

**A revision of *Eleodes* subgenus *Eleodes* Eschscholtz
(Coleoptera: Tenebrionidae)**

CHARLES A. TRIPLEHORN¹ DONALD B. THOMAS² & AARON D. SMITH³

¹Museum of Biological Diversity, The Ohio State University, 1315 Kinnear Road, Columbus, OH 43212,

²USDA-ARS Cattle Fever Tick Research Laboratory, 22675 N. Moorefield Rd., Edinburg, TX 78596

³Department of Biological Sciences, Northern Arizona University, Flagstaff, AZ 86001

(DT = Corresponding author, donald.thomas@ars.usda.gov)

ABSTRACT

Keys, descriptions and figures are provided for the identification of 30 species assignable to the nominate subgenus of the tenebrionid genus *Eleodes*. Three species groups can be recognized: the grandicollis group, containing only *E. grandicollis* Mannerheim; the obscurus group, containing *E. obscurus* (Say), *E. acutus* (Say) and *E. suturalis* (Say); and the dentipes group, containing *E. dentipes* Eschscholtz, *E. acuticaudus* LeConte, *E. adumbratus* Blaisdell, *E. armatus* (LeConte), *E. curvidens* Triplehorn & Cifuentes, *E. discinctus* Blaisdell, *E. eschscholtzi* Solier, *E. femoratus* LeConte, *E. gracilis* LeConte, *E. hispilabris* (Say), *E. loretensis* Blaisdell, *E. mexicanus* Blaisdell, *E. mirabilis* Triplehorn, *E. moestus* Blaisdell, *E. muricatus* Triplehorn, *E. rossi* Blaisdell, *E. rugosus* Perbosc, *E. samalayuca* Triplehorn, *E. sanmartinensis* Blaisdell, *E. scyropterus* Triplehorn, *E. spinipes* Champion, *E. sponsus* LeConte, *E. subcylindricus* Casey, *E. tenuipes* Casey, *E. vanduzeei* Blaisdell, and a new species described herein, *Eleodes fiski* Triplehorn.

Eleodes amadeensis Blaisdell and *Eleodes striatipennis* Blaisdell are synonymized under *Eleodes armatus* (LeConte). *Eleodes subpinguis* Blaisdell is synonymized under *Eleodes hispilabris* (Say). *Eleodes wickhami* Horn is synonymized under *E. eschscholtzi* Solier. The status of *Eleodes femoratus* LeConte 1851 under *E. militaris* Horn 1870, is reversed based on priority.

Key Words. false wireworms, darkling beetles, defensive posturing, mimicry

In a previous contribution (Triplehorn and Thomas 2012) we defined the genus *Eleodes* and revised the subgenera *Melaneleodes* Blaisdell and *Omegeleodes* Triplehorn & Thomas. In the present article we provide a revision of the nominate subgenus. The genus name *Eleodes*, and thus its nominate subgenus, was proposed by the Russian naturalist Eschscholtz (1829) to hold twelve species collected on an expedition to the western coast of North America. None were designated as type-species until Hope (1840) selected *Eleodes dentipes* Eschscholtz as the name bearer.

Horn (1870) divided *Eleodes* into three subgenera assigning those species with the plantar surface of the tarsus devoid of golden silky hairs or spongy pubescence to the nominate subgenus. Blaisdell (1909), in his comprehensive monograph on the genus, redefined Horn's subgenus based on

the structure of the female genitalia. In Blaisdell's arrangement the nineteen recognized species placed in the nominate subgenus included all of the species in which both genders have a tooth on the profemur, plus two distinctive species which have the tip of the elytra caudate.

In Blaisdell's arrangement he recognized three groups of species: the grandicollis group, containing only *E. grandicollis* Mannerheim, which he considered to be intermediate between the other two groups; the obscurus group, containing *E. obscurus* (Say), *E. acutus* (Say) and *E. suturalis* (Say); and the dentipes group containing the bulk of the species. He subdivided the dentipes group into group A with four species: *hispilabris* (Say), *sponsus* LeConte, *longipilosus* Horn, and *caudiferus* LeConte; and group B with eleven species: *dentipes* Eschscholtz, *armatus* (LeConte), *acuticaudus* LeConte, *eschscholtzii* Solier, *gracilis* LeConte,

militaris Horn, *subpinguis* Blaisdell, *subcylindricus* Casey, *tenuipes* Casey, *ventricosus* LeConte, and *wickhami* Horn. As a result of our studies we have removed *E. longipilosus* Horn and *E. caudiferus* LeConte from the subgenus with their final subgeneric placement held in abeyance.

Blaisdell mistakenly placed LeConte's species *E. femoratus* as a subspecies of *E. militaris* overlooking that *Eleodes femoratus* LeConte 1851 had priority over *Eleodes militaris* Horn 1870. In his monograph Blaisdell did not include Mexican species. *Eleodes spinipes* Champion and *E. rugosus* Perbosc belong to this subgenus and fall into the dentipes group. Subsequently, Blaisdell described as new, twelve species assignable to the dentipes group: *adumbratus*, *amadeensis*, *discinctus*, *ineptus*, *loretensis*, *marthae*, *mexicanus*, *moestus*, *morbosus*, *rossi*, *sanmartinensis*, *striatipennis*, and *vanduzeei*. More recently Triplehorn described five "dentipes" group species: *bidens*, *muricatus*, *mirabilis*, *samalayuae* and *scyropterus*, later adding *curvidens* Triplehorn & Cifuentes. In his revision of the *Eleodes* of Baja California, Triplehorn (1996) reduced *E. ineptus* and *E. marthae* to synonyms of *E. femoratus*, and *E. morbosus* to a synonym of *E. sanmartinensis*. As a result of the studies reported herein we reduce *E. striatipennis* and *E. amadeensis* to synonyms of *E. armatus* (LeConte), and *E. subpinguis* to a synonym of *E. hispilabris*. *Eleodes wickhami* Horn is synonymized under *E. eschscholtzi* Solier. A female of *E. bidens* was available for study which allowed us to determine that it belongs in the subgenus *Promus*. We also describe one new species, *Eleodes fiski* Triplehorn. This leaves a total of 30 species in the subgenus *Eleodes* which can be defined as follows.

***Eleodes* subgenus *Eleodes* Eschscholtz**

Members of the genus *Eleodes* with the dorsal surface of each second valvifer strongly concave, the edges reflexed, with the submarginal groove on its outer side visible from above (Fig. 1). With one exception, the mentum in both genders has a sloping tumescence at the middle, more elevated anteriorly with a broad projection (Fig. 2). With few exceptions the profemora of males, and sometimes the female, have a subapical tooth. In those species

which lack the profemoral tooth the elytra are caudate. The pronotum and disc of the elytron is smooth without long setae.

Key to the adults of the subgenus *Eleodes*

- | | | |
|-------|--|-----------------------------|
| 1 | Basal protarsomere thickened at apex ventrally, bearing a tuft of modified setae thus interrupting plantar groove; large species, 25-35 mm long. | 2 |
| 1' | Basal protarsomere not thickened at apex ventrally, and without tuft of setae; plantar groove open; size variable, both large and small species | 4 |
| 2(1) | Pronotum somewhat concave on either side of disc; dorsal side of each elytron with a carinate bead for most of its length (Figs. 50-51) | <i>E. suturalis</i> |
| 2' | Pronotum evenly convex; dorsal side of each elytron rounded or with a carina restricted to the humeral angle | 3 |
| 3(2') | Sides of elytra with a dorsolateral carina at humeral angle (fig. 5) | <i>E. acutus</i> |
| 3' | Sides of elytra rounded throughout (Fig. 33) | <i>E. obscurus</i> |
| 4(2') | Meso- and metafemora dentate (subdentate in some <i>femoratus</i> and <i>moestus</i>) | 5 |
| 4' | Meso- and metafemora not dentate | 9 |
| 5(4) | Basal three abdominal sterna coarsely, deeply punctate; Baja California | 6 |
| 5' | Basal three abdominal sterna finely punctured to almost impunctate. | 7 |
| 6(5) | Punctures of elytral intervals and striae strongly spiculiferous (especially laterally and apically) (Fig. 54); basal three abdominal sterna with punctures discrete | <i>E. vanduzeei</i> |
| 6' | Punctures of elytral intervals and striae slightly muricate, not spiculiferous laterally and apically (Fig. 24); basal three abdominal sterna rugosely punctured | <i>E. loretensis</i> |

- 7(5') Elytra more or less abruptly declivous apically (especially in female); body elongate, parallel-sided (Fig. 7); all femoral teeth usually long and acute; pronotum widest anterior to middle, sinuately narrowed to base . . . *E. armatus*
- 7' Elytra more evenly and gradually declivous apically, attenuate; body fusiform; femoral teeth usually more robust, stout, sometimes reduced on meso- and meta-femora; pronotum widest at about middle, usually not sinuate toward base **8**
- 8(7') Elytral punctures (both striae and intervals) slightly to strongly muricate (Fig. 32); hypomera with numerous fine, shiny, muricate, setigerous punctures, especially medially and anteriorly; metatibia more or less straight in both sexes . . . *E. moestus*
- 8' Elytral punctures simple or very finely muricate (Fig. 17); hypomera smooth or with at most a few non-setigerous, muricate punctures, metatibia notably curved (sigmoid) in male, strongly bent in female *E. femoratus*
- 9(4') Pronotum with lateral margins strongly arcuate in dorsal view, usually narrowing in basal one third **10**
- 9' Pronotum with lateral margins moderately to feebly arcuate in dorsal view **13**
- 10(9) Pronotum with anterior angles rounded (sometimes with very small everted teeth) (Fig. 18) *E. grandicollis*
- 10' Pronotum with anterior angles acute, dentiform **11**
- 11(10') Pronotum not at all constricted at base (Fig. 46) *E. sanmartinensis*
- 11' Pronotum distinctly constricted at base **12**
- 12(11') Pronotum extremely broadly expanded laterally, twice as wide as head in dorsal view (Fig. 4) *E. acuticaudus*
- 12' Pronotum moderately broadly expanded laterally, less than twice as broad as head in dorsal view (Fig. 9) *E. dentipes*
- 13(9') Pronotum coarsely and densely punctured, punctures separated by less than their diameters **14**
- 13' Pronotum finely and sparsely punctured, punctures separated by much more than their diameters **15**
- 14(13) Mentum with a projecting middle lobe (Fig. 2) *E. rugosus*
- 14' Mentum with front edge emarginated at middle (Fig. 3) *E. fiski* n. sp.
- 15(13') Elytral punctures distinctly muricate (either striae or interval punctures or both) **16**
- 15' Elytral punctures simple or very finely muricate (finely asperate at apex in *E. tenuipes*) **22**
- 16(15) Pronotum widest anterior to middle . . . **17**
- 16' Pronotum widest at middle **19**
- 17(16) Pronotum with apical margin truncate, angles obtuse, not prominent (Fig. 37) lateral marginal bead very fine, northern Chihuahua *E. samalayuca*
- 17' Pronotum with apical margin broadly, shallowly emarginated, angles acute, prominent, often dentiform, lateral marginal bead strong **18**
- 18(17') Elytra distinctly punctate-striate, intervals convex (Fig. 23) *E. hispilabris*
- 18' Elytra indistinctly punctate-striate, intervals not evident, rugosely sculptured (Fig. 48) *E. sponsus*

- 19(16') Pronotum quadrate or longer than broad, shiny, mainland Mexico. **20**
- 19' Pronotum broader than long, dull and alutaceous (Fig. 6) (channel islands, Baja California) *E. adumbratus*
- 20(19) Elytra with sutural and three prominent discal costae, the first and third uniting and continuing almost to apex; intervals between costae with short, dense, setigerous punctures which frequently collect argillaceous material contrasting sharply with costae (Fig 28) *E. mirabilis*
- 20' Elytra not sculptured as above, punctures subseriate, with several sizes of muricate, usually setigerous, punctures. **21**
- 21(20') Pronotum longer than broad; males caudate (Fig. 47). *E. scyropterus*
- 21' Pronotum quadrate, males not caudate though elytral apex bifid (Fig. 27). *E. muricatulus*
- 22(15') Pronotum widest anterior to middle, lateral margin sinuate; smaller species less than 20 mm long **23**
- 22' Pronotum widest at middle, usually not sinuate. Large, robust species, usually 25 mm long or greater **24**
- 23(22) Elytral luster dull, striae punctures very fine, intervals flat (Fig. 35) *E. rossi*
- 23' Elytral luster shiny, striae punctures moderate to coarse, intervals subconvex (Fig. 20) or flat (*E. g. distans*) *E. gracilis*
- 24(22') Profemoral tooth bent downward (Fig. 8); metatibia not expanded apically in either sex *E. curvidens*
- 24' Profemoral tooth not bent downward . . . **25**
- 25(24') Metatibia of males bent and abruptly expanded in apical half; females with body slender **26**
- 25' Metatibia of males gradually expanded from base to apex; body of females robust **27**
- 26(25) Anterolateral angle of pronotum dentiform (Fig. 15) (Baja California Sur) *E. eschscholtzi lucae*
- 26' Anterolateral angle of pronotum acute, weakly produced (Fig. 14) (western Mexican mainland and SWUS). *E. eschscholtzi eschscholtzi*
- 27(25') Punctures of elytral striae distinctly larger than those of intervals; surface luster shiny; males usually with distinct cauda (except *E. mexicanus*) **28**
- 27' Punctures of elytral striae subequal in size to those of intervals; surface luster dull; males with apex of elytra acuminate, but without distinct cauda **29**
- 28(27) Elytral striae with punctures in grooves, intervals subconvex (Fig. 49); southern California Nevada, Baja California. *E. subcylindricus*
- 28' Elytral striae with punctures not in grooves, intervals flat (Fig. 11); northern Baja California. *E. discinctus*
- 29(27') Elytra with punctures of elytral intervals becoming conspicuously spiculiferous laterally and on apical declivity, extending onto cauda (Fig. 53). *E. tenuipes*
- 29' Elytra with punctures of intervals simple from base to apex. **30**
- 30(29') Pronotum flat, basal angles obtusely angulate; elytra subparallel-sided; males fusiform, usually ecaudate (Fig. 25); Baja California. *E. mexicanus*
- 30' Pronotum convex from side to side, basal angles obtusely rounded; elytra broadest in posterior third in both sexes (Figs. 40-45); males often distinctly caudate *E. spinipes*

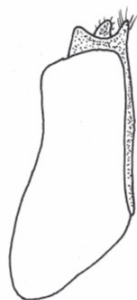


Fig. 1. Right second valvifer of female *Eleodes obscurus*.



Figs. 2-3. Mentum and associated mouthparts in ventral view. 2. *E. rugosus*, 3. *E. fiski*.

***Eleodes acuticaudus* LeConte**

(Fig. 4, Map 1)

- Eleodes acuticauda* LeConte, 1851. Ann. Lyc. Nat. Hist. New York 5:135.
Eleodes laticollis LeConte, 1851. Ann. Lyc. Nat. Hist. New York 5:135.
Eleodes (Eleodes) acuticauda: Horn, 1870. Trans. Am. Philos. Soc. 14:314.
Eleodes (Eleodes) acuticauda forma *punctata* Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 63:280.
Eleodes (Eleodes) acuticauda laticollis forma *insularis* Blaisdell, 1909. U.S. Natl. Mus. No. 63:284.
Eleodes (Eleodes) acuticauda laticollis forma *minor* Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 63:283.
Eleodes acuticauda laticollis forma *muricata minor* Blaisdell, 1910. Ent. News 21:62.
Eleodes acuticauda laticollis forma *muricata major* Blaisdell, 1910. Ent. News 21:62.
Eleodes laticollis apprima Blaisdell, 1921. Stanford Univ. Publ. Biol. Sci. 1:219. [*nomen novum* for *insularis* Blaisdell].
Eleodes laticollis minor: Blaisdell, 1925c. Pan-Pacif. Entomol. 2:80.
Eleodes acuticauda var. *punctata*: Blaisdell, 1925c. Pan-Pacif. Entomol. 2:80.
Eleodes acuticauda punctata: Tanner, 1961. Great Basin Nat. 21:73.

Diagnosis — This large smooth, shiny species is easily recognizable by the broadly expanded disc of the pronotum. In dorsal view the lateral margins are evenly arcuate except for the basal constriction, and each anterior angle is strongly produced as an acuminate tooth. The prosternum has a short digitoid production. The mentum rugosely punctate, basally excavate, the anterior margin truncately arcuate. Both genders have dentate profemora and though less pronounced in females, both genders are caudate, the epipleuron ending just before the elytral apex. Female length: 24-29 mm, width: 7.7-9.8 mm. Male length: 16.0-30.5 mm; width: 4.8-10.8 mm.

