

TAXONOMIC AND FAUNISTIC COMMENTS ON DECTICINE KATYDIDS WITH THE DESCRIPTION OF SEVERAL NEW SPECIES (ORTHOPTERA: TETTIGONIIDAE: DECTICINAE)

DAVID C. RENTZ

Academy of Natural Sciences of Philadelphia

ABSTRACT. — *Inyodectes*, *Eremopedes* and *Oreopedes* are closely related members of the "eremopedioid" genera while *Ateloplus* and *Pediodectes* are more distinct. Data are presented offering new limits to the above. *Eremopedes spinosa* is moved to *Inyodectes* the concept of which has been broadened by the addition of the new species *I. bandari* and *I. schlingeri*. *Pediodectes ateloploides* is transferred to *Eremopedes*. *Oreopedes* is reduced to subgeneric rank in *Eremopedes* based on analysis of the characters of *E. balli*, *E. ephippiata* and *O. cryptoptera*. *Eremopedes ephippiata sonorensis* is raised to specific status. The subgenus *Eremopedes* now consists of: *ateloploides*, *bilineata*, *ephippiata*, *sonorensis*, *colonialis*, *scudderi*, and *tectinota*. *Oreopedes* now contains: *balli*, *californica*, *cryptoptera*, *cylindricerca*, and *pintiati*. The placement of *Eremopedes subcarinata* remains in doubt. Tables of characters indicating the similarities and differences of all of the eremopedioid genera are presented as well as redescrptions of relevant species in *Eremopedes*. Figures of male and female structures and photographs of holotypes and pertinent specimens are included. Eight new species are described. In the subgenus *Eremopedes*, of *Eremopedes*, *E. colonialis* and *tectinota* are described as new. In the subgenus *Oreopedes* of the same genus *californica*, *cylindricerca* and *pintiati* are described as new. Two new species are added to *Inyodectes*, those being *bandari* and *schlingeri*. *Ateloplus joaquin* is also newly described. The first males of *Idionotus lundgreni* are recorded and the species is illustrated and redescrbed. Keys to the species of *Inyodectes* and *Oreopedes* are included as are maps of the distributions of all species discussed in detail.

INTRODUCTION

The decticines or shield-backed katydids are a major component of the orthopteroid fauna in arid regions of the world. Many species are secretive in their habits or otherwise occur in peculiar places requiring specialized collecting techniques to obtain specimens. As a result this subfamily is poorly represented in most general collections. This paucity

of material has contributed to several taxonomic problems created when some of the earliest descriptions of North American species were based on either poorly preserved material or females which usually do not display the most diagnostic specific characters. This paper attempts to solve some of the current problems involving the identity of a number of North American and Mexican genera and species. Several new species, described herein, necessitate re-evaluation of the limits of several of the best known North American genera. This study concentrates on representatives of the southwestern United States and adjacent northern Mexico and presents generic diagnoses, keys and distributional data. Illustrations of the holotypes of several of the earliest described species are also included. This is the first in a series of publications dealing with the Decticinae and is a contribution toward a monograph of the subfamily. Reviews of the literature and studies pertaining to species in the geographic area covered by this paper may be found in Caudell (1907), Tinkham (1944) and the comprehensive treatment of Rentz and Birchim (1968). It is this author's hope that interested parties may be stimulated to comment on the characters used herein and limitations proposed for the genera.

Appreciation is expressed to Drs. Peter F. Bellingier, W. E. Ferguson, A. B. Gurney, and C. D. Johnson for making specimens available for study. Mr. David Weissman is thanked for his assistance in the field. Mrs. Donna M. Foster prepared the illustrations and Miss Kathryn Mowery typed the manuscript. This work was completed with the aid of a grant from the National Science Foundation, GB-31044. Field work in Mexico in 1964 was made

possible in part by a grant from the American Philosophical Society.

Ownership of the material used in this investigation may be identified by the following abbreviations: Academy of Natural Sciences of Philadelphia (ANSP), California Academy of Sciences (CAS), California Insect Survey, University of California, Berkeley (CIS), D. C. Rentz collection (DCR), University of California, Riverside (UCR), University of Michigan, Museum of Zoology (UMMZ), Smithsonian Institution, U.S. National Museum (USNM). Data cited in the "Type data" sections are direct quotes from the labels. Periods separate different labels. Locality data are interpreted in the "Records" sections.

THE EREMOPEDIOID GENERA

The so-called eremopedioid genera include *Eremopedes*, *Oreopedes*, *Ateloplus*, *Pediodes*, and *Inyodes*. They can be recognized by the shape of pronotum and its lack of carinae, shape of tegmina, simple paired titillators, and simple, elongate ovipositor. All species occur in the southwestern United States and Mexico, including Baja California. *Pediodes* and *Eremopedes*, Sonoran in origin, each contain species which extend north and east onto the Great Plains. The others are Sonoran-Great Basin in their development. *Inyodes* and the aberrant *Pediodes ateloploides* are the sole representatives of the subfamily known from Baja California, an area which probably harbors many more species. All members of these genera are known to be nocturnal but certain species of *Pediodes* and *Eremopedes* are active during the day but do not mate at that time.

Prior to this investigation, the distinctness and composition of the eremopedioid genera seemed to follow historic lines rather than evolutionary ones. As the genera are presently constituted, one sees a continuum from one extreme to the other with only the species of *Ateloplus* being obviously generically distinct. In an effort to clarify this situation, diagnoses of the genera are presented and the characters of each are contrasted and compared as the discussion moves from genus to genus. Evolutionary importance is not suggested by the sequence of characters. As a result of this study, it is necessary to transfer a number of species from one genus to another to be consistent with the limitations of the

synopses. It will be discovered by anyone who pursues this study that certain species are more closely related than others. For instance, *Eremopedes* and *Oreopedes* form a closely knit unit and study of several new species as well as the types of *E. balli* Caudell and *E. ephippiata* (Scudder) reveal that the two are so closely related that subgeneric status for *Oreopedes* is more meaningful in expressing this relationship. *Oreopedes* is listed separately below for comparative purposes. The generic diagnoses follow. An asterisk indicates characteristics most useful in recognizing each genus.

PEDIOIDES Rehn and Hebard

Orchesticus Scudder (not of Saussure, 1859) 1897: 55.

Stipator, 1916, preoccupied, of authors prior to 1916.

Pediodes Rehn and Hebard, 1916. Type of the genus:

Stipator grandis Rehn by original designation.

- *1. Prosternal processes elongate (spiniform, not peg-like).
2. Pronotum of male concealing $\frac{3}{4}$ to almost $\frac{4}{5}$ of tegmina.
- *3. Body surface polished.
4. Internal ventral apical calcars of hind tibia always present, often well developed, $\frac{3}{4}$ length of outer calcars.
5. Subgenital plate of male with styles elongate, three or more times longer than basal width.
6. Subgenital plate of female simple, apex never infolded.
- *7. Antennae as long or slightly longer than body.
8. Hind femur with stout teeth on inner ventral margin; anterior ventral surface of fore and middle femora occasionally with a few stout teeth.
9. Ovipositor more than half the length of hind femur, never longer than hind femur.
10. Thoracic auditory structure slit-like to ovate, at least $\frac{1}{2}$ concealed by pronotum.
11. Anterior portion of lateral lobes of pronotum with sulcus deeply incised (*P. stevensonii*, *P. ateloploides*) to hardly indicated (*P. haldemani*, *P. nigromarginata*); sulcus never present on dorsal surface of disk.
12. Genicular lobes of middle femur with one to two teeth on internal margin.
13. Middle femur considerably shorter than dorsal length of pronotum.
14. Tarsal segments uniformly dark colored.

INYODECTES Rentz and Birchim

Inyodectes Rentz and Birchim, 1968: 109. Type of the genus: *Inyodectes pallida* Rentz and Birchim by monotypy.

1. Prosternal processes virtually absent (*I. pallida*) to peg-like (*I. spinosa*) to distinctly spiniform (*I. bandari* Rentz, new species).
2. Pronotum concealing most of tegmen (*I. pallida*) or at least half of tegmina exposed (other species).
- *3. Body surface polished.
4. Internal ventral apical calcars of hind tibia present, well developed.
5. Subgenital plate of male with styles two times as long as broad (*I. pallida*) to more than two times basal width (*I. schlingeri* Rentz, new species).
6. Subgenital plate of female with apex somewhat infolded, never medially carinate.
- *7. Antennae three-four times the length of body.
8. Ventral carinae of all femora with many teeth, usually on both margins, except posterior margin of fore femur unarmed.
9. Ovipositor always longer than half the length of hind femur, never as long.
- *10. Thoracic auditory structure massive, ovate, completely exposed.
- *11. Anterior portion of lateral lobes of pronotum with deeply engraved transverse sulcus continuous from posterior of lobe anteriorly and dorsad across disk.
12. Genicular lobe of middle femur with two teeth on internal margin.
- *13. Middle femur characteristically longer than dorsal length of pronotum.
14. Third tarsal segment contrastingly darker colored than others.

EREMOPEDES Cockerell

Eremopedes Cockerell, 1898: 323. Type of the genus: *Eremopedes scudderi* Cockerell, selected by Kirby (1906).

Oreopedes Rehn and Hebard, 1920: 251. Type of the genus: *Oreopedes cryptoptera* Rehn and Hebard by monotypy.

Subgenus **EREMOPEDES** Cockerell

1. Prosternal processes present or absent.
2. Pronotum concealing much of tegmina or not more than half (*E. bilineata*, *E. covilleae*, *E. scudderi*).
- *3. Body surface not polished, dull.
4. Internal ventral apical calcars always present.

5. Subgenital plate of male with styles two or two and one-quarter times as long as basal width.
- *6. Subgenital plate of female simple, apex never infolded.
7. Antennae one and one-half times body length.
8. Ventral carina of all femora usually without teeth; hind femur frequently with teeth on inner ventral margin.
9. Ovipositor as long as or longer than (*E. bilineata*) or shorter to less than half (*E. sonorensis*) the length of hind femur.
- *10. Thoracic auditory structure obscure, elongate, never ovate.
- *11. Anterior portion of pronotum with shallow to obscure sulcus, exception: *E. bilineata*, heavily engraved, but not continued onto lateral lobes.
12. Genicular lobe of middle femur with one to two teeth on internal margin.
13. Middle femur longer (*E. bilineata*) or shorter (most other species) than dorsal length of pronotum.
14. Tarsal segments uniformly colored, usually dark.

Subgenus **OREOPEDES** Rehn and Hebard, new status

1. Prosternal processes absent or present as minute tubercles.
2. Pronotum concealing most of tegmina.
3. Body surface polished, *E. (O.) balli* not well polished.
- *4. Internal ventral apical calcars of hind tibia present or absent (frequently on a single specimen present on one side, absent on the other), always minute when present.
- *5. Subgenital plate of male with styles knob-like *E. (O.) cryptoptera*, one to one and one-quarter times as long as broad (*E. (O.) pintiati*), twice as long as broad (*E. (O.) balli*).
- *6. Subgenital plate of female with apex infolded (in *E. (O.) cryptoptera* also medially carinate).
7. Antennae one and one-half times length of body.
8. Ventral carinae of all femora either without teeth or with a few minute teeth on inner margin of hind femur.
9. Ovipositor little longer than half length of hind femur.
10. Thoracic auditory structure elongate, slit-like, nearly completely concealed by pronotum.
11. Anterior margin of disk pronotum with shallow sulcus, obsolete mesad.
12. Genicular lobe of middle femur armed on internal margin with a single small tooth (*E. (O.) cryptoptera*) or no tooth at all (other species).
13. Middle femur shorter (*E. (O.) cryptoptera*) or longer (*E. (O.) pintiati*) than dorsal length of pronotum.
14. Third tarsal segment contrastingly darker than other segments.

ATELOPLUS Scudder

Ateloplus Scudder, 1900: 79. Type of the genus: *Ateloplus notatus* Scudder by original designation.

- *1. Prosternal spines absent.
2. Pronotum of male concealing approximately half of tegmina.
3. Body surface dull.
4. Internal ventral apical calcars of hind tibia present, well indicated.
5. Fore tibia armed on posterior margin of dorsal surface with a single spine, this positioned apicad (*A. splendidus*, *A. schwarzi*, *A. coco-nino*, *A. minor*) or with three widely spaced spines (*A. luteus*, *A. hesperus*).
6. Subgenital plate of male with styles reduced (*A. schwarzi*) or moderately elongate (*A. notatus*) to elongate (*A. splendidus*).
7. Subgenital plate of female with apex infolded mesad; median portion of plate excavate, depressed, fissate.
8. Antennae at most one and one-half times length of body.
9. Ovipositor half length of hind femur or less.
10. Thoracic auditory structure elongate, open, never developed to the extent seen in *Inyodectes*.
11. Anterior margin of disk of pronotum with moderately pronounced transverse sulcus, obsolete mesad.
12. Genicular lobe of middle femur armed on inner and outer ventral margins with a single tooth.
13. Middle femur shorter than dorsal length of pronotum.
14. Tarsal segments similarly colored.
- *15. Lateral lobes of pronotum poorly developed.

Genus INYODECTES Rentz and Birchim

If the proposed generic definitions are to be adopted, *Eremopedes spinosa* Hebard must be transferred to *Inyodectes*. Two new species are herein described which are closely related to *I. spinosa*. Together with *I. pallida*, these five species form a distinct, readily identifiable unit. All known species are uniformly polished brown and very similar in overall general appearance (figs. 2, 3, 4). One of the most interesting characters shared by all members of the genus is the very large thoracic auditory organ (figs. 1, 3). No other members of the eremopedioid genera or other Nearctic Decticinae show such development of this structure. Of similar dis-

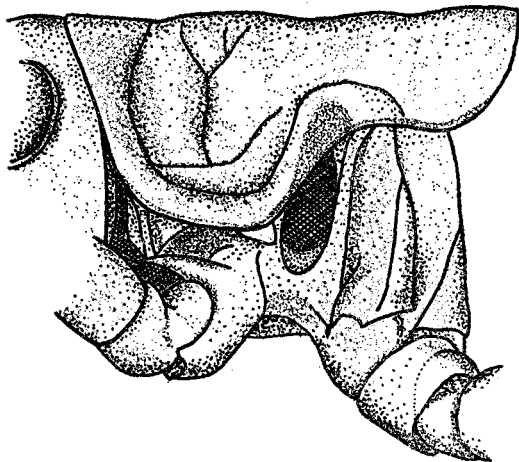


FIGURE 1. — *Inyodectes schlingeri*, holotype male, lateral view thorax; note auditory structure, 12 ×.

tingtion are the long limbs of all species but *I. pallida*. Likewise are the antennae which are proportionately longer than those of any other decticine species with which I am familiar. The presence of longer legs, antennae and the highly specialized hearing organ probably indicate adaptation as a result of high predation pressure. One can only conclude that development of these structures is a modification aiding in rapid escape. The toothed nature of the ventral carinae of the femora seem to be an additional adaptation against predation. The recent investigations of the scorpion fauna of Baja California and adjacent islands (the region occupied by some *Inyodectes* species) by Williams (1970, and personal communication) demonstrate that rock dwelling or burrow inhabiting insects might find more acute hearing and other predator detection modifications (such as longer antennae) advantageous. As can be noted in the records of *I. spinosa*, the species has been taken in burrows, an unusual habitat for a shield-backed katydid but not unique. Uvarov (1928) recorded a similar habit for a species living in an arid part of Mongolia. It is noteworthy that one morphological feature observed repeatedly among tropical Gryllidae and Tettigoniidae is the proportionately longer antennae of those species relative to species in non-tropical regions. This is apparently a response to increased predation. If this is the explanation, one could also argue that such increased predation would result in lower numbers of individuals of a given species per unit area and the longer antennae could

serve a necessary function in pair formation.

The distinguishing characters given by Rentz and Birchim (1968) in the original description of *Inyodectes* apply as the genus is now constituted with the following additions: hind femur of all species with distinct apical annulus; third tarsal segment of all species contrastingly darker than the other segments. The armature of the prosternum ranges from virtually no development (*I. pallida*) to spiniform pegs (*I. bandari*).

The geographic distribution of *Inyodectes* species presents an interesting, although very incomplete, picture. Some species of the genus seem to be confined to islands in the Gulf of California. No species has been found on the mainland of Baja California. As had been noted by Rentz and Birchim (1968) regarding *I. pallida*, members of the genus are apparently rare in nature. With the rather intense entomological interest in the deserts of southern California it seems peculiar that such a large, conspicuous species as *I. schlingeri* Rentz, new species from the Palm Desert vicinity should go unnoticed until now. Field notes on a collection of *I. spinosa* indicate that the species inhabits animal burrows or lives under rocks. As previously indicated this is not unique in the subfamily but is most unusual. The detailed biology of other species, with the exception of *I. pallida*, is unknown. But if they are biologically similar to *I. spinosa*, their rarity in collections might be thus explained.

KEY TO SPECIES OF INYODECTES

1. Male tegmen ovate in outline, with only faint indication of subapical band. Cerci and titillators of male, Rentz and Birchim (1968, figs. 25 A-D). Size small (18.0-22.0 mm body length, 6.0-6.8 mm pronotal length). Known from Westgard Pass vicinity, Inyo County, California (fig. 8) *I. pallida* Rentz and Birchim
- Male tegmen elongate, with distinct black subapical band (fig. 2). Size very large (24.0-30.8 mm body length, 8.5-9.5 mm pronotal length). Known from near Palm Desert, Riverside County, California and several islands in the Gulf of California (figs. 5, 8) 2
- 2(1). Supra-anal plate of male large, tongue-like (fig. 17). Projections of 10th abdominal tergite reduced, divergent. Size very large (28.0 mm body length, last instar). Known from Isla Danzante, Gulf of California (fig. 8) *I. bandari* Rentz, new species
- Supra-anal plate of male normal, reduced, without other combination of characters 3

- 3(2). Body form attenuate (figs. 2, 3). Cercus elongate, apex tapered (fig. 18). Known only from Deep Canyon, near Palm Desert, Riverside County, California (fig. 5) *I. schlingeri* Rentz, new species
- Body form robust. Cercus shorter, not as above (figs. 15, 16). Known from Isla Mejia and Isla Angel de le Guardia, Gulf of California (fig. 8) *I. spinosa* (Hebard)

Inyodectes spinosa (Hebard), new combination (Figs. 8, 15, 16, 30)

Eremopedes spinosa Hebard, 1923: 337. Type locality: Mejia Island, Gulf of California, holotype male, California Academy of Sciences.

Hebard (1923) commented on the distinct appearance of this species, stating "... and is readily distinguished from the known form of *Eremopedes* by the conspicuous though shallow first transverse sulcus of the pronotum, the very strong humeral sinus with margin there deeply though broadly concave, the bispinose genicular lobes of the cephalic and median femora and unspined external genicular lobes of the caudal femora, the heavily spined ventral femoral margins (except the caudal of the cephalic femora), the differently specialized ultimate tergite and subgenital plate of the female and the male genitalia." Most of these features are tabulated in the diagnosis and are possessed by all species with the exceptions noted below. The unusually long antennae shared by all species with the exception of *I. pallida*, the northernmost representative of the genus, were also observed by Hebard who listed the male type as having antennae 62 mm in length and the allotype female 73 mm long. The body lengths of each specimen were given as 25.0 and 26.2 respectively. The peculiar texture, black subapical band and shape of the tegmen are quite different from the condition shared by other members of the eremopedioid genera.

