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REVIEW OF THE WEEVILS OF THE TRIBE OPHRYASTINI OF AMERICA, NORTH OF MEXICO

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THE present study is the result of an attempt to classify the species of the coleopterous genus *Eupagoderes* in my own collection. Typical and nearly typical specimens are relatively easy to place by the use of existing keys, which depend upon external characters entirely. Many specimens, however, vary so much from the usual condition in size, shape, and vestiture that all attempts to assign them to their proper species are futile. Other specimens fall by the keys into species to which they do not belong, because of the student's unfamiliarity with the amount of variation allowable in certain characters.

In such instances, before any further progress can be made in identification, it is necessary to go beyond the external characters commonly employed and find, if possible, at least one definite char-

¹ ALONZO CLAYTON DAVIS died on January 4, 1942, at the age of 40. An obituary notice was published in the Proceedings of the Entomological Society of Washington, vol. 44, pp. 33-37, March 1942. For several years before his death Mr. Davis had been working, chiefly during spare time, on a revision of the New World species of the large flightless weevils comprising the tribe Ophryastini, which, in the Junk-Schenkling catalog, is placed in the subfamily Leptopinae. The group is almost entirely confined to two regions of the world: Western North America from southern Canada (Medicine Hat, Alberta) into Mexico, where 7 genera and about 65 species occur; and Asia, from which the single genus *Deracanthus*, with 27 described species, is recorded. The group is best developed in the southwestern part of the United States. So far as is known only one New World species, and this of doubtful relationships, occurs south of Mexico, namely, "*Ophryastes hispidus* Latreille," from "Südamerika."

After Mr. Davis' death, L. J. Bottlmer gathered together a mass of manuscript, notes, and loose drawings, which represent the progress made by Davis in his study of the Ophryastini. In putting these in order I have added type localities and indicated genotypes, so far as the latter could be determined from the literature; and I have made various minor changes and corrections, none of which materially affects the main conclusions, and none of which seemed of sufficient importance to call for individual comment. In addition, certain points that require explanation, as well as a few more or less extensive alterations in the text, are differentiated by enclosure in brackets. Davis had studied several Mexican species, and his notes on these are, in general, well advanced. Unfortunately they lack certain essentials which it is not now practicable to supply, and his treatment of the Mexican forms (excepting two species of *Tosastes*) has, therefore, been omitted.—L. L. BUCHANAN.

acter by which each species may be recognized regardless of the amount of variation in other respects, or a character by which the group may be subdivided. In the Ophryastini the genitalia, especially those of the female, were found to be of value in grouping related species, and often in distinguishing individual species.

I agree with Ferris (1928, pp. 66-69) in his remarks upon the shortcomings of a system that makes more or less of a fetish of perfect specimens when their complete dismemberment may enhance their value greatly from a standpoint of accessibility and scientific study, and in his statement that the use of any point of structure, anatomy, and physiology is legitimate in classification. At the same time the truth remains that in any systematic study a compromise must be made between the ideal and the possible or practical. For example, in *Eupagoderes* the male internal sac and at least one of the valves of the alimentary canal show characters of value, though for certain practical reasons these could not be used in the present study. A similar compromise must be made with illustration, the quality of the drawings being determined by the artistic ability of the writer or by the availability of an artist trained for scientific drawing.

Through the courtesy of J. N. Knull, of the University of Ohio, Dr. R. H. Beamer, of the University of Kansas, E. T. Cresson, of the Academy of Natural Sciences of Philadelphia, Gilbert Arrow, of the British Museum, L. J. Muchmore and Dr. J. A. Comstock, of the Los Angeles Museum, and Dr. E. A. Chapin, of the United States National Museum, I have been able to study all or part of the material in their respective institutions. Thanks are due also to Dr. E. C. Van Dyke, of the University of California, for comparison of specimens with his types, and to Dr. P. J. Darlington, Jr., of the Museum of Comparative Zoology, for comparing specimens with types in the LeConte collection. I am especially indebted to H. C. Fall, of Tyngsboro, Mass., and to L. L. Buchanan, of the Division of Insect Identification, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, for loan of material, assistance, advice, and criticism.

The type specimens of the species of Ophryastini are scattered from England to California, and although an earnest effort was made it was impossible to see them all. In some cases dissection of the type was not desirable, even when it was available. For these reasons two keys were sometimes made, one based upon the genitalia as far as known at present, and the other based upon external characters. The species not examined have been placed in the keys as accurately as possible from published descriptions.

Genitalia were prepared for study in the following manner: The thoroughly relaxed specimen was held beneath the dissecting microscope between the thumb and a finger of the left hand, ventral side

up. The abdominal segment closing the anal aperture was lifted up and back, and a finely pointed scalpel made from a needle was inserted. A cut on each side from the vicinity of the posterior coxae, the edge of the scalpel pressing against the inner side of the abdominal segments and outward against their inturned edges, severed the semi-membranous dorsal sclerites. The scalpel was then brought to the center, close along the ventral plates and the flat side of the blade pressed inward until the internal parts came free of the ventral plates. A transverse cut at about the line of the posterior coxae severed the internal parts completely and the whole viscera posterior to this point could then be lifted out. The ventral segments were then replaced, no damage being done to the appearance of the specimen in most instances.

The internal parts were then dropped into 10 percent potassium-hydroxide solution and left for two hours or more. In species having lightly chitinized genitalia, such as *Eupagoderes decipiens* and *Rhigopsis* spp., this was sufficient, but heavily chitinized genitalia such as those of *Eupagoderes desertus* required soaking in the solution for some hours, then boiling in it, by which process the specimens were not harmed. Having been cleaned and cleared sufficiently, the genitalia were placed in water or acetic acid and examined under a dissecting binocular. Some were completely dismembered, all parts being dissociated for detailed study. Others were preserved complete. Several hours of soaking in acetic acid alcohol neutralized any remaining traces of potassium hydroxide, and the genitalia were then mounted dry upon points beneath the specimens or were placed in minute vials of glycerine similarly pinned beneath the specimens.

Drawings were made with a camera lucida, the outlines and principal structures being traced and the details filled in later under a low-power binocular. In most cases the setae were left out of the drawings as obscuring the detail and serving no useful purpose in separating the species.

The nomenclature of the various parts of the genitalia is more or less of a combination. Names that seemed to apply well have been adopted where found. Those of the male genitalia are largely from Sharp and Muir (1912) and those of the female genitalia partly from Tanner (1927) and partly from Dobzhansky (1931). Some names have been made up where they could not be found readily in literature. Since the present study is not one of phylogeny or homology, but is merely an attempt to distinguish the genera and species of a limited group, descriptive terms should be considered to mean no more than convenient words for reference. The following are the terms used, with a brief explanation of each (the letters in parentheses are those used in fig. 49):

Apical plates (AP): Large, dorsolateral, heavily chitinized, finlike plates upon the apex of the female genital tube (fig. 49, *a*, *b*).

Baculi: Rodlike structures of heavy chitin between the other plates of the female genital tube. These sometimes act as supports

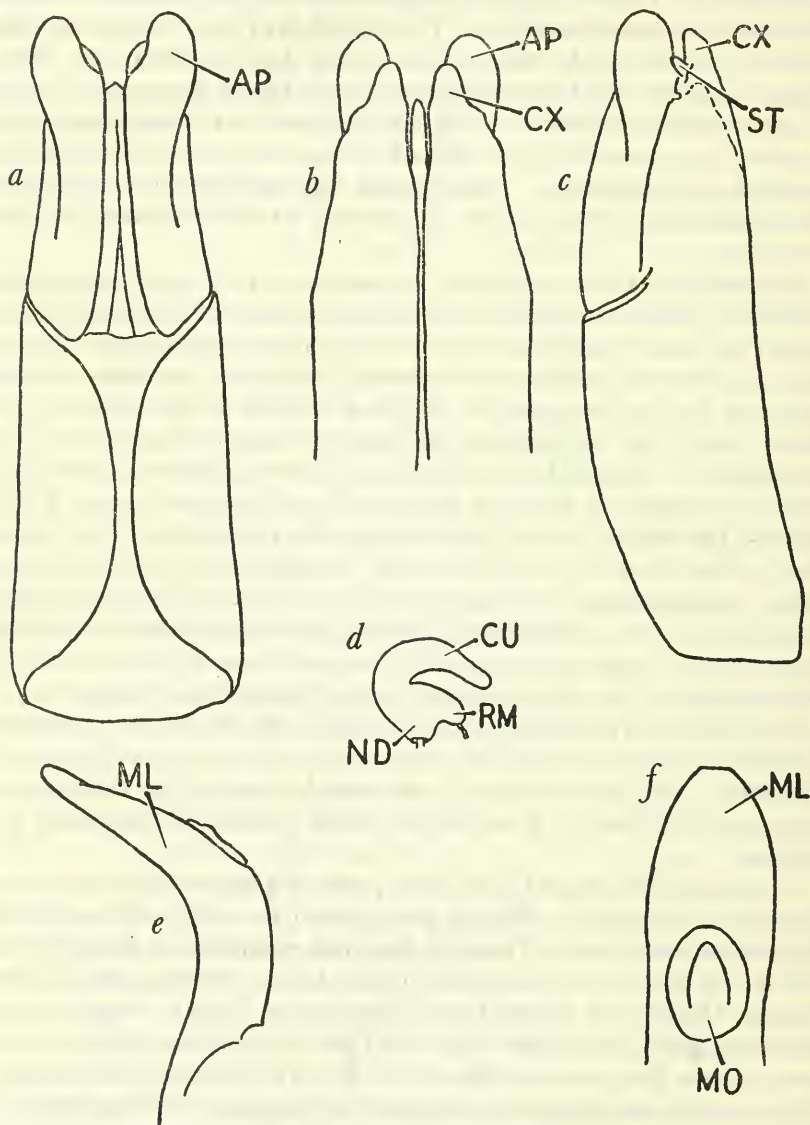


FIGURE 49.—Genital structures of *Eupagoderes* cf. *desertus-californicus* section: *a*, Female genital tube, dorsal view; *b*, female genital tube, ventral view; *c*, female genital tube, lateral view (dorsum to left); *d*, receptaculum seminis; *e*, median lobe of male genitalia, lateral view; *f*, median lobe of male genitalia, dorsal view. See text (pp. 486–487) for further explanation.

in cases where the genital tube is lightly chitinized, as in *Eupagoderes decipiens*.

Corites (CX): Ventral appendages on either side of the apex of the female genital tube, presumably borne by the tenth segment, and carrying the styli (fig. 49, *b, c*). They are generally lobelike, but occasionally they broaden into plates, and may take the place of the apical plates, which then usually become lobelike.

Cornu (CU): Part of the receptaculum seminis (fig. 49, *d*).

Genital tube: The tubelike protrusible portion of the female genitalia.

Median lobe (ML): The central portion of the aedeagus upon which the median orifice is situated. Usually considered the penis (fig. 49, *e, f*).

Median orifice (MO): The opening upon the dorsal surface of the median lobe through which the internal sac is evaginated (fig. 49, *f*).

Nodulus (ND): Part of the receptaculum seminis (fig. 49, *d*).

Ramus (RM): Part of the receptaculum seminis (fig. 49, *d*).

Receptaculum seminis: Divided into the cornu (CU); nodulus (ND); and ramus (RM) (fig. 49, *d*).

Styli (ST): Cercuslike appendages borne by the coxites (fig. 49, *c*).

The Ophryastini are characterized briefly as follows:

Ocular lobes present, partially covering the eyes, which are usually elongate, transverse, and acuminate beneath. Mentum large, covering the maxillae (except in *Caccophryastes* Sharp, in which the palpi project beyond the mentum). Antennal scrobe well defined, lateral, directed beneath the eye. Rostrum robust, quadrangular, its dorsal surface often with three longitudinal grooves or striae, a median one, and one each side of the median, the two latter called lateral striae, lateral grooves, or lateral sulci.

The New World genera of the Ophryastini may be separated by the following key, which is a modification of the one by Pierce (1913, pp. 373-374):

KEY TO NEW WORLD GENERA OF OPHRYASTINI

1. Abdomen with second segment rarely as long as the third and fourth together, first suture straight. Intercoxal process of abdomen moderately wide. 2
- Abdomen with second segment longer than the third and fourth together, first suture strongly arcuate. Intercoxal process very broad.----- 8
2. Third tarsal joint pubescent beneath, broadly bilobed, distinctly wider than second.----- 3
- Third tarsal joint not pubescent beneath, not broadly bilobed, not or only slightly wider than second, emarginate at apex; rostral striae straight. 7
3. Rostral striae narrow, deep (though often partially obscured by the dense coating of scales), the lateral ones abruptly bent outward at base of beak, thence extending downward on side of beak, and ending next to eye near upper, basal edge of scrobe; basal margins of elytra elevated; second segment of abdomen nearly as long as the third and fourth combined.---**Sapotes** Casey

- Rostral striae, when present, relatively coarser and shallower, and confined to dorsal surface..... 4
4. Rostral striae evident, straight; second abdominal segment plainly shorter than the third and fourth combined..... 5
- Rostral striae obsolete, indicated by faint depressions only; second abdominal segment subequal to the third and fourth combined..... 6
5. Mentum concealing palpi entirely..... **Eupagoderes** Horn
Palpi projecting beyond apex of mentum (Mexico).
- Caccophryastes** Sharp: Genotype, **C. lineatus** Sharp (monobasic)
6. Spinules at apex of fore tibia rather coarse, forming a row which is usually broadly interrupted near upper apical angle..... **Amydrogmus** Pierce
7. Prothorax more or less tuberculate at sides and little, if any, narrower than elytra; apex of hind tibia with two rows (one of which is usually much confused) of spinules, enclosing an elongate space.
- Ophryastes** Schoenherr
Prothorax not tuberculate at sides, much narrower than elytra; apex of hind tibia with only one distinct row of spinules..... **Tosastes** Sharp
8. Third tarsal joint emarginate, spinulose beneath, scarcely (hind tarsus) or only moderately (front tarsus) broader than second..... **Rhigopsis** LeConte

The foregoing key appears to be about as satisfactory as any that can be devised. Perhaps the greatest single difficulty is with *Tosastes coarctatus* Champion, in which the prothorax is distinctly tuberculate at the sides and as wide as the elytra, the species in these respects displaying tendencies similar to *Ophryastes*. *Sapotes*, *Amydrogmus*, and *Rhigopsis* are well marked. The genus *Caccophryastes* should be recognizable, unless, as Sharp (1891, p. 92) suggests, it is based upon a malformed specimen of a species properly belonging in one of the other genera. The characters given for the separation of *Eupagoderes*, *Ophryastes*, and *Tosastes* should be used with caution, as these genera intergrade with one another to a considerable extent.

Genus SAPOTES Casey

Sapotes CASEY, 1888, p. 241. (Genotype, *Sapotes puncticollis* Casey, monobasic.)

This genus is characterized by Casey as follows:

Beak about as long as the head, trisulcate; scrobes narrow, deep, beginning near the apex, passing rapidly beneath, vanishing slightly below and before the eyes; the latter broader than long, subacute beneath, partially concealed in repose by the ocular lobes. Antennae short; scape a little shorter than the funicle, barely attaining the eyes, gradually, feebly clavate; funicle seven-jointed, first joint as long as the next two together, second nearly twice as long as the third, joints three to six equal, subquadrate, seventh a little wider, transverse, rather close to the club; the latter ovoidal, pointed, rather small, finely pubescent. Prothorax without lateral tuberosities; ocular lobes well developed, devoid of fimbriae. Scutellum small, triangular, distinct. Tenth elytral stria distinct in basal third. First abdominal segment much longer than the metasternum, nearly as long as the next three together, separated from the second by a very feebly arcuate, deeply impressed suture; second nearly as long as the third and fourth together. Tarsi rather robust; first three joints short, setose with the tips spinose beneath; third slightly wider than the second, bilobed; fourth nearly as long as the first three

together; claws long, divergent. Cotyloid surface of the posterior tibiae semi-cavernous, having a long outer and a short inner line of short, very robust spinules; spurs obsolete.

As pointed out by Pierce (1909, p. 341) and Van Dyke (1934, p. 175), Casey was in error in saying that the ocular lobes were not fimbriate. This genus is at once separated from the others of the group by the deep, narrow, lateral sulci of the rostrum, turning abruptly outward at the junction of the head and rostrum, and nearly attaining the upper basal edge of the scrobe.

SAPOTES PUNCTICOLLIS Casey

FIGURE 50

Sapotes puncticollis CASEY, 1888, p. 241.

Form more elongate and parallel than most of the others of the tribe. Color brown, front of rostrum and three vittae on pronotum gray, elytra irregularly mottled with darker brown and irrorate with light gray, or black with scattered light gray and darker scales. The scales of the head and pronotum appear tessellate, those of the remainder of the body large and imbricated. Rostrum heavy, somewhat constricted at base beneath, not greatly arched dorsally; median sulcus narrow and deep, from about the middle of the rostrum, usually terminating abruptly at junction of head and rostrum but occasionally carried up onto the front for a short distance; lateral sulci deep, narrow, bent outward at junction of head and rostrum and continuing down the sides of the rostrum nearly or quite to the eyes. Rostrum separated from the front by a vague transverse impression, which is sometimes nearly lacking; head and rostrum distinctly but sparsely and rather finely punctate, and with subrecumbent white or tawny

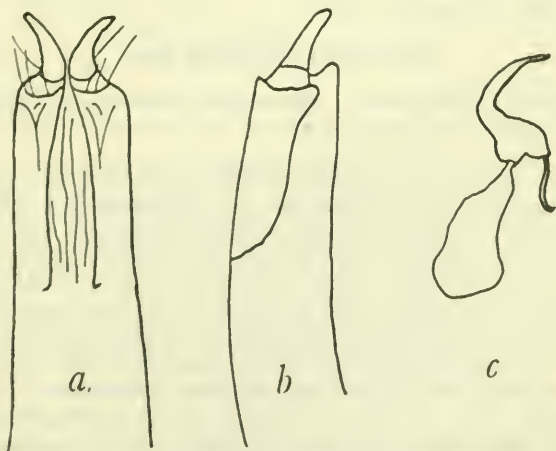


FIGURE 50.—*Sapotes puncticollis* Casey, female genital tube: a, Dorsal view; b, lateral view; c, receptaculum seminis.

setae. The head appears rugose owing to one or two impressed lines running posteriorly from each puncture. Pronotum slightly wider than long (1.5 by 1.1 mm.), base and apex subequal in width, evenly rounded at sides; disk deeply, coarsely, and closely punctate, giving it a reticulate appearance, and with more or less erect setae from finer punctures on the intervals between the larger ones. Elytral striae consisting of rows of large, round, deep, unconnected punctures; intervals subequal in width, nearly flat, each with a single row of long, semierect, tawny setae. Legs stout, front tibiae nearly straight and denticulate within; apices of hind tibiae truncate, with a double row of spines.

Measurements in millimeters.—Length 5.0 to 5.5; width 2.0 to 2.6.

Female genitalia (fig. 50).—Eighth sternite broadly rounded and hairy at apex. Genital tube long, lightly chitinized, slightly curved downward, with two diverging, heavily chitinized spines at apex. Receptaculum seminis with the cornu very thin, irregular, curved but not hooked, nodulus small.

Type locality.—El Paso, Tex.

I have seen specimens of this species from El Paso, Tex.; Deming and Albuquerque, N. Mex.; and Tucson, Ariz. All specimens examined are females.

SAPOTES LONGIPILIS Van Dyke

Sapotes longipilis VAN DYKE, 1934, p. 175.

This species differs from *S. puncticollis* in the longer setae, narrower, and less robust form, finer rostral sulci, and the finer and more irregular (nonreticulate) punctuation of the pronotum. The female genitalia of the two species are identical.

Type locality.—Winslow, Ariz.

Genus EUPAGODERES Horn

Eupagoderes HORN, 1876, p. 32. (Genotype, *Ophryastes speciosus* LeConte, designated by Pierce, 1913, p. 374.)

Although it seems desirable to maintain *Eupagoderes* as a genus, or at least as a subgenus of *Ophryastes*, for convenience in classification, there is actually no character that holds throughout the group. On this point I cannot do better than to quote from Fall (1907, pp. 260–261):

The establishment of *Eupagoderes* by Horn for certain species previously referred to *Ophryastes* has not proved satisfactory, all the characters named being gradational. The most conspicuous of these, taking the species as a whole, is the presence of lateral callosities of the prothorax in *Ophryastes*, but as pointed out by Dr. Sharp in the "Biologia" this cannot be properly regarded as a generic character. The latter author is, however, equally at fault in stating that the two genera may be separated by the presence (*Eupagoderes*) or absence (*Ophryastes*) of adhesive pubescence on the lobes of the third tarsal joints, this character being

a purely sexual one in at least a considerable number of species of both genera and possibly in all.

The character of cavernous or open corbels as used by Lacordaire was pointed out as undependable by LeConte and Horn (1876, p. 32). The latter authors state that the articulating cavities of the hind tibiae become internal in *Eupagoderes*. This matter is not clear to me, and I see no difference between the two genera in that respect. The character of the truncate hind tibia used by LeConte and Horn to define *Eupagoderes* certainly does not hold throughout the genus. The amount of dilation of the tarsal joints is less in some *Eupagoderes* than in some *Ophryastes*. Fall (1907, pp. 260-261; 1910, p. 189) rejected Sharp's character of the presence or absence of adhesive pubescence on the lobes of the third tarsal joints (a character accepted by Pierce) and he was justified in so doing. He accepted with reservations the character of the lateral tuberosities of the thorax, which Sharp had rejected as being unreliable. This seems to be the most reliable character of all, but it is subject to a great deal of variation. If it were a question of absolute presence or absence of tubercles the character would hold, but the distinction is one of indefinite degree. In many if not most specimens of *Eupagoderes argentatus* (LeConte) and *E. marmoratus* Fall, for example, there are small but well-developed and plainly visible lateral tuberosities. On the other hand, some specimens of *Ophryastes* have the lateral tuberosities so poorly developed as to raise serious doubt as to their correct generic assignment, and *O. symmetricus* Fall has none at all. The character of the "straight" rostral sulci in *Ophryastes* does not hold. In *Eupagoderes sordidus* (LeConte,) for example, the lateral sulci are usually nearly straight, while in *Ophryastes vittatus* Say they are usually slightly arcuate. The median sulcus is straight in both genera. A study of both sexes of various species shows no character upon which the genera may be separated, *Ophryastes* breaking up in much the same fashion as does *Eupagoderes* and the genitalia of the two groups forming a fairly complete series. The retention of the two as distinct genera is, therefore, largely a matter of convenience.

