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ORTHOPTERA OF THE UPPER RIO GRANDE VALLEY AND THE ADJACENT MOUNTAINS IN NORTHERN NEW MEXICO

BY MORGAN HEBARD.

From early July to early September 1934 the author had an uninterrupted opportunity to study the Orthoptera of the Rio Grande valley north of Santa Fé, New Mexico, the Sangre de Cristo Range bounding it on the east and the foothills of the Jemez Mountains to the west. The home station was the Rancho del Monte, two miles east of the indian pueblo of Tesuque. This ranch is at 7000 feet in the center of the zone of juniper and pinyon (Upper Austral Zone) where the latter, as is usual in all but the higher portions of this area, is almost wholly supplanted by the former tree. We were particularly pleased to be able to study the meagre but always intensely interesting orthopteran population of this zone, more thoroughly than has ever before been possible. The three most important finds were species peculiar to or at least almost always living in the junipers: *Melanoplus splendidus*, not known since the small original series was described; *Insara juniperi* a new species, and *Oecanthus californicus pictipennis* a new subspecies. Next in importance was the discovery so far north of *Heliastus benjamini* and *Hoplosphyrum boreale*, species hitherto supposed to be confined to near the southwestern border of the United States.

We have here discussed one hundred species, eighty-four taken in 1934, three additional from the same territory in 1917 found by Rehn and Hebard, five previously recorded from this region, and eight the known distribution of which shows that they are certain to be found there.

Of these seventy-six are found in the Upper Austral Zone, thirty-two in the Transition Zone, thirty-five in the Canadian Zone, thirteen in the Hudsonian Zone and three in the Arctic-Alpine Zone. Had the species known from the not distant but much lower (5026 feet) vicinity of Albuquerque been included, a large number of additions would have been made.

The species, divided into the families they represent, are found in the five life zones in the following numbers.

	Upper Austral	Transition	Canadian	Hudsonian	Arctic-Alpine
Blattidae	1	0	0	0	0
Mantidae	3	0	0	0	0
Phasmidae	3	2	1	0	0
Acrididae	47	24	27	12	3
Tettigoniidae	13	4	5	1	0
Gryllidae	9	2	2	0	0
	<hr style="width: 100%;"/>	<hr style="width: 100%;"/>	<hr style="width: 100%;"/>	<hr style="width: 100%;"/>	<hr style="width: 100%;"/>
	76	32	35	13	3

The letters after the names of the species indicate the Life Zones in which they are found, those in parentheses a Zone in which we know the species occurs but was not taken in this region. U is for the Upper Austral Zone, T the Transition Zone, C the Canadian Zone, H the Hudsonian Zone and A the Arctic-Alpine Zone.

Though elevation is by far the most significant feature in delimiting the Life Zones, the elevation of a certain area does not necessarily determine the Zone there present. Thus in apparently typical Transition Zone environment two miles north of Frijoles Canyon at 8000 feet, a small area showed in the Orthoptera a strong Upper Austral influence. We have, therefore, not counted as present in the Transition Zone the following species, widely distributed through the Upper Austral Zone, which occurred there; *Mermiria texana*, *Opeia imperfecta*, *Psoloessa texana pusilla*, *Trimerotropis pallidipennis pallidipennis*, and *Trimerotropis cyaneipennis*. Zonal inversion is also frequently encountered, as in canyon bottoms often down to 7900 feet typical Canadian Zone may be present, whereas on hot dry outlying ridges typical Upper Austral Zone conditions may reach well above that elevation. Moreover the upper limits of the Zones, under otherwise similar conditions, reach decidedly higher on the southern than on the northern slopes of the mountains. The Arctic Alpine Zone is extremely restricted on Santa Fé Baldy (from 12300 to 12680 feet) and not a single species of Orthoptera is peculiar to it. We recognize it, however, as a distinct Zonal area, as the butterfly *Parnassius smintheus* D. and H. is definitely limited to it and the Dusky Marmot *Marmota flaviventris obscura* Howell on that mountain is similarly restricted, though it is again present in the cirques on Lake Peak (probably also Arctic Alpine areas) where it does not inhabit the precipitous upper slopes which are definitely Hudsonian to the summit at 12380 feet.

Other species which may well occur in the region here treated are: *Microcentrum rhombifolium* (Saussure) known as far north as Cedar Edge in southwestern Colorado. *Plagiostira albonotata* Scudder, recorded from Albuquerque and in northwestern New Mexico found by us at Farmington. See footnote 15.

Scudder and Cockerell's "A First List of the Orthoptera of New Mexico" includes not only an unusual number of synonyms but also many incorrect determinations and vague records. Of the latter the following might well lead one to expect to find the species in question in the regions now under consideration, though not one of these has as yet, and in many cases will never be, found there.

Recorded from "Northern New Mexico", material probably all from the eastern slopes of the Rocky Mountains or the plains of northeastern New Mexico.

Eritettix tricarinatus (Thomas) (as the synonym *navicula*)
Acrolophitus hirtipes (Say)
Boopedon nubilum Say (and as the synonym *flavofasciatum*)
Trachyrhachis aspera Scudder
Trachyrhachis coronata Scudder
Brachystola magna (Girard)
Campylacantha olivacea vivax (Scudder)
Dactylotum variegatum (Scudder)
Udeopsylla robusta Haldeman

Recorded from "Pecos River — Texas or New Mexico", material certainly not from the upper Pecos River if from New Mexico.