Types — *E. acuticauda*, Holotype, (MCZC No. 4579), gold disc label (=California); *E. laticollis*, Holotype, (MCZC No. 4580), gold disc label (=California). *E. laticollis apprima*, Holotype, female, (CASC No. 904), allotype, male, (CASC No. 905), S. Nicholas Is., III-28-18, J. R. Slevin.

Distribution — This species occupies a rather narrow range from Tulare County California to the San Pedro Martir Mountains of Baja California. Within its range it appears to be rather common.

More than 200 specimens were studied. Records indicate that it is found throughout the year.

Remarks — LeConte described *acuticauda* and *laticollis* on the same page in 1851. Blaisdell (1909) considered them to be subspecific in rank. However, specimens from San Nicolas Island were described as a form that he gave the latin name *insularis*, which became a homonym when raised to a subspecies by him in 1921. This necessitated a new name for which he proposed *E. laticollis apprima*, having by then changed his mind about the status of *laticollis* as a species. After studying large series from a number of localities, including the types from San Nicolas, we have concluded that all of these represent normal variation in *E. acuticaudus*. We detected no geographical trend in the variation requiring recognition of subspecies.

Eleodes acuticaudus is part of a müllerian mimicry complex that involves species of the genus *Coelocnemis* (Doyen and Somerby 1974). The mimicry includes the defensive posture associated with the threatened release of dissuasive chemicals known as headstanding (Tschinkel 1975). In spite of its defenses it is recorded as a regular prey item for the endangered channel island fox (Doyen 1974). The species was identified among the subfossil material from the La Brea tar pits by Grinnell (1908), a determination confirmed by Doyen and Miller (1980).

***Eleodes acutus* (Say)**

(Fig. 5, Map 1)

- Blaps acuta* Say, 1824. J. Acad. Nat. Sci. Phila. 3:258.
Eleodes acuta: Eschscholtz, 1829. Zoologischer Atlas 3:10.
Eleodes (Eleodes) acuta: Horn, 1870. Trans. Am. Philos. Soc. 14:306.
Eleodes acuta pernigra Blaisdell, 1937. Trans. Am. Entomol. Soc. 63:128.

Diagnosis — This is one of the largest species of *Eleodes*. It is most similar to *E. suturalis*, differing from that species in having the elytral sides rounded with a distinct dorsal marginal bead restricted to the humeral angle. Also the pronotal disc is convex to flat and not reflexed laterally. From *E. obscurus*, another large species, it may be distinguished by the marginal bead extending on

to the side of the elytron from the humeral angle (no dorsal marginal bead in *E. obscurus*). The taxon described as *E. a. pernigra* is a not unusual variation of *E. acutus*. Females: length: 29.5-33.2 mm; width: 13.0-16.8 mm. Males: length: 28.0-36.5 mm; width: 12.5-15.0 mm.

Types — *Blaps acuta*. Not seen, presumed lost. Type-locality, “near Council Bluffs, Missouri” [Iowa]. *Eleodes acuta pernigra*. Holotype, female, Katherine, Texas; allotype, male, Sarita, Texas (both in INHS).

Distribution — This species occupies a relatively narrow range in the prairie states from western South Dakota, Nebraska, Kansas, to eastern Colorado, south through the Texas Panhandle to the lower Rio Grande Valley and New Mexico. We have seen specimens labeled Arizona (Globe, Maricopa Co) which may be mislabeled. We also have reservations about Say’s type locality at Council Bluff’s where the Long expedition overwintered, suspecting that it was collected further west.

Remarks — We have seen no large series of this species; the most taken at any one place and time is four. It is not common in collections, less than 70 specimens having been studied by us. Blaisdell (1909) saw only 28 specimens.

Eleodes adumbratus Blaisdell

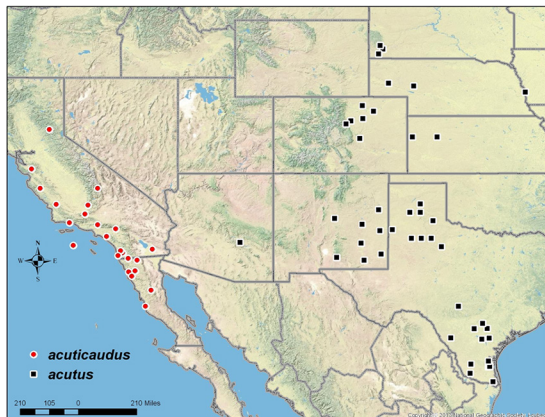
(Fig. 6, Map 2)

Eleodes (Eleodes) adumbrata Blaisdell, 1925. Proc. Calif. Acad. Sci. 14:332.

Diagnosis — This species may be recognized by the feebly subcostate elytral intervals and very fine, uniform, sometimes regular, sometimes irregular, muricate punctures on both the striae and intervals. Rather conspicuous brownish setae are present on the elytra, especially laterally, on the apical declivity and on the abdominal sterna. Both genders in length: 22-24 mm; width: 8.5-9.0 mm.

Types — Holotype, female (CASC #1688), allotype, male (CASC #1689). Baja California, Middle San Benito Island, Pacific Coastal Group.

Distribution — Known only from Isla San Benito, Isla Santa Margarita, and Isla La Asuncion. Inasmuch as these islands are distantly separated, but close to the mainland, suggests that this species may occur on the peninsula as well.



Map 1. Known distribution of *E. acuticaudus* and *E. acutus*.



Map 2. Known distribution of *E. adumbratus* and *E. curvidens*.

***Eleodes armatus* LeConte**

(Fig. 7, Map 3)

- Eleodes armata* LeConte, 1851. Ann. Lyc. Nat. Hist. New York 5:134.
Eleodes (Eleodes) armata: Horn, 1870. Trans. Am. Philos. Soc. 14:310.
Eleodes armata impotens Blaisdell, 1895. Ent. News 6(7):236.
Eleodes (Eleodes) armata forma *sinuata* Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 63:266.
Eleodes armata pumila Blaisdell, 1933. Trans. Am. Entomol. Soc. 59:197.
Eleodes amadeensis Blaisdell, 1933. Trans. Am. Entomol. Soc. 59:199. [NEW SYNONYMY]
Eleodes (Eleodes) amadeensis: Gebien, 1938. Katalog der Tenebrioniden Pt. 2, p. 58.
Eleodes striatipennis Blaisdell, 1942. Trans. Amer. Entomol. Soc. 68:134. [NEW SYNONYMY]

Diagnosis — Large to medium sized, robust, smooth; all femora strongly dentate, teeth typically long, slender, acute. Prosternum variably angulate posteriorly. Pronotum widest anterior to middle, lateral margins sinuately narrowed from widest point to base. Elytra abruptly vertically declivous apically, in males at most feebly caudate. Females: length: 23.5-32.5 mm; width: 7.8-12.0 mm. Males: 23.8-29.0 mm; width: 8.0-9.0 mm.

Types — *Eleodes armata* LeConte: Holotype (sex not recorded), gold disc label (=California). MCZC #4609. *Eleodes armata* var *impotens* Blaisdell: Holotype, female (dissected), Livingston, Merced County, California, MCZC #2838; allotype, male, same data, MCZC #2839. *Eleodes amadeensis* Blaisdell: Holotype, female, Amadee, Lassen County, California, CASC #3712; allotype, male, same data (MCZC #3713). *Eleodes armata* var *pumila* Blaisdell: Holotype, female, about 20 miles northeast of El Centro, Imperial County, California, CASC #3710; allotype, male, same data, CASC #3711.
Eleodes striatipennis Blaisdell: Holotype, male, Winnemucca, Nevada, CASC #5286; allotype, female, same data, CASC #5287.

Distribution — USA: California, southeastern Oregon, southwestern Idaho, western Nevada, southwestern Utah, western Arizona. MEXICO: northern Baja California, northern Sonora.

Remarks — This species is common in the low desert habitats of the American southwest (Doyen

and Opler 1973). Tanner and Packham (1965) reported that it can be found active in all months of the year. Misapagel and Sleeper (1983) estimated adult population densities at 96-693 individuals per ha at a Mojave Desert site near Death Valley. Its physiological adaptations to hot arid conditions have been studied by Ahearn & Hadley (1969), Ahearn (1970), Hadley (1970, 1972, 1977), Bohm and Hadley (1977), Slobodchikoff (1983) and Cooper (1983, 1993). Thomas (1984) described the immature stages.

***Eleodes curvidens* Triplehorn & Cifuentes**

(Fig. 8, Map 2)

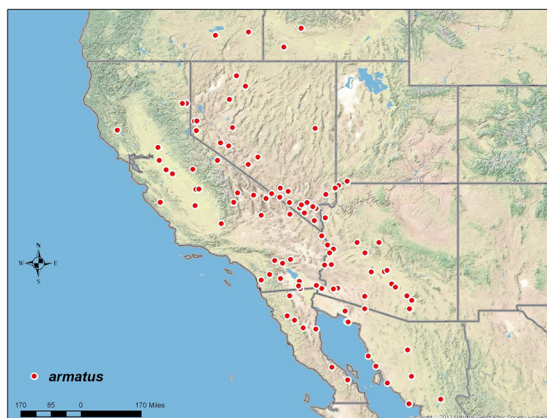
- Eleodes curvidens* Triplehorn and Cifuentes, 2011
 Zootaxa 2937:66.

Diagnosis — Broadly oval, robust, black, shining. Profemur in male with strong, curved tooth, bent downward; in female with abrupt emargination at the apical fifth. Pronotum broader than long, lateral margin arcuate in dorsal view, narrowing slightly toward base, widest anterior to middle, both apical and basal angles rounded, surface minutely and sparsely punctate. Elytra robust with rounded lateral margins, strongly convex from side to side, surface obsoletely punctate-striate. Prosternal process convex. Length (both sexes): 18-22 mm; width: 7.8-11 mm

Types — Holotype, female, México, Morelos, Quilamula, Sierra de Huautla, Paulina Cifuentes Ruiz, collector, Allotype, male, same data as holotype. Both holotype and allotype deposited in Colección Nacional de Insectos, Instituto de Biología, Universidad Nacional Autónoma de México, Delegación Coyoacán, México, D. F. (CNIN). Paratypes: 15 males, 9 females all with same data as primary types, but with different collecting dates (Jan 20 to April 22) deposited in NMNH and OSUC.

Distribution — Except for the type series, the only other records are from Guerrero (Taxco), Puebla (Acatlan; 8 mi. s of Izucar de Matamoros), and Michoacan (San Jose Purua).

Remarks — Males of this species can be recognized easily by the downcurved profemoral tooth.



Map 3. Known distribution of *E. armatus*.

***Eleodes dentipes* Eschscholtz**

(Fig. 9, Map 4)

Eleodes dentipes Eschscholtz, 1829. Zool. Atl. 3:10; Pl. 14, fig. 4.

Eleodes (Eleodes) dentipes: Horn, 1870. Trans. Am. Philos. Soc. 14:314.

Eleodes prominens Casey, 1890. Ann. New York Acad. Sci. 5:401.

Eleodes elegans Casey, 1890. Ann. New York Acad. Sci. 5:401.

Eleodes confinis Blaisdell, 1895. Ent. News 7(7):237.

Eleodes (Eleodes) dentipes forma *confinis*: Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 63:255.

Eleodes (Eleodes) dentipes forma *elegans*: Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 63:257.

Eleodes (Eleodes) dentipes forma *pertenuis* Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 63:253.

Eleodes (Eleodes) dentipes forma *elongata* Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 63:254.

Eleodes (Eleodes) dentipes forma *elongata punctata* Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 63:254.

Eleodes (Eleodes) dentipes forma *elongata laevis* Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 63:254.

Eleodes (Eleodes) dentipes forma *robusta* Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 63:255.

Eleodes (Eleodes) dentipes forma *prominens*: Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 63:254.

Eleodes dentipes pertenuis: Blaisdell, 1910. Ent. News 21:62.

Eleodes dentipes elongata: Blaisdell, 1910. Ent. News 21:62.

Eleodes dentipes prominens: Blaisdell, 1910. Ent. News 21:62.

Eleodes dentipes confinis: forma *robusta*: Blaisdell, 1910. Ent. News 21:62.

Eleodes dentipes elegans: Blaisdell, 1910. Ent. News

21:62.

Eleodes dentipes var. *perpunctata* Blaisdell, 1918. Ent. News 29:386. [*nomen novum* for *punctata elongata*].

Eleodes dentipes montana Blaisdell, 1925a [*nec* Champion]. Proc. Calif. Acad. Sci. 14(16):385.

Eleodes dentipes tularensis Blaisdell, 1925a. Proc. Calif. Acad. Sci. 14(16):386.

Eleodes paradoxa Blaisdell, 1931. Pan-Pacif. Entomol. 8:78. [*nomen novum* for *montana* Blaisdell].

Eleodes montana: Leng & Mutchler, 1933. Cat. Coleop. Amer. Suppl. 2:36.

Eleodes (Eleodes) dentipes sordida Blaisdell, 1935. Can. Entomol. 67:30.

Eleodes (Eleodes) dentipes sublitoralis Blaisdell, in, Gebien 1938. Katalog der Tenebrioniden Pt. 2, p. 57. [*nomen nudum*].

Eleodes dentipes laevis: Papp, 1961. Opusc. Entomol. 26:113.

Eleodes dentipes robusta: Papp, 1961. Opusc. Entomol. 26:113.

Eleodes dentipes sublitoralis: Papp, 1961. Opusc. Entomol. 26:113.

Eleodes dentipes paradoxa: Tanner, 1961. Great Basin Nat. 21:72.

Diagnosis — Elongate-oval or subfusiform; shiny. Surface of head and pronotum finely granulate-punctate. Pronotum with lateral margins rounded and strongly sinuate basally, anterolateral angles dentate. Profemora strongly dentate in both sexes. It is most similar to *E. acuticaudus*, differing in the less strongly rounded lateral margins of the pronotum which are less strongly and suddenly constricted at the base. Length of female 22.5-30.2 mm; width: 8.2-16.0 mm. Male length 13.0-29.5 mm; width: 6.2-9.8 mm.

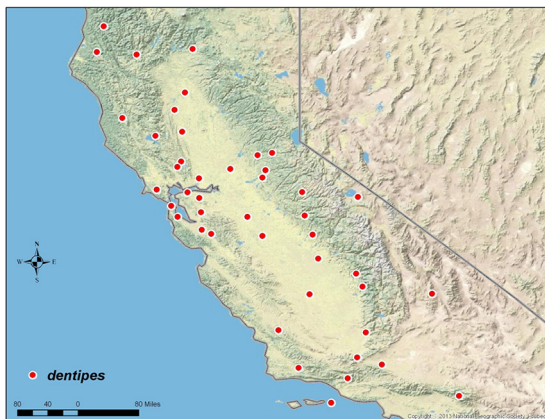
Types — *Eleodes dentipes*. Lectotype, female, selected by the senior author from four syntypes, "California" (Berlin Zoological Museum). *Eleodes prominens*, Port Harford, San Luis Obispo County, California (USNM #46751). *Eleodes elegans*, Hoopa Valley, Humboldt County, California (USNM #46752). *Eleodes confinis*, Holotype, female, Mokel Hill, California (CASC #2842).

Distribution — This species is recorded from almost every county in California except those at the extreme north and south.

Remarks — Blaisdell (1909) stated that "undoubtedly *dentipes* is unusually reactive to the environment, for each geographical region produces some peculiar modification of the typical form, and

yet more or less typical examples are taken within the same region.” In 1909, Blaisdell recognized eight forms, all except one of which (*E. elegans* Casey) was described by him. Later he named two more varieties and two more subspecies, two of which were replacement names for two described as forms in 1909. Blaisdell (1925) listed eight subspecies and one variety (*perpunctata*). Tanner (1961) listed ten subspecies. Blaisdell (1909) used eight pages discussing and describing the various subspecies, varieties, forms, and aberrations of the 960 specimens he studied. With all of the name changes and changes in taxonomic status, the nomenclatorial problems are greater in our opinion than the biological entities they purport to represent. We are unable to recognize any of the subspecific taxa of Blaisdell, much less attempt to delimit them geographically. We do not believe that *E. dentipes* is any more variable than many other species of the genus, and that attempting to name all of the variations confuses rather than clarifies its status.

Eleodes dentipes is one of the species involved in the Müllerian mimicry complex with species of *Coelocnemis* (Doyen & Somerby, 1974). Little else is recorded on the biology although Papp and Pierce (1960) reported it feeding on stored barley. Blaisdell (1909) illustrated the larva.



Map 4. Known distribution of *E. dentipes*.