The species of *Eupagoderes* have been grouped into two keys. The following rather unsatisfactory key is an enlargement of that of Fall (1910, pp. 193-194), which is based upon external characters. The key contains several species that I have not seen, these being placed as far as possible from the published descriptions. *E. wickhami* and *ocellatus* are included in the key for the benefit of those who prefer to retain them in *Eupagoderes*, although they will be discussed under *Ophryastes*. Because of the great amount of variation in certain characters, some species will be found under more than one heading.

KEY TO SPECIES OF EUPAGODERES¹

1. Dorsum of rostrum and front continuous, without interruption by a transverse impression at base of rostrum..... 2
Dorsum of rostrum and front not continuous, but interrupted by a transverse impression at base of rostrum; or (chiefly in species following couplet 25) dorsum of rostrum and front with separate convexities as viewed from the side, giving the appearance of a transverse impression..... 10
2. Rostrum with a well-defined median sulcus..... 3
Rostrum without a median sulcus..... 7
3. Pronotum finely and sparsely punctate..... 4
Pronotum more coarsely and closely punctate..... 6
4. Prevailing color of scales chocolate brown, thorax and elytra vittate with white. Length 14.4 to 21.5 mm..... **speciosus** (LeConte)
Prevailing color of scales white, not or but feebly mottled. Length 11 to 15 mm..... **nivosus** Fall
Prevailing color of scales plumbeous, gray, or pinkish; more or less conspicuously mottled. Length 6.1 to 12.3 mm..... 5
5. Tibiae not denticulate within..... **sordidus** (LeConte)²
Tibiae, at least anterior ones, denticulate within..... 6
6. Elytra with ocellate plumbeous spots. Length 10-17 mm. **marmoratus** Fall
Elytra without ocellate spots; length 12 mm or less.... **simulans** Van Dyke
7. Lateral sulci of rostrum short, linear..... 8
Lateral sulci of rostrum longer, arcuate, convergent basally..... 9
8. Scales light and dark gray, confusedly mottled; elytral striae impressed, finely punctate..... **decipiens** (LeConte)
Scales white, sometimes feebly mottled with gray; elytral striae extremely finely impressed, feebly and remotely punctate, almost impunctate..... **decipiens** (LeConte), variety **dunnianus** Casey
9. Scales whitish to cinereous, marmorate with darker gray... **variatus** (LeConte)
Scales pinkish cinereous, feebly mottled with gray; vertex flattened and finely carinate in the type..... **aridus** Fall
10. Elytral striae coarse, with round, usually disconnected punctures; intervals usually elevated, at least between punctures of adjacent rows..... 11
Elytral striae fine, impressed; intervals usually flat or nearly so, and unequal in width..... 16
11. First joint of antennal funicle of about the same length and breadth as the second..... **lucanus** Horn
First joint of antennal funicle longer and somewhat wider than the second..... 12
12. Color predominantly cinereous; form more parallel..... 13
Color not predominantly cinereous, form more robust..... 14
13. Setae long, tawny, numerous..... **wickhami** Sharp
Setae shorter and sparser..... **ocellatus** Van Dyke
14. Disk of pronotum finely, sparsely punctate..... **desertus** Horn⁴
californicus Ting
Disk of pronotum more coarsely punctate..... 15
15. Elytra greatly inflated; median sulcus of rostrum lacking.
robustus, new species
Elytra less inflated; median sulcus of rostrum present. **argentatus** (LeConte)

¹ Based on external characters.² See note at end of *Eupagoderes* section regarding *E. cretaceus* Sharp.⁴ [For distinctions between *desertus* and *californicus* see note following discussion of *desertus*.]

16. Pronotum finely punctate..... 17
 Pronotum more coarsely punctate..... 21
17. Sutural intervals of elytra fulvous. Length 12 to 18 mm... *mortivallis* Fall
 Sutural intervals of elytra not fulvous. Length 7 to 12 mm..... 18
18. Scales opalescent..... 19
 Scales not opalescent..... 20
19. Front of head convex; sulcus of rostrum linear, vague; apices of hind tibiae obliquely narrowed, not truncate..... *setosus* Van Dyke
 Front of head slightly flattened; median sulcus of rostrum usually lacking; apices of hind tibiae obliquely truncate..... *aeneus*, new species
20. Color whitish to cinereous, marmorate with darker gray... *varius* (LeConte)
 Color pinkish cinereous, feebly mottled with gray; vertex flattened and finely carinate in the type specimen..... *aridus* Fall
 Color gray or brown, even numbered elytral intervals darker.
geminatus Horn⁴
21. Median sulcus of rostrum narrow..... 22
 Median sulcus of rostrum broad..... 24
22. Rostrum more robust, apex markedly depressed; Texas... *simulans* Van Dyke
 Rostrum less robust, apex not so markedly depressed; California..... 23
23. Plumbeous; unicolorous or nearly so.
varius (LeConte), variety *plumbeus* Horn
 Gray, variously marked with plumbeous or black, even numbered elytral intervals darker..... *geminatus* Horn
24. Median sulcus of rostrum, when present, terminating at junction with head..... 25
 Median sulcus of rostrum extending onto the front... *pilosus*, new species
25. Elytral striae not, or feebly, impressed, punctures large, separate... 26
 Elytral striae more distinctly impressed, punctures finer..... 27
26. Scaly vestiture white with black or plumbeous ocellate spots; elytral striae not impressed..... *marmoratus* Fall
 Scaly vestiture black, brown, and white, without ocellate spots; elytral striae slightly impressed at base and apex..... *huachuacae* Van Dyke
27. Rostrum with a median sulcus..... 28
 Rostrum without a median sulcus..... 31
28. Robust, dorsum flattened..... *griseus*, new species
 Less robust, dorsum not or very slightly flattened..... 29
29. Lateral rostral sulci linear..... *halli* Van Dyke
 Lateral rostral sulci arcuate..... 30
30. Form more parallel; elytra confusedly mottled..... *sordidus* (LeConte)
 Form less parallel; alternate (even) elytral intervals darker... *geminatus* Horn
31. Scales whitish to cinereous, marmorate with darker gray... *varius* (LeConte)
 Scales pinkish cinereous, feebly mottled with gray..... *aridus* Fall

The following key makes use of the female genitalia for dividing the genus into groups; the species of each group are then separated largely upon external characters.

KEY TO GROUPS OF EUPAGODERES

Eighth sternite thin, apex rounded, emarginate, or pointed, but not produced.

Female genitalia tubular.

Female genitalia heavily chitinized, apical plate prominent, styli small.
desertus group, I

⁴ Refer to note at end of *Eupagoderes* section regarding *E. utahensis* Tanner and *E. hardyi* Tanner.

- Female genitalia lightly chitinized, apical plates lacking coxites and styli very small.....**robustus** group, II
 Female genitalia membranous, with supporting rods of chitin, apical plates extremely small or lacking, styli large.....**decipiens** group, III
 Female genitalia wedge shaped..... **speciosus** group, IV
 Eighth sternite produced into 2 large teeth, curving down and back. **lucanus** group, V

I. DESERTUS group

In the species of this group the genital organ of the female is tubular and it usually has well-developed apical plates and small styli. The median lobe of the males is, in general, robust, heavily chitinized, and moderately curved. All the species in this group have a transverse impression between the base of the rostrum and the front of the head.

KEY TO SPECIES OF DESERTUS GROUP

1. Elytral striae coarse, the punctures round and distinct, elytral intervals usually of nearly equal width, and convex..... **desertus** Horn⁶
 Elytral striae fine and impressed, punctures fine, intervals flat or very slightly convex, alternate intervals usually wider..... 2
2. Pronotum coarsely and closely punctate..... 3
 Pronotum finely and sparsely punctate..... 4
3. Apical plates of female genital tube rounded on outer edges; median sulcus of rostrum sharply defined; elytral intervals less convex...**geminatus** Horn
 Apical plates of female genital tube toothed or irregular on outer edges; median sulcus of rostrum broad, or with small subsidiary sulci; elytral intervals more convex.....**griseus**, new species
4. Smaller (7 to 10 mm.); brown, usually with coppery iridescence; Utah..... **aeneus**, new species
 Larger (12 to 18 mm.); white or light gray with conspicuous fulvous or yellow marking along the sutural intervals; California .. **mortivallis** Fall

EUPAGODERES DESERTUS Horn

Eupagoderes desertus HORN, 1876, p. 34.

Eupagoderes giganteus CHITTENDEN, 1926, p. 169 (new synonymy).

Form robust, convex, dorsum slightly flattened. Color creamy white or slightly yellowish, elytral intervals 2, 4, and 6 slightly darker; a rather narrow median and two rather wide lateral vittae on the pronotum darker, these often feebly defined. Rostrum robust, moderately arched above, not markedly constricted basally beneath; trisulcate, the median sulcus narrow, lateral sulci nearly straight apically, converging sharply at the base of the rostrum. Head and rostrum separated by a well-marked transverse impression. Head smoothly rounded, and, with the rostrum, extremely finely and rather sparsely punctate, with moderately numerous very small white setae. Pronotum one-seventh to one-fifth wider than long, base one-fifth to one-third wider than apex, subobsoletely sulcate at middle, punctuation varying from coarse and moderately sparse to moderately coarse and

⁶ [See notes on separation of the closely related *Eupagoderes californicus* Ting following discussion of *desertus*.]

very sparse. Elytral striae marked by rows of large, round, non-confluent punctures; intervals convex, 2, 4, and 6 usually slightly wider; setae white, extremely short and fine, arising from the striae punctures and from a fine secondary punctation on the intervals. Legs stout; fore tibiae strongly curved at apex; all tibiae denticulate within; posterior tibiae with a broad, hairy truncation.

Measurements in millimeters.—Length 14 to 22.

Female genitalia.—Very similar to those shown in figure 49, *a, b, c, d*. Genital tube heavily chitinized, sides nearly parallel; apical plates rather small in proportion, heavily chitinized and tilted so that the outer edges are higher than the inner; coxites lightly chitinized; styli short, conical. Eighth sternite very slightly and broadly emarginate at apex, sides rounded.

Male genitalia.—About as in figure 49, *e, f*. Median lobe only moderately sharply curved, heavily chitinized, thick in profile; broadly, obtusely rounded, and truncated at apex as viewed from above; not deeply excavated dorsally; median orifice oval.

Type locality.—Of *desertus*, Carisa Creek, on the borders of the Colorado Desert of California. Of *giganteus*, Thermal, Calif.⁷

The type specimen of *desertus* was found dead near Carisa Creek, a branch of San Felipe Creek, in Imperial or San Diego County, Calif. Other California localities are Indio (W. T. Swingle), Holtville (W. Benedict), La Puerta (Ricksecker), and Thermal (A. C. Davis and H. J. Ryan). Specimens have also been seen from Yuma, Ariz. (Herbert Brown).

Remarks.—*E. desertus* Horn in average size is probably the largest of the genus. The type, a female specimen, has been at one time covered with mud, and the punctures are still partially filled, giving the specimen a rather smooth appearance. The pronotum is much less heavily punctate than in most specimens. This species has been confused with *E. wickhami* Sharp, from which it may be distinguished by the more robust form and the lighter color.

Examination of the type and two paratypes of *Eupagoderes giganteus* Chittenden shows them to be female specimens of *E. desertus* Horn.

[EUPAGODERES CALIFORNICUS TING

Eupagoderes californicus TING, 1939, p. 81.

Type locality.—Stove Pipe Wells, Death Valley, Calif.

Remarks.—No mention of this species was found in Mr. Davis's manuscript.

Eupagoderes californicus was described from a long series taken at two places in Death Valley—Stove Pipe Wells, and on the west side

⁷ [In the original description of *giganteus* the type locality is stated to be Conchella, Calif., but the type specimen and the two paratypes are labeled Thermal. These towns are only a few miles apart.]

of the valley, 20 miles south of Furnace Creek Ranch. The National Museum collection contains several old examples of *californicus* from Death Valley, and two from "Ariz.," all of which were found mixed in with the series of *desertus*; in addition several paratypes of *californicus* are at hand, presented to the National Museum by Mr. Ting. Ting's species is quite distinct from *desertus*, though the two are closely related. Of several characters of *californicus* pointed out by Ting, in which it differs from *desertus*, the following were found especially useful: The more or less distinctly speckled elytra, the shallower serial punctures on the elytra, the obscuring of the tenth row of punctures by the scaly vestiture, the shape of the median lobe of the male genitalia (figured by Ting), and, particularly in the female, the greater convexity of the fifth abdominal sternite. In addition, when the two species are compared in series, *californicus* is seen to be considerably smaller, ranging from 10.5 to 17 mm. in length (teste Ting), whereas *desertus* is from about 14 to 22 mm. long. Davis's redescription of *desertus* was evidently based chiefly on specimens of this species, though included in it were a few statements of exception and qualification that obviously referred to *californicus*. After the elimination of these inapplicable portions, Davis's description fits *desertus* well enough.]

EUPAGODERES GEMINATUS Horn

FIGURE 51

Eupagoderes geminatus HORN, 1876, p. 35.

Robust, elytra moderately inflated; color variable but predominantly gray; head usually with a median line and a space in front of each eye dark brown or plumbeous; markings of elytra variable, but usually light gray, intervals 2, 4, and 6 darker. Sometimes interval 1 is also dark. Some specimens are dark gray irrorate with darker gray or black, and others have the even numbered elytral intervals only slightly darker, with irregular paired spots of gray or black in the striae, one on each side of the interval. Specimens from Overton, Nev., have the suture and some of the markings on the head, thorax, and elytra light brown. However marked, the third elytral interval is nearly always conspicuously lighter. Rostrum moderately stout, constricted⁸ at base beneath; median sulcus fine, sharp; lateral sulci short, evenly arcuate, sometimes subobsolete. Transverse impression vague, sometimes nearly obsolete. Head rounded, front slightly flattened; head and rostrum finely and sparsely punctate. Pronotum one-fourth or slightly more than one-fourth wider than long, base one-sixth to two-sevenths wider than apex; sides evenly rounded; disk varying from nearly impunctate to coarsely, closely punctate; in

⁸ The constriction, in this and in other species, is not always apparent, at least with the scales in place.

the latter case subtuberculate at sides; median impression present. Elytra more or less inflated; two-sevenths to one-third longer than wide, widest at apical three-fifths; truncate at base; striae finely impressed, punctures fine, intervals 3 and 5 usually slightly wider, all intervals usually slightly convex. Legs only moderately stout, fore and middle tibiae usually, but not always, minutely denticulate within, posterior tibiae usually obliquely truncate.

Measurements in millimeters.—Length 6.0 to 12.5, averaging about 8.

Female genitalia (fig. 51, *a, b, c, d*).—Genital tube tubular, apical plates rather thick, varying in shape as shown in the figures, margins smooth; coxites small, laterally compressed, lightly chitinized, the setae in small bundles rather than single; styli visible from beneath. In profile the “roach-backed” appearance of the dorsal outline apically seems peculiar to this species. The eighth sternite is usually slightly obtusely emarginate at apex, but smoothly rounded in some specimens; sides smoothly rounded.

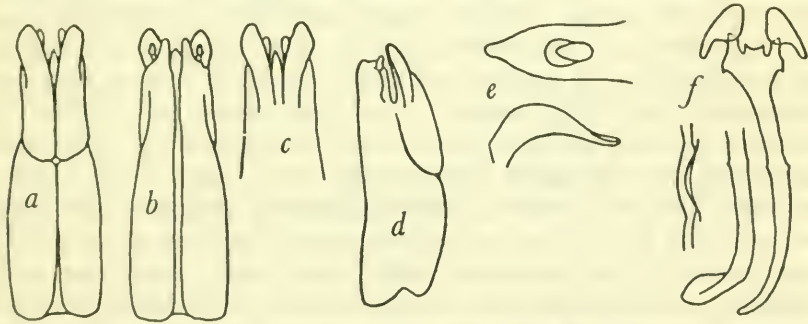


FIGURE 51.—*Eupagoderes geminatus* Horn: *a* and *c*, Female genital tube, dorsal view; *b*, female genital tube, ventral view; *d*, female genital tube, lateral view; *e*, median lobe of male genitalia, dorsal and lateral views; *f*, accessory parts of male genitalia.

Male genitalia (fig. 51, *e, f*).—Median lobe heavily chitinized, black; in profile very sharply curved, apex recurved and flattened; moderately deeply excavated dorsally, the margins near the apex sinuate.

The curvature of the median lobe of the male, as well as the degree of sharpness of the tip, is subject to some variation, but the female genital tube seems to vary little except to a minor extent in the degree of sharpness of the apical plates.

Type locality.—Owens Valley, Calif. I have the following records of locality: CALIFORNIA, Kern County (Coquillett); Los Angeles County (Coquillett); Lancaster (Wickham); San Francisco (?); Owens Lake (Wickham), Panamint Valley, Argus Mountains, Humboldt Lake (Wickham), Keeler (Wickham), Independence (Wickham), Mojave Desert, Fairmont (A. C. Davis), Fort Tejon (A. C. Davis), Amadee (Wickham), Claremont (W. Benedict), San Bernardino.

NEVADA, Wadsworth, Hawthorne (Wickham), Overton (David E. Fox), Glendale (E. W. Davis).

The San Francisco locality (University of Ohio collection) is probably an error in labeling, or an accidental transportation of specimens from the southern part of the State.

Remarks.—This is the most variable species of the genus, as the genital structure is the only character that does not vary tremendously. It may be distinguished easily by the characters given in the key when it has been placed in the proper group by the genitalia of the female.

EUPAGODERES GRISEUS, new species

FIGURE 52

Robust, inflated, dorsum flattened. Color gray, with a median spot on the front, a spot in front of each eye, a narrow median, and two wide lateral vittae upon the pronotum, plumbeous; narrow elongate spots of black along the elytral striae, and diffuse blotches of darker gray upon the elytra. Rostrum moderately stout, arched above and not constricted at base beneath; median sulcus broad, rather shallow, wider apically, or if narrow and finely impressed, with a very fine, subobsolete subsidiary sulcus at each side about one-third of the distance to the lateral sulci; lateral sulci distinct, short. Transverse impression between head and rostrum very vague. Head evenly rounded; head and rostrum finely and sparsely punctate. Pronotum two-sevenths wider than long, widest slightly in front of the middle, base one-sixth to one-fourth wider than apex, subglobose, sides smoothly rounded; disk moderately coarsely and closely punctate, more closely toward the sides, which are subtuberculate in some specimens; median impression deep and distinct, to subobsolete. Elytra moderately inflated, and from three-fourths to two-thirds longer than wide, truncate at base; striae finely impressed, strial punctures distinct; elytral intervals convex, subequal in width. Legs moderately stout, front and middle tibiae usually very minutely denticulate within; posterior tibiae truncate at apex.

Measurements in millimeters.—Length 8.0 to 13.5; width 3.9 to 6.7.

Female genitalia (fig. 52, *a*, *b*, *c*).—Genital tube tubular; apical plates rather thin, long, broad, flaring outward, the apical margins toothed or irregular; coxites large, laterally compressed, very heavily chitinized, especially near the apex; styli small, borne upon the dorsal bases of the coxites and invisible from above or below. Eighth sternite usually smoothly rounded at apex, but sometimes with a vague rounded emargination.

Male genitalia (fig. 52, *d*, *e*).—Median lobe not very heavily chitinized, brown; in profile moderately curved, apex very slightly re-curved; deeply excavated dorsally, distal to the median orifice;

outline as seen from above smoothly rounded, apex obtusely rounded.

Type locality.—The flat, semidesert land below Grapevine Canyon, on the inland route between Los Angeles and Bakersfield, Calif., near Rose Station. [The type specimens are labeled "Bakersfield, Cal. IV-1934."]

Types.—Holotype female, allotype male, and one paratype, U.S.N.M. No. 56768; seven paratypes in my collection [now in collection L. J. Bottimer]; one female paratype each, both labeled "Cal." only, in the collections of the University of Ohio and H. C. Fall.

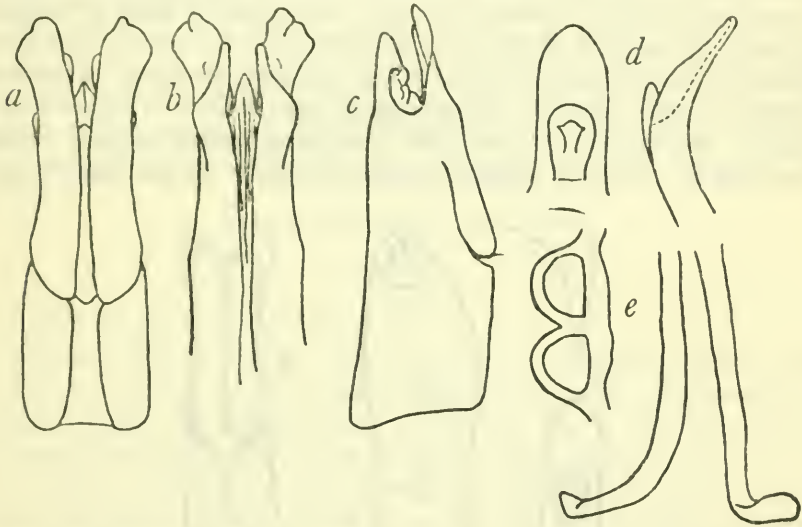


FIGURE 52.—*Eupagoderes griseus*, new species: *a*, Female genital tube, dorsal view; *b*, female genital tube, ventral view; *c*, female genital tube, lateral view; *d*, median lobe of male genitalia, dorsal and lateral views; *e*, accessory parts of male genitalia.

