

MISCELLANEOUS STUDIES IN THE COLEOPTERA, NO. 6¹ (MELYRIDAE AND TENEBRIONIDAE)

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I. NEW SPECIES OF MELYRIDAE AND TENEBRIONIDAE

The following new species have been submitted to me for study: An interesting species of *Trichochrous* Motsch, received from the Entomological Laboratory, Natural History Museum, Balboa Park, San Diego, California. Three Tenebrionid species, namely; A new species of *Triorophus* Lec. and an *Eleodes* Esch. from Nevada, submitted by Mr. Ira La Rivers, and a *Blapstinus* Latr. collected in Death Valley, Inyo County, California, by Dr. E. C. Vandyke. The species may now be described as follows:

Trichochrous nevadensis new species

Nevadensis has to be distinguished from *subcalvus*, *funebri* and *vittiger* of Casey, as well as *subvittiger* Blaisdell. In *subcalvus* and *nevadensis* the distribution of the cinereous and darker pubescence form a similar pattern of maculation. In *subcalvus* the pronotum is transversely oval and evenly convex; the body is less elongate and the pubescence more abundant; type locality Southern California at San Diego. The species also occurs in the vicinity of Mokelumne Hill, Calaveras County, and in Fresno County (Sierra National Forest?), California. In *nevadensis* the pronotal sides are more prominent posteriorly and somewhat convergent apically (viewed from above); the disk appears more convex and rather more declivous antero-laterally.

Funebris is without metallic luster; pronotum more transverse and widest behind the middle, pubescence moderately dense, re-

¹No. 1. Can. Ent., LIII, pp. 129-132, (June, 1921). No. 2. Pan-Pacif. Ent., III, pp. 163-168, (April, 1927). No. 3. Pan-Pacif. Ent., VI, pp. 21-25, (July, 1929). No. 4. Pan-Pacif., VI, pp. 57-62, (Oct., 1929). No. 5. Trans. Amer. Ent. Soc., LXIII, pp. 127-145, (June 29, 1937).

clined and blackish, generally coarser and cinereous laterally; on the elytra the pale hairs occur along the suture and at the sides, especially toward base, where they diffuse inward in basal two-fifths; the lateral pronotal fimbriae are short. The species occurs in Colorado (Rocky Mountains). In *nevadensis* the pale hairs of the elytra form a well defined sutural stripe; at base they occur only on the margin and scutellum.

In *vittiger* the legs are rufous throughout, the pubescence longer, coarser, less decumbent and more abundant. The subsutural vitta of each elytron is less developed and variable. The species occurs in New Mexico.

Subvittiger has a more abundant cinereous pubescence, and the elytral vittae are more or less obsolete; body smaller, legs rufous.

In form *nevadensis* is elongate oblong-oval, about two and one-fourth times as long as wide. Color black, with a more or less aeneous tinge; tibiae and tarsi rufo-testaceous. Pubescence fine, decumbent and brownish on the pronotal and elytral disks, with cinereous hairs distributed as follows: Sparse laterally and narrowly across the base of the pronotal disk; each elytron with a sutural vitta, narrowly on the basal margin, on the declivous sides and apical declivity, dense on the scutellum. Lateral pronotal fimbriae ashy, moderately long and regular, increasing slightly in length from apex to basal fourth, and there reversed in direction. Elytral marginal fringe shorter, hairs quite equal in length and less closely spaced to apex. Pubescence of the ventral surface short, fine, dense and closely appressed to the surface, dark in color.

Head moderately small, widest across the eyes and there about a third wider than long before the post-ocular line. Frons very feebly convex, surface finely and densely punctato-scabrous, a slight glabrous tumescence present on the median line at the epistomal base; articulating membrane and labrum blackish to paler. Eyes large, prominent, not setose, facets very small. Antennae moderate in stoutness, equal in length to that of the pronotum; blackish throughout, basal segment sometimes paler, distal segments slightly wider and stouter, a little more prominent anteriorly than posteriorly (viewed in lateral extension); third segment obconical and less than a third longer than wide at apex; segments fourth, fifth and sixth subtriangular, the fifth largest and most prominent anteriorly; seventh less triangular and more rounded anteriorly; segments eighth, ninth and tenth gradually broader and rounded, prominent anteriorly, tenth widest; eleventh subovate, about a third longer than wide.

Pronotum suboval, about one-fifth wider than long; apex transverse to feebly sinuate, equal in width to that of the head across the eyes, angles bluntly rounded and not in the least prominent; sides broadly arcuate and continuously so, with the much less arcuate base. Disk somewhat strongly

convex, rather more arcuately declivous antero-laterally than usual in about apical third; surface rather closely punctate, punctures well defined, separated by a distance equal to one or two times their diameter, intervals extremely finely granulate.

Elytra oblong-oval, a little less than twice as long as wide; base transverse, a little wider than that of the pronotum, humeri not prominent and evenly rounded, scutellum quadrate; sides parallel, scarcely arcuate, parabolically rounded at apex, the latter slightly emarginate at the suture, angles narrowly rounded. Disk moderately and evenly convex, arcuately and very gradually declivous laterally, most so apically, abruptly so and somewhat impressed at and beneath the humeri, very feebly subexplanate in the sub-marginal area; marginal bead fine, feebly reflexed and very slightly denticulate, frimbriae pale; surface somewhat finely and densely punctate, slightly impressed within the small humeral umbones.

Abdomen extremely finely punctate. Legs moderate in length and stoutness; metafemora straight and not adapted to sides of body; metatarsi five-sixths as long as their tibia.

Male: Usually somewhat narrower. Abdomen less convex, fifth segment truncate and feebly sinuate at apex, surface not modified.

Female: Usually broader. Abdomen moderately convex, fifth ventral segment longer and arcuate at apex.

Measurements: (Types) Length 4 mm.; width 1.5 to 1.9 mm.

Holotype.—Female; Clark County, Nevada; (C. C. Searles); [Author's collection, California Academy of Sciences, no. 5214].

Allotype.—Male; with same data; [Author's Colln.; no. 5215].

Paratypes.—22; with same data.

