IX, 13, 1903, 3500 feet, (W. L. Tower;

bottom of La Barranca), 1 ♀, [Am. Mus. Nat. Hist.]; (D. L. Crawford), 2 ♂, 5 ♀, [A. N. S. P.].

Tepic, Mexico, 2 ♂, 5 ♀, *type* and *allotype*, [Hebard Cln.].

Scudderia cuneata Morse (Pl. IX, fig. 3; pl. X, fig. 21.)

1901. *Scudderia cuneata* Morse, Can. Ent., xxxiii, p. 130. [Alabama.]

The form of the supra-anal plate in the male of the present species is distinctive but shows that the insect is related more closely to *S. mexicana* than to any other species, from which form it differs decidedly in size and general structure. In these latter respects the present species much more closely resembles *S. furcata*, and the material before us shows that although specimens of the present species from Florida are separable through somewhat larger size and heavier proportions, the insect becomes smaller and slightly less robust in its northward distribution. As the female genital characters are practically identical with those of *furcata*, and as the two species are of almost exactly the same size and proportions from North Carolina to Georgia and Alabama, where both are found from the Piedmont region to the coast, separation of that sex of the two species is there decidedly difficult. The eyes in *cuneata* appear to be very slightly more rotundate and prominent than in *furcata*, while other similarly almost intangible characters are to be found in the contour of the tegmina and in the ovipositor.

Measurements (in millimeters) of extremes

♂	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of subgenital plate
Fayetteville, N. C. (4)	4.7-5.2	27-30.8	5.3-5.7	25-25.7	5.9-6
Florence, S. C. (3)	5.1-5.2	30.7-32	5.8-5.9	26-28.2	6.4-6.6
Brunswick, Georgia ... (1)	5.3	30.9	5.8	26.7	6.3
Jacksonville, Florida... (1)	5.7	33.1	6.6	28.8	6.9
Miami, Florida..... (1)	6.7	34.2	6.9	29.2	7.1
♀	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur	Length of ovipositor
Fayetteville, N. C. (10)	4.9-5.2	27.5-28.3	5.6-5.9	23.1-26.1	6.4-6.7
Florence, S. C. (4)	4.8-5	28.7-28.9	5.8-5.9	26.1-27.8	6.3-6.7
Pablo Beach, Florida.. (1)	5.7	32.3	6.4	28.2	7.4
Miami, Florida..... (1)	6.4	34.7	6.7	29.7	7.4

In general coloration the series before us is uniform green, many individuals have the lateral angles of the pronotum weakly outlined in yellowish.

Material from North and South Carolina has the least ovipositor width, ranging from 1.8 to 2 mm., in females from Florida this width is 2.2 (Pablo Beach) and 2.3 mm. (Miami).

The present species is known to range from Raleigh, North Carolina, south to Miami, Florida, and west to Alabama. It has been found to be a scarce but rather generally distributed species in the low country below the fall line in the region defined above.

Specimens Examined: 31; 15 males and 16 females.

Fayetteville, North Carolina, IX, 9, 1911, (R. & H.; common in short-leaf pine woods especially about scrub oaks) 4 ♂, 10 ♀.

Wrightsville, North Carolina, IX, 7, 1911, (R. & H.), 1 ♂.

Lake Waccamaw, North Carolina, IX, 8, 1911, (R. & H.), 1 ♂.

Florence, South Carolina, IX, 6, 1911, (R. & H.; in raspberry and other plants along "branch" in forest of gum, sweet gum, etc.), 3 ♂, 4 ♀.

Sandfly, Georgia, IX, 3, 1911, (R. & H.; heavy undergrowth of gray-bark pine forest), 2 ♂.

Brunswick, Georgia, VIII, 30, 1911, (H.; on palmetto flats), 1 ♂.

Billy's Island, Okeefenokee Swamp, Georgia, VI to IX, 1912-13, (J. C. Bradley), 2 ♂, 2 ♀, [Cornell Univ.].