The specimens labeled "Bakersfield, Cal." were collected beneath dried cow dung in April.

Two large males in the collection of the United States National Museum, one from Kern County, Calif. (Hubbard and Schwarz), the other from Colton, Calif., and two similar males in the collection of H. C. Fall, have been tentatively referred to this species.

Remarks.—*Eupagoderes griseus* resembles closely *E. geminatus* Horn. Although when series of the two species are placed side by side they appear very different, an attempt to discover just what the differences are reveals so much variation that all the characters are eliminated except the female genitalia, the median sulcus of the rostrum, and the truncation of the hind tibiae. The truncation of the hind tibiae in *griseus* is usually broader and more transverse, lacking the raised inner edge found so frequently in *E. geminatus*. The latter character is, however, subject to some variation.

EUPAGODERES AENEUS, new species

FIGURE 53

Robust, convex, dorsum slightly flattened; light brown, feebly and irregularly mottled with gray-brown and white, and more or less irrorate with black; scales iridescent, the iridescence predominantly red. Head and rostrum separated by a well-marked transverse impression. Rostrum well arched above, very slightly constricted at base beneath, in the female about as stout as that of *E. geminatus* Horn, in the male a little less stout; median sulcus faint or lacking; lateral sulci nearly obsolete, sharply converging at base of rostrum. Front very slightly flattened; remainder of head evenly, smoothly rounded; head and rostrum finely and sparsely punctate. Pronotum finely, sparsely punctate, feebly sulcate, from a little over one-fifth to slightly less than two-fifths wider than long, widest slightly behind the middle, posterior margin straight, anterior margin slightly pro-

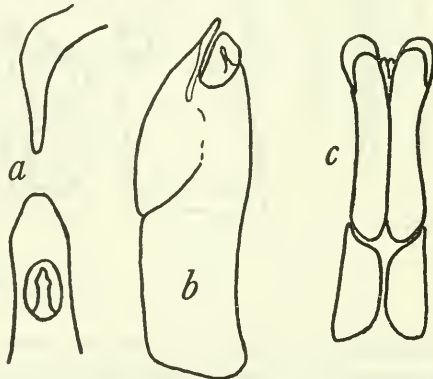


FIGURE 53.—*Eupagoderes aeneus*, new species: *a*, Median lobe of male genitalia, lateral and dorsal views; *b*, female genital tube, lateral view; *c*, female genital tube, dorsal view.

duced at center, sides broadly rounded, smooth. Elytra about one-fifth longer than wide, widest at or slightly behind the middle; striae fine, strial punctures very fine, intervals subequal in width and nearly or quite flat; elytral setae subdecumbent, tawny, moderately conspicuous. Legs fairly stout; tibiae not denticulate within, posterior tibiae obliquely truncate; tarsi with the third joint widest in the male, and with tufts of pubescence in both sexes.

Measurements in millimeters.—Length 7 to 10.1; width 3.5 to 5.2.

Female genitalia (fig. 53 *b, c*).—Genital tube tubular, rather heavily chitinized, very close to *E. geminatus* Horn in shape. Apical plates large, flat or slightly concave beneath; as viewed from above broadly rounded, with a transparent border. Coxites large, hairy; styli fairly large, placed upon the dorsolateral surface of the coxites. Eighth sternite broadly, smoothly rounded at apex.

Male genitalia (fig. 53, *a*).—Median lobe heavily chitinized, sharply curved, heavy at base, not deeply excavated above near the apex; median orifice broadly oval.

Type locality.—Virgin River, Utah.

Types.—Holotype female, allotype male, and four paratypes, U.S.N.M. No. 56769. The male allotype and one male paratype are labeled "U. T."; the three paratypes (one male and two females) are from Virgin River, Utah. A female specimen that may be considered a paratype is in the collection of the Academy of Natural Sciences of Philadelphia.

Remarks.—In only one of the seven specimens studied is the median sulcus of the rostrum present, and in one specimen the lateral sulci also are absent. In one specimen the front bears a trace of a median carina. This species may be distinguished from its nearest relatives by characters of the genitalia, the absence of rostral sulci, and the color.

EUPAGODERES MORTIVALLIS Fall

FIGURE 54

Eupagoderes mortivallis FALL, 1910, p. 192.

Robust, inflated, silvery white, usually more or less irrorate with plumbeous; a median and two lateral vittae on the pronotum plumbeous; middle of pronotal disk and sutural interval fulvous or lemon-yellow. Rostrum only moderately stout, sharply arched near apex above, not or hardly constricted at base beneath; median sulcus very fine, nearly obsolete in some specimens; lateral sulci short, shallow, diverging apically. Transverse impression between head and rostrum present, but usually feeble. Head rounded, front slightly flattened, very finely, sparsely punctate; rostrum more coarsely and closely punctate. Pronotum wider than long, widest at middle; apex slightly constricted; disk finely, sparsely punctate, median sulcus nearly or quite lacking. Elytra from about one-third longer than wide to a little less than twice as long as wide, widest at about the apical one-third, truncate at base; elytral striae finely impressed, punctures fine; intervals subequal in width except the first (sutural), which is narrow and convex. Legs moderately robust, tibiae finely denticulate within; posterior tibiae obliquely truncate.

Measurements in millimeters.—Length 12 to 18.

Female genitalia (fig. 54, *a*, *b*, *c*).—Genital tube heavily chitinized, tubular; apical plates moderate in size, curved downward and slightly concave beneath; coxites large, fleshy in appearance; styli moderate in size, set upon the dorsal face of the coxites halfway between base and apex. Eighth sternite broadly rounded and very broadly, shallowly emarginate at apex.

Male genitalia (fig. 54, *d*).—Median lobe about as in *E. geminatus* Horn, but much larger and with the apical margins more evenly arcuate (not sinuate).

Type locality.—Death Valley, Calif.

The U. S. National Museum collection contains several specimens from Death Valley, Calif.; also, one which appears at first glance to be an abnormal specimen of *E. desertus* Horn, from which it differs externally in the impressed elytral striae, the more impunctate, smoother appearance, and the fulvous suture. It is dark grayish yellow, with conspicuous irregularly placed ocellate spots of deep brown along the striae.

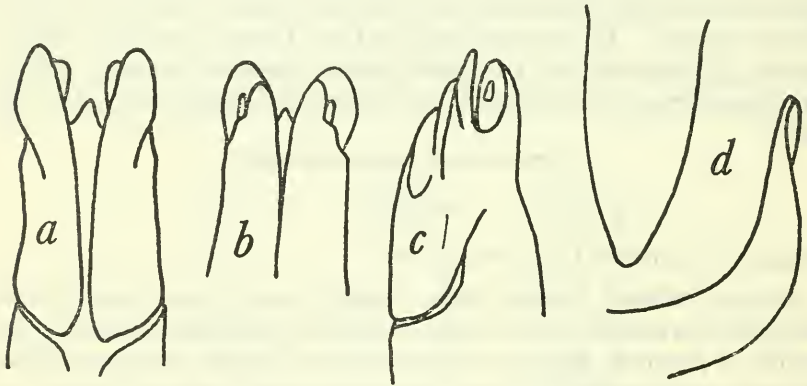


FIGURE 54.—*Eupagoderes mortivallis* Fall: *a*, Female genital tube, dorsal view; *b*, female genital tube, ventral view; *c*, female genital tube, lateral view; *d*, median lobe of male genitalia, dorsal and lateral views.

Remarks.—The female genitalia of *E. mortivallis* differ from those of *E. desertus* chiefly in the apical plates, which are nearly horizontal from side to side and concave beneath, not tilted upward at their lateral edges and nearly flat, and in the coxites' being more rounded as viewed from the side. The male median lobe is thinner, sharper at apex, and not squarely truncate as in *desertus*. *E. mortivallis* is more closely related to *E. geminatus* Horn, from which it may be distinguished by its size and color.

EUPAGODERES MORTIVALLIS Fall, **APPROXIMATUS**, new variety

Form as in *E. mortivallis* Fall. Color gray, irrorate with plumbeous scales; elytral intervals 2, 4, and 6 darker; no trace of fulvous or yellow except for a very narrow line along the elytral suture. Median sulcus of rostrum extremely fine. Pronotum more coarsely and closely punctate than in typical *E. mortivallis*. Genitalia as in *E. mortivallis*.

Type locality.—Baker, Calif., April (R. E. Barrett).

Types.—Holotype female and allotype male, Baker, Calif., U.S.N.M. No. 56770. One paratype female, Needles, Calif., in my collection [now in collection of L. J. Bottimer]. One paratype in the collection of H. C. Fall.

Remarks.—With this variety is tentatively included a specimen from Death Valley, Calif., which is uniform gray, the suture narrowly fulvous, the striae of a blackish tinge, and the head and pronotum yellow-gray.

This is merely a color form of *E. mortivallis* Fall, but it differs so markedly in appearance and color from that species that it has caused some confusion, and for that reason it has been thought well to give it a name.

II. ROBUSTUS group

Included at present is a single species:

EUPAGODERES ROBUSTUS, new species

FIGURE 55

Form robust, elytra greatly inflated; color uniform gray-white; scales feebly imbricated on elytra. Rostrum stout, moderately arched dorsally; median sulcus lacking; lateral sulci short, rather shallow, arcuate, convergent at base of rostrum. Head evenly rounded; head and rostrum moderately finely, evenly punctate, a short white seta in each puncture. Pronotum one-seventh wider than long, widest at apical two-fifths, base one-fifth wider than apex, sides evenly rounded; disk moderately coarsely, rather closely punctate, the median groove rather fine. Elytra inflated, together almost one-third longer than wide, widest at basal one-third; humeri not developed, but elytra truncate and swelling abruptly from base, wider at base than the base of the pronotum; striae punctures very coarse, round, deep, and not confluent; intervals 2, 4, and 6 very slightly wider, flat; intervals 3, 5, and 7 elevated; setae extremely minute, not or hardly visible at a magnification of about 30 diameters. Legs only moderately stout, tibiae not apparently denticulate.

Measurements in millimeters.—Length 9.5 to 12.4.

Female genitalia (fig. 55, a, b, c).—Genital tube lightly chitinized, subconical, apical plate lacking, coxites and styli extremely minute. Eighth sternite of *decipiens* type, acute, apex truncate or slightly emarginate, and hairy.

Male genitalia (fig. 55, d).—Median lobe heavily chitinized, moderately curved and thick at apex as viewed from the side; from above short and rather broad, very slightly dilated at apical one-third, apex broadly, evenly rounded, not deeply excavated above.

Type locality.—"20 mi. west of Yuma, Calif. X-27-24."

Types.—Holotype female, allotype male, and paratype female, the

two latter from Palmer, Ariz. (Hubbard and Schwarz), U.S.N.M. No. 56771.

Remarks.—The female paratype has a median carina upon the rostrum instead of a sulcus, terminating at the transverse impression. The frons is slightly produced, but not carinate. This specimen has become blackened and the setae show more plainly against the blackish background; also, the elytra are more inflated than in the other two specimens (one-fifth longer than wide), the abrupt widening from the base much more evident, almost enough to be considered humeri.

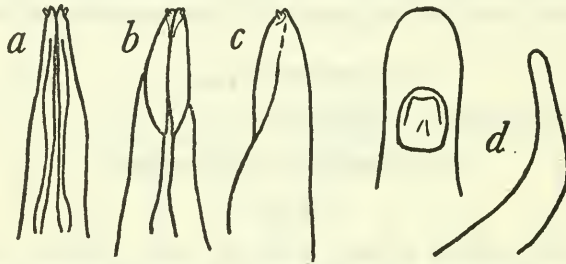


FIGURE 55.—*Eupagoderes robustus*, new species: *a*, Female genital tube, ventral view; *b*, female genital tube, dorsal view; *c*, female genital tube, lateral view; *d*, median lobe of male genitalia, dorsal and lateral views.

III. DECIPIENS group

This group is characterized by the structure of the female genital tube, which is semimembranous with supporting rods of chitin, and bears large styli; by the acutely pointed eighth sternite of the female; and by the thick, rounded, deeply excavated median lobe of the male. The genitalia of the United States species are not distinguishable one from another, and for this reason only the genitalia of *E. decipiens* have been drawn. All the species in the *decipiens* group seem to be very closely related, and most of them vary so much that detailed descriptions would necessarily consist mainly of repetition and exceptions. The diagnostic characters in the key below must be used with caution.

KEY TO SPECIES OF DECIPIENS GROUP

1. Rostrum continuous with the front..... 2
 Rostrum separated from the front by a transverse impression..... 3
2. Brown or gray, less inflated, elytral striae distinct..... *decipiens* (LeConte)
 White, sometimes sparingly irrorate with plumbeous; elytral striae fine and indistinct..... *decipiens* (LeConte), variety *dunnianus* Casey
3. Setae conspicuous, semierect; median sulcus of rostrum extended onto front.
 *pilosus*, new species
 Setae small, more nearly flat; median sulcus of rostrum not extended onto front..... 4
4. Vertex flattened, finely carinate in the type; scales pinkish cinereous; feebly mottled with gray..... *aridus* Fall

Vertex evenly convex; scales whitish to cinereous; marmorate with darker gray..... 5

5. Median sulcus of rostrum shallow and vague..... *varius* (LeConte)
 Median sulcus fine and sharp (in the type).

varius (LeConte), variety *plumbeus* Horn

EUPAGODERES DECIPIENS (LeConte)

FIGURE 56

Ophryastes decipiens LECONTE, 1853, p. 445.

In this species there is a great deal of variation in size, shape, and degree of maculation. Some specimens are robust, convex, the body dilated and widest behind the middle, others are flatter and more parallel, with the body widest at about the middle. The color varies from almost uniform gray with blotches of white upon the elytra, through gray distinctly marked with brown and white, to a nearly uniform muddy brown. One median and two lateral vittae of darker color upon the pronotum are sometimes faint, but seem always to be present. The median sulcus of the rostrum is usually, but not always, represented by an obsolete fovea about opposite the antennal insertion. At times a median sulcus may be faintly suggested by a fine impressed line extending backward from the fovea. The lateral sulci

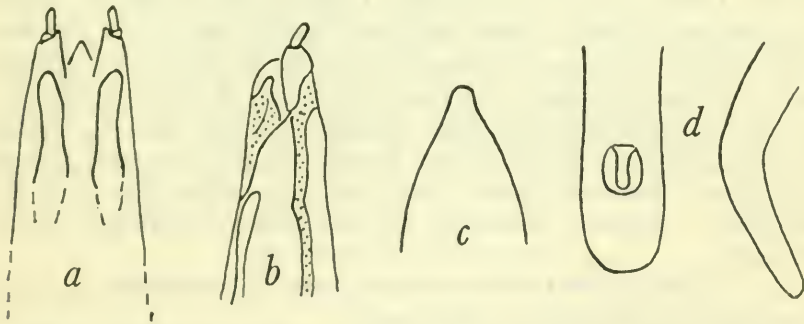


FIGURE 56.—*Eupagoderes decipiens* (LeConte): *a*, Female genital tube, dorsal view; *b*, female genital tube, lateral view; *c*, eighth sternite, female; *d*, median lobe of male genitalia, dorsal and lateral views.

are variable, sometimes nearly obsolete but usually well defined. The ridges between the sulci vary from obsolete to high and sharp. In the latter case their sudden rise at the base of the rostrum gives the profile the appearance of having a slight transverse impression between head and rostrum. The ridges above and in front of the eyes are pronounced. The punctation of the pronotum varies from coarse and rather close to practically absent. As a rule it is fairly coarse and moderately close, coarser and closer at the sides. The elytral striae are fine but distinct, and the tawny, moderately conspic-

uous setae are arranged in rows upon the flat elytral intervals. Posterior tibiae truncate at apices.

Measurements in millimeters.—Length 6.1 to 11.3, averaging about 8.1.

Female genitalia (fig. 56, *a, b, c*).—Genital tube tubular, membranous, with supporting rods, or baculi. These consist of a rod at each side ventrally and another on each side dorsally. The latter two are interrupted, the apical portion of each broadening out as a chitinous plate on each side near the apex of the tube. Coxites large, fleshy; styli large, chitinous, with long setae. Eighth sternite acutely angulate, the apex truncate or narrowly rounded, and hairy.

Male genitalia (fig. 56, *d*).—Heavily chitinized; as seen in profile very thick, abruptly curved at about basal two-fifths, base and apex nearly straight. As viewed from above, sides nearly parallel, apex very broadly and evenly rounded, deeply excavated below the median orifice.

Type locality.—"Eagle Pass" [Texas].

Specimens of *Eupagoderes decipiens* have been seen from the following localities: ARIZONA, Cat Pass, Tucson Mountains (W. D. Pierce); Tucson (Hubbard and Schwarz; Wickham); Catalina Springs (Hubbard and Schwarz); Colorado Canyon (Barber and Schwarz); Indian Garden, Grand Canyon (Wickham); Catalina Mountains (C. Voorhies); Sabine Canyon. NEW MEXICO, Mesilla Park (C. N. Ainslie; Cockerell); Alamogordo. TEXAS, Cotulla (W. D. Pierce; J. C. Crawford); Del Rio (Wickham); El Paso (Wickham; W. Knaus); Sander-son (J. D. Mitchell); Brewster County; Mission (B. R. Coad); Val Verde County; Devils River; Laredo (E. A. Schwarz); Chisos Mountains; "between Pecos River and Guadalupe Mts." (F. L. Odenbach). MEXICO, Monterrey (E. A. Schwarz); Monclova (E. A. Schwarz).

EUPAGODERES DECIPIENS (LeConte), variety DUNNIANUS Casey

Eupagoderes dunnianus CASEY, 1888, p. 240.

This name seems to have caused considerable confusion. Casey's description of the species states that it is white, with the striae extremely fine, finely and remotely punctate. The description fits the type very well, but some specimens included in the Casey collection series are the usual brown specimens of *decipiens* with the striae slightly less well marked than usual. I have found no characters other than those given above that distinguish *dunnianus* from *decipiens*. The genitalia are the same. Although this is merely an extreme form of *decipiens*, I believe the name should be retained, as specimens occasionally come to hand that are very robust, white, and with subobsolete striae, and these are otherwise difficult to place.

Type locality.—El Paso, Tex.

EUPAGODERES PILOSUS, new species

Of about the same size and shape as the more common specimens of *E. decipiens* (LeConte), perhaps a trifle more robust. Color dark gray, sparingly and irregularly mottled with black, especially upon the basal portions of the second and fourth elytral intervals; pronotum bearing a blackish lateral stripe upon each side and a narrow black median line. Head moderately, evenly convex, a broad depression separating it from the rostrum, the dorsal curve of which, if carried through, would just about meet the upper margin of the eye; rostrum stout, markedly arched toward apex, trisulcate, the median sulcus shallow and rather vague and extending onto the front nearly to the vertex; lateral sulci deep, converging toward the base of the rostrum; frons and rostrum moderately thickly set with fine, semierect setae. Pronotum about one-fourth wider than long, widest at middle, sides smoothly and evenly rounded; anterior and posterior margins nearly straight; disk with a deep median groove and coarsely, closely punctate, bearing numerous small semierect setae. Elytra together one-fifth longer than wide, three-fifths longer than the pronotum; striae very fine, the punctures fine and shallow; elytra closely set with rather long, dark brown or black, semierect setae. Legs moderately stout.

Measurements in millimeters.—Length 7.5 to 8.1.

Type locality.—Canyon City, Colo.

Types.—Holotype female and one female paratype collected at type locality, H. Soltau collection 9-V-97, U. S. N. M. No. 56772.

Remarks.—The genitalia of this species places it in the *decipiens* group, from the other members of which it may be distinguished by the conspicuous semierect setae, the more widely imbricate scales of the elytra, and the sulcate frons.

EUPAGODERES VARIUS (LeConte)

Ophryastes varius LECONTE, 1853, p. 444.

This species is the most variable of the genus in size, shape, and color; therefore a detailed description is not practicable. Some specimens resemble *E. decipiens* rather closely in general appearance although they are nearly always lighter in color. The form of the body and the sculpture are subject to the same amount of variation as in that species. The average size is larger, but some specimens are very small.

Measurements in millimeters.—Length 7.8 to 12.8, averaging about 9.5.

Type locality.—Desert of the Colorado, Calif.

Specimens have been examined from the following localities: CALIFORNIA, Palm Springs (Hubbard and Schwarz); Palm Canyon (R. E. Campbell); Mountain Springs, San Diego County (W. D.

Pierce); Holtville (W. Benedict); San Diego County (Coquillett); Imperial County (J. C. Bridwell); Goffs, Cabazon (E. D. Ball); San Bernardino County; Indio (Wickham); Death Valley; Saltdale (A. C. Davis); Boundary Canyon, Amargosa Mountains, Inyo County. ARIZONA, Littlefield (E. W. Davis); Fort Yuma (Hubbard and Schwarz). NEVADA, Lee Canyon, Spring Mountain; Hawthorne; Las Vegas (David E. Fox). UTAH, St. George; Virgin River.

Remarks.—Occasional specimens are extremely difficult to distinguish from *E. aridus* Fall, which appears to be the most closely related species. The characters given in the key will serve to separate *E. varius* from others of the group.

EUPAGODERES VARIUS (LeConte), variety PLUMBEUS Horn

Eupagoderes plumbeus HORN, 1876, p. 35.

According to Fall (1910, p. 193) this species is the same as *E. varius* (LeConte). In the type specimen of *E. plumbeus*, however, the median sulcus of the rostrum is fine, but sharply defined, whereas I have not seen *E. varius* with more than a bare indication of the median sulcus. The paratypes in the Horn collection seem to be a mixed lot and may not all represent this variety. One of them has the median sulcus almost lacking. A specimen of *E. aeneus* Davis is also included in the series. *E. plumbeus* Horn is certainly very closely related to *E. varius* (LeConte), but on the basis of the difference given above it seems best to retain the name for the present. No comparison of the genitalia has been made but it seems likely that these would turn out to be indistinguishable from those of the rest of the group.