Paratypes.—22 specimens of both sexes; with same data as for types. Distribution: Author's Colln., Colln. Natural History Museum, Balboa Park, San Diego, and Colln. The American Entomological Society.

Fifteen additional specimens were studied.

In a series of more than a hundred specimens submitted to the author for study, over two-thirds of them had been entirely denuded of pubescence by psocids (*Troctes divinatorius* Muller), which have been observed in action as follows: On one occasion, while examining a specimen of the series under the microscope, one of the pests suddenly appeared from the ventral surface onto that of the elytra; it moved about between the hairs, finally biting off one close to its base, retaining it between the mandibles. At another time when studying the pronotal characters of a specimen under a binocular, one of the lateral fimbriae was observed waving

in a very unusual and irregular manner; suddenly a psocid appeared from beneath the pronotal margin, it was nibbling the base of a fimbria which it held between the mandibles. The psocid was feeding. These observations explain one of the causes of denudation, when the pubescence has not been rendered distasteful by reagents.

***Triorophus lariversi* new species**

The species is to be recognized by the smooth and polished surface, slender antennae, with the ninth and tenth segments triangular, and as long as wide. The frons is broadly and feebly impressed behind the epistomal umbo, punctures are absent or very minute, becoming slightly larger and sparse toward the vertex; two long and parallel plicae are present each side within the supra-orbital carina, the intervening surface quadrately defined between the epistomal umbo anteriorly and the summit of the vertex, short parallel rugulae may be present, very feeble or absent.

Pronotal sides are convergent behind the middle and not sinuate before the basal angles. The elytral striae of punctures become obliterated at apical third; punctures moderately small and well defined; humeral angles small, sharp, distinct and exposed.

In *gracilicornis* and *longicornis* of Casey the tenth antennal segments are longer than wide, the frons more strongly punctate in these and other species. *Lariversi* is only known from Nevada; it is neither opaque nor pubescent, although the elytral punctures possess extremely minute pale setae, visible only under high power. The species is described as follows:

Form elongate subovate, about two and one-half times as long as wide. Surface smooth and shining. Color castaneous, palpi rufous, antennae rufocastaneous.

Head relatively moderate in size, when fully retracted the eyes are in contact with the inner surface of the pronotal angles; eyes and sides of the front equally prominent; side margins evenly arcuate over the antennal insertions, subparallel in basal half, thence converging to apex of the mandibular notch, the latter well marked, partly encircling the superior mandibular base; sides of the adjacent epistoma arcuately emarginate, then angulate, thence straight and convergent to the apical angle. Frons feebly convex between the eyes, becoming somewhat broadly, rather widely and transversely impressed at and around the base of the evenly and strongly convex umbo; sides evenly convex over the antennal insertions from the eyes to the man-

dibular notch and, limited internally by the continuation of the supra-orbital carinae which extend forward to the summit of the convex sides; laterally the surface of the frons within the carinae is marked by two, sometimes three plicae that extend forward from sides of vertex just behind the eyes to the forward limit of the supra-orbital carinae, these plicae are straight and parallel, separated by rather narrow sulci; surface behind the eyes and lateral to the frontal folds is marked by two or three small rather oblique rugae which become obsolete on the tempora. Surface discretely punctate, punctures fine to obsolete on the impressed area, well defined on the umbo and apical portion of the epistoma, larger on the convex sides. Mandibles strongly and closely punctate. Terminal segment of the palpi subsecuriform. Antennae slender, in length extending two or three segments beyond the pronotal base; segments two to seven obconico-cylindrical, second two-thirds as long as the third, the latter three times as long as wide at apex; ninth and tenth triangular and as long as wide; eleventh smaller and oval.

Pronotum about one-sixth wider than long; apex one-sixth wider than the base, feebly and broadly arcuate, becoming slightly sinuate within the small and acute angles; sides broadly arcuate anteriorly, less so posteriorly and converging to base, marginal bead not coarse; base broadly, very moderately arcuate, marginal bead broad and flat, angles distinct and obtusangular. Disk strongly convex, punctures rather coarse and evenly distributed, separated by a distance equal to two or three times their diameter, slightly coarser laterally, discrete throughout.

Elytra oval, about two and two-thirds times as long as the pronotum and one-third longer than wide; base broadly emarginate and narrowly margined, slightly wider than the pronotal base, humeral angles distinct and slightly acute; sides rather strongly and broadly arcuate to the obtuse apex; surface strongly convex from side to side, margins not visible from above, bead fine and sharp, strongly and acutely declivous apically, subapical surface impressed; striate, striae of discrete and rather coarse punctures, separated by a distance equal to two or three times their diameter, becoming gradually smaller and obsolete on the apical declivity; intervals with widely distributed punctules. Scutellum small, not entering between the elytra beyond the basal bead. Epipleurae narrow and impunctate.

Sterna and parasterna very coarsely punctate. First abdominal segment similarly punctate laterally, centrally more or less punctulate about the pubescent fovea of the male. The fovea not impressed, rather small and oval, hairs short, dense and yellowish or brown in color; the other segments very sparsely punctate. Legs slender and moderate in length.

Measurements.—(Types) Length 8–9.5 mm.; width 3 to 4 mm.

Holotype.—Male; Lovelock, Nevada; June 15, 1941; (Ira La Rivers); [Author's collection, California Academy of Sciences, no. 5282].

Allotype.—Female; with same data; [Author's Colln., Cal. Acad. Sci., no. 5283].

Paratypes.—1 ♂, 1 ♀; with same data as for type. 4 ♂, 4 ♀; Pyramid Lake, Nevada, August 31, 1914. 2 ♂, 1 ♀; Alamo, Nevada, January 17, 1941. Distribution: Author's Colln., Colln. Ira La Rivers, and The American Entomological Society.

Three additional specimens were studied.