Eleodes discinctus Blaisdell

(Figs. 10, 11, Map 5)

Eleodes discincta Blaisdell, 1925b. Proc. Calif. Acad. Sci. 14:333.

Eleodes (Eleodes) discincta Gebien, 1938. Katalog der Tenebrioniden 2, p. 59.

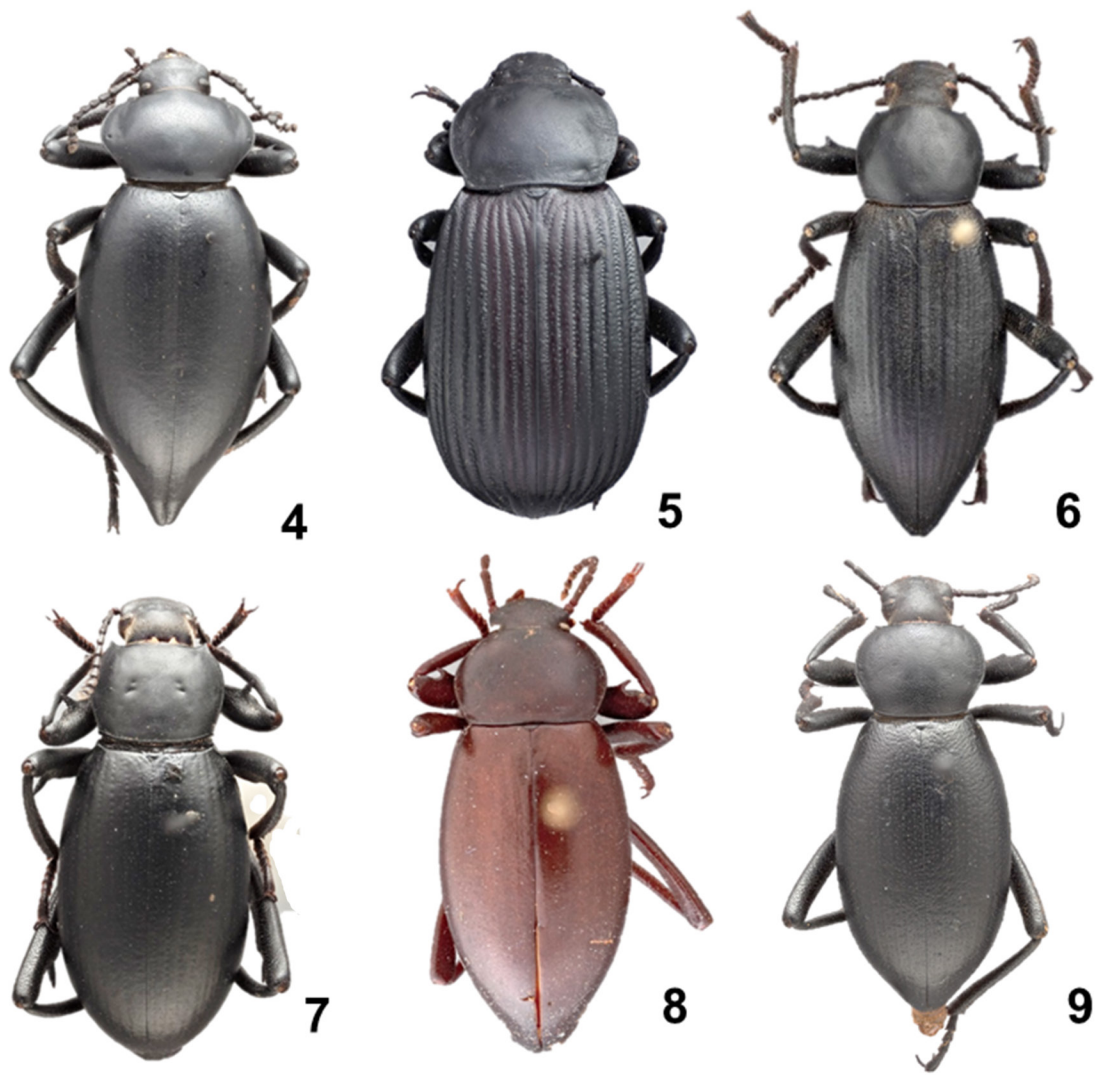
Eleodes (Eleodes) discinctus: Triplehorn, 1996. Ohio Biol. Surv. Bull. 10:9.

Diagnosis — This is a large, slender, elongate species, the elytra attenuate behind to a subacute apex (especially striking in males). There is a short but pronounced groove along the suture at the elytral apex caused by the inflection of the tips of the elytra on each side in both sexes. In dorsal view the lateral margins of the pronotum are only slightly curved, nearly subparallel and without a basal constriction. Anterior pronotal angles acute, subdentate. The male profemur has a large curved subapical tooth; the female has an angulate projection subapically and in both genders the prosternum typically has a stout tooth directed posteriorly. The elytra have unimpressed series of very fine, muricate punctures with subequal muricate punctures on the intervals. Length of female: 28.5-32.5 mm; width: 9.7-11.5 mm; Male length: 22.5-29.5 mm; width: 6.5-10.5 mm.

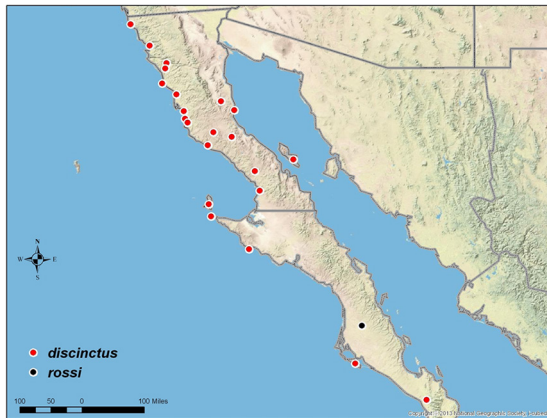
Types — Holotype, female (CASC No. 1690), allotype, male (CASC No. 1691), Natividad Island (Pacific Coastal Group), August 3, 1922, G. D. Hanna; paratypes, same data and from Angulo Rock, Asunción Island, Cedros Island, and Santa Margarita Island (July 29, 1922).

Distribution — Recorded by Blaisdell (1925, 1943) from a number of locales on mainland Baja California. We have seen more than 80 specimens, mostly from northern Baja California on both coasts and several offshore islands not mentioned by Blaisdell.

Remarks — See comments under *E. mexicanus*.



Figs. 4-9. Dorsal habitus. 4. *E. acuticaudus*, 5. *E. acutus*, 6. *E. adumbratus*, 7. *E. armatus*, 8. *E. curvidens*, 9. *E. dentipes*.



Map 5. Known distribution of *E. discinctus* and *E. rossi*.

***Eleodes eschscholtzi* Solier**
(Figs. 13-15, Map 6)

- Eleodes eschscholtzi* Solier, 1848. Baudi et Truqui Studi Entomol. 2:238.
Eleodes lucae LeConte, 1866a. Smithson. Misc. Coll. No. 167:114.
Eleodes (Eleodes) lucae: Horn, 1870. Trans. Am. Philos. Soc. 14:312.
Eleodes wickhami Horn, 1891. Trans. Amer. Philos. Soc. 14:41, pl. 1, fig. 12.
Eleodes (Eleodes) eschscholtzii lucae: Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 63:289.
Eleodes (Eleodes) eschscholtzi lucae forma *ecaudata* Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 63:290.
Eleodes (Eleodes) eschscholtzi lucae forma *grandis* Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 63:291.
Eleodes (Eleodes) eschscholtzi lucae forma *inflata* Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 43:291.
Eleodes inflata: Blaisdell, 1923. Proc. Calif. Acad. Sci. 12:261.
Eleodes lucae inflata: Blaisdell, 1943. Proc. Calif. Acad. Sci. 24:249.
Eleodes eschscholtzi inflata: Tanner, 1961. Great Basin Nat. 21:73.
Eleodes eschscholtzi ecaudata: Papp, 1961. Opusc. Entomol. 26:113.
Eleodes eschscholtzi grandis: Papp, 1961. Opusc. Entomol. 26:113.

Diagnosis — Elongate, slender, fusiform, caudate (especially male). Pronotum quadrate, anterolateral angles acute, slightly prominent to dentiform, basal angles obtuse; lateral margins in dorsal view weakly arcuate; anterior margin broadly

concave; pronotal surface very finely punctate. Elytra striato-punctate, punctures moderate in size and closely spaced, intervals variably convex with widely spaced fine punctures. Males and females with strong profemoral tooth. Males with metatibiae strongly bent at slightly beyond middle, then suddenly dilated and straight to apex. Female length: 23.5-26.2 mm; width: 9.0-9.8 mm. Male length: 25.2-29.5 mm, width: 8.8-9.2 mm.

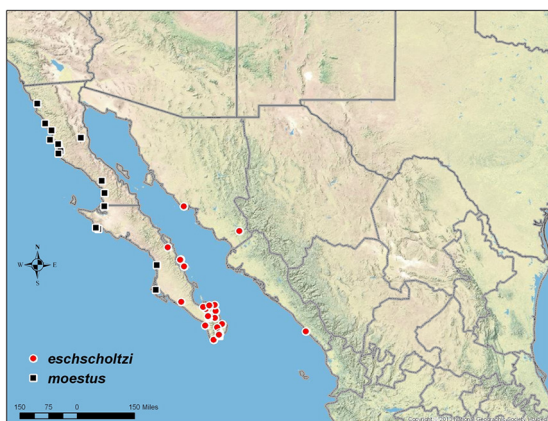
Types — Of *E. eschscholtzi*, not seen (“du Mexique”). Holotype of *E. wickhami*, male (dissected), Tucson, Arizona (MCZC #3954). Of *E. lucae*, holotype, male, MCZC #4615, silver disc label. Of *E. inflata*, holotype, female, CASC #1171, allotype, male, CASC # 1172, the published type locality is Cape San Lucas, Baja California, but the two labeled as types are from Monserrate Island.

Distribution — This species is found in mainland México (states of Jalisco, Nayarit, Chihuahua, Sonora and Sinaloa) extending northward into southern Arizona (Pima and Pinal county), and New Mexico (Dona Ana County). Several previous authors have included Texas in the distribution. Blaisdell, Gebien, Tanner, et al., were probably misled by Champion’s record “Presidio (Forrer).” According to Selander and Vaurie (1962) the mentioned locality is “near Mazatlan, Sinaloa, México.” This is consistent with our observations. In Baja California Sur it is confined to and very abundant in the Cape Region (more than 500 specimens studied) and on the islands of Monserrate and Isla del Carmen in the Gulf of California.

Remarks — This species is very similar to *E. discinctus* and *E. mexicanus* and the presumed relationships are discussed in the paper on *Eleodes* of Baja California (Triplehorn 1996). A somewhat variable species with several morphological variants, or *formae*, described by Blaisdell (1909): *ecaudata*, in which the tail on the elytron is reduced; *inflata*, in which the elytron is ventricose; *grandis*, for especially large specimens which also have an uncinated prosternal process; and finally, *typica*, for the non-variant specimens. Blaisdell reduced *E. lucae* to a subspecies of *E. eschscholtzi* as they both have the characteristic bent male metatibia. The primary difference between the mainland and Baja populations is the consistently thinner, sharper profemoral tooth in *E.e. lucae*, which condition

persists in both males and females. In the mainland population the development of the tooth in the females is variable, though usually reduced, and in the males is obtuse and somewhat bent. Also, the distal half of the metatibia is abruptly (vs gradually) expanded in *E. e. eschscholtzi*. Because of the allopatry associated with these characters we conclude that the subspecific distinction of the peninsular and mainland populations should be maintained.

Blaisdell (1909) considered *E. wickhami* to be a race of *E. tenuipes*, but he had only seen one male of each. Now that more material is available we recognize the correct relationship is under *E. eschscholtzi*. The Arizona population differs from the Mexican population only in that the elytron is smoother.



Map 6. Known distribution of *E. eschscholtzi* and *E. moestus*.

Eleodes femoratus LeConte

(Figs. 16, 17, Map 7)

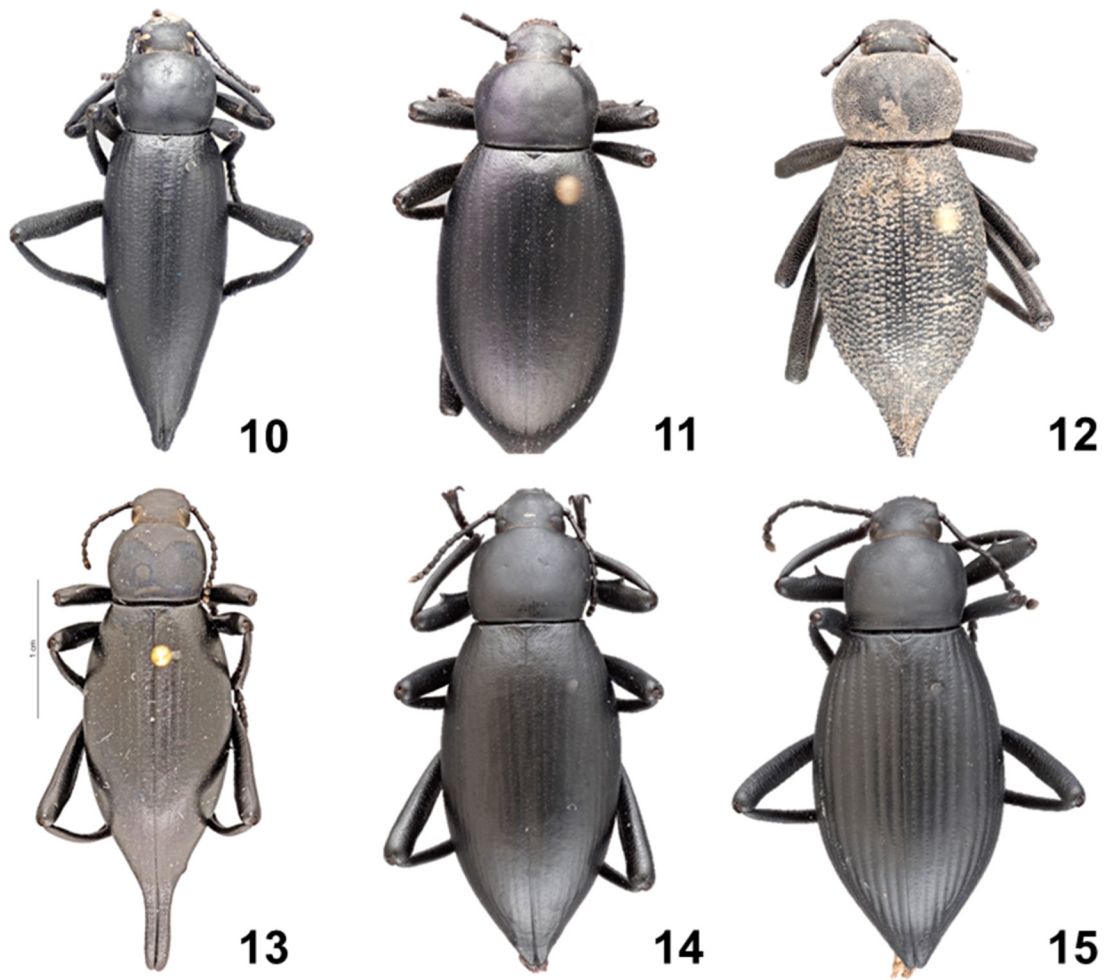
- Eleodes femorata* LeConte, 1851. Ann. Lyc. Nat. Hist. New York 5:134.
Eleodes (Eleodes) militaris Horn, 1870. Trans. Am. Philos. Soc. 14:310.
Eleodes (Eleodes) femorata: Horn, 1870. Trans. Am. Philos. Soc. 14:311.
Eleodes (Eleodes) militaris forma *subedentata* Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 63:270.
Eleodes (Eleodes) militaris femorata: Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 63:272.
Eleodes inepta Blaisdell, 1925b. Proc. Calif. Acad. Sci. 14:334.
Eleodes marthae Blaisdell, 1943. Proc. Calif. Acad. Sci. 24:243.
Eleodes militaris subedentata: Papp, 1961. Opusc. Entomol. 26:113.

Diagnosis — Large, robust, elongate-oval, convex. Pronotal surface finely, sparsely punctate; all femora densely, coarsely punctate. Elytral apex attenuate but not caudate; surface finely punctate-striate, intervals flat, sparsely punctulate. All femora triangularly dentate in both genders. Metatibia notably sinuate. Length of female: 20.5-25.2 mm; width: 7.5-10.2 mm. Male length: 22.0-28.5 mm; width: 7.5-9.8 mm.

