

NORTH AMERICAN ACRIDIDAE (ORTHOPTERA)

PAPERS 1 AND 2

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PAPER ONE

A STUDY OF THE GROUP ACHURI, AS FOUND IN THE
UNITED STATES

The Achuri, here separated for the first time, come first among the North American groups in the Subfamily Acridinae (= Truxalinae of authors). As our field work has resulted in the assembling of material of all the forms found in the United States, we have decided to present the results of the study of the series now available.

No affinity with the Group Hyalopteryges exists, the nearest relationship apparently being with the Old World Group Odontomeli. In the linear arrangement of the North American Acridinae, *Achurum* and *Radinotatum* come first, then *Pseudopomala* and *Mermiria* of the Group Mermiriae, followed by *Truxalis*, a true Hyalopterygine genus.

Comparison has been made with material of the other Hyalopterygine genera *Hyalopteryx*, *Eutryxalis* and *Paratruxalis*, as well as several genera of the Group Odontomeli in the Philadelphia Collections.

The Achuri are distinguished by the very slender, elongate form; the produced, horizontal head, with vertex laterally and medio-longitudinally carinate; the weakly defined lateral or ventro-lateral foveolae; the ensiform antennae; the long pronotum with disk flattened, lateral and medio-longitudinal carinae parallel and straight and the very shallow lateral lobes; the slender, acuminate tegmina and wings (when fully developed), the latter with no fenestrate area in either sex; the prosternum with cephalic portion slightly convex; the very slender caudal femora with dorsal and ventral genicular angles produced, and the conical (strongly to greatly) produced male subgenital plate.

Two genera, three species and one geographic race are included, all occurring in the territory under consideration, though two of the species find their northernmost limit of distribution just over the Mexican line in the United States.

In the present study nine hundred and nine specimens have been examined, four hundred and fifty of these having been previously reported by Rehn and Hebard, individually or jointly. We feel that the limits of distribution of each form are now roughly definable for the regions being studied. Unless otherwise stated the material collected by Rehn and Hebard, individually or jointly, is in the collection of the author or that of the Academy of Natural Sciences of Philadelphia.

The following key includes the features by which the forms here discussed may be readily distinguished.

(Form very slender, linear. Antennae ensiform. Head horizontal, dorsal length greater than that of pronotum. Pronotum with metazona one-half as long as prozona or shorter; disk deplanate, with lateral and medio-longitudinal carinae distinct and parallel. Tegmina and wings vestigial or fully developed; the former, when fully developed, with apices sharply rounded, nearly acute and without a fenestrate area in either sex. Caudal femora with dorsal and ventral genicular angles well produced.)

A. Head with lateral carinae of vertex overhanging the very weak lateral foveolae; the latter with ventral delimiting carina very weak, but best indicated mesad. (Pronotum with caudal margin convex, showing weak obtuse-angulation.) Tegmina and wings fully developed. Male subgenital plate with length nearly equal to length of preceding sternite. Dorso-external genicular angles of caudal femora slightly the longer. Mountains of extreme southern Arizona, southward.

Achurum Saussure

Genotype.—**sumichrasti** Saussure

AA. Head with lateral carinae of vertex not overhanging the very weak lateral foveolae; the latter with ventral delimiting carina very weak, but best indicated distad. Tegmina and wings greatly reduced or vestigial. Male subgenital plate with ventral length decidedly greater than that of preceding sternite. Dorso-internal genicular angles of caudal femora the longer.

B. Pronotum with caudal margin broadly convex. Tegmina and wings greatly reduced, overlapping; the former with apices well rounded in males, sharply rounded to different degrees in females. (Male subgenital plate with length nearly twice that of preceding sternite.) Dorsal genicular angles of caudal femora distinctly more produced than ventral. Brownsville region of Texas, southward into eastern Mexico.

Radinotatum minimipenne (Caudell)

BB. Pronotum with caudal margin weakly concave. Tegmina and wings vestigial, linear, lateral; the former with apices sharply rounded, nearly acute. Dorsal genicular angles of caudal femora much more strongly produced than the ventral.

C. Head shorter, vertex less produced and face less concave. Antennae shorter. Pronotum with lateral lobes deeper. Male subgenital plate shorter and heavier. Caudal femora shorter and heavier. South-eastern states, in Florida south to central peninsular portion.

Radinotatum brevipenne brevipenne (Thomas)

Genotype of Radinotatum

CC. Head longer, with vertex much more produced and face more concave. Antennae longer. Pronotum with lateral lobes shallower. Male subgenital plate longer and more slender. Caudal femora longer and more slender. Southern peninsular Florida.

Radinotatum brevipenne peninsulare R. & H.

Tuberculation of the prosternum and number of caudal tibial spines are of hardly any value as generic criteria in this group. The prosternum does not bear a small tubercle, as has been stated in past literature. The number of spines on the dorso-external margin of the caudal tibiae is individually variable and unsafe as a generic character. The extremes and average for the species before us show the difference between *Achurum* and *Radinotatum* to be much less in this respect than has been supposed.

Achurum sumichrasti (Saussure) (Plate IV, figures 1, 2, 3 and 4.)

1861. *Tr[uxalis (Achurum)] sumichrasti* Saussure, Rev. et Mag. de Zool., XIII, p. 313. [♀, Temperate Mexico.]

1873. *T[ruxalis] acridodes* Stål, Ofv. K. Vetensk.-Akad. Förh., 1873, no. 4, p. 52. [♂, Mexico.]

1897. *Achurum sumichrasti* McNeill, Proc. Davenport Acad. Nat. Sci., VI, p. 202, pl. I, figs. 2, 2a, 2b, 2c. [Fort Grant, Arizona.¹]

1904. *Rhadinotatum brevipenne* Bruner (not *Tryxalis brevipenne* Thomas, 1873), Biol. Cent.-Amer., Orth., II, p. 34. ["♂", juv.; Orizaba, [Vera Cruz], Mexico.²]

¹ This is the first record of the species from the United States. Scudder (Index, N. A. Orth., p. 5, (1901)) is in error in crediting to Thomas a record of *A. acridodes* from the western United States. Thomas stated, "The following new species is described from Mexico by Stål," after having remarked on page 851 that no adult Truxalids were in the collection there reported. (Rept. Geol. Geogr. Expl. Surv. West of 100th Merid., Wheeler, v, p. 865, (1875).)

² The specimens upon which this record, from memory, was based are in the Hebard Collection ex Bruner. The reason that author was unable to find them when preparing the manuscript for the Biologia appears to be that, in the interim, he had recognized them as immature examples of *Achurum sumichrasti* and had so labelled them, afterwards forgetting that assignment.

1907. *Achurum acridodes* Rehn, Proc. Acad. Nat. Sci. Phila., 1907, pp. 31 and 69. [♂, ♀; Carr Canyon, Huachuca Mountains; Palmerlee, and Baboquivari Mountains, Arizona.]

1907. *Achurum acridodes* Snow, Trans. Kansas Acad. Sci., xx, part ii, p. 36. [Baboquivari Mountains, Arizona.]

The type of this species is probably in the Geneva Museum.