***Eleodes striatipennis* new species**

This species is described as new from a series of 31 specimens. Ira La Rivers the collector states that it occurs abundantly in the sand dune areas at Walker Lake and Paradise Valley, Nevada. The specimens show difference in size, that varies from 17 to 25 mm. in length; the body surface is dull without sericeous luster, the elytra distinctly striate, the striae are not noticeably impressed and, composed of small, distinct and closely placed punctures; in the males the elytra are elongate and subparallel, the sides broadly arcuate. The smaller specimens are somewhat ovate in form and, the striae show a tendency to become less distinct, these can be compared with the homologous subspecies *pumila* Blaisdell of *armata* LeConte of more southern habitat. In *Eleodes amedeensis* Blaisdell the surface luster is distinctly sericeous and, the elytral striae less distinct. *Armata* is larger and more variable in form, with the femoral spurs much stronger. Long series of most species of *Eleodes* show marked extremes in size and sculpturing. The species is described as follows:

Form moderately large, elongate suboval to subfusiform-ovate, two and two-thirds times as long as wide. Color dull black. Elytra striate.

Head relatively moderate in size, widest across the eyes, a little less than twice as wide as long before the post-ocular line; side margins over the antennal insertions arcuate, converging slightly to the oblique suture, thence the sides of epistoma are convergent and feebly arcuate to the obtuse apical angles, apex transverse. Frons slightly convex, oblique sutures distinct, the transverse more or less obliterated at middle; surface discretely and rather irregularly punctate, punctures moderately small, slightly smaller and denser laterally, each with a very short, black seta; vertex more densely and finely punctate; tempora feebly convex and convergent posteriorly from margin of the eyes, densely punctate and setose. Labrum arcuate laterally and continuously so with the apex, the latter emarginate at middle; surface densely punctate apically, each puncture with a rather long seta, those of the margin brownish.

Antennae moderate in length, about attaining the pronotal base, second segment short, about as long as wide at apex and subannular; segments three to six inclusive cylindrico-subconical; third about five times as long as wide at apex and twice as long as the fourth, the latter twice as long as wide at apex; segments five to eight quite equal in length; fifth and sixth about one-half longer than wide at apex; seventh feebly triangulo-obconical, eighth subtriangular; the latter to the eleventh slightly wider than the preceding; ninth and tenth somewhat irregularly spherical, as long as wide; eleventh obovate, truncate at apex and as long as wide.

Pronotum about one-seventh wider than long, widest at middle; apex broadly and deeply emarginate, finely beaded within the angles, the latter distinctly prominent anteriorly and acute; sides moderately arcuate, less so and somewhat straighter behind the middle, slightly sinuate behind the apical angles, marginal bead fine; base equal in width to the apex, broadly, evenly but not strongly arcuate to the angles, marginal bead narrow, angles small and obtuse. Disk evenly and moderately convex, finely and somewhat sparsely punctulate, punctules well defined laterally, subobsolete centrally.

Elytra one and four-fifths times as long as wide, but variable, widest slightly behind the middle; about two and three-fourths times as long as the pronotum; base scarcely wider than pronotal base, not margined, broadly and feebly emarginate, humeral angles distinct but not in the least prominent; sides broadly and moderately arcuate, apex obtuse. Disk moderately convex centrally to slightly deplanate, broadly and arcuately declivous and inflexed laterally; arcuately and obliquely declivous in about apical fourth; distinctly striate, slightly less so on the lateral and apical declivities, punctures small, well defined and separated by a distance one or two times their diameter; intervals with a series of similar and widely spaced punctures. Epipleurae narrow, gradually widening before the middle, becoming very narrow to apex.

Ventral surface very irregularly and indistinctly punctate. Intercostal prosternal process mucronate at apex. Prothroracic sides rather strongly convex. Abdomen variable according to sex. Legs long and rather strongly sculptured; femoral teeth rather narrow, comparatively long and acute. Tarsi not noticeably elongate and rather robust.

Male. Narrower and more subfusiform-ovate. Abdomen less convex, flattened in middle third on segments one, two and three, and more or less impressed on the median line; surface finely and quite sparsely punctulate.

Female. Moderately broader and more elongate subovate. Abdomen rather strongly convex; surface finely and sparsely punctulate.

Measurements.—(Types) Length 24–28 mm.; width, 8–10 mm.

Holotype.—Male; Winnemucca, Nevada; July 4, 1941; (Ira La Rivers); [Author's collection, California Academy of Sciences, no. 5286].

Allotype.—Female; with same data; [Author's Colln. Cal. Acad. Sci., no. 5287].

Paratypes.—2 ♂, 2 ♀; Walker Lake, Nevada. 2 ♂, 2 ♀; Paradise Valley, Nevada. 1 ♂, 2 ♀; Tonopah, Nevada, July 26, 1941, (J. R. Slivin). Distribution: Author's Colln., Colln. Ira La Rivers, and The American Entomological Society.

Sixteen additional specimens were studied.

***Blapstinus vandykei* new species**

Vandykei can be recognized by the moderately small size, somewhat more abundant brownish pubescence and well developed wings. Its genetic relationship is apparently with that of *castaneus* and *histicus* Casey and *coronadensis* and *annosus* Blaisdell. Compared with *castaneus*, the body color is quite the same; the latter is as a rule a little larger and less convex, pubescence paler in color, less abundant and the striae less defined; in perfect specimens of *vandykei* the pubescence is confined to the intervals, rendering the striae more evident. In older and worn specimens the pubescence is usually more or less displaced or lost and the striate appearance effaced. Col. Casey in discussing *castaneus* mentions two variations in particular, stating that he was convinced that the variations represent several distinct species. *Vandykei* is evidently one of these, as the author has been able to associate specimens referred to *castaneus* from Palm Springs, California, and from Phoenix, Arizona.²

Form moderately small, oblong-oval, about two and a third times as long as wide and moderately convex. Color nigro-piceous, frontal margin and labrum more or less and legs rufous. Pubescence moderately dense, loosely decumbent and in perfect specimens confined to the intervals, brownish, slender, moderately short and somewhat conspicuous.