It seems appropriate to comment on several statements made by Hebard (1923) in the original description of *I. spinosa*. His notation of "... the unspined external genicular lobes of the caudal femora" is incorrect as illustrated by the paratypic series. All specimens bear a single spine in that position. The statement "prosternum unarmed" is inaccurate for the holotype as well as all of the specimens before me, including two paratypes. Each one possesses a pair of small peg-like tubercles.

Records. — These additional specimens have been

collected since the original description of the species: Gulf of California, Mejia Island, 28 May 1962 (R. and A. Ryckman, C. Christianson, 2 ♂, ex: burrows, under rocks, CIS).

Inyodectes schlingeri Rentz, new species
(Figs. 1, 2, 3, 5, 18, 31, 48)

Type data. — "Deep Cyn. Riv. Co., Cal., 21-VII-64, E. I. Schlinger. Collected on *Chilopsis*. UCR Ent. Mus. specimen #24688." Holotype and allotype deposited in the Academy of Natural Sciences of Philadelphia.

Type locality. — Deep Canyon lies one to ten miles south of Palm Desert adjacent to highway 74. The entire area is part of a reserve operated by the Riverside Campus of the University of California. The types were collected at night near the main laboratory and were apparently attracted to light.

Diagnosis. — Size large (largest species known), form attenuate, long-legged. Cercus (fig. 18) elongate, inner margin distad of subapical tooth divergent, apex acute. Titillator (fig. 31) toothed dorsad, with many small teeth basad, arms not joined beyond base. Inner and outer genicular lobe of hind femur with a single elongate tooth; fore and middle femur with two teeth on anterior and posterior margins. Prosternum unarmed or with a pair of minute tubercles. Ovipositor thin, poorly sclerotized, about half the length of hind femur, weakly curved upward, without lateral carinae, apex sharp.

Species description:

HOLOTYPE MALE. — Size large, form attenuate (figs. 2, 3). PRONOTUM well produced distad; anterior portion of disk with two transverse sulci, the anterior one continuous on lateral lobe from one side

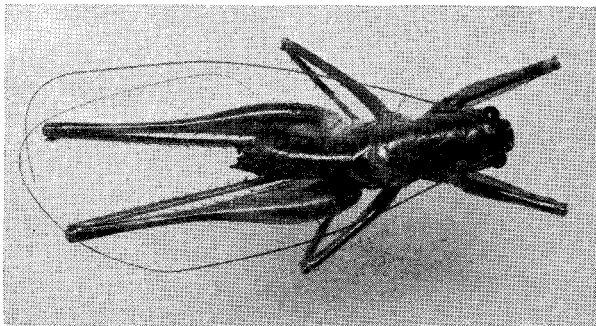


FIGURE 2. — *Inyodectes schlingeri*, holotype male, dorsal view.

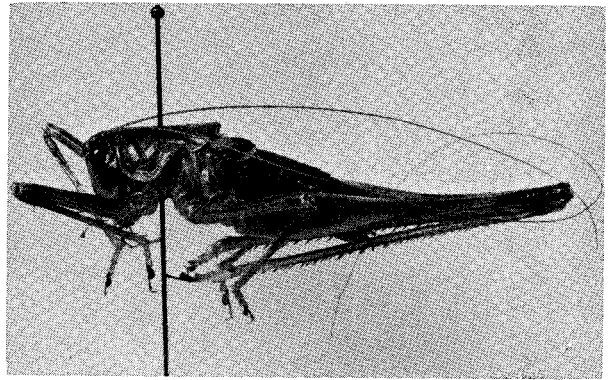


FIGURE 3. — *Inyodectes schlingeri*, holotype male, lateral view.

to the other; second sulcus deeply engraved only on lateral lobe, obsolete on dorsum of disk. Surface of disk with median V-shaped impression, somewhat heavily engraved; posterior portion of lateral lobe with well defined humeral callus, the dorsal sulcus roughly outlining dorsal periphery of auditory organ. Tegmen (fig. 2) similar to that of *I. spinosa*, elongate, flat, not appearing to be highly sclerotized. Prosternum wholly without processes, left side with minute tubercle. Mesosternum with a pair of acute projections; metasternum with more obtuse projections. HEAD with fastigium of vertex broad, not projecting as much as in *I. bandari*, barely surpassing first antennal segment. Eye very prominent, dorso-ventrally elongate, bulging, protruding beyond first antennal segment. Antenna two to three times body length. Tegmen thin, veins net-like. Fore and middle tibia armed with six very elongate spines on anterior and posterior margins of ventral surface; dorsal surface of fore tibia with three widely spaced spines on anterior surface, posterior surface unarmed, middle tibia armed dorsally with two spines on anterior margin, posterior margin with four spines. Hind tibia armed dorsally with 27 spines on outer margin, inner margin with 23 spines; ventral surface with 7 spines on outer margin, inner margin with five spines. Apex of hind tibia armed dorsally with two apical calcars, very similar in size to spines preceding them; ventral surface with four calcars, the middle pair $\frac{3}{4}$ length of outermost spur. Plantula of hind tarsus elongate, ovate apically, less than half the length of metatarsus. Femora toothed as follows: ventral surface of fore femur with two to three teeth on anterior margin, posterior margin with one to two

teeth; ventral surface of middle femur with three teeth on anterior margin, four teeth on posterior; hind femur with ten teeth on external surface, internal surface with eight to nine teeth. Genicular lobes of fore and middle femora with two teeth on both margins; hind femur with single tooth on both margins. Thoracic auditory structure massive (fig. 1), twice as long as eye, nearly as wide. ABDOMEN smooth dorsally, without any indication of median carina. Ninth and tenth abdominal tergites hirsute. Apex of tenth tergite with pair of triangular processes not attaining subapical tooth of cercus in length. Cercus elongate, outline of outer surface concave, apex divergent, acute; inner tooth with minute teeth on internal margin (fig. 18). Entire cercus hirsute. Supra-anal plate triangulate, not as developed as in *I. bandari* (fig. 17), barely attaining median tooth of cercus. Subgenital plate with shallow median impression, region ventrad of styles carinate; distance between styles shorter than length of one style. Styles prominent, elongate, four times longer than basal width. Titillator (fig. 31) large, not joined by membrane along arms; arm serrated or toothed dorsad, with scattered teeth at base. COLORATION uniform brownish with following exceptions: apex of fore and hind femora with faint darker brown annulus preceded by lighter straw brown, broader annulus; hind femur with additional darker brown annulus preceding straw brown annulus; middle femur almost uniformly brown, but with very faint brown apical annulus. Tegmen whitish brown with broad black subapical area almost identical in this respect to that of *I. spinosa*. Abdomen darker dorsally, with two indistinct dorsal stripes formed by ovate lighter areas on distal portions of abdominal tergites. Eye very dark brown. All spines and teeth light straw brown basad, apical $\frac{1}{3}$ - $\frac{1}{4}$ dark brown. Tarsi very light straw brown, third segment dark brown, claw dark but not as dark as basal portion of segment. Outer paginae of all femora faintly infuscate, no indication of stripe. Entire surface of body with polished appearance.

ALLOTYPE FEMALE. — Similar to male with following exceptions: tegmina indicated as ovate pads, wholly concealed by pronotum. Prosternum armed with a pair of small tubercles, better indicated than in holotype. Cercus elongate, conical, apex blunt, feebly directed ventrad. Entire surface of cercus pilose. Subgenital plate broad (fig. 48), lateral

portions of apex broadly rounded, median incision broadly V-shaped. Ovipositor short, feebly up-curved, distal portion of lateral and ventral valves weakly carinate, apex very sharp. Coloration similar to male but pattern of annuli and dorsum of abdomen somewhat more intensified.

Measurements

	Holotype male	Allotype
Total length	26.5	23.5
Length fore femur	11.7	10.0
Length middle femur	12.3	11.0
Length hind femur	30.6	28.3
Median length pronotum	9.5	8.5
Posterior width of pronotum	4.5	4.3
Length ovipositor		21.0

Derivation of name. — This species is named in honor of Dr. Evert I. Schlinger of the University of California, collector of the primary types and whose interest in the Deep Springs research area has promoted the discovery of many new species of insects.

Records. — CALIFORNIA: RIVERSIDE COUNTY: Deep Canyon, 28 March 1963 (E. I. Schlinger, 1 ♀, nymph, UCR); 21 July, 1 July 1964 (E. I. Schlinger, holotype on *Chilopsis*, allotype ♀, ANSP).

Discussion. — *I. schlinger* is most closely related to *I. spinosa* from which it may be distinguished by its larger size, more attenuate body form and differently shaped male cerci. Although widely separated geographically, species of *Inyodectes* occupy rather similar habitats. Deep Canyon is a desolate portion of the western margin of the Colorado Desert. A single trip by the author to the type locality in March 1967 did not yield any juvenile specimens due to the lack of rain during the previous fall and winter. Apparently, like many other desert insects, this species appears sporadically depending on local weather conditions. The long-legged appearance and extraordinarily long antennae are distinctive of the species.

Inyodectes bandari Rentz, new species (Figs. 4, 8, 17, 32)

Type data. — "Mex. Gulf of Calif., 21-VI-1964, R. Bandar. Isla Danzante, N. W. side. Genitalia in permount, solvent is toluene." Holotype deposited in California Academy of Sciences, no. 11338.

Type locality. — Isla Danzante is located in the Gulf of California (fig. 8) not far from Mulege.

Diagnosis. — Only last instar male known. Size

large for genus, probably largest species, form attenuate. Cercus elongate, inner margin distad of subapical tooth parallel, apex blunt; subapical tooth smooth, not serrate (fig. 17), supra-anal plate elongate, extending to base of internal cercal tooth. Genicular lobes of inner and outer margin of hind femur with single tooth; anterior ventral margin of fore femur with two teeth. Prosternum armed with relatively elongate peg-like spines, two and one half times longer than basal width. Titillator (fig. 32) short, undeveloped.

Species description:

HOLOTYPE MALE.— Last instar nymph. Size large (as large or slightly larger than adult males of *I. spinosa*), form decidedly attenuate. Pronotum produced distad as in other members of genus; anterior portion of disk with deeply engraved transverse sulcus continuous from ventral portion of lateral lobe

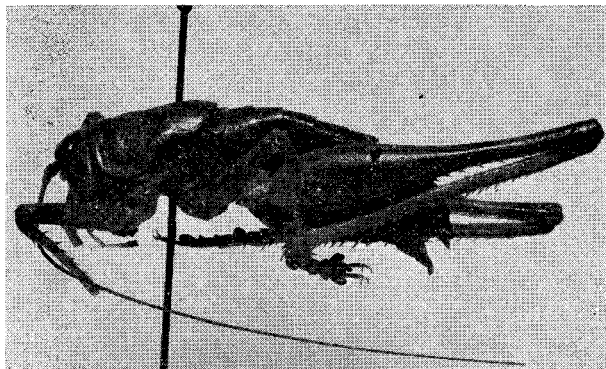


FIGURE 4. — *Inyodectes bandari*, holotype male, lateral view.

dorsad and across disk, not obsolete mesad; dorsum of disk with shallow median depression; anterior and posterior margins of disk weakly concave, margin of disk (outline) rimmed; lateral lobes deep, humeral sinus pronounced revealing large auditory organ. Tegmen undeveloped, barely attaining apex of pronotum. Prosternum armed with a pair of widely separated spines, two and one-half times longer than basal width. Meso- and metasternum with developed projecting, triangulate lobes. Head with fastigium of vertex produced, not as broad as in *Pedio-dectes* species, but better produced, one-quarter again as broad as first antennal segment. Antenna broken at distance equal to apex of hind femur, at that point thick, stout, indicating great length when fully intact,

likely three or more times length of body. Fore and middle tibia armed with six elongate spines on anterior and posterior ventral margins; dorsal surface of fore tibia with two to three spines on anterior margin, unarmed on posterior; dorsal surface of middle tibia with one to two spines on anterior margin, posterior margin with four spines. Dorsal surface of hind tibia armed on outer margin with 28 spines, inner margin with 21 spines; ventral surface armed on outer margin with three spines, inner margin with eight to nine spines. Apex of hind tibia armed dorsally with two calcars not greatly exceeding the spines preceding them in length; ventral surface with four calcars, the inner pair stout, recurved, half as long as outer pair of which the outermost calcar is subequal to the innermost. Plantula of hind tarsus ovate, about as wide as long, approximately half as long as metatarsus. Femora toothed as follows: ventral surface of fore femur with four to five teeth on anterior margin, posterior margin without teeth; ventral surface of middle femur with four to five teeth on both margins; hind femur armed with eight to ten teeth on inner and outer margins of ventral surface, the distal teeth very elongate. Thoracic auditory organ large, elongate, one and one half times length of eye, a little more than half as wide. Abdomen smooth dorsally, without median carina; tergum ten with broad medial incision, with a pair of triangulate processes; cercus cylindrical, elongate, sparsely pilose, with subapical inner tooth smooth, not serrate; supra-anal plate linguiform, attaining base of inner tooth. Subgenital plate with weak indication of carinae in region of styles; median incision shallow, roughly V-shaped, style half again as long as one side, styles two and one-quarter times as long as basal width. Titillator (fig. 32) bud-like. Coloration uniform light brown with following exceptions: apex of hind femur with faint darker apical band preceded by a lighter brown annulus; eye dark brown, almost black; third tarsal segment very dark brown or black contrasting with other segments which are light straw brown. Outer pagina of all femora slightly infuscate, hind femur faintly darker mesad, resembling a stripe; entire body with polished or glossy appearance.

Specimens studied. — 1, holotype.

Derivation of name. — I take pleasure in naming this species in honor of the collector of the type, Mr. Raymond Bandar of San Francisco, whose inspira-

tion and enthusiasm has been a constant source of stimulation to many prospective young biologists.

Measurements

	Holotype male, last instar
Total length	28.0
Median length of pronotum	8.5
Posterior width of pronotum	4.5
Length fore femur	7.9
Length median femur	9.6
Length hind femur	22.4

Discussion. — The description of a new species based on a nymph often leads to future confusion associating the proper adults with the species represented by the type but because of the distinct nature of this species and its isolation, no subsequent problems are anticipated. On the basis of measurements of the type, *I. bandari* is probably the largest species in the genus, surpassing *I. schlingeri* in this respect.

Genus EREMOPEDES Cockerell

Subgenus EREMOPEDES Cockerell, new status

The division of *Eremopedes* into subgenera is necessitated as a result of comparison of the holotypes of several well known species and the discovery of the intergradation of the characters previously used to define the genera. *Eremopedes balli* Caudell and *E. ehippiata* (Scudder) are examples of species sharing characters of both subgenera as defined in the diagnoses. *E. balli* resembles *Oreopedes cryptoptera* (figs. 10, 11, 25), the type species of the genus, in the following: the dorsal apical calcars of the hind tibia are reduced, the medial pair of ventral calcars are either reduced or completely absent; the titillators of the male are fused; the prosternal processes are small; the subgenital plate of the female (fig. 55) has the apex infolded; the genicular lobe of the median femur may be armed or unarmed; and the third tarsal segment is contrastingly darker than the others. The species resembles *Eremopedes scudleri* Cockerell, type species of the genus, in that the body surface is relatively unpolished and dull, but the styles of the subgenital plate of the male are comparatively more elongate. *E. ehippiata* unifies the genera in the other direction. It is *Oreopedes*-like in having the body surface with a distinct lustre and the third tarsal segment darker than the others. The

species resembles *Eremopedes* in having the medial pair of ventral calcars of the hind tibia elongate, the subgenital plate of the female simple, its apex not infolded; the styles of the subgenital plate of the male elongate, and the prosternal processes comparatively longer. Several of the new species described in this paper also serve to unite the genera. I propose to place *E. balli* in the subgenus *Oreopedes* and *E. ehippiata* in *Eremopedes*.

Behavioral investigation including the use of recordings of calling songs is bound to be an aid in solving problems at the species level. The convergence of genitalic structure amongst many of the species of the eremopedioid genera including *Inyodectes spinosa*, *Eremopedes (Oreopedes) balli*, *E. (O.) californica*, *E. (O.) pintiati*, *E. (E.) ehippiata* and *Ateloplus schwarzi* is worthy of further study, especially in relation to isolating mechanisms among sympatric species.

Keys to the species of *Eremopedes* (sensu lato) as well as distributional and ecological information may be found in Rentz and Birchim (1968) and Tinkham (1944). The new species described below broaden our concept of the genus both morphologically and distributionally.

Eremopedes (Eremopedes) ehippiata (Scudder) (Figs. 5, 19, 33a, 33b, 42, 49)

Cacopteris ehippiatus Scudder, 1899: 88.

Eremopedes unicolor Scudder, 1900: 97. Type locality: Arizona.

Eremopedes ehippiata, Caudell, 1907: 332.

Eremopedes ehippiatus ehippiatus, Tinkham, 1944: 320.

Type data. — "Palmer's Assorting no. 1120, Sonora Mex. *Cacopteris ehippiata* Scudder's type no. 14151, 1899." Type in Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts.

Type locality. — Dr. A. B. Gurney suggests that the type probably came from an area somewhere along the route from Nogales, Arizona to Guaymas, Sonora. Palmer frequently worked near Guaymas and 1897 was his last trip there.

Diagnosis. — Size medium for genus, a little larger than *E. (O.) balli*. Male cercus (fig. 42) large, flat, distinctively depressed mesad rendering dorsal surface concave in appearance; projections of tergum 10, elongate, almost parallel; titillators (figs. 33a, 33b) joined from base to apex, apical portion exca-

vate, concave, membranous, outer margin serrated; styles of subgenital plate elongate, much longer than basal width. Female with tergum ten produced apically (fig. 42), cercus stout, apex tapered abruptly, distinctly directed outward; subgenital plate simple (fig. 49), apex attenuate, not infolded.

Discussion. — The holotype male is in poor condition lacking all appendages but the hind legs which have been pinned beneath the specimen. The antennae and styles of the subgenital plate are missing and it appears that the specimen had once been preserved in alcohol since it is bleached and brittle. The tegmina are still intact but the veins, especially those at the apex, are abnormally darkened. The tillators of the type (figs. 33a, 33b) and a cercus of a comparable specimen are illustrated (fig. 42).

Tinkham (1944), noting the disparity in size amongst populations of *E. (E.) ehippiata*, proposed the trinomen *sonorensis* as a racial designation

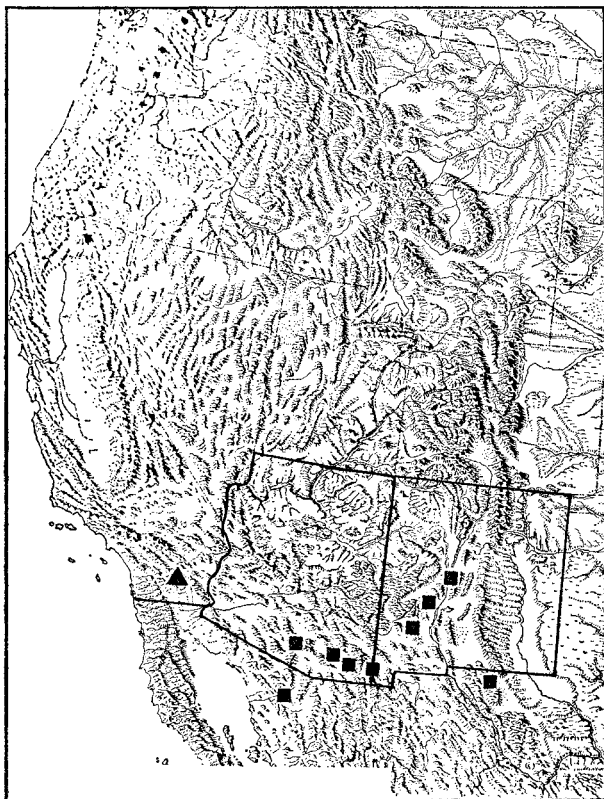


FIGURE 5. — Known distribution of *Inyodectes schlingeri* (triangle) and *Eremopedes (E.) ehippiata* (squares).

recognizing the large Mexican race. He was appar-

ently unaware that the type of *ehippiata* was described from Sonora, Mexico but is small, like the Arizona populations. The large size and different genitalic structure indicate that his trinomen should be raised to species status. *E. (E.) sonorensis* is discussed and illustrated later.