The sides of the vertex normally show weak convergence. In rare examples, however, they are parallel to the rounded apex, as is normal in *Radinotatum*. The disk of the pronotum toward the cephalic margin and the entire metazonal portion is minutely impresso-punctate, individually varying through all stages to minutely and longitudinally rugulose. This variation and the sexual difference (the male being smaller and distinctly more slender) led Stål to describe, as *acridodes*, a male showing the impresso-punctulate type. The validity of that name has constantly been questioned and the material now before us satisfactorily proves the synonymy indicated above.³ Those individuals having the pronotal disk brown appear to be more liable to have it more generally roughened with rugae more decided. The genicular lobes of the caudal femora vary slightly in length and slenderness, but this does not appear to be sufficiently decided or stable to warrant racial or other nominal recognition. The number of dorso-external spines of the caudal tibiae varies from thirteen to seventeen, the average being fifteen.

In the half-grown and larger immatures of this species the supra-anal plate is short and truncate, but beyond it projects, as a slenderly conical process, an elongate terminal segment (plate IV, figure 4). This process is similar in the series, longer than the pronotum, straight, with dorsal surface concave between

³ The following Mexican material is before us.

Guadalajara, Jalisco, (D. L. Crawford), 6 ♂, 7 ♀; VIII, 20 and IX, 18, 1903, (J. F. McClendon), 2 ♀, [all A. N. S. P.].

Vera Cruz, (A. Sallé), 1 ♂, [Hebard Cln.].

Orizaba, Vera Cruz, I, 1892, (L. Bruner), 2 juv. ♂, 1 juv. ♀, [Hebard Cln.].

Cuernavaca, Morelos, (D. L. Crawford), 1 ♂, 1 ♀; I, 4, 1899, (L. Bruner), 1 juv. ♂, [all Hebard Cln.].

Chilpancingo, Guerrero, 4600 feet, VI and VIII, (H. H. Smith), 1 ♂, 1 ♀, [Hebard Cln.]

Tonala, Chiapas, VIII, 7, 1909, (A. Petrunkevitch; hill about 1000 feet high), 1 ♀, [A. M. N. H.].

lateral carinae, its surface convex elsewhere, with a strong medio-longitudinal ventral carina. This entire segment disappears in the adult, the supra-anal plate in both sexes being small, trigono-shield-shaped, with apex bluntly rounded. It was the purely superficial, but quite apparent, resemblance of this appendage to the subgenital plate of males of *Radinotatum brevipenne* (Thomas) which misled Bruner into recording immatures of the present insect as that species.

Measurements (in millimeters)

	Length of body	Length of pronotum	Caudal width of pronotal disk	Length of tegmen	Length of caudal femur
♂					
Carr Canyon, Huachuca Mts., Arizona...	26.8	4.1	1.7	23.8	12
Fort Grant, Arizona...	28.2	24.8	12.6
Fort Grant, Arizona...	29.8	4.5	1.9	24.2	12.1
Black Dike Prospect, Arizona.....	28.8	4.3	1.8	24.3	12
Baboquivari Mountains, Arizona.....	29	4.5	1.9	25.3	12.8
♀					
Fort Grant, Arizona...	36.2	5.5	2.1	30	14.8
Fort Grant, Arizona...	38.5	5.3	2.1	30.8	14.8

The largest female before us, from Tonalá, Chiapas, Mexico, measures: length of body, 37 (shrivelled); length of pronotum, 5.9; caudal width of pronotal disk, 2.2; length of tegmen, 34; length of caudal femur, 16.8 mm.

The color phases are as follows. A. All brown. B. Brown, with dorsal surface of head, pronotum and tegmina green. C. All green, with a post-ocular band of brown, continued along the dorsal margin of the pronotal lateral lobes and expanding to different degrees on the lateral surfaces of the tegmina. Variation from brown to yellowish-brown is also shown.

The habits of this species have never been discussed. Rehn secured a single specimen in the Sierritas above Black Dike Prospect, Arizona, while beating "bear grass" (*Nolina* sp.). No further specimens were found during three hours' work.

In addition to twenty-five Mexican individuals, seven from the United States are before us, all of the latter having been recorded previously and belonging to the Philadelphia Collections, except the following male.

Seven miles above Black Dike Prospect, Sierritas Mountains, Pima County, Arizona, 4700 to 4825 feet, VII, 28, 1916, (J. A. G. Rehn), 1 ♂, [A. M. N. H.].

Radinotatum minimipenne (Caudell) (Plate IV, figures 5, 6 and 7.)

1904. *Achurum minimipenne* Caudell, Sci. Bull., Mus. Brooklyn Inst. Arts and Sci., 1, p. 110, pl. vi, figs. 3 and 4. [♀, Brownsville, Texas.⁴]

The type is in the collection of the Museum of the Brooklyn Institute of Arts and Sciences.

As Caudell has stated, "this species seems to form a connecting link between *Achurum* and *Radinotatum*." Nearer affinity is, however, with the latter and, from study of the material before us, we feel fully justified in transferring *minimipenne* to that genus.

The vertex is much like that of *R. brevipenne* (Thomas), the lateral margins not overhanging and less convergent than is normal in *Achurum*. The lateral foveolae are subobsolete, agreeing with *brevipenne* in facing laterad, with delimiting ventral carina indicated only distad; in *Achurum* the lateral foveolae face ventro-laterad, with delimiting ventral carina indicated only mesad. The caudal margin of the pronotum is not concave as in *brevipenne*, nor is it nearly as strongly angulate-produced as in *Achurum*. It is very possible that the differences shown in this feature in these species, is wholly attributable to modification resulting from degree of reduction of the organs of flight. Such difference should, in consequence, be given little generic value. In the genicular lobes of the caudal femora we find much closer agreement with *brevipenne*, the dorsal pairs being decidedly the more produced, the dorso-internal the longer. In *brevipenne* the only difference is that the production of the dorsal lobes is much greater. Similar closer affinity is found in the form of the male subgenital plate. The dorso-external spines of the caudal tibiae vary individually in number from fourteen to seventeen in the material here recorded, the average being sixteen.⁵ When we consider that *brevipenne* has from sixteen to twenty-three such spines, and *Achurum* thirteen to seventeen, we see that this feature is of little value from a generic point of view.

The genera *Achurum* and *Radinotatum* are close, but the former, as here limited, may be quickly separated by the structure of the fastigium of the vertex, of its lateral foveolae and the proportions of the genicular lobes of the caudal femora.

⁴ Both sexes were at the same time recorded from Esperanza Ranch, near Brownsville, Texas.

⁵ In one specimen from Tampico, Tamaulipas, Mexico, one of the caudal tibiae has nineteen such spines.

Measurements (in millimeters) of extremes

♂	Length of body	Length of pronotum	Caudal width of pronotal disk	Length of tegmen	Length of caudal femur
Brownsville, Texas (8).....	24.8-26	3.7-3.9	1.1-1.2	6.7-7.5	12.9-13.8
Piper Plantation, Texas (23).....	24.1-26.5	3.5-4	1.1-1.2	6.8-7.3	12.7-14.8
Lyford, Texas (2)...	26-26.1	3.7-3.8	1.2-1.2	7.2-7.3	12.8-13.8
Tampico, Mexico...	25	3.8	1.3	7	14.2
Pueblo Viejo, Mexico.....	21.4-25.3	3.3-4	1.2-1.4	6.7-7.7	11.8-13.2
♀					
Lyford, Texas.....	33.8	5.3	2	7.8	16.7
Piper Plantation, Texas (17).....	30.8-34.2	4.8-5.1	1.8-2	6.2-7.8	15.5-17
Tampico, Mexico (2).....	32.1-31.5	5.1-5.1	2-2	6.7-7.5	15.2-16
Pueblo Viejo, Mex- ico.....	30	5	1.9	6.8	14.8

In addition to a light brown color phase, the following are noted. Male: dorsal surface of head and pronotum, all of tegmina and caudal femora to distal portions light green, other portions light brown. Female: face and genae, lateral lobes of pronotum, lateral portions of tegmina and caudal femora to distal portions light green, other portions light brown, the dorsal surfaces of the head, pronotum and tegmina palest. In one brown female from Tampico, Mexico, the tegmina alone are greenish.