Types — Holotype. *Eleodes femorata*, gold disc label (=California), MCZC #4610. *Eleodes militaris*, lectotype, male, "Cal", MCZC #3952. *Eleodes inepta* holotype, male, Angulo Rock, Asunción Island [Baja California], August 1, 1922, Hanna and Slevin, CASC #1692. *Eleodes marthae*, holotype, female (CASC #5080) and allotype, male (CASC #5081), Mesquitál, Lower California, June 22, 1939, Michelbacher and Ross. There are 36 paratypes with the same data.

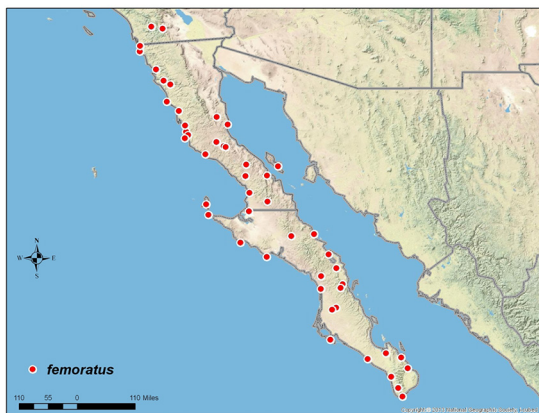
Distribution — From San Diego County, California through almost the entire Baja California peninsula, except for the cape region south of La Paz.

Remarks — As the senior author pointed out in *Eleodes* of Baja California (Triplehorn 1996), this species varies clinally from north to south. The two ends of the cline have been described as distinct species and, were it not for the large number of specimens (approximately 600) available from all along the peninsula, we probably would have agreed. In San Diego County, California,



Figs. 10-15. Dorsal habitus. 10. *E. discinctus* ♂, 11. *E. discinctus* ♀, 12. *E. fiski*, 13. *E. eschscholtzi* *eschscholtzi* ♂, 14. *E. eschscholtzi eschscholtzi* ♀, 15. *E. eschscholtzi lucae*

specimens are relatively slender and the femoral teeth are thin and acute. At the extreme southern limits of the range the body is much more robust, and the femoral teeth are very large. This latter form is the one referred to as *E. marthae* by Blaisdell.



Map 7. Known distribution of *E. femoratus*.

***Eleodes fiski* Triplehorn new species**

(Figs. 3, 12, Map 8)

urn:lsid:zoobank.org:act:8E102248-D3BB-4130-89DF-243219CCB5FE

Diagnosis — This species is most similar to *E. rugosus* sharing the rugulose surface on the elytron with males caudate, profemora armate; differing mainly in the configuration of the mentum. *Eleodes fiski* is unique in the subgenus in having the mentum flat with the anterior edge emarginated at the middle. All other members of the subgenus, including *E. rugosus*, have a mentum with a strongly projecting middle lobe.

Description — Elongate, ovately fusiform, constricted between pronotum and elytron; black, elytral surface opaque, rugose. Males caudate, profemora armate. Females with femora unarmed; second valvifer typical for the subgenus. Length of body: males: 28-30 mm; females: 25-27 mm.

Head — Dorsal surface coarsely punctate with many short setae. Epistomal margin subtruncate; eyes narrow, strap-like. The mentum is large, flat, strongly punctate, the anterior edge sinuately emarginated at middle; hypomera strongly and coarsely punctate. Antennae stout, extending slightly beyond base of pronotum; third

antennomere subequal to 4-6 combined.

Prothorax — Notum length 7.5 mm, width 8.0 mm. Widest at middle, dorsal surface coarsely punctate. Lateral marginal bead carinate, reflexed; anterolateral angle subacute, posterolateral angle obtuse. Legs coarsely punctate; profemora of males with an anteapical tooth or strong angulation, anteapically emarginated in females; protibial spurs approximately equal in size; probasitarsus of males longest, in females subequal. Prosternum in most examples horizontal with an angular, posteriorly directed projection.

Elytron — surface flatly rugulose, with shiny muricate punctures arranged in rows; humeri obtuse, males caudate. Length: 31-33 mm, width: 10-12 mm in males; length: 28-30 mm, width: 10-12.5 mm in females.

Venter — sternites finely rugulose laterally, punctate on disc.

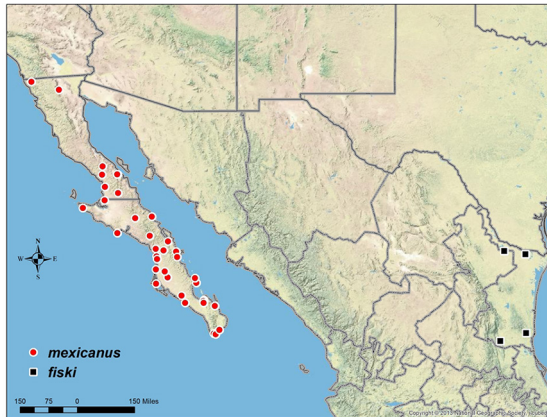
Genitalia — Female second valvifer trapezoidal, dorsal plate concave, length about three times width; lateral groove evident and visible from above; posterior margin undulately concave in dorsal view, medial and lateral apical angles somewhat projecting. Male basale cylindrical, slightly longer than apicale. Apicale subtumid, long triangular, the sides straight, not concave.

Holotype — Male, Labeled (a) “Mexico, Tamps. Cueva de la Florida near Abra. 21-XII-71, F.W. Fisk.” (b) T.M. Gilligan Photo: 20 Feb 2006, IMG_2459_2006.jpg.” (c) “HOLOTYPE *Eleodes fiski* Triplehorn.” [Deposited OSUC].

Paratypes — [Deposited OSUC]. Male, labeled (a) Mexico: Tamps. 10 Km sw Aldama, 29-XI-1980. (b) “Cueva de las Carteles” (c) “W. Elliott, M. Padgett, S. Smith.” (d) “PARATYPE *Eleodes fiski* Thomas & Triplehorn.” [Deposited OSUC]. Male, labeled (a) “MEXICO: Tamaulipas, Mun. Villa de Casas, 500 m. 47 Km E. Cd. Victoria, 1-10-VI-1986. Ex. carrion trap, R. Jones, B. Trevino.” (b) “PARATYPE: *Eleodes fiski* Triplehorn.” [Deposited OSUC]. Two females labeled same as previous, Deposited OSUC and DBTC collection. Male. Labeled (a) “Cueva de El Choveno, El Pachon, Tamaulipas, Mex.” (b) “Tenebrionid Base, Aaron D. Smith, Catalog # 13019.” (c) “PARATYPE *Eleodes fiski* Triplehorn” [deposited A.D. Smith coll.].

Etymology — We take pleasure in naming this species for Frank W. Fisk who collected the holotype and who has made many valuable contributions to the Ohio State University insect collection.

Remarks — In 1980 the senior author was able to study material from Veracruz identified as *E. rugosus* Perbosc by Champion and directly compare them to the new species. In addition to the different mentum, the pronotum and elytron are more convex and the prosternal process more prominent than in *E. rugosus*.



Map 8. Known distribution of *E. fiski* and *E. mexicanus*.

***Eleodes gracilis* LeConte**
(Figs. 19, 20, Map 9)

Eleodes gracilis LeConte, 1858. Proc. Acad. Nat. Sci. Phila. 10:184.

Eleodes (Eleodes) gracilis: Horn, 1870. Trans. Am. Philos. Soc. 14:312.

Eleodes (Eleodes) gracilis distans Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 63:242.

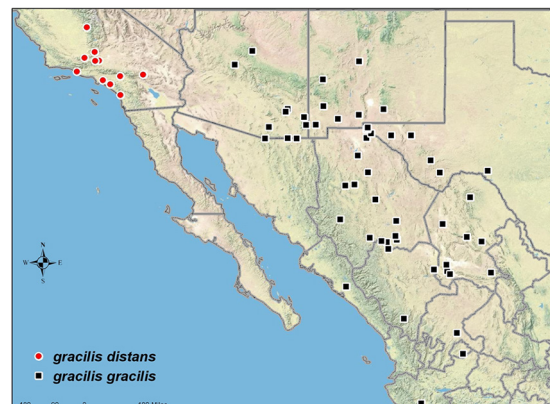
Diagnosis — Slender, elongate-oval, smooth, shiny, never caudate. Pronotum widest anterior to middle, margins distinctly convexly arcuate in dorsal view, anterior angles acute, usually dentiform but not everted, surface minutely and sparsely punctate. Elytra finely punctate-striate, intervals flat to subconvex, with a single row of widely spaced fine punctures which are finer than those of striae. Prosternal process obtuse between procoxae; both genders with a strong tooth on the profemur. We

concur with Blaisdell that the taxon described as *E. g. distans* is a distinct subspecies found in California. It has muricate striae and interval punctures, which are quite different from the nominate form. Female length: 19.5-28.0 mm, width: 7.7-11.2 mm; Male length: 20.2-26.5 mm, width: 6.3-9.2 mm.

Types — Holotype, male, silver disc label (=Arizona), MCZC #4616. The LeConte collection has ten more specimens labeled “So. Cal”, and “N.M.” The types of *E. g. distans* are in CASC: holotype, female (#2840) and allotype, male (#2841), Fairmont, Los Angeles County, California, Fuchs and Hopping.

Distribution — USA: southeastern Arizona, southwestern New Mexico and west Texas for the nominate subspecies, and southern California for *E. g. distans*. MEXICO: *E. gracilis* is known from Chihuahua, Coahuila, Durango, Sinaloa, Sonora, and Zacatecas. We have not seen any specimens from Baja California, however, see remarks on *Eleodes rossi* below.

Remarks — *Eleodes gracilis* is a summer active species tolerant of high temperatures (Smith & Whitford 1976). Kramm & Kramm (1972) found them hiding in ground squirrel holes. Tschinkel (1975a,b) described the morphology of the defensive glands and the associated aposematic headstanding behavior.



Map 9. Known distribution of *E. gracilis*.

***Eleodes grandicollis* Mannerheim**
(Figs. 18, 21, Map 10)

Eleodes grandicollis Mannerheim, 1843. Bull. Soc. Nat. Moscou 16:266.

Eleodes valida Boheman, 1858. Kongl. Sven. Freg. Eugen. Resa 1:90.

Eleodes (Eleodes) grandicollis: Horn, 1870. Trans. Am. Philos. Soc. 14:312.

Eleodes elongata Grinnell, 1908. Univ. Calif. Publ. Geol. 5(12):29.

Eleodes (Eleodes) grandicollis forma *valida*: Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 63:209.

Eleodes grandicollis valida: Blaisdell, 1925c. Pan-Pac. Entomol. 2:79.

Diagnosis — This is one of the largest species of *Eleodes*, distinguished from all others of the subgenus *Eleodes* by its obsolete humeri. The lateral pronotal margin is strongly rounded in dorsal view and the bead reflexed; the anterolateral angles are obtusely rounded, and the surface is finely and sparsely punctate. The prosternal process has a rearward directed tooth on its posterior surface and the profemoral tooth is prominent in both genders. Female length: 28.5-29.8 mm; width: 11.2-12.5 mm. Male length: 26.8-29.2 mm; width: 10.2-11.7 mm.

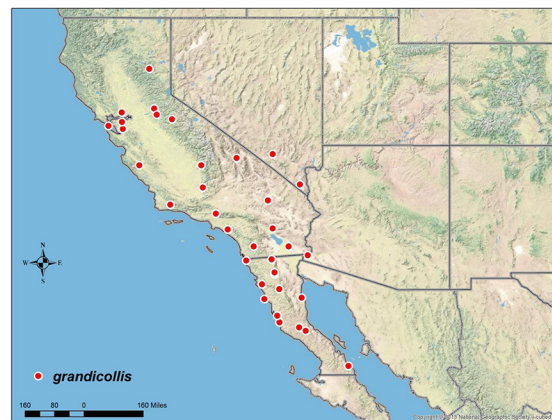
Types — A specimen from the Berlin Museum was stated to be a “syntype or authenticated specimen of Mannerheim” (Uhlig, pers. comm.). It is in fair condition though both antennae and both hind tarsi are broken. Labeled “15119”, machine printed, and. “*Eleodes grandicollis* Mann. California,” (green, handscript label). It is probably a female, not dissected. We accept this specimen as holotype. The types of *E. valida* were not seen.

Distribution — This species is widely distributed in California. It is known from northern Baja California, with records from southern Nevada (Clark and Nye Counties) and southwestern Arizona.

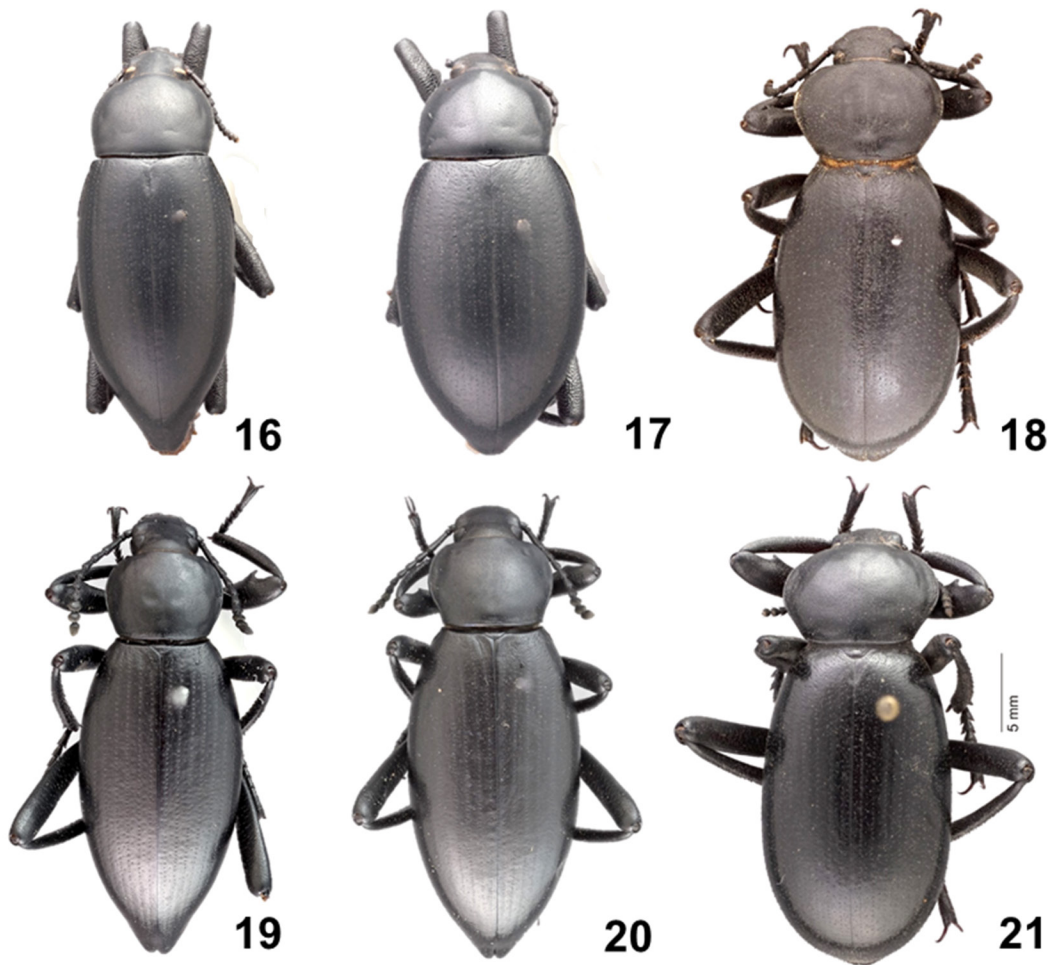
Remarks — Blaisdell considered *E. valida*, “at least a good subspecies of *E. grandicollis*, in having a larger, more or less inflated form, broader pronotum, more strongly rounded laterally, and broadly oval elytra.” He recorded the nominate form from San Francisco, and Marin, Calaveras, Monterey, and Tulare Counties. Those from southern California (San Diego, Los Angeles, San Bernardino and Kern Counties), he assigned to the

subspecies *E. g. valida*. We have not seen enough specimens from the northern part of the range to contradict Blaisdell’s opinion. All we have seen from San Diego and Riverside counties are identical to the large numbers studied by the senior author from Baja California. Also, we have never seen long series of this species, ten being the most from any one place and time.

Specimens have been collected most months of the year except February, March, April and November. Tanner and Packham (1965) based on trap records at the Nevada Test Site found the adults active spring through fall, most abundantly in association with the fleshy leafed plant *Lycium* (Solanaceae). Doyen and Miller (1980) reported subfossil specimens from the La Brea tar pits.



