# REVISION OF *BLEDIUS*. PART III. THE *ANNULARIS* AND *EMARGINATUS* GROUPS (COLEOPTERA, STAPHYLINIDAE, OXYTELINAE)

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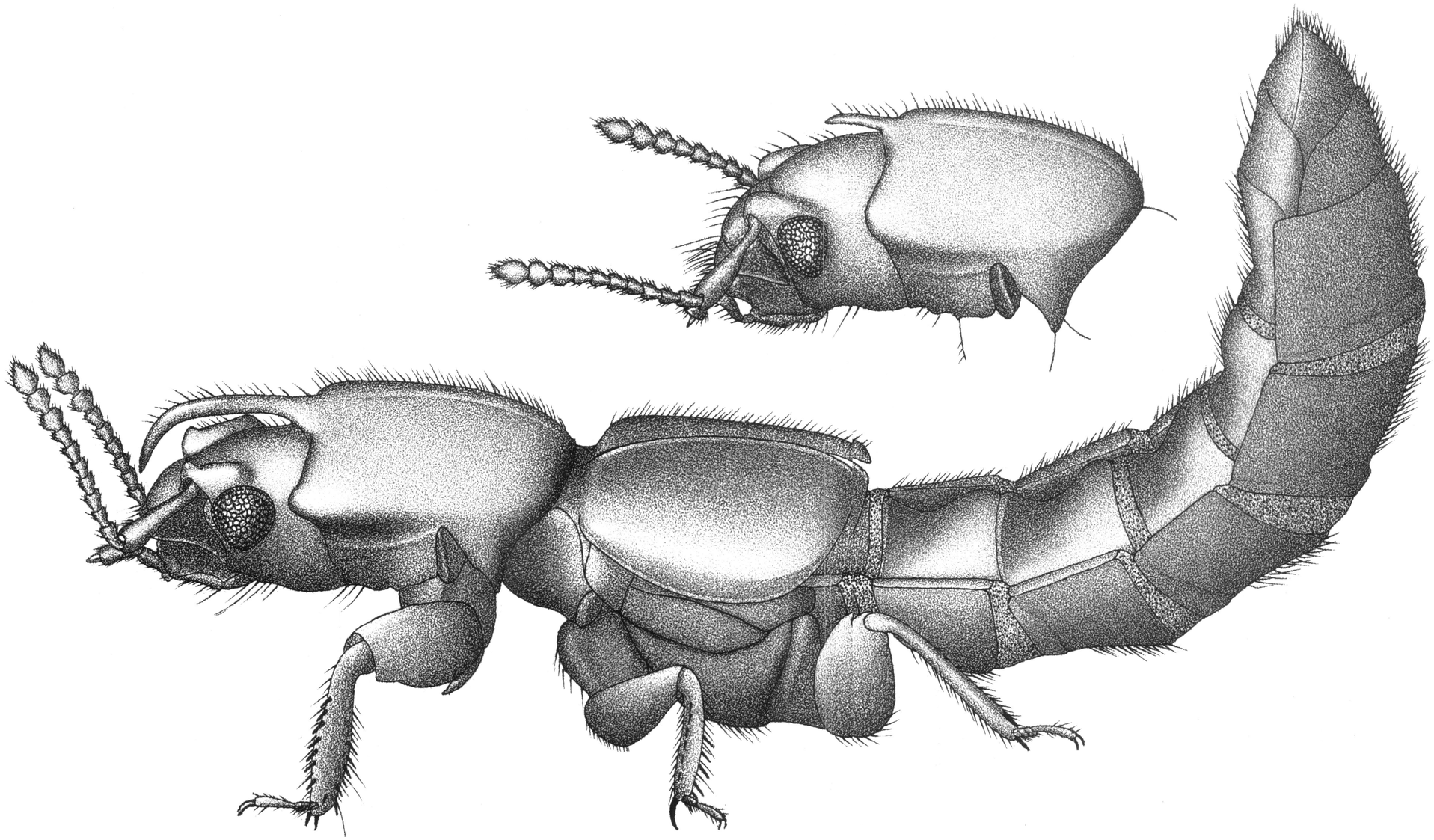

FRONTISPIECE. *Bledius susae*. Female, head and prothorax, above. Male, below.

# CONTENTS

## ABSTRACT

In the present report, the third in a series on *Bledius*, the *annularis* and *emarginatus* groups are discussed and a new species is described in the *aequatorialis* group. A key to the species, descriptions, diagnoses, illustrations, and distributional and habitat data for each species are presented. *Bledius habrus, melanocolus, aurantius, jucundus, naius, nardus, omega, venus, viriosus, wudus,* and *zophus* are newly described. Thirteen nominal species are recognized as synonyms. *Bledius albidipennis* Bernhauer and *ornatus* LeConte are new junior synonyms of *albonotatus* Mäklin; *apicalis* Fall is a new junior synonym of *diagonalis* LeConte; *adjustus* Casey and *transitus* Fall are new junior synonyms of *gentilis* Casey; *kincaidi* Hatch is a new junior synonym of *parvicollis* Casey; *rusticus* Fall is a new junior synonym of *bicolor* Casey; *luteipennis* LeConte, *medialis* Fall, *oregonensis* Hatch, and *pleuralis* LeConte are new junior synonyms of *suturalis* LeConte; and *borealis* Blatchley and *bowronensis* Hatch are new junior synonyms of *turgidus* Casey.

The species in the United States included in the *emarginatus* group are *cognatus* LeConte, *emarginatus* (Say), and *wudus* Herman. They are found in the eastern and southeastern United States. The species are similar and not easily distinguished.

*Bledius albonotatus* Mäklin, *aurantius* Herman, *bicolor* Casey, *cedarensis* Hatch, *confusus* LeConte, *diagonalis* LeConte, *gentilis* Casey, *gracilis* Casey, *habrus* Herman, *jucundus* Herman, *laticollis* LeConte, *melanocolus* Herman, *monticola* Casey, *naius* Herman, *nardus* Herman, *newelli* Hatch, *omega* Herman, *parvicollis* Casey, *persimilis* Fall, *phytosinus* LeConte, *ruficornis* LeConte, *suturalis* LeConte, *tarandus* Herman, *tau* LeConte, *turgidus* Casey, *venus* Herman, *villosus* Casey, *viriosus* Herman and *zophus* Herman are species from the United States and Canada included in the *annularis* group and which I can identify. Also included in the *annularis* group are nine species listed together in what I call the *annularis* complex: *annularis* LeConte, *brereroni* Hatch, *honestus* Casey, *languidus* Casey, *mysticus* Fall, *nebulosus* Casey, *sinuatus* LeConte, *stabilis* Casey, and *washingtonensis* Hatch. After years of study and collecting I have been unable to resolve the species of this complex which is widespread in Canada and the northern United States. I was unable to resolve three other species: *fasciatus* (Say), *longipennis* Mäklin, and *verticalis* Notman; the types of each have been lost but I discuss each of them. The *annularis* group species are widespread in the United States and Canada and most are found in shaded soil near fresh water. Only two, *albonotatus* and *newelli,* are associated with coastal, saline habitats. Several species, notably *ruficornis, tarandus,* and *turgidus,* have transcontinental distributions, and one, *albonotatus,* is found along the coast from western Alaska to Baja California.

The addition of a new species, *susae,* to the *aequatorialis* group brings that group up to four. However, *susae* is the only one of the group known only from the United States which is found only on the mainland. It is also the sole species of *Bledius* in which the females have a pronotal horn; although pronotal horns are known in a number of New and Old World species, heretofore no females have been reported with such a modification.