Near Brownsville, Texas, the species was found locally quite numerous in the low, coarse grass growing in openings of the thorny tangle, choking the low-lands near the Rio Grande. The species is not very active and, once found, a series was easily secured.

This insect was previously known only from the material originally reported by Caudell. Its distribution is now found to extend from Mercedes and Lyford, in the Brownsville region of Texas, south to Pueblo Viejo, at the extreme northern extremity of Vera Cruz, on the Gulf of Mexico.

Specimens Examined, in addition to a pair previously recorded: 68; 37 males, 21 females and 10 immature individuals.

TEXAS: Lyford, Cameron County, VIII, 6 and 7, 1912, (R. and H.), 2 ♂, 1 ♀. Mercedes, Cameron County, II, 1909, (T. D. Urbahns), 1 juv. ♀, [U. S. N. M.]. Brownsville, VII, 31 to VIII, 5, 1912, (Hebard), 8 ♂, 1 juv.

♂, 2 juv. ♀. Piper Plantation, near Brownsville, VIII, 3, 1912, (R. and H.), 23 ♂, 17 ♀, 3 juv. ♂.

MEXICO: Tampico, Tamaulipas, XII, 1906, (C. A. Hart), 1 ♂, 2 ♀, [Hebard Chn.]. Pueblo Viejo, Vera Cruz, XII, 8, 1909, (F. C. Bishopp), 3 ♂, 1 ♀, [U. S. N. M.].

Radinotatum brevipenne brevipenne (Thomas) (Plate IV, figure 8.)

1873. *Tr[yxalis] brevipenne* Thomas, Rept. U. S. Geol. Surv. Terr., v, pl. Synopsis Acrid., fig. 12. [♀; Palatka, Florida.]

1897. *Radinotatum brevipenne* McNeill, Proc. Davenport Acad. Nat. Sci., vi, p. 200, pl. I, figs. 1, 1a and 1b. [♂, ♀; Orange, Florida.]

1902. *Rhadinotatum brevipenne* Blatchley, A Nature Wooing, p. 219. [Ormond, Florida.]

1904. *Rhadinotatum brevipenne* Morse, Carnegie Inst. Washington, Publ. no. 18, p. 28. [Juv.: Savannah and Waycross, Georgia; De Funiak Springs, Live Oak and Tallahassee, Florida; Greenville, Alabama.]

1905. *Radinotatum brevipenne* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1904, p. 783. [♂, ♀, juv.: Thomasville, Georgia; Leon County, Florida.]

1907. *Radinotatum brevipenne* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1907, p. 285. [♂, ♀, juv.; Pablo Beach and Gainesville, Florida.]

1912. *R[adinotatum] brevipenne* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1912, p. 247, figs. 2, 4, 6, 8 and 10. (Comparison with *Radinotatum brevipenne peninsulare* R. and H.)

1914. *Radinotatum brevipenne* Davis, (in part), Jour. N. Y. Ent. Soc., xxii, p. 194. [♂, ♀; La Grange, Florida.⁶]

1916. *Radinotatum brevipenne brevipenne* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1916, p. 153. [♂, ♀, juv.: Yemassee, South Carolina; Augusta, Warm Springs, Macon, Isle of Hope, Sandfly, Jesup, Brunswick, Homerville, Hebardville, Suwannee Creek, Billy's Island, Honey Island, Albany and Spring Creek, Georgia; Jacksonville, Atlantic Beach, Pablo Beach, Live Oak and Cedar Keys, Florida.]

1920. *Rhadinotatum brevipenne* Blatchley, (in part), Orth. N. E. Amer., p. 195, figs. 72 and 73. [Dunedin, Florida;⁷ Agricultural College, Mississippi.]

Typical *brevipenne* and the south Floridian race *b. peninsulare* were thoroughly compared by Rehn and Hebard in 1912. Blatchley, in the last paper referred to above, refuses to recognize the southern race of this species. He quotes our statement that "Lakeland individuals are absolutely intermediate," and that "In central Florida the species (i. e., by inference the typical race) intergrades with its geographic race *R. brevipenne peninsulare*" as proof of our error. Apparently he does not realize that an area of intergradation lies between the geographic races of a species, unless the latter be insular or has in some other manner been completely separated from the parent stock. We reiterate that Lakeland material is intermediate; that

⁶ The Miami female should have been referred to *R. b. peninsulare*.

⁷ Probably intermediate between *b. brevipenne* and *b. peninsulare*.

locality in central Florida being in the area of intergradation between the races of *brevipenne*. Blatchley's experience with the present species has been almost wholly with material from Dunedin, another locality in the area of intergradation, where strong individual variation is often found. His statement that "All distinctions as given are comparative only and may be found in any large series of specimens taken almost anywhere in Florida" is correct in the first part, but erroneous in the second. Both races are individually variable, but any series from southern Florida may be easily separated from any series from the northern portions of the species' range.

The dorso-external spines of the caudal tibiae vary in number from sixteen to twenty in the material before us, the average being eighteen.

The following measurements are given to show the differences in proportions found in *brevipenne brevipenne*, atypical *brevipenne* and *brevipenne peninsulare*.

	Length of body	Length of vertex ⁸	Length of pronotum	Length of tegmen	Ventral length of subgenital plate	Length of caudal femur
♂						
<i>Brevipenne brevipenne</i>						
Macon, Georgia...	26.8	1.65	3.8	4.8	3	15
Thomasville,						
Georgia (5)....	30-28.4	1.65-1.75	4-3.9	5.8-6	3.6-3.6	14.3-13.8
Hebardville,						
Georgia (7)....	28-29.8	1.54-1.75	3.8-4	5.3-5.2	3.4-4	14.2-14.9
Ocala, Florida (9)	29-30.3	1.7-1.84	4-4.1	4-4.8	3.1-3.8	13.2-14.1
<i>Atypical brevipenne</i>						
Kissimmee,						
Florida (28)...	27.8-33	1.84-2.02	3.7-4.3	3.8-5	2.8-4.3	12.9-15.8
Lakeland,						
Florida (10)...	26.8-29	1.7-1.86	3.2-3.6	3.8-4.3	3-4	12.5-13.7
Arcadia, Fla. (12)	29.5-34.7	1.84-2.15	3.8-4	3.9-4.7	3.3-4.9	13.8-15.2
<i>Brevipenne peninsulare</i>						
Fort Myers,						
Florida (35)...	32.3-35.5	2.04-2.16	3.8-4.1	3.6-4.1	4.2-5	13.7-15.1
Fort Reed,						
Florida (2)....	33.6-34.7	1.95-2.18	4-4.1	4-5.2	4.4-4.8	... -15.4
Miami Beach,						
Florida (4)....	33-35.6	2.02-2.31	3.9-4	4.3-4.1	4.1-5	15-15.4
Homestead,						
Florida (85)....	34.2-35	2.06-2.18	4.1-4	4.7-4.8	4.3-4.7	15-16.3
Big Pine Key,						
Florida ⁹ (30)...	28.8-31	1.72-1.91	3.3-3.7	3.1-3.8	3.3-4.1	12.7-14.2

⁸ These measurements and the proportions given below the tables were taken by micrometer.