Map 10. Known distribution of *E. grandicollis*



Figs. 16-21. Dorsal habitus. 16. *E. femoratus* ♂, 17. *E. femoratus* ♀, 18. *E. grandicollis* ♂, 19. *E. gracilis* ♂, 20. *E. gracilis* ♀, *E. grandicollis* ♀.

***Eleodes hispilabris* (Say)**

(Figs. 22, 23. Map 11)

- Blaps hispilabris* Say, 1824. J. Acad. Nat. Sci. Phila. 3:259.
- Eleodes hispilabris*: Eschscholtz, 1829. Zoologischer Atlas 3:10.
- Eleodes sulcata* LeConte, 1852 [*nec* Eschscholtz 1829]. Proc. Acad. Nat. Sci. Phila. 6:67.
- Eleodes connexa* LeConte, 1857. Reports of Explorations and Surveys. vol. 12, pt. 3, p. 49.
- Eleodes convexa* LeConte, 1858. Proc. Acad. Nat. Sci. Phila. 10:181 (invalid emendation).
- Eleodes nupta* LeConte, 1858. Proc. Acad. Nat. Sci. Phila. 10:183.
- Eleodes lecontei* Gemminger & Harold, 1870. Coleoptera 6:122 [*nomen novum* for *sulcata*].
- Eleodes binotata* Walker, 1866. A Naturalist in Vancouver Island and British Colombia. vol. 2, p. 329.
- Eleodes* (*Eleodes*) *hispilabris* forma *nupta*: Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 63:220.
- Eleodes* (*Eleodes*) *hispilabris* forma *convexa*: Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 63:220.
- Eleodes* (*Eleodes*) *hispilabris* forma *sculptilis* Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 63:220.
- Eleodes* (*Eleodes*) *hispilabris* forma *elongata* Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 63:220.
- Eleodes* (*Eleodes*) *hispilabris* forma *laevis* Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 63:220.
- Eleodes* (*Eleodes*) *subpinquis* Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 63:247. **NEW SYNONYMY**
- Eleodes hispilabris sculptilis*: Blaisdell, 1910. Ent. News 21:62.
- Eleodes hispilabris* var. *imitabilis* Blaisdell, 1918. Ent. News 29:167.
- Eleodes hispilabris* var. *imitabilis* forma *elongata*: Blaisdell, 1918. Ent. News 29:167.
- Eleodes hispilabris* var. *attenuata* Blaisdell, 1918. Ent. News 29:168.
- Eleodes hispilabris convexa*: Blaisdell, 1925. Proc. Calif. Acad. Sci. 14(16):384.
- Eleodes hispilabris nupta*: Blaisdell, 1925. Proc. Calif. Acad. Sci. 14(16):384.
- Eleodes hispilabris immunda* Blaisdell, 1925. Pan-Pacif. Entomol. 2:79.

Diagnosis — Blaisdell (1909) characterized *E. hispilabris* quite adequately as follows: "...recognized from the members of the *obscura* group by the prominent dentiform apical angles of the prothorax [not 100%] and by the simple tarsi [i.e. the plantar groove is not interrupted by tufts of setae]; from all species of the subgenus *Eleodes* by the [usually] more or less deeply sulcate elytra, with convex intervals, and in never being caudate." We

are unable to improve upon those generalizations. Female length: 18.0-28.7 mm; width: 8.5-12.5 mm; Male length: 18.8-26.5 mm; width: 8.0-11.2 mm.

Types — *Blaps hispilabris*, not seen, presumed destroyed, "inhabits Missouri" (Say). *Eleodes sulcata*, represented in the LeConte Collection (MCZC) by six specimens each bearing a green disc label. *Eleodes connexa*, holotype sex not noted, MCZC #4576, Prairie Paso, Texas. *Eleodes nupta*, holotype, sex not noted, MCZC #4620, purple disc label. *Eleodes hispilabris sculptilis*, holotype female (dissected), CASC #2844; allotype male, CASC #2845, Walnut, Arizona. *Eleodes hispilabris imitabilis*, holotype female, CASC # 2849; allotype male, CASC # 2850, Walla Walla, Washington. *Eleodes hispilabris attenuata*, holotype female CASC #2851, allotype male CASC #2852, Nogales, Arizona. *Eleodes hispilabris immunda*, holotype female, CASC # 2859. Round Mt., Nevada, VII-21-1913, J. R. Slevin, no allotype designated. *Eleodes subpinquis*, holotype female (dissected), CASC # 2843, Cameron County, Texas, no allotype designated.

Distribution — The five recognizable races are as follows:

Great Plains Race. This is the nominate form. Integument shining, elytra usually somewhat depressed, sulci moderate in depth, intervals subconvex, frequently reddish along suture. We have seen specimens from Kansas, Nebraska, Oklahoma, North Dakota, South Dakota, eastern Colorado, Wyoming, Montana, extreme northern New Mexico, and the Texas panhandle.

Great Basin Race. This is the race described by Blaisdell (1909) as "forma *sculptilis*," which he later (Blaisdell 1925) raised to subspecific status. Integument dull, elytra convex, sulci usually opaque, deep and wide, intervals strongly convex, abruptly elevated, shining and conspicuous. We have seen specimens from western Utah, eastern Nevada, southern Idaho, southeastern California, Arizona, and western New Mexico.

Pacific Northwest Race. Characterized as "forma *laevis*" by Blaisdell (1909), later formally described by him (Blaisdell 1918) as "variety *imitabilis*," which he later (Blaisdell 1925) raised to subspecific status. Integument dull, alutaceous, smooth; sulci very shallow, intervals feebly convex.

This is the race found in eastern Washington and Oregon, eastern Idaho, northwestern Nevada, and northeastern California. *Eleodes binotata* (Walker, 1866) from British Columbia belongs here as well.

New Mexico Race. This taxon was originally described by LeConte (1857) as a full species, *E. connexa*, which somehow became *E. convexa* in various lists (e.g. Leng, 1920: 228), perhaps because Blaisdell changed the spelling (1909). Blaisdell used the name as a “forma” (Blaisdell 1909), and later (Blaisdell 1925) as a subspecific epithet. Integument black, strongly shining, sulci rather deep, intervals moderately to strongly convex; head and pronotum shining, the latter finely and sparsely punctate. All of the specimens we have seen are from south and central New Mexico, except for a few from the El Paso region of Texas, and Saltillo, Coahuila, Mexico.

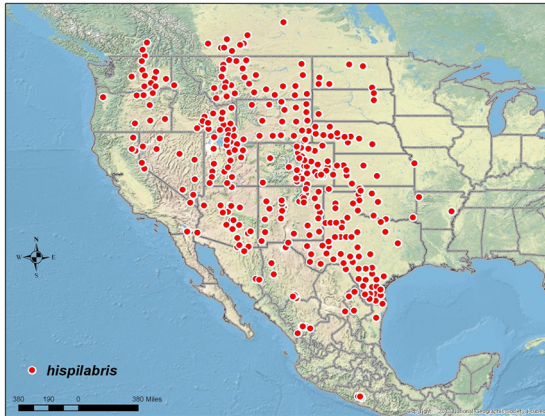
South Texas Race. This race was originally described by LeConte (1859) as a full species, *E. nupta*. Blaisdell (1909) used the name as a “forma,” and later (Blaisdell 1925) gave it subspecific status. Casey’s *E. compositus* (Casey 1891) and Blaisdell’s *E. subpinguis* (Blaisdell 1909) both fit under our concept of this south Texas race. Robust, strongly convex or even ventricose, elytra shining, pronotum usually duller, sulci moderate to deep, intervals subconvex to flat. All of the specimens we have seen are from south Texas (Davis Mountains, along the Rio Grande River valley to Brownsville), and the adjacent Mexican states of Chihuahua, Tamaulipas, Nuevo Leon, Coahuila, and Sonora. Of the five races, this one appears to be the only one which varies clinally. Those from the Brownsville area have more ventricose elytra with convex elytral intervals. Those from the Davis Mountains are more elongate, not conspicuously ventricose and the elytral intervals are at most subconvex, often perfectly flat.

Remarks — Blaisdell (1909) in his classic revision of Eleodiini, had this to say about *E. hispilabris*: “The five incipient races which I have recognized are simply extremes along particular lines of divergence in the ample series before me, and they are all united into one continuous series by an abundance of mesotypes.” Despite the above statement, which we believe is a valid assessment of the situation, Blaisdell continued to

refine his concept of the species and its variability, and persisted in coining names for the various “subspecies,” “races,” and “forms” (Blaisdell, 1916, 1925). We have studied thousands of specimens of *E. hispilabris* from widely scattered parts of its range, and we have also studied the types that were available. Our concept of the variability agrees essentially with that of Blaisdell, but we do lament the proliferation of names which can only grow if the practice of naming slightly different populations were to continue.

As Blaisdell noted, *Eleodes hispilabris* may be conveniently divided into five races which occupy more-or-less reciprocal ranges in the western United States and Canada, extending into Mexico where there are several more races until now unrecognized (and fortunately unnamed), with in all probability, more to be discovered.

The regional variation in morphology ties in with a Müllerian mimicry complex that involves the defensive posturing as well as the appearance of the beetles (Doyen and Somerby 1974). The grooves in the elytra help spread the dissuasive chemicals secreted by the perianal glands (Roth & Eisner 1962). The defensive secretions (paraquinones) were analyzed by Blum and Crain (1961). In spite of their defenses LaRivers (1943) found them to be regular prey items for white-rumped shrikes. *Eleodes hispilabris* is common on the short grass prairies of the Great Plains (Stapp 1997) as well as the hilly shrub-steppe terrain of eastern Washington (Rickard 1971b). It is one of the false-wireworm species that damages dry-land wheat (Calkins and Kirk 1975a). The immature stages were described by McColloch (1922) who reared the adults from larvae found in the sand dunes along the Kansas River. Haverfield (1965) described the mating behavior and Marshall (1985) documented the reproductive activity. Kenagy and Stevenson (1982) studied the ecology correlating body temperature to seasonality and daily activity rhythms. Rogers et al, (1988) and McIntyre and Vaughn (1997) reported on the scavenging dietary habits.

Map 11. Known distribution of *E. hispilabris*.Map 12. Known distribution of *E. loretensis* and *E. vanduzeei*.***Eleodes loretensis* Blaisdell**

(Fig. 24, Map 12)

Eleodes (Eleodes) loretensis Blaisdell, 1923. Proc. Calif. Acad. Sci. 12(12):262.

Diagnosis — Body robust, all femora broad and flattened with greatly enlarged teeth, abdominal sterna coarsely and densely punctured. Elytral disc with stria punctures simple, becoming slightly muricate laterally and finely spiculiferous on the declivity. The prosternal process flat, expanded, cordate in outline. Process of the mentum squarely truncate apically. Length of female: 17.7-25.0 mm, width: 8.0-11.5 mm. Male length: 18.0-23.7; width: 7.3-9.5 mm.

Types — Holotype, female (CASC #1173), allotype, male (CASC #1174) and eleven paratypes, Loreto, Lower California, 20 May, 1921, E. P. Vanduzee.

Distribution — Central Baja California, México (59 specimens studied).

Remarks — This species is very similar to *E. vanduzeei* which occurs in the same general area. They may be separated by the degree of murication of the elytral punctures, which in *E. vanduzeei* are distinctly muricate (subtuberculate) over the entire elytral surface and strongly spiculiferous on the flanks and apical declivity.

***Eleodes mexicana* Blaisdell**

(Figs. 25, 26, Map 8)

Eleodes mexicana Blaisdell, 1943. Proc. Calif. Acad. Sci. 24:246.

Eleodes simondsi Blaisdell, 1943. Proc. Calif. Acad. Sci. 24:247.

Eleodes blaisdelli Blackwelder, 1945 [*lapsus calami*]. U.S.N.M. Bull. 185, pt. 3:521.

Diagnosis — This is a large species with dentate profemora in both genders, the meso- and metafemora mutic. The somewhat flattened pronotal dorsum has acutely prominent anterior angles and nearly parallel lateral margins. The males are caudate. Length of female: 21.5-34.0 mm; width: 8.7-14.5 mm. Male length: 28.5-35.0 mm; width: 9.0-10.5 mm.

Types — *Eleodes mexicana*, holotype, male (CASC No.5075), Baja California, México, 20 miles west of Santa Rosalía, July 26, 1938; allotype, female (CASC No. 5076), Baja California, 15 miles north of El Refugio, July 4, 1938, both collected by Michelbacher and Ross. *Eleodes simondsi*, holotype, female (CASC No. 5093), allotype, male (CASC No. 5094), Baja California, Mesquitál, July 28, 1938, Michelbacher and Ross.

Distribution — Common and widespread, from Bahía de Los Angeles to the Cape Region on both coasts of the Baja California peninsula.

Remarks — A variable species, discussed in the paper on Baja California *Eleodes* (Triplehorn 1996). In the Cape Region females are very similar

to females of *E. eschscholtzi*. South of Puerto Escondido, there is a population in which the males are very slender and briefly caudate, strongly resembling *E. discinctus*. We interpret these variations as an indication of possible hybridization.

***Eleodes mirabilis* Triplehorn**

(Figs. 28, 29, Map 13)

Eleodes mirabilis, Triplehorn, 2007. Proc. Entomol. Soc. Wash. 109:634; figs. 1, 2.

Diagnosis — This is one of the most easily recognized species in the genus *Eleodes*. The large size, caudate male, each elytron with sutural, marginal, and three discal costae, flat area between each costa with short, black setae which usually collect argillaceous material, causing the costae to stand out in bold relief. Female length: 32 mm; width: 12.5 mm. Male length: 30.2 mm; width: 10.7 mm.

Types — Holotype female, allotype male, Mexico, Nuevo Leon, 42 km n, 3 km w of Doctor Arroyo, 25 July, 1981, Allan Chaney (TAIU).

Distribution — Known only from the Mexican states of Nuevo Leon, San Luis Potosi, and Tamaulipas, with one record from Val Verde County, Texas.

Remarks — It is difficult to understand how such a spectacular beetle remained undescribed until very recently. We saw only 19 specimens and the largest series collected was six. It occupies a very restricted area and remains very rare in collections.

***Eleodes moestus* Blaisdell**

(Figs. 31, 32, Map 6)

Eleodes sanmartinensis moesta Blaisdell, 1921. Stanford Univ. Publ. Biol. Sci. 1:221.

Eleodes morbosus Blaisdell, 1925. Proc. Calif. Acad. Sci. 14:335.

Eleodes (Eleodes) sanmartinensis var. *moesta*: Gebien, 1938. Katalog der Tenebrioniden Pt. 2, p. 56.

Eleodes (Eleodes) morbosus: Gebien, 1938. Katalog der Tenebrioniden Pt. 2, p. 58.

Eleodes moesta: Blaisdell, 1943. Proc. Calif. Acad. Sci. 24:246

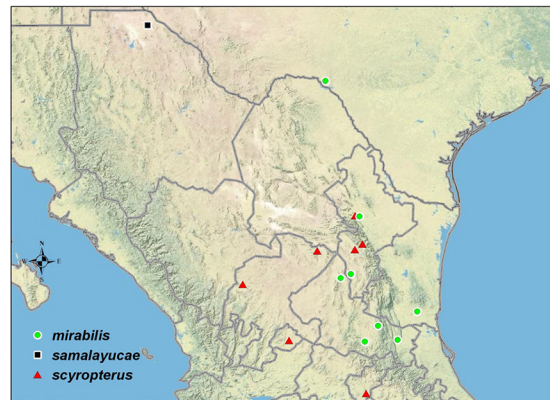
Eleodes (Eleodes) moestus: Triplehorn, 1996. Ohio Biol. Surv. Bull. 10:11.

Diagnosis — Medium sized with a glossy surface, this species has the profemora always strongly dentate whereas the meso- and metafemora vary from clearly dentate to obtuse angulations. Pronotum widest anterior of middle, lateral margins evenly curved in dorsal view, anterior angles subacute. The elytral punctures are distinctly muricate and usually setose, especially laterally and apically. They are rather fusiform in body shape though constricted at the pronotal-elytral juncture. Female length: 19.5-21.0 mm; width: 6.8-9.5 mm. Male length: 13.4-21 mm; width: 5.5-9.5 mm.

Types — *Eleodes sanmartinensis moesta*, holotype, male (CASC No. 907), San Martin Is., VII-11-05; *E. morbosus*, holotype, female (CASC No. 1693) and allotype, male (CASC No. 1694), Ascuncion Is.

Distribution — Wide-ranging along the west coast of Baja California, almost to the Cape Region, and adjacent off-shore islands.

Remarks — Specimens (341 examined) have been collected every month of the year.