Since publication of Parts I and II of this monograph, I have examined over 6000 more specimens of 41 previously revised species. In Appendix II all the new records are included; for many species extensions of their previously known range are recorded.

Lectotypes are designated for the species of *Bledius* described by LeConte, Casey, and Fall.

For Part III, 28,408 specimens were examined.


## INTRODUCTION

*Bledius* is a large, subcosmopolitan group of species that excavates burrows in moist soil and eats algae. Most species can be collected easily and abundantly by hand and often in vast numbers by light trap. The genus is taxonomically complex but extraordinarily interesting biologically, zoogeographically, phylogenetically, and taxonomically. Many interesting questions may be asked about these beetles but a firm taxonomic basis is required before the questions can be answered and in some cases, before they can even be asked. The taxonomic complexity, the beauty of the animals, and their fascinating biology and distribution have compelled me to study 42,000 specimens for Parts I to III. I collected more than 20,000 specimens.

This article is the third in a series on the classification and phylogenetic relationships of *Bledius*. In Part I (Herman, 1972) two new genera, *Microbledius* and *Psamathobledius,* and three new species of *Microbledius* were described. I continued using the five groups of species of *Bledius* recognized by LeConte (1877) but added a new group, the *aequatorialis* group, which is found in southern Florida, the Caribbean, northern South America, and the Galapagos Islands. The *aequatorialis, mandibularis,* and *semiferrugineus* groups were revised in Part I. In these three groups, nine nominal species were first recognized as junior synonyms. In Part II (Herman, 1976) the *armatus* and *basalis* groups were revised and a new group with one species, the *melanocephalus* group, was separated. Three new species were described in Part II and 15 nominal species were shown to be junior synonyms. In the first two parts 49 species were recognized and 13,369 specimens studied.

The remaining species from Canada and the United States are discussed in Part III. Thirty-four species are recognized, nine others are included in an unresolved phenetic complex, and three are undeterminable. The *emarginatus* group includes three species from the United States and Canada, a new one is added to the *aequatorialis* group, and 39 are in the *annularis* group (including the nine unresolved species).

The species of the *emarginatus* group are small, about 2 to 3 mm. long, and of uniform appearance. Other species in the group from Central and South America will be listed and discussed in Part IV of this series. In the United States and Canada, *Bledius emarginatus* is the most widespread of the three species of the group. It is found in the eastern half of the United States, except Florida, to the southeastern edge of Canada and can be collected abundantly near rivers, streams, and lakes. The other two species are confined to the southern United States. One, *wudus,* is found in habitats similar to those for *emarginatus*; the other, *cognatus,* can be collected near streams and lakes but also in temporarily moist soil that is not immediately adjacent to permanent bodies of water.

The species of the *annularis* group are small to moderately large, about 2 to 8 mm. long, and vary in color, form, and other details. Other species of the group are found in the Old World and will be discussed in Part IV. Nine of the 39 species of the *annularis* group are placed in the unresolved *annularis* complex in this report. The problems associated with this complex are discussed and defined; a further attempt will be made in the future to unravel the species. The species of the *annularis* complex are found in the northern half of North America, are common in Canada and Alaska, and abundant near rivers, streams, and lakes.

Of the remaining 30 species of the *annularis* group in the United States and Canada, two are found in northern Baja California; the others occur over the same general area depicted for the *annularis* complex (fig. 321) but come from farther south, particularly in California and Arizona.

Among the species of the *annularis* group *albonotatus* and *newelli* are restricted to habitats near the ocean. However, *albonotatus* is found adjacent to freshwater streams that flow into the ocean. *Bledius newelli* is found in moist, sparsely vegetated sand flats near beach dunes, and might also be found in the same kind of habitat that harbors *Bledius mandibularis.* This kind of habitat is common along the eastern coast of the United States but less common along the western coast. The restricted distribution of *newelli* in Washington and Oregon (fig. 263) is in contrast to the extensive distribution of *albonotatus. Bledius albonotatus* (fig. 49) occurs along virtually the entire Pacific coast of North America. It has been collected in southern Alaska (once by me and once at the type locality where it has not been collected again) from just north of the Alaska Peninsula south to central Baja. The species can be collected abundantly in California. Further collecting may extend the range to the tip of Baja California.

Only *tau* is confined to the eastern part of the continent (fig. 140). The similar *omega* (fig. 152) overlaps the distribution of *tau* and continues to the eastern part of the Rocky Mountains. The remaining species are either confined to the West, and are abundant there, but extend to the East, or are transcontinental, and commonly found in Canada. Eight species, *naius, phytosinus, persimilis, melanocolus, venus, diagonalis, aurantius,* and *clarus,* have been found only in the south-

western United States and a ninth, *laticollis,* is common in southern California but extends north to Washington where it is rarely collected. Several species are known from few localities and are rarely collected. *Bledius clarus* is known now from 100 specimens, of which I collected all but 17. Until my work, the species had not been collected since 1918. A newly described species, *aurantius,* is similar to, and occurs sympatrically with, *clarus,* and is known from few specimens and localities. *Bledius naius* is known from three specimens at one locality, and *cedarensis* from six specimens at four localities. *Bledius phytosinus* was described in 1877 from one callow adult; a second, determined as *rusticus,* was collected at about the turn of the century; the only other known specimen I found in May 1981. *Bledius gracilis* is known from five localities, *jucundus* from four, *persimilis* from seven, and *melanocolus* from two. *Bledius monticola* has been collected at a few localities in the mountains of Oregon and California and is found abundantly in the moist soil near montane springs. Until I discovered the habitat, only 11 specimens of the species were known in collections. *Bledius jucundus* is known from the eastern Rocky Mountains. *Bledius adustus, villosus, parvicollis, habrus, confusus, nardus* and *zophus* are obtained in the western United States and Canada. Most specimens of *zophus* are from Washington and Oregon but, surprisingly, I saw it in the Big Horn Mountains of Wyoming at 7400 feet. Most collections of the small form of *suturalis* have been made in British Columbia but a few specimens were taken in southern California and the Great Lakes region. The medium-size form of *suturalis* is widespread in the western half of the continent and is very abundant in the Pacific coastal states. The large form of *suturalis* is common in southern California.

*Bledius ruficornis* is an abundant species that is found widely in the western United States. In California, Washington, and Oregon it is one of the most commonly collected species in the mountains at moderate elevations. There are scattered records for the species across Canada and quite amazingly I collected it near New York City along the Hudson River (fig. 294).

*Bledius tarandus* (fig. 104) and *turgidus* (fig. 245) have northern, transcontinental distributions that extend south into the United States along the Rocky Mountains. *Bledius tarandus* can be collected in large numbers in unvegetated sand near bodies of fresh water throughout the range. The habitat and sinuous pattern of their burrows are so characteristic that the occurrence of *tarandus* can often be predicted before specimens have actually been collected. *Bledius turgidus* is the largest species of the *annularis* group, is collected less frequently and in smaller numbers than *tarandus,* and is usually found in moist, vegetated soil. *Bledius viriosus* also has a transcontinental distribution but is found principally in Canada and Alaska where it is rare.