Eremopedes (E.) ehippiata resembles *E. (O.) balli* in overall general appearance and, as with that species, varies in size from one population to the other. Because of the poor condition of the type, a specimen in better condition, but structurally similar, is described below.

Species description:

MALE. — Size medium for genus, form attenuate. Pronotum moderately produced distad; anterior portion of disk with weak transverse sulcus indicated mostly by color; surface of disk smooth; posterior portion of lateral lobe with shallow sinus. Prosteronum armed with a pair of erect tubercles, two and one-quarter times longer than basal width. HEAD with fastigium of vertex broad, broader, more deltoid than in *E. (O.) balli*. Eye not as prominent as in that species, of similar shape. Antennae a little surpassing apex of hind femur. Fore and middle tibia armed with six slender spines on inner and outer margins of ventral surface; dorsal surface of fore tibia unarmed on anterior margin, posterior margin with three slender, evenly spaced spines; middle tibia armed dorsally with two spines on anterior margin, four on posterior. Hind tibia armed dorsally with 25 spines on outer surface, inner surface with 29 spines; ventral surface armed with ten spines on outer margin, inner margin with eight spines. Apex of hind tibia armed dorsally with a pair of short, slender apical spurs, of nearly equal length; ventral surface with four apical calcars, the inner pair minute, the outermost spur heavy, the innermost heavier, recurved. All femora unarmed; genicular lobe of middle femur often with a minute tooth on inner margin. Plantula of hind tarsus elongate, narrow, apex acute, two-thirds length of metatarsus. Abdomen smooth dorsally, without any indication of a median carina. Tenth tergite with elongate, parallel to divergent projections attaining distal two-thirds of cercus. Cercus depressed or deflexed mesad, region of inner tooth narrowed, apex of inner tooth with uncinatc projections. Subgenital plate narrow, styles elongate, two and one-half to three times longer than

basal width; median incision shallow, V-shaped, the length of one side less than the length of one style. Titillator (figs. 33a, 33b) robust, arms joined for entire length, serrated on outer margin with scattered teeth along surface; apex of arm spatulate, concave when viewed dorsally. Coloration variable, always brown or shades of brown, no green forms known; humeral angles of pronotum black, ventral one-third of margin of lateral lobes creamish, tegmen black, veins brown, apical mantle whitish to light green. Fore and middle femora with indistinct subapical annulus or none at all; outer pagina of hind femur with two longitudinal stripes. Third tarsal segment contrastingly darker-colored than others. Cercus uniform brown, serrated portion black. Body surface with ill-defined lustre.

FEMALE. — Differs from male in following characteristics: size slightly larger, form more robust. Tenth abdominal tergite with medio-internal angles acutely produced (fig. 42); cercus tapered, abruptly narrowed apically, weakly directed outward. Subgenital plate (fig. 49) broad basally, apex narrowed, not at all infolded. Ovipositor distinctly upcurved, not as long as hind femur, apex laterally carinate, somewhat narrowed.

Records. — ARIZONA: COCHISE COUNTY: Chirichahua Mts., 3 Sept. 1931 (E. R. Tinkham, 2 ♂♂, 1 ♀, ANSP); 7 Aug. 1932 (R. H. Beamer, 1 ♂, 1 ♀, ANSP); 6 Sept. 1933 (R. H. Beamer, 3 ♂♂, ANSP); Aug. 1934 (C. J. Drake, 1 ♀, ANSP); Carr Canyon, Aug. 1905 (H. Skinner, 4 ♂♂, 5 ♀♀, ANSP); 28 Sept. 1909 (M. Hebard, 1 ♂, 1 ♀, ANSP). Pinery Canyon, 12 July 1919 (W. Stone, 2 ♂♂, 10 ♀♀, ANSP); Onion Pass, 2 mi. W. (Coronado Nat. Pk.), 4 Aug. 1968 (N. D. Jago, 6 ♂♂, 2 ♀♀, ANSP). Southwestern Research Station, Cave Creek Canyon, 6 Aug. 1961, 5,400 ft. elev., (D. C. Eades, 2 ♀♀, ANSP); 30 July 1968 (N. D. Jago, 1 ♂, ANSP). Silver Creek road, old graveyard, 6 Aug. 1968 (N. D. Jago, 1 ♂, ANSP). MARICOPA COUNTY: Pinto Creek Res., Upper Salt River, 3,150 ft. elev., 22 Aug. 1937 (J. A. and J. W. Rehn, V. Pate, 1 ♂, 1 ♀, ANSP). PIMA COUNTY: Baboquivari Mts., Kits Peak Rincon, 31 Aug. 1916 (no collector, 7 ♂♂, 1 ♀, ANSP); Sycamore Canyon, 7 Oct. 1910 (no collector, 6 ♀♀, ANSP). Sta. Catalina Mts., Mud Sprs., 13 Aug. 1916 (no collector, 2 ♀♀, ANSP); Sabino Basin, 3,000 ft. elev.,

15 July 1916 (no collector, 1 ♂, ANSP). PINALENO COUNTY: Oracle, Oak zone, 8 Sept. 1931 (E. R. Tinkham, 7 ♂♂, 4 ♀♀, ANSP). SANTA CRUZ COUNTY: Atascosa Mountain, Pajaritos Mts., 22 Sept. 1922 (M. Hebard, 1 ♂, 1 ♀, ANSP); Sta. Ritz Mts., 9 Sept. 1925 (A. A. Nichol, 1 ♀, ANSP); 17 Aug. 1932 (R. H. Beamer, 1 ♂, ANSP); 19 July 1938 (R. A. Beamer, 1 ♂, ANSP); Madera Canyon, 30 Sept. 1931 (E. R. Tinkham, 2 ♂♂, ANSP). MEXICO: SONORA: Sta. Ana, 40 mi. S. on Hwy. 15, 19 Sept. 1970 (T. J. and J. W. Cohn, 4 ♂♂, UMMZ). Questionable Placement: TEXAS: CULBERSON COUNTY: Frijole, 15 July 1931 (R. H. Beamer, 1 ♂, ANSP).

Eremopedes (Eremopedes) sonorensis Tinkham,
new status

(Figs. 8, 20, 34a, 34b, 34c, 43, 50)

Eremopedes ephippiatus sonorensis Tinkham, 1944: 320.
Type locality: 40 miles north of Hermosillo, Sonora, Mexico.

Diagnosis. — Size large for genus. Male tegmina dark black except extremities (mantle) which is light colored or greenish. Cercus flat (fig. 20), morphologically similar to that of *E. (E.) ephippiata*, weakly concave or depressed medially. Extensions of tergum ten very elongate, parallel, bent ventrad. Titillators (figs. 34a, 34b, 34c) massive, apex furrowed, spoon-shaped, concave when viewed dorsally, apex not joined by a membrane. Subgenital plate narrowed apically, in region of styles subcarinate. Female with latero-external portions of tergum ten produced (fig. 43); cercus stout, apex narrowed, feebly directed laterad; subgenital plate (fig. 50) broad, apex concave, infolded, latero-externo angles produced. Coloration rather uniform dark brown, pronotum not lighter dorsally than laterally.

Species description:

MALE. — Size large for genus, form robust. Pronotum well produced distad; anterior portion of disk with feeble transverse sulcus, indicated mostly by color, completely absent from surface of disk; posterior portion of lateral lobe with weak sinus. Prosternum armed with a pair of widely spaced, elongate projections, three and one-half times longer than basal width. HEAD with fastigium of vertex broad, broader proportionately than *E. (E.) ephippiata*, without median furrow. Eye not prominent, longer

than broad. Antenna little surpassing apex of hind femur. Tibiae spined as described for *E. (E.) ehippiata*. Fore and middle femora unarmed on ventral surface; hind femur armed on outer margin with up to six stout, recurved teeth, internal margin with up to 12 similar teeth. Genicular lobe of middle femur with a single large tooth on internal margin. Plantula of hind tarsus elongate, fully $\frac{3}{4}$ length of metatarsus. ABDOMEN smooth dorsally, without indication of median carina. Tenth tergite (fig. 20) greatly produced distally, the projections parallel, bent ventrad; cercus large, flat, weakly depressed mesad, region of internal tooth narrowed with several apical projections. Cercus sparsely hirsute. Subgenital plate broad basally, apex very narrow, subcarinate in region of styles; styles elongate, three and one-half times longer than basal width; medial incision shallow, V-shaped distance between styles less than length of one style. Titillator (figs. 34a, 34b, 34c) with arm serrated on outer margin, apex of arm concave on dorsal internal surface, tip bent forward rendering titillator flat when viewed dorsally. Coloration rather uniform dark brown. Tegmen black except for apical mantle which is either straw brown or light blue green. Humeral angles of pronotum black, posterior and ventral margin of lateral lobes light cream color; distal borders of thoracic episternal sutures black, anterior borders white. All femora speckled, the apical speckles coalesced forming an indistinct band; outer pagina of hind femur with or without longitudinal stripe, if with, then on ventral border and not well indicated. Third tarsal segment contrastingly darker than others. Cercus uniformly dark brown, serrated portion black. Body surface dull, somewhat polished when viewed microscopically.

FEMALE. — Differs from male in following characteristics: size larger, form more robust. Tenth abdominal tergite with medio-internal angles produced (fig. 43); cercus elongate, stout, apex tapered, feebly directed laterad, if at all. Subgenital plate (fig. 50) broad basad, apex infolded, latero-external angles produced. Ovipositor relatively short, less than half length of hind femur, apex laterally carinate, tip smooth, not produced dorsad.

Records. — MEXICO: SONORA: Alamos, 2 Aug. 1960 (D. C. Rentz, 1 ♂, 2 ♀♀, DCR); Trailer Park, 20 Aug. 1964 (D. C. and K. A. Rentz, H. J. Grant, 1 ♂, ANSP). Guamuchil, 13.5 mi. W.

on Hwy. 15, 16 Oct. 1970 (T. J. and J. W. Cohn, 5 ♂♂, 1 ♀, UMMZ). Carbo, 30 mi. E., Copete Mine (F. C. Nicholas, 2 ♂, ANSP).

Measurements

	Males	Females
Number of specimens examined	2	2
Total length	24.0-28.0	37.5-39.5
Median length of pronotum	9.6-11.0	10.9-11.0
Posterior width of pronotum	5.3- 6.5	6.3- 7.3
Length hind femur	30.5-32.2	33.4-35.0
Length ovipositor		19.6-21.0

Specimens studied. — 12.

Discussion. — Although the type has not been examined, I have material from several localities in Sonora, Mexico which agrees with the description of the species and most certainly is *E. (E.) sonorensis*. As previously indicated, there is little justification, at this point, to indicate that this species is a geographic race of *E. (E.) sonorensis*. Morphologically the two species are quite dissimilar (compare figs. 20, 34, 43, 50 with 19, 33, 42, 49) and there is no indication that intermediates exist. *E. (E.) sonorensis* is much larger than any specimens of *E. (E.) ehippiata* found in Arizona.

Hebard (1932) recorded *E. (E.) ehippiata* from Sonora, Mexico but examination of the two females he studied demonstrates that they actually represent *E. (E.) sonorensis*. Tinkham (1944) stated that the University of Arizona collection contained specimens of his *E. (E.) ehippiata sonorensis* from the Baboquivari Mountains, Arizona. Specimens in the collections of the ANSP from that locality are all representative of *E. (E.) ehippiata*.

E. (E.) sonorensis is said to be an inhabitant of the Pacific lowland Coastal Plain of northwest Mexico, Leopold (1959). It is apparently not strictly a coastal species but occurs in the foothills of the Sierra Madre Occidental. When I found the species at Alamos, Sonora, Mexico, it was found living within the crevices of an ancient man made rock wall which, as commonly seen throughout the country, consists of rocks placed one upon another to a height of four to five feet, and two to three feet in thickness. The innumerable crevices created by the placement of the rocks afford habitats for a great many diverse species. Through the passage of time, bushes, trees and vines have covered the walls, often concealing

them completely. During the day the katydids could be seen resting in the crevices of the wall, but quickly retreated deeper within the wall at the slightest disturbance. At night they emerged from their shelters and wandered freely on the surface. I always found them near the wall, which was continuous across the landscape for several miles. The song of *E. (E.) sonorensis* as indicated by Tinkham (1944) is very loud, easily audible from fifty feet. Males commence singing shortly before dusk and continue roughly until midnight. Nothing is known of the food of the species but it may prey upon insects and spiders which also reside in the wall.

Eremopedes (Eremopedes) colonialis Rentz,
new species

(Figs. 8, 21, 22, 35, 44, 51)

Type data. — "MEX. Sonora, San Carlos Bay, VIII-10-1960. D. C. Rentz collector." The holotype and allotype are deposited in the Academy of Natural Sciences of Philadelphia.

Type locality. — San Carlos Bay is located nine miles north of Guaymas, Sonora, Mexico on the Gulf of California (fig. 8) in the southern portion of the Sonora Desert. According to Leopold (1959) this area receives less than 15.8 inches of rain per year.

Diagnosis. — Size large for subgenus. Lateral profile of pronotum is diagnostic. Male tegmina protrudes beyond apex of pronotum for a distance of half its dorsal length. Cercus of male (fig. 21) mostly concealed by projections of tenth tergite; internal tooth placed mesad; titillator (fig. 35) fused basad, apices free, divergent, laterally serrated. Female with cercus (fig. 44) short, conical, apex blunt feebly directed ventrad; tenth tergite with well developed projections; subgenital plate (fig. 51) excavate mesad, feebly carinate; ovipositor short, up-curved, laterally carinate.

Species description:

HOLOTYPE MALE. — Size large for genus, form robust. PRONOTUM produced distad, but not to degree illustrated by other species, giving the dorsal surface a quadrate appearance, only covering two-thirds of tegmina; anterior margin of surface of disk transversed by a strong, undulant sulcus, continuous from base of lateral lobe onto surface of disk; median portion of surface of disk with weak V-shaped incision. Thoracic auditory structure ovate, well con-

cealed by pronotum. Tegmen projecting beyond apex of pronotum for a distance nearly one-half its dorsal length. Prosternum armed with a pair of elongate, slender processes, two and one-half times basal width. Mesosternum with a pair of small, blunt triangular processes; metasternum without such processes but with a heavy transverse ridge. HEAD with fastigium of vertex narrow, laterally excavate, subequal in width to first antennal segment, with shallow median sulcus. Eye ovate, bulging considerably, dorso-ventral length two and one-fourth times basal width of first antennal segment. Antenna considerably longer than seen in most other species in the subgenus. One and one-quarter times length of body. APPENDAGES: All femora well armed with short, triangular teeth on both sides of ventral surface (much as described for *E. (E.) ateloploides*) except fore femur which is unarmed on posterior margin. All tibiae armed in usual fashion for genus; dorsal surface of hind tibia with two apical calcars, rather small, erect, apex gently recurved ventral surface with four such calcars, all very well defined, the inner pair nearly as long as the outer. Plantula of hind tarsus small, ovate, half as long as metatarsus. ABDOMEN smooth dorsally, median carina poorly indicated, mostly by color. Tenth tergite (fig. 22) with short, divergent, triangular processes. Cercus rather small relative to size of insect, elongate, internal tooth poorly developed. Subgenital plate (fig. 21) elongate, apex narrowed; styles three or more times basal width, as long as length of one side of medial incision. Titillator (fig. 35) large, arms attenuate, joined only at base, serrated dorsolaterally, apices divergent. COLORATION: Type bicolored, dorsum of pronotum and abdomen tan, remainder of body mottled grey or grey brown; lateral lobes of pronotum grey, humeral angles not darkened. Head in region of dorsum of eye with narrow black stripe extending posteriorly where it follows V-shaped sulcus. Head otherwise uniformly grey brown, fastigium of vertex dark brown or black. Fore and middle femora with a greyish black subapical annulus; hind femur without such annulus, outer pagina mottled grey, without any indication of stripe. All tibia with basal grey black annulus. First two tarsal segments light grey, third segment contrastingly darker than the others. Tegmina distinctively colored; veins, mantle and latero-medial region straw

brown grading into darker brown to black as one progresses anteriorly. Entire ventral surface of insect light grey brown. Body surface without lustre.

ALLOTYPE FEMALE. — Same data as holotype. Similar to male but with following exceptions: size larger, form more robust. Tegmina projecting beyond apex of pronotum. Cercus (fig. 35) conical, short, apex rather blunt, feebly directed ventrad. Tergite ten (fig. 35) with U-shaped medial incision, projections triangular attaining almost two-thirds distance of cercus. Subgenital plate (fig. 51) excavate medially (infolded) with weak median carina for entire length. Ovipositor rather short, distinctly up-curved, apex very sharp, laterally carinate. Coloration differs as follows: body uniformly grey, dorsum of pronotum and abdomen with two parallel median stripes continuous to apex. Ventral quarter of lateral lobe of pronotum whitish or cream. Ovipositor grey brown except apical one-fifth which is black.

Measurements

	Males	Females
Number of specimens examined	6	1
Total length	25.00-32.0	32.0
Median length of pronotum	7.50- 9.8	9.0
Posterior width of pronotum	5.32- 7.0	6.0
Length hind femur	24.30-26.2	25.0
Length ovipositor		18.5

Derivation of name. — This species is named with reference to its gregarious habits.

Records. — MEXICO: SONORA: San Carlos Bay, nine miles north of Guaymas on Gulf of California, 1 August 1960 (D. C. Rentz, holotype, allotype, paratypes, 9 ♂♂, 2 ♀♀, nymphs, 1 ♂, 3 ♀♀, DCR, ANSP); 20 August 1964 (D. C. and K. A. Rentz, H. J. Grant, paratype, 1 ♂, ANSP); 13 August 1965 (W. E. Ferguson, paratypes, 2 ♂♂, 2 ♀♀, ANSP). Paratypes will be deposited in the Smithsonian Institution and British Museum.

Specimens studied. — 20, holotype, allotype, paratypes.

Discussion. — *Eremopedes (E.) colonialis* and *E. (E.) ateloploides* are quite similar morphologically and may be found to be conspecific when adults of the latter are obtained. They are geographically isolated and the Cape Region inhabited by *E. (E.) ateloploides* is one of the most geologically undisturbed parts of Baja California, having remained in its present state without submergence from at least

the Paleocene, Durham and Allison (1960). The majority of endemic insects discovered to date have been found in the Cape Region, Truxal (1960), a reflection of its relatively long-term isolation. A similar disjunct distribution occurs with the spur-throat grasshopper *Oedomerus corallipes* Bruner which inhabits both the Cape Region of Baja California, Hebard (1923), and coastal Sonora.