Head relatively small, widest just before the eyes and about twice as wide as long before the post-ocular line, marginal outline nearly evenly arcuate from side to side, including the tempora; epistoma slightly and arcuately emarginate over the labrum. Frons moderately convex, epistomal sutures obliterated; surface slightly impressed before the eyes, rather coarsely and densely punctate, punctures not confluent but in close contact, slightly smaller on epistoma and sides. Eyes relatively large, superior and inferior lobes slightly oval and similar. Labral apex narrowly deflexed and scarcely emarginate. Antennae slender, about attaining the pronotal base, in length quite equal to width of pronotal base; first segment slightly stouter than the second, the latter to the sixth obconical, second and fourth equal in length, third

² The type locality for *castaneus* is El Paso, Texas; for *histicus*, Newhall, Ventura County, California; *coronadensis* near San Diego, Southern California; for *annosus*, Lower California.

elongate, twice as long as second; sixth and seventh segments obconico-oval, equal in length and width; segments eighth, ninth and tenth increasing slightly in width, equal in length, more circular in outline and feebly compressed; eleventh oval and a little longer than wide.

Pronotum about two-fifths wider than long, length at middle equal to width of head; apex slightly emarginate, angles rather narrowly rounded and not in the least prominent; sides subparallel, slightly arcuate, feebly convergent before the middle; base broadly arcuate in middle two-fourths, feebly sinuate laterally, angles obtusely rounded; margins finely beaded. Disk less than moderately convex from side to side and without basal impressions, densely and evenly punctate, punctures in close contact centrally, slightly confluent laterally.

Elytra twice as long as wide, a little less than three times as long as the pronotum, and about one-fourth wider at middle than the latter, at base slightly wider than the pronotal base, humeri rounded and not in the least prominent; sides subparallel, broadly and moderately arcuate, quite parabolically rounded in apical one-fourth, slightly emarginate at the suture, angles rounded. Disk less than moderately convex, quite evenly and arcuately declivous laterally, more gradually so in apical fourth; striae distinct, punctures small, separated by a distance equal to one or two times their diameter, intervals not convex, finely and irregularly punctate; normally the pubescence is confined to the intervals, rendering the striae more exposed producing a lineate appearance. Surface very finely, densely subasperate.

Legs moderate in length and stoutness. Metafemora straight and about equal in length to the metatibia; metatarsi about one-ninth shorter than their tibia, basal segment equal in length to the second and third taken together.

Male. Slightly more parallel and narrower. Profemora moderately swollen. Protarsi moderately dilated, second and third segments subequal in width and length, the width about equal to the fourth antennal segment; first segment subtriangular, relatively stout and a little narrower than the second, fourth one-half as wide as third, triangular; first three segments densely pubescent beneath. Mesotarsi feebly dilated. Abdomen less than moderately convex, first three segments feebly impressed in middle third.

Female. Slightly wider, subparallel and feebly ovate. Abdomen moderately convex.

Measurements.—(Types) Length 5 to 5.5 mm.; width 2 to 2.5 mm.

Holotype.—Female; Death Valley, Inyo County, California; March 13, 1941; (Edwin C. Van Dyke); [Van Dyke Collection, California Academy of Sciences, no. 5288].

Allotype.—Male; with same data; [Colln. Van Dyke, Cal. Acad. Sci., no. 5289].

Paratypes.—15 specimens; with same data; [Colln. Van Dyke, Cal. Acad. Sci., 9; Colln. American Entomological Society, 6].

II. A BRIEF REVIEW OF THE SPECIES OF ELEODES SUBGENUS
LITHELEODES, WITH THE DESCRIPTION OF A NEW
SUBSPECIES (TENEBRIONIDAE)

The recent collecting of more abundant specimens of the different species and subspecies belonging to the subgenus *Litheleodes*, calls for a review of the taxonomic relationships. It is the desire of the author, to aid the student in the determination of the species, by presenting the specific characteristics of the several, distinct forms. If greater details are needed, the student should consult the author's Monograph of the Eleodiini.³ The species are divisible into three distinct groups as follows:

Arcuata Group. Those species having a smooth surface, a simple sculpturing not in the least asperate; the anterior femora distinctly mutic in both sexes.

Extricata Group. All those species having the anterior femora distinctly dentate in the male. Elytra more or less densely punctate, punctures not distinctly muricate, series more or less evident, intervals rather narrow; punctuation at times more or less confused and varying in coarseness.

Granulata Group. The species have the anterior femora mutic or simply angulate (subdentate). Elytra more strongly sculptured and more or less granulate, muricato-tuberculate or simply tuberculate.

The species may be briefly characterized as follows:

Arcuata Group

Eleodes (Litheleodes) arcuata Casey

Litheleodes arcuata Casey, Contr. to Descr. and Syst. Col. of N. A., pt. 1, p. 47, 1884. Annals N. Y. Acad. Sci., v, p. 395, Nov. 1890.

Form oblong-ovate to ovate, robust. Surface glabrous, more or less shining, color intense black. Finely sculptured, elytral punctures small, simple and subserial. Anterior femora more or less feebly angulate in both sexes.

Type locality.—Arizona.

Distribution.—Occurs in the Santa Rita and Chiricahua Mountains.

³ Blaisdell, F. E., The Eleodiini, *U. S. Nat. Mus.*, Bull. 63, p. 114-138, 1909.

Extricata Group

Eleodes (Litheleodes) extricata (Say)

Blaps extricata Say, Jour. Acad. Nat. Sci. Phila., III, p. 261, 1823.

Eleodes extricata LeConte, Proc. Acad. Nat. Sci. Phila., p. 181, 1858. Horn, Trans. Amer. Phil. Soc., XIV, p. 309, 1870. Casey, Contr. to Descr. and Syst. Col. of N. Amer., pt. 1, p. 48, 1884.

Size moderate, 10 mm. more or less in length. Form fusiform-ovate to ovate in the sexes, surface shining. Pronotum sparsely punctulate; apical angles obtuse not acute, basal angles rounded, not evident. Elytra densely and more or less irregularly punctate, punctures rather coarse, not distinctly muricate or feebly so, series somewhat binary at times and the alternate intervals slightly wider, as seen viewed longitudinally.

Habitat.—Widely dispersed from Arizona, Texas and Colorado to Canada.

Eleodes (Litheleodes) extricata subspecies **convexicollis** Blaisdell

Eleodes extricata forma convexicollis Blaisdell, U. S. Nat. Mus. Bull., no. 63, p. 123, 1909.

Eleodes (Litheleodes) extricata var. *convexicollis* Blaisdell, Can. Entom., LIII, p. 132, 1921.