Acrolophitus hirtipes (Say)
Tropidolophus formosus (Say)
Hesperotettix viridis pratensis Scudder
Hesperotettix speciosus (Scudder)
Melanoplus regalis (Dodge)
Melanoplus (probably) *bowditchi* Scudder (incorrectly recorded as the northwestern *cinereus*)

Gillette in 1904 recorded as *Melanoplus kennicotti* Scudder material from Chama, New Mexico, examination of which shows that *Melanoplus mexicanus mexicanus* (Saussure) was actually represented. We believe that the southern limital points for *Melanoplus kennicotti nubicola* (Scudder), the southern high mountain race of this boreal species, will not be extended much south of those already known in central Colorado.¹

Although *Encoptolophus sordidus costalis* (Scudder),² *Xanthippus coralipes latefasciatus* Scudder, *Trachyrhachis kiowa kiowa* (Thomas), *Hadrotettix trifasciatus* (Say) and *Hesperotettix viridis nevadensis* Morse³ have been found in the upper Rio Grande valley in Colorado, we believe that these species do not occur in the part of that river valley here under consideration. The first four are widely distributed over the Great Plains and would appear to have reached that area by crossing the Veta Pass, though it has an elevation of 9378 feet. The last is a race the distribution of which is almost entirely in the Great Basin and it apparently reaches its southeastern limit of distribution there at Alamosa.

The same is true for *Trimerotropis campestris* McNeill, which species, though we found it at Chama, New Mexico, locally frequent in grasses and plants on a boulder-strewn flat and along the banks of the Chama River at 7863 feet on September 10, 1921, is a boreal insect probably reaching very little south of that locality, in spite of the fact that to the west material before us proves that it occurs as far south as the White Mountains and Bill Williams Mountain in Arizona.

¹ See Hebard, Proc. Acad. Nat. Sci. Phila., LXXXI, p. 384, 1929.

² See Hebard, Ent. News, XLV, p. 104, (1934).

³ Recorded as the synonym *gillettei* Bruner. See Hebard, Proc. Acad. Nat. Sci. Phila., LXXXI, p. 372, (1929) and *ibid.*, LXXXII, p. 393, (1931).

Melanoplus foedus foedus Scudder. U.

Taos, 7000 feet, August 16, 3 ♂ (caudal tibiae pink), moderately numerous in open among tumble weeds, but particularly in tangles of green weeds and along stream. Three miles south of Santa Cruz, 5987 feet, August 15, 1 ♀ (caudal tibiae pink). Tesuque Creek, 7400 feet, VII, 28, 1919, (Rehn and Hebard; few in areas of tall weeds), 1 ♂.

Melanoplus packardii Scudder. U.

Tesuque, 6800 feet, July 12, 1 ♀ (caudal tibiae pink), common in Alfalfa.

This and Jemez Hot Springs are southern limits of distribution in New Mexico.

Melanoplus angustipennis (Dodge). U.

Chimayo, 7000 feet, August 8, 1 ♂, 1 ♀ (caudal tibiae glaucous), in irrigated area.

This is a southern limital point.

Melanoplus bowditchi bowditchi Scudder. U.

Chimayo, 7000 feet, August 8, 1 ♂, in irrigated field among lush green weeds and alfalfa with a few scattered gray-green composites. Chamita, 5925 feet, September 3, 1 ♀, in rabbit weed in wash. Three miles south of Santa Cruz, 5900 feet, August 15, 8 ♀, occasional in scattered rabbit weed along wash. Pojoaque, 6150 feet, August 13, 2 ♂, only seen in rabbit weed in wash. Rancho del Monte, 7000 feet, July 11, 1 ♂, on flat of parched short grass with very small clumps of rabbit weed. Otowi railroad station, 5825 feet, August 31, 1 ♀, only one seen in rabbit weed on gravelly adobe wash.

These specimens are quite constant in appearance but quite different from the normal for *bowditchi bowditchi* in Colorado and Nebraska. The present condition appears to be quite widely distributed to the south. It may prove to represent a race quite as well defined as *bowditchi canus* of the sage-brush plains in the north. No differences are shown by the penis. We do not feel however that recognition of a race would be justified until all of our material of this difficult group has been studied and a revisionary report prepared.

We are inclined to believe that this insect reaches its maximum adult abundance in June or early July.

TETTIGONIIDAE**PHANEROPTERINAE****Arethaea gracilipes gracilipes** (Thomas). U.

Mesa north of Rio en Medio, 7000 feet, August 15, 1 ♂ in tuft of short parched grass among junipers. Rancho del Monte, 7000 feet, July 11, 1 ♂ in tuft of short parched grass among junipers; July 26, 1 ♂ flew on wind

shield of car while running slowly at night; July 28 to September 2, 6 ♂ at light at night. Tesuque Creek, 7200 feet, July 28, 1919, 1 ♂, in dry tuft of grass among junipers.