Map 13. Known distribution of *E. mirabilis*, *E. samalayuca* and *E. scyropterus*.

***Eleodes muricatus* Triplehorn**

(Fig. 27, Map 14)

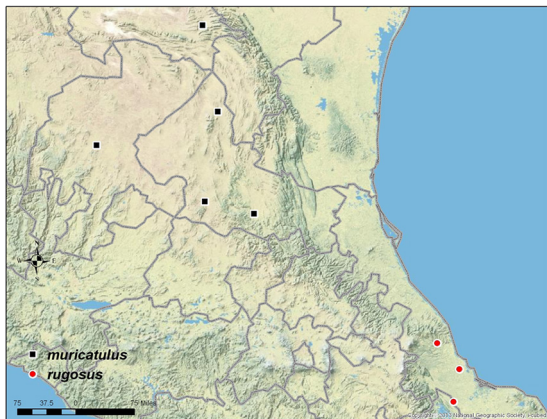
Eleodes muricatus Triplehorn, 2007. Proc. Entomol. Soc. Wash. 109: 637.

Diagnosis — Elongate, fusiform, surface shiny. Pronotum quadrate or slightly wider than long; lateral margins arcuate; posterior angles obtuse, rounded; anterior angles acute prominent. Elytral sides subparallel, posteriorly narrowing gradually, apex bifid; surface with rows of muricate punctures, intervals glossy. Male profemur with strong pre-apical tooth, female profemur with blunt pre-apical tooth. Female length: 24.8 mm; width 9.5 mm. Male length 19.7 mm, width 7.8 mm.

Types — Holotype female (repository CNC): México: San Luis Potosí, El Refugio and Allotype male (repository CASC): San Luis Potosí, Cedral, were examined.

Distribution — Described from seven specimens from San Luis Potosí, Coahuila and Zacatecas.

Remarks — In size and sculpturing it resembles *E. scyropterus* but differs in the quadrate pronotum (longer than wide in *E. scyropterus*) and the male elytra not caudate.



Map 14. Known distribution of *E. muricatus* and *E. rugosus*.

***Eleodes obscura* (Say)**

(Figs. 30, 33, Map 15)

Blaps obscura Say, 1823. J. Acad. Nat. Sci. Phila. 3:259.
Eleodes obscura: Eschscholtz, 1829. Zoologischer Atlas 3:10.

Eleodes sulcipennis Mannerheim, 1843. Bull. Soc. Imp. Moscou 16:266.

Eleodes obscura: LeConte, 1851. Ann. Lyceum Nat. Hist. New York 5:133.

Eleodes arata LeConte, 1858. Proc. Acad. Nat. Sci. Phila. 10:182.

Eleodes deleta LeConte, 1858. Proc. Acad. Nat. Sci. Phila. 10:182.

Eleodes dispersa LeConte, 1858. Proc. Acad. Nat. Sci. Phila. 10:182.

Eleodes convexcicollis Walker, 1866. A Naturalist in Vancouver and British Columbia, vol 2, p. 328.

Eleodes conjuncta Walker, 1866. A Naturalist in Vancouver and British Columbia, vol 2, p. 329.

Eleodes (Eleodes) obscura: Horn, 1870. Trans. Am. Philos. Soc. 14:305.

Eleodes obscura race *dispersa* Horn, 1870. Trans. Am. Philos. Soc. 14:305.

Eleodes obscura race *sulcipennis*: Horn, 1870. Trans. Am. Philos. Soc. 14:306.

Eleodes dispersa sulcipennis: Wickham, 1890. Entomol. Amer. 6:86.

Eleodes (Eleodes) obscura dispersa: Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 63:190.

Eleodes (Eleodes) obscura sulcipennis: Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 63:190.

Eleodes (Eleodes) obscura sulcipennis forma *deleta*: Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 63:194.

Eleodes (Eleodes) obscura sulcipennis forma *arata*: Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 63:194.

Eleodes obscura dispersa forma *deleta*: Blaisdell, 1910. Ent. News 21:61.

Eleodes obscura glabriuscula Blaisdell, 1925. Proc. Calif. Acad. Sci. 14(16):383.

Diagnosis — This large species often has the elytra costate with the sides rounded (not margined). The profemora are dentate in males, simply sinuate in females. The anterior pronotal angles are obtuse. Female length: 28.5-34.0 mm; width: 11-12 mm; male length: 27.8-35.2 mm; width: 10-15.5 mm. Four subspecies may be separated as follows:

1. Elytra with little or no indication of striae . . . 2
- 1'. Elytra punctate-striate to sulcate 3

2. Elytra irregularly and muricately punctate (four corners area) *E. obscurus dispersus*
- 2'. Elytra irregularly, coarsely punctate (west Texas) *E. o. glabriusculus*
3. Elytral striae strongly sulcate, intervals convex (intermountain region) *E. o. sulcipennis*
- 3'. Elytral striae not in sulci, intervals flat (great plains) *E. o. obscurus*

Types — *Blaps obscura* Say: not seen, presumably destroyed (country bordering the River Platte within a hundred miles of the Rocky Mountains, Say). *Eleodes dispersa* LeConte: holotype, sex not noted. MCZC #4572, New Mexico. *Eleodes deleta* LeConte: holotype, sex not noted, MCZC #4573, New Mexico. *Eleodes arata* LeConte: holotype, sex not noted, MCZC #4574, Arizona. *Eleodes obscurus glabriuscula* Blaisdell: holotype, female, CASC #1814, Alpine, Texas; allotype, male, CASC #2854, Livermore Peak, Davis Mts., Texas.

Distribution — The nominate subspecies is found in northeastern New Mexico, central Colorado, eastern Wyoming, western Nebraska, with one record from central Montana, and one from the Texas panhandle. *Eleodes o. dispersus* is found in northeastern Arizona, northwestern New Mexico, southwestern Colorado, and extreme southeastern Utah. *Eleodes o. sulcipennis* has a wide range from eastern Washington and Oregon, Nevada, Arizona, Utah, Idaho, western Montana, southwestern New Mexico, with a few records from extreme east-central California in the United States, and a few scattered records from the Mexican states of Sonora, Chihuahua, and Durango. *Eleodes o. glabriusculus* is found in west Texas, and southwestern New Mexico, with one record from southeastern Arizona and from the Mexican state of Chihuahua.

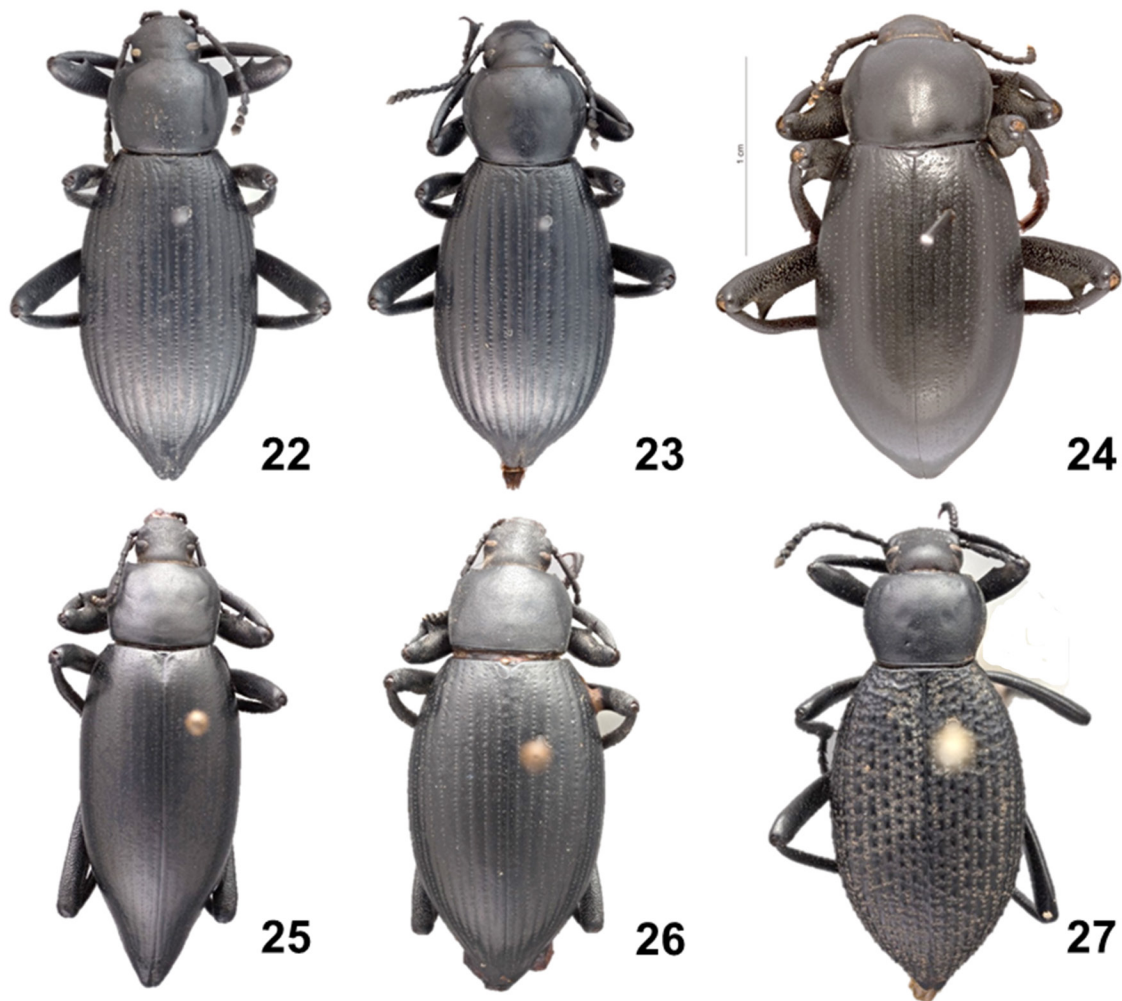
Remarks — Horn (1870) remarked that “I cannot accept the feeble differences between the five species described, as indicative of specific distinction.” He recognized “three principle variations,” *E. obscura*, *E. dispersa* (synonym *E. deleta*), and *E. sulcipennis* (synonym *E. arata*), which he said could be called races.

Blaisdell (1909) summarized his treatment of *E. obscurus* as follows: “The student will recognize the five forms just considered as expressions of variations in the same species, and these forms may be arranged in the following morphological sequence: *dispersa*, *deleta*, *obscura*, *sulcipennis*, and *arata*, which makes the series complete as far as known.” Later Blaisdell (1925) described the subspecies *E. o. glabriuscula*.

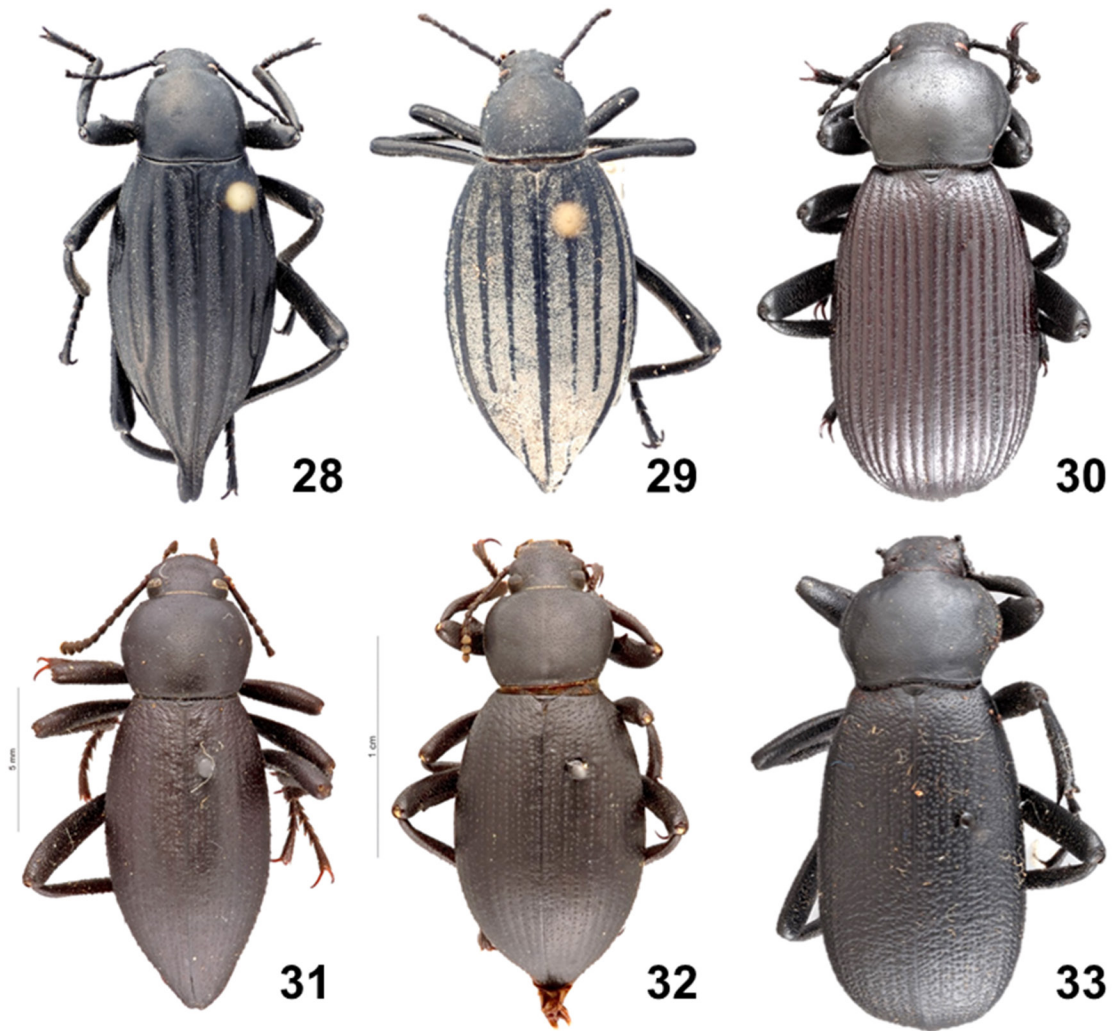
Tanner (1961) recognized four subspecies: *E. o. obscura*, *E. o. dispersa* (= *deleta*), *E. o. sulcipennis* (= *arata*), and *E. o. glabriuscula*.

Our own conclusions differ very little from the above three individuals. We recognize four rather distinct populations that can be considered subspecies. There is some overlap in ranges and some intergradation is apparent. We examined Walker’s types from British Columbia. *Eleodes conjunctus* is a male and *Eleodes convexcicollis* a female, of *Eleodes obscurus sulcipennis*. Thus, they are correctly placed as synonyms of *E. obscurus* in Gebien’s (1911) catalog.

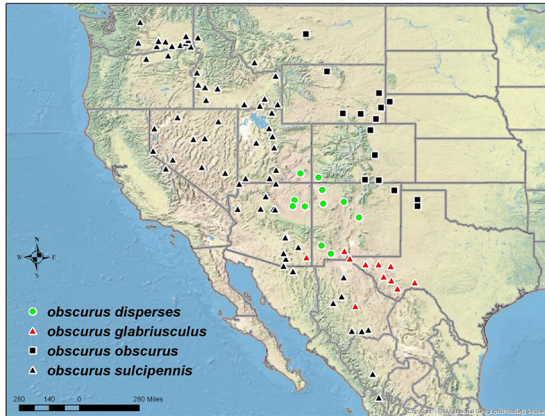
Ecological studies include Wise (1981) on interspecific competition and population size, Kenagy and Stevenson (1982) who related body temperature to seasonality and daily activity rhythms, Slobodchikoff (1983) on temperature preferences, Marino (1986) on activity period and microhabitat, and Whicker and Tracy (1987) on ambient conditions and activity period. Rogers et al. (1988) studied the diet. With regard to habitat, LaRivers (1943) found them to be common on sand dunes in Nevada and Tanner and Packham (1965) trapped them in abundance both in *Grayia-Lycium* and Pinyon-Juniper habitats. Evidently they hide in animal burrows in the daytime because Wickham (1890) encountered them frequently at entrances of prairie dog holes and Hyslop (1912) similarly states that they are usually found around ground squirrel and badger burrows. Cress and Lawson (1971) described the defensive repertoire against predators, and yet Slobodchikoff (1978) described how captive skunks can learn to eat them.



Figs. 22-27. Dorsal habitus. 22. *E. hispilabris* ♂, 23. *E. hispilabris* ♀, 24. *E. lorentensis*, 25. *E. mexicanus* ♂, 26. *E. mexicanus* ♀, 27. *E. muricatulus*



Figs. 28-33. Dorsal habitus. 28. *E. mirabilis* ♂, 29. *E. mirabilis* ♀, 30. *E. obscurus sulcipennis*, 31. *E. moestus* ♂, 32. *E. moestus* ♀, 33. *E. obscurus obscurus*.