Type locality.—Owens Valley, Calif.

EUPAGODERES ARIDUS Fall

Eupagoderes aridus FALL, 1910, p. 192.

All species of the *decipiens* group are closely related, but the relationship between *E. varius* (LeConte), and *E. aridus* Fall seems to be unusually close. Separation of the two depends largely upon color and general appearance. The carinate front occurs in both species, but much less frequently in *aridus*. In fact, the type is the only specimen of *aridus* known to me in which this character is found. I have before me a large, pink, subvittate specimen which answers to the description of *aridus* perfectly except that the front is not carinate, but, this character being so far unique to the type, the specimen is relegated to the *aridus* series. Another specimen, smaller in size, gray with irregular brown mottling, would be unhesitatingly placed with *varius* except that the frons is distinctly carinate. *E. aridus* in general tends to be vittate, intervals 3, 5, and 7 being colored with black or plumbeous, the other intervals more irregularly marked with

gray. This species also tends to be less parallel in form than *E. varius*. The average size is somewhat larger than in *varius*.

Measurements in millimeters.—Length 8.6 to 12.3, averaging about 10.5

Type locality.—Western border of the Colorado Desert, Calif.

I have the following records of capture for this species: CALIFORNIA, Imperial County (J. C. Bridwell); San Diego County; Holtville (A. C. Davis). ARIZONA, Palmer (Hubbard and Schwarz).

IV. SPECIOSUS group

This group is characterized by the female genital tube being dorso-ventrally flattened, robust, and more or less wedge-shaped as viewed from above or below. The transverse impression between the head and rostrum seems to be rather an unstable character in this group

KEY TO SPECIES OF SPECIOSUS GROUP

- | | |
|------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| 1. Rostrum continuous with the front..... | 2 |
| Rostrum separated from the front by a transverse impression..... | 6 |
| 2. Disk of pronotum finely and sparsely punctate..... | 3 |
| Disk of pronotum more coarsely and closely punctate..... | 4 |
| 3. Color chocolate brown, pronotum and elytra vittate with white. | |
| | speciosus (LeConte) |
| Color white, not or but feebly mottled..... | nivosus Fall |
| 4. Larger (10 to 17 mm.); scales predominantly white; fore tibiae denticulate.. | 5 |
| Smaller (6 to 10.6 mm.); scales predominantly gray or brown; fore tibiae not denticulate..... | sordidus (LeConte) |
| 5. White, not or but feebly mottled..... | nivosus Fall |
| White, heavily mottled with ocellate plumbeous spots..... | marmoratus Fall |
| 6. Gray, even numbered elytral intervals more or less strongly marked with black or darker gray; setae small, but visible; Texas. | |
| | simulans Van Dyke |
| Gray, usually strongly, irregularly blotched with black; setae extremely small and inconspicuous; California, Arizona, Nevada, and Utah. | |
| | argentatus (LeConte) |

EUPAGODERES SPECIOSUS (LeConte)

FIGURE 57

Ophryastes speciosus LECONTE, 1853, p. 444.

Elongate, moderately convex, deep chocolate brown with two blotchy white vittae upon the pronotum and irregular white vittae upon the even numbered elytral intervals; head with an irregular sprinkling of white scales. Rostrum long, stout, continuous with the front, trisulcate, the median sulcus narrow and deep. The ridges between the sulci are greatly developed and are flat dorsally, giving the deep lateral sulci the appearance of being upon the sides of the rostrum and converging rather sharply toward the the base dorsally; setae of rostrum small, squamiform, recumbent. In some specimens the median sulcus extends up onto the front to about the level of the upper edge of the eyes. Pronotum usually widest before the middle,

finely and sparsely punctate and with a fine median impression. Elytral striae fine, punctures distinct; intervals nearly flat, 3 and 5 wider; setae fine, yellowish, placed in the strial punctures and in a fine secondary punctation upon the intervals. Legs only moderately stout, brown with a sprinkling of white scales; tibiae minutely denticulate on the inner side.

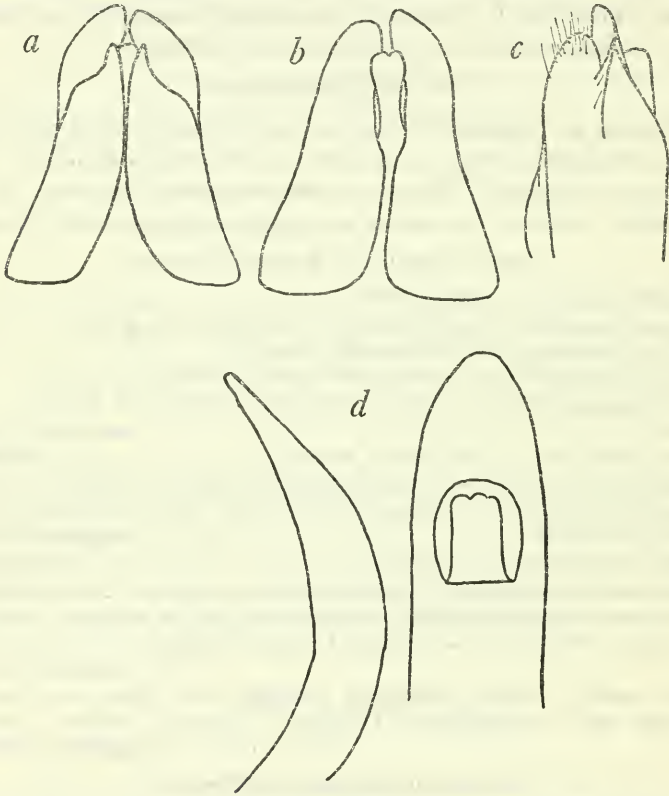


FIGURE 57.—*Eupagoderes speciosus* (LeConte): *a*, Female genital tube, dorsal view; *b*, female genital tube, ventral view; *c*, female genital tube, lateral view; *d*, median lobe of male genitalia, lateral and dorsal views.

Measurements in millimeters.—Length 14.4 to 21.5.

Female genitalia (fig. 57, *a*, *b*, *c*).—Genital tube wedge-shaped, dorsoventrally flattened, rather heavily chitinized. Coxites large, hairy; styli very small; apical plates large, their upper surfaces slightly concave.

Male genitalia (fig. 57, *d*).—Median lobe heavily chitinized, moderately, evenly curved in profile, apex thin. As viewed from above, sides parallel or nearly so, the apex evenly, acutely rounded; not deeply excavated below the median orifice; median orifice large, oval, truncated basally.

Type locality.—"Eagle Pass" [Texas].

I have seen specimens of this species from Alpine, Tex., and from San Luis Potosí, Chihuahua City, and Saltillo, Coahuila, Mexico.

Remarks.—*Eupagoderes speciosus* (LeConte) is evidently a Mexican species for which the southern United States is the northern limit of distribution. Its large size, dark color, extremely lightly punctate pronotum, and conspicuous white vittae make this species the most easily recognized of the genus.

EUPAGODERES NIVOSUS Fall

Eupagoderes nivosus FALL, 1910, p. 190.

Elongate, moderately convex, covered with white scales throughout, sometimes with irregularly scattered small black spots; a median and two vague lateral gray vittae sometimes present upon the pronotum. One specimen seen was lightly irrorate with black upon the basal half of the elytra. Rostrum long, not greatly arched above, not constricted at base beneath; continuous with the front, trisulcate, the median sulcus sharply defined and extending up onto the front in some specimens; lateral sulci deep, broadly arcuate, slightly convergent basally. Head smoothly rounded, head and rostrum finely and sparsely punctate. Pronotum one-third to two-sevenths wider than long, sides evenly, strongly arcuate, apical margin slightly produced at middle, basal margin slightly emarginate at middle; median groove present; disk moderately finely and rather irregularly punctate, having a rugose appearance which is more noticeable toward the sides; sides of pronotum subtuberculate in some specimens. Elytra oval, striae finely impressed, strial punctures fine; intervals feebly convex, 3 and 5 slightly wider. Legs moderately robust; all tibiae denticulate within; posterior tibiae truncate, the flattened end narrow and scaly.

Measurements in millimeters.—Length 11 to 15.

Female genitalia.—Genital tube short, wedge shaped, dorsoventrally flattened, rather lightly chitinized; apical plates thick, concave above, their apices directed upward; styli extremely small, borne upon membranous areas on the dorsal bases of the apical plates. Eighth sternite broadly, obtusely emarginate at apex.

Male genitalia.—Median lobe only moderately heavily chitinized, brown, curved less sharply in profile than in most species, apex very slightly recurved; moderately deeply excavated apically as viewed from above, apex broadly rounded, sides near the apex sinuate, sides posterior to the median orifice straight, slightly divergent.

Type locality.—Phoenix, Ariz.

Specimens of this species have been seen from Phoenix (J. S. Tait) and Rice (D. K. Duncan), Ariz.

EUPAGODERES MARMORATUS Fall

FIGURE 58

Eupagoderes marmoratus FALL, 1910, p. 191.

This species is very closely related to *E. nivosus* Fall, and resembles it closely in shape. It is distinguished chiefly by being strongly mottled with ocellate black spots, especially along the elytral striae, by having the rostrum usually more deeply sulcate, and the pronotum more coarsely and closely punctate. In some specimens the median sulcus of the rostrum continues up onto the front nearly to the vertex, in which case it is usually in the center of a median brown stripe. The lateral sulci may be evenly arcuate or straight apically, and are rather

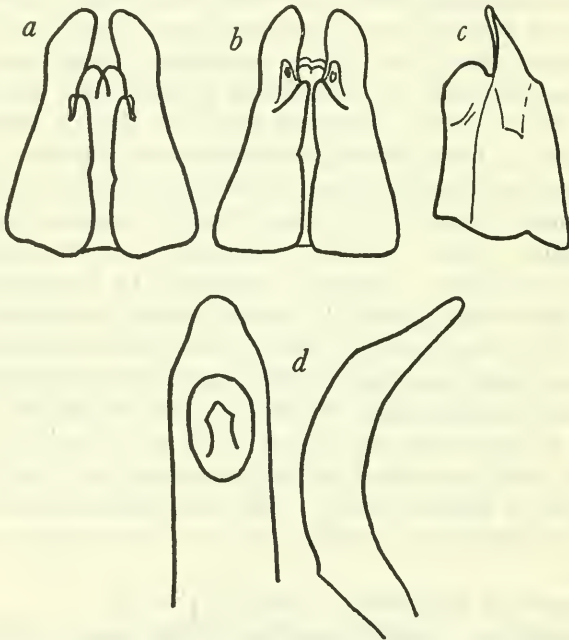


FIGURE 58.—*Eupagoderes marmoratus* Fall: *a*, Female genital tube, dorsal view; *b*, female genital tube, ventral view; *c*, female genital tube, lateral view (dorsal side to left); *d*, median lobe of male genitalia, dorsal and lateral views.

sharply convergent near the base of the rostrum. In many specimens the ridges between the sulci are so pronounced that the head and rostrum have separate convexities as viewed from the side, giving the illusion of a transverse impression between head and rostrum. The pronotum is usually a little more than one-fifth wider than long, and varies from moderately coarsely, sparsely punctate to coarsely and closely punctate. In most specimens the prothorax at the sides is so densely punctate that the punctures coalesce, and there are small but very evident tuberosities present. The spots upon the elytra are

very rarely lacking, and are ocellate with buff or tawny centers. In certain small specimens examined the elytra are unicolorous gray or white, nearly or quite lacking markings, the front of the head or rostrum or both strongly marked with black. The third tarsal joint in many specimens is no wider, perhaps a little narrower, than the second.

Measurements in millimeters.—Length 10 to 17, averaging about 14.

The genitalia of both sexes are identical with those of *E. nivosus* Fall. It is possible that this species represents a race or variety of *E. nivosus*.

Type locality.—Tucson, Ariz.

Specimens of *E. marmoratus* Fall have been seen from the following Arizona localities: Tucson (Wickham; J. W. Toumy; G. Hofer); Rice (D. K. Duncan); Florence (C. R. Biederman); Phoenix (J. S. Tait); Globe (D. K. Duncan); Wellington Well, Quitoota Mountains.

EUPAGODERES SORDIDUS (LeConte)

FIGURE 59

Ophryastes sordidus LeConte, 1853, p. 445.

Color usually some shade of gray, irregularly mottled with white and brown or dark gray, but three male specimens from Vaughn, N. Mex., in the United States National Museum collection are predominantly light brown mottled with gray and white. In the lighter-colored specimens there is a brown median line upon the front and a brown patch above each eye. The pronotum usually has a rather wide brown vitta at either side. Rostrum rather short, not very stout, trisulcate, the median sulcus sharply defined and ending abruptly at the junction of the head and rostrum, apically either extending to the apex of the rostrum or ending abruptly about opposite the antennal insertions; lateral sulci deep, nearly straight, usually slightly divergent at the base of the rostrum. Rostrum constricted at base beneath and usually not evenly continuous with the front above, as in most specimens the head and rostrum have slight separate convexities as viewed from the side. Punctuation of pronotum rather coarse, but sparse, coarser and closer at the sides. Elytral striae fine but usually distinct, in some specimens becoming obsolete in the center of the disk. The three lateral striae on each side usually consisting of rows of large, oblique punctures, the other striae impressed, the punctures connected. Legs rather thin, tibiae not denticulate within, posterior tibiae truncate, the truncation wide, glabrous, and usually slightly elevated. There seems to be very little sexual difference in the tarsi of this species.

Measurements in millimeters.—Length 6.2 to 10.6.

Female genitalia (fig. 59, *a, b, c, d*).—Genital tube stout and short; apical plates heavily chitinized, small, pointed, close to the midline,

and so twisted that their concave faces are ventrolateral, their apices divergent; coxites produced, chitinous, divergent at apex; styli very small, flattened, situated upon the dorsal face of the coxites. Eighth sternite broad, acutely emarginate at apex.

Male genitalia (fig. 59, *e*, *f*).—Median lobe small, very broadly rounded at apex and deeply excavated distad of the median orifice;

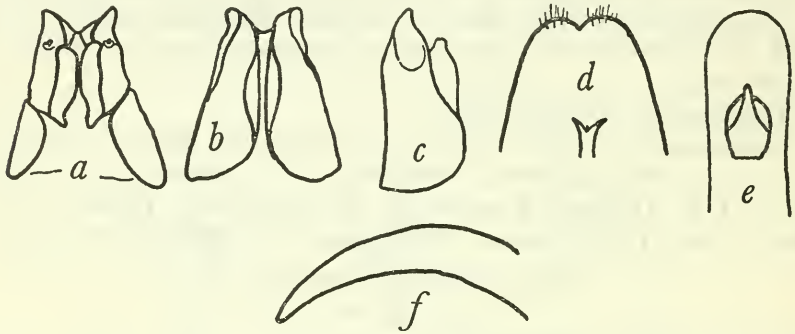


FIGURE 59.—*Eupagoderes sordidus* (LeConte): *a*, Female genital tube, dorsal view; *b*, female genital tube, ventral view; *c*, female genital tube, lateral view; *d*, eighth sternite of female; *e*, median lobe of male genitalia, dorsal view; *f*, median lobe of male genitalia, lateral view.

median orifice slightly elongate, truncate at base; median lobe in profile rather thin, evenly curved.

Type locality.—Platte River.

Specimens of this species have been examined from the following localities: ARIZONA, Winslow (Hubbard and Schwarz; Wickham). NEW MEXICO, Tucumcari (Wickham); Fort Wingate; Albuquerque (Wickham); Deming (Wickham); Santa Fe; Corona; Vaughn; San Juan Valley, Taos County; Roswell; Magdalena (Strickler). TEXAS, Marfa; Marathon; Chisos Mountains, Brewster County. KANSAS, "W. Kansas" (Popenoe).

EUPAGODERES SIMULANS Van Dyke

FIGURE 60

Eupagoderes simulans VAN DYKE, 1934, p. 176.

Moderately robust, convex, covered with dark gray scales, with irregular mottlings of black or dark gray upon the elytra and three dark vittae upon the pronotum. Rostrum moderately stout, deeply transversely grooved at base beneath, moderately arched at apex above, separated from the front by a well-marked transverse impression; median sulcus sharply defined; lateral sulci broad and deep, nearly straight, converging toward the base of the rostrum. Front slightly flattened, head otherwise evenly rounded. Pronotum almost

one-third wider than long, widest at about the middle, base straight, apex not appreciably advanced, sides evenly, feebly arcuate, appearing subparallel; disk with punctation coarse, irregular, usually giving a rugose appearance; median impression sometimes deep, sometimes subobsolete and interrupted. Elytra together about one-third longer than wide, widest at or slightly behind the middle; striae finely impressed, the second markedly deeper; strial punctures large and shallow; intervals moderately convex, even numbered ones usually somewhat narrower and darker in color; setae small, white, rather numerous. Legs moderately robust, fore tibiae not greatly curved, finely denticulate in some males, not so plainly so in females; posterior tibiae not truncate at apex, obliquely rounded on outer side.

Measurements in millimeters.—Length 9.1 to 12.0.

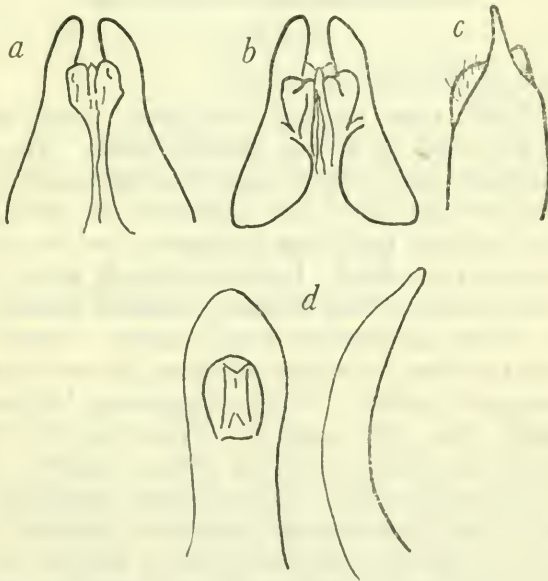


FIGURE 60.—*Eupagoderes simulans* Van Dyke: *a*, Female genital tube, dorsal view; *b*, female genital tube, ventral view; *c*, female genital tube, lateral view; *d*, median lobe of male genitalia, dorsal and lateral views.

Female genitalia (fig. 60, *a*, *b*, *c*).—Very similar to those of *E. argentatus* (LeConte), but smaller, and with the apical plates usually slightly more rounded and a trifle more concave.

Male genitalia (fig. 60, *d*).—Median lobe thick, evenly curved, narrowed a little at apex as viewed from the side; as viewed from above, apex inflated, moderately deeply excavated.

Type locality.—Allamore, Tex.

I have seen specimens from Allamore and from Chisos Mountains

Tex., all collected in July. In one of the latter specimens the ridges between the rostral sulci are so greatly developed that the transverse impression between the head and rostrum is completely wanting. This species superficially resembles *E. geminatus* Horn, as pointed out by Van Dyke, 1934, p. 177, but may be distinguished from that species by the stouter rostrum, and the genitalia, as well as by the locality. I do not think the character of the rounded or truncate posterior tibiae will serve to separate the two, as *E. geminatus* exhibits too much variation in this respect. From *E. argentatus* (LeConte), to which it seems most closely related, *simulans* may be distinguished by the smaller size, the small but plainly visible setae of the elytra, the less acutely arched apex of the rostrum, the well-defined elytral striae, and the color pattern.

EUPAGODERES ARGENTATUS (LeConte)

FIGURE 61

Ophryastes argentatus LECONTE, 1853, p. 444.

Robust, inflated, color varying from pearly gray (with intervals 2, 4, and 6 brownish) to almost uniform black. The usual specimens are whitish or gray, strongly and irregularly marked with black. The form and convexity vary, but in general the sides of the body diverge rather regularly back from the thorax, and the body is widest at about the apical one-third. Rostrum strongly arched above, very stout, not constricted at base beneath, widened apically; trisulcate, the median sulcus moderately deep, sharply defined, sometimes extended onto the front for a short distance; lateral sulci subparallel, curved, convergent basally. Median impression between head and rostrum usually very well marked. Pronotum four-fifths to five-sevenths wider than long, widest at apical one-fifth, coarsely and moderately closely punctate. Elytral striae consisting of rows of large, round, deep disconnected punctures; intervals nearly flat; setae very minute, white. Legs fairly robust, anterior tibiae denticulate within, posterior tibiae subtruncate or rounded at apex.

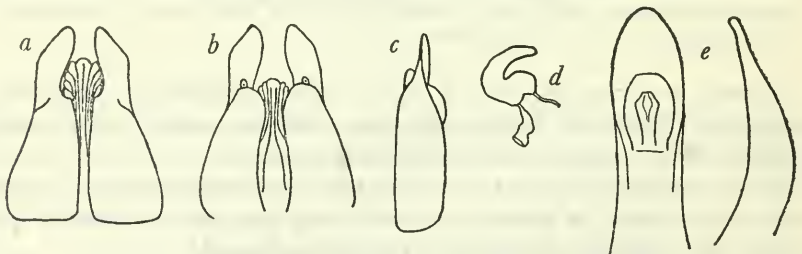


FIGURE 61.—*Eupagoderes argentatus* (LeConte): *a*, Female genital tube, dorsal view; *b*, female genital tube, ventral view; *c*, female genital tube, lateral view; *d*, receptaculum seminis; *e*, median lobe of male genitalia, dorsal and lateral views.

Measurements in millimeters.—Length 9.5 to 15.8.