Not at all common in this area the insect remarkably blends with the tufts of short parched grass in the zone of juniper and pinyon in which it lives.

Tesuque Creek, Jemez Hot Springs and Fort Wingate, New Mexico are northern limits for this race, which to the east, however, reaches as far north Trinidad, Colorado.

Insara juniperi, new species. U. Text-figures 1 and 2.

This species is nearest *covilleae* Rehn and Hebard, differing in the more robust form, somewhat shorter organs of flight and limbs, less strongly sellate pronotum with shorter lateral lobes and very different marking.

The tegmina instead of having a row of large pale spots show a herring-bone pattern somewhat suggesting that found in *elegans elegans* (Scudder) but the general green coloration is decidedly deeper and the veins of the tegmina are more extensively and more broadly pale particularly toward their sutural margins. The limbs are weakly bicolored, not very strikingly and broadly annulate as in *covilleae* or immaculate as in *elegans*.

Type: ♂; Rancho del Monte, Santa Fé County, New Mexico. Elevation 7000 feet. August 29, 1934. (M. Hebard and M. Hebard, Jr.) [Hebard Collection, Type No. 1275.]

Size rather small for the genus, form rather robust, the abdomen in life being short and extremely inflated. Head slightly broader than in *elegans*; eye prominent, elongate, nearly oval, almost vertical; vertex similar to that of the related species, declivent, this strongest proximad, its dorsal surface very narrow and sulcate. Pronotum short, with dorsum weakly sellate, lateral carinae coarsely and weakly indicated, cephalic margin very weakly concave, caudal margin broadly convex with flattening of the convexity shown on each side, lateral lobes with greatest depth equal to greatest width, the humeral sinus large, deep, concave, its margins perpendicular to each other, below this the ventro-caudal portion is roundly produced ventro-caudad, that section occupied by a large convex callosity. Tegmina narrow with apices rounded, marginal field narrowing (less rapidly than in *covilleae*, more rapidly than in *elegans*) and disappearing mesad. Wings extending well beyond tegmina. Dorsal abdominal tergites pinched meso-distad but not produced.

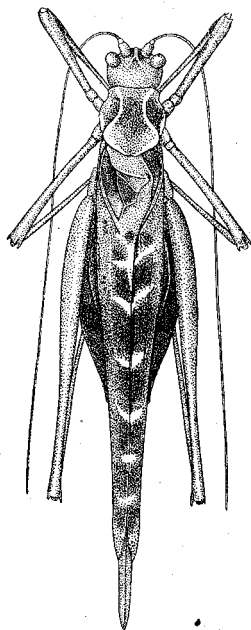


FIG. 1.—*Insara juniperi*.
Male *Type*. (+ 2½)

Genitalia much as in the related species. Disto-dorsal tergite with a large meso-distal depressed area. Supra-anal plate small, triangular. Cerci tapering, slightly curved but definitely bent inward mesad, just before apical tooth impressed dorsad, tooth small acute triangular, directed dorsad and slightly distad. Subgenital plate with short non-articulate styliform appendages and with distal margin slightly and bluntly produced mesad between these. Limbs comparatively short. Cephalic tibiae enlarged proximad with both large tympana apert, narrowing gradually distad of these. Genicular lobes of cephalic and median femora bidentate. Ventral femoral margins unarmed. Very important diagnostic characters shown by color pattern.

Allotype: ♀; same data as type but taken August 24, 1934. [Hebard Collection.]

Very similar to male, larger and form somewhat more attenuate. Ovipositor comparatively large, deep, particularly at base where it is strongly bent dorsad, margins beyond converging very weakly then curving to apex; dorsal margin armed with minute triangular teeth which increase in size distad, ventral margin so armed only distad; lateral surfaces of dorsal valves microscopically acutely tuberculate, of ventral valves showing microscopic vertical ridges dorsad, these becoming weaker and general distad.

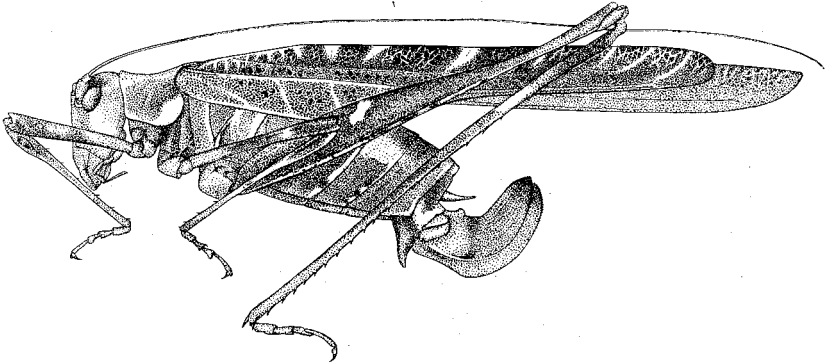


FIG. 2.—*Insara juniperi*. Female *Allotype*. (+ 2½)