*Bledius albonotatus* is an unusual species in several respects. It has a unique habitat and, so far as I can determine, has only been collected one time other than near the ocean. It is one of only a few species that exhibits species specific characters of the aedeagus and species specific sexually dimorphic abdominal features, and is the only species in the *annularis* group for which clinal variation (for color of legs and elytra) is demonstrable. Another species with species specific aedeagal characters is *persimilis.*

In the *annularis* and *emarginatus* groups there are several species complexes—that is, groups of species that are similar and difficult to distinguish and that may or may not be phylogenetically related. The species of three of the complexes are separated principally by size.

The largest, most complicated, least soluble is the *annularis* complex which is composed of nine species and found in northern North America and discussed in greater detail in the section titled "*annularis* complex." It is this complex that for years has delayed publication of Part III of this revision.

The *emarginatus* group is a large complex of small beetles. Many of the species can be sorted easily by one or another striking feature. However, there is a large number of species centered around *emarginatus* and *wudus* that show slight and difficult to discern differences. Slight variation of the mandibles distinguish *emarginatus* and *wudus* but the other species are not so vividly distinct.

*Bledius tau* and *omega* are distinguished

by size and color. *Bledius tarandus* and *parvicollis* are separated by size and color. For these pairs of species there seemed to be no overlap of size and the species had been collected at the same or adjacent localities. *Bledius nardus* and *zophus* were first distinguished in the field by size and preference of habitat and later were found to have consistent differences of elytral pubescence.

*Bledius diagonalis* and *venus* are quite similar but *venus* has striking abdominal characters that separate it. However, *diagonalis* is composed of three forms that I had initially regarded as different species; this opinion changed when I discovered intergrading specimens. The three forms are distinctive and the overlap slight; two are based on difference of size and the other by the form of the pronotum.

*Bledius newelli, turgidus, cedarensis,* and *viriosus* are similar; the males are easily separated but the females resemble one another. *Bledius ruficornis* and *bicolor* are separated by a membranous lobe on the elytral margin. *Bledius clarus* and *aurantius* are similar in all respects except density of elytral and pronotal punctation and elytral length.

*Bledius susae,* the fourth species of the *aequatorialis* group, is particularly interesting in that it is the only species of *Bledius* in which the *female* has a pronotal horn. The males of the *aequatorialis* group in the New World and several groups in the Old World have pronotal and cephalic horns, but there are no females with either. The cephalic horn of the males of *susae* are reduced to pimple-like swellings. *Bledius susae* is the sole species of the *aequatorialis* group known only from the mainland (Texas). The other three species are found on islands in the Caribbean and Pacific; two of them are also reported from the mainland (see Appendix II [*ceratus*] and Herman, 1972 [*beattyi*]).

I neglected to designate lectotypes for species described by LeConte, Casey, and Fall in the earlier parts of this revision. Lectotypes here are designated in a separate section.

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# TAXONOMY

## KEY TO THE SPECIES OF THE *ANNULARIS* AND *EMARGINATUS* GROUPS FOR THE UNITED STATES AND CANADA

1. Labrum fused medially (figs. 6, 13) ... (*emarginatus* group) ..... 2
   Labrum divided medially (figs. 26, 114, 216) ... (*annularis* group) ..... 4
2(1). Dorsum of head finely punctate (fig. 14), surface shining dully, elytral length/pronotal length = 1.21 to 1.40 .... 3
   Dorsum of head coarsely punctate (fig. 3), surface polished to shining strongly; elytral length/pronotal length = 1.09 to 1.23 ..... 1. *cognatus*
3(2). Apical mandibular denticle short, middle and basal denticles of nearly equal size (figs. 19–21) ..... 3. *wudus*
   Apical mandibular denticle long, middle denticle small to minute, much smaller than basal denticle (fig. 16) ..... 2. *emarginatus*
4(1). Mandibles bidentate (figs. 30, 65, 75) .. ..... 5
   Mandibles tridentate (figs. 191, 209, 232) ..... 30
5(4). Elytral epipleuron dark (black to dark reddish brown to reddish brown) in part or completely (including those with pale apical half or third ..... 6
   Elytral epipleuron entirely pale, yellowish brown ..... 25
6(5). Abdominal sternites III and IV (figs. 349, 350) with distinct, prominent, well developed, microimbricate sculpturing; punctation less distinct than sculpturing; pubescence sparse ..... 5. *venus*
   Abdominal sternites III and IV (fig. 348) with moderately to poorly developed sculpturing; punctation more distinct than sculpturing; pubescence moderately dense to dense ..... 7
7(6). Elytral disk unicolorous, dark ..... 8
   Elytral disk bicolored, with dark sutural stripe and pale laterally or posteriorly, or with pale posterior and dark anterior portion ..... 17
8(7). Pronotum with anterior angles acute and strongly produced (fig. 27) and abdominal terga IV to VI with basolateral pubescence lateroposteriorly directed (figs. 31, 342) ..... 4. *albonotatus*
   Pronotum with anterior angles rounded and even with anterior margin to acute and moderately produced; abdominal terga IV to VI with basolateral pubescence mediolaterally or lateroposteriorly directed (figs. 112, 125) ..... 9
9(8). Elytral posterior margin without membranous lobe (figs. 71–74) ..... 10
   Elytral posterior margin with membranous lobe (fig. 157) ..... 13. *gentilis*[1]
10(9). Pronotal basal angles rounded (figs. 61–62, 70, 320) ..... 11
   Pronotal basal angles strongly rectangulate (figs. 63, 64, 83, 96, 111, 123, 276) ..... 12
11(10). Elytra short, elytral length/pronotal length 1.40 to 1.13 ... (females) .. 33. *naius*
   Elytra long, elytral length/pronotal length 1.40 to 1.62 ..... 6. *diagonalis*
12(10). Elytra short and coarsely punctate (fig. 384); elytral length less than 0.69 mm. ..... 27. *monticola*
   Elytra long and finely to moderately coarsely punctate; elytral length greater than 0.70 mm. ..... 13
13(12). Pronotum with basal third strongly constricted (figs. 111, 123) ..... 16
   Pronotum with basal third more gradually convergent to basal angles (figs. 63, 64, 83, 97, 276) ..... 14
14(13). Species small, head width less than 0.69 mm. ... (unicolored form) ..... 8. *tarandus*
   Species large, head width greater than 0.70 mm. ... (unicolored form) ..... 15
15(14). Elytra (yellowish brown to reddish brown) paler than abdomen (black to dark reddish brown); mandibles with large basal denticle (figs. 65, 66) ... (unicolorous form) ..... 6. *diagonalis*
   Elytra (black to dark reddish brown) nearly concolorous with abdomen (black to dark reddish brown); mandibles with small basal denticle (figs. 80, 81) ... (unicolorous form) ..... 7. *parvicollis*
16(13). Elytral pubescence medially directed near middle of lateral side (fig. 107) ..... 9. *zophus*

[1] Some specimens of *gracilis* and *persimilis* that have the basal or third mandibular denticle worn so that it is difficult to see will run here to *gentilis*. The males of *persimilis* can be recognized by the slender parameres. *Bledius gracilis* is small, has a deeper, broader labral emargination and coarser pronotal punctation; *gentilis* is larger, has a shallower labral emargination, and finer pronotal punctation.