⁹ This series is decidedly depauperate, the proportions, however, being typical of *b. peninsulare*.

♀	Length of body	Length of vertex ⁸	Length of pronotum	Length of tegmen	Length of caudal femur
<i>Brevipenne brevipenne</i>					
Thomasville,					
Georgia (2).....	37-38.8	2.15-2.31	5.8-5.8	7-7.1	17.8—...
Hebardville,					
Georgia (5).....	35.8-39.6	2.08-2.38	5-5.9	6.8-6.2	15.9-18.6
Jacksonville, Fla...	40	2.36	5.9	6.4	17.8
Ocala, Florida (4)..	36.4-39.8	2.1-2.16	5-5.7	5.4-5	15.8-17.4
<i>Atypical brevipenne</i>					
Kissimmee,					
Florida (19)....	39.8-45.8	2.31-2.79	5.3-6	5.7-6.4	16.8-18.8
Lakeland, Fla. (7)..	37-39	2.15-2.18	5-6	4.7-5.3	15.7-16.8
Arcadia, Fla. (5)..	38-43.5	2.18-2.58	5.1-5.8	5.2-5.9	16.5-18.3
<i>Brevipenne peninsulare</i>					
Fort Myers, Flor-					
ida (6).....	40-42	2.38-2.69	5.3-5.8	5.1-4.8	17-16.5
Chokoloskee, Fla..	49	3.1	6.6	6.8	21.5
Homestead,					
Florida (41)....	42-47	2.65-2.7	5.2-5.8	5.8-5.9	17.8-19
Big Pine Key,					
Florida ⁹ (6).....	37-39.5	2.16-2.31	5-4.9	4.6-4.8	16.4-17.2

The extremes of the series show the width of the vertex contained the following number of times in its length:

Males. *Brevipenne brevipenne*. Macon, 1.29; Thomasville, 1.23 to 1.24; Hebardville, 1.18 to 1.44; Billy's Island, 1.34; Ocala, 1.35 to 1.37. *Atypical brevipenne*. De Leon Springs, 1.53; Kissimmee, 1.5 to 1.74; Lakeland, 1.47 to 1.84; Tampa, 1.5 and 1.5; Arcadia, 1.46 to 1.77. *Brevipenne peninsulare*. Fort Myers, 1.7 to 1.84; Fort Reed, 1.56 to 1.63; Miami Beach, 1.71 to 2.04; Homestead, 1.6 to 1.83; Big Pine Key, 1.51 to 1.79.

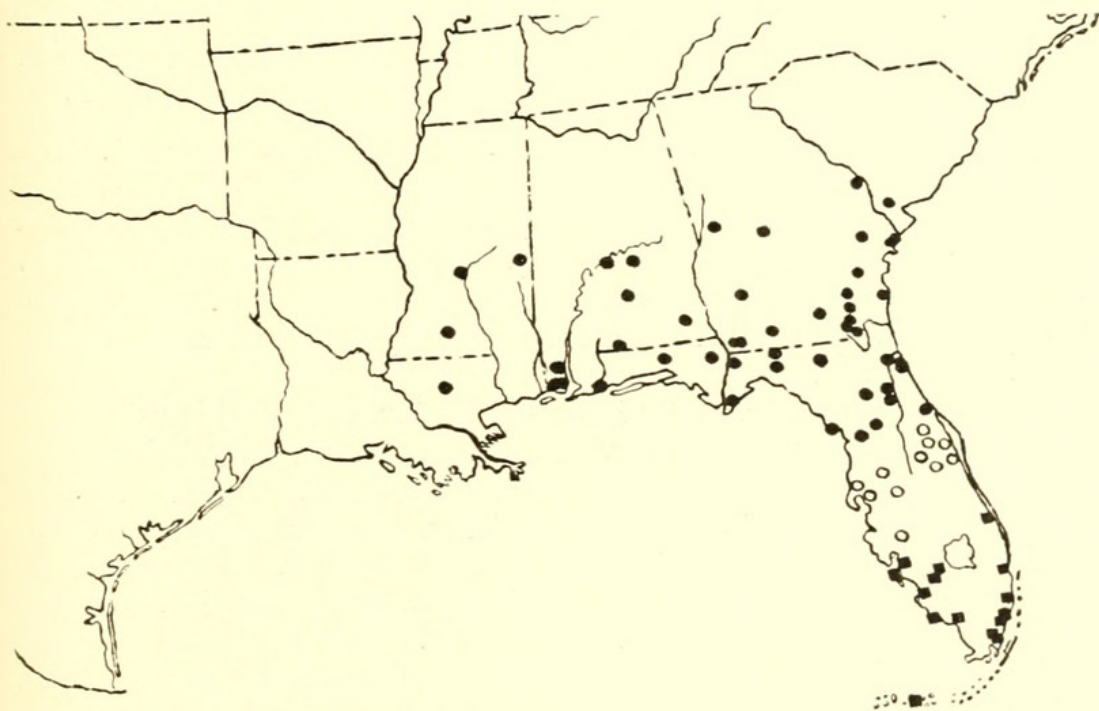
Females. *Brevipenne brevipenne*. Thomasville, 1.21 to 1.22; Hebardville, 1.17 to 1.23; Jacksonville, 1.23; Ocala, 1.25 to 1.27. *Atypical brevipenne*. Kissimmee, 1.36 to 1.54; Lakeland, 1.25 to 1.39; Arcadia, 1.31 to 1.41. *Brevipenne peninsulare*. Fort Myers, 1.45 to 1.52; Fort Reed, 1.31 to 1.37; Homestead, 1.43 to 1.59; Big Pine Key, 1.45 to 1.49.

These proportions for *brevipenne brevipenne* are seen to be: ♂, 1.18 to 1.44, a mean of 1.31; ♀, 1.17 to 1.27, a mean of 1.22. For *brevipenne peninsulare* they are: ♂, 1.51 to 2.04, a mean of 1.77; ♀, 1.31 to 1.59, a mean of 1.45.

The measurements serve better to separate the races of this species than any diagnosis we could give. Though in general appearance very different, careful comparisons of series show both *b. brevipenne* and *b. peninsulare* to be subject to considerable individual variability. Only in the area of intergradation, however, are individuals encountered in the same series referable to both types. It is of interest to note that this area of intergradation lies much more to the north on the East than on the West Coast of Florida, apparently forming a broad oblique

band across the state. It includes the following localities as indicated by material before us: De Leon Springs to Trilby on the north, Fort Reed,¹⁰ Kissimmee and Arcadia on the south.

The following color phases are developed in this species. A. Both sexes often with general coloration light yellowish brown to dark brown, sometimes speckled with darker brown, rarely with lateral carinae of pronotum very narrowly buffy. Rarely the dorsal surface of head, pronotum and abdomen is blackish brown in this and the laterally green phase. B. Frequent males are brown with dorsal surface of head, pronotum, proximal portion of abdomen and tegmina green. C. Frequent females, very rarely males, are green, with dorsal surface of head, pronotum and all of abdomen brown, the caudal femora sometimes suffused distad with brown.