General coloration in dorsal aspect bright cedar green, the face and sides slightly paler (peacock green), with the following markings. Eyes wood brown. Antennae light green, distad with irregular annuli, some very short and dark brown, others longer and light brown. Head with all of vertex, vertical facial carinae broadly, an extensive sub-ocular area and a narrower post-ocular suffusion warm buff. Pronotum with lateral carinae of disk warm buff, caudal margin laterad white, this entire area preceded by a rather broad suffusion of rusty brown; lateral lobes with convex callosity very conspicuously white. Tegmina with cross-veins buffy, those running to sutural margin more broadly so and there including the proximal portions of the cross-veinlets; very numerous microscopic black dots present in dis-

caudal field among the numerous network of green veinlets particularly toward the sutural margin, very few in the marginal field; male stridulating field tinged with brown proximo-laterad and a large black dot at its apex caudad. Abdomen (from life) green, with first exposed tergite showing a greenish-buff area on each side which is continued on the next tergite to a pre-marginal narrow blackish area, the caudal margin of that tergite narrowly buffy to near the median section, this line breaking into dots on the sides; a large dorso-lateral buffy area on the next tergite, this and the following tergite with caudal margins narrowly buffy laterad. Ventral sternites green with a fine elevated shining white median line on each side of which is a row of fairly large irregularly rounded buffy areas and then a row of even larger buffy longitudinal areas alternating with these. Thus when seen from above or below this insect's broken up and streaked markings conceal it very completely in the foliage of the junipers.¹⁴ Ovipositor red brown at apex. Cephalic and median limbs extensively but very vaguely and not conspicuously annulate with whitish green; caudal femora cedar green washed dorso-proximad with whitish and a large fleck of the same dorso-mesad on the external surface, ventro-external margin sometimes paler and whitish green with inconspicuous and irregular flecks of slightly darker green, caudal tibiae with a broad but not conspicuous annulus of whitish green. Feet green with joints ventro-laterad olivaceous and darker.

The extremes in the present series measure as follows: length of body ♂ 15.5 to 17, ♀ 16.7 to 19.3; length of pronotum ♂ 3.6 to 3.7, ♀ 3.6 to 3.7; length of tegmen ♂ 20 to 21.8, ♀ 23 to 24.3; post-median width of tegmen ♂ 2.3 to 2.7, ♀ 2.7 to 2.8; projection of wing beyond tegmen ♂ 4 to 4.1, ♀ 4.2 to 4.3; length of caudal femur ♂ 15.7 to 17.3, ♀ 18.5 to 19.7; length of ovipositor 5.2 to 5.3 mm.

The eggs are black, measure 5 by 2.1 mm., with dorsal margin broadly convex, ventral margin very weakly convex, bluntly rounded at one end and at the other with dorsal margin curving down to a very small rounded projection at the juncture with the ventral margin.

The first specimen seen, which came to light on the night of August 10th, showed almost unmistakably from its color and markings that it was an inhabitant of the junipers, but how to find additional material was a decided puzzle as these shrubs are too stout and stiff to permit ordinary beating with a net and no stridulation was heard. A week later two females were accidentally found on a juniper at night, but it was not until the twenty-fifth that my son accompanied me on a search through the junipers after dark. His sharp ears instantly detected the exceedingly faint stridulation of males on all sides, which proved so numerous that time alone prevented the capture of many. Soon after the number considered particularly needed had been traced by their stridulation and secured (by the twenty-ninth) cold weather preceding and following that date prevented further search on many nights and the few favorable evenings prior to our departure on

¹⁴ The marking of the ventral surface of the abdomen is lost in practically all dried specimens. The body and limbs sometimes also become brownish buff in drying.

September 8th were taken up largely with search for other species of which sufficient series had not been obtained. Deliberate approach and careful search alone is necessary, as a male could be heard on favorable evenings on approximately one out of the twenty-five nearest junipers over a large area about the ranch house. As I was able to hear the stridulation of such insects as *Cycloptilum* and *Hoplospyrum* at a distance of thirty to forty feet, I was much surprised to find the song of *Insara juniperi* so faint that I could frequently not detect the singing when only a few feet distant. This song somewhat resembles the rapid clicking of the teeth of a mouse sometimes heard when it is feeding; at other times a series of very faint whirrs are given.

In addition to the type and allotype, fifteen males and eight females bearing the same data but taken from August 10 to September 6 are designated paratypes.

We are describing a closely related species from northwestern Arizona in a paper which will shortly be published.

Scudderia furcata furcifera Scudder. U. (T.)

Rancho del Monte, 7000 feet, August 25, 1 ♂ (atypical) attracted to light at night.

This insect is probably present only in green herbage and deciduous shrubs and trees in the vicinity of water courses. Most of our night work was done far from such in the typical arid environment of junipers, which probably explains why only one specimen was seen.

COPIPHORINAE

Rehn recorded *Neoconocephalus ensiger* (Harris) [U.] [T.] [C.] from the Rio Grande in New Mexico in 1904 (referring it to *Conocephalus* as was then customary). The author secured a series of this northern species, much to his surprise, at Albuquerque, 4943 feet, on August 17, 1921, in marshy areas at night, the song noted as a loud incessant dzee-dzee-dzee-dzee. Individuals were not alert and were quite easily secured. This is a southwestern limit, a northwestern limit being Julesburg, Colorado. The species will therefore probably be found in the upper Rio Grande valley and the mountain valleys of Colorado, though throughout those regions we have neither seen or heard it.