Elytral pubescence of lateral side posteriorly or lateroposteriorly directed (figs. 121, 123) ..... 10. *nardus*

17(7). Abdominal terga IV to VI with basolateral pubescence lateroposteriorly directed (fig. 31) and pronotum with anterior angles acute and produced (fig. 27) ..... 4. *albonotatus*

Abdominal terga IV to VI with basolateral pubescence medioposteriorly to posteriorly directed (as in fig. 125); pronotum with anterior angles rounded; anterior angles even with anterior margin to strongly produced ..... 18

18(17). Elytral posterior margin with membranous lobe (fig. 157, 175) ..... 22

Elytral posterior margin without membranous lobe ..... 19

19(18). Pronotal basal angles strongly rectangulate (figs. 63, 64, 83, 96, 97); elytra with or without narrow black or dark brown stripe on posterior edge ..... 20

Pronotal basal angles rounded (figs. 60–62, 70); elytra with pale yellowish brown posterior margin ..... 6. *diagonalis*

20(19). Species small, head width less than 0.68 mm.; elytral length less than 1.00 mm. . . . (bicolored form) .... 8. *tarandus*

Species large, head width greater than 0.69 mm.; elytral length greater than 1.00 mm. ..... 21

21(20). Elytra with narrow black or dark reddish brown stripe along posterior margin (figs. 87–89); mandibles with small basal denticle (figs. 80, 81) . . . (bicolored form) ..... 7. *parvicollis*

Elytra with posterior margin concolorous with paler portion of disk, without dark stripe along posterior margin (figs. 55–57, 73, 74); mandibles with large basal denticle (figs. 65, 66, 75) . . . (bicolored form) ..... 6. *diagonalis*

22(18). Elytra bicolored with posterior or lateroposterior portion pale yellowish brown and basal portion black to blackish brown to reddish brown (fig. 161, 162); pronotum with basal third strongly constricted (figs. 155, 166) ..... 23

Elytra bicolored with broad (figs. 175, 176) to narrow (fig. 177) sutural stripe; stripe at times restricted to base and to narrow area adjacent to suture ..... 24

23(2). Coxae and femora black to dark reddish brown ..... 14. *melanocolus*

Coxae and femora yellowish brown to pale reddish brown . . . (bicolored form) . . ..... 13. *gentilis*[2]

24(22). Species larger, head width larger than 0.53 mm. . . . (medium and large forms) . . ..... 15. *suturalis*

Species smaller, head width 0.52 mm. or less . . . (small form) ....15. *suturalis*

25(5). Abdominal terga IV to VI densely pubescent with basolateral pubescence lateroposteriorly directed (fig. 31) ..... 4. *albonotatus*

Abdominal terga IV to VI sparsely to moderately densely pubescent with basolateral pubescence medioposteriorly or posteriorly directed ..... 26

26(25). Pronotal anterior angles rounded to acute and slightly to strongly produced beyond anterior margin (figs. 96, 135, 147) ..... 27

Pronotal anterior angles rounded and even with anterior margin ..... 29

27(26). Procoxae pale, yellowish brown ..... 11. *tau*

Procoxae dark, pale brown to dark brown ..... 28

28(27). Antennae dark reddish brown (California population) ..... 8. *tarandus*

Antennae pale reddish brown ..... 12. *omega*

29(26). Species larger, head width larger than 0.53 mm. . . . (medium and large forms) . . ..... 15. *suturalis*

Species smaller, head width smaller than 0.52 mm. . . . (small form) ..... 15. *suturalis*

30(4). Elytra with membranous lobe on posterior margin (fig. 198) ..... 34

Elytra without membranous lobe on posterior margin (fig. 277) ..... 31

31(30). Sternum VII with emarginate posterior margin (fig. 316) . . . (male) ..... 33. *naius*

Sternum VII with truncate posterior margin ..... 32

32(31). Pronotum densely punctate (figs. 276, 284), punctation obscured by or coprominent with dense, strong ground sculpturing ..... 33

Pronotum moderately densely punctate

[2] Rarely, a few specimens of *suturalis* will run here to *gentilis* but can be separated by the less strongly constricted pronotal base and shallower pronotal midlongitudinal groove. In these specimens of *suturalis* the paler lateroapical spot is not strongly delimited from the darker portion and the sutural stripe is broad and diffuse.

(figs. 255, 260), punctation distinctly more prominent than moderately strong ground sculpturing ..... 25. *newelli*[3]

33(32). Elytra with truncate posterior margins (fig. 214); smaller species, elytral length 0.52 to 0.64 mm., basal denticle of mandibles small to minute and closely associated with middle denticle (figs. 270–272, 275) ..... 27. *monticola*

Elytra with posterior margin broadly rounded (fig. 286); larger species, elytral length 0.67 to 1.07 mm.; basal denticle of mandibles large to moderately large and well separated from middle denticle (figs. 282, 283) ..... 28. *ruficornis*

34(30). Body, particularly elytra (fig. 198) and abdomen, with long pubescence ..... 18. *villosus*

Body with short to moderately long pubescence (figs. 207, 214) ..... 35

35(34). Pronotum and elytra bright orange to reddish orange ..... 36

Pronotum black to reddish brown; elytra black, brown, red, yellow, or some shade of these colors ..... 37

36(35). Elytra (fig. 207) and pronotum (fig. 208) sparsely punctate and pubescent ..... 19. *clarus*

Elytra (fig. 214) and pronotum (fig. 217) densely punctate and pubescent ..... 20. *aurantius*

37(35). Pronotal basal angles absent to feeble and rounded (figs. 226, 230, 305) ..... 38

Pronotal basal angles strongly angulate (figs. 186, 194, 240, 250, 265, 302, 311) ..... 40

38(37). Pronotal punctation fine (fig. 305), obscured by ground sculpturing, and difficult to see; small species, pronotal width less than 0.60 mm. (table 2) ... ..... 31. *phytosinus*

Pronotal punctation well developed (figs. 222, 230), as strong as or stronger than ground sculpturing, and easily observed; small to large species, pronotal width greater than 0.65 mm. ..... 39

39(38). Pronotal punctation coarse; elytra short, 0.61 to 0.79 mm. ..... 21. *confusus*[4]

Pronotal punctation fine; elytra long 0.83 to 1.09 mm. ..... 22. *laticollis*

40(37). Abdominal sternites V to VII with median, dense patch of long pubescence (fig. 310) ... (male) ... 32. *jucundus*[5]

Abdominal sternites with uniformly distributed pubescence ..... 41

41(40). Elytra with laterally or posterolaterally directed pubescence on lateral three-fourths of disk (fig. 296) ..... 42

Elytral pubescence posteriorly directed on central disk or lateroposteriorly directed with pubescence on lateral side medioposteriorly directed (as in fig. 286) ..... 44

42(41). Margins of proxocal fissure not overlapping, fissure open for entire length; elytra coarsely punctate (fig. 374) ..... 30. *habrus*

Margins of procoxal fissure overlapping, fissure partially closed (fig. 293); elytra with moderately coarse punctation .. ..... 43

43(42). Elytra short, elytral length/pronotal length 1.02 to 1.17; species large and robust, pronotal width greater than 1 mm. (table 2) ..... 26. *cedarensis*

Elytra long, elytral length/pronotal length 1.43 to 1.65; species of medium size and build, pronotal width less than 0.85 mm. (table II) ..... 29. *bicolor*

44(41). Procoxal fissure open for entire length, margins not overlapping (fig. 257); protrochantin exposed for entire length of fissure (fig. 257) ..... 47

Procoxal fissure closed for part to most of length, open only at ventral portion, margins of fissure overlapping at dorsal portion (figs. 244, 252, 293); protrochantin exposed only at ventral portion of fissure ..... 45

45(44). Pronotal ground sculpturing as prominent as pronotal punctation (as in fig. 279) ..... 29. *bicolor*

Pronotal punctation more prominent than pronotal ground sculpturing ..... ..... 46

46(45). Prosternum with well-developed setaceous pit (fig. 236); elytra short, elytral length/pronotal length 1.04 to 1.15 .. ..... 23. *turgidus*

Prosternum with feebly developed setaceous pit, with only a few setae in shallow depression (fig. 246); elytra long,

[3] *Bledius newelli* has a broad very short membranous lobe on the posterior margin of the elytra. The species is brought out both in this part of the Key and in the part requiring the presence of the lobe because it is often difficult to see.