Female genitalia (fig. 61, *a, b, c, d*).—Genital tube short, lightly chitinized, almost as wide at base as long; sides converging apically as viewed from above or below, parallel as viewed from the side. Apical plates large, thin, acutely rounded at apex, concave dorsally; coxites large, semimembranous; styli extremely minute, borne upon a small membranous area on the bases of the apical plates as in *E. marmoratus* Fall.

Male genitalia (fig. 61, *e*).—Median lobe long, moderately heavily chitinized; in profile not much curved, bisinuate near the apex; as viewed from above very shallowly excavated dorsally, apex rounded, margins near apex very slightly sinuate.

Type locality.—"Vallecitas," Calif.

Specimens of *Eupagoderes argentatus* (LeConte) have been seen from the following localities: CALIFORNIA, Yuma (Wickham); Palm Canyon, Riverside County (W. Benedict); Holtville (A. C. Davis); Saltdale (A. C. Davis); Imperial County (J. C. Bridwell); La Rierta Valley, San Diego County. ARIZONA, Yuma (Herbert Brown); Tucson; Florence (C. R. Biederman); Palmerlee (C. R. Biederman). NEVADA, Glendale (E. W. Davis). UTAH, St. George (Wickham); Virgin River.

V. LUCANUS group

This group is represented by only one species:

EUPAGODERES LUCANUS Horn

FIGURE 62

Eupagoderes lucanus HORN, 1876, p. 34.

Cinereous or brown, with irregular mottlings of black; pronotum with a diffuse median and two conspicuous, lateral black stripes (one each side) the latter continuing along the sides of the head. Scales imbricated throughout. Rostrum long, more parallel and less stout than in most species of the genus, only moderately arched near apex dorsally and not greatly dilated; trisulcate, median sulcus narrow, lateral sulci moderately deep, arcuate. Front markedly flattened. Transverse impression between head and rostrum vague, owing to this flattening of the front. Pronotum about one-third wider than long, widest slightly behind the middle; subglobular; strongly narrowed in front, base one-fifth wider than apex; broadly and evenly rounded at sides, anterior and posterior margins straight; disk very coarsely, closely punctate. Elytra from one-third to two-fifths longer than wide, widest before the middle; at base wider than the base of the pronotum.

Most specimens have well-developed humeri. Strial punctures coarse, distinct; clytral intervals convex, the third more convex and

wider than the second or fourth; setae minute, tawny. Legs moderately stout, all tibiae denticulate.

Measurements in millimeters.—Length 0.9 to 12.1.

Female genitalia (fig. 62, *a, b, d*).—Genital tube very lightly chitinized, laterally compressed; coxites large, angular, curved downward slightly at apex, with a rather wide rim of thick setae upon the dorsal edge; styli small, set upon the ventral face of the coxites. Eighth sternite produced into two large teeth, curving ventrally.

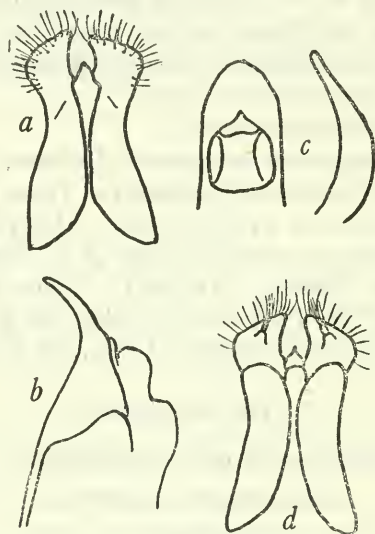


FIGURE 62.—*Eupagoderes lucanus* Horn: *a*, Apex of female genital tube, dorsal view; *b*, eighth sternite of female, lateral view; *c*, median lobe of male, dorsal and lateral views; *d*, female genital tube, ventral view.

Male genitalia (fig. 62, *c*).—Median lobe rather lightly chitinized, evenly and not greatly curved in profile, apex slightly recurved. From above, extremely short and broad, very slightly excavated at apex, median orifice large.

Type locality.—Cape San Lucas, Baja California.

This species seems to be confined to Baja California. I have seen specimens from Santa Rosa (Gus Boyer) and Cape San Lucas (Horn).

Remarks.—*Eupagoderes lucanus* Horn is set apart from all the others of the genus by the brown color, the elongate rostrum, the equal basal joints of the antennal funicle, and, above all, by the extraordinary development of the female eighth sternite into two large teeth, curving downward, a character that is as peculiar in *Eupagoderes* as is the female genitalic structure of *symmetricus* Fall in the genus *Ophryastes*.

One specimen examined has large subsidiary median sulci upon the rostrum, the base of the rostrum being 5-sulcate, and the

subsidiary sulci joining the median and causing it to be very broad apically. Nearly all the punctures of this species have a glabrous spot at the bottom.

I have not seen the following three species, but I have placed them in the key as best I could from the published descriptions.

EUPAGODERES SETOSUS Van Dyke

Eupagoderes setosus VAN DYKE, 1934, p. 179.

This species, as indicated in the key, runs close to *aeneus*, both having opalescent scaly vestiture. It differs from *aeneus* in the longer white setae, the convex front of the head, the color, and, if that character has weight, in the truncate hind tibiae. From *E. mortivallis* Fall, to which it runs in Fall's key, it differs in the conspicuous setae, the smaller size, and the color.

Type locality.—Phoenix, Ariz. [Recorded only from the type locality.]

EUPAGODERES HUACHUCAE Van Dyke

Eupagoderes huachucae VAN DYKE, 1934, p. 180.

In the key this species is placed near *E. marmoratus* Fall. From the description I judge it belongs in the *speciosus* group, close to *sordidus* (LeConte), to which it appears to be more closely related than to *E. mexicanus* Sharp, with which Van Dyke compares it. From *E. sordidus* (LeConte) it differs in the larger size and the finer punctuation of the pronotum.

Type locality.—Babocomari River, Huachuca Mountains, Ariz. [Recorded only from the type locality.]

EUPAGODERES HALLI Van Dyke

Eupagoderes halli VAN DYKE, 1934, p. 181.

Seems to differ from *E. sordidus* (LeConte) chiefly in the flattened front of the head. Examination of the genitalia of the above three species would possibly clear up their true relationships.

Type locality.—Nineteen miles southwest of Kayenta, Navajo County, Ariz., altitude 6,500 feet.

Types.—Also recorded (paratypes) from 23 miles west of Kayenta, Ariz., altitude 6,900 feet.

[No mention of *Eupagoderes cretaceus* Sharp (1891, p. 96) was found in Davis's manuscript. Champion (1911, p. 321) records *cretaceus* from Arizona, and suggests that it may be a synonym of *sordidus* (LeConte). Tanner (1939, p. 31) describes two new species of *Eupagoderes* from Utah which are not included in Davis's treatment of the genus. These are: *E. utahensis* Tanner, type locality St. George, Washington County, and *E. hardyi* Tanner, type locality north fork at Provo Canyon, Utah County, elevation 6,300 feet. Both species are placed by Tanner in the vicinity of *geminatus* Horn.]

Genus *AMYDROGMUS* Pierce

Amydrogmus PIERCE, 1913, p. 374. (Genotype, *A. variabilis* Pierce, monobasic and original designation.)

This genus is defined by Pierce as follows:

Rostrum with scrobes deep and definite, passing rapidly inferior; rostral striae almost obsolete, indicated by faint depressions; third tarsal joint broadly bilobed, and pubescent beneath; second abdominal segment subequal to the two following; prothorax not tuberculate at sides.

In view of the great variation in depth of the rostral sulci in the other genera of the Ophryastini, it seems to me that the most striking character of this genus is the thorax, which is wider at the apex than at the base, a feature that is more differentiating than the nearly obsolete rostral striae, and that is sufficient to distinguish *Amydrogmus* from other genera of the group.

AMYDROGMUS VARIABILIS Pierce

FIGURE 63

Amydrogmus variabilis PIERCE, 1913, p. 374.

Pierce's original description is as follows:

Small, resembling *Sapotes puncticollis* in form, with elytra more or less robust, closely covered with pavement scales, which are generally white, but sometimes heavily mottled with brown, and with two brown fasciae [stripes] on prothorax. Length 4-6 mm.; width 1.75-2.75 mm. Beak strongly constricted at base above and beneath, a little longer than head above, densely covered with white polygonally crowded pavement scales, with short erect setae interspersed, apically emarginate and medially shallowly sulcate, also with feeble longitudinal impressions in front of eyes. Antennae densely clothed with scales, with exception of the club, which is finely pubescent. Prothorax a little shorter than head; truncate at base and apex; ocular lobes small, finely fimbriate; sides broadly arcuate, base not as wide as apex, slightly constricted in front of base; surface very unevenly punctate, with deep punctures of variable sizes; in specimens showing color, two fasciae [stripes] of brown scales; vestiture as described for beak. Elytra of females inflated as in *Tosastes ovalis* and *globularis*, while in males very little wider than the thorax; elytral striae very fine, punctures fine, interstitial punctures irregular but as large as striae punctures; surface sometimes mottled with brown. Undersides densely squamose and clothed as above. Last ventral segment in female elongate triangular, apically rounded, and longer than the two preceding segments. Legs densely squamose; corbels of posterior tibiae with a double row of spines, inclosing an elliptical squamose area.

Female genitalia (fig. 63, *a*, *b*, *d*).—Eighth sternite sharply acute, narrowly rounded at apex, apex slightly hairy. Genital tube rather lightly chitinized, laterally compressed; apical plates lacking; coxites large; styli large. Receptaculum seminis with cornu fairly thin, irregular, only slightly hooked; nodulus moderately large; ramus subglobular; ductus receptaculi thin, not curved downward.

Male genitalia (fig. 63, *c*).—Median lobe moderately heavily chitinized, thick, very slightly curved in profile, dorsal profile not

sinuate but evenly rounded to apex. From above elongate, widened near apex, which is acutely rounded; median orifice very elongate, flap long and thin.

Type locality.—Brewster County, Tex., on the Rio Grande.

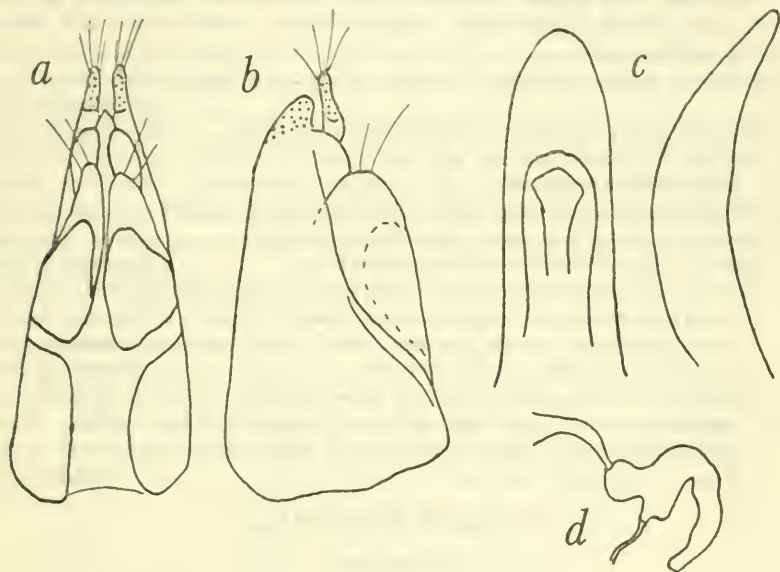


FIGURE 63.—*Amydrogmus variabilis* Pierce: *a*, Female genital tube, dorsal view; *b*, female genital tube, lateral view; *c*, median lobe of male genitalia, dorsal and lateral views; *d*, receptaculum seminis.

Genus OPHRYASTES Schoenherr

Ophryastes SCHOENHERR, 1833, 508. (Genotype, *Liparus sulcirostris* Say, original designation.)

[For characters of *Ophryastes* see discussion under *Eupagoderes*.]

KEY TO SPECIES OF OPHRYASTES

- | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| 1. Transverse impression between rostrum and head evident; ridges above eyes usually large..... | 2 |
| Transverse impression vague or lacking, and where present due to the great development of the ridges between the rostral sulci; ridges above eyes not large..... | 8 |
| 2. Punctures of elytral striae large, round, distinct basally; intervals convex..... | 3 |
| Punctures of elytral striae fine, equal in size; striae finely impressed; intervals less convex..... | 6 |
| 3. Median sulcus of rostrum finely impressed..... | 4 |
| Median sulcus of rostrum broad apically..... | 5 |
| 4. Marked with ocellate spots..... | <i>ocellatus</i> (Van Dyke) |
| Without ocellate spots..... | <i>shufeldti</i> Casey, and <i>wickhami</i> Sharp |
| 5. Larger (11 to 16 mm.); tuberosity on side of prothorax prominent; tenth elytral stria distinct at basal one-third..... | <i>latirostris</i> LeConte |

Smaller (6.8 to 9.5); lateral tuberosity feeble; tenth stria obliterated.

- | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| | <i>porosus</i> LeConte |
| 6. Prothorax not tuberculate at sides, not constricted at base; punctures of elytral striae larger; median rostral sulcus broad, with a median carina. | <i>symmetricus</i> Fall |
| Prothorax with lateral tuberosities and more or less constricted at base; punctures of elytral striae larger; median sulcus broad, but lacking a median carina..... | 7 |
| 7. Base of elytra produced; elytral striae only moderately deep. | <i>sulcirostris</i> (Say) |
| Base of elytra truncate; elytral striae very deep..... | <i>sulcipennis</i> Casey |
| 8. Elytral intervals narrow and subequal in width; strial punctures very large and shallow..... | 9 |
| Alternate elytral intervals wider and elevated; strial punctures finer..... | 10 |
| 9. Base of elytra with a short, necklike constriction..... | <i>collaris</i> Champion |
| Base of elytra without necklike constriction..... | <i>tuberosus</i> LeConte |
| 10. Lateral tuberosities of prothorax large, prominent; elytra inflated; punctures of elytral striae very large, unevenly spaced, giving a tuberculate appearance; cinereous, brown, or gray, with black markings; smaller, most specimens between 6 and 9 mm. long..... | <i>ovipennis</i> Sharp |
| Lateral tuberosities smaller; elytra more parallel; punctures of striae moderate and evenly spaced; gray or brown, alternate elytral intervals usually, and suture always, darker; larger, most specimens between 9.5 to 14 mm. long..... | <i>vittatus</i> (Say) |

OPHRYASTES WICKHAMI Sharp

FIGURE 64

Ophryastes wickhami SHARP, 1891, p. 88.

Form robust, dorsum rather flattened, sides of elytra subparallel. Color whitish through buff to gray, striae cinereous; three vague plumbeous vittae upon the pronotum. Scaly vestiture predominantly imbricate. Rostrum only moderately stout, slightly arched, not constricted basally beneath; median sulcus deep, rounded at bottom, narrowed abruptly at a deep longitudinal pit between the antennal insertions; often a nearly obsolete subsidiary lateral sulcus at either side of the median, so that the latter is wide, triangular, the base of the triangle toward the apex of the rostrum; lateral sulci subparallel, well defined. Transverse impression between head and rostrum present but not conspicuous; head and rostrum finely, sparsely punctate. Pronotum one-quarter or slightly more than one-quarter wider than long, widest at or slightly behind the middle; base about one-sixth wider than apex; sides rounded, in most specimens slightly tuberculate; disk obsoletely impressed at middle, very coarsely and rather closely punctate. Elytra about four-ninths longer than wide, widest behind the middle, usually very slightly produced at base; striae usually composed of large, shallow punctures not closely connected, although in some specimens the striae are narrow and deeply impressed; elytral intervals convex, alternate intervals very

slightly wider and more convex; setae large, suberect, flattened, tawny. Legs stout; front and middle tibiae minutely denticulate within; hind tibiae truncate at apex.

Measurements in millimeters.—Length 13.5 to 19.5.

Female genitalia (fig. 64, *a, b, c, e*).—Genital tube heavily chitinized. Apical plates distinct, the inner face of each produced in a sharp dorsal keel, their apices so bent as to fit into one another; coxites relatively small, slightly compressed dorsoventrally; styli small, borne upon membranous areas on the dorsal bases of the coxites, invisible from above or below. The interlocking of the two dorsal keels throws one half of the tube ahead of the other, the whole tube being slightly askew. Eighth sternite with outer corners broadly rounded, posterior margin nearly square, with a faint suggestion of an emargination at the midline.

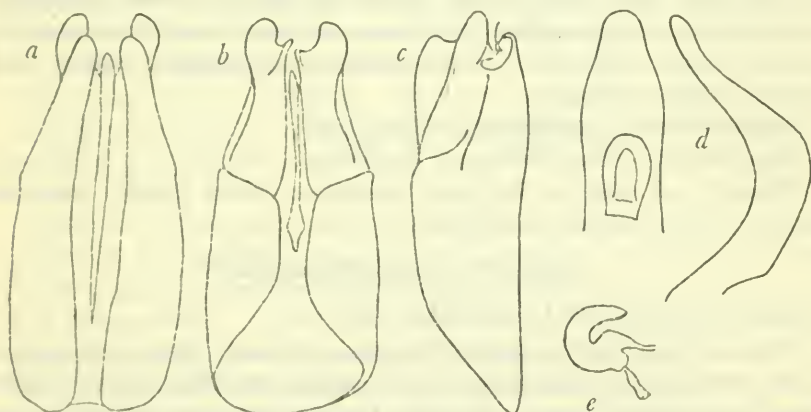


FIGURE 64.—*Ophryastes wickhami* Sharp: *a*, female genital tube, ventral view; *b*, female genital tube, dorsal view; *c*, female genital tube, lateral view; *d*, median lobe of male genitalia, dorsal and lateral views; *e*, receptaculum seminis.

Male genitalia (fig. 64, *d*).—Median lobe stout, sharply curved in profile, apex reflexed; in dorsal view sides slightly emarginate on either side of the median orifice, apex broadly rounded.

Type locality.—Winslow, Ariz.

Specimens from the following localities have been seen: ARIZONA, Winslow (Wickham). NEW MEXICO, Albuquerque; Coolidge (Wickham); Alamogordo; Old Laguna (H. A. Scullen). A single female specimen labeled "Cul" has been examined.

Remarks.—The collection of the U. S. National Museum contains two examples from Alamogordo, N. Mex., which are nearly white, the elytral striae alone being faintly tawny and marked with small but distinct ocellate darker spots, and the elytral scales less broadly overlapping than usual.

OPHRYASTES SHUFELDTI Casey

Ophryastes shufeldti CASEY, 1888, p. 238.

Elongate-oval, convex, dorsum slightly flattened, sides of the elytra more parallel than in most species. Color cinereous, with a vague lateral vitta on either side of the pronotum and irregular spots along the elytral striae darker brown. Rostrum only moderately stout, slightly arched, not constricted basally beneath; median sulcus deep, narrow, rounded at bottom; lateral sulci subparallel, well defined. Head convex, front slightly flattened; transverse impression between head and rostrum distinct; head and rostrum finely, sparsely punctate. Pronotum a little more than one-fourth wider than long, widest slightly behind the middle, base one-third wider than apex; sides rounded; disk coarsely and moderately closely punctate, more closely toward the sides; median impression distinct. Elytra about four-ninths longer than wide, widest before the middle; striae impressed, punctures distinct, round; intervals convex; setae rather fine, suberect, tawny. Legs stout; front tibiae minutely denticulate within; hind tibiae truncate at apex.

Measurements in millimeters.—Length 13.

Type locality.—Fort Wingate, N. Mex.

Remarks.—A male in the Casey collection differs slightly from the female. (Cf. *ocellatus* Van Dyke.)

OPHRYASTES OCELLATUS (Van Dyke)

Eupagoderes ocellatus VAN DYKE, 1934, p. 177.

Form robust, dorsum slightly flattened, sides of elytra subparallel. Color pearly gray, three stripes on the pronotum black, elytral suture sometimes golden brown. Rostrum moderately stout, elongate, not constricted beneath at base, rather sharply arched near apex above; median sulcus well marked, rounded at bottom, narrowed opposite the antennal insertion as in *O. wickhami* Sharp; lateral sulci short, well defined, slightly convergent at base of rostrum. Transverse impression between head and rostrum shallow, not conspicuous. Head rounded, front convex; head and rostrum finely and moderately closely punctate, with suberect white setae. Pronotum about one-fourth broader than long, base about one-fourth wider than apex; sides evenly rounded, with a suggestion of tuberosity; disk coarsely, rather closely punctate, median impression feeble. Elytra nearly twice as long as wide, widest behind the middle, usually not produced at base, not greatly inflated; elytral striae finely impressed, punctures coarse; intervals convex, alternate ones slightly wider but very slightly if at all more convex. Legs moderately stout; fore and middle tibiae minutely denticulate within, hind tibiae truncate at apex.

Measurements in millimeters.—Length 13–14.5 mm.

Type locality.—Grand Junction, Colo.

Reported also from Thompson, Utah. One specimen seen from Coolidge, N. Mex. The latter specimen was determined for me by Dr. Van Dyke as "*Eupagoderes ocellatus* Van D., var." It differs from the type as described above by having the scaly vestiture imbricate in the center of the elytra; by the darker color (although still with the ocellate spots); by the more abruptly arched apex of the rostrum; the slightly flattened front; the tawny, conspicuous setae, and in the elytral striae, which are not greatly if at all impressed. This specimen is a male. The genitalia are the same as those of *O. wickhami* Sharp. Upon comparing this specimen with a male of *O. shufeldti* Casey in the Casey collection, I find that they are identical except for the fact that *O. shufeldti* lacks the lighter centers in the elytral spots. I am unable to detect any real difference between *O. wickhami* Sharp, as represented in the several series examined, and *O. shufeldti* Casey, either externally or in the genitalia. I am inclined to consider both *wickhami* and *ocellatus* as individual variations, or at most minor races, of *shufeldti*. However, for the benefit of those who may disagree with me in this I have kept them separate. Because the genitalia are identical, only those of *O. wickhami* Sharp have been drawn.