CONOCEPHALINAE

Material considered intermediate between the eastern *Conocephalus fasciatus fasciatus* (DeGeer) [U.] [T.] [C.] and the western *Conocephalus fasciatus vicinus* (Morse) was recorded from the Jemez Mountains and Jemez Hot Springs, New Mexico, by Rehn and Hebard in 1915. Though we did not see the species it is certainly present and probably locally common in the irrigated areas of the upper Rio Grande valley.

DECTICINAE

Capnobotes occidentalis (Thomas). U.

Rancho del Monte, 7000 feet, July 11 to August 18, 10 ♂, 6 ♀, 1 large juv. ♀, (six males and two females green, the others brown), six in junipers, two taken from pinyon, one drowned in swimming pool, and eight at light at night, one of the latter, the immature female, on the screen of a second-floor window.

This species was at its maximum adult abundance upon our arrival on July 11 and was heard on all sides in the junipers until the end of the month but the number of singers steadily diminished. In August very few were to be heard and we were surprised to find a single male stridulating bravely as late as August 29. It is clear that, contrary to our previous impression, this is not a species which appears adult late in the season but one which probably occurs adult early in June. In early July it was far more abundant than we had ever previously found it and it is probably more common over its extremely wide range than we had supposed. On July 11 as many as six or seven males could be heard stridulating after dark, usually in the topmost tufts of foliage of the low junipers in a circle of not more than one hundred feet about the ranch house. This is the most alert and wary orthopteron we have ever collected, showing at times actions almost suggesting actual intelligence.

The males, while resting or moving very slowly about on the topmost tufts of foliage, stridulate without pause, when once started, with tegmina then only slightly raised and kept in a continuous spasmodic fluttering. The note produced is not loud, scarcely audible at over fifty feet, and has an exceptionally ventriloquistic quality. The green phase blends quite as remarkably with the green foliage of the juniper as does the gray phase with the gray bark of that shrub and if a singer is not located to almost its exact position before it becomes silent it is almost impossible to find. Some individuals were found to be much more alert than others and were much more apt to be startled by an incautious approach than by the rays of the electric torch, which at times could be played directly on a singer without its giving the brilliant light any notice. When individuals came to the light at night they were invariably very alert and active, jumping and flying vigorously if not approached with extreme caution.

This is a northeastern and Pecos, New Mexico, a southeastern limit for the species.

Anabrus simplex Haldeman. C.

Ridge between Rio en Medio and Chupidero Canyons, Sangre de Cristo Range, 9100 feet, July 27, males stridulating and moderately common in bushes in open area on summit, but so wary that none could be located, 1 ♀ (green) found walking across open. Aspen Ranch, Sangre de Cristo Range, 9000 feet, July 27, males stridulating and moderately numerous in bushes.

Beulah (recorded as the synonym *coloradus* by Scudder and Cockerell in 1902) and the above constitute southern limital records.

Eremopedes scudderi Cockerell. U.

Pojoaque, 6150 feet, September 2, 1 ♂, stridulating very faintly (detected by M. Hebard, Jr.) and intermittently although it was very warm, at night in middle of close topmost clump of spines and foliage of *Sarcobatus vermiculatus*.¹⁵ Abandoned pueblo southwest of Rio en Medio on mesa, 7100 feet, August 29, 1 ♀, only individual seen in parched short grass among junipers. Rancho del Monte, 7000 feet, July 8, 1 juv. ♀ in house at night undoubtedly attracted to light on porch; August 19, 1 ♂ in top clump of foliage of very low juniper resting head downward, very cool evening at 9:30 P. M., temperature 64°.

These specimens are extremely small for the species. All are gray brown marked with whitish.

Northern limits are Rio en Medio and Pojoaque, but to the east the species occurs as far north as La Junta, Colorado. Western limits are Pojoaque, Albuquerque and Mesilla Park, New Mexico.

STENOPELMATINAE

Stenopelmatus fuscus Haldeman. U.

Rancho del Monte, 7000 feet, August 14, 1 ♂ climbing up adobe wall toward light at night; September 6, 1 ♀ with full sized eggs, size decidedly smaller than male, on ground under powerful electric light at night, resting motionless until seized. We believe that these individuals came to the light at night upon seeing insects fluttering about it and that they themselves were in no way dazzled.

The male, when grasped by the head, was so powerful that with all feet in action it was difficult to hold. When dropped into a net it first tried to bite viciously, then running about rapidly it would kick violently and repeatedly with its caudal limbs when fearing attack from the rear, this bringing into action the formidable spurs of the caudal tibiae. We had not before realized how vigorously this insect can defend itself. Biting and kicking powerfully it would undoubtedly discourage a mouse or other small creature, to which its large soft body would otherwise prove a luscious feast.

RHAPHIDOPHORINAE

Phrixocnemis neomexicanus (Scudder). (T.) C.

Tesuque Creek, Sangre de Cristo Range, 7900 feet, July 27, 1919, (M. Hebard; on road at night in lower edge of Canadian Zone forest with the aid of an electric torch), 1 adult.

¹⁵ This *Sarcobatus* flat was visited to see if *Plagiostira albonotata* were present, but none were heard or seen.