Map 15. Known distribution of *E. obscurus*.

***Eleodes rossi* Blaisdell**
(Figs. 34, 35, Map 5)

Eleodes rossi Blaisdell, 1943. Proc. Calif. Acad. Sci. 24:241.

Eleodes (Eleodes) rossi: Triplehorn, 1996. Ohio Biol. Surv. Bull. 10:9.

Diagnosis — This species is very similar to *E. gracilis*, but is more robust and slightly duller in luster; the pronotal and elytral punctation is virtually identical. The greatest difference between the two is in the shape of the pronotum. In *E. rossi* the lateral margins are more strongly rounded in dorsal view, the base more constricted and the anterolateral pronotal angles more strongly dentate. Length (both genders, *fide* Blaisdell): 25–26 mm; width: 9–10 mm.

Types — Holotype, female (CASC #5069), and allotype male (CASC #5070), and five paratypes, Comondú, Lower California, July 22, 1938, Michlbacher and Ross.

Distribution — Known only from the type locality in Baja California Sur, México.

Remarks — *Eleodes rossi* closely resembles *E. gracilis*, a widespread and variable species in southwestern United States and northern México. Were it not for the extreme disjunctive presence in Baja California, we would consider *E. rossi* a local race of that species, which it very well might be.

***Eleodes rugosus* Perbosc**
(Figs. 2, 36, 39, Map 14)

Eleodes rugosa Perbosc, 1840. Rev. Zool. 1839:263.

Eleodes caudata Solier, 1848. Baudi et Truqui Studi Entomol. 2:238 (*nec* Horn, 1870).

Diagnosis — Elytra coarsely rugulose, strongly caudate in male, weakly caudate and somewhat ventricose in female. Pronotum coarsely and densely (but not confluent) punctured; anterior angles acuminate, posterior angles obtuse. Femora punctured; males with strong subapical tooth on profemur, in females profemora emarginated. Prosternal process deflexed, not at all prominent. Body length: 22–31 mm (both sexes, *fide* Champion 1884).

Types — Not seen, type locality, “Vera Cruz,” México (*fide* Champion, 1884:77).

Distribution — Early records are all from the state of Veracruz (Jalapa, Veracruz, Tieria, Palo Gache).

Remarks — This species is very rare in collections. We have seen only 40 specimens.

***Eleodes samalayuca* Triplehorn**
(Figs. 37, 38, Map 13)

Eleodes samalayuca Triplehorn, 2007. Proc. Entomol. Soc. Wash. 109:641.

Diagnosis — This species is very similar to *E. hispilabris* in general body proportions, but differs in not having dentate profemora in either gender, in the narrow and sparsely punctate pronotum with anterior angles obtusely rounded, not prominent. The tibial spurs and tarsal claw are likewise much longer than in *E. hispilabris*. Female length: 19.8 mm; width: 7.5 mm. Male length: 22.2 mm; width: 7.4 mm.

Types — Holotype, female, and allotype male. México, Chihuahua, Samalayuca, 24–VI-1947, Cazier, D. Rockefeller Exp. (AMNH). Paratypes. 1 male, same data as holotype (AMNH), 1 male, 1 female, same locality, but 15-V-1947, C. M. Bogart (OSUC), 2 males, 5 mi. s. Samalayuca, 31-VII-1947, R. L. Mangan, D. S. Chandler (DSCC).

Distribution — Apparently confined to the dry

lake Samalayuca, south of Juarez, Chihuahua, México. We have seen a number of additional specimens from the vicinity of the lake which became available after the original description was written.

***Eleodes sanmartinensis* Blaisdell**

(Fig. 46)

Eleodes sanmartinensis Blaisdell, 1921. Stanford Univ. Publ. Biol. Sci. 1:220.

Eleodes (Eleodes) sanmartinensis: Triplehorn, 1996. Ohio Biol. Surv. Bull. 10:8.

Diagnosis — The sides of the pronotum are arcuate with the anterior angle dentiform. The surface of the pronotum is finely, sparsely punctate. The elytra have the punctures in series and are not muricate. The legs are robust with only the anterior femora dentate. Male length: 23 mm, width 9.5 mm. Female length: 26-30 mm; width 11-12 mm.

Types — Holotype female: Isla San Martin, Baja California, Mexico; 11 July 1905, F.X. Williams. Allotype male, same data as holotype. [CASC].

Distribution — In addition to the type locality which is an island off the coast of northern Baja California peninsula we have seen specimens from Playa El Faro near Ensenada, Baja California.

Remarks — In his original description Blaisdell noted the resemblance to *E. grandicollis* mainly in the form of the pronotal margins. Alongside his original description Blaisdell (1921) described a variety, also from San Martin, which he named “*moesta*” differing in that the elytra were muricately sculptured. Later (Blaisdell 1943) he decided this “variety” was actually related to *E. morbosa* Blaisdell, a mainland form which has all femora dentate. The names were considered synonymous by Triplehorn (1996) (see remarks under *Eleodes moestus*).

***Eleodes scyropterus* Triplehorn**

(Fig. 47. Map 13)

Eleodes scyropterus Triplehorn, 2007. Proc. Entomol. Soc. Wash. 109: 635; figs. 4, 5.

Diagnosis — A large species, caudate in the male, both genders with dentate profemora. The elytral sculpture consisting of a series of moderately large, muricate tubercles, with smaller, more closely spaced tubercles between, causing entire surface to be rough, almost filelike, both large and small tubercles each with a short, dark, semierect seta arising from posterior side. Female length: 25.5-32.5 mm.; width: 11.0-11.5 mm. Male length: 27.5-34.4 mm.; width: 10.0-11.5 mm.

Types — Holotype, female, Mexico, Hidalgo, 7 mi. w. of Pachuca, 24-VI-1975, CA, WE, BW Triplehorn (OSUC); allotype, male, Mexico, Nuevo Leon, 5 mi s. of Galeana, 8-VIII-1959, B.&B. Valentine (OSUC).

Distribution — This species is known from the following Mexican states: Aguascalientes, Guanajuato, Hidalgo, Nuevo Leon, Queretaro, and Zacatecas. It is widespread but rare in collections.

Remarks — *Eleodes scyropterus*, and *E. mirabilis* appear to be very closely related except for the elytral sculpturing. No large series have been collected, usually only one at a time and place.

***Eleodes spinipes* Solier**

(Figs. 40-45, Map 16)

Eleodes spinipes Solier, 1848. Baudi et Truqui Studi Ent. 2:238.

Eleodes ventricosa LeConte, 1858. Proc. Acad. Nat. Sci. Phila. 10:186.

Eleodes (Eleodes) ventricosa: Horn, 1870. Trans. Am. Philos. Soc. 14:311.

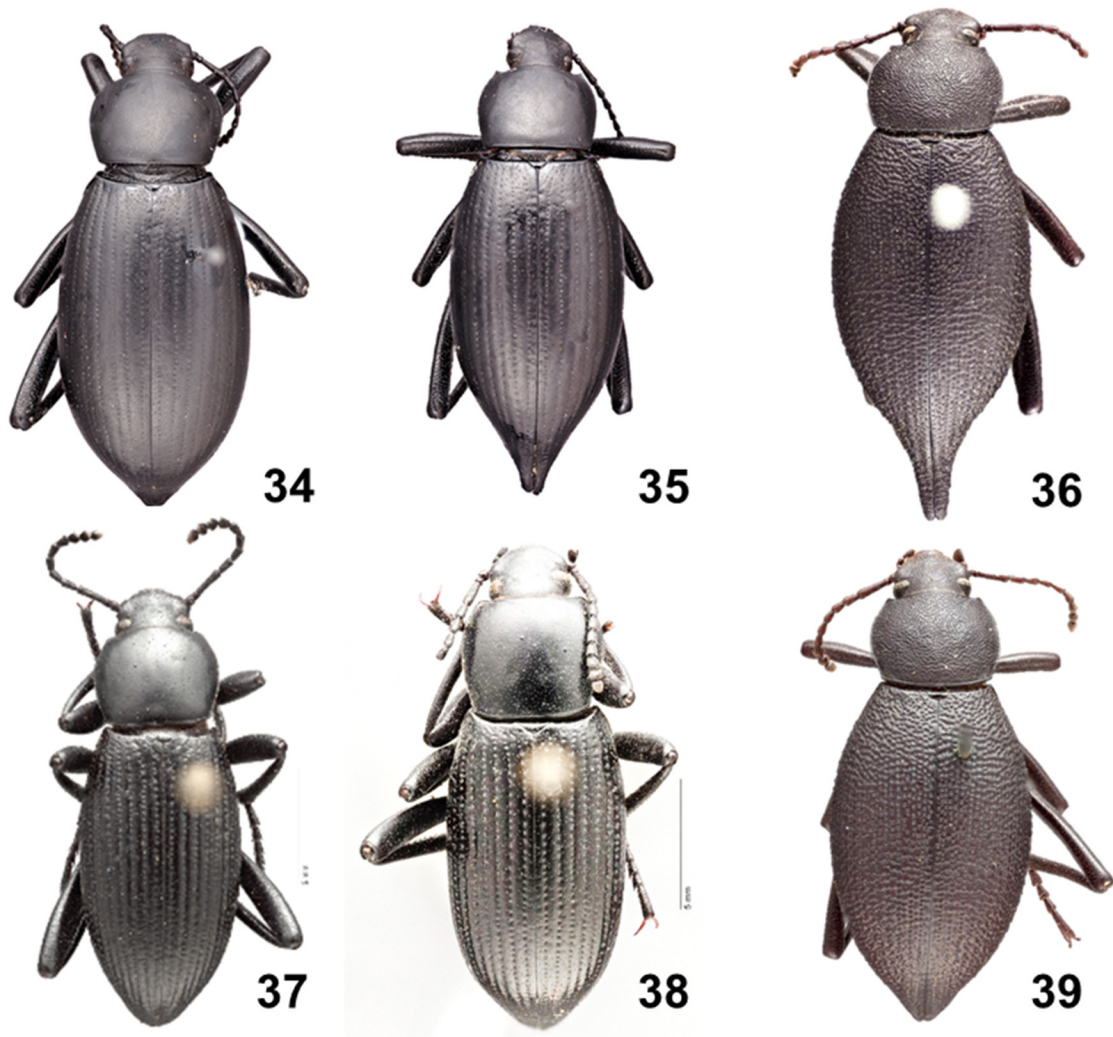
Eleodes macrura Champion, 1892. Biol. Cent.-Am. vol. 4:511.

Eleodes (Eleodes) ventricosa falli Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 63:305.

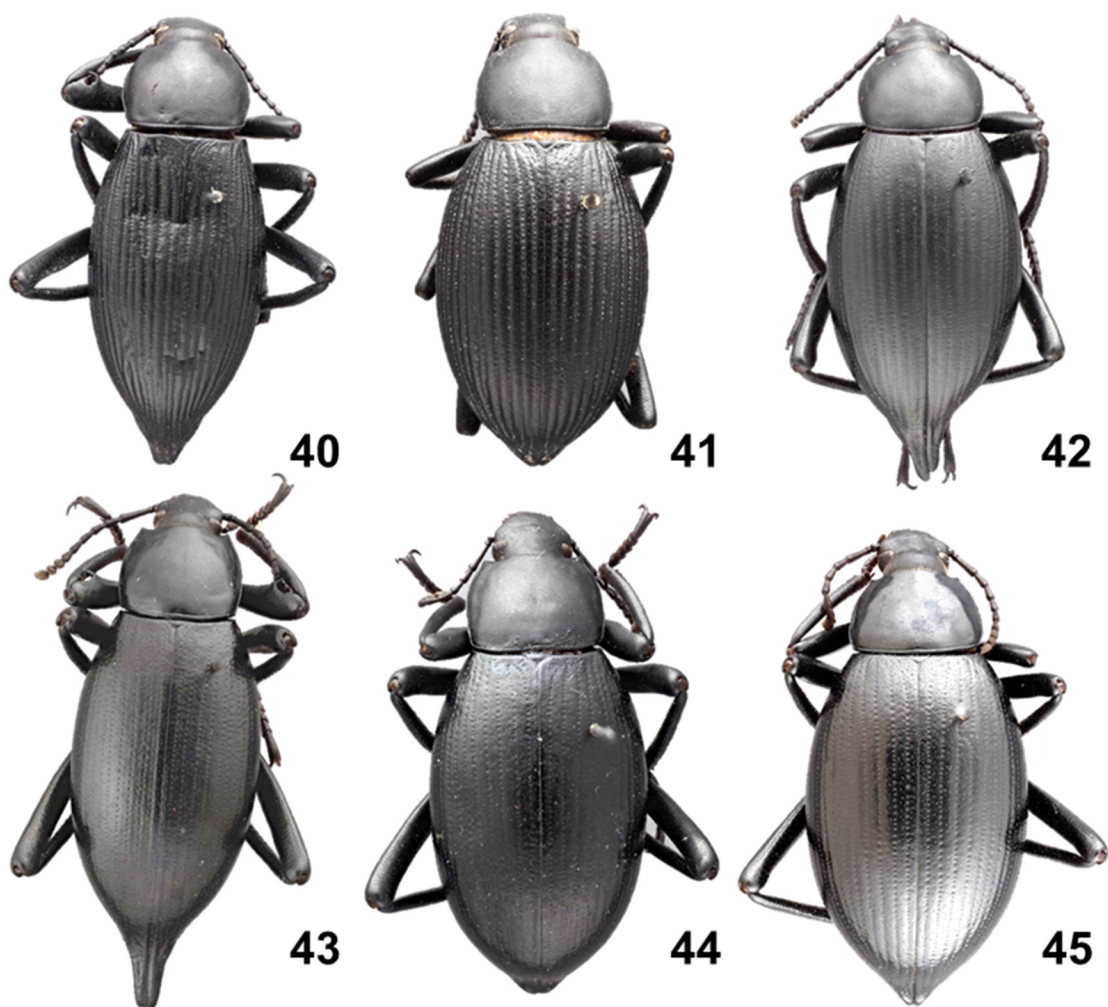
Eleodes (Eleodes) spinipes: Gebien, 1938. Katalog der Tenebrioniden Pt. 2, p. 58.

Eleodes (Steneleodes) spinipes: Pierre, 1975. Ann. Soc. Entomol. France 11:706.

Diagnosis — This large, robust species has distinct profemoral teeth only in the male; the



Figs. 34-39. Dorsal habitus. 34. *E. rossi* ♀, 35. *E. rossi* ♂, 36. *E. rugosus* ♂, 37. *E. samalayuca* ♂, 38. *E. samalayuca* ♀, 39. *E. rugosus* ♀.



Figs. 40-45. Dorsal habitus of the subspecies of *Eleodes spinipes*. 40. *E. s. spinipes* ♂, 41. *E. s. spinipes* ♀, 42. *E. s. ventricosus* ♂, 43. *E. s. macrurus* ♂, 44. *E. s. macrurus* ♀, 45. *E. s. ventricosus* ♀.

***Eleodes sponsus* LeConte**

(Fig. 48, Map 17)

Eleodes sponsa LeConte, 1858. Proc. Acad. Nat. Sci. Phila. 10:184.

Eleodes (Eleodes) sponsa: Horn, 1870. Trans. Am. Philos. Soc. 14:313.

Eleodes (Eleodes) sponsa forma convexa Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 63:215.

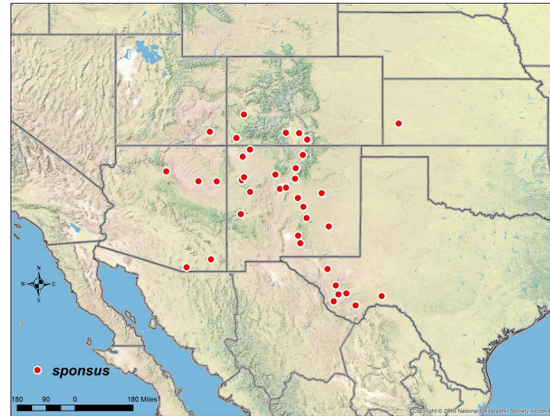
Diagnosis — Very similar to *E. gracilis*, differing from that species in having the elytral punctures coarsely muricate rather than simple. Female: length: 22.0-27.5 mm; width: 8.0-10.5 mm. Male: length: 19.5-25.2 mm; width: 7.8-10.2 mm.