Jacksonville, Florida, IX, 7, 1913, (W. T. Davis), 1 ♂, [Davis Cln.].

Scudderia mexicana (Saussure) (Pl. IX, fig. 4; pl. X, fig. 28.)

1861. *Phaneroptera mexicana* Saussure, Rev. et Mag. Zool., 2e Ser., xiii, p. 129. [Mexico.]

1878. *Sc[udderia] furculata* Brunner, Monogr. Phaner., p. 239, fig. 72b. [Mexico; Texas.]

With the exception of the very aberrant *S. strigata*, the present insect is the most attenuate of the species of the present genus. The genital characters of the male of *mexicana* are very distinctive as given in the key. The species is very different from its nearest allies *S. cuneata* and *ungulata*.

Measurements (in millimeters) of extremes

♂	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of wing	Length of caudal femur	Length of subgenital plate
Pasadena, California.... (1)	5.7	36.7	6.7	44.7	28.7	7
Santa Monica, California.. (1)	5.7	37.3	6.4	44.5	28.4	7.3
Sycamore Canyon, Ariz... (3)	5.7-5.9	34.1-36.5	5.8-6.5	41.3-44.4	26.2-28.3	7-7.8
Cuernavaca, Mexico... (10)	5.4-6	31.4-36.1	6-6.6	37.1-44.4	23.8-25.7	5.9-7.3
♀	Length of pronotum	Length of tegmen	Greatest width of tegmen	Length of wing	Length of caudal femur	Length of ovipositor
Los Angeles Co., California.. (1)	5.9	36	6.6	42.7	28.3	6.9
Tumamoc Hill, Arizona. ... (2)	5.4-5.7	31-33.9	6-6.2	38.1-39.7	25.4-26.1	6.4-6.7
Sycamore Canyon, Ariz... (2)	5.6-5.7	34.8-35.4	6.1-6.5	42.3-42.4	27.9-28.3	6.9-7
Cuernavaca, Mexico..... (8)	5.4-5.7	32.7-33.1	6.1-6.8	39.4-41.1	24.8-27	6.1-6.2

Normally uniform green in general coloration the series before us contains a few specimens which exhibit a more or less marked brownish suffusion. The lateral angles of the pronotum though usually immaculate are in a few specimens heavily outlined in yellowish.

The series before us from Cuernavaca shows that the variation in the present species is chiefly individual, the majority of specimens from that locality, however, approach the minimum measurements.

Intermediate material between *S. furcata furcata* and *S. f. furcifera* was found at Brownsville, Texas, by the authors, attracted to light at night in great numbers; the series before us of the present species from Cuernavaca shows that it responds similarly to lights at night.

In its northernmost distribution the present insect is found in the United States in the Chisos Mountains in Texas, in southeastern Arizona as far north as Fort Grant and on the California

coast to Pasadena.²⁴ In Mexico the species is widely distributed and is known from as far south as Guatemala.

Specimens Examined: 41; 24 males and 17 females.

Chisos Mountains, Texas, VI, 10 to 12, 1908, (J. D. Mitchell), 1 ♀, [U. S. N. M.].

Fort Grant, Arizona, 1882, 1 ♂, [U. S. N. M.].

Tumamoc Hill, Tucson Mountains, Arizona, X, 3 to 4, 1910, 2720 feet, (R. & H.; from yellow grass about culture frames at laboratory), 2 ♀.

Sycamore Canyon, Baboquivari Mountains, Arizona, X, 6 to 9, 1910, 3700 to 4700 feet, (R. & H.; scarce in grasses on hillsides), 3 ♂, 2 ♀.

Los Angeles County, California, (Coquillett), 3 ♂, 2 ♀, [U. S. N. M. and Hebard Cln.].

Coronado Beach, California, (Blaisdell), 2 ♂, [Hebard Cln.].

Lower California, (G. Eisen), 1 ♂, [Hebard Cln.].