Map 1. Showing distribution of *Radinotatum brevipenne brevipenne* by dots, of *Radinotatum brevipenne peninsulare* by squares, and of material intermediate between these races by circles.

This insect is everywhere met with in the pine-needles and slender grasses of the pine forests which extend over the greater portion of its distribution, where its remarkably slender form

¹⁰ The series recorded from this locality by Scudder is before us.

and coloration are unusually protective in character. As is usual with such forms of insect life, it is not particularly active. The species is also found, however, among grasses in open areas, along the borders of forests and in damp situations.

Over the greater portion of its distribution *brevipenne brevipenne* is a spring form, frequent immatures, but adults almost never, being met with after midsummer. In the southern portion of its distribution, however, like its more southern race, it is to be found adult both in Spring and Fall, and is probably present in that stage throughout most of the year.

The northern limit of distribution of typical *brevipenne*, as now known, runs through Yemassee, South Carolina; Augusta, Macon and Warm Springs, Georgia; Montgomery and Selma, Alabama; Agricultural College and Jackson, Mississippi. It is probably limited in western distribution by the eastern escarpment and delta country of the Mississippi River. In peninsular Florida it is found typical as far south as Palatka, Ocala and Dunellon.

Specimens Examined, in addition to 123 previously recorded: 218; 26 males, 15 females, 177 immature individuals.

GEORGIA: Groveland, IX, 21, 1917, (R. and H.; juv., few in forest undergrowth), 3 juv. ♂, 4 juv. ♀. Billy's Island, Okefenokee Swamp, VII, 16 to 19, 1917, (Hebard; undergrowth in long-leaf pine forest), 1 ♀. Bainbridge, IX, 5, 1915, (R. and H.; juv. occasional in pine and oak woods undergrowth), 4 juv. ♂, 5 juv. ♀.

ALABAMA: Dothan, IX, 6, 1915, (R. and H.; juv. occasional in drier spots of low long-leaf pine woods), 3 juv. ♂, 4 juv. ♀. Montgomery, IX, 8, 1915, (R. and H.; juv. occasional in grasses of short-leaf pine woods), 1 juv. ♂, 3 juv. ♀. Greenville, VIII, 3, 1915, (Hebard; juv. in grasses on edge of forest), 1 juv. ♀. Flomaton, VIII, 27, 1915, (R. and H.; few juv. in undergrowth of pine woods), 2 juv. ♀. Selma, IX, 9, 1915, (R. and H.; few juv. in grasses on edge of lowland woods), 1 juv. ♂, 4 juv. ♀. Mobile, VIII, 26, 1915, (R. and H.; juv. occasional in undergrowth of long-leaf pine flat-woods), 3 juv. ♂, 2 juv. ♀. Springhill, Mobile County, VIII, 25, 1915, (R. and H.), 3 juv. ♂, 2 juv. ♀. Irvington, VIII, 26, 1915, (R. and H.; juv. occasional on damp ground among bog plants and grasses), 2 juv. ♂, 5 juv. ♀. St. Elmo, VIII, 26, 1915, (R. and H.; juv. occasional in undergrowth of long-leaf pine flatwoods), 2 juv. ♂, 5 juv. ♀.

MISSISSIPPI: Meridian, IX, 10, 1915, (R. and H.; juv. scarce about small areas of coarse grass in mixed forest), 3 juv. ♂, 3 juv. ♀. Hattiesburg, IX, 11, 1915, (R. and H.; juv. moderate numbers in undergrowth of long-leaf pine forest), 3 juv. ♂, 8 juv. ♀. Jackson, IX, 12, 1915, (R. and H.; juv. moderate numbers in grasses of mixed forest on hills), 6 juv. ♀. Brookhaven, IX, 15, 1915, (Rehn; juv. in mixed forest), 12 juv. ♂, 13 juv. ♀.

LOUISIANA: Breckenridge, IX, 16, 1915, (Rehn; juv. occasional in virgin long-leaf pine forest), 2 juv. ♀.

FLORIDA: Pomona, IX, 7 and 8, 1917, (R. and H.; juv. not scarce on edge of marsh and in pine woods undergrowth), 3 ♂, 7 juv. ♂, 3 juv. ♀. Ocala, IX, 19 and 20, 1917, (R. and H.; juv. common, adults moderately numerous, undergrowth of sandy pine flat-woods), 9 ♂, 4 ♀, 4 juv. ♂, 10 juv. ♀. Dunellon, IX, 18, 1917, (R. and H.; few in area of short grass growing on damp sand), 1 juv. ♀. Tallahassee, IX, 2, 1915, (R. and H.), 6 juv. ♂, 1 juv. ♀. Woodville, IX, 1, 1915, (R. and H.; juv. occasional in long-leaf pine flat-woods), 4 juv. ♂, 1 juv. ♀. Carrabelle, IX, 2 and 3, 1915, (R. and H.; juv. moderate numbers in grasses of undergrowth of pine woods and in grasses and plants on edge of swampy areas), 1 juv. ♂, 3 juv. ♀. River Junction, VIII, 31, 1915, (R. and H.), 4 juv. ♂, 3 juv. ♀. Grand Ridge, IX, 1, 1915, (R. and H.; juv., undergrowth of pine woods), 1 juv. ♂, 2 juv. ♀. DeFuniak Springs, VIII, 30, 1915, (R. and H.), 4 juv. ♂, 2 juv. ♀. Pensacola, VIII, 29, 1915, (Hebard; one juv. in wire-grass of higher long-leaf pine woods), 1 juv. ♂.

Intermediates nearest *brevipenne brevipenne*

FLORIDA: DeLeon Springs, IX, 8 and 9, 1917, (R. and H.), 1 ♂, 3 juv. ♂. Trilby, IX, 16, 1917, (R. and H.; occasional in pine woods undergrowth), 3 ♂, 3 ♀, 3 juv. ♂, 2 juv. ♀. Lakeland, IX, 11, 1917, (R. and H.; moderately numerous in pine woods undergrowth), 10 ♂, 7 ♀, 2 juv. ♂.

Radinotatum brevipenne peninsulare Rehn and Hebard (Plate IV, figure 9.)

1877. *Achurum brevipenne* Scudder, Proc. Bost. Soc. Nat. Hist., xix, p. 88. [Adults and juv.; Fort Reed, Florida.]

1888. *Achurum brevipenne* Comstock, Introd. Ent., p. 101. [Florida; Maryland (unquestionably in error).]

1902. *Rhadinotatum brevipenne* Rehn, Trans. Am. Ent. Soc., xxvii, p. 331. [♂, ♀; Miami, Florida.]

1905. *Rhadinotatum brevipenne* Caudell, Ent. News, xvi, p. 217. [Arcadia and Miami, Florida.]

1905. *Radinotatum brevipenne* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1905, p. 35. [Tampa and Miami, Florida.]

1912. *Radinotatum brevipenne peninsulare* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1912, p. 246, figs. 1, 3, 5, 7 and 9. [♂, ♀; Homestead, Miami, Fort Reed, Gotha, Tampa, Fort Capron and Chokoloskee, Florida.]

1914. *Radinotatum brevipenne peninsulare* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1914, p. 389. [♂, ♀, juv.; Homestead, Detroit and Big Pine Key, Florida.]