Both *E. (E.) colonialis* and *E. (E.) ateloploides* are very distinct members of the genus and may warrant separate subgeneric ranking. In this paper I consider both species part of the nominate subgenus on the basis of overall general appearance, lack of lustre to the body surface and length of the styles of the subgenital plate of the male. The femoral and prosternal armature are so highly developed relative to the other species in the genus and the antennae are so much longer that they could be considered at least subgenerically distinct.

The habits of *E. (E.) colonialis* are unique for what is known to occur in the genus. When I found the species, both in 1960 and 1964, it was confined to a very thorny shrub growing roughly thirty feet or less from the shores of San Carlos Bay. Other shrubs were present but the katydids were not found in them. Also occupying the bushes with the katydids were large numbers of vespids (*Polistes* sp.) which were tending nests. The presence of these aggressive wasps hindered collecting activity. The katydids were further protected by the thorny, virtually impenetrable nature of the plants. One plant roughly ten feet in diameter and eight feet high contained fifty or more of the katydids, both adults and subadults. The species was active during the day and could be rather easily observed because of the sparse foliage of the plants. Any disturbance of their habitat elicited an aggressive reaction by the wasps. This hindered diurnal collecting and made conditions more difficult. As with *E. (E.) sonorensis*, *E. (E.) colonialis* is very wary at night. The song of the male is loud and sharp and can be heard for a considerable distance.

Other entomologists have observed the apparent symbiosis of the katydids and the wasps and Dr. William E. Ferguson of San Jose State College suggested to me that perhaps the katydids feed on the eggs and larvae of the wasps at night when the adults are inactive. No observations were made in support of this hypothesis.

Eremopedes (Eremopedes) ateloploides (Caudell),
new combination
(Figs. 6, 7, 8, 45a, 45b)

Stipator ateloploides Caudell, 1907: 350. Type locality: San Jose del Cabo, Baja California, Mexico. Holotype female, USNM, no. 10172.

Pediocetes ateloploides, Rehn and Hebard, 1916: 45.

This species has had an interesting taxonomic history due to the description having been based on an immature female, also to the lack of subsequent collections and its peculiar combination of characters. Its name is in reference to species of the genus *Atelopplus*, as Caudell (1907) was impressed by the shallow lobes of the pronotum (fig. 7) which he believed resembled the condition found in *Atelopplus*. The discovery of additional species in *Eremopedes* and in *Atelopplus* reveals that this is in no way unusual and that the purported resemblance to that genus is superficial. However, as discussed below, the species is peculiar in other characteristics not mentioned by Caudell.

Truxal (1960) discussed the locality data associated with the material collected by J. Xantus de Vesey in Baja California for the Smithsonian Institution between 1859-1861. I believe that the type of this species is part of that collection although Caudell noted that it was presented by Lawrence Bruner. The locality data for material collected by Vesey is believed to pertain to an area between San Jose del Cabo and La Paz.

The determination that the type is a last instar nymph is made on the basis of the following observations: integument thin, not well sclerotized (the specimen had been originally preserved in alcohol

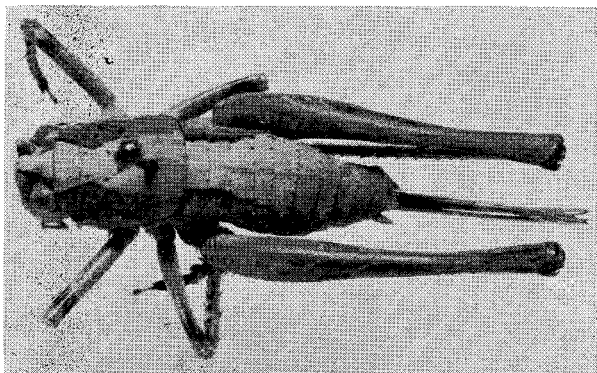


FIGURE 6. — *Eremopedes (E.) ateloploides*, holotype, last instar female.

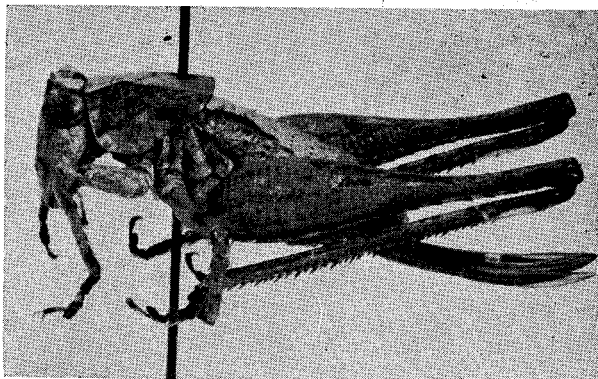


FIGURE 7. — *Eremopedes (E.) ateloploides*, holotype, last instar female.

and subsequent drying may have caused some distortion), the undeveloped nature of the ovipositor including the absence of lateral carinae, a feature common to species of *Eremopedes*, and the lack of development of the subgenital plate. In addition, the apices of the ovipositor valves have separated, a condition observed when nymphs are pinned.

Eremopedes (E.) ateloploides and *E. (E.) colonialis* (as previously noted) are aberrant species of the genus and are unique in bearing large, stout teeth on the ventral surface of all femoral carinae. The hind femur of the type bears eight teeth on the outer surface, the inner surface seven; the middle femur possesses three such teeth on the anterior (outer) margin, the distal two very elongate, spine-like; the fore femur possesses four teeth on the anterior margin of the right leg, and a single tooth on the left. The genicular lobes of the femora are similarly well armed. The fore femur bears two stout teeth on the anterior margin, the middle femur is armed on both margins. A similar degree of femoral armature is illustrated only by species of the genus *Inyodectes*. Reasons for this condition may be the same as presented for *Inyodectes*.

Since the original description of the species, only a single additional specimen has come to my attention. It, like the type, appears to be a last instar female and is nearly identical with the type with the following exceptions: genicular lobes of middle femur with but a single tooth on each margin, coloration uniform dark brown, surface of abdomen with a lighter region dorsally, a few black speckles longitudinally arranged along its margins. The color pattern of the type (fig. 6) is not exhibited by this

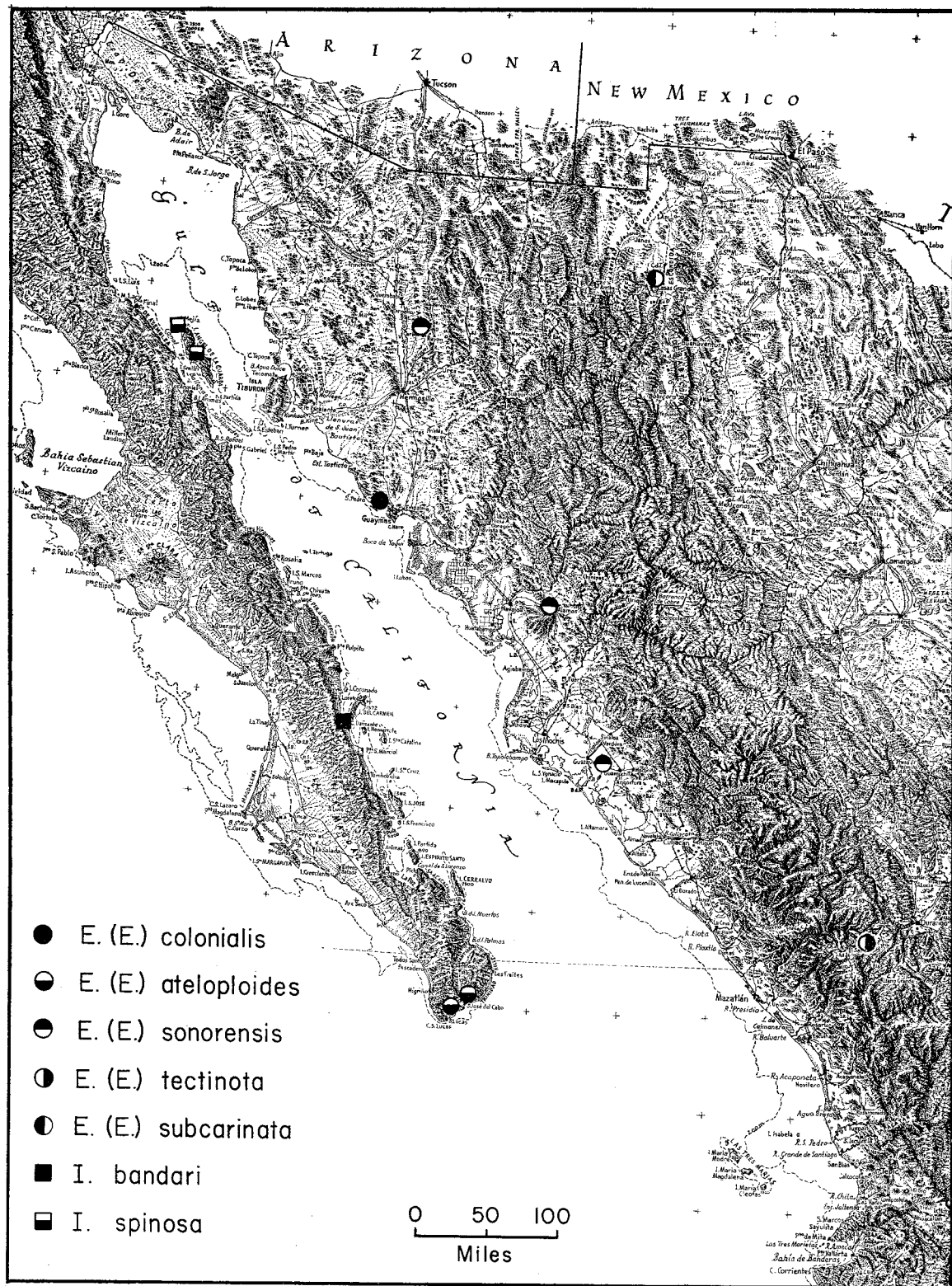


FIGURE 8. — Known distribution of *Inyodectes* species and several *Eremopedes* species in Mexico.

specimen which is considerably darker brown probably owing to its improper preservation.

Diagnostic description:

HOLOTYPE FEMALE. — Size medium for genus, form robust. Pronotum with distinct transverse sulcus on anterior portion of disk, somewhat obsolete mesad; surface of disk with V-shaped incision in median portion, somewhat indistinct; apex of disk truncate. Appendages armed as noted above. Prosternum armed with a pair of distinct spines, three times longer than basal width; meso- and metasternal lobes produced, acute. Cerci (fig. 45a) stout, conical, apex blunt, not directed ventrad or laterad. Tenth abdominal tergite with internal angles forming acute triangulate projections. Subgenital plate (fig. 45b) short, deeply incised. Basic color greyish (figs. 6, 7) with distinct contrasting darker pattern. Fore and middle femora each with dark brown subapical band. Outer pagina of hind femur with several black streaks in no way resembling a stripe. Tarsi brown, the third segment somewhat darker. Ovipositor uniform grey brown.

Measurements

	Holotype female, last instar
Total length	20.5
Median length of pronotum	6.5
Posterior width of pronotum	5.0
Length hind femur	20.1
Length ovipositor	13.2

Records. — MEXICO: BAJA CALIFORNIA: San Jose del Cabo, (holotype female, USNM, no. 10,172, deposited in California Academy of Sciences). Cape San Lucas, 8 mi. NE, 10 July 1938 (A. E. Michelbacher, E. S. Ross, 1 last instar ♀, CAS).

Specimens studied. — 2.

Eremopedes (Eremopedes) tectinota Rentz,
new species
(Figs. 8, 9, 23, 36, 46a, 46b, 52)

Type data. — "Mex. Durango, 137 mi. E. Jct. Hwy. 15 and 40 on Hwy. 40, 7000', 28-VIII-1964. Rentz, Rentz, Grant." Holotype and allotype deposited in the Academy of Natural Sciences of Philadelphia.

Type locality. — The type locality is in the pine-oak woodlands east of the divide between Sinaloa

and Durango. The type locality is not far from the village of El Salto. According to Leopold (1959) the area receives between 800 and 1220 mm of rain per year.

Diagnosis. — Unlike most species in genus. Development of pronotum (fig. 9) is diagnostic. Cercus of male (fig. 23) elongate, with small internal tooth. Titillator (fig. 36) large, projecting beyond apex of abdomen, laterally serrated, its apex deflexed. Female with conical cercus (fig. 46a), apical one-third directed laterad. Subgenital plate (fig. 52) distinct, lateral lobes medially depressed, apex recurved.

Species description:

HOLOTYPE MALE. — Size small for subgenus, form attenuate. Pronotum produced dorsad, distinctly tectate (fig. 9), covering two-thirds of tegmina; surface of disk smooth, without any indication

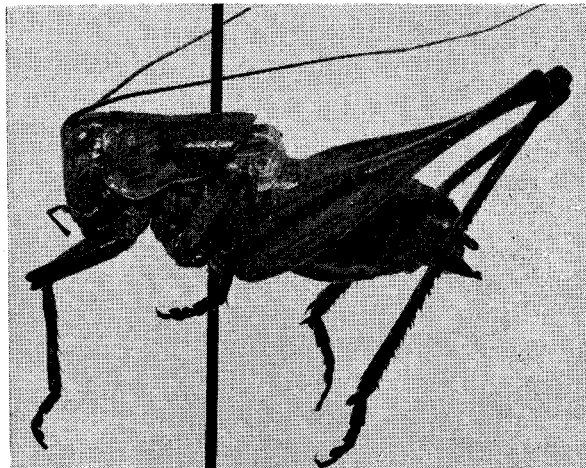


FIGURE 9. — *Eremopedes (E.) tectinota*, paratype male.

of sulci; lateral lobes shallow, faint sulcus present on anterior humeral angle; thoracic auditory structure elongate. Prosternum armed with a pair of widely spaced short pegs; meso- and metathoracic projections showing moderate development. HEAD in lateral profile with face distinctly slanting; fastigium of vertex produced above antennal bases, slightly narrower than proximal antennal segment, with poorly indicated median longitudinal sulcus. Eye dorsoventrally elongate, moderately protruding. Antenna slightly longer than length of body. APPENDAGES: Fore and middle femora unspined, hind

femur with a few small teeth on internal margin of ventral surface. Fore tibia armed dorsally only on external margin with three widely spaced spines; hind tibia armed dorsally with a pair of small calcars, hardly distinguishable from spines preceding them; ventral surface with 4 apical calcars, the inner pair minute, the innermost calcar the longest, feebly five times as long as either internal spur, one and one-half times length of external spur; all other tibiae normally spined for subgenus. Plantula of hind tarsus elongate, well developed, approaching half the length of metatarsus. ABDOMEN smooth dorsally, without any indication of median carina. Tenth tergite with moderate incision (fig. 23), triangular processes parallel, densely hirsute. Cercus (fig. 23) elongate, of uniform width throughout, with a small tooth mesad on internal margin. Subgenital plate moderately developed, apex not incised; styles short, two and one-quarter times basal width. Titillators (fig. 36) well developed, arms long, with teeth laterally, apex abruptly directed ventrad. COLORATION: Overall body color uniform flat grey; pronotum greyish brown, lateral lobes creamish. Face and femora greyish with black speckles; eye dark brown; tegmen straw brown, cells darker, overall appearance of tegmen straw brown. Plantula and flanges of third tarsal segment of each leg black. Entire ventral surface of insect greyish. Body surface entirely without lustre.

ALLOTYPE FEMALE. — Same data as for holotype. Similar to male but with following exceptions: size larger. Tegmina wholly concealed by pronotum. Cercus (fig. 46a) conical, distal one-third tapered, feebly directed laterad. Tenth tergite (fig. 46a) incised, lateral projections rounded. Subgenital plate (fig. 53) with narrow, distinct medial incision; lateral lobes depressed mesad, margins feebly recurved. Ovipositor (fig. 46b) short, upcurved, much shorter than hind femur, smooth, narrowed mesad, apex abruptly sharp. Coloration similar to male with following exceptions: dorsum of eye margined with black; dorsum of abdomen in region of tegmina black; ovipositor mottled dark brown, margins and tip darker.

Derivation of name. — This species is named with reference to the peculiar roof-like development of the pronotum.

Records. — MEXICO: Durango: 137 mi. E. Jct.

Hwy. 15 and 40 on Hwy. 40, 7000 ft. elev., 29 August 1964 (D. C. and K. A. Rentz, H. J. Grant, 10 ♂♂, 4 ♀♀, holotype, allotype, paratypes, ANSP).

Specimens studied. — 14. In addition to the Academy of Natural Sciences, paratypes will be deposited in the Smithsonian Institution and the British Museum (Natural History).

Measurements

	Males	Females
Number of specimens examined	10	3
Total length	16.6-20.9	24.0-27.5
Median length of pronotum	5.7- 6.6	6.1- 6.9
Posterior width of pronotum	4.0- 5.0	4.2- 5.2
Length hind femur	13.9-16.4	18.7-20.0
Length ovipositor		14.3-15.0

Discussion. — *Eremopedes (E.) tectinota* is one of the most distinct members of the genus. It is a nocturnal species, emerging shortly after sunset to feed and sing. Males sing with a continuous high-pitched buzz audible for up to twenty feet. Because of the rapidly decreasing temperatures after sunset in the mountains of the Sierra Madre Occidental, *E. (E.) tectinota* ceases its stridulatory activity well before midnight. The species was seen to remain active, feeding and wandering about for a much longer period than indicated by its singing. All specimens were found in oaks and other broad-leaved plants. None were found in the pines. *E. (E.) tectinota* is a thamnophilus species apparently not venturing high into the trees and shrubs in its habitat. Most specimens were found within four feet of the ground and none was detected higher than eight feet. Feeding was observed and in each of four instances plant material was being ingested. Neither mating nor females with spermatophores were discovered. No further material of this species was obtained during the expedition to Mexico which yielded the type series. A number of localities to the east and west of the type locality were investigated but no specimens were obtained. A new and apparently closely related species was discovered on the Chihuahuan Desert south of Hidalgo del Parral, but it is not represented by more than two males and does not warrant description at this time.

Subgenus **OREOPEDES** Rehn and Hebard, new status

Oreopedes Rehn and Hebard, 1920: 251. Type of the genus: *O. cryptoptera* Rehn and Hebard 1920, by monotypy.

Oreopedes was originally proposed because of the peculiar nature of the type species, Rehn and Hebard (1920) commenting "an extraordinary blending of the characteristics of other decticine genera." These statements were made on

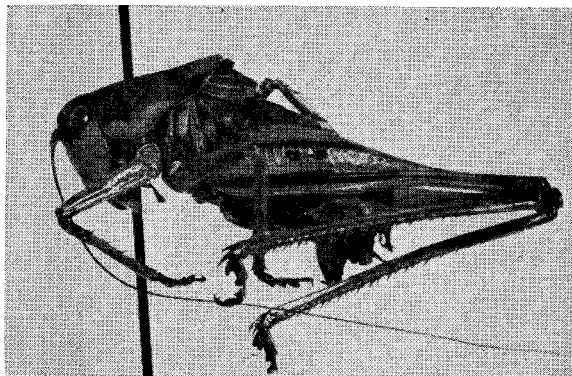


FIGURE 10. — *Eremopedes (O.) balli*, holotype male.

the basis of a single specimen, a male. The discovery of females and additional males as described and illustrated by Rentz and Birchim (1968) revealed a close relationship with *Eremopedes*. The discovery of a number of additional species in this complex and the examination of the types of several well known species, indicate a much closer relationship.