Similar in form and sculpturing to *extricata* Say, size smaller; pronotum strongly, transversely convex.

Habitat.—Wyoming: Lamarie; Montana.

Eleodes (Litheleodes) extricata subspecies **arizonensis** Blaisdell

Eleodes (Litheleodes) extricata var. *arizonensis* Blais., Can. Ent., LIII, No. 6, June, 1921, p. 132.

Similar in form to typical *extricata* Say, but with the elytra more or less costate on the alternate intervals, the intervening intervals wide, two series of distinct punctures separated by similar irregular punctures.

Habitat.—Arizona.

Eleodes (Litheleodes) extricata subspecies **utahensis** Blaisdell

Eleodes (Litheleodes) extricata var. *utahensis* Blaisdell, Can. Ent., LIII, No. 6, p. 131, June, 1921.

Rather less robust, somewhat elongate. Surface not strongly sculptured, pronotum quite impunctate or not; elytral punctures finer and less distinct. Luster dull.

Habitat.—Utah: Stockton, Milford and Eureka.

Eleodes (Litheleodes) extricata subspecies **cognata** Haldeman

Eleodes cognata Haldeman, Stansbury's Explor. and Survey, Great Salt Lake, Utah, Appendix C, p. 376, 1852. Casey, Annals N. Y. Acad. Sci., v, p. 395, Nov., 1890.

Size somewhat larger, surface luster more or less dull. Punctuation denser and rather coarse, that of the elytra irregular (viewed from above), but in close series as seen when viewed obliquely from behind. Two forms recognizable: One in which the punctuation is less dense and not as distinctly defined; in the other distinctly denser and well defined.

Habitat.—Arizona: Pinal Mountains; Colorado: Gulnare; Utah; New Mexico: Cloudcroft, 9000 ft.

Granulata Group

Eleodes (Litheleodes) granulata LeConte

Eleodes granulata LeConte, Reports of Explor. and Surveys . . . 47th and 49th Parallel, XII, Appendix, No. 1, p. 50, 1857, (female). Horn, Trans. Amer. Phil. Soc., XIV, p. 309, 1870. Blaisdell, Mon., Bull. 63, U. S. Nat. Mus., p. 127, 1909.

Form ovate, male narrower; size moderate, length near 10 mm. Head densely punctate. Pronotum subquadrate, moderately densely punctate; sides arcuate, basal angles obtusely rounded. Elytra rather densely, irregularly submuricato-granulate, most marked laterally and apically. In fact the granulate condition is really due to small, flat or convex tubercles and scattered intervening muricate punctures.

Habitat.—Oregon; northern California: Siskiyou County.

Eleodes (Litheleodes) granulata subspecies **obtusa** LeConte

Eleodes obtusa LeConte, Proc. Acad. Nat. Sci. Phila., p. 352, male, 1861.
Litheleodes obtusa LeConte.—Blaisdell, Mon., Bull. 63, U. S. Nat. Mus., p. 130, 1909.

Form elongate, as in *granulata*, length near 13 mm., luster dull. Head and pronotum densely punctate, sides of the latter arcuate, less so posteriorly and rather oblique, basal angles obtuse, disk with small irregular smooth areas each side of middle. Elytra sculptured with flattened elevations laterally and apically; the oval elevations are smaller in the parasutural area and not distinctly seriate. The elevations are obsoletely muricate and not shining.

Habitat.—Eastern California (Desert region).

Eleodes (Litheleodes) granulata subspecies **aspera** LeConte

Eleodes aspera LeConte, Smithson. Miscel. Coll., No. 167, p. 115, 1865.
(?) *Eleodes subaspera* Solier, Studi Entomol., II, p. 246, 1848. Blaisdell, Mon., Bull. 63, U. S. Nat. Mus., p. 130, 1909.

Form resembles *granulata*, opaque, head and pronotum rather strongly and densely punctate. Pronotal apex submarginate, angles not prominent; sides finely margined, arcuate, subsinuate behind the apical and before the basal angles; disk moderately convex. Elytra oval to slightly ovate, humeri subacute; apically strongly declivous and gradually narrowed, dorsal area somewhat flattened; surface sculptured with shining, reclinate, feebly piliferous granules densely and subseriately placed.

Habitat.—Colorado: Gateway, June 29, 1932, 1 specimen.

Eleodes (Litheleodes) vandykei Blaisdell

Eleodes letcheri var. *vandykei* Blaisdell, Mon., Bull. 63, U. S. Nat. Mus., p. 136, 1909.

Recent studies indicate that *vandykei* is not a race of *letcheri*.

Form moderately ovate, narrower in the male, length 10 to 13 mm. Surface luster dull. Pronotum quadrate, sides less arcuate in the male than in the female; apex sinuate, angles obtuse not prominent. Elytra not pubescent, densely sculptured with small raised areas, subseriate as viewed obliquely from behind; each puncture with a short, inconspicuous and semi-recumbent seta.

Habitat.—California: Modoc County.

Eleodes (Litheleodes) vandykei subspecies **modificata** Blaisdell

Eleodes (Litheleodes) vandykei variety *modificata* Blaisdell, Can. Ent., LIII, pp. 131–132, June, 1921.

Form and size similar to that of *vandykei*. Deep black and shining. Pronotal apex transverse, angles not in the least prominent; sides arcuate, slightly sinuate before the basal obtuse angles. Elytra moderately coarsely submuricato-rugose throughout with scattered punctures in the intervals, the parasutural area is more punctato-rugose.

Habitat.—British Columbia: Vernon.

Eleodes (Litheleodes) vandykei subspecies **parvula** Blaisdell

Eleodes letcheri var. *vandykei* forma *parvula* Blaisdell, Mon., Bull. 63, U. S. Nat. Mus., p. 137, 1909.

Eleodes (Litheleodes) vandykei var. *parvula* Blaisdell, Can. Ent., LIII, p. 132, June, 1921. (Synopsis.)

Size smaller, length 10 to 13 mm.; width 4.5 to 7 mm.

Form ovate. Pronotum relatively small, quadrate; apex truncate, angles small, acute, not prominent; sides less arcuate in the males than in the females; base feebly arcuate, angles small and obtuse. Elytra distinctly asperate with muricate granules, longitudinal series somewhat evident, parasutural area less strongly sculptured.