[4] Some specimens of *honestus* run here to *confusus* and the two are indistinguishable. Most specimens of *honestus* have rectangulate to strongly angulate basal angles of the pronotum and therefore go to couplet 49.

[5] The females of *jucundus* will run to the *annularis* complex in couplet 49. They can be identified only by association with the males.

elytral length/pronotal length 1.16 to 1.32 ..... 24. *viriosus*

47(44). Aedeagus with slender parameres (figs. 183, 184) ..... 16. *persimilis*[6]

Aedeagus with broad parameres (as in fig. 308) and all females ..... 48

48(47). Elytra with short, broad, poorly developed membranous lobe on posterior margin (fig. 256); head with long, midlongitudinally divided tumescence (fig. 255) ..... 25. *newelli*

Elytra with long, narrow, well-developed membranous lobe on posterior margin (fig. 288); head with dorsal, undivided tumescence, with, at best, depression near posterior end ..... 49

49(48). Labrum with broad, moderately deep emargination (fig. 189) ... 17. *gracilis*

Labrum shallowly emarginate (as in fig. 285) ..... 34. *annularis* complex

## *emarginatus* GROUP

Figures 1–22, 334–339; Table 1

DIAGNOSIS: The *emarginatus* group can be separated from other New World groups by the midlongitudinally fused labrum (figs. 6, 13), open procoxal fissure (figs. 12, 336), and presence of a setigerous prosternal pit and elytral epipleural ridge.

DESCRIPTION: *Bledius*. Supra-antennal horns absent (fig. 5). Clypeal tubercles present (figs. 3, 14) and moderately large to small or absent. Gular sutures confluent to submentum and sharply divergent at base. Labrum (figs. 6, 13) with sinuotruncate anterior margin and fused midlongitudinally; anterior margin not reflexed. Labial palpus (fig. 9) with first and second segments of approximately equal length; third segment equal to or slightly shorter than first or second; segments each slightly narrower than preceding segment; basal segment with two setae, middle segment with one seta. Hypopharynx as in figures 334, 335, 337–339. Maxillary palpus as in figure 8; galea with numerous spinelike setae. Mandibles edentate, bidentate, or tridentate.

[6] The female must be identified by association with the male. *Bledius persimilis* is a small, slender species with shining or polished spots on the pronotum and with a broadly, moderately deeply emarginate labrum. In this Key, the females run to *gracilis* from which they can be separated by the characters given in the Diagnoses of the two species.

Pronotal shape as in figures 5, 15. Pronotal horn absent. Pronotal lateral marginal bead present and entire (fig. 12). Protergosternal suture present, carina fine to feeble; suture and marginal bead divergent from base of suture toward apex and curved and convergent near apex of suture (fig. 12). Procoxal fissure open. Protrochantin exposed. Prosternal process present. Prosternum with small, shallow densely setigerous pit anterior to procoxa (fig. 12, 336). Elytra (fig. 10) with small membranous lobe on posterior margin; epipleural ridge present and complete.

Abdomen with posterior margin of tergum VIII emarginate; margin not serrulate.

Aedeagus (figs. 1, 4) trilobed. Median lobe with rounded apex; apical portion dorsoventrally flattened; base bulbous; dorsal surface membranous; ventral surface sclerotized except for membranous median portion of apical region; ostium at apex. Parameres extending from ventral surface to sides of median lobe; parameres slender, cylindrical and extending beyond apex of median lobe.

Spermatheca as in figures 7, 17.

DISCUSSION: Although the *emarginatus* group is represented only by three described species in the United States and Canada, there are many species south from Mexico and the West Indies into South America. Most of these are not described, and those that are are similar to *emarginatus*.

### 1. *Bledius cognatus* LeConte

Figures 1–11, 338–339; Table 1

*Bledius cognatus* LeConte, 1877, p. 231. (Type locality: North Carolina. Type in Museum of Comparative Zoology, Harvard University. Type examined).

DIAGNOSIS: *Bledius cognatus* is distinguished from *emarginatus* and *wudus* by the coarse punctation on the dorsum of the head (fig. 3), and by the usually strongly shining to polished dorsum of the head and pronotum. The ratio elytral length/pronotal length for *cognatus* is smaller than that for *wudus* and *emarginatus* (table 1).

DESCRIPTION: *emarginatus* group.

Length 2.5 to 3.1 mm.

Color reddish brown. Head dark reddish brown, dorsum often paler. Pronotum orangish brown to pale orange, darker than ely-

TABLE 1

**Measurements (in Millimeters) of Head, Prothorax, and Elytra of Adults of the Species of the *emarginatus* Group**

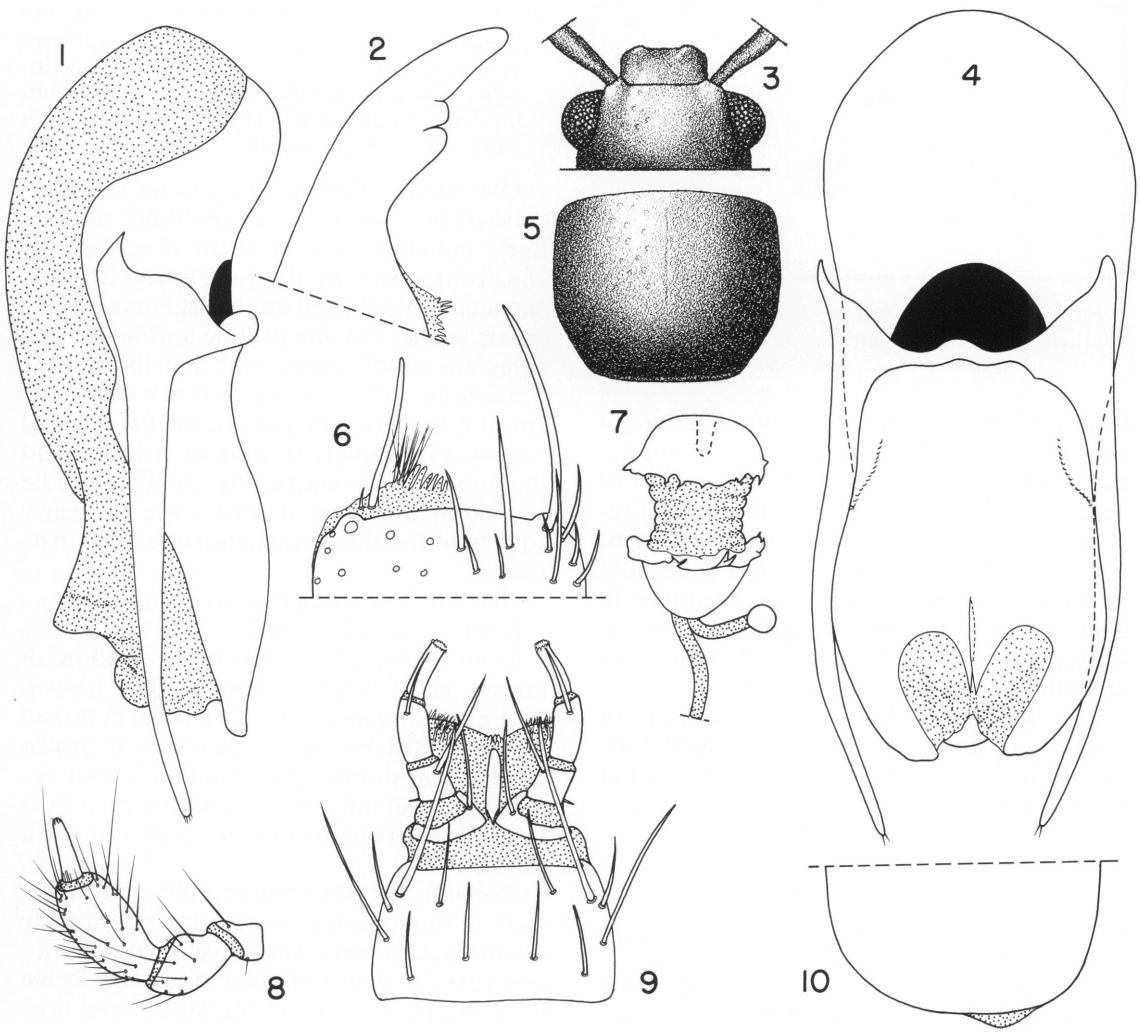
(The mean, standard deviation, and sample size are given in that order for each sample.)