KEY TO SPECIES OF SUBGENUS OREOPEDES

1. Projections of tenth abdominal tergite of male short, bluntly triangular (figs. 11, 27). Subgenital plate of female medially carinate (fig. 53); female of *O. cylindricerca* unknown 2
- Projections of tenth tergite elongate, digitiform (figs. 24, 25, 26). Subgenital plate of female never medially carinate 3
2. Cercus of male distinctly cylindrical, internal tooth minute (fig. 27); titillator (fig. 37) with sharp, recurved teeth along entire margin. Female unknown. Known only from 20 miles north of Flagstaff, Arizona (fig. 13)
..... *E. (O.) cylindricerca* Rentz, new species
- Cercus of male stout, subcylindrical (Rentz and Birchim, 1968, fig. 25E), internal tooth with several smaller teeth on anterior margin; titillator (Rentz and Birchim, 1968, fig. 25F) with arm proportionately shorter and with fewer teeth. Female with complex subgenital plate (fig. 53), medially carinate. Known from several localities in Alpine, Inyo, and Mono counties, California (fig. 13)
..... *E. (O.) cryptoptera* Rehn and Hebard,
new combination
3. Overall coloration yellowish brown; dorsum of pronotum mottled with black and brown and with two lighter spots on median portion of disk. Male with cercus elongate (fig. 26), internal teeth with

serrations. Female with cercus feebly directed ventrad and laterad. Known only from the Providence Mountains of San Bernardino County, California (fig. 13)

- *E. (O.) californica* Rentz, new species
Without above combination of characters 4
- 4(3). Apex of male tegmen with a whitish or greenish fringe contrasting with remainder of tegmen which is usually black; cercus (fig. 25) elongate. Female with ovipositor more than half the length of hind femur. Body coloration usually uniform brown or tan, only a small percentage of individuals of a given population with dorsal aspect of insect contrastingly lighter in color than lateral aspect 5
- Apex of male tegmen not contrasting in color with remainder; cercus (fig. 24), titillator (fig. 39). Female with ovipositor usually less than half the length of hind femur. Body coloration either pallid light grey or dorsally light brown contrasting with darker brown or grey of lateral aspect of insect. Known from southern Nevada and northern Arizona (fig. 13)
- *E. (O.) pintiati* Rentz, new species
- 5(4). Coloration uniform pale tan or brown, usually speckled with black, never contrasting. Known only from northern Arizona (fig. 13)
- *E. (O.) balli pallida* Tinkham,
new combination
- Coloration variable but never pale or light brown. Widely distributed throughout Arizona, Colorado and Utah (fig. 13) *E. (O.) balli balli* Caudell,
new combination

Eremopedes (Oreopedes) cryptoptera Rehn and Hebard, new combination (Figs. 11, 13, 53)

Oreopedes cryptoptera Rehn and Hebard, 1920: 252. Type locality: Silver Canyon Trail, White Mountains, Inyo County, California. Holotype ♂, Acad. Nat. Sci. Phila.

Rentz and Birchim (1968) described and illustrated both sexes of this interesting, small decticine. Recent examination of the holotype indicated that additional comments are necessary. Rehn and Hebard stated "... and the caudal tibiae lacking the dorsal pair of distal spurs, constitute other diagnostic features of value ..." This character as well as the presence or absence of the medial pair of apical spurs on the ventral surface of the hind tibia is truly variable, a single specimen frequently possessing one condition on the right hand side, the other on the left. *E. (O.) cryptoptera* is unique among members of its subgenus in having titillators separated and individually well armed. Other species character-

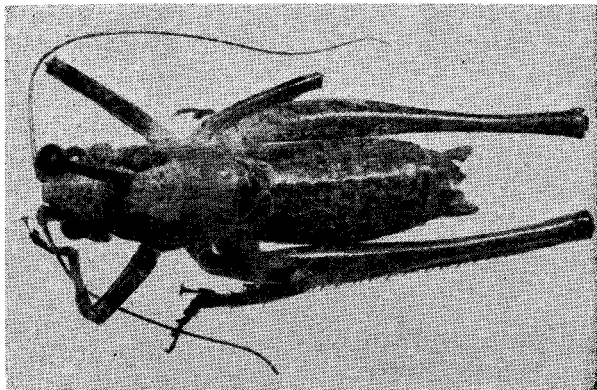


FIGURE 11. — *Eremopedes (O.) cryptoptera*, male.

istically have the arms of the titillators fused and armed laterally. On the basis of the absence of prosternal tubercles, reduced femoral and tibial spination and the generalized structure of the titillator, *E. (O.) cryptoptera* appears to be the most primitive member of the genus.

***Eremopedes (Oreopedes) pintiati* Rentz, new species**
(Figs. 12, 13, 24, 39, 54)

Type data. — "Nev. Clark Co., 3-5 mi. SW Jct. Hwys. 95-52, on Hwy. 52, Lee Canyon Road, 29-VII-1967. D. C. and K. A. Rentz. Genitalia in permount, solvent is toluene." Holotype and allotype are deposited in the Academy of Natural Sciences of Philadelphia.

Type locality. — The Lee Canyon road is a familiar one to orthopterists. Rehn and Hebard (1920) and Rentz and Birchim (1968) commented in detail on the species occurring there. *E. (O.) nevadensis* was found only in the Juniper-Woodland, unlike *Ateloplus luteus* which was found with it but also was commonly seen in the Creosote bush community at a slightly lower elevation. Most of the type series collected by the author was found on highway 52 at night.

Diagnosis. — Very similar to *E. (O.) cryptoptera* in overall appearance but slightly larger. Cercus of male (fig. 24) with apex triangular, inner tooth with several blunt serrations; tenth abdominal tergite with elongate, parallel projections extending nearly to apex of cercus; titillator fused, apex truncate (fig. 39), laterally serrated; tegmen with apical portion darkened, veins whitish or with tint of green. Female with cercus cylindrical, apex directed ventrad; apex

of subgenital plate abruptly curved inward (fig. 54), without median carina.

Species description:

HOLOTYPE MALE. — Size small, form elongate. PRONOTUM produced distad, not as cylindrical as *E. (O.) cryptoptera*, covering three-quarters of tegmina; anterior margin of disk transversed by very shallow, undulant sulcus, obsolete in median one-third of disk; surface of disk smooth, without median carina. Thoracic auditory organ elongate, nearly concealed by pronotum. Prosternum with a pair of very minute tubercles. Meso- and metasternum each with a pair of well developed triangulate processes. HEAD with fastigium narrow, well produced, with shallow median sulcus. Eye elongate dorsoventrally, bulging. Antenna attaining apex of hind femur. APPENDAGES: All femora unarmed, genicular lobe of middle femur with a single spine on inner margin; fore tibia unarmed dorsally on anterior margin, posterior margin with three widely spaced spines; middle tibia armed on dorsal surface with two spines on anterior margin, four on posterior margin; ventral surface of fore and middle tibia with six spines on anterior and posterior margins; hind tibia armed dorsally on outer margin with 29 spines, inner margin with 28 spines; ventral surface armed with nine spines on outer margin, inner margin with six spines; apex of hind tibia armed dorsally with two calcars in length hardly differentiated from adjacent spines. Plantula of hind tarsus elongate, one-half to two-thirds length of metatarsus. ABDOMEN smooth dorsally, without any indication of median carina, surface smooth. Tenth tergite with elongate projections (fig. 24) separated by a narrow groove. Cercus rather elongate, apex triangulate, acute; inner tooth positioned mesad with several stout teeth on anterior margin; base of cercus narrowed, constricted. Subgenital plate with apex narrowed, with small V-shaped medial incision; styles small, one and one-half times as long as one side of medial incision. Titillators with arms fused (fig. 39), apex truncate, serrated laterally in apical third. COLORATION distinctive. Lateral lobes of pronotum and adjacent portions of head and abdomen dark brown; disk of pronotum and dorsum of abdomen contrastingly lighter in color rendering insect a two-striped appearance. Tegmen brownish except for apical one-fourth which is black (exposed portion), the veins

light brown; outer margin and adjacent veins whitish with light greenish tinge. Auditory foramen, and tibio-femoral articulation darker brown; outer pagina of hind femur with two distinct longitudinal stripes; third tarsal segment contrastingly darker than others. Head and other regions of body peppered with brownish speckles on lighter background. Entire ventral surface of insect light brown. Surface of body lustrous.

ALLOTYPE FEMALE. — Same data as holotype. Similar to holotype with following exceptions: tegmina represented as small ovate pads completely concealed by pronotum; cercus cylindrical, apex rather blunt, distinctly directed ventrad; subgenital plate (fig. 54) without any indication of median carina. Ovipositor short, upturned, distinctly narrower in middle than at either end, apex sharp, carinate laterally on dorsal and ventral valves. Coloration much as in male, apex of ovipositor darker, remaining portion speckled.

Measurements

	Males	Females
Number of specimens examined	5	9
Total length	16.5-18.5	17.0-20.0
Median length of pronotum	4.7- 5.4	5.0- 5.4
Posterior width of pronotum	2.8- 3.0	3.0- 3.1
Length hind femur	13.7-14.9	14.5-16.9
Length ovipositor		13.2-14.1

Derivation of name. — This name refers to a band of Paiute Indians who formerly lived in southeastern Nevada.

Records. — ARIZONA: COCONINO COUNTY: NW slope Kaibab Plateau, 6,700 ft. elev. (J. Rehn, M. Hebard, ♀, ANSP). NEVADA: CLARK COUNTY: 3-5 mi. SW Jct. Hwys. 95-52 on Hwy 52, Lee Canyon road, 29 July 1967 (D. C. and K. A. Rentz, 4 ♂♂, 5 ♀♀, holotype, allotype, paratypes, ANSP, DCR); Lee Canyon, Spring Mts., 6,000 ft. elev., 18-21 August 1919 (J. Rehn and M. Hebard, 2 ♂♂, 3 ♀♀, ANSP). LINCOLN COUNTY: Oak Sprs. Summit, 10 August 1971, at light trap (G. F. Nisida, D. F. Zoller, 1 ♂, NSDA). NYE COUNTY: Belted Peak, west base at 6,700 ft. elev., 25 August 1924 (J. Rehn, M. Hebard, 1 ♂, 1 ♀, ANSP).

Specimens studied. — 17.

Discussion. — *Eremopedes (O.) pintiati* superficially resembles *E. (O.) cryptoptera* probably as a

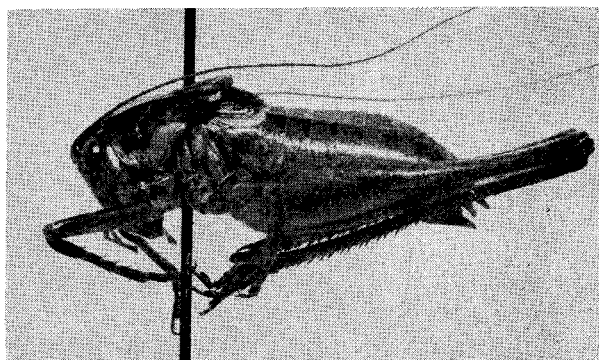


FIGURE 12. — *Eremopedes (O.) pintiati*, paratype male.

result of similar environmental factors influencing coloration. It can be distinguished morphologically from that species by its larger size, very different male genitalia and higher percentage of bi-colored individuals in a given population. It appears to be more closely related to *E. (O.) balli* than any other species.

Like *E. (O.) cryptoptera* this species is rare in nature. At the type locality it occurred along with the decticine *Ateloplus luteus*, *Idiostatus nevadensis*, *Capnobotes occidentalis*, and *Neduba (Aglaothorax) ovata armiger*. *E. (O.) pintiati* was the least common of the species present and seemed restricted to a narrow band of vegetation dominated by juniper, deerbrush, big sagebrush, and pinyon pine on the eastern slopes of the Spring Mountains. Nothing is known of the habits of the species but it appears to be quite nomadic, wandering freely after dark. All specimens were found either on the ground or on the surface of the road after dark. None were found on vegetation. Males were not detected in stridulation although all of the other decticine listed above could be found singing.

Eremopedes (Oreopedes) cylindricerca Rentz, new species (Figs. 13, 27, 37)

Type data. — "20 mi. N. Flagstaff, Ariz., 8-20-1962 J. Scott. Genitalia in permount, solvent is toluene." The holotype is deposited in the Academy of Natural Sciences of Philadelphia.

Type locality. — No further data is available concerning the type locality. The specimen was collected by a student and placed in the collection at

Northern Arizona University and forwarded to the author by Dr. C. D. Johnson.

Diagnosis. — Size small, as in *E. (O.) cryptoptera* and *E. (O.) pintiati*. Cercus of male (fig. 27) cylindrical, of nearly uniform thickness, internal tooth minute, feebly projecting from main shaft; extensions of tergum ten short, barely attaining internal tooth of cercus; titillator (fig. 37) with arms fused, apex truncate, lateral portion heavily armed, the basal teeth overlapping. Female unknown.

Species description:

HOLOTYPE MALE. — Size small, form robust. PRONOTUM produced distad, covering three-quarters of tegmina; anterior margin of disk with two distinct sulci on anterior portion of lateral lobe; surface of disk smooth, without any trace of median carina. Thoracic auditory organ elongate, nearly three-quarters concealed by pronotum. Prosternum unarmed. Meso- and metasternum with blunt processes, hardly produced. HEAD with fastigium well produced, somewhat broader than in the other species, surface with very shallow sulcus. Eye dorsoventrally elongate, moderately bulging. Antenna attaining apex of hind femur. APPENDAGES: All femora unarmed; genicular lobe of middle femur without spine; fore tibia unarmed dorsally on anterior margin; posterior margin with three widely spaced spines; middle tibia armed on dorsal surface with two spines on anterior margin, four on posterior margin; ventral surface of fore and middle tibiae with six spines on anterior and posterior margins; hind tibia armed dorsally on outer margin with 24 spines, inner margin with 19 spines; ventral surface armed with five to six spines on inner and outer margins; apex of hind tibia armed dorsally with two calcars, these better developed relative to the adjacent spines than to the degree exhibited by either *E. (O.) cryptoptera* or *E. (O.) pintiati*; ventral surface armed apically with two calcars, the middle pair absent, inner ventral calcar elongate, half again as long as outer, apex recurved, excavate. Plantula of hind tarsus elongate, about half the length of metatarsus. ABDOMEN smooth dorsally, without any traces of median carina. Tenth tergite with projections short (fig. 27), median incision U-shaped. Cercus uniformly cylindrical, internal tooth weakly produced anteriorad of center. Titillator (fig. 37) with base small, arms fused, with uncinat teeth

laterad, apex truncate. COLORATION obscure due to improper preservation. Lateral lobes of pronotum dark brown, this extending feebly onto abdomen, not forming the stripes as seen in *E. (O.) pintiati*. Tegmen with lateral portion of apical two-thirds black, veins straw brown. Tibial auditory foramen outlined in black. Fore and middle femora and tibiae with indistinct subapical band; dorsum of fore femur also dark brown; base of all tibial spines black, other spines straw brown, apices darker. Hind femur with seven transverse stripes at base, outer pagina with a pair of longitudinal stripes. Dorsum of abdomen uniformly dark brown except where noted above, lustre of body reduced.

Measurements

	Holotype male
Total length	14.0
Median length of pronotum	5.1
Posterior width of pronotum	3.6
Length hind femur	11.9

Derivation of name. — The name refers to the shape of the cercus.

Record. — This species is known solely from the holotype.

Discussion. — Nothing is known of the habits of *E. (O.) cylindricerca*. The area of the type locality is primarily Arizona Pine Forest, Kuchler (1968), with intrusions of Juniper-Pinyon Woodland. This is probably very similar ecologically to the habitats at both Westgard Pass and on the Lee Canyon road where *E. (O.) cryptoptera* and *E. (O.) pintiati* occur respectively. Morphologically *E. (O.) cylindricerca* is similar to *E. (O.) cryptoptera* and is probably very closely related to that species. The shape of the cercus and tergal extensions are very similar to the condition exhibited by that species.

A single female labelled "Vial Lk, nr. Flagstaff, Arizona, alt. 8,000 ft." may represent this species but appears disproportionately large relative to the size of the male. It lacks the glossy appearance of the body characteristic of the subgenus but possesses the infolded subgenital plate without medial carination, absence of prosternal tubercles, and the meso- and metasternal lobes are similarly reduced. The cerci are conical, with the apical one-quarter distinctly directed ventrad, the apex blunt. Both hind legs are missing from this specimen.

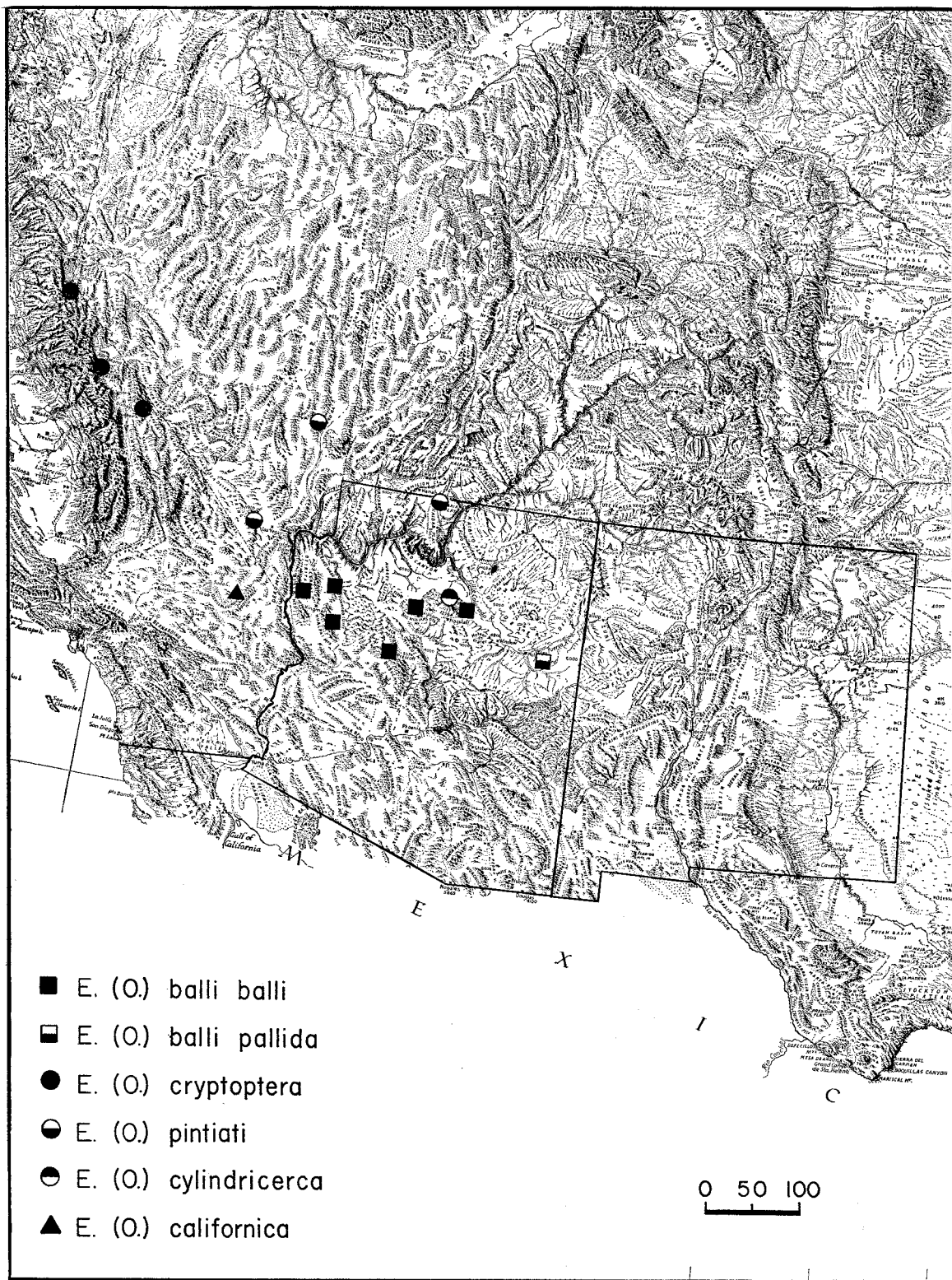


FIGURE 13.—Known distribution of species of the subgenus *Oreopedes*.