Habitat.—Oregon: Dalles; Idaho: Blackfoot.

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***Eleodes (Litheleodes) vandykei similis* new subspecies**

Form moderately small, subfusiform-ovate to ovate. Color black, luster alutaceous to somewhat shining; ventral surface more shining and polished.

Head relatively moderate in size, not quite twice as wide as long before the post-ocular line, widest just before the eyes. Side margins moderately arcuate over the antennal insertions, thence convergent and nearly straight to the epistomal angles, the latter obtusely rounded; epistomal apex transverse. Frontal surface slightly convex, feebly and broadly impressed within the slightly convex sides, the latter feebly declivous against the eyes; sutures obliterated, densely and discretely punctate laterally and anteriorly, punctures contiguous and well defined, relatively small and not visibly setose; less dense centrally and toward vertex, separated by a distance equal to one to three times their diameter. Labrum slightly convex, lateral margins evenly arcuate, continuously so with the apex, the latter briefly and arcuately emarginate at middle; densely punctate, punctures setigerous, the setae longer on margin and paler in color. Tempora feebly convex, converging from the eyes to the nuchal constriction, punctures distinctly setigerous, setae black.

Antennae moderately long, slender, extending about two segments beyond the pronotal base. First segment moderately stout, second small, subannular and feebly obconical, as long as wide, one-third as long as the third segment, the latter, fourth and fifth obconico-cylindrical, third three times as long as wide at apex; fourth a little longer than fifth, the latter subequal to sixth, which is a little shorter and slightly wider at apex; seventh slightly triangular and about as wide at apex as long; seventh, eighth and tenth moderately compressed, feebly wider than preceding segments, the seventh more triangular, eighth and tenth irregularly suboval; eleventh longer than wide near base, ovate, truncate at apex and flattened apically.

Pronotum about one-seventh wider than long; apex slightly emarginate, obsolete beaded; sides arcuate in anterior two-thirds, continuously so with the well rounded apical angles, straighter and convergent posteriorly to the obtusangular basal angles, marginal bead narrow; base about one-sixth wider than apex, broadly arcuate. Disk rather strongly convex from side to side, moderately evenly punctate, punctures discrete, rather evenly defined, moderately shallow, separated by a distance equal to one or three times their diameter, somewhat denser laterally, submarginal area linearly impressed against the bead.

Elytra widest at middle, about two and one-half times as long as the pronotum; base broadly and rather slightly emarginate, not beaded, slightly wider than pronotal base; scutellum transverse, apex arcuate; humeral angles slightly acute, feebly prominent anteriorly; sides broadly and moderately strongly arcuate to apex, marginal bead rather thin. Disk moderately convex, becoming more strongly so laterally and arcuately declivous; apical declivity moderately abrupt, arcuately oblique; irregularly punctate in the central area, punctures slightly impressed and moderate in size; sides and apical declivity becoming gradually scabrous, the punctures muricate, slightly tuberculate and reclinate. Sterna and parasterna more or less finely and muricately punctate.

Abdomen rather densely punctate, punctures small and the surface more or less rugulose. Legs slender and moderate in length. Metafemora slightly longer than the metatibiae. Metatarsi a little less than two-thirds as long as their tibia; first segment twice as long as the second or third segment, the latter subequal, fourth a little shorter than the first.

Male. Narrower subfusiform-ovate, relative size about two and one-third times as long as wide. Elytra about one and one-half times as long as wide, nearly one-fourth wider than pronotum but variable. Abdomen moderately convex, slightly impressed in middle third.

Female. Ovate, about twice as long as wide. Elytra about one-fourth wider than the pronotum, slightly inflated but variable. Abdomen strongly convex.

Measurements.—(Types) Length 12–12 mm.; width 4.5 to 5 mm.

Holotype.—Male; Haines, Oregon; April 20, 1941; (K. M. Fender); [Author's collection, California Academy of Sciences, no. 5284].

Allotype.—Female; with same data; [Author's collection, Cal. Acad. Sci., no. 5285].

Paratypes.—5 ♂, 3 ♀; with same data. Distribution: Author's collection, Cal. Acad. Sci., 3; Colln. American Entomological Society, 5.

Eleodes (Litheleodes) letcheri Blaisdell

Eleodes letcheri Blaisdell, Mon., Bull. 63, U. S. Nat. Mus., pp. 133–136, 1909.

(Synopsis.) Can. Ent., LIII, No. 6, p. 132, June, 1921.

Form and sculpturing as in *vandykei*. Surface luster opaque. Elytra with moderately long fine hairs. In the males the anterior margins of the under surface of the anterior tibiae are subangulate.

Habitat.—Nevada, toward Truckee from near Verdi. Idaho.

Eleodes (Litheleodes) corvina Blaisdell

Eleodes corvina Blaisdell, Stanford Univ. Publ., 1, (No. 3), pp. 224–225, 1921.

Eleodes (Litheleodes) granulata var. *corvina* Blaisdell, Can. Ent., LIII, p. 132, June, 1921. (Synopsis.)

Male elongate subovate, female ovate. Deep black, shining, head and pronotum duller in luster. Pronotum similar in the sexes, apex truncate, angles narrowly rounded; sides strongly arcuate; basal angles obtusangular; disk densely punctate, punctures moderate in size, small impunctate areas present. Elytral sculpturing strong, coarsely punctato-rugose in the parasutural area, rugoso-tuberculate laterally and apically, tubercles flat, very irregular, setae minute.

Habitat.—California: Walker, Siskiyou Co., (C. L. Fox); Dry Lake, Klammath National Forest; [Collection of E. C. Van Dyke].

***Eleodes (Litheleodes) papillosa* Blaisdell**

Eleodes granulata forma *tuberculata* Blaisdell, Mon., Bull. 63, U. S. Nat. Mus., p. 131, 1909.

Eleodes papillosa Blaisdell, Ent. News, xxviii, pp. 226–227, May, 1917. (Syn. *granulata* forma *tuberculata*.)