| | Head Width | | | Interocular Width | | | Pronotal Width | | | Pronotal Length | | | Elytral Length | | | Head Width / Interocular Width | | | Pronotal Width / Pronotal Length | | | Elytral Length / Pronotal Length | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *emarginatus* | | | | | | | | | | | | | | | | | | | | | | | | |
| ♂ | 0.44 | 0.01 | 20 | 0.25 | 0.01 | 20 | 0.46 | 0.01 | 20 | 0.40 | 0.01 | 20 | 0.52 | 0.01 | 20 | 1.75 | 0.03 | 20 | 1.16 | 0.02 | 20 | 1.31 | 0.03 | 20 |
| ♀ | 0.45 | 0.01 | 20 | 0.26 | 0.01 | 20 | 0.47 | 0.01 | 20 | 0.39 | 0.01 | 20 | 0.52 | 0.01 | 20 | 1.75 | 0.04 | 20 | 1.20 | 0.02 | 20 | 1.33 | 0.04 | 20 |
| *wudus* | 0.42 | 0.01 | 20 | 0.26 | 0.01 | 20 | 0.46 | 0.01 | 20 | 0.39 | 0.01 | 20 | 0.49 | 0.02 | 20 | 1.62 | 0.03 | 20 | 1.19 | 0.03 | 20 | 1.28 | 0.04 | 20 |
| *cognatus* | 0.49 | 0.01 | 20 | 0.30 | 0.01 | 20 | 0.54 | 0.02 | 20 | 0.47 | 0.01 | 20 | 0.54 | 0.02 | 20 | 1.61 | 0.03 | 20 | 1.15 | 0.02 | 20 | 1.16 | 0.04 | 20 |

tra. Elytra, legs, and antennae pale orange to yellowish brown, elytral epipleuron and disk concolorous. Abdomen reddish brown to yellowish brown to orange.

Dorsum of head polished to strongly shining; microgranulate ground sculpturing absent or weak to moderately strong; punctation coarse and moderately dense to dense (fig. 3); micropunctation often visible on polished dorsum; pubescence moderately long; dorsum of head (fig. 3) broadly rounded and without median tumescence but head of male more strongly convex than that of female; dorsum of head with feeble, median, punctiform, postocular depression and without transverse postocular depression. Clypeus polished to strongly shining; microgranulate ground sculpturing weak to moderately strong basally and laterally and absent to weak medially; punctation feeble, anterior margin of male with pair of well-developed but small tubercles (fig. 3); anterior margin of female with low tumescence on each side. Eyes moderately large to large. Width of head 0.46 to 0.51 mm.; interocular width 0.28 to 0.32 mm.; head width/interocular width 1.54 to 1.69. Labrum (fig. 6) with unreflexed, truncate anterior margin. Mandibles tridentate (fig. 2); apical denticle moderately long; middle and basal denticle of nearly equal size or basal denticle slightly larger. Antennomeres 3 to 5 without but 6 and 7 with moderately developed ridge encircling apex.

Pronotum 0.51 to 0.57 mm. wide; 0.44 to 0.49 mm. long; pronotal width/pronotal length 1.10 to 1.20; pronotum (fig. 5) strongly convex; lateral margin with anterior two-thirds nearly straight and parallel and basal third nearly straight to slightly curved, and convergent to base or lateral margin gradually curved from anterior margin to base; basal angles feeble to moderately well developed but rounded; anterior angles rounded and even with anterior margin. Pronotal surface polished to strongly shining; microgranulate ground sculpturing absent to weak; punctation dense, coarse, and more prominent than ground sculpturing; pubescence moderately long; midlongitudinal groove well developed. Prohypomeron strongly shining, with well-developed ground sculpturing. Procoxal fissure open for entire length; protrochantin exposed. Prosternal setigerous pit well devel-




FIGS. 1–10. *Bledius cognatus*. 1. Aedeagus, lateral view. 2. Mandible, left. 3. Head, dorsal view. 4. Aedeagus, dorsal view. 5. Pronotum. 6. Labrum, setae of left side and epipharyngeal lobe of right side removed. 7. Spermatheca. 8. Maxillary palpus. 9. Labium, ventral view. 10. Elytron, right apex.

oped. Elytra 0.51 to 0.59 mm. long; elytral length/pronotal length 1.09 to 1.23; elytra densely and finely punctate; pubescence moderately long and posteriorly directed; posterior margin with membranous lobe (fig. 10); posterior margin broadly rounded.

Abdominal tergal pubescence moderately long and medioposteriorly directed; terga IV to VI shallowly impressed basally. Tergum VIII with feeble, isodiametric polygonal ground sculpturing. Sternites with uniformly dense pubescence; ground sculpturing feeble. Sternites VII and VIII unmodified.

Spermatheca as in figure 7.

Aedeagus with setae on apex of parameres (figs. 1, 4).

SEXUAL DIMORPHISM: The male has a pair of moderately large clypeal tubercles; the female has a pair of feeble swellings on the anterior margin of the clypeus. The dorsum of the head of the male is more strongly convex than in the female.

HABITAT AND DISTRIBUTION: *Bledius cognatus* is known from scattered localities in the southeastern United States from North Carolina to Texas (fig. 11; see Appendix I for

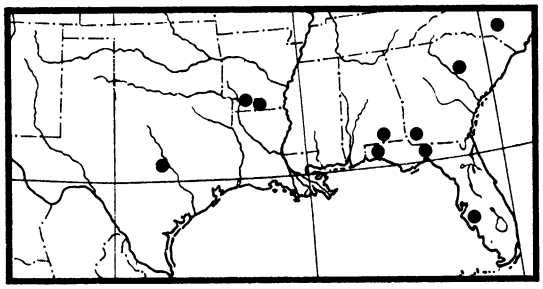


FIG. 11. Distribution of *Bledius cognatus* in southeastern United States.

localities). All the collections but three are of one or two specimens each and only one series has habitat data on the labels. North of Tallahassee, I found 20 specimens in soil recently wet from rains. The species rarely might be collected, and in small numbers because normally it is found in temporarily moist soil. Such temporary habitats are often overlooked by collectors, are unpredictable, and difficult to find.