Types — Gender not recorded, green disc label (=New Mexico), MCZC #4577. The LeConte collection has eleven more, and the Horn collection has four, all labeled “New Mexico.” Gebien (1911) placed *Eleodes binotatus* Walker, 1866, as a synonym of *E. sponsus* Horn without comment. Thanks to the good offices of curator Max Barclay at the British Museum we have been able to examine Walker’s type and find it to be a specimen of *Eleodes hispilabris*.

Distribution — Southeastern Utah, northeastern Arizona, southwestern Colorado, most of New Mexico, and west Texas. We have not seen any Mexican (or Canadian) specimens.

Remarks — The Texas population has the elytral punctures very coarse (both striae and interstitial) and tend to be shinier than those from New Mexico, Arizona and Utah. It is tempting to regard *E. sponsus* as a subspecies of *E. gracilis* (they were both described on the same page by LeConte). Since they are so easily separated and occupy, for the most part, reciprocal ranges, we regard them as distinct species.

Eleodes sponsus is one of the species identified as part of a müllerian mimicry complex involving the scent glands and defensive posturing (Doyen and Somerby 1974). Wise (1981b) studied a population in New Mexico and found peak abundance in the summer months. Johnson et al. (1992) report that the adults use kangaroo rat mounds as daytime refugia and that they forage at night near the mounds.



Map 17. Known distribution of *E. sponsus*.

***Eleodes subcylindrica* Casey**

(Fig. 49, Map 18)

Eleodes subcylindrica Casey, 1890. Ann. New York Acad. Sci. 5:400.

Eleodes (Eleodes) armata forma subedentata Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 63:262.

Eleodes (Eleodes) armata subcylindrica forma subedentata: Blaisdell, 1910. Ent. News 21:62.

Eleodes subcylindrica: Blaisdell, 1925. Pan-Pac. Entomol. 2:79.

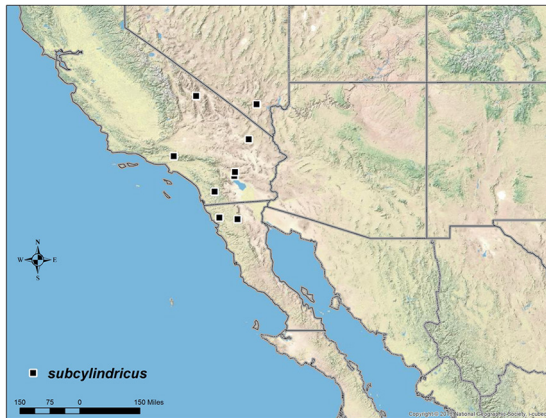
Eleodes (Eleodes) subcylindrica: Gebien, 1938. Katalog der Tenebrioniden Pt. 2, p. 58.

Diagnosis — Dull in luster, cylindrically convex, narrowly elongate (especially male). Pronotum extremely finely punctate, the anterior angles acute and prominent; elytra finely punctate-striate, punctures well separated, intervals flat, with a single row of widely spaced punctures which are finer than those of striae. Legs long, slender, profemoral teeth small, acute and sharply defined in both sexes; femora all coarsely and densely punctured, finely denticulate ventrally; tibiae strongly bent. The prosternal process is horizontal, apex prolonged. Female length: 18.5-25.0 mm; width: 7.0-9.5 mm. Male length: 21-28 mm; width: 7.5-9.0 mm.

Types — A unique male (dissected) labeled, “Arizona” (Casey collection, USNM #46748). The Casey collection contains one additional male, also labeled “Arizona.”

Distribution — USA: California (Inyo, Los Angeles, Nevada, Riverside, San Bernardino, San Diego Counties). Nevada (Clark Co., 30 km wsw of Las Vegas). MEXICO: Baja California, Sierra Juarez, Guadalupe Canyon

Remarks — All of the specimens (n = 25) seen by us are from California, Nevada, and Baja California, not Arizona. Perhaps the type was mislabeled.



Map 18. Known distribution of *E. subcylindricus*.

***Eleodes suturalis* (Say)**
(Figs. 50, 51. Map 19)

Blaps suturalis Say, 1823. J. Acad. Nat. Sci. Phila. 3:257.

Eleodes suturalis: Eschscholtz, 1829. Zoologischer Atlas 3:10.

Eleodes texana LeConte, 1858. Proc. Acad. Nat. Sci. Phila. 4:182.

Eleodes (Eleodes) suturalis: Horn, 1870. Trans. Am. Philos. Soc. 14:306.

Eleodes (Eleodes) texanus: Horn, 1870. Trans. Am. Philos. Soc. 14:306.

Eleodes (Eleodes) suturalis texanus: Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 63:202.

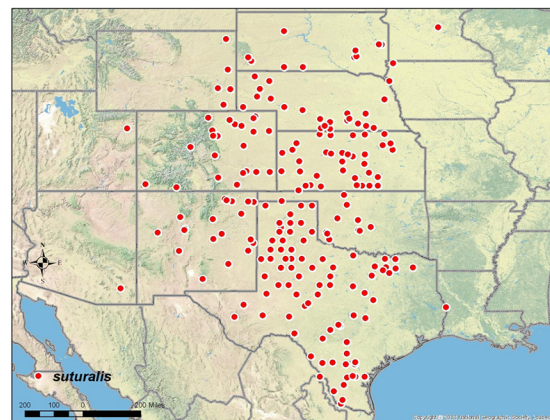
Diagnosis — The large size, acute and reflexed elytral and pronotal margins, and concave pronotal disc, will readily separate this species from the other large *Eleodes*. It is most similar to *E. acutus* which has the elytral margins subacute, but not reflexed, and a convex or flat pronotal disc. We can find no consistent differences to warrant distinguishing *E. texanus* even as a variety as Horn (1874) considered it. We have never seen large series of this form. Female length: 21.5-33.5 mm; width: 10.3-13.0 mm

Male length: 25-36 mm; width: 11-14.5 mm.

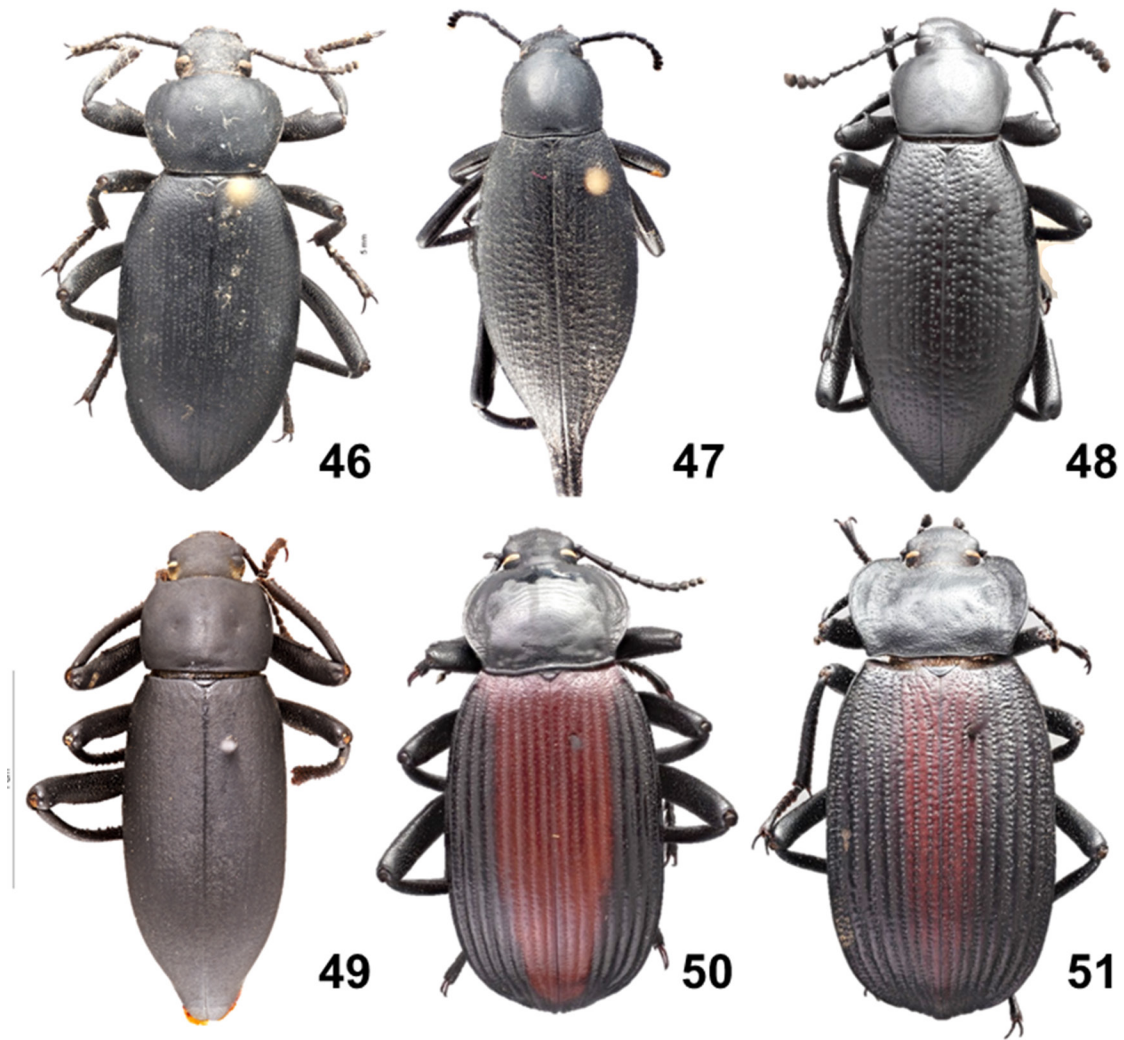
Types — *Eleodes suturalis* Say, not seen, presumably destroyed; type locality not mentioned. *Eleodes suturalis* variety *texana* LeConte, (holotype at MCZC), Ringold Barracks (=Rio Grande City), Texas.

Distribution — This species ranges from South Dakota to Texas, west to southwestern Wyoming, Colorado, New Mexico and extreme southeastern Arizona. We have not seen any Mexican specimens, but it surely occurs south of the Lower Rio Grande Valley, Texas. A specimen from Lewiston, Idaho is probably mislabeled.

Remarks — *Eleodes suturalis* is the most economically important of the false wireworm species attacking germinating wheat (Wade 1921, Calkins and Kirk 1973b, Calkins and Kirk, 1975b), with occasional damage to corn and garden crops (Wade and St. George 1923). Their natural habitat is the high prairies (Quinn et al. 1990) where they hide in the daytime under rocks or logs (McColloch 1922). Wright (1972) studied the diapause. Boving and Craighead (1931) described the larva. At one time it was considered as a candidate for mass rearing as a source of pet food (Matteson 1966).



Map 19. Known distribution of *E. suturalis*.



Figs. 46-51. Dorsal habitus. 46. *E. sanmartinensis*, 47. *E. scyropterus*, 48. *E. sponsus*, 49. *E. subcylindricus*, 50. *E. suturalis* ♀, 51. *E. suturalis* ♂.

***Eleodes tenuipes* Casey**
(Figs. 52, 53. Map 20)

Eleodes tenuipes Casey, 1890. Ann. New York Acad. Sci. 5:339.

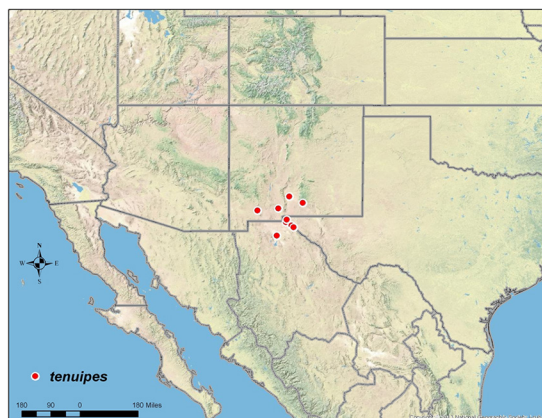
Eleodes (Eleodes) tenuipes: Blaisdell, 1909. Bull. U.S. Natl. Mus. No. 63:294.

Diagnosis — Elongate-oval, smooth, shiny, caudate in both genders (longer in male). Pronotum usually widest anterior to middle, distinctly narrowed toward base, with anterior angles dentiform, strongly everted; elytra punctate-striate, punctures fine, simple, unimpressed, intervals flat, with a single row of still finer and more widely spaced punctures which laterally and apically become very coarse, sparse, asperate; prosternal process deflexed, not prominent; profemoral teeth subequal in the genders. Female: length: 26.0-35.0 mm; width: 9.6-12.5 mm. Male length: 27.5-40.0 mm; width: 9.6-12.0 mm.

Types — Holotype male. El Paso, Texas (Casey collection, USNM #46747).

Distribution — For many years this species was known only from the unique type. Additional localities are: USA: New Mexico: (Dona Ana Co., Otero Co., Deming, White Sands National Monument). Texas: (El Paso Co., Winkler Co., Fabens). MEXICO: Chihuahua (Ciudad Juarez, Samalayuca) (36 specimens). This species has a very narrow distribution and remains rare in collections. The largest series (n = 16) was collected at White Sands Park Headquarters, New Mexico, 19 August, 1962, at night by the senior author and his family (OSUC).

Remarks — This species is most similar to *E. eschscholtzi* and *E. wickhami*, the most distinguishing character being the elytral punctuation. In *E. tenuipes* the striae punctures are simple and not deeply impressed, the intervals each with a single row of still finer and more widely spaced punctures which become very coarsely asperate laterally and apically. Smith and Whitford (1976) studied a population at the Jornada Playa in New Mexico and found them to be a heat tolerant, summer active species.



Map. 20. Known distribution of *E. tenuipes*.

***Eleodes vanduzeei* Blaisdell**
(Fig. 54, Map 12)

Eleodes vanduzeei Blaisdell, 1923. Proc. Calif. Acad. Sci. 12:264.

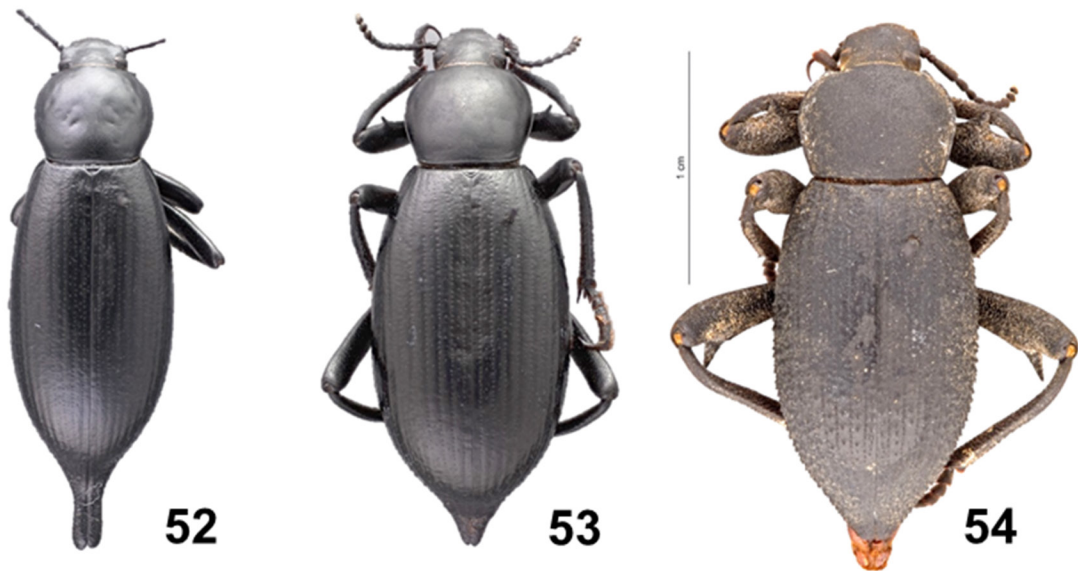
Eleodes (Eleodes) vanduzeei: Triplehorn, 1996. Ohio Biol. Surv. Bull. 10:7.

Diagnosis — A robust species with all femora strongly dentate. The punctures of the elytral intervals are strongly spiculiferous, especially on the lateral margins and the apical declivity. Female length: 21.5-24.8 mm; width: 7.8-10.5 mm. Male length: 22-26 mm; width: 8-11 mm.

Types — Holotype, female (CASC #1175), allotype, male (CASC #1176). Baja California, Mulege.

Distribution — This species is apparently restricted to the Santa Rosalia-Mulege area along the east coast of Baja California Sur.

Remarks — See discussion under *E. lorentensis*.



Figs. 52-54. Dorsal habitus. 52. *E. tenuipes* ♂, 53. *E. tenuipes* ♀, 54. *E. vanduzeei*.

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