Eremopedes (Oreopedes) californica Rentz,
new species

(Figs. 13, 26, 38, 47a, 47b, 56)

Type data. — "CAL. S. Bdno. Co., Providence Mts., Bonanza King Mine, 16-III-1967, D. C. Rentz. Genitalia in permount, solvent is toluene. Molt 30-V, matured 2-VI." Holotype and allotype are deposited in the Academy of Natural Sciences of Philadelphia.

Type locality. — The type locality is a box canyon at the site of the Bonanza King Silver mine, now deserted. The area is widely known to naturalists and is frequently visited by lepidopterists from the Los Angeles area who collect many endemic forms present in the Providence Mountains.

Diagnosis. — Size large (largest species in subgenus). Cercus (fig. 26) triangular, inner tooth serrated. Titillator (fig. 38) large, only apical portion toothed and fused. Tegmen nearly completely concealed by pronotum, with black subapical area; apical veins small reticulate, white, similar to the condition illustrated by *Inyodectes* species. Projections of tergite ten prominent. Female with tegmen completely concealed by pronotum; cercus cylindrical, apex directed ventrad and laterad; subgenital plate (fig. 56) without medial carination. Coloration of species distinctive, basic color yellowish brown, dorsum of pronotum with irregular black marking, central portion of disk with a pair of light brownish yellow blotches; humeral angle of pronotum black, this continuing onto abdomen only on anterior half or less; outer pagina with two indistinct, longitudinal stripes. Entire body and appendages speckled with darker brown. Known only from type locality.

Species description:

HOLOTYPE MALE. — Size large for subgenus, form robust. PRONOTUM produced distad covering two-thirds of tegmina; transverse sulcus present on anterior portion of disk, obsolete on median portion; median portion of disk with V-shaped sulci, emphasized by black coloration, no trace of median pronotal carina. Thoracic auditory foramen slit-like, obscure. Prosternum with a pair of triangular, poorly developed processes; meso- and metasternal lobes very well indicated, triangulate. Antenna extending to apex of hind femur. HEAD with vertex broad, prominent. Eye somewhat cordate, positioned

high on head; fastigium feebly sulcate medially. APPENDAGES: All femora unarmed except internal ventral surface of hind femur which bears four elongate spines. Genuiclar lobe of middle femur with a minute spine on internal margin. Fore tibia and middle tibia armed as described for *E. (O.) pintiati*. Hind tibia (type missing right hind leg) armed dorsally on outer margin with 25 spines, internal margin with 26 spines; ventral surface with seven spines on outer margin, inner margin with six spines; apex of hind tibia armed dorsally with a pair of apical calcars of similar length, the internal spur somewhat longer, apex blunt, less than twice as long as the adjacent spines. Ventral surface with a pair of outer apical calcars, very elongate; internal calcars reduced to a single minute spur, although a pair of such spurs is present on allotype. Plantula of hind tarsus well developed, elongate, two-thirds length of metatarsus. ABDOMEN smooth dorsally, median carina indicated solely by color, surface smooth. Tenth tergite (fig. 26) with apical projections elongate nearly attaining apex of cercus, median channel narrow; cercus triangulate, apex acute, internal tooth positioned mesad, with minute serrations; base of cercus narrow. Subgenital plate narrow, apex with very shallow, V-shaped medial incision, styles short, scarcely twice basal width, distinctly shorter than length of one side of medial incision. Titillators (fig. 38) relatively massive, basal portion of arms separated, only apex fused and laterally serrated, apex acute. COLORATION distinctive. Basic color yellow brown overlaid by darker speckling. Head dark brown, darker mesad, eyes black. First segment of antenna straw brown with dark speckles; second segment with distinct stripe on outer margin; flagellum uniform dark brown. Pronotum with black dorsally on anterior and posterior margins at juncture of lateral lobes; median portion in region of V-shaped sulci also black; area distad of sulci light straw brown. Tegmen with black subapical region, distal veins reticulate, white; outer margin of tegmen black, extreme apex greenish. Fore tibia immaculate grey on outer surface, internal surface speckled with darker subapical region and auditory foramen; middle tibia uniform grey speckled with brown, area around spines darker; fore and middle femur with large brownish speckles coalesced apically forming an indistinct subapical annulus.

Hind femur with outer pagina with brownish ribs transversing two longitudinal stripes, the ventral stripe much better indicated; hind tibia uniform grey brown. Abdomen brown, lighter dorsally, this area accentuated by two longitudinal stripes continuing from pronotum onto abdomen, becoming less distinct apically. Tenth tergite and cerci reddish brown; region of internal tooth black. Entire ventral surface straw brown.

ALLOTYPE FEMALE. — Same data as holotype except matured 17-VI-1967. Similar to male with following exceptions: size slightly larger; tegmen wholly concealed by pronotum; tenth tergite with apices produced; cercus (fig. 47a) tapered, apex blunt, directed ventrad and laterad; subgenital plate (fig. 56) narrow, apex infolded, without median carina; ovipositor shorter than hind femur, distinctly directed upward, laterally carinate in apical quarter. Coloration as in male but darker. Base of ovipositor (fig. 47b) with two short, black stripes dorsally, distal one-third dark brown, basal portion yellow brown.

Measurements

	Males	Females
Number of specimens examined	1	2
Total length	22.0	23.0
Median length of pronotum	6.8	6.5- 6.6
Posterior length of pronotum	3.8	3.5- 3.7
Length hind femur	20.9	20.5-21.4
Length ovipositor		16.1-16.2

Derivation of name. — The name refers to the geographical distribution.

Records. — In addition to the holotype and allotype there is a single female paratype bearing identical locality and collection data.

Specimens studied. — 3.

Eremopedes subcarinata (Caudell) (Figs. 8, 14)

Idionotus subcarinatus Caudell, 1907: 397.

Eremopedes subcarinatus Rentz and Birchim, 1968: 119.

The placement of this species was discussed by Rentz and Birchim (1968) who discovered that it was in no way related to *Idionotus*. Its relationship with other species in *Eremopedes* remains unclear because it is represented solely by the type female. Its general appearance and color pattern are much like those characters of *Pediodes nigrumarginata*, but it differs morphologically in the absence of pro-

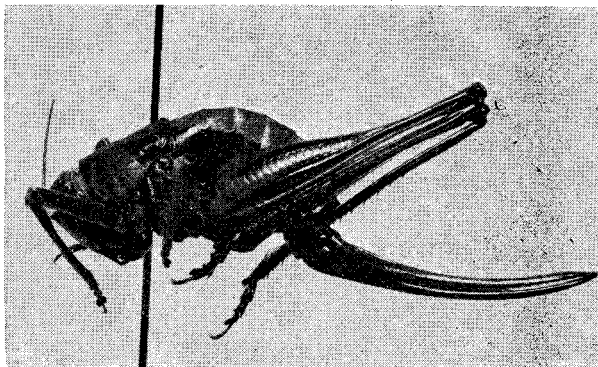


FIGURE 14. — *Eremopedes subcarinata*, holotype female.

sternal spines and teeth on the ventral femoral margins. The middle femur is not shorter than the pronotum. The third tarsal segment is contrastingly darker than the others and the apex of the subgenital plate is infolded as is characterized by many *Eremopedes* species. The lustrous appearance of the surface of the body presents a distinct impression of *Pediodes* species. Until further material is available for study, the placement of the species remains in doubt.

Genus *ATELOPLUS* Scudder

Atelopus Scudder, 1900: 79. Type of the genus: *Atelopus notatus* Scudder by original designation.

Atelopus joaquin Rentz, new species (Figs. 28, 40)

Type data. — "Calif. Fresno Co., Jacalitos Cr., 6 mi. SSW of Coalinga, 31-VI-1956. R. O. Schuster collector." Type deposited in the California Academy of Sciences, number 11339.

Type locality. — The type locality is a portion of the Jacalitos uplift, an area of Pleistocene sediments which extends north approximately fifty to seventy-five miles. This area is one of the "pockets" of desert flora and fauna extending north from the Mojave. Many typical desert insects may be found there and a degree of endemism is indicated and demonstrated by the recently described Jerusalem cricket, *Stenopelmatus nigrocapitatus* Tinkham and Rentz (1969), which is known from a restricted area including Jacalitos Canyon.

Diagnosis. — Females unknown. Size small (approaching *A. hesperus*, smallest known species in the

genus), overall coloration greyish. Tegmen protruding beyond pronotal apex for a distance of nearly one-half dorsal length of pronotum (in other species except *A. schwarzi* the tegmina are nearly concealed completely by the pronotum). Abdomen dorsally concolorous, not broken by longitudinal stripe (as in *A. luteus*, *A. notatus*). Titillator (fig. 40) with arms parallel, touching apically (not divergent as in *A. luteus*); base as long as arm or slightly longer (shorter in both *A. luteus* and *A. hesperus*), directed at right angles downward at lateral apex (in *A. luteus* and *A. hesperus* the arm is uniplanar, simple). Projections (fig. 28) of abdominal tergite ten prominent, medial incision V- to U-shaped.

Species description:

HOLOTYPE MALE.—Size small for genus, form attenuate. HEAD with fastigium of vertex low (not narrow and produced as in *A. luteus*) dorsally concave, triangulate (other species narrow, flat or convex). First antennal segment one-quarter again as broad as fastigium. Eye moderately bulging, dorso-ventrally elongate. PRONOTUM broad, smooth on dorsal surface with exception of anterior one-quarter which is cut by a shallow, transverse sulcus, obsolete mesad; median V-shaped incision poorly indicated; median carina not present; cephalic margin truncate, distal margin truncate weakly concave; lateral lobes with broad, well defined humeral sinus; convex callosity prominent (as in *A. luteus*, absent in *A. hesperus*). TEGMINA protruding beyond apex of pronotum more noticeably than any other species in genus; lateral flange or mantle produced, veinlets numerous, better developed laterally. Prosternum unarmed. ABDOMEN: Tenth abdominal tergite produced forming two blunt projections separated by V- to U-shaped medial incision. Cerci elongate, moderately prominent, somewhat inflated basad, apical one-quarter abruptly uncinat, directed inward; dorsal surface in region of attenuation depressed, concave. Subgenital plate without medial longitudinal carina, distal margin with V-shaped incision (as in *A. luteus*, not broadly incised as in *A. hesperus*); styles elongate, two to three times longer than basal width (not short, knob-like as in *A. luteus* or *A. hesperus* where it is a little longer than broad), longer than length of one side of incision. Genicular lobes of fore femur unarmed, middle femur with tooth on posterior margin. Ventral surface of femora

armed as follows: fore, one to two teeth on anterior margin, posterior margin unarmed; middle, two to three teeth on anterior margin, posterior unarmed; hind, outer margins with seven to nine teeth, inner margin with four to seven teeth. Tibiae armed as follows: fore, anterior margin of dorsal surface unarmed, posterior margin with three equally spaced spines; middle, anterior margin of dorsal surface with three equally spaced spines, posterior margin with four such spines; hind, outer margin with 27-28 spines, inner margin with 19-21 spines; ventral surface of fore and middle tibiae with six spines on anterior and posterior margins. Apex of hind tibia armed dorsally with two slender apical calcars, ventral surface with four calcars. COLORATION probably greyish in life (both type and paratype had been preserved in alcohol). First few antennal segments darker brown on outer surface. Tegmen with veins cream colored, cells brownish to smoky black, laterally lighter. Distal portion of abdominal segments with black flecks rendering abdomen a streaked appearance. Pronotum streaked with grey and brown, area of median carina indicated only by dark brown stripe.

Measurements

	Holotype ♂	Paratype ♂
Total length	14.4	14.0
Median length of pronotum	5.4	5.4
Posterior width of pronotum	3.5	3.6
Length hind femur	14.7	14.7

Derivation of name.—This species is named with reference to the San Joaquin Valley of Central California where the species lives.

Records.—In addition to the holotype, there is a single male paratype bearing identical locality and collection data.

Discussion.—The discovery of a species of *Ateloplus* in the San Joaquin Valley is of zoogeographical interest not only because the genus was known only from the Great Sonoran Desert but because it provides further evidence indicating the importance of several isolated reservoirs of desert species in Central California. Botanists and zoologists alike have discovered many desert species in the Jacalitos Canyon area and have noted that other areas, such as Pinnacles National Monument and Panoche Canyon similarly harbor desert species or close relatives of species considered as part of the Mojave or Sonoran

deserts. The type locality of *A. joaquin* is relatively safe from destruction by building because it is in an area where oil drilling is pre-eminent. However, there is danger from overgrazing, as with many sections of the Central Valley, in this instance from sheep. Efforts to save "desert pockets" should be made and the value of such relicts noted when possible.

As noted in the description, *A. joaquin* is most closely related to *A. luteus* and *A. hesperus*. It is a much more slender insect than either of these species and may spend more of its time in shrubbery than either of the two relatives which are predominantly ground dwellers.

Genus *IDIONOTUS* Scudder

Species of *Idionotus* are confined to southern Oregon and California west of the crest of the Sierra. Seven species have been described and additional collecting in the mixed evergreen forests and California oakwood plant communities is bound to yield more. Most species of the genus are drab, brown small-sized katydids found as adults in early summer. Of particular significance is the complexity and diversity of the male genitalia. These insects show the greatest specialization in this character among any Nearctic Decticinae. Very little observational data is available on the function of these structures during mating but Rentz and Birchim (1968) figured both sexes of all species and presented keys to species and discussed distributional patterns within the genus. A redescription and further distributional information on *I. lundgreni* Rentz and Birchim is presented below.

Idionotus lundgreni Rentz and Birchim (Figs. 29, 41a, 41b)

Idionotus lundgreni Rentz and Birchim, 1968: 133. Type locality: Twain Harte, Tuolumne County, California, holotype female, in California Academy of Sciences.

Idionotus lundgreni was described from three topotypes, two females and a last instar male. A redescription of the species is presented below with illustrations of the male genitalia and further distributional data.

Diagnosis. — Size medium for genus, form rather slender. Cercus of male small, elongate (fig. 29), internal tooth prominent, similar to *I. brunneus*.

Tergite ten of male with moderately broad, shallow incision (fig. 29); titillator (figs. 41a, 41b) in two portions, tubular portion with apex blunt, toothed, recurved, main portion massive, apex truncate, divided. Female with cerci broad, in basal two-thirds narrowed to apex, conical, straight, not incurved. Coloration uniform dark brown or light grey with broad, brownish streaks.

Description of male sex. — Head with fastigium of vertex broad, low, two and one-half times as broad as first antennal segment. Eye dorso-ventrally elongate, slightly more than twice the length of first antennal segment. Pronotum with lateral carinae percurrent, divergent on anterior surface; anterior transverse sulcus weak indistinct, median V-shaped sulcus rather deeply incised, continuous almost to outer margin; lateral lobes strongly declivent, humeral sinus weak, callosity moderately developed. Tegmina exposed for most of their length, well beyond stridulatory file. Prosternum unarmed, mesosternum with two short, triangulate projections. Tenth abdominal tergite with broad, shallow median excavation, lateral projections triangulate. Cercus elongate (fig. 29) with subapical inner tooth. Subgenital plate broad with V-shaped medial incision, styles three to four times longer than broad, shorter than length of one side of medial incision. Genicular lobes of fore and middle femora unarmed, hind femur with spine on inner apex. Ventral femoral surfaces unarmed except inner surface of hind femur which has four to six short spines. Fore tibia armed on dorsal surface with three spines on posterior margin, anterior margin unarmed. Middle tibia armed on dorsal surface with two spines mesad on anterior margin, posterior margin with four evenly spaced spines. Hind tibia armed on dorsal surface with 24 spines on inner and outer margins. Apex of hind tibia armed on dorsal surface with two short apical calcars of equal lengths; ventral surface with four apical calcars, innermost calcar elongate, apex curved.

Female as in original description of species with following additional comments: penultimate tergite straight or weakly convex; tenth tergite with somewhat broader U-shaped medial incision, the lateral angles acutely pointed; cercus conical, straight, not directed upward or ventrad, apical one-third evenly tapered, apex narrow but not uncinat; subgenital plate about as long as broad, distal margins folded,

medial incision U-shaped, not V-shaped as in *I. tuolumne*, *I. incurvus*, more like *I. brunneus* in this respect.

Records. — The following records extend the known distribution of the species. CALIFORNIA: MARIPOSA COUNTY: Yosemite Valley, 20 August 1962 (D. Gibo collector, 1 ♂, 1 ♀, DCR); 11 October 1969 (C. F. Fusaro, 1 ♂ on bracken, DCR); Yosemite Falls, 24 July 1968 (J. D. Haddock, 1 ♀ last instar nymph, DCR). TUOLUMNE COUNTY: Camp Mather, Hetch Hetchy road, 5,000 ft. elev., 23 June 1969, last instars, matured mid July 1969 (D. C. and K. A. Rentz, 6 ♂ ♂, 7 ♀ ♀, DCR).

Specimens studied. — 17.

Measurements

	Males	Females
Number of specimens examined	7	5
Total length	16.0-18.0	16.0-23.0
Median length of pronotum	5.0- 5.3	5.1- 6.0
Posterior width of pronotum	3.3- 3.6	3.1- 3.6
Tegminal protrusion beyond pronotum	1.6- 3.2	1.3- 1.6
Length hind femur	18.4-22.1	20.6-23.0
Length ovipositor		15.6-17.9

Discussion. — The geographic range of *I. lundgreni* is considerably broadened by the collections noted above. That the species is tolerant of a variety of ecological situations is attested to by the following: W. E. Ferguson (personal communication) states that Mr. Fusaro collected the male from Yosemite on a small island in the Merced River near Camp 11, not far from Happy Isles. The katydid was found on a bracken fern, *Pteridium aquilinum*, in an area of very wet soil in a heavily foliated region of the island. On the other hand, the series from Hetch Hetchy road was found on a dry northeast hillside in grasses (dry) and herbaceous vegetation under oaks where the nymphs were easily discovered by trampling low-growing plants.

Both the concealed and external genitalic structures of the adult male suggest closer relationship to *I. brunneus* than to *I. siskyou* in contrast to previous opinion. The "tongue" of the titillator is more bulbate and spined as in the latter species, whereas in the former the tongue is flat, caplike, and not at all inflated. The cerci of the male are strikingly similar to those of *I. brunneus* (compare figs. with fig. 27H, Rentz and Birchim, 1968), differing principally in

the length of the tooth and the proportional amount of thickness of the main shaft.