DISCUSSION: In LeConte's collection of *cognatus* the two specimens from North Carolina and South Carolina are *cognatus* but those from Florida are *wudus*.

### 2. *Bledius emarginatus* (Say)

Figures 12–18, 334–336; Table 1

*Oxytelus emarginatus* Say, 1834, p. 461. (Type locality: Indiana. Holotype apparently lost).

*Bledius emarginatus* (Say): Erichson, 1840, p. 780 (transferred to *Bledius*). LeConte, 1877, p. 226, 231. Blatchley, 1910, p. 466.

*Bledius troglodytes* Erichson, 1840, p. 774. LeConte, 1877, p. 231 (cited as junior synonym of *emarginatus*). Casey, 1889, p. 56. (Type locality: Carolina meridionali. Type in Museum für Naturkunde an der Humboldt-Universität zu Berlin, type examined).

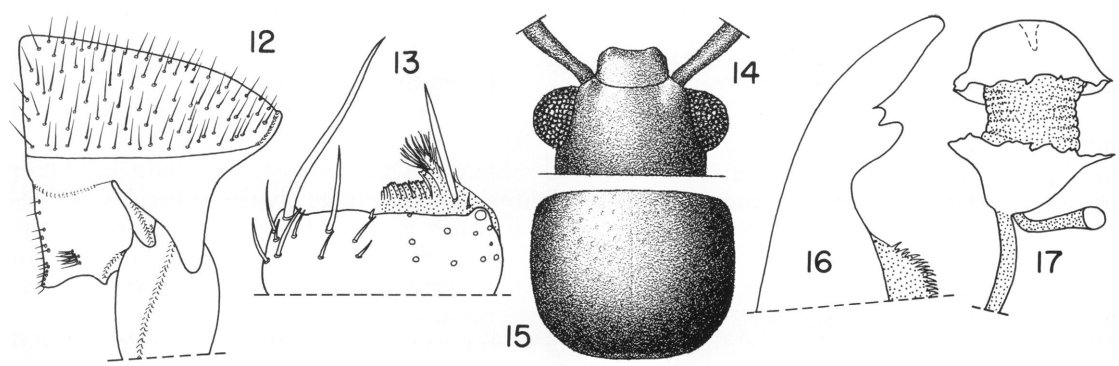
DIAGNOSIS: *Bledius emarginatus* is distinguished from *cognatus* by the dully shining, finely punctate dorsum of the head (fig. 14) and from *wudus* by the long apical denticle and small middle and large basal mandibular denticles (fig. 16); the middle and basal denticles are closely associated and the middle denticle is tucked in between the basal and apical denticles. The dorsum of the head of *cognatus* is strongly shining to polished and the punctation is coarse (fig. 3). The middle and basal denticles of *wudus* are of nearly equal size and the apical denticle is short (figs. 19–21).

DESCRIPTION: *emarginatus* group.

Length 1.8 to 2.7 mm.

Color black, reddish brown, and yellowish brown. Head black to dark reddish brown. Pronotum and abdomen dark reddish brown to pale reddish brown. Elytra yellowish brown with broad, diffuse, pale reddish brown sutural stripe; epipleuron yellowish brown. Antennae pale reddish brown. Legs yellowish brown.

Dorsum of head shining dully to moderately strongly, not polished; microgranulate ground sculpturing well developed; punctation (fig. 14) dense, shallow, fine, and feeble to weak; pubescence moderately long; dorsum of head broadly rounded, without tu-




FIGS. 12–17. *Bledius emarginatus*. 12. Prothorax, lateral view. 13. Labrum, right setae and left epipharyngeal lobes removed. 14. Head, dorsal view. 15. Pronotum. 16. Mandible, left. 17. Spermatheca.

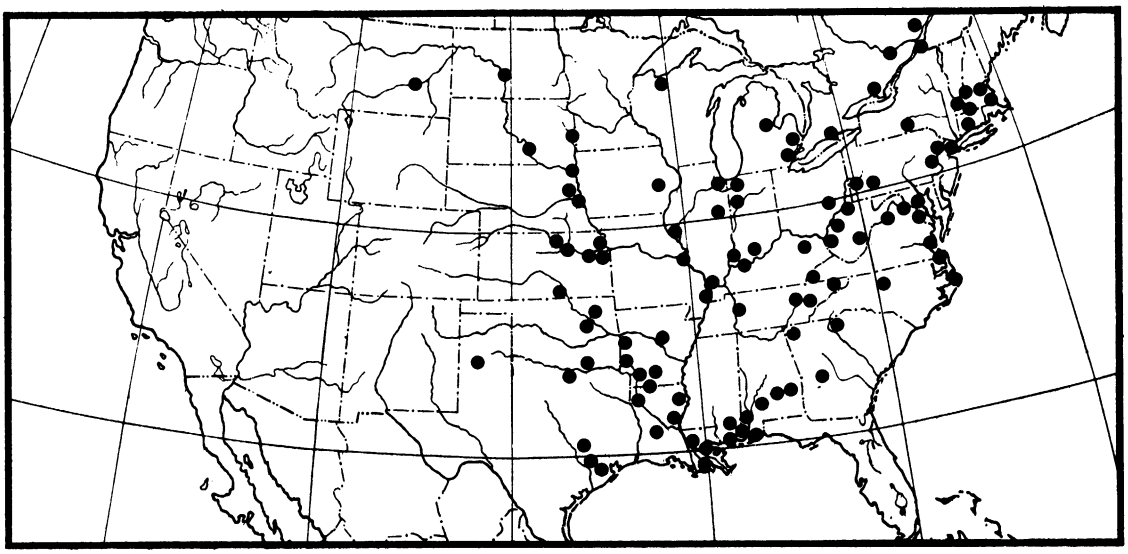


FIG. 18. Distribution of *Bledius emarginatus* in the United States and Canada.

mescence; dorsum with shallow, median, punctiform, postocular depression; dorsum without transverse, postocular depression. Clypeus shining dully to strongly, not polished; microgranulate ground sculpturing well developed; punctation feeble; anterior margin of male with broad well-developed tubercles near lateral margin; anterior margin of female without or with feebly developed tubercles or laminae. Eyes large. Width of head 0.40 to 0.46 mm.; interocular width 0.23 to 0.28 mm.; head width/interocular width 1.67 to 1.82. Labrum (fig. 13) with unreflexed, truncate anterior margin. Mandibles (fig. 16) tridentate; apical denticle elongate; middle denticle small and tucked tightly between apical and basal denticles; basal denticle large. Antennomeres 3 to 5 without, but 6 to 7 with, moderately developed ridge encircling apex.