We did not see this insect in the season of 1934, due certainly to the fact that opportunity did not offer to do night work in the Canadian Zone.

The Albuquerque specimen (probably from the adjacent Sandia Mountains) recorded as *Udeopsylla robusta* by Scudder and Cockerell actually represents the present species and it is probable that the same is true for the specimen from [the mountains near] Santa Fé, recorded by them as *Udeopsylla nigra* (established as a synonym of *robusta* by Hebard in 1925).

Chama, New Mexico is a northern and eastern limit and the above and Cloudercroft in the Sacramento Mountains, New Mexico, are eastern and southeastern limits respectively.

As *Daihiniodes hastiferum* (Rehn) has been recorded from Kennedy, New Mexico, at 6008 feet, a locality just south of Santa Fé, the species may be present anywhere at the lower elevations in the region under consideration.

Ceuthophilus utahensis Thomas. C. H.

Lake Peak, Sangre de Cristo Range, 12380 feet, August 12, 1 small juv. ♀, considerable search under half-buried granite rocks on the immediate summit revealed only this one specimen.

In 1919 the following additional material was secured nearby in the Sangre de Cristo Range. West slope of Lake Peak, 10000 to 11000 feet, July 28, (M. Hebard; under bark of firs in Hudsonian Zone forest), 3 juv. ♂. Tesuque Creek, 7900 feet, July 27 and 28, (Rehn and Hebard; under bark of logs and stumps of Canadian Zone forest and five females there on road at night with aid of electric torch), 6 ♀, 4 juv. ♂.

This species has been previously recorded from Beulah, Las Vegas Range and from Cloudercroft in the Sacramento Mountains at 8600 feet as *uniformis* and as *valgus* and from Santa Fé (certainly from the adjacent Sangre de Cristo Range) and the White Mountains as *valgus*. It is by far the most abundant species of the genus in the Rocky Mountain uplift of this region from the lower edge of the Canadian Zone up to the mountain summits through the Hudsonian Zone.¹⁶

Ceuthophilus nearest *arizonensis*. U.

Rancho del Monte, 7000 feet, September 1, 1 ♂ at night on adobe wall upon which some light was shining. Tesuque, 6800 feet, September 6, 1 ♂ at night on road beside irrigating ditch with aid of electric torch.

This is a small, very distinctive species, shortly to be described by Hubbell from southeastern Utah.

¹⁶ We believe that this Zone reaches the very summit of Lake Peak, the Arctic Alpine Zone appearing on Santa Fé Baldy only over the small area above 12300 feet (timber line), where no *Ceuthophili* were found.

Like most of the specimens of *pallidus* which we secured, these were motionless until the cyanide bottle had been cautiously put over them, but the instant antenna, limb or body is touched they spring about with tremendously vigorous and rapid erratic leaps.

Ceuthophilus nearest *secretus*. U.

Tesuque, 68000 feet, September 6 and 7, 3 ♂, 1 very small juv. ♂, 1 very small juv. ♀, about ranch house at night with aid of electric torch, one on ground beside adobe wall of house under vines, others on adobe walls.

This was evidently the most numerous species of the genus at this spot, which is surrounded by an irrigated orchard, trees and green vines.

The species, common on the plains of western Oklahoma and Texas, will shortly be described by Hubbell.

Ceuthophilus pallidus Thomas. U.

Rancho del Monte, 7000 feet, July 14 to September 6, 11 ♂, 22 ♀. Tesuque, 6800 feet, September 7, 1 ♀, on adobe road in orchard after dark with aid of electric torch.

This was by far the commonest species of the genus, though never abundant, in the vicinity of the ranch house in the dry typical Juniper and Pinyon Zone environment of the first locality. All were taken singly, the first on adobe walls at light but later individuals were found more frequently by searching with the electric torch along adobe walls and the bases of tents in the dark, while a few were found high up on the former.

We believe that these almost omnivorous insects come to light attracted more by the presence of other insects which they may catch and eat than due to the fact that they may be dazzled. This, we believe, was similarly the case with *Stagmomantis limbata* and *Stenopelmatus fuscus*.

The dark checkering overlaying the pale coloration of this insect is very conspicuous but serious discoloration is very apt to occur in drying and much the best way to preserve it, we are convinced, is thorough evisceration and stuffing with a bit of cotton. The size variation in the series is not very great, the majority being small for the species and only one male (July 29) and the Tesuque female being fairly large.

Ceuthophilus related to *silvestris*. U.

Rancho del Monte, 7000 feet, August 30, 1 very small ♀, climbing about rapidly on adobe wall at a light eight feet above the ground at night; August 31, 1 large ♂, on adobe wall close to ground at night, everything wet from showers and temperature down to 60°; September 1, 1 medium sized ♀, on adobe wall at night where some light was shining on it.

GRYLLIDAE

GRYLLINAE

Gryllus assimilis (Fabricius). U. (T.) (C.)

Rancho del Monte, 7000 feet, 1 ♀ at night on bank of arroyo. During our entire stay, July 11 to September 8, males of a few small colonies could be heard stridulating, particularly in the evening, in the banks of nearby arroyos. In early September small immature individuals were frequently seen running over the ground at night.