Larger and more robust than *granulata* LeConte, deep black in color and feebly shining. Head densely punctate, sides and eyes equally prominent. Pronotum widest before the middle, sides arcuate before the middle, thence straighter and converging to base; pronotal punctation dense, like that of *Upis ceremboides*, but distinctly not coalescent, discrete, moderately coarse and somewhat shallow. Elytra densely sculptured with conical more or less reclining tubercles with scattered minute points between, almost like those of *Pseudeleodes granosa* LeConte. Abdomen of the male moderately convex, segments not impressed along the median line of the first three segments.

Measurements.—Male.—Length 16 mm.; width 6 mm. Female.—Length 15 mm.; width 13.5 mm.

Habitat.—California: Siskiyou Co., [Collections of the National Museum and that of Albert Koebele].

III. A STUDY OF THE DIFFERENTIAL CHARACTERS OF THE SPECIES BELONGING TO THE GENUS APHANOTUS.

(TENEBRIONIDAE)

***Aphanotus* LeConte**

1866. LeConte, Class. Coleopt. N. Amer., p. 233. 1870. Horn, Trans. Amer. Philo. Soc., xiv, p. 368. (Revis. Tenebr.) 1883. LeConte and Horn, Smiths. Misc. Coll., no. 507, p. 381. (Class. Coleopt. Amer. N. of Mex.)

Form elongate, parallel, epipleurae entire. Head relatively moderate in size, not tuberculate; epistoma truncate to feebly sinuate at apex, surface convex, slightly concave laterally, sutures indistinct; mentum relatively moderate in size, last segment of the maxillary palpi oblong-subfusiform, slightly compressed, scarcely triangular. Eyes very deeply emarginate to complete division or not, by the backward extension of the sides of the front, superior ocular lobes oblique.

Antennae moderately short, rather stout, gradually broader to tip; first and second segments thicker than the third; second short, nearly globular; third slightly longer than the fourth; segments four to eleven very gradually wider, the eleventh subquadrangular, larger and quite truncate at apex.

Base of prothorax applied against the bases of the elytra, or somewhat distant from them. Elytra elongate, about twice as long as wide, sculptured with striae of faintly impressed punctures, intervals flat except at middle where they form an elevated carinated line. Pronotal intercoxal process arcuate between the coxae, not in the least prominent. Mesosternum very slightly concave. Anterior tibiae more or less dilated, broader than the middle tibiae, not denticulate. Metatarsi short, first segment equal to the two intermediate, fourth longer than the first.

Three species are listed at the present time and may be recognized from the following characterizations:

Aphanotus brevicornis (LeConte)

Eulabis brevicornis LeConte, Proc. Acad. Nat. Sci's. Phila., XI, p. 78, 1859.

Aphanotus brevicornis Horn, Trans. Amer. Philo. Soc., XIV, p. 268, 1870.

(Revis. Tenebr.)

Aphanotus brevicornis Casey, Annals N. Y. Acad. Sci's., v, p. 483, 1890.

(Coleopt. Notices.)

Eyes completely and distinctly divided, facets moderate in size. Sides of head moderately explanate, margins quite evenly arcuate to very feebly sinuate; the lateral processes of the front distinctly attain the temporal angles opposite the posterior margins of the ocular lobes. Frontal punctures shallow, equal in size and discrete; intervals sometimes slightly and irregularly prominent. Superior ocular lobes oblique and a little below the surface plane, oblong-oval, twice as long as wide, truncate posteriorly and obtusely rounded anteriorly, supra-ciliary margin not elevated. Inferior lobes suboval, narrowed basally, forming a lateral angle at line of union of the lateral frontal processes and temporal angles. Last segment of the maxillary palpi subcylindrico-oval, about twice as long as wide, apical sensory area circular. Genial processes produced, about twice as long as wide. Antennae short, gradually dilated from the sixth segment, the segments in close contact, the eleventh wider than long and truncate at apex, the sensitive area may be slightly swollen and somewhat arcuate.

Pronotum about a fourth wider than long, apex truncate between the prominent angles; lateral marginal beads fine, not dilated on angle, continued onto the lateral thirds of the apex; discal surface moderately convex and not more arcuately declivous at the angles. Elytra elongate, sculptured with striae of slightly impressed punctures, intervals flat except at middle where each is moderately finely costate.

Measurements.—Length 5 to 6 mm.; width 2 to 2.5 mm.

Type locality.—Fort Tejon, Kern County, California.

Distribution.—All the specimens at hand or studied from elsewhere, are from the length and breadth of California.

Aphanotus parallelus Casey

Aphanotus parallelus Casey, Annals N. Y. Acad. Sci., v, p. 483, 1890.
(Coleopt. Notices.)

Eyes not completely divided, the lateral frontal processes not attaining the temporal angles, the interval of separation equal to about the combined width of two facets, opposite to the posterior part of the ocular lobes. Sides of head scarcely less explanate than in *brevicornis* LeConte, but less prominent posteriorly, margins evenly arcuate. Frontal punctures dense, less discretely defined. Eyes larger, superior lobes oblique, oblong-subovate, truncate and wider posteriorly, obtusely rounded antero-internally, facets larger and easily observed in transverse series; inferior lobes relatively large, subcircular, slightly convex and as wide as long. Terminal segment of the maxillary palpi subfusiform, slightly compressed, a little more than twice as long as wide at middle, apical sensory area slightly oblique. Buccal processes of the genae short, as wide as long. Antennae less stout, segments three to five inclusive cylindrical; distal segments gradually dilated, seventh to the eleventh more loosely articulated and slightly perfoliate.

Pronotal punctures dense, more or less discrete, not strongly defined; apical angles moderately prominent anteriorly and obtuse, margin somewhat stronger internally than laterally and reflected onto the lateral thirds of the apical margin; discal surface gradually declivous antero-laterally at the angles.

Measurements.—Length 5 to 6 mm., width 2.0 to 2.5 mm.

Type locality.—Benson, Arizona, (G. W. Dunn).

Distribution.—Arizona: Cottonwood, Grand Canyon; St. Xavier Mts., Tucson and Redington. California: Palm Springs.

Aphanotus destructor (Uytenboogaart)

1933. *Tribolium destructor* Uytenboogaart, Tijdschr. Ent., LXXVI, p. XII.