Tepic, Mexico, 1 ♂, [Hebard Cln.].

Federal District, Mexico, (J. R. Inda), 1 ♂, 1 ♀, [U. S. N. M.].

Cuernavaca, Morelos, Mexico, V, 22 to VII, 5, 1905, (W. L. Tower; at light), 9 ♂, 8 ♀, [Am. Mus. Nat. Hist.]; XI, 1898, (O. W. Barrett), 1 ♂, [Hebard Cln.].

Oaxaca, Mexico, VI, 28, (C. C. Deam), 1 ♂, [U. S. N. M.].

Merida, Yucatan, Mexico, (Gaumer), 1 ♂, 1 ♀, [Hebard Cln.].

²⁴ The Grant's Pass, Oregon, record published by Scudder (Proc. Amer. Acad. Arts and Sci., xxxiii, p. 280, (1898), is probably to be accounted for by an error in labelling, as we have examined the specimens and find the determination to be correct, but the locality is wholly inconsistent with our knowledge of the distribution of the insect.

*These figures are all one-half
the dimensions cited.*

EXPLANATION OF PLATES

Plate IX

- FIG. 1.—*Scudderia furcata furcata*. Disto-dorsal abdominal segment of male from dorsum. Shasta County, California. (× 12)
- “ 2.—*Scudderia furcata furcata*. Disto-dorsal abdominal segment of male from dorsum. Lake Mahopac, New York. (× 12)
- “ 3.—*Scudderia cuneata*. Disto-dorsal abdominal segment of male from dorsum. Florence, South Carolina. (× 12)
- “ 4.—*Scudderia mexicana*. Disto-dorsal abdominal segment of male from dorsum. Baboquivari Mountains, Arizona. (× 12)
- “ 5.—*Scudderia texensis*. Disto-dorsal abdominal segment of male from dorsum. Rosenberg, Texas. (× 12)
- “ 6.—*Scudderia strigata*. Disto-dorsal abdominal segment of male from dorsum. Jacksonville, Florida. (× 12)
- “ 7.—*Scudderia curvicauda curvicauda*. Disto-dorsal abdominal segment of male from dorsum. Rockville, Pennsylvania. (× 12)
- “ 8.—*Scudderia pistillata*. Disto-dorsal abdominal segment of male from dorsum. Pequaming, Michigan. (× 12)
- “ 9.—*Scudderia curvicauda borealis*. Disto-dorsal abdominal segment of male from dorsum. Aweme, Manitoba. *Allotype*. (× 12)
- “ 10.—*Scudderia curvicauda laticauda*. Disto-dorsal abdominal segment of male from dorsum. Billy's Island, Georgia. (× 12)
- “ 11.—*Scudderia hemidactyla*. Lateral outline of *type*. Caparo, Trinidad. (× 2)
- “ 12.—*Scudderia curvicauda laticauda*. Lateral outline of female. Billy's Island, Georgia. (× 2)
- “ 13.—*Scudderia strigata*. Outline of tegmen of male. Jacksonville, Florida. (× 12)
- “ 14.—*Scudderia septentrionalis*. Disto-dorsal abdominal segment of male from dorsum. West Point, Nebraska. (× 12)
- “ 15.—*Scudderia hemidactyla*. Disto-dorsal abdominal segment of male from dorsum. Caparo, Trinidad. *Type*. (× 12)
- “ 16.—*Scudderia hemidactyla*. Disto-dorsal abdominal segment of male in lateral outline. Caparo, Trinidad. *Type*. (× 12)
- “ 17.—*Scudderia hemidactyla*. Disto-dorsal abdominal segment of male from venter. Caparo, Trinidad. *Type*. (× 12)

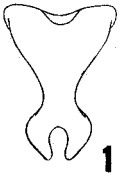
Plate X

Care should be taken in comparing material with these figures, as the plane of the basal axis is not the same in all cases.