NEMOBIINAE

Nemobius sp. (probably *fasciatus*). U. (T.) (C.)

Males were trilling vigorously in the green grasses beside an irrigating ditch, but none were located in the little time available September 7th.

OECANTHINAE

Oecanthus niveus (DeGeer). U.

Rancho del Monte, 7000 feet, August 14, 1 ♀ at light at night. Tesuque, 6800 feet, September 6, 2 ♂ traced at night, one in apple tree, one in vine on ranch house; song continuous, rich and evenly undulating. Mesa two miles north of Frijoles Canyon, Sandoval County, 8000 feet, August 30, 2 ♀ beaten from scrub oaks in Western Yellow Pine forest growing on volcanic sands and pumice.

This species is quite common in the green foliage of trees and vines in irrigated areas and was also heard at the Bishop's Lodge, at 7200 feet.

Oecanthus nigricornis quadripunctatus Beutenmuller. U.

Rancho del Monte, 7000 feet, August 13, 1 ♀ at light at night; September 5, 1 ♂ stridulating in rabbit weed among junipers at night, located with electric torch by M. Hebard, Jr. Pojoaque, 6150 feet, September 2, 1 ♂ stridulating on Burdock on adobe flat at night, located with electric torch by M. Hebard, Jr.; the species numerous there.

This common species is probably quite generally distributed through the zone of juniper and pinyon in this region.

Oecanthus californicus pictipennis, new subspecies. U. Text-figure 3.

Immediate habitat appears to be a factor in the development of this condition, which occurs over a comparatively small area in the very extensive distribution of this species.

It is a development in many ways very similar to *Oecanthus nigricornis nigricornis* which occurs locally only over part of the eastern United States, whereas *nigricornis quadripunctatus* is generally present there and also reaches far west of the typical condition.

Type: ♂; Rancho del Monte, Santa Fé County, New Mexico. Elevation 7000 feet. August 11, 1934. (M. Hebard.) [Hebard Collection, Type No. 1276.]

Differs only from males of typical *californicus* in coloration and showing a striking tegminal color pattern.¹⁷ Caudal femora and sides of tegmina rich clear green. Other femora paler green; tibiae the same, the cephalic but the particularly the median suffused. Sides of abdominal sternites dark purplish brown, this also suffusing the mesosternum and metasternum, soft integument between sternites and tergites of abdomen strikingly purplish pink. Head deeper purplish pink paling toward mouth. Pronotum and proximal portions of tegmina rich clear green, the tegmina weakly but conspicuously suffused with clove brown rather broadly along the principal oblique vein, the two oblique veins which cross the tympanum, the margin of the dorsal field except in all but the distal portion of the anal field and all but the proximal three-fifths of the elongate submarginal open area toward the sutural margin. This coloration is shown in life, dried specimens with greens becoming rapidly weak or pale yellowish and purples much less brilliant. Often the head and pronotum mesad and laterad are suffused with brown, but such also sometimes occurs in the typical condition. The blackish vertical streak near and paralleling the inner margin of the first antennal joint ventrad varies from obsolete to heavy, in most specimens being very faintly indicated.

Females, of which one bearing the same data as the type but taken August 15 is selected allotype, are distinguished from the typical condition when dried only by the greenish veins of the dorsal tegminal field, but as these apparently often in time fade to yellowish, it is probable that material of this sex can not always be separated.

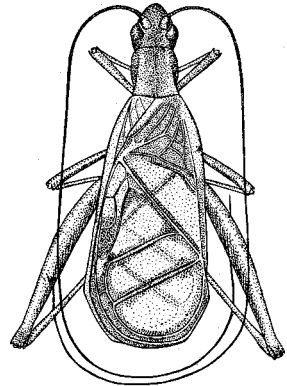


FIG. 3.—*Oecanthus californicus pictipennis*. Male Type. (+ 3)

	Length of pronotum	Width of pronotum ¹⁸	Length of tegmen	Width of tegmen	Length of caudal femur
♂					
Rancho del Monte, N. M. ...	2.34 to 2.4	2.4 to 2.55	10.6 to 11.9	5.3 to 5.7	8.1 to 8.8
Jemez Hot Springs, N. M. ...	2.12	2.5	11.2	5.3	8.
Pink Hills, Utah	1.98 to 2.	2. to 2.3	9.2 to 10.7	4.7 to 4.9	7.1 to —
Kaibab Plateau, Ariz.	2.2	2.3	10.3	4.8	7.2
				Length of ovipositor	
♀					
Mesa Verde, Colo.	2.2	2.13	9.	5.7	8.
Rancho del Monte, N. M. ...	2.27 to 2.27	1.84 to 2.	9.4 to 9.8	6.1 to 6.6	8.7 to 8.8
Jemez Hot Springs, N. M. ...	2.5	2.34	11.	6.8	8.9
Pink Hills, Utah	2.1	1.9	8. to 9.3	5. to 5.8	7.8 to —

¹⁷ The tegmina of all other species of North American *Oecanthus* are immaculate.

¹⁸ This dimension is unsatisfactory, particularly for females, the pronotal lateral lobes flaring much more ventrad in some than in others, probably due largely to position when drying.