Remarks.—*Ophryastes wickhami* Sharp was moved from *Ophryastes* (where it was originally placed) to *Eupagoderes*, on the basis of the pubescence of the fore tarsi of the male, and *O. ocellatus* was described as a *Eupagoderes*. As has been pointed out, the distinction between these two genera (and *Tosastes* for that matter) is largely one of convenience. From the general appearance and the genitalia of the three foregoing forms it seems that they could be placed to better advantage in *Ophryastes*.

OPHRYASTES LATIROSTRIS LeConte

FIGURE 65

Ophryastes latirostris LeConte, 1853, p. 443.⁹

Moderately robust. Color gray-white with large irregularly placed black or plumbeous blotches, which are more dense, even subcontinuous basally. Rostrum stout, moderately arched above, not or very slightly constricted at base beneath; median sulcus very broad, interrupted (except for a median fovea) by a transverse ridge about opposite the antennal insertions, and basally terminating abruptly at the junction of the rostrum and head; lateral sulci broad, moderately deep, more or less sharply convergent near base of rostrum. Head evenly rounded, front not flattened, separated from the rostrum by a very

⁹[*Ophryastes validus* LeConte, 1854, p. 225, type locality "near Chihuahua," is usually treated as a synonym of *latirostris*.]

well marked transverse impression. Immediately posterior to this, in some specimens, there is a tubercle, or slight transverse ridge, upon the front. Supraorbital ridges moderate, a vague depression before each eye; head and rostrum moderately finely and closely punctate, with a fairly long white or yellowish seta in each puncture. Pronotum from two-fifths to a little less than one-half wider than long; base one-third to one-fourth wider than apex, fimbriate with brown or yellow scales; sides strongly tuberculate, each lateral ridge divided into several small tubercles at apex; disk coarsely and irregularly punctate, rugose, with small white or yellow setae in smaller secondary punctures upon the intervals. Median groove nearly or quite

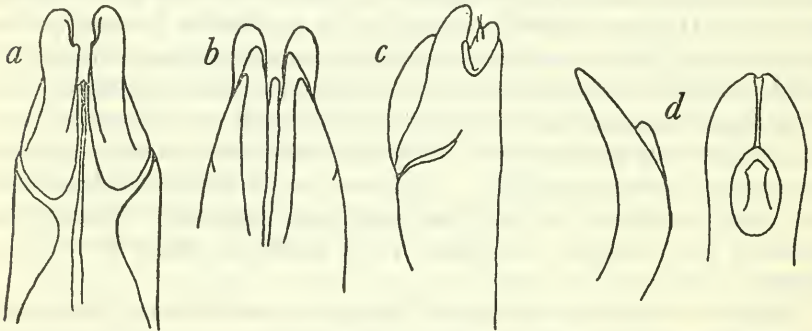


FIGURE 65.—*Ophryastes latirostris* LeConte: *a*, Female genital tube, dorsal view; *b*, female genital tube, ventral view; *c*, female genital tube, lateral view; *d*, median lobe of male genitalia, lateral and dorsal views.

obsolete. Elytra moderately inflated, widest at basal one-third (female) or at middle (male); striae finely impressed (sometimes not impressed); punctures large, round, evenly spaced; intervals convex, 1 and 6 narrower, remainder subequal in width. Legs moderately stout; front tibiae not denticulate within; hind tibiae obliquely truncate at apex, the space covered with flat scales. Tarsi not pubescent beneath, but apices of lobes pointed, spinelike.

Measurements in millimeters.—Length 11–16.

Female genitalia (fig. 65, *a*, *b*, *c*).—Genital tube heavily chitinized; apical plates flattened, rounded at apex, inner edge raised in a high keel, the apex of which, when viewed from above, appears to be a tooth; coxites large, subconical; styli small, dorsolateral in position; eighth sternite broadly, obtusely emarginate at apex (more so than in *O. tuberosus* LeConte).

Male genitalia (fig. 65, *d*).—Median lobe stout; in profile apex rounded, portion immediately back of apex nearly straight, remainder evenly curved; as viewed from above rather deeply excavated; apex rounded, with a deep, obtuse emargination. A distinct keel runs from the apex to the median orifice upon the upper side.

Type locality.—Arkansas River, near the mountains.

This species has been recorded from the following localities: NEW MEXICO, Albuquerque (H. Soltau); Gallup; 10 miles south of New Mexico State College. ARIZONA, Chiricahua Mountains (Hubbard and Schwarz); Winslow (M. Linell); Peach Springs (Wickham); Tucson. TEXAS, Alpine (Wickham); between Pecos River and Guadalupe Mountains. UTAH, Cedar (E. D. Ball); Callao (Tom Spaulding); Marysvale; Sevier Lake (Wickham). COLORADO, Canyon City (Wickham). IDAHO, Blackfoot (C. Wakeland) (E. S. G. Titus). OREGON.

The genitalia of this species, both male and female, indicate a rather close relationship to *O. wickhami* Sharp, but are easily distinguished from those of that species.

OPHRYASTES SYMMETRICUS Fall

FIGURE 66

Ophryastes symmetricus FALL, 1907, p. 260.

Robust, convex. Head with a narrow dark brown stripe and two rather wide lateral dark brown stripes passing beyond the eye to the insertion of the antennae, continuous with the pronotal stripe; remainder of head mixed gray, white, and brown; pronotum gray, yellowish on flanks, a lateral vitta each side dark brown; elytral intervals 1, 3, 5, and 7 brownish, alternate ones gray, brownish basally, with dark brown mottling along the striae. Rostrum stout, markedly arched above, somewhat constricted at base beneath; median sulcus subobsolete apically, and replaced by a median carina basally, which terminates at the junction of head and rostrum; lateral sulci wide, short, arcuate, convergent basally. Head and rostrum separated by a rather vague transverse impression. Head convex, very slightly flattened between the eyes, with a median groove extending to the vertex; eyes prominent, convex; head and rostrum moderately finely and rather closely punctate and rather thickly set with erect tawny or brown setae. Pronotum less than twice as wide as long, widest at or slightly before the middle, sides nearly evenly arcuate, not tuberculate; slightly constricted apically, anterior margin broadly arcuate, emarginate at center; basal margin slightly trisinate; median impression wanting; disk evenly, coarsely, and closely punctate and with erect tawny or brown setae. Elytra cordate, base truncate; striae fine, not impressed, punctures hardly visible; intervals 1 and 3 wider than 2 and 4 and elevated, intervals 5, 6, and 7 only slightly wider than 1 and 3 and much more elevated, especially at the base of the elytra, interval 8 flat, wide; setae conspicuous, semierect, brown. Legs moderately stout, tibiae not denticulate, but spinose apically, within; apices of hind tibiae rounded; tarsi elongate, two-thirds as

long as hind tibiae, each joint set with long, stout, black spines, especially at sides and apex.

Measurements in millimeters.—Length 10.5.

The foregoing description is that of the male type. The only other specimen known to me is a female in the collection of the U. S. National Museum. This specimen, while undoubtedly of the same species, differs from the type rather markedly in some respects. The front of the head is greatly depressed, with a median groove reaching to the vortex; elytra produced at base; humeri rounded but prominent; elytra intervals 1 and 3 narrower than 2 and 4 and elevated, intervals 5, 6, and 7 slightly wider than 1 and 3 and greatly elevated, so that the sides of the elytra are vertical. The predominating color is buff or light brown, with gray or dark brown markings. Length 13.4 mm.

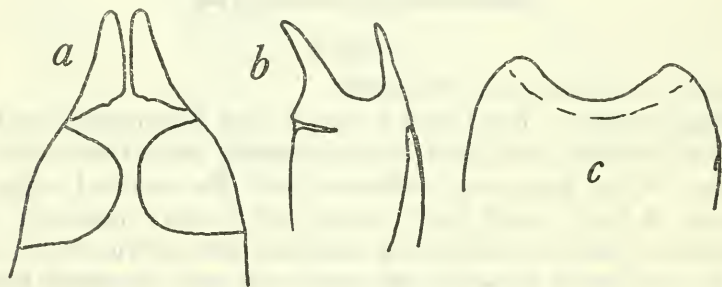


FIGURE 66.—*Ophryastes symmetricus* Fall: *a*, Female genital tube, dorsal view; *b*, female genital tube, lateral view; *c*, eighth sternite of female.

Female genitalia (fig. 66, *a*, *b*, *c*).—Genital tube short, stout, not heavily chitinized; both apical plates and coxites prolonged into large, upward curving spines, appearing almost the same from either above or below; styli not visible at ordinary magnifications. Eighth sternite broadly, roundedly emarginate, the emargination involving the whole apex.

Male genitalia.—Not examined.

This species is unique in the form of the female genitalia, the rostral carina, and the extremely spinose tarsi.

Type locality.—Sante Fe, N. Mex. The female mentioned above is from Winslow, Ariz.

OPHRYASTES SULCIPENNIS Casey

FIGURE 67

Ophryastes sulcipennis CASEY, 1888, p. 239.

Form oblong, densely clothed throughout with a squamose dark brown indument, paler beneath and on the legs; alternate intervals of elytra slightly paler by certain reflections. *Head* moderate; beak very much longer than the head, and,

at apex, nearly as wide, fully one-half longer than wide, abruptly strongly dilated at apex, strongly trisulcate; sulci abruptly ending at the very deep and strongly marked transverse basal impression; middle sulcus very broad and deep, shallower anteriorly, becoming gradually narrower and deeper toward base, obsolete in apical two-fifths; lateral only present in basal half, narrow, deep, becoming slightly broader from apex to base; front convex, flattened above in the middle; antennae with dense piceous indument; first joint of funicle slightly longer than the next two together. *Prothorax* nearly twice as wide as long, widest at posterior third where the sides are very strongly rounded and prominent, thence strongly convergent and almost straight nearly to the apex, then abruptly constricted, strongly constricted near the base behind the lateral prominences; sides very minutely and unevenly notched at middle; base transverse, truncate, one-third wider than the apex; the latter broadly arcuate; disk broadly convex, slightly uneven, being broadly impressed anteriorly and laterally, coarsely and indefinitely ruguloso-punctate; median groove moderate, not well defined. *Elytra* oblong, rather acutely rounded behind from above, declivous posteriorly, but not perpendicular, slightly wider at apical third; sides nearly straight; humeri very broadly rounded; base transversely truncate; scutellum slightly prominent, triangular, wider than long, black, finely rugulose, dull; disk flattened above, strongly convex at the sides, less than one-half longer than wide, very slightly wider than the prothorax, deeply sulcate; sulci with very large, rather close, feebly defined impressed punctures; intervals but slightly wider than the sulci, very strongly convex, with small, slender, scattered setae. Length 13.0 mm.

Type locality.—Fort Wingate, N. Mex.

Except for its inclusion in the key to species, and the drawings of the male genitalia, no reference to *sulcipennis* was found among Davis's notes; the foregoing is taken from Casey's original description.]

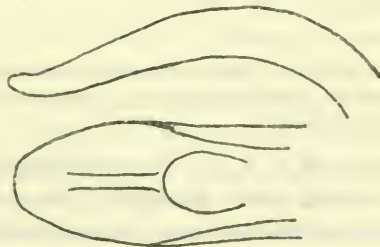


FIGURE 67.—*Ophryastes sulcipennis* Casey, median lobe of male genitalia, lateral and dorsal views.

OPHRYASTES SULCIROSTRIS (Say)

FIGURE 68

Liparus sulcirostris SAY, 1824, p. 316.

Ophryastes ligatus LÉCONTE, 1853, p. 443.

Moderately robust, elytra inflated, dorsum convex. Color blackish or brown with irregular mottlings of black or brown on the head and elytra and a narrow median and two wider lateral stripes on the pronotum. Rostrum short, stout, well arched above, sharply constricted

at base beneath; median sulcus broad, usually quite deep, wider toward the apex of the rostrum; lateral sulci deep, arcuate, convergent toward the base of the rostrum; intersulcal ridges usually very large, flat. Head rounded, ridges above eyes prominent; punctation of head and rostrum very fine and sparse. Pronotum two-fifths wider than long, widest at middle or at basal two-fifths, base varying from very little to nearly one-fourth wider than apex; sides varying from evenly rounded to rough and tuberculate, constricted before base and apex; disk coarsely, sparsely punctate; median groove subobsolete. Elytra cordiform, about one-third longer than wide, base produced; striae finely impressed, punctures large, round, shallow, separate, usually at least partially obscured by the scaly covering; setae numerous, short, subrecumbent, white or yellow. Legs moderately stout; anterior tibiae not denticulate within; posterior tibiae obliquely truncate to rounded and not at all truncate.

Measurements in millimeters.—Length 6.2 to 11.

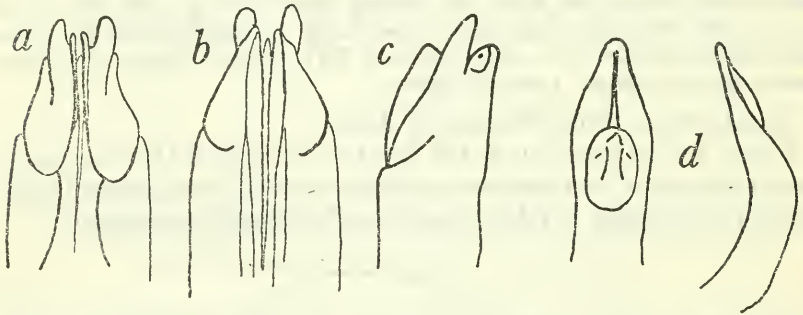


FIGURE 68.—*Ophryastes sulcirostris* (Say): *a*, Female genital tube, dorsal view; *b*, female genital tube, ventral view; *c*, female genital tube, lateral view; *d*, median lobe of male genitalia, dorsal and lateral views.

Female genitalia (fig. 68, *a*, *b*, *c*).—Genital tube tubular, moderately heavily chitinized; apical plates flattened, twisted out of horizontal plane, and rounded at apices, the inner edge of each raised into a narrow keel, which is more prominent apically; coxites moderate, a trifle flattened laterally, and subconical; styli extremely minute, hardly visible. Eighth sternite rather narrow, deeply obtusely emarginate at apex, the emargination rounded at bottom.

Male genitalia (fig. 68, *d*).—Median lobe rather strongly curved, extremely thin at apex, not deeply excavated above, with a thin keel on the dorsal midline reaching nearly to the apex.

Type locality.—Of *sulcirostris*, "Arkansa"; of *ligatus*, Nebraska. [The synonymy of *ligatus* LeConte with *sulcirostris* Say was proposed by Horn (1876, p. 31).]

Specimens of *sulcirostris* have been seen from the following localities: ARIZONA, Peach Springs (Wickham); Williams. NEW MEXICO, Al-

buquerque (H. Soltan); Magdalena (Strickler). TEXAS, Alpine (Wickham); Marfa (Wickham). UTAH, Dividend (Tom Spaulding); American Fork (Hubbard and Schwarz). COLORADO (Popenoe). MONTANA, Helena. IDAHO, Pocatello (Wickham).

[From a note which Davis had pinned into the National Museum collection it appears that certain specimens from the localities listed above are those which he had placed as *sulcirostris* with considerable confidence. In addition the Museum collection contains a good many specimens that Davis had examined and set aside as either *sulcirostris* (Say) or *porosus* LeConte, but which he had not yet placed more definitely. These specimens, which can be considered to belong to a *sulcirostris-porosus* complex, are from the following places: TEXAS, Marfa; Sweetwater; Big Springs. NEW MEXICO, Luna; Torrance County; Albuquerque; Koehler; near Koehler. ARIZONA, Peach Springs; Winslow; "Palm Spg." KANSAS and western Kansas. COLORADO, Canon City; Custer County; Bent County; Denver; Colorado Springs; La Junta; Fort Collins; Graham's Park. UTAH, Salt Lake. WYOMING, Cheyenne. IDAHO, Hagerman. MONTANA, Helena; Enid; Miles City; "Assinbne." NORTH DAKOTA, Bismarek. CANADA, Medicine Hat, Alberta.]

OPHRYASTES POROSUS LeConte

FIGURE 69

Ophryastes porosus LECONTE, 1854, p. 225.

The description of *O. sulcirostris* (Say) applies equally well to this species. The two species, although separable on genitalic characters of the female, are so closely related as to be practically indistinguishable on external characters. The character given by LeConte and Horn (1876, p. 30) for their separation does not hold through any considerable series, and in any case is very indefinite. It may be that the two forms represent the extremes of a single rather variable species, which are being arbitrarily divided; especially since the geographical ranges overlap. In general, from specimens seen so far, *porosus* seems to range not so far north as *sulcirostris*. The male genitalia are practically indistinguishable. The median orifice in *sulcirostris* is perhaps a little longer and the flap of the opening longer and narrower, the apex a little more pointed, and the keel not so prominent near the apex, but all these characters are subject to great variation.

Measurements in millimeters.—Length 6.8 to 9.5.

The female genitalia are much more easily distinguished, as shown in figures 68, *a, b, c* and 69, *a, b, c*. The apical plates of *sulcirostris* are flattened, twisted at an angle to the horizontal, and broadly rounded at the apices; the dorsal keel at each side of the midline is very promi-

ment, especially apically, terminating abruptly. In *porosus* the apical plates are somewhat larger in proportion, more twisted out of horizontal, the inner apical angle of each is sharper, and the dorsal keel is smoothly rounded as seen from the side, not terminating abruptly apically.

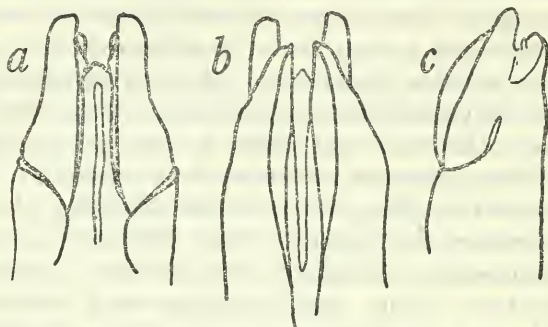


FIGURE 69.—*Ophryastes porosus* LeConte: *a*, Female genital tube, dorsal view; *b*, female genital tube, ventral view; *c*, female genital tube, lateral view.

Type locality.—"Near Chihúahua."

Specimens of this species have been seen from the following localities: "CAL." ARIZONA, Chiricahua Mountains (Hubbard and Schwarz). COLORADO, Denver (H. Soltau); Otero County. "NEB." CANADA, Medicine Hat, Alberta (F. S. Carr).

OPHRYASTES COLLARIS Champion

Ophryastes collaris CHAMPION, 1911, p. 319.

No specimen of this species has been seen. The following is a copy of the original description:

Moderately elongate, black; densely clothed with chalky-white or pale brownish scales, the head with a small patch on each side above the eyes, the prothorax with three spots at the apex, and the elytra with various irregular scattered patches, infuscate, the intermediate and posterior femora also fusco-annulate in front; the surface also set with minute, short, scattered hairs. Rostrum very broad, without definite transverse depression at the base, deeply trisulcate, the lateral grooves converging posteriorly, the flattened inter-ocular portion of the head also shallowly trisulcate. Prothorax strongly transverse, laterally bilobato-dilatate (the posterior lobe prominent and the prothorax here nearly or quite as wide as the elytra), constricted just before the base, the groove in front of the basal ridge deeply impressed laterally and obsolete in the middle; the depressed narrow basal portion angularly produced backwards in the middle; the surface uneven, sparsely, coarsely punctate. Elytra convex, oblong-oval, with a short, neck-like constriction at the base; coarsely punctate-striate, the interstices convex.

Length 9–12½, breath 4¾–5½ millim.

[*Type locality*.—Not definitely stated in original description.]

Hab. North America, Texas (*coll. Fry*).—Mexico, Nuevo Laredo in Tamaulipas (*Höge*).

Two specimens, assumed to be male and female, the Texan example (♀) being much broader than the other. Near *O. tetralobus*, but with the median groove of

the rostrum obsoletely extending to the inter-ocular portion of the head, the latero-anterior lobe of the prothorax less prominent, and the depressed basal portion of the prothorax more produced in the middle behind. The neck-like constriction to the base of the elytra separates *O. collaris* from *O. tuberosus*, *bituberosus*, and *basalis*, the last mentioned insect, moreover, having the median sulcus of the rostrum extending upwards. The dark markings may be partly due to abrasion or discoloration. Both examples are figured.

No representative of this species was available for study, so I have placed *collaris* in the key where it seemed to belong from the above description.

OPHRYASTES TUBEROSUS LeConte

FIGURE 70

Ophryastes tuberosus LeConte, 1853, p. 443.

Broadly elongate oval, dorsum slightly depressed. Head gray, pronotum gray-black, elytra gray-black, intervals 1 and 3 apically and 5 and 7 for nearly their entire length light ashy gray, legs light gray. Rostrum stout, not greatly arched at apex above, slightly or not at all constricted at base beneath; median sulcus deep, acute, wide, not interrupted by a fovea apically, and terminating at junction of head and rostrum; lateral sulci well defined apically, vague and broad basally, and continuing upon the head above the eyes, causing large "supra-orbital" ridges. Head evenly rounded, not separated from the rostrum by a transverse impression, although head and rostrum have slight separate convexities as viewed from the side, caused by the great development of the intersulcal ridges upon the rostrum; head and rostrum finely, or at most only moderately coarsely punctate. Pronotum two-fifths wider than long, base wider than apex, quadrate in outline, widest across basal tuberosities; tuberosities large, subequal in size; basal margin squarely transverse, apical margin rounded, produced in the center; punctation of disk coarse and close, median sulcus of pronotum subobsolete. Elytra widest at about the middle, humeri lacking; punctures of elytral striae large, round, separate; interval 5 conspicuously wider and elevated, others subequal in width and slightly convex; setae extremely small and inconspicuous, white. Legs stout; anterior tibiae much curved, and terminated in a distinct hook; apices of hind tibiae rounded, not truncate. The foregoing description is that of the type in the LeConte collection.