1914. *Radinotatum brevipenne peninsulare* Rehn and Hebard, Jour. N. Y. Ent. Soc., xxii, p. 103. [♂, ♀, juv.; Long Boat Key, Punta Gorda, Fort Myers, La Belle, Marco and Allen River to Deep Lake, Florida.]

1915. *Radinotatum brevipenne peninsulare* Hebard, Ent. News, xxvi, p. 402. [Miami, Florida.]

1916. *Radinotatum brevipenne peninsulare* Hebard, Ent. News, xxvii, p. 17.
[Pineland on Pine Island, Charlotte Harbor, Florida.]

1920. *Radinotatum brevipenne* Blatchley, (in part), Orth. N. E. Amer., p. 197, fig. 74.

This geographic race is fully discussed in the original description and compared further with typical *brevipenne* under the treatment of that insect in the present paper.

The small size of the Big Pine Key series has already been commented upon. The series before us shows a still more important regional differentiation. The material from Miami to Homestead, on the East Coast, and from Big Pine Key, has the genicular angles of the caudal femora less elongate than is normal in typical *brevipenne*. The material from Fort Myers to Chokoloskee, on the West Coast, however, has these angles decidedly more elongate than in typical *brevipenne*, as would be expected in specimens showing more decided attenuation. This feature indicates a slight divergence of development in the race in the extreme southern portions of Florida, separated by the Everglades and the Bay of Florida.

Typical *peninsulare* appears adult throughout the year. Its habits and color phases are in every way similar to those of the more northern race. The typical condition has not been found north of the northern limits of the Caribbean Pine.

Specimens Examined, in addition to 319 previously recorded: 147; 86 males, 51 females and 10 immature individuals.

Atypical brevipenne peninsulare

FLORIDA: Kissimmee, IX, 10, 1917, (R. and H.; very abundant on wet "prairie", very grassy with an abundance of water-loving plants), 30 ♂, 19 ♀, 2 juv. ♂, 1 juv. ♀. Arcadia, IX, 12, 1917, (Rehn and Hebard; moderately common in undergrowth of long-leaf pine woods, largely wire-grass, saw-palmetto and bayberry), 12 ♂, 5 ♀, 1 juv. ♂, 2 juv. ♀.

Typical brevipenne peninsulare

FLORIDA: Fort Myers, IX, 13 to 15, 1917, (Rehn and Hebard: moderately common, generally distributed through wire-grass of the Caribbean Pine woods), 35 ♂, 21 ♀, 2 juv. ♂, 1 juv. ♀. Iona, Lee County, IX, 13, 1917, (Rehn and Hebard; generally distributed through pine woods), 2 ♂, 2 ♀. Boca Raton, III, 1, 1916, (Hebard; in field of scanty grass in sand region), 1 juv. ♂. Ojus, II, 29, 1916, (Hebard; undergrowth of Caribbean Pine forest), 1 ♀. Miami, II and III, (J. H. Comstock), 1 ♂, [Cornell Univ.]; III, 3, 1916, (Hebard; undergrowth of Caribbean Pine forest), 6 ♂, 3 ♀.

PAPER TWO

THE GROUP HYALOPTERYGES AS FOUND IN THE UNITED STATES
AND CANADA

A single species of this group is found in the area under consideration. This is *Truxalis brevicornis* (Johannson), the only species of the genus. The insect is a simple Hyalopterygine type, as shown by the general structure and particularly by the strikingly fenestrate wings of the male. The highest specialization in the group occurs in the South American genus *Hyalopteryx*. There are no other North American genera of the group, though *Thyripton* Bruner¹ and *Orphula* Stål,² species of both of which genera occur in Mexico, are aberrant Orphulellae showing convergence toward the Hyalopteryges in having the male wings strikingly fenestrate.

The genera of the Group Hyalopteryges now recognized are: *Hyalopteryx* Charpentier, *Eutryxalis* Bruner, *Truxalis* Fabricius and *Paratruxalis* Rehn. In linear arrangement of the North American genera, found north of Mexico, we place *Truxalis* after *Mermiria* and before *Syrbula*, which, of course, represent other genera groups.

The following characters are important in distinguishing this genus and species.

Head weakly ascending, its dorsal length shorter than that of the pronotum. Vertex roundly produced, a little longer than wide, showing a very weak medio-longitudinal carina; lateral foveolae weakly indicated, small, triangular, facing laterad; face rather strongly oblique. Pronotum with disk flattened, having distinct, straight, weak medio-longitudinal and lateral carinae; metazona nearly three-fourths as long as prozona; lateral lobes vertical, distinctly, but not decidedly, longer than deep. Tegmina and wings fully developed; the former obliquely truncate distad; the latter, in the male sex, with a fenestrate area as figured. Caudal femora with dorsal genicular lobes alone feebly produced, the internal very slightly

¹ Bruner's *Sisantum* is a synonym of *Thyripton*, as comparison of the types of the two genotypic species convincingly shows.

² The difficulties surrounding the proper application of this generic name have been eradicated by Rehn, Trans. Am. Ent. Soc., XLII, p. 275, (1916) and Idem, XLIII, p. 344, (1917).

the more so. Male supra-anal plate shield-shaped. Male subgenital plate elongate conical, its ventral length less than that of the preceding sternite.

Truxalis brevicornis (Johannson) (Plate IV, figure 10.)

1764. [*Gryllus*] *brevicornis* Johansson, Amoenit. Acad., VI, p. 398. [North America.]
 1773. *Acrydium ensicornu* DeGeer, Mém. l'Hist. Ins., III, p. 499, pl. 42, fig. 7. [Pennsylvania.]
 1861. *Ox[ycoryphus] burkhartianus* Saussure, Rev. et Mag. de Zool., XIII, p. 314. [♂, Mexico.]
 1894. *Truxalis brevicornis* Beutenmüller, Bull. Amer. Mus. Nat. Hist., VI, p. 291, pl. VIII, figs. 1 and 2. [New York, New York.]
 1896. *Tryxalis brevicornis* Morse, Psyche, VII, p. 383, pl. 7, figs. A, Aa and Ab.
 1916. *Truxalis brevicornis* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1916, p. 155. (Discussion and many records from the southeastern United States.)

Though frequently appearing in the literature, the other records of this species add little but distributional data to those given above.

An average increase in size southward occurs in the species. Individuals from different localities in the same region, however, sometimes show very marked size difference. This is particularly demonstrated by males before us from Houston and Harrisburg, Texas.

Comparison of North American individuals with material from Mexico, Costa Rica, British Guiana, Brazil, Paraguay and Argentina shows no tendency whatever toward racial differentiation.