The loud continuous resonant trilling of this insect was first heard about the end of July, and a week later males were singing on all sides. It was clearly the most abundant orthopteron which sings at night in the juniper and pinyon zone and near our ranch house a male would be stridulating in about every sixth juniper. As is usual with the Oecanthinae, however, a singer is difficult to locate, on account of the ventriloquistic element, this mainly due to the different angles at which the two tegmina are held but partially to the fact that while singing an individual often shifts its position. Once it was known, however, that males when singing are usually perched near the tips of the bare dead twigs of the junipers far inside the foliage and near the trunks, usually only one to three feet from the ground, only time was needed to obtain as large a series as might be desired. Even then ten to twenty minutes might sometimes be necessary and some singers would remain silent so long after their first alarm (at even the most careful approach) that waiting to hear further stridulation in order to locate them would not be worth while. During our numerous searches for males only two females were seen, one of which was feasting on the secretions from the glands at the base of the dorsal surface of a male's abdomen while the latter rested motionless with uplifted tegmina. The entire series was found in junipers except one male which was on the leaves of a scrub oak sapling growing within a juniper and two females which came to light at night.

Specimens Examined: 55; 40 males, 14 females and 1 immature individual.

COLORADO. Mesa Verde, September 4, 1921, (C. D. Duncan), 1 ♀, [Hebard Cln.].

NEW MEXICO. Rancho del Monte, 7000 feet, August 11 to September 6, 1934, (M. Hebard and M. Hebard, Jr.), 31 ♂, 3 ♀, type, allotype and paratypes, [Hebard Cln.]. Jemez Hot Springs, August 6, 1911, (John Woodgate), 1 juv. ♂; August 29 to October 5, 1914 to 1917, (same), 6 ♂, 5 ♀, [A.N.S.P. and Hebard Cln.].

UTAH. Pink sand hills, road between Virgin River and Three Lakes, Washington County, 5750 feet, September 1, 1926, (Rehn and Hebard; in drooping sage brush, yucca and composites), 2 ♂, 5 ♀ very small, markings weak; typical *californicus* also present and also very small, [A.N.S.P. and Hebard Cln.].

ARIZONA. Northern slopes of Kaibab Plateau, 6700 feet, September 2, 1926, (J. A. G. Rehn; at light at night, camp in juniper, pinyon and rabbit brush of Upper Sonoran Zone), 1 ♂, [Hebard Cln.].

It is evident that Fulton had males of this condition from Durango, Colorado and [the Coconino Plateau at] the Grand Canyon, Arizona.¹⁹

¹⁹ Oregon Agr. Exp. Sta., Bull. 223, p. 17. He there described and figured (figures 8A to F) an apparently annectant condition between this and the typical insect from Corvallis, Oregon, of which a poorly preserved male from the same locality taken by Rehn and Hebard is in the author's collection.

A very large series of *californicus californicus* from western Texas, western Colorado, southern New Mexico, Idaho, southern Nevada, Arizona, western Oregon, and California, is before us, all the males of which have the tegmina immaculate, though very great variation in size and degree of tegminal development is shown.

MOGOPLISTINAE

Cycloptilum comprehendens comprehendens Hebard. U.

Rancho del Monte, 7000 feet, August 8 to August 18, 4 ♂, 9 ♀, at night on adobe walls of ranch house, the majority at light, a very few inside the house.

The frequent rapid ti-tee ti-tee ti-tee—ti-tee ti-tee ti-tee of this species was to be heard on all sides after the first of August from dusk until the night became rather chilly. The song is remarkably loud for so very small an insect. This was, after *Oecanthus californicus pictipennis*, decidedly the most abundant stridulating orthopteron in the zone of juniper and pinyon. The number of singers decreased much more rapidly than we expected from the very first chilly evenings of the early Fall.

The series is typical of this eastern race, for which this is a western limital point, though it is known northwestward as far as Farmington, New Mexico.

Hoplosphyrum boreale (Scudder). U.

Rancho del Monte, 7000 feet, August 8, 1 ♂ stridulating at night on adobe wall back of umbrella; August 24, 2 ♂ stridulating at night on adobe walls, located with electric torch.

Only a few other males were heard, while not a female was seen. About the first of September, during a period of decidedly chilly weather, two males could be heard, often in the daytime, between the ceiling poles within the ranch house, but neither could be located.

The singing is a continuous trill, suggesting that of *Gryllus assimilis*, but somewhat higher pitched and definitely not as loud, though of surprising volume for so small an insect. When stridulating the tegmina are elevated, almost vertical, with head and pronotum bent downward. This produces the same ventriloquistic quality found also in the song of the various species of *Oecanthus*.

Not only is this an eastern limit but also extends far north of any other point the known distribution of the species.

MYRMECOPHILINAE

As *Myrmecophila nebrascensis* Lugger [U.] has been taken at Santa Fé, we looked for it in a number of ant nests, but without success.

TRIDACTYLINAE

Tridactylus minutus Scudder. U.

Otowi railroad station, 5825 feet, August 21, 2 juv. ♀, moderately numerous on edges of wet spots along the Rio Grande.

This diminutive cricket is found only along the margins of permanent water.