Female genitalia (fig. 70, a, b, c).—Genital tube heavily chitinized; apical plates strongly curved downward, concave beneath, pointed at apices. The inner dorsal edge of each is raised into a thin keel extending to the apical one-half or two-fifths. Coxites large, rounded; styli small, placed upon large, semi-membranous areas upon the dorso-lateral faces of the coxites. Eighth sternite with the external corners rounded, and a large, obtuse emargination at apex.

Male genitalia (fig. 70, *d*).—Median lobe in lateral view strongly curved basally, nearly straight apically, heavily chitinized; in dorsal view slightly widening apically, apex rounded and emarginate; deeply excavated above, with a heavy keel along the midline from the median orifice to the apex. This keel is usually visible from the side.

Measurements in millimeters.—Length 8.5 to 13.5.

Type locality.—Santa Fe, N. Mex.

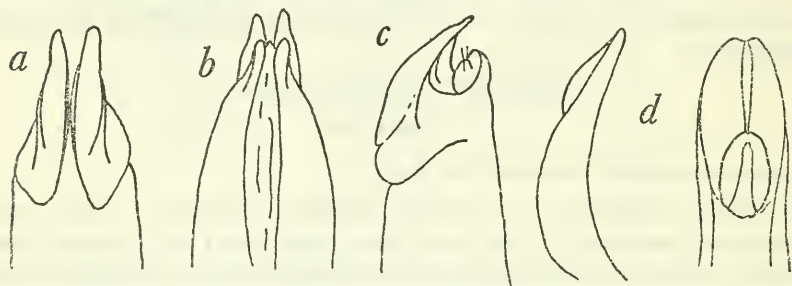


FIGURE 70.—*Ophryastes tuberosus* LeConte: *a*, Female genital tube, dorsal view; *b*, female genital tube, ventral view; *c*, female genital tube, lateral view; *d*, median lobe of male genitalia, lateral and dorsal views.

The type in the LeConte collection bears a dark green circular label which is supposed to indicate New Mexico. LeConte's series shows considerable variation in the punctation of the elytra, the striae being impressed in some specimens. There is also great variation in the prominence of the lateral thoracic tuberosities. Specimens have been examined from the following localities: ARIZONA, Winslow (M. L. Linell). NEW MEXICO, Torrance County (J. R. Douglas); Albuquerque (H. Soltau); Estancia (J. R. Douglas); 10 miles south of New Mexico State College; Roswell; Sierra Blanca; Oro Grande; Las Cruces; Koehler (Wickham); Deming (Wickham), Maxwell. TEXAS, Alpine (Wickham); Hondo (J. D. Mitchell); El Paso (Wickham); San Diego (Hubbard and Schwarz); Sabinal (F. C. Pratt); Marfa (Mitchell and Cushman); Pecos (E. L. Diven); Sylvester. COLORADO, Holly (Wickham); Canyon City (H. Soltau). KANSAS, Garden City (F. H. Milliken); SOUTH DAKOTA, Cascade Falls. CANADA, Alberta, Medicine Hat (F. S. Carr).

The apices of the hind tibiae are usually rounded, not squarely truncate, although in some specimens they are definitely obliquely truncated. In color *tuberosus* varies from light, almost unicolorous gray, sometimes with ocellate plumbeous spots along the striae, through pinkish, strongly marked with chocolate brown, to uniform dull brown or nearly black. The median sulcus frequently extends up onto the front. So much variation in size, punctation, and shape exists in this species that no external characters can be given other than those mentioned in the key.

OPHRYASTES OVIPENNIS Sharp

FIGURE 71

Ophryastes ovipennis SHARP, 1891, p. 90.

Ophryastes bituberosus PIERCE, 1909, p. 344 (not Sharp, 1891, p. 90) (misidentification).

Robust, convex, elytra inflated. Color brown or gray, pronotum usually with a median, and sometimes with two lateral, darker vittae; elytra irregularly marked with gray and black. Rostrum moderately stout, not greatly arched above, very slightly constricted at base beneath; median sulcus well defined, becoming vague apically and usually terminating at or before a median fovea about opposite the antennal insertions, continuing up onto the front basally, becoming deeper, and terminating usually in a fovea at or just before the upper level of the eyes; lateral sulci short, moderately broad and deep, straight or slightly divergent apically; intersulcal ridges well developed.

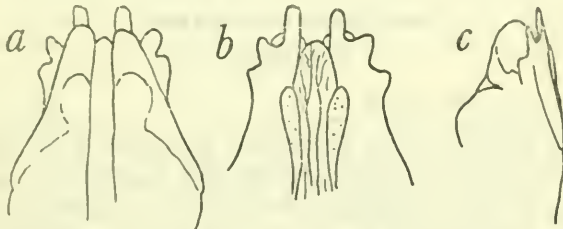


FIGURE 71.—*Ophryastes ovipennis* Sharp: a, Female genital tube, dorsal view; b, female genital tube, ventral view; c, female genital tube, lateral view.

Head evenly rounded, front dorsally continuous with rostrum; occasionally a vague depression on each side of the median sulcus, causing a slight supraorbital ridge, but usually with the sides of the head smoothly rounding to the eyes; head and rostrum extremely finely and sparsely punctate, with short, tawny setae. Pronotum varying from one-third wider than long to twice as wide as long; maximum width at posterior tuberosities; base from not at all to one-third wider than apex, squarely transverse, or slightly arcuate, fimbriate; apex sinuate; lateral tuberosity deeply emarginate at middle, the posterior half largest, sharp, subhamate behind; disk sparsely, very coarsely punctate at sides and along the wide, subobsolete median impression, and with a subimpunctate area at each side of the median groove; sparsely clothed with short, tawny, recumbent setae. Elytra broadly inflated, widest at basal one-fifth (♀) or one-third (♂), usually slightly produced at base; striae not impressed, consisting of deep, round, unconnected punctures placed in pairs, with an interval between each pair, giving the elytra a tuberculate appearance; intervals 3, 5, and 7 slightly wider, and greatly elevated basally, less so apically. Legs

short, rather stout; tibiae nearly straight, not denticulate within; posterior tibiae very sharply rounded but not truncate apically.

Measurements in millimeters.—Length 6 to 9.

Female genitalia (fig. 71, *a, b, c*).—Genital tube not very heavily chitinized; apical plates reduced, lightly chitinized, broadly rounded, thickly set with long hairs; coxites heavily chitinized, and enlarged into a broad, tridentate plate on each side; styli invisible.

Male genitalia.—Nearly identical with those of *O. vittatus*, but thinner, not quite so greatly curved, not so deeply excavated, and lacking all indication of a ventral keel.

Type locality.—Paso del Norte, Mexico.

Specimens of *ovipennis* have been seen from San Diego, Garrison, Bexar, Goliad, Beeville, Bowie, Del Rio, and El Paso, all in Texas.

Remarks.—In this species the teeth of the coxites are shorter and not as stout as in *O. vittatus*. They tend to be flat or to recurve downward, whereas those of *vittatus* are evenly concave upon the upper side.

OPHRYASTES VITTATUS (Say)

FIGURE 72

Liparus vittatus SAY, 1824, p. 316.

Color dark to light gray, pronotum trivittate with dark brown, elytra with the suture nearly always and intervals 3, 5, 7, and 9 usually more or less completely dark brown. Rostrum continuous with the head, moderately stout and not greatly dilated at apex or greatly arched dorsally near apex; median sulcus broad, deep, with tawny imbricate scales at bottom, narrowing somewhat and becoming shallower at junction of head and rostrum and extending up onto the front nearly to the vertex; lateral sulci very broad and deep, with imbricate scales at bottom, nearly straight; rostrum and head extremely finely and sparsely punctate, or practically impunctate. Pronotum almost exactly twice as wide as long, widest at basal third, base about one-eighth wider than apex, apex dorsally slightly produced, base dorsally sinuate and fimbriate with scales; sides tuberculate, with a large basal and a smaller apical tubercle; disk coarsely, rather sparsely punctate, and rugose; median impression fine, sometimes interrupted, but nearly always present. Scutellum usually well exposed, transverse. Elytra inflated (female) or not greatly inflated (male); striae moderately finely impressed, punctures large, round, deep, and separated; elytral intervals subequal in width, the sutural and 3, 5, 7, and 9 slightly elevated; sutural intervals with fine punctation and numerous fine, short, white or tawny setae; setae practically lacking elsewhere on elytra. Legs fairly stout, anterior tibiae greatly curved near apex, posterior tibiae varying from subtruncate to evenly rounded; tarsi with joints 1 to 3 of about equal width, the third joint

of the tarsi of the fore and middle legs with adhesive pubescence, at least in the male.

Measurements in millimeters.—Length 9.5 to 14.1; width 4.4 to 6.6.

Female genitalia (fig. 72, a, b, c).—Eighth sternite slightly produced at outer corners, broadly rounded, and obtusely emarginate and hairy at apex. Genital tube slightly flattened dorsoventrally, apical plates ventral, their dorsal faces concave and each divided into three large teeth.

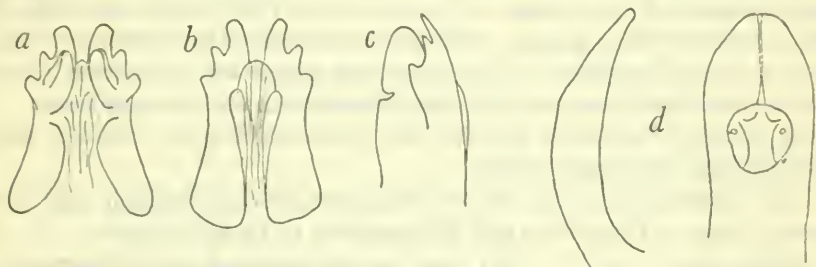


FIGURE 72.—*Ophryastes vittatus* (Say): a, Female genital tube, dorsal view; b, female genital tube, ventral view; c, female genital tube, lateral view (dorsum to left); d, median lobe of male genitalia, lateral and dorsal views.

Male genitalia (fig. 72, d).—Median lobe in profile fairly sharply curved, especially near the base, and rather thick; as viewed from above wide, somewhat dilated at about apical third, rather deeply excavated, and with a minute but distinct keel from the median orifice to the apex. An indication of a keel ventrally also, at point of greatest curve.

Type locality.—"Arkansa."

This seems to be the most widely distributed species of the genus. I have the following records of capture: ARIZONA, Winslow. NEW MEXICO, Maxwell, Koehler, Estancia, Torrance County. COLORADO, Colorado Springs, Holly, Pueblo, Berkeley, Greeley. KANSAS, "Western Kansas." OKLAHOMA, Lawton. TEXAS, Marathon, Abilene, Brownsville. The species is also found in Nevada.

Genus TOSTASTES Sharp

Tosastes SHARP, 1891, p. 91. (Genotype, *Tosastes globipennis* Sharp. Designated by Pierce, 1913, p. 375.)

The characterization of the genus given by Sharp is as follows:

Tarsi articulo tertio vix lobato, subtus absque pubescentia. Tibiae posteriores ad apicem simpliciter laminatae, nullo modo truncatae.

This genus has an appearance very different to *Ophryastes*, though it appears to be closely allied thereto; as, however, the apices of the hind tibiae are without any trace of truncature, or of a second row of spinules, it is perhaps advisable to treat the two forms as distinct genera. I cannot detect any other difference of true generic importance, though there are several minor peculiarities. The second ventral is quite short, the first suture straight, the third and fourth seg-

ments very short. The body is covered with overlapping scales as in *Ophryastes*. The ocular lobes are well developed.

As remarked above, the facies is very different from *Ophryastes*; had it not been for this I should not have separated the two, as the corbels of the hind tibiae are in this group in a transitory condition, and differ from species to species.

Since the above was written, species have been described in which there are two rows of spines upon the apex of the hind tibiae, and a definite suggestion of truncature. In spite of the fact that the appearance of most of the species of *Tosastes* is very different from that of the species of other genera, it seems impossible to lay down any real definition of the genus. The characters given for separation must all be considered, and considerable allowance made for variation.

In general, *Tosastes* is smaller, the elytra much more inflated, and the rostrum not deeply sulcate.

The proportions of the ventral segments are too variable and too nearly those of *Ophryastes* and *Eupagoderes* to be relied upon.

Pierce (1913, pp. 373, 374) uses the short second ventral segment, the narrow and nonpubescent third tarsal joint, the nontuberculate sides of the thorax, and the laminate tips of the posterior tibiae for separating *Tosastes* from other genera of the group. In *T. coarctatus* Champion the pronotum is nearly if not quite as wide as the elytra in some specimens and is subtuberculate, nearly tuberculate enough to be confusing, and the third joint of the anterior tarsi is wider than the second, and sometimes bears a small patch of what appears to be pubescence. Some species, or at any rate, some specimens, of both *Eupagoderes* and *Ophryastes*, have spinules more or less well developed upon the apices of the hind tibiae.

While the genitalia vary from one species to another, there seems to be no good genitalic character that applies well enough to them all to give a reliable point upon which to base the separation of this genus from the others.

Keys for the separation of the species of *Tosastes*, both by external characters and by the genitalia, follow. In the type of *Tosastes ovalis* Pierce the second row of spines on the apex of the hind tibia is present, but so very small as to be difficult to make out with a magnification of 20 diameters. Other specimens of this species leave one in doubt as to the presence or absence of spines at a magnification of 50 diameters, and it may be that the second row of spines is lacking in these. For this reason the use of this character has been avoided in the key as far as possible.

KEY TO SPECIES OF TOSTASTES BY EXTERNAL CHARACTERS

- | | |
|------------------------------------------------------------------------------------------------------|----------------------------|
| 1. Elytra with acute humeral angles..... | 2 |
| Elytra with broadly rounded humeri..... | 3 |
| 2. Humeral angles prominent, dentiform; sides of prothorax abruptly constricted before the base..... | <i>coarctatus</i> Champion |

- Humeral angles minute; sides of prothorax less abruptly constricted before the base.....humeralis Sharp
3. Strial punctures of elytra long, fine, connected.....globularis Pierce
Strial punctures of elytra large, rather shallow..... 4
4. Posterior tibiae rounded externally and tipped with a single row of spines... 5
Posterior tibiae subtruncate and tipped with a double row of spines..... 6
5. Elytral striae finely impressed, punctures large and shallow....ovalis Pierce
Elytral striae consisting of large, shallow, unconnected punctures.
globipennis Sharp
6. Pronotum slightly less than twice as wide as long.....ovalis Pierce
Pronotum about two-fifths wider than long.....cinerascens Pierce

KEY TO FOUR SPECIES OF TOSASTES BY FEMALE GENITALIA

1. Apical plates very large, concave above; eighth sternite with a truncate tooth at each posterolateral angle, and bidentate or tridentate separate median plate at apex.....cinerascens Pierce
Apical plates small or only moderately large; eighth sternite without median plate at apex..... 2
2. Eighth sternite produced at apex, and sharply emarginate; apical plates broadly rounded at apex.....ovalis Pierce
Eighth sternite not produced at apex; apical plates sharper at apex..... 3
3. Apical plates acute at apex, coxites large; stipes long and laterally flattened; eighth sternite acute, emarginate at apex; ramus and ductus receptaculi of receptaculum seminis pressed closely together.....globularis Pierce
Apical plates broadly rounded at apex; coxites smaller; styli greater in diameter and subcylindrical; eighth sternite broadly, evenly rounded and emarginate at apex; ramus and ductus receptaculi of receptaculum seminis with a space between them.....coarctatus Champion

KEY TO FOUR SPECIES OF TOSASTES BY MALE GENITALIA

1. Median lobe dilated near apex..... 2
Median lobe not dilated near apex..... 3
2. Median lobe only slightly dilated, only slightly excavated above, and with a carina from the median orifice to the apex; apex rounded or truncate.
coarctatus Champion
Median lobe broadly dilated, spoon-shaped, deeply excavated above; dorsal carina lacking; apex produced and slightly emarginate....ovalis Pierce
3. Profile (lateral) of apical half of median lobe thin, nearly straight, slightly recurved at apex; median orifice oval.....cinerascens Pierce
Profile of median lobe thicker, evenly curved to apex, not recurved; median orifice somewhat pointed apically, more truncate basally.
globularis Pierce

TOSASTES COARCTATUS Champion

FIGURE 73

Tosastes coarctatus CHAMPION, 1911, p. 319.

Black, densely clothed with imbricate white scales. Rostrum stout, separated from the front by a transverse impression, and greatly arched dorsally near the apex; median sulcus distinct, finely impressed, broadening at each end, terminating abruptly at the transverse impression; lateral sulci short, broad, tending to converge at base of rostrum; intersulcal ridges prominent; scar of deciduous cusps of mandibles almost as prominent as in *T. cinerascens* Pierce.

Front more or less flattened. Pronotum from one-fourth to one-third wider than long, widest at basal two-fifths; from one-fourth to two-thirds wider at base than at apex; disk very coarsely punctate, sufficiently so as to be rugose, median impression subobsolete; sides tuberculate, abruptly constricted just before the base, thence dilated

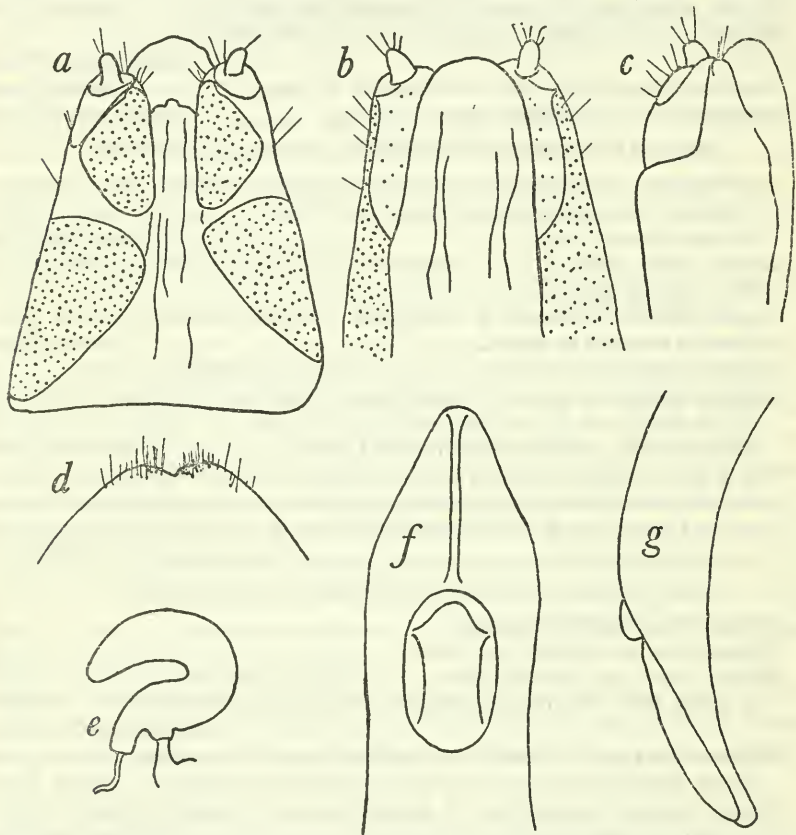


FIGURE 73.—*Tosastes coarctatus* Champion: *a*, Female genital tube, dorsal view; *b*, female genital tube, ventral view; *c*, female genital tube, lateral view; *d*, eighth sternite of female; *e*, receptaculum seminis; *f*, median lobe of male genitalia, dorsal view; *g*, median lobe of male genitalia, lateral view.

into a coarse, obtuse tooth on each side; apical margin slightly advanced, evenly arcuate, basal margin slightly retracted. Elytra widest at or slightly before the middle, oval, with prominent dentate humeri; striae not very sharply impressed, the punctures large, shallow; intervals subequal and nearly flat. Legs moderately stout; posterior tibiae rounded and with a single row of spines at apex; anterior tarsi of male with the third joint wider than the second, and, in some specimens, with a tiny patch of what appears to be adhesive pubescence upon the bottom of each lobe.

Measurements in millimeters.—Length 5.2 to 8.6; width 2.7 to 4.4.

Female genitalia (fig. 73, *a, b, c, d, e*).—Wedge-shaped, apex truncate, dorsoventrally flattened, not heavily chitinized; apical plates flat, broadly rounded at apex. Coxites very large; styli large. Eighth sternite rounded, emarginate at apex.

Male genitalia (fig. 73, *f, g*).—Median lobe in profile, evenly and not greatly curved, thick. From above very slightly dilated at apical two-fifths, thence tapering to an acutely rounded apex. There is a thin, high median carina, or keel, from the median orifice to the apex, dorsally, which is conspicuous from above or from the side.

Type locality.—Monclova, Coahuila, Mexico.

Remarks.—This species may be distinguished from any other except *T. humeralis* by the acute humeri. From that species it may be separated by the abruptly constricted sides of the thorax, with a tooth at the side, at base, and by the more prominent humeri. The specimens examined were collected by E. A. Schwarz and F. C. Bishopp.

TOSASTES HUMERALIS Sharp

Tosastes humeralis SHARP, 1891, p. 91.

I have seen no specimen of this species. Sharp's original description follows (Latin diagnosis omitted):

Covered with thin scales, which on the anterior parts are almost entirely fused into a continuous indument, bearing also some scanty, very short setae. Rostrum short, with a broad median groove and a large lateral impression on each side. Thorax strongly transverse, very deeply rugose. Elytra quite truncate at the base, and with the angles minutely prominent; very closely applied to the base of the thorax, and of exactly the same width, so that the two are almost continuous in outline; the sculpture consists of vague, large depressions, placed in series, and connected by obscure striae. Spinules at the apex of the hind tibiae excessively short and broad, and very few in number. Two specimens.

"Long. cumque rostro 7-8 millim."

Type locality.—Chihuahua City, Mexico.

TOSASTES GLOBULARIS Pierce

FIGURE 74

Tosastes globularis PIERCE, 1909, p. 344.