LOCALITY DATA FOR SPECIMENS FIGURED

- Ateloplus joaquin*, Figs. 28, 40, paratopotype.
Eremopedes (E.) ateloploides, Figs. 6, 7, 45a, 45b, holotype.
Eremopedes (E.) colonialis, Figs. 22, 35, 44, 51, paratopotypes.
Eremopedes (E.) ephippiata, Fig. 19, holotype male, 33a, 33b, 42, 49, Carr Canyon, Arizona.
Eremopedes (E.) sonorensis, Figs. 20, 34a, 34b, 34c, 43, 50, Alamos, Sonora, Mexico.
Eremopedes subcarinata, Fig. 14, holotype female.
Eremopedes (E.) tectinota, Figs. 9, 23, 36, 46a, 46b, paratopotypes.
Eremopedes (O.) balli, Fig. 10, holotype male; 25, Oak Creek Canyon, Arizona; 55, allotype, Williams, Arizona.
Eremopedes (O.) californica, Fig. 26, paratype; 38, holotype; 47a, 47b, 56, allotype.
Eremopedes (O.) cylindricerca, Figs. 27, 37, holotype.
Eremopedes (O.) cryptoptera, Fig. 11, five miles West of Westgard Pass, California.
Eremopedes (O.) pintiati, Figs. 12, 24, 39, 54, paratopotypes.
Idionotus lundgreni, Figs. 29, 41a, 41b, Hetch Hetchy Road, Camp Mather, California.
Inyodectes bandari, Figs. 4, 17, 32, holotype male.
Inyodectes schlinger, Figs. 1, 2, 18, 31, holotype; 48, allotype.
Inyodectes spinosa, Figs. 15, 16, 30, paratopotype.

LITERATURE CITED

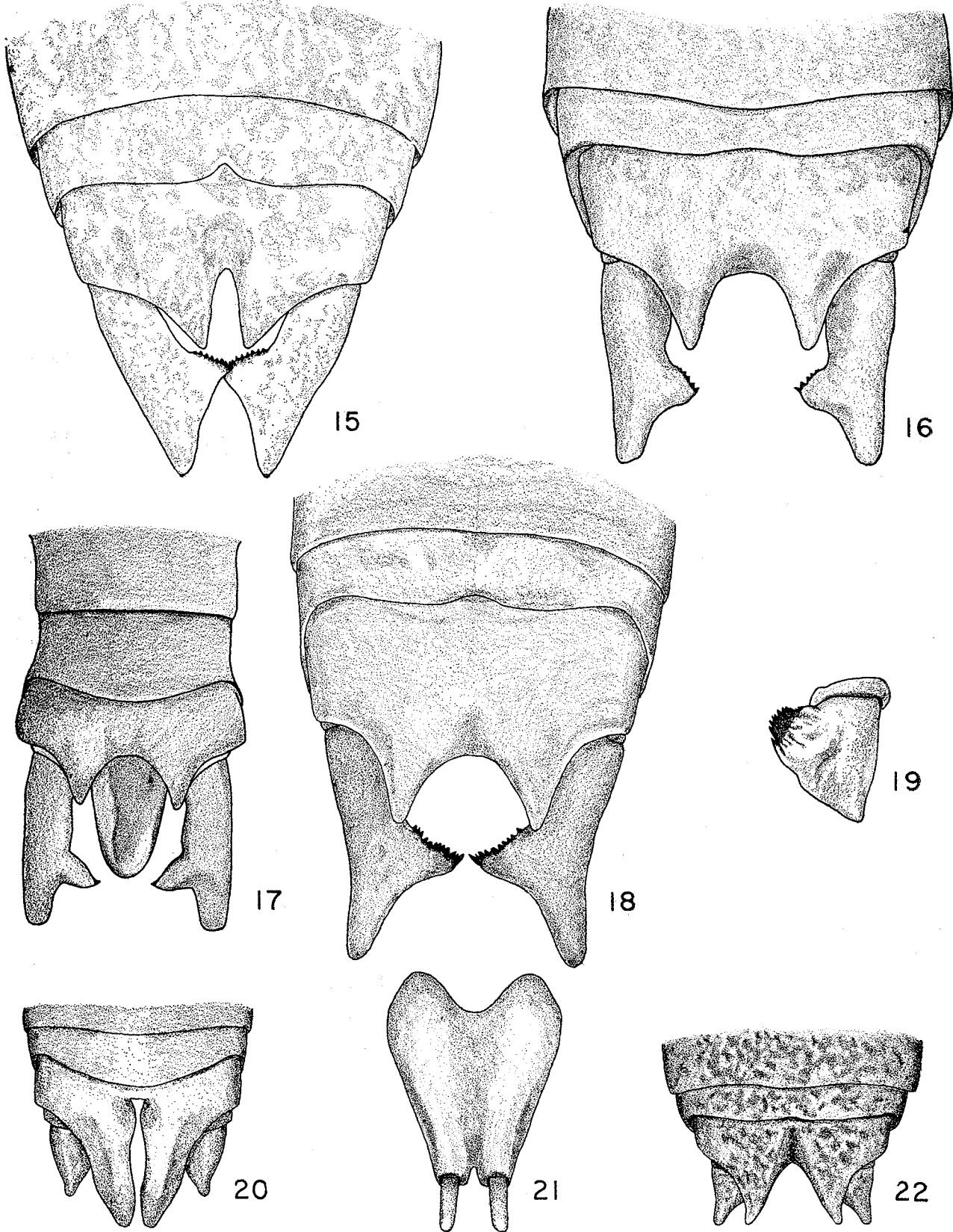
- CAUPELL, A. N. 1907. The Decticinae (a group of Orthoptera) of North America. — *Proceedings of the United States National Museum*, 32: 285-410, figures 1-94.
 COCKERELL, T. D. A. 1898. New North American Insects. — *Annals of the Magazine of Natural History*, 7(2): 321-331.
 DURHAM, J. W. AND E. C. ALLISON. 1960. The biogeography of Baja California and adjacent seas. I. Geologic history. The geologic history of Baja California and its marine faunas. — *Systematic Zoology*, 9(2): 47-91, 7 figures, 9 tables.
 HEBARD, M. 1923. XV. Expedition of the California Academy of Sciences to the Gulf of California in 1921. The Dermaptera and Orthoptera. — *Proceedings of the California Academy of Sciences*, fourth series, 12(15): 319-340, 13 figures.

- HEBARD, M. 1932. New species and records of Mexican Orthoptera. — *Transactions of the American Entomological Society*, 58(967): 201-371, plates 17-21.
- KIRBY, W. F. 1906. A synonymic catalog of Orthoptera. Vol. II. Orthoptera, Saltatoria. Part I (Achetidae, Phasgonuridae). — London, 592 pages.
- KÜCHLER, A. W. 1964. Potential natural vegetation of the conterminous United States. — *American Geographical Society, Special Publication No. 36*, 1-116, illustrations with 1 map.
- LEOPOLD, A. S. 1959. Wildlife of Mexico: The gamebirds and mammals. — *University of California Press, Berkeley*, 568 pages, many illustrations.
- REHN, J. A. G. AND M. HEBARD. 1916. Studies in American Tettigoniidae (Orthoptera). VII. A revision of the species of the genus *Atlantius* (Decticinae). — *Transactions of the American Entomological Society*, 42: 33-100, plates 6-8, 70 figures.
- REHN, J. A. G. AND M. HEBARD. 1920. Descriptions of new genera and species of North American Decticinae (Orthoptera; Tettigoniidae). — *Transactions of the American Entomological Society*, 46: 225-265, plates 8-11, 42 figures.
- RENTZ, D. C. AND J. D. BIRCHIM. 1968. Revisionary studies in the Nearctic Decticinae. — *Memoirs of the Pacific Coast Entomological Society*, 3: 1-173, 37 figures.
- SCUDDER, S. H. 1897. Guide to the genera and classification of the North American Orthoptera found north of Mexico. — Cambridge, 89 pages.
- SCUDDER, S. H. 1899. Two genera of North American Decticinae. — *Proceedings of the American Academy of Arts and Sciences*, 35(5): 81-93.
- . 1900. Catalog of the described Orthoptera of the United States and Canada. — *Proceedings of the Davenport Academy of Natural Sciences*, 8: 1-101, plates 1-3.
- TINKHAM, E. R. 1944. Biological, taxonomic and faunistic studies on the shield-backed katydids of the North American deserts. — *American Midland Naturalist*, 31: 257-328, 28 figures.
- AND D. C. RENTZ. 1969. Notes on the biometrics and distribution of the genus *Stenopelmatus* in Central California with the description of a new species. — *Pan-Pacific Entomologist*, 45(1): 4-14.
- TRUXAL, F. S. 1960. The biogeography of Baja California and adjacent seas. III. Terrestrial and fresh-water biotas. The entomofauna with special reference to its origin and affinities. — *Systematic Zoology*, 9(3-4): 165-170, 1 figure.
- UVAROV, B. P. 1928. Orthoptera Palearctica critica. VI. Genus *Bergiola* Stschelk. — *Eos, Revista Espanola de Entomologia*, 4(2): 243-251, 7 figures.
- WILLIAMS, S. C. 1970. Scorpion fauna of Baja California, Mexico: Eleven new species of *Vejovis* (Scorpionida: Vejovidae). — *Proceedings of the California Academy of Sciences*, fourth series, 30(8): 275-332.

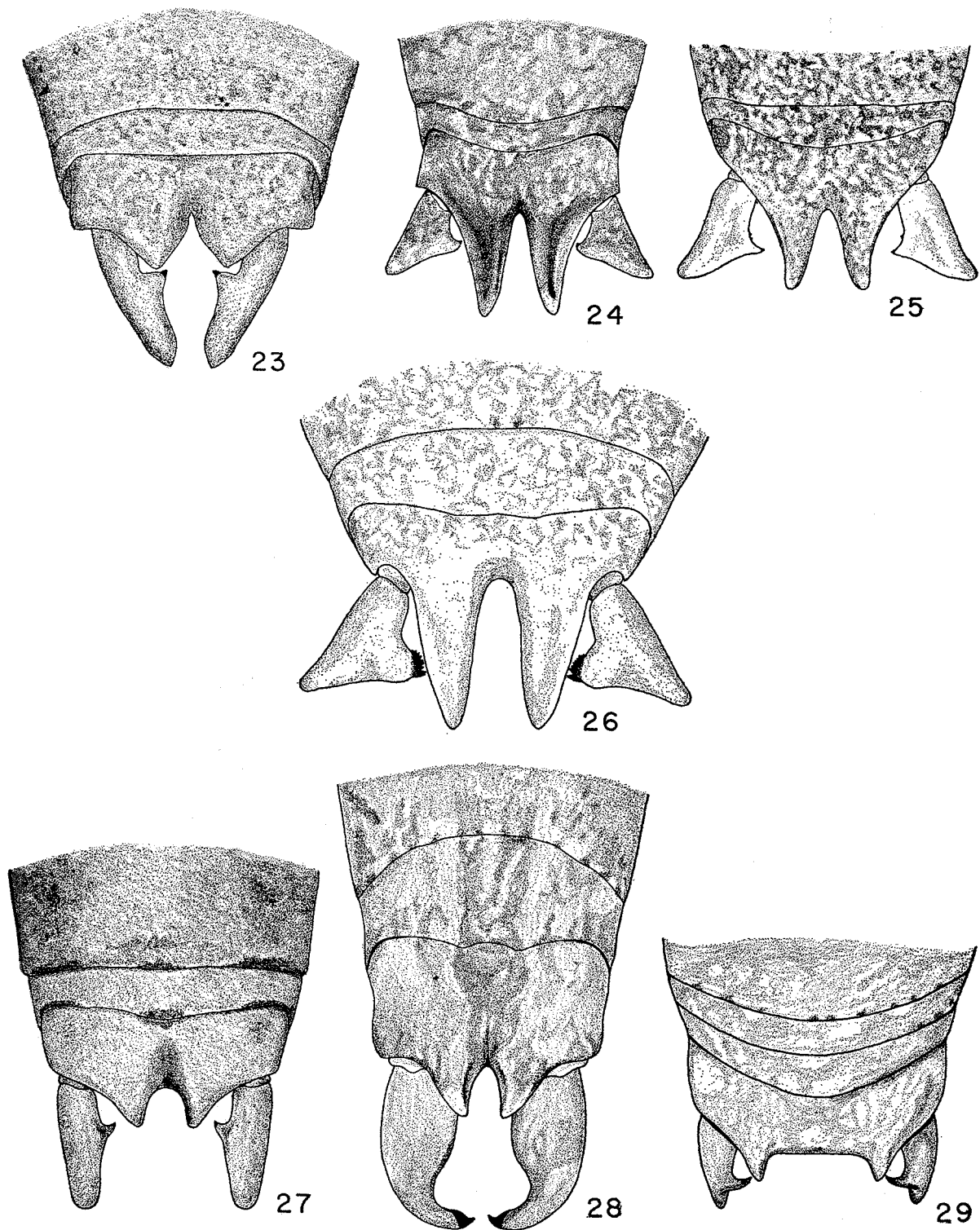
REVIEWERS OF THIS PAPER:

Ashley B. Gurney, Systematics Laboratory, U.S. National Museum, Washington, D.C. 20560

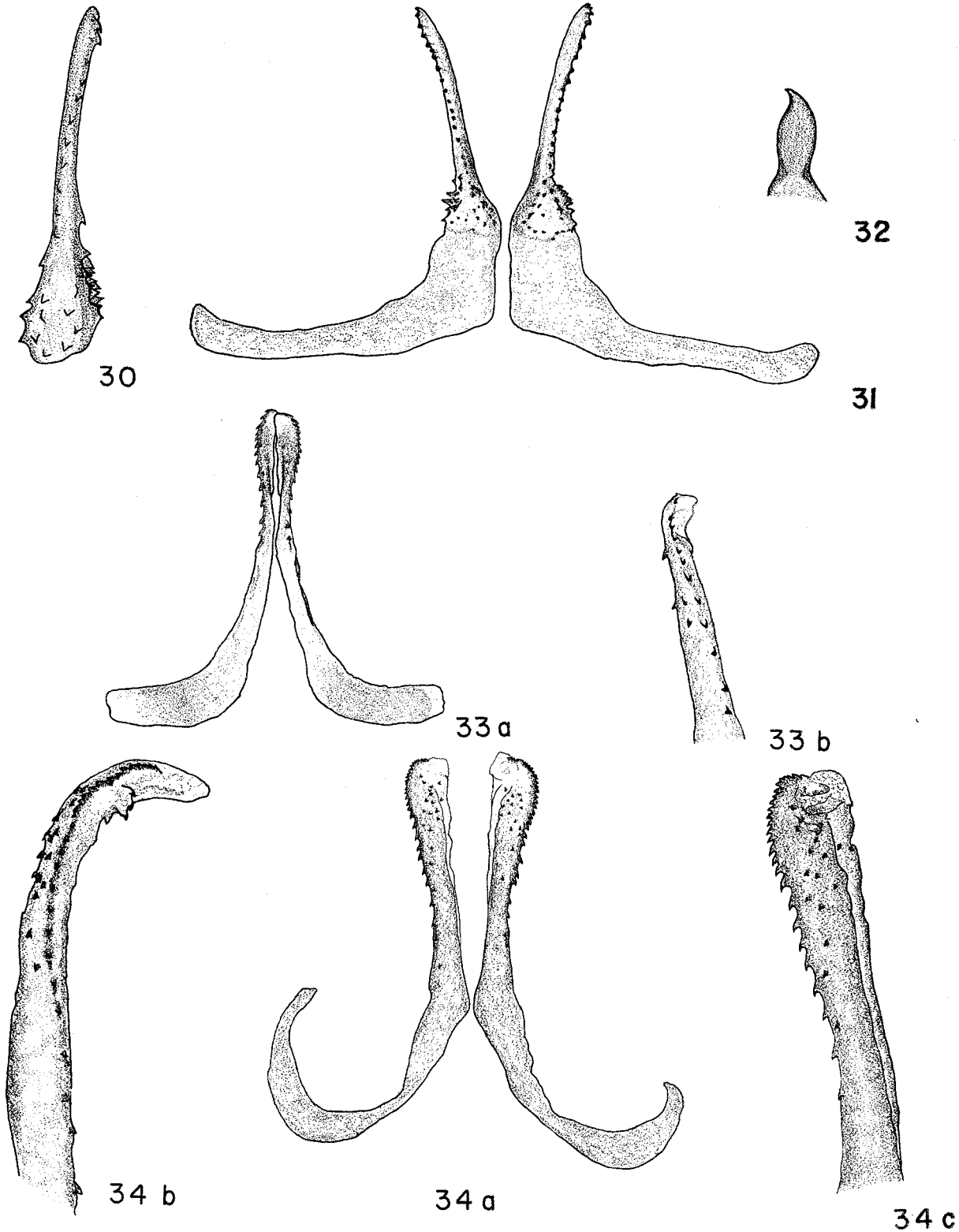
H. Radclyffe Roberts, Department of Entomology, Academy of Natural Sciences of Philadelphia.



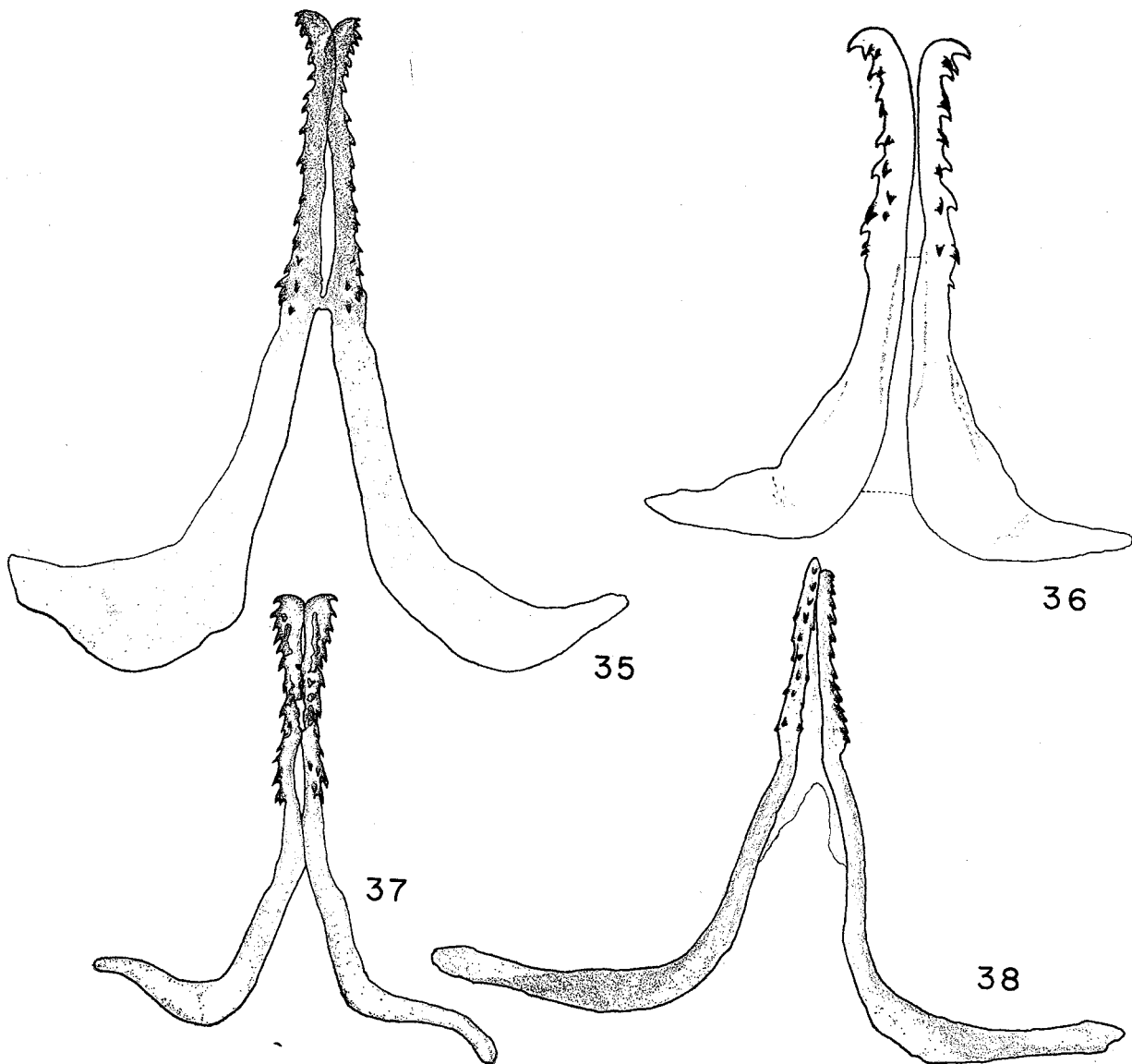
FIGURES 15-22.—Terminalia of males of *Inyodectes* and *Eremopedes*. Figs. 15-16, *I. spinosa*; 17, *I. bandari*; 18, *I. schlingeri*; 19, cercus holotype *E. ephippiata*; 20, *E. (E.) sonorensis*; 21, subgenital plate, 50 ×; 22, last abdominal segment, *E. (E.) colonialis*. All at 25 × except where noted.