Measurements (in millimeters) of average specimens and extremes

	Length of body	Length of vertex	Length of pronotum	Caudal width of pronotal disk	Length of tegmen	Length of caudal femur
♂						
West Creek, N. J.	21.2	1.2	4.1	2.2	20.8	13.2
Raleigh, N. C.	20.8	1.4	4.7	2.6	22.7	14.8
Billy's Island, Ga. . . .	26	1.4	5.4	2.8	27.2	17.7
Fort Myers, Florida. . .	25	1.3	5.2	2.9	26	17.8
Wolf Lake, Illinois. . .	20.3	1.2	4.1	2.1	20.7	13.4
Greenville, Alabama. . .	24	1.3	4.8	2.7	23.7	15.9
Orleans Canal, La. . . .	23.5	1.5	5.4	2.7	24.2	16.3
Orleans Canal, La. . . .	25.5	1.6	5.5	2.8	26.3	17.8
Houston, Texas.	22.3	1.3	4.4	2.3	20.3	14.3
Harrisburg, Texas. . . .	25.9	1.4	5.2	2.8	25.8	16.6
San Antonio, Texas. . .	27.2	1.7	5.8	2.8	26.4	17.7

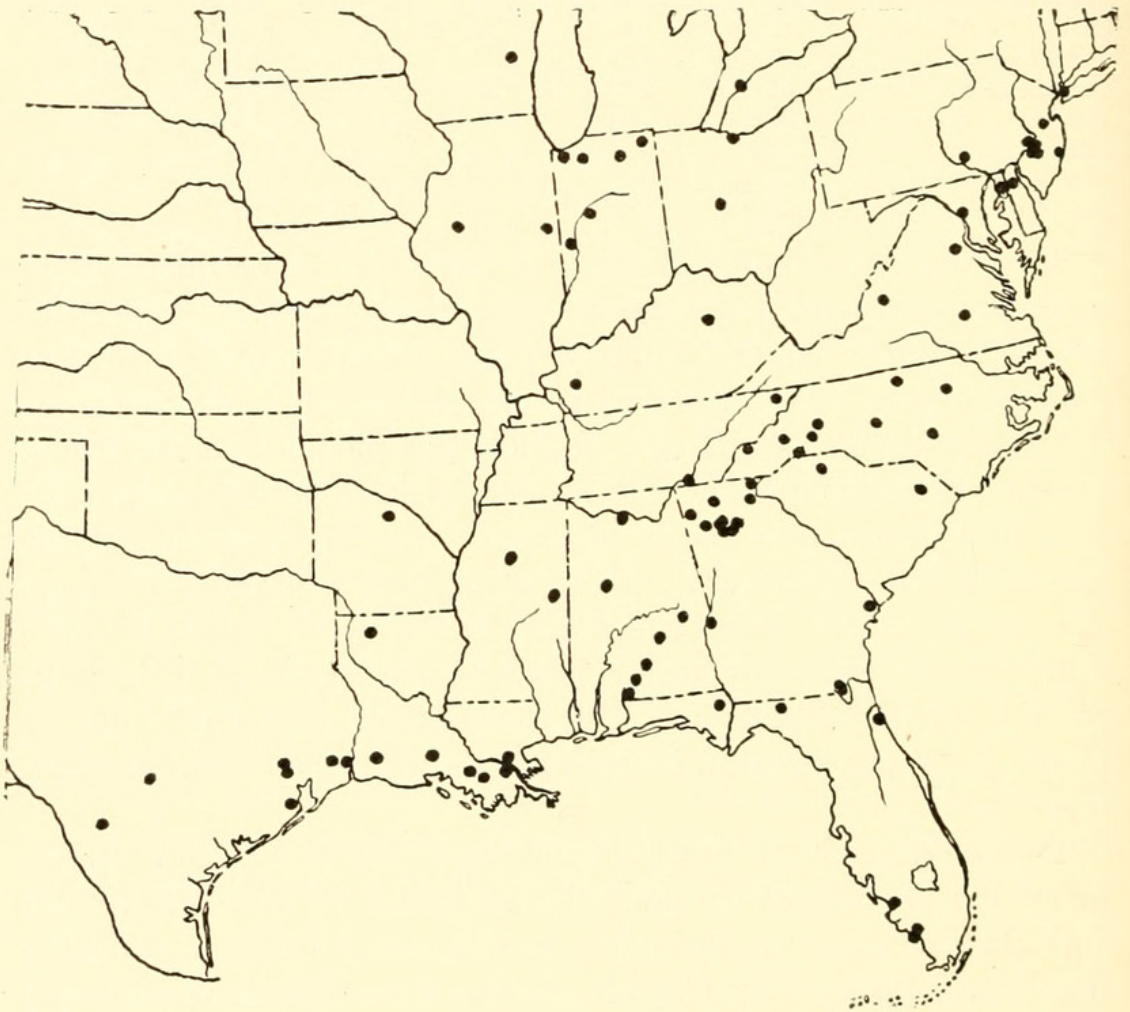
	Length of body	Length of vertex	Length of pronotum	Caudal width of pronotal disk	Length of tegmen	Length of caudal femur
♀						
Anglesea, New Jersey	34	1.7	6.3	3.3	26.6	18
Anglesea, New Jersey	36.5	1.8	6.8	3.8	31	20.2
Raleigh, N. C.	35	1.8	6.7	3.7	30.8	20.8
Fort Myers, Florida..	39.3	1.8	7.3	3.9	32.8	23.3
Everglade, Florida...	39.5	...	7.8	...	38	25
Wolf Lake, Illinois...	31.5	1.4	5.8	3.3	25.4	18
Orleans Canal, La....	45	2	7.8	4.3	37.4	23.7
Harahan, Louisiana..	38.8	1.9	7.3	4.1	33.3	22
Lake Charles, La....	43.5	2	8	4.7	39.3	23.2
San Antonio, Texas..	43.2	2	8.2	4.2	37.7	24.2
San Antonio, Texas..	43.7	2.1	8.8	4.7	37	26

Several distinct color phases are developed. Frequent individuals of both sexes are brown, this rarely dark in shade, the dorsal surface usually slightly paler. The majority of the males, however, are brown, with face, occiput, disk of pronotum, dorsal surface of tegmina and cephalic and median femora bright green. Frequent females are almost entirely green, often with a slender post-ocular streak of brown running along the lateral carinae of the pronotum and breaking into a series of dots on the tegmina. A few females are green, with dorsal surface buffy brown, this spreading distad on the tegmina to include all of their distal portion. The caudal tibiae are buffy brown, rarely green proximad in individuals showing that color strongly elsewhere.

The distribution of *brevicornis* in North America is now known to extend northward on the Atlantic Coast to New York City and Harrisburg, Pennsylvania, in Ohio and Indiana reaching the Great Lakes. In Canada it has been found at but one locality, Point Pelee, Ontario. The known western limits are Fond du Lac, Wisconsin; Wolf Lake, Illinois;³ central Arkansas, and on the Gulf Coast of Texas as far inland as Houston, Burnet County, and San Antonio. Its range southward extends over much of continental America to Paraguay and Argentina.

³ We can not give Bruner's record of "eastern Nebraska" recognition. No material of the species is in that author's collection from that state and his Nebraska list has been found to contain names of several other species which do not occur in Nebraska.

The species is a marsh dweller, preferring areas of cat-tails, high reeds and grasses. In such situations colonies are usually located by hearing a sharp and peculiar ticking sound, made by the males in flight. Individuals fly rapidly, usually curving quickly back into the vegetation from which they have been



Map 2. Showing distribution of *Truxalis brevicornis* (Johannson) in North America.

flushed, where they often cling high above the ground. So peculiar to such environment are they, that individuals will not be seen in the regions where the species is very abundant, unless the proper environment is visited. Like many semi-aquatic insects, *brevicornis* appears to have the habit of migrating from one favorable spot to another during the night.

In the extensive marshlands of southern peninsular Florida, and in the lowlands of the lower Mississippi region, this insect is, naturally, more generally encountered than elsewhere in the United States.

Specimens Examined, in addition to 156⁴ previously recorded: 159; 84 males, 67 females and 8 immature individuals.