Shape much as in *T. cinerascens* Pierce. Gray or dark brown, head with brown and black mottlings, pronotum with a wide black median stripe, elytra with various markings of ashy gray and black. Rostrum stout, constricted at base beneath, continuous with head above; median sulcus lacking; lateral sulci short, subobsolete; scars of deciduous cusps of mandibles much less prominent than in *T. cinerascens*, nearly flush with the lateral face of the mandibles. Front slightly flattened. Head and rostrum smooth, nearly or quite impunctate, and with sparse, minute setae. Pronotum nearly a third wider than

long (1.1×1.8 mm.), base about a fourth wider than the apex (1.1 : 1.6 mm.), apex very slightly produced and slightly sinuate, base straight, sides evenly rounded; disk very lightly and sparsely punctate; median impression sharp, distinct. Elytra greatly inflated, wider at base than the base of the pronotum, humeri rounded; striae finely impressed, strial punctures shallow; intervals slightly convex, with subrecumbent tawny setae. Legs moderately robust; posterior tibiae rounded at apex, with a single row of spines.

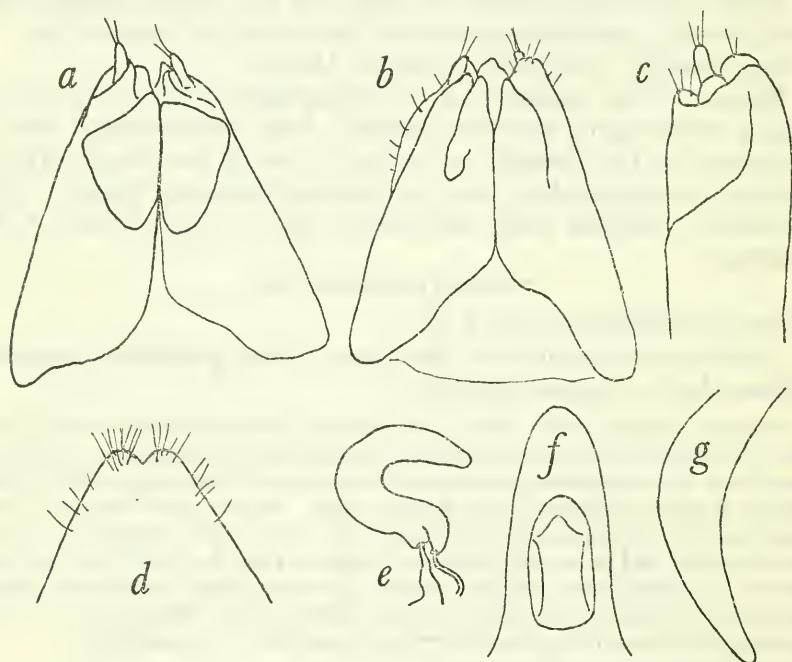


FIGURE 74.—*Tosastes globularis* Pierce: *a*, Female genital tube, dorsal view; *b*, female genital tube, ventral view; *c*, female genital tube, lateral view; *d*, eighth sternite of female; *e*, receptaculum seminis; *f*, median lobe of male genitalia, dorsal view; *g*, median lobe of male genitalia, lateral view.

Measurements in millimeters.—Length 5.0 to 6.6; width 2.7 to 3.5.

Female genitalia (fig. 74, *a*, *b*, *c*, *d*, *e*).—Eighth sternite triangular as viewed from below, deeply acutely emarginate at apex. Genital tube dorsoventrally compressed, subpyramidal as seen from above or below; apical plates very small, short, acute at apex; coxites large; styli very large. Receptaculum seminis stout, broadly rounded, ramus and ductus receptaculi very closely pressed together.

Male genitalia (fig. 74, *f*, *g*).—Median lobe in profile moderately, evenly curved, tapering regularly to a rather thick, rounded apex. From above, widest at base, sides gradually converging to apical

fourth, thence more rapidly to an acutely rounded apex; median orifice broadly oval, subtruncate basally, three-sevenths longer than wide.

Type locality.—Albuquerque, N. Mex. No specimens have been seen from other localities.

Remarks.—From *T. ovalis* Pierce, which it resembles closely superficially, the present species may be distinguished by the lack of a transverse impression at the base of the rostrum, and the finely and sparsely punctate pronotum, with its sharper median impression. The strial punctures are finer, the striae finely impressed, and the intervals less convex. From *T. coarctatus* Champion it may be distinguished by the rounded humeri.

TOSASTES OVALIS Pierce

FIGURE 75

Tosastes ovalis PIERCE, 1909, p. 345.

Black, covered uniformly with gray-white imbricated scales, base of head dorsally yellowish white. Rostrum quadrate in cross section, stout, somewhat narrowed at base beneath and at sides; median sulcus short, interrupted, fine, or entirely lacking; lateral sulci short, rather vague, converging sharply at base of rostrum to form a transverse groove (in some specimens the inturned ends fail to reach the center, and no transverse impression is therefore evident in profile view). Front flattened, ridges above eyes prominent. Head and rostrum practically impunctate. Pronotum slightly less than twice as wide as long, base one-fifth wider than apex, sides evenly arcuate; anterior margin slightly produced, posterior margin transverse, very slightly sinuate; disk deeply, coarsely, and rather sparsely punctate; median impression vague, subobsolescent in some specimens. Elytra inflated, widest before the middle; striae fine, their punctures large and shallow; interspaces with white or tawny subrecumbent setae. Legs moderately stout, apices of hind tibiae subtruncate, with two rows of spines, the outer row short, sometimes absent.

Measurements in millimeters.—Length 5.2 to 6.8; width 3.0 to 4.0.

Female genitalia (fig. 75, a, b, c, d, e).—Genital tube slightly laterally compressed, base wider than apex as viewed from above, unevenly chitinized, semimembranous with rods of chitin apically. Apical plate of moderate size, broadly rounded, coxites large; styli large; seminal receptacle large, sharply curved, the nodus globular, the ductus receptaculi long, cylindrical, and the ramus practically nonexistent.

Male genitalia (fig. 75, f, g).—Median lobe heavily chitinized, as seen in profile, thick, slightly curved near base, apical two-thirds nearly straight; from above, apical half broadly dilated, very deeply excavated, margins sinuate, apex broadly rounded, very slightly emar-

ginate at midline; median orifice regularly oval, slightly narrowed toward the base.

Type locality.—Devils River, Tex.

Specimens are at hand from Marathon, Tex. (J. D. Mitchell and R. A. Cushman), and from Sulphur Spring Valley, Ariz. (Hubbard and Schwarz).

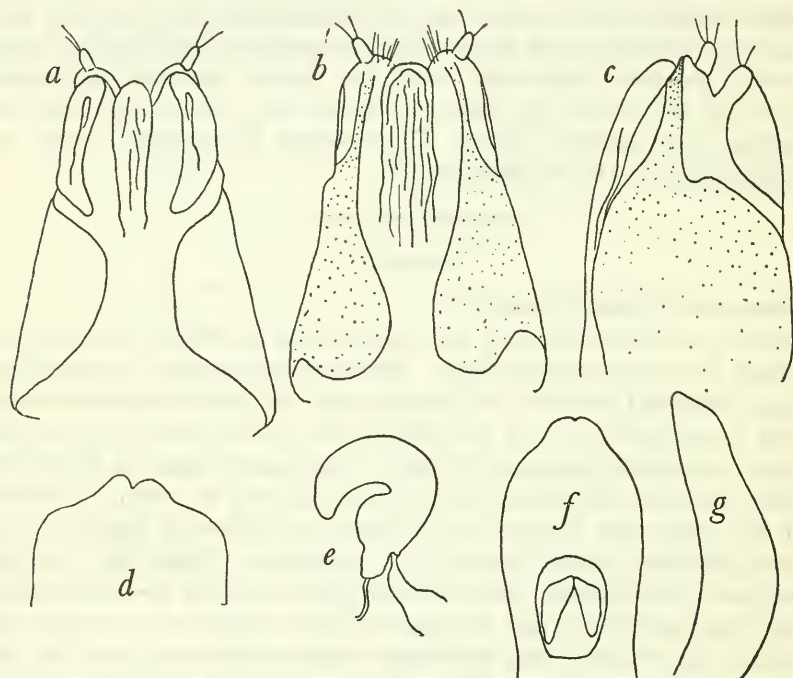


FIGURE 75.—*Tosastes ovalis* Pierce: *a*, Female genital tube, dorsal view; *b*, female genital tube, ventral view; *c*, female genital tube, lateral view; *d*, eighth sternite of female; *e*, receptaculum seminis; *f*, median lobe of male genitalia, dorsal view; *g*, median lobe of male genitalia, lateral view.

Remarks.—This species may be distinguished from *T. globipennis* Sharp, nearest to which it falls in the key, chiefly by the less inflated form and the more finely impressed elytral striae. Specimens which have the double row of spines plainly evident upon the apex of the hind tibia are easily distinguished by this character.

TOSASTES GLOBIPENNIS Sharp

Tosastes globipennis SHARP, 1891, p. 91.

Three specimens in the collection of the United States National Museum, one from San Carlos, Ariz. (J. C. Bradley), and two from Palmerlee, Ariz. (H. A. Wenzel), answer closely to the description of this species as published. All three specimens have genitalia

which seem to be identical with those of *T. ovalis* Pierce. The three were sent to Gilbert Arrow, of the British Museum, for comparison with the type, with the suggestion that *T. globipennis* might prove to be identical with *T. ovalis*. The following note was received from him:

Sir Guy Marshall has examined the specimens of *Tosastes* and compared them with the unique type of *T. globipennis*. He finds slight differences, the value of which it is not possible to decide without seeing a larger number of specimens, but which appear to him to make it undesirable for the present to sink either name.

No comparison of genitalia was made.

The two forms appear to be closely related, and may eventually be found to intergrade.

Type locality.—Guajuco, Nuevo León, Mexico.

TOSASTES CINERASCENS Pierce

FIGURE 76

Tosastes cinerascens PIERCE, 1913, p. 376.

Head fulvous at base, gray on front and sides, rostrum gray, a wide median black stripe from vertex nearly to apex of rostrum. Pronotum gray with scattered pinkish iridescent scales, a moderately wide median black stripe, and sometimes a trace of a lateral vitta on each side. Elytra confusedly mottled with ashy gray, black, and light gray-brown. Scales imbricate throughout. Rostrum quadrate in cross section, not greatly broadened in either direction at apex. evenly curved dorsally and not, or hardly, arched at apex; separated from the front by what seems in profile to be a vague transverse impression, but what is really a flattening of the front; median sulcus extremely fine, or reduced to a mere flattening of the dorsal surface of the rostrum; lateral sulci extremely vague, short, and shallow; bases or scars of the deciduous cusps of the mandibles round, extremely prominent, the flattened face of the scar turned slightly outward; head and rostrum with fairly close, short setae. Pronotum about two-fifths wider than long (1.3×2.0 mm.), widest at about the apical third, wider at base than at apex (1.5:1.8 mm.); disk coarsely, closely punctate; median impression fine. Elytra greatly inflated, wider at base than the base of the thorax, widest at about basal third; striae consisting of rows of large, round, shallow punctures; interspaces elevated, with subrecumbent whitish setae. Legs rather stout, posterior tibiae truncate at apex, with a double row of spines.

Measurements in millimeters.—Length 4.2 to 6.0; width 2.0 to 3.4.

Female genitalia (fig. 76, a, b, c, d, e, f).—Eighth sternite quadrate at apex, with a truncate tooth at each outer corner and a thin median apical crest or plate, raised and projecting beyond and beneath the

apex of the sternite, sinuate and tridentate at apex. Genital tube dorsoventrally flattened, sides subparallel; apical plates short, large, concave above; styli very small, flat, set upon the dorsal inner bases of the apical plates. Receptaculum seminis sharply curved, nodulus large, ramus and ductus receptaculi close together but distinct, the ductus longer and pointed.

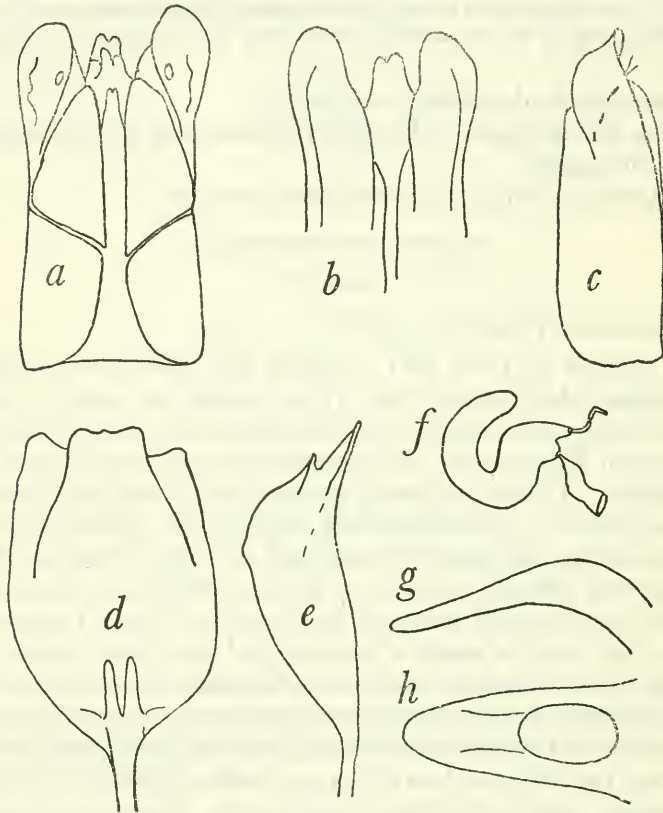


FIGURE 76.—*Tosastes cinerascens* Pierce: *a*, Female genital tube, dorsal view; *b*, female genital tube, ventral view; *c*, female genital tube, lateral view; *d*, eighth sternite of female, ventral view; *e*, eighth sternite of female, lateral view; *f*, receptaculum seminis; *g*, median lobe of male genitalia, lateral view; *h*, median lobe of male genitalia, dorsal view.

Male genitalia (fig. 76, *g*, *h*).—Median lobe moderately heavily chitinized; in profile the basal half rather sharply curved, apical half thin, nearly straight, slightly recurved at apex; from above, sides converging from base, converging more sharply about apical fourth, apex rounded; lobe very shallowly excavated apically; median orifice oval.

Type locality.—Wenatchee, Wash.

I have seen specimens from the following localities, all in Washington, and all collected during April and May; Mesa (M. C. Lane); Lind (M. C. Lane); Ritzville (M. C. Lane); Ellensburg (W. W. Baker); Okanogan; Riparia; Hanford; Wenatchee; Oroville; Tonasket; Mabton.

Remarks.—This species may at present be distinguished by the locality alone. The structure of the eighth sternite of the female is unique in the genus. The more convex elytral intervals and the narrower pronotum serve to distinguish this species from *T. ovalis* Pierce.

[Davis's work on *Rhigopsis* evidently had not been completed, and the status of the three named forms remains to be worked out.]

Genus RHIGOPSIS LeConte

Rhigopsis LeConte, 1874, p. 459. (Genotype, *Rhigopsis effracta* LeConte (monobasic).)

Horn's characterization of the genus (1876, p. 36) follows:

Rostrum quadrangular, slightly longer than the head, dilated at tip and obliquely truncate above, upper surface deeply trisulcate, tip feebly emarginate. Mentum slightly retracted. Scrobes deep, well-defined, slightly arcuate in front, directed toward the lower border of the eye. Eyes narrow, acute beneath. Antennae moderate, scaly, scape gradually stouter attaining the margin of the eye; funicle 7-jointed, first two joints longer, stouter and nearly equal, 3-7 short, gradually broader, club oval, indistinctly articulated. Ocular lobes prominent. Scutellum indistinct. Elytra oval, feebly conjointly emarginate, humeri prominent, tuberculate. Metasternal side pieces connate with the body without suture. Hind coxae very widely distant, intercoxal process broad, truncate. Second segment of abdomen longer than the two following united, separated from the first by a strongly arcuate suture. Tibiae not mucronate at tip, corbels of hind tibiae feebly cavernous. Tarsi spinous beneath third joint feebly emarginate, not wider than the preceding. Claws moderate, free. Body densely covered with scales, almost entirely obscured by exudation coating.

So far as found, Davis's notes contained no reference to *Rhigopsis scutellata* Casey (1888, p. 242), type locality, Los Angeles County, Calif., apparently because he held the generally accepted opinion that *scutellata* is a synonym of *effracta*. This synonymy was first proposed by Horn, 1894, p. 442, in the following words:

An examination of my series of *R. (rhigopsis) effracta* shows that *R. scutellata* Casey cannot be retained as distinct, the species having doubtless been described from females. The scutellar character has no value, as several of my specimens have the scutellum entirely concealed by the elevations near it.]

RHIGOPSIS EFFRACTA LeConte

FIGURE 77

Rhigopsis effracta LeConte, 1874, p. 459.

Moderately robust, slightly flattened. Color varying from silver-gray with suture and a narrow median stripe upon the pronotum

darker, to very dark gray-brown with two narrow light gray stripes upon head and pronotum, carried back upon the second elytral stria a short distance, and with a few irregular lighter mottlings upon the elytra. Partially denuded specimens may be more or less uniform gray-brown. Rostrum robust, constricted basally beneath, evidently arched above; median sulcus narrow, deep, interrupted at apical fourth, whence it becomes a small median carina upon the apex of

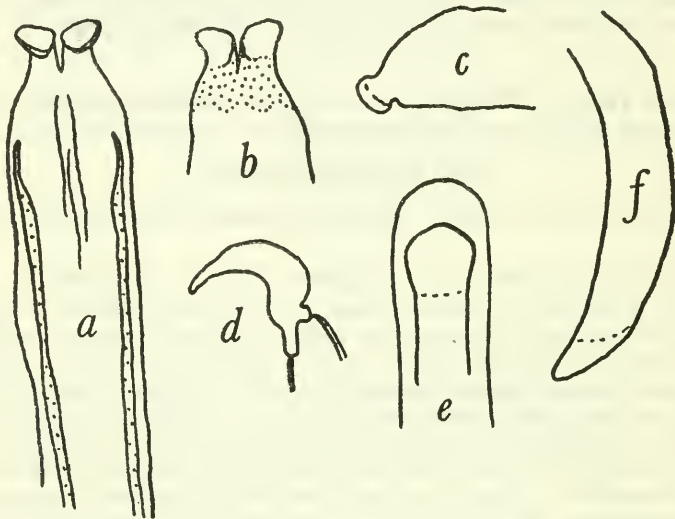


FIGURE 77.—*Rhigopsis effracta* LeConte: *a*, Female genital tube, dorsal view; *b*, apex of female genital tube, ventral view; *c*, apex of female genital tube, lateral view; *d*, receptaculum seminis; *e*, median lobe of male genitalia, dorsal view; *f*, median lobe of male genitalia, lateral view.

the rostrum; basally extending up onto the head, although sometimes interrupted at a point between the eyes; lateral sulci broad, rounded at bottom, nearly straight, widening markedly toward the base of the rostrum. Head rounded, the ridges above the eyes prominent, tuberculate. Elytra slightly inflated, humeri dentiform; elytral intervals 2, 4, and 6 greatly elevated, a conspicuous tubercle apically at the end of 4, at the junction of 5 and 6, and a smaller one at the junction of 2 and 8. Strial punctures small, round, distinct, each with a small white seta; a secondary system of extremely large, deep punctures upon the elytral intervals gives an irregular, "warty" appearance; setae upon the intervals, head, and rostrum flattened, recumbent, brown except at sides and apices of elytra, where they are white. Vestiture throughout imbricate. Legs rather stout and short, hind tibiae subtruncate.

Measurements in millimeters.—Length about 4.5 to 6.5.

Female genitalia (fig. 77, *a*, *b*, *c*, *d*).—Genital tube tubular, semi-

membranous, with two dorsal rods, or baculi, of heavy chitin. The apical plates are curved, concave dorsally, having a tubular appearance.

Male genitalia (fig. 77, *e, f*).—Median lobe thick, evenly curved from base to apex, very deeply excavated apically to the median orifice.

Type locality.—Southern part of California.

Specimens have been examined from the following localities, all in California: Orange County (A. C. Davis); Pasadena²/₄ (A. C. Davis); Cabazon (A. C. Davis); Aguanga (A. C. Davis).

[The National Museum collection contains a considerable number of *Rhigopsis* specimens from various places in the southern part of California, which Davis had not examined.]

RHIGOPSIS SIMPLEX Horn

Rhigopsis simplex HORN, 1894, p. 442.

Form much as in *R. effracta* LeConte, but appears to be slightly more flattened above. Head gray-brown, pronotum grayish, with a wide central and two narrower lateral stripes brown; elytral disk brown, mottled with blackish, sides of elytra gray or gray-brown; legs and body beneath gray to light brown. Rostrum stout, constricted basally beneath, markedly arched above, separated from the front by a transverse groove. Median sulcus sharp, deep, not interrupted apically, extending to the occiput; lateral sulci deep basally, invisible apically. Head with the ridges above the eyes well developed, subtuberculate. Pronotum more than one-third longer than wide, widest at basal fourth; striae slightly impressed, punctures large, round, separate; elytral interval two elevated, and intervals 4, 5, 6, and 7 elevated together, terminating abruptly apically leaving a small tubercle. Vestiture throughout imbricate, scales round or nearly so; setae semierect or erect, brownish on head and pronotum, white on elytral intervals, body beneath, and legs. Legs stout; apices of hind tibiae not truncated, and with a row of large spines at apex.

Measurements in millimeters.—Length 5.0; width 2.3.

The genitalia of this specimen seem to be identical with those of females of *R. effracta*.

Type locality.—Calmali Mines [Lower California].

The above description is that of a single female specimen in the collection of the U. S. National Museum, collected at San Ysidro, Calif., May 25. It was found alive upon *Neomammillaria* sp. from Lower California.

[Horn (1894, p. 442), after describing *Rhigopsis simplex*, says: "This species may be known from *effracta* by the absence of tuberosities, the feeble elytral costae and the almost entire absence of lateral rostral sulci."]

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