The first specimens received by the author, were collected by Mr. James E. Cottle of Hayward, Alameda County, California. The species was discovered infesting sun flower seeds bought at a local store, to be used for parrot food. Numerous specimens were reared, the larvae thrived on alfalfa meal and rolled oats, without water.

Ten of the Hayward specimens were deposited in the collection of the National Museum for identification. It was determined as *Tribolium destructor* Uyten. Two topotypes from Erfurt, Germany, were presented to the California Academy of Sciences, by the National Museum, for which the California Academy of Sciences is very grateful, and expresses its thanks for the gift. The author is indebted to Dr. Edward A. Chapin and Dr. Richard E. Black-

welder, Assistant Curators of the Division of Insects, for the determination of the species.

According to the studies and interpretation of the generic characters by the author the species is not a *Tribolium*, but a member of the genus *Aphanotus* LeConte. In *Tribolium* the eyes are only moderately emarginate, not deeply so. As it is a pest, infesting stored seeds and cereals it is necessary that the species be recognized by students of Economic Entomology. The original description of Uyttenboogaart is not readily available, therefore the author considers it important that the species be redescribed as follows:

Eyes not completely divided. Distal segments of antennae not perfoliate, less transverse and closely articulated. Frontal punctures more irregular, rather more distinctly defined and the intervals more evidently subrugulose in the central area. Lobes of the eyes smaller and sides of head more sinuate. Last segment of maxillary palpi cylindro-subfusiform, apical sensory area round. Pronotal apical angles broader, more rounded at apex, marginal bead dilated on their inner margin, but not reflected to the apical margin; discal surface at the angles rather more strongly and arcuately declivous.

Form parallel, elongate oval, three times as long as wide. Color nigropiceous to paler from immaturity; sides of head opposite to the eyes and before the antennal insertions within the frontal angles more or less rufous; surface slightly shining. Buccal angles of the genae short.

Head moderate in size, widest across the anterior margin of the eyes, twice as wide as long before the post-ocular line, width equal to length of pronotum at middle; sides moderately convergent apically, distinctly arcuate opposite to the eyes, thence rather broadly and feebly sinuate over the antennal insertions, becoming arcuately continuous with the epistomal angles, apex of epistoma slightly sinuato-truncate.

Frons rather moderately convex between the eyes, epistoma a little more strongly so and feebly declivous anteriorly to the apical margin; sutures slightly evident, surface at position of transverse suture feebly impressed; sides lateral to epistoma quite plane, becoming slightly convex over antennal insertions, and somewhat impresso-declivous against the eyes; vertex on same plane as frons, moderately and evenly, transversely convex; supra-orbital margins narrowly thickened and slightly elevated; surface densely punctate, punctures moderate in size, intervals at middle slightly longitudinally rugulose, separating punctures in twos and threes, the latter becoming smaller and less strongly defined laterally.

Eyes not in the least prominent, slightly sunken below the frontal plane, most so anteriorly; narrowly divided into superior and inferior lobes by sides of front and small temporal angles, the interval of separation equal to

one or two facets; superior lobe oblique, equal in width to about four facets, twice as wide as long and arcuate antero-internally; inferior lobes larger, rounded and moderately convex, about seven facets wide, the latter moderate in size, convex and not setose. Tempora small, feebly convex and convergent posteriorly.

Antennae rather stout, attaining middle of pronotum; first segment not visible from above, second to the sixth inclusive subcylindrical and nearly as long as wide, thence segments seven to ten gradually wider and transverse, eleventh circular in outline and as long as wide.

Pronotum moderately transverse, less than one-third wider than long, about two-fifths wider than head; base a third wider than apex, the latter not margined and somewhat feebly arcuate between the rather large and moderately, anteriorly prominent angles which are well rounded at apex; sides broadly and moderately arcuate, most so and convergent in apical third, sometimes very feebly and briefly subsinuate before the subrectangular basal angles, margin narrow, rather thin and slightly reflexed, widening on the inner margin of the apical angles; base broadly arcuate in central two-fourths, thence broadly sinuate to the angles, margin strongly beaded. Disk moderately and nearly evenly convex, more declivous at the apical angles, where the marginal bead is widened; densely punctate, punctures moderately coarse, discrete centrally, coarser and slightly more impressed laterally, the intervals forming rugulae with the punctures in slightly arcuate rows, lateral submarginal area more finely punctate.

Elytra twice as long as wide, three times as long as pronotum, somewhat depressed, slightly wider at middle than the pronotum; base broadly sinuate in middle two-fourths, not margined, scarcely wider than pronotal base; scutellum small, arcuate at apex, surface punctate; humeri small, not in the least prominent, narrowly rounded; sides parallel and feebly arcuate, subparabolically rounded in apical third, slightly emarginate at suture, each angle rounded. Disk less than moderately convex in each para-sutural third, thence more arcuately and declivous laterally; very gradually and arcuately declivous to apex in about apical third. Surface irregularly and rather densely punctate, punctures small, rather well defined; stria punctures not impressed; intervals costate, except the first two or three, costae abruptly elevated, very thin and subacute, gradually becoming somewhat more distinctly so laterally; summit of each costa appears to be between two rows of very minute punctures; in the feebly concave intervals the stria punctures form feeble, rather close-set series; scutellar area not costate, but irregularly punctate; marginal beads slightly reflexed, the submarginal area feebly impressed, particularly beneath the humeri where the margin is not visible from above.

Under surface of body smooth and shining, more strongly punctate, especially on the sterna, punctures discrete. Abdomen moderately convex, punctures separated by a distance equal to one or two times their diameter, denser on fifth segment. Punctures not setose except on the appendages. Femoral punctures small. Sexual differences in form not very noticeable, males more or less narrower than the females.

Measurements.—Length 6 mm.; width 2 mm.

Topotypes.—2; from Erfurt, Germany, FHB90623. Collected from the dried fruit of the Virginia Creeper.

Local specimens studied.—72; distributed as follows: Author's collection, California Academy of Sciences, 38; National Museum, Washington, 10; American Entomological Society, 34; Colln. of James E. Cottle, 8.