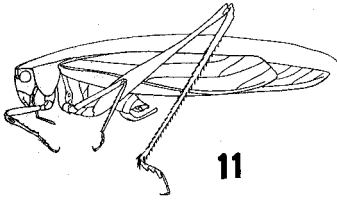
- FIG. 18.—*Scudderia strigata*. Outline of ovipositor. Jacksonville, Florida. (Greatly enlarged.)
- “ 19.—*Scudderia furcata furcata*. Outline of ovipositor. Saunders-town, Rhode Island. (Greatly enlarged.)
- “ 20.—*Scudderia furcata furcifera*. Outline of ovipositor. Chisos Mountains, Texas. (Greatly enlarged.)
- “ 21.—*Scudderia cuneata*. Outline of ovipositor. Miami, Florida. (Greatly enlarged.)
- “ 22.—*Scudderia hemidactyla*. Outline of ovipositor. *Allotype*. Caparo, Trinidad. (Greatly enlarged.)
- “ 23.—*Scudderia texensis*. Outline of ovipositor. La Marque, Texas. (Greatly enlarged.)
- “ 24.—*Scudderia pistillata*. Outline of ovipositor. Great Cranberry Island, Maine. (Greatly enlarged.)
- “ 25.—*Scudderia curvicauda laticauda*. Outline of ovipositor. Billy's Island, Georgia. (Greatly enlarged.)
- “ 26.—*Scudderia curvicauda curvicauda*. Outline of ovipositor. Rockville, Pennsylvania. (Greatly enlarged.)
- “ 27.—*Scudderia curvicauda borealis*. Outline of ovipositor. Aweme, Manitoba. *Type*. (Greatly enlarged.)
- “ 28.—*Scudderia mexicana*. Outline of ovipositor. Huachuca Mountains, Arizona. (Greatly enlarged.)
- “ 29.—*Scudderia septentrionalis*. Outline of ovipositor. No locality. (Greatly enlarged.)

Plate XI

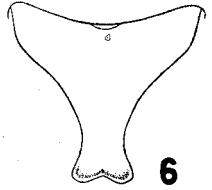
- FIG. 30.—*Scudderia pistillata*. Outline of male cercus. Pequaming, Michigan. (Greatly enlarged.)
- “ 31.—*Scudderia septentrionalis*. Outline of male cercus. West Point, Nebraska. (Greatly enlarged.)
- “ 32.—*Amblycorypha oblongifolia*. Lateral outline of pronotum, tegmen and exposed wing. Male. Chestnut Hill, Pennsylvania. (× 2)
- “ 33.—*Amblycorypha floridana floridana*. Lateral outline of pronotum, tegmen and exposed wing. Male. Homestead, Florida. (× 2)
- “ 34.—*Amblycorypha floridana carinata*. Lateral outline of pronotum, tegmen and exposed wing. Male. *Type*. Stafford's Forge, New Jersey. (× 2)



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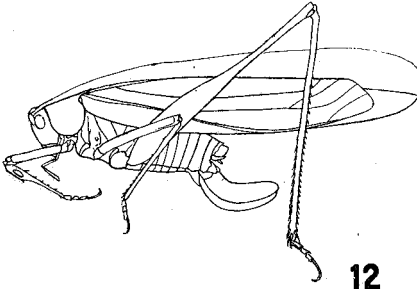
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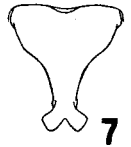
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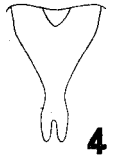
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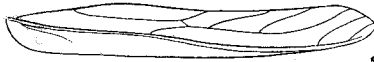
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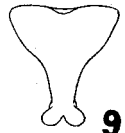
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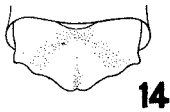
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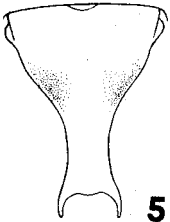
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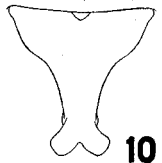
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