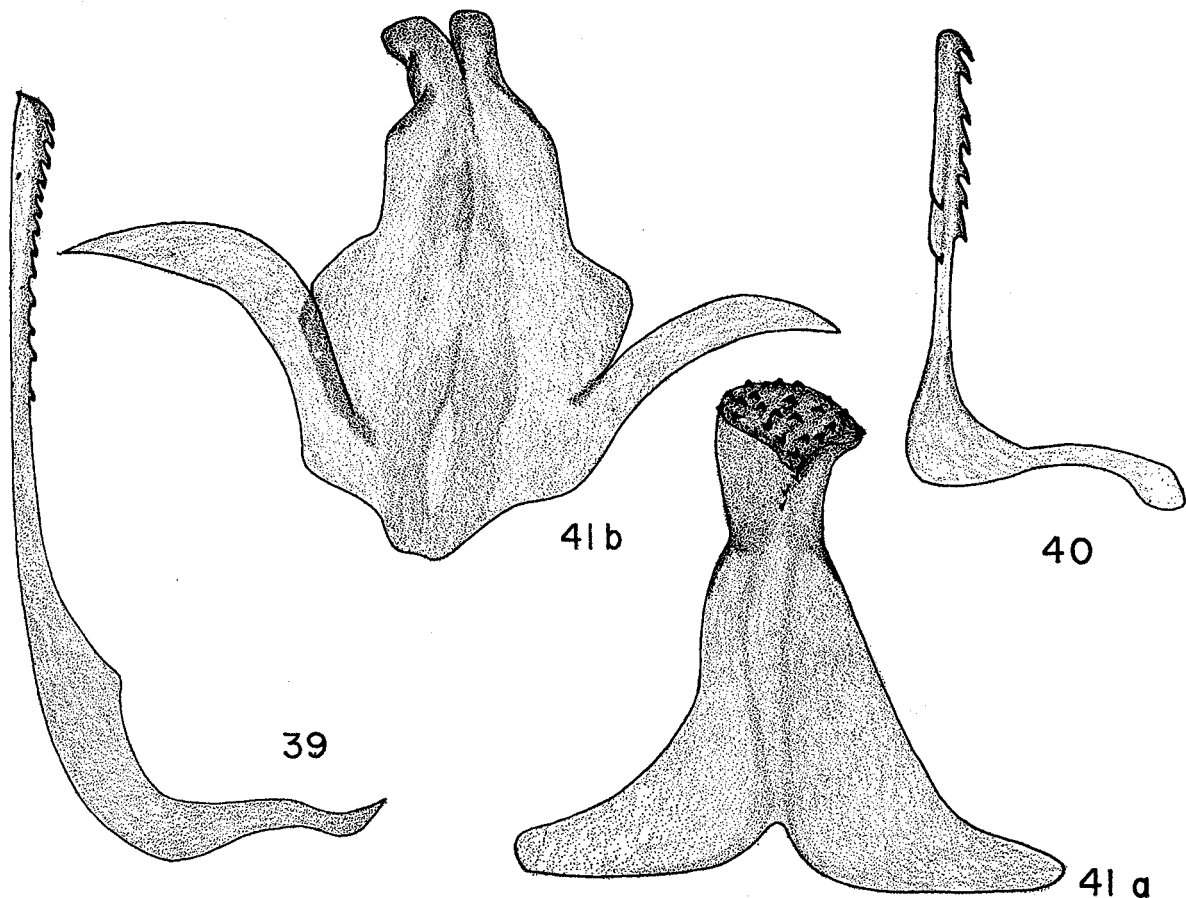
FIGURES 23-29. — Terminalia of males of species of the *Eremopedes* and other genera. Fig. 23, *E. (O.) tectinota*; 24, *E. (O.) pintiati*; 25, *E. (O.) balli balli*; 26, *E. (O.) californica*; 27, *E. (O.) cylindricerca*; 28, *Ateloplus joaquin*; 29, *Idionotus lundgreni*. All at 25 \times .



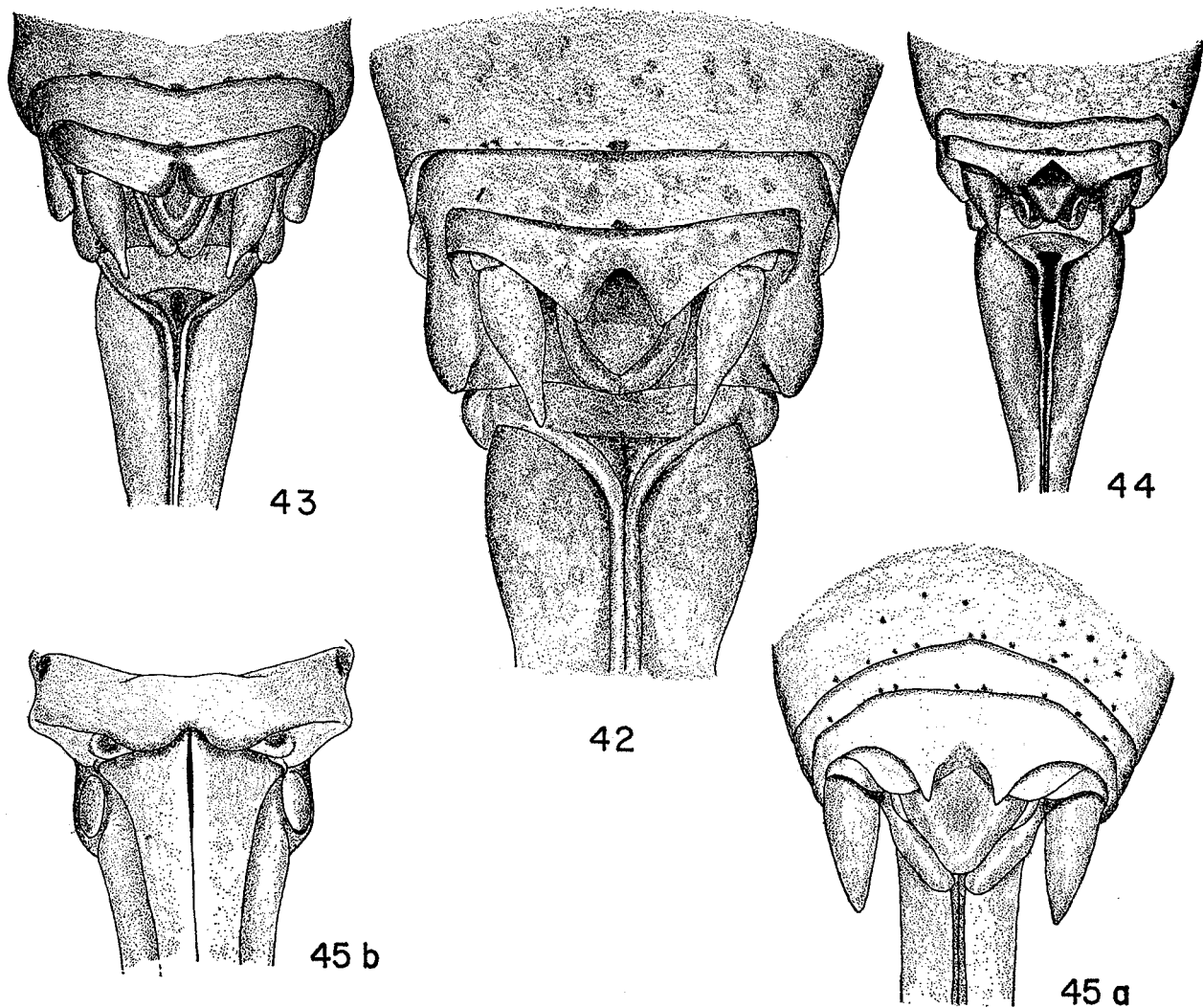
FIGURES 30-34.—Titillators of males of *Inyodectes* and *Eremopedes* species. Fig. 30, *I. spinosa*; 31, *I. schlingeri*, 25×; 32, *I. bandari*; 33a, *E. (E.) ehippiata*, 25×, 33b, lateral view apex; 34a, *E. (E.) sonorensis*, 34b, lateral view apex, 34c, dorsal view apex. All at 50× except where noted.



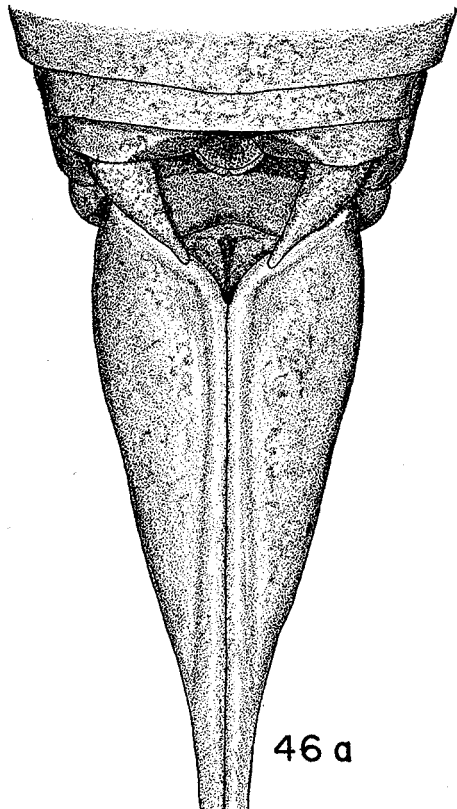
FIGURES 35-38.—Titillators of males of *Eremopedes* species. Fig. 35, *E. (E.) colonialis*; 36, *E. (E.) tectinota*; 37, *E. (O.) cylindricerca*; 38, *E. (O.) californica*. All at 50 \times .



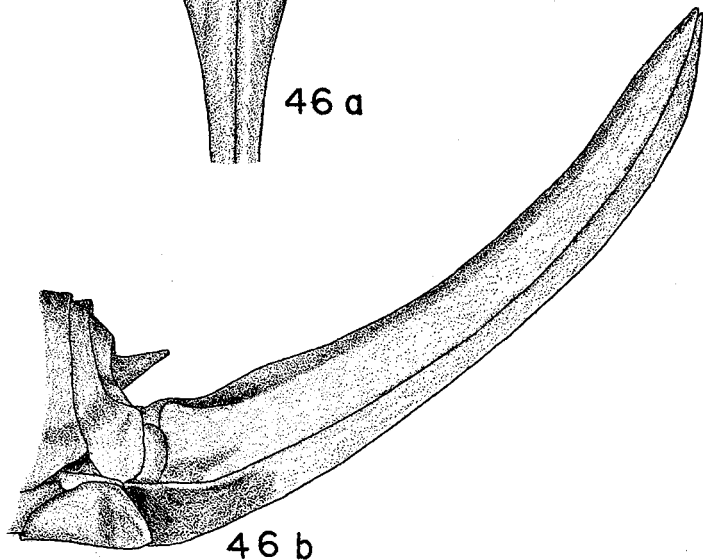
FIGURES 39-41. — Titillators of males of *Eremopedes* and other genera. Fig. 39, *E. (O.) pintiati*, right arm; 40, *Ateloplus joaquin*, right arm; 41a, *Idionotus lundgreni*, tubular portion, 41b, main portion. All at 50 \times .



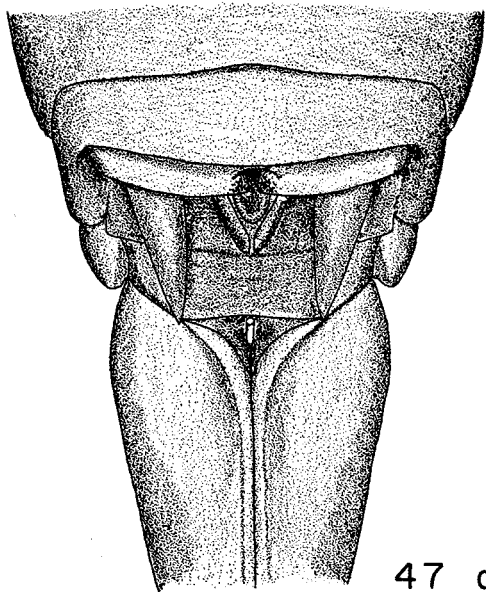
FIGURES 42-45. — Terminalia of females of *Eremopedes* species. Fig. 42, *E. (E.) ehippiata*, 25×; 43, *E. (E.) sonorensis*, 12×; 44, *E. (E.) colonialis*, 12×; 45a, *E. (E.) ateloploides*, dorsal view, 25×, 45b, ventral view, 25×.



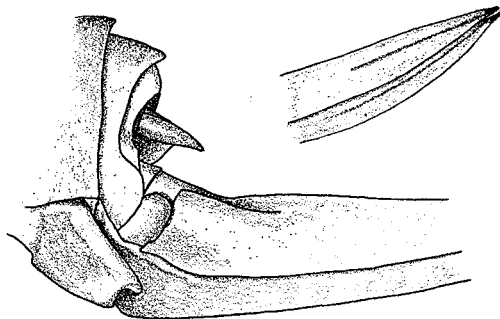
46 a



46 b

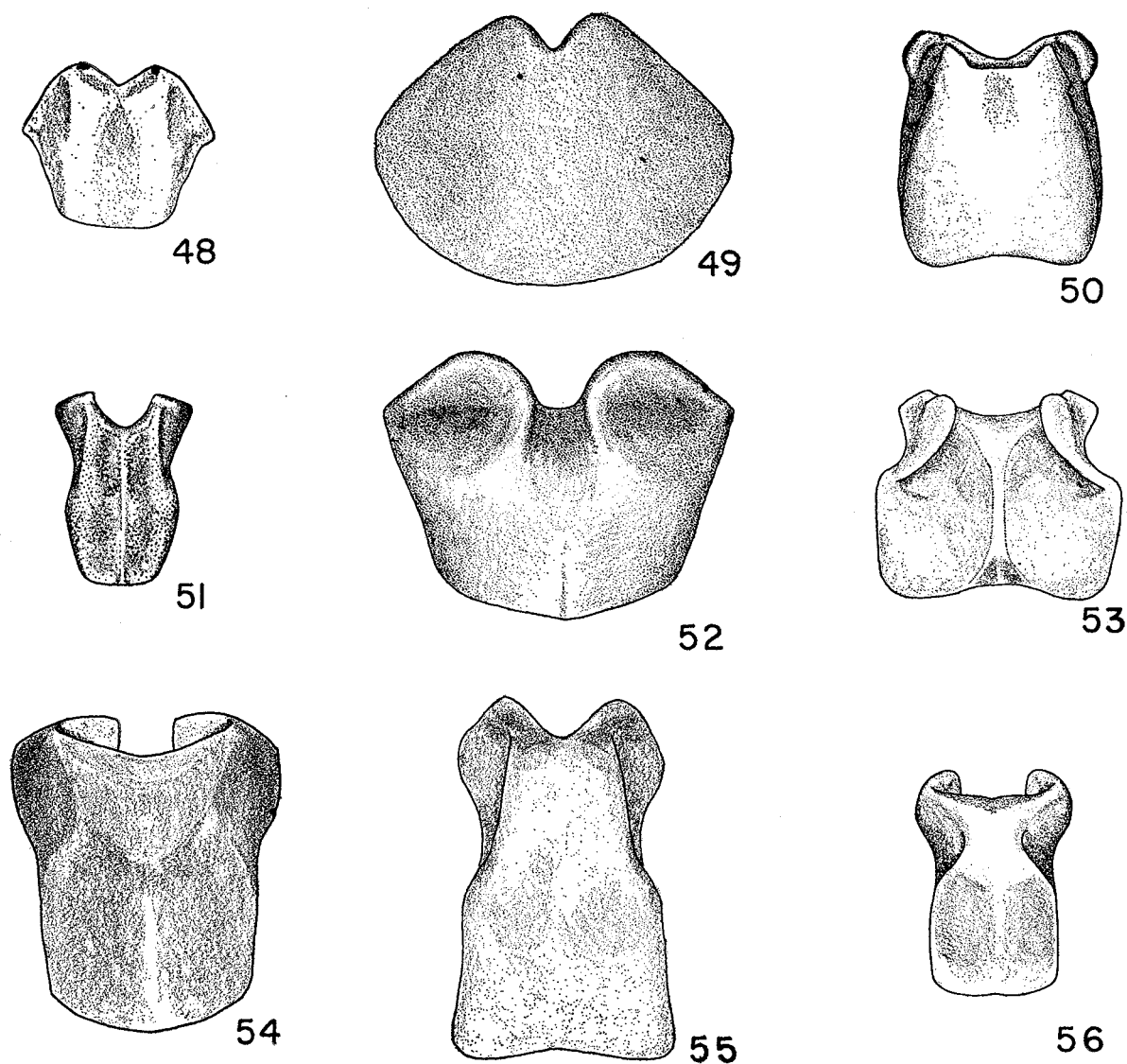


47 a



47 b

FIGURES 46-47. — Terminalia of females of *Eremopedes* species. Fig. 46a, *E. (E.) tectinota*, dorsal view, 25 \times , 46b, lateral view ovipositor, 12 \times ; 47a, *E. (O.) californica*, dorsal view, 25 \times , 47b, lateral view ovipositor, 12 \times .



FIGURES 48-56. — Subgenital plates of females of *Inyodectes* and *Eremopedes* species. Fig. 48, *I. schlingeri*, 12 ×; 49, *E. (E.) ehippiata*, 25 ×; 50, *E. (E.) sonorensis*, 12 ×; 51, *E. (E.) colonialis*, 12 ×; 52, *E. (E.) tectinota*, 25 ×; 53, *E. (O.) cryptoptera*, 12 ×; 54, *E. (O.) pintiati*, 25 ×; 55, *E. (O.) balli balli*, 25 ×; 56, *E. (O.) californica*, 12 ×.