NEW JERSEY: May's Landing, VIII, 29, 1914, (Hebard; common in small fresh-water marsh), 2 ♀. Tuckahoe, VIII, 26, 1914, (Hebard; in fresh-water marsh), 1 ♂, 5 ♀. Cedar Springs, VIII, 14, 1914. (Hebard; small colony in rushes of fresh-water marsh), 2 ♂, 1 ♀. Cape May Court House, VIII, 21, 1914, (Hebard; in cat-tails and rushes bordering salt-marsh), 1 ♀. Cape May, VIII, 18 to 31, 1917, (W. Stone), 12 ♂, 13 ♀, 1 juv. ♀, [A. N. S. P.].

NORTH CAROLINA: Asheville, VIII, 1897, 2 ♂, 2 ♀, [Cornell Univ.].

GEORGIA: Dillard, Rabun County, 2200 feet, IX, 4, 1917, (R. and H.; numerous colony in swampy spot, covered with low weeds), 3 ♂, 3 ♀, 1 juv. ♀. Billy's Island, Okeefenokee Swamp, VII, 16 to 19, 1917, (Hebard; in swamp vegetation on edge of lake), 1 ♂.

FLORIDA: Fort Myers, IX, 13 to 15, 1917, (R. and H.; one small colony in "hammock" undergrowth), 3 ♂, 1 ♀.

OHIO: Columbus, (Wood), 1 ♀, [Hebard Cln.].

INDIANA: Kosciusko County, VIII, 11, 1902, (W. S. Blatchley), 1 ♀, [Hebard Cln.]. Vigo County, IX, 18, 1894, (W. S. Blatchley), 1 ♂, [Hebard Cln.].

WISCONSIN: Fond du Lac, (Mitchell), 1 ♂, [Hebard Cln.].

ILLINOIS: Wolf Lake, near Havana, IX, 10, 1898, 1 ♂, 1 ♀, [Hebard Cln.].

TENNESSEE: Chattanooga, (B. Shimek), 1 ♂, 2 ♀, [Hebard Cln.].

ALABAMA: Opelika, VIII, 2, 1915, (Hebard; moderate numbers everywhere in marshy areas), 1 ♀, 1 juv. ♂. Montgomery, IX, 8, 1915, (R. and H.; common in marshy river bottom areas), 2 ♂, 2 ♀. Greenville, Butler County, VIII, 3, 1915, (Hebard), 4 ♂, 1 ♀. Evergreen, Conecuh County VIII, 4, 1915, (Hebard; moderate numbers in marshy area), 2 ♂. Flomaton, Escambia County, VIII, 27, 1915, (R. and H.; moderately large colony in grasses of opening in "branch"), 2 ♂, 1 ♀.

MISSISSIPPI: Meridian, IX, 10, 1915, (R. and H.; locally common in marshy areas in bottom), 2 ♂, 3 ♀. Winona, IX, 15, 1915, (Hebard; in grasses bordering slough), 1 ♂, 1 ♀.

LOUISIANA: Arcadia, VIII, 20, 1915, (R. and H.), 1 ♂. Spanish Fort, Orleans Parish, VIII, 5 to 7, 1915, (R. and H.; common in high grass marsh bordering Lake Pontchartrain), 7 ♂, 4 ♀. Orleans Canal, near Spanish Fort, Orleans Parish, VIII, 6 and 7, 1915, (R. and H.; very common in high marsh grass), 5 ♂, 4 ♀. New Orleans, VI, 29, 1916, (Rehn), 1 ♂, [A. M. N. H.]; VIII, 6, 1915, (R. and H.), 1 ♂, 1 ♀. Harahan, Plaquemines Parish, VIII, 7, 1915, (R. and H.; one in short grass of levee, one in heavy willow swamp bordering river), 2 ♀. Rhoda, St. Mary Parish, VIII, 8, 1915, (R. and H.; common in swampy areas about small pond), 1 ♂. Morgan City, VIII, 8, 1915, (R. and H.; everywhere common in swamp vegetation), 5 ♂, 6 ♀. Lafayette, VIII, 9, 1915, (R. and H.; swamp grasses near bayou), 1 ♂, 1 juv. ♀. Lake Charles, VIII, 10, 1915, (R. and H.; common in marshy areas, two seen at light at night), 1 ♀, 1 juv. ♀.

⁴ Of these, sixty-eight are from localities ranging from Mexico south to Argentina.

TEXAS: Beaumont, VII, 23, 1912, (Hebard; occasional in tangles of weeds in forest), 3 ♂, 2 ♀. Nome, Jefferson County, VI, 30, 1916, (Rehn; attracted to light on train after dark), 1 ♂. Houston, VIII, 12, 1915, (R. and H.), 1 ♂, 1 juv. ♂. Harrisburg, Harris County, VIII, 13, 1915, (R. and H.; common in flag-like, saw-edged grass near stream), 2 ♂. Dickinson, Galveston County, VII, 20, 1912, (Hebard; scarce in tall green plants near stream in pine woods), 2 ♂, 1 ♀, 2 juv. ♀. Burnet County, X, 1884, (F. G. Schaupp), 1 ♀, [Hebard Cln.]. San Antonio, VIII, 16, 1912, (R. and H.; San Antonio river bottom, common in rank, high, green grasses and nettles), 13 ♂, 3 ♀.

EXPLANATION OF PLATE IV

Fig. 1.—*Achurum sumichrasti* (Saussure). Fort Grant, Arizona. Male. Dorsal view of tegmen and wing. ($\times 1\frac{1}{2}$)

Fig. 2.—*Achurum sumichrasti* (Saussure). Fort Grant, Arizona. Male. Lateral view of distal portion of abdomen. ($\times 8$)

Fig. 3.—*Achurum sumichrasti* (Saussure). Fort Grant, Arizona. Male. Dorsal view of distal extremity of dextral caudal tibia. (Much enlarged.)

Fig. 4.—*Achurum sumichrasti* (Saussure). Orizaba, Vera Cruz, Mexico. Immature male. Lateral view of distal portion of abdomen. A. Supra-anal plate. B. Tergite beyond supra-anal plate, which in the adult disappears. C. Cercus. D. Subgenital plate. ($\times 8$)

Fig. 5.—*Radinotatum minimipenne* (Caudell). Piper Plantation, near Brownsville, Texas. Male. Lateral view. ($\times 2\frac{1}{2}$)

Fig. 6.—*Radinotatum minimipenne* (Caudell). Piper Plantation, near Brownsville, Texas. Male. Lateral view of distal portion of abdomen. ($\times 8$)

Fig. 7.—*Radinotatum minimipenne* (Caudell). Piper Plantation, near Brownsville, Texas. Male. Dorsal view of distal extremity of dextral caudal tibia. (Much enlarged.)

Fig. 8.—*Radinotatum brevipenne brevipenne* (Thomas). Pomona, Florida. Male. Lateral view of distal portion of abdomen. ($\times 8$)

Fig. 9.—*Radinotatum brevipenne peninsulare* Rehn and Hebard. Homestead, Florida. Male (*type*). Lateral view of distal portion of abdomen. ($\times 8$)

Fig. 10.—*Truxalis brevicornis* (Johannson). Fort Myers, Florida. Male. Dorsal view of tegmen and wing. ($\times 2$)



Hebard, Morgan. 1922. "North American Acrididae (Orthoptera)." *Transactions of the American Entomological Society* 48, 89–108.

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