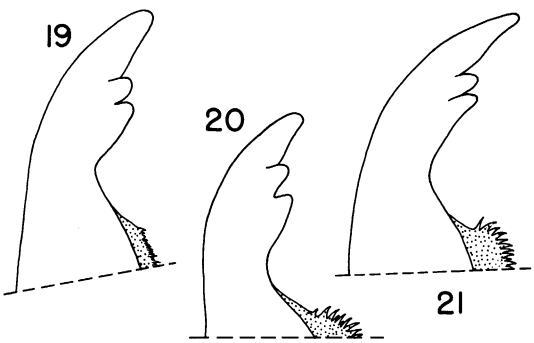
Pronotum 0.44 to 0.49 mm. wide; 0.36 to 0.42 mm. long; pronotal width/pronotal length 1.12 to 1.34; pronotum (fig. 15) strongly convex; lateral margin gradually curved from anterior margin to base; basal angles absent to feebly developed and rounded; anterior angles rounded and even with anterior margin. Pronotal surface shining dully to moderately strongly; microgranulate ground sculpturing strongly to weakly developed; punctation more prominent than ground sculpturing, dense and moderately deep (fig. 15); pubescence moderately long; midlongitudinal groove well developed. Prohypomeron strongly shining, with well-developed ground sculpturing. Procoxal fissure (figs. 12, 336) open for entire length; protrochantin exposed. Prosternal setigerous pit weakly developed with a few setae in depression. Elytra 0.50 to 0.56 mm. long; elytral length/pronotal length 1.24 to 1.40; elytra densely and finely punctate; pubescence moderately long and posteriorly directed; posterior margin with membranous lobe; posterior margin broadly rounded.

Abdominal tergal pubescence moderately long and medioposteriorly directed; terga IV to VI shallowly impressed at base. Tergum VIII with feeble, isodiametric polygonal ground sculpturing. Sternites with uniformly dense pubescence; ground sculpturing moderately well developed. Sternites VII and VIII unmodified.

Spermatheca as in figure 17.

Aedeagus with microsetae on apex of parameres.

SEXUAL DIMORPHISM: The males have a pair of well-developed tubercles on the anterior margin of the clypeus; the females either lack these tubercles or have feebly developed ones.




FIGS. 19–21. *Bledius wudus*. Mandible, left, variation. 19. Tall Timbers, Florida. 20. Billy Island, Georgia. 21. Waycross, Georgia.

HABITAT AND DISTRIBUTION: *Bledius emarginatus* is widespread occurring from the eastern coastal states west to eastern Montana. It has not been found in eastern South Carolina, southern Georgia and Florida where it is replaced by *Bledius wudus* (fig. 18; see Appendix I for localities).

NATURAL HISTORY: *Bledius emarginatus* was collected with *Dyschirius affinis* Fall at Walshingham, Ontario.

DISCUSSION: *Bledius emarginatus* was originally included in *Oxytelus* (Say, 1834). Erichson (1840, p. 780), without commenting, moved the species to *Bledius*. There is no way to confirm or dispute the generic assignment nor the species identity since the type is evidently lost.

### 3. **Bledius wudus**, new species
Figures 19–22, 337; Table 1

HOLOTYPE: Florida: Leon County: 20 miles N Tallahassee, Tall Timbers Research Station, March 21, 1971, collected by Lee Herman, deposited in the American Museum of Natural History.

PARATYPES: Eleven with same data as holotype and deposited with holotype.

DIAGNOSIS: *Bledius wudus* is distinguished from *cognatus* by the fine punctation and dully shining dorsum of the head (as in fig. 14). It is similar to *emarginatus* in all respects but the mandibular denticulation; the apical denticle of *wudus* is short and the basal and middle denticles are of nearly equal size (figs. 19–21). The apical denticle of *emarginatus* is long and the middle denticle is much smaller than the basal one (figs. 19–21).

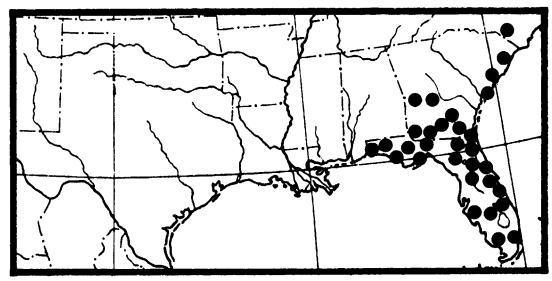


FIG. 22. Distribution of *Bledius wudus* in southeastern United States.

DESCRIPTION: *emarginatus* group.

Length 1.7 to 2.6 mm.

Color reddish brown and yellowish brown. Head and pronotum bright reddish brown to dark reddish brown. Abdomen reddish brown to dark reddish brown. Elytra yellowish brown and usually with diffuse, pale reddish brown sutural stripe; epipleuron yellowish brown. Legs and antennae pale reddish brown to yellowish brown.

Dorsum of head shining dully, not polished; microgranulate ground sculpturing well developed; punctation (as in fig. 14) dense, shallow, and moderately strong; pubescence moderately long; dorsum of head broadly rounded, without tumescence; dorsum with feeble, median postocular depression, transverse, postocular depression feeble to absent. Clypeus shining dully, not polished; microgranulate ground sculpturing well developed; punctation feeble; anterior margin of male with broad, well-developed tubercles near lateral margin; anterior margin of female without tubercles or laminae. Eyes moderately large to large. Width of head 0.39 to 0.46 mm.; interocular width 0.23 to 0.29 mm.; head width/interocular width 1.56 to 1.70. Labrum (as in fig. 13) with unreflexed, truncate anterior margin. Mandibles (figs. 19–21) tridentate; apical denticle short; middle and basal denticles of nearly equal size. Antennomeres 3 to 5 without but 6 and 7 with, moderately developed ridge encircling apex.

Pronotum 0.40 to 0.50 mm. wide; 0.34 to 0.41 mm. long; pronotal width/pronotal length 1.15 to 1.23; pronotum (as in fig. 15) strongly convex; lateral margin gradually curved from anterior margin to base; basal

angles absent to feebly developed; anterior angles rounded and even with anterior margin. Pronotal surface shining dully to moderately strongly; microgranulate ground sculpturing strongly to weakly developed; punctation more prominent than ground sculpturing, dense and moderately deep; pubescence moderately long; midlongitudinal groove well developed. Prohypomeron strongly shining, with well-developed ground sculpturing. Procoxal fissure open for entire length; protrochantin exposed. Prosternal setigerous pit weakly developed, with few setae. Elytra 0.44 to 0.51 mm. long; elytral length/pronotal length 1.21 to 1.34; elytra densely and finely punctate; pubescence moderately long and posteriorly directed; posterior margin with membranous lobe; posterior margin broadly rounded.

Abdominal tergal pubescence moderately long and medioposteriorly directed; terga IV to VI shallowly impressed at base. Tergum VIII with feeble isodiametric polygonal ground sculpturing. Sternites with uniformly dense pubescence; ground sculpturing feeble to moderately well developed. Sternites VII to VIII unmodified.

Spermatheca as in figure 17.

Aedeagus with microsetae on apex of parameres.

SEXUAL DIMORPHISM: The males have a pair of broad, moderately well-developed tubercles on the anterior margin; the females lack them.

HABITAT AND DISTRIBUTION: *Bledius wudus* is known only from Florida, southern Georgia, and eastern North and South Carolina. It is replaced in the remainder of the eastern and midwestern United States by *B. emarginatus* (fig. 22; see Appendix I for localities). At Tall Timber Research Station, the only locality from which I have habitat data, the species was found in moist soil on a patch of unvegetated soil in a field.

DISCUSSION: *Bledius emarginatus* and *wudus* are allopatric although in central Georgia collections of the two species have been made in adjacent counties. The two species are separated only by mandibular characters but since they are consistent I regard them as two species.

ETYMOLOGY: From the Anglo-Saxon *wudu* for woody or wooden.

## *annularis* GROUP

Figures 23–322, 340–410; Table 2

DIAGNOSIS: The *annularis* group can be recognized by the midlongitudinally separated labrum (figs. 26, 69, 261), the usually open procoxal fissure (fig. 257) and presence of a setigerous prosternal pit (fig. 236) and elytral epipleural ridge.

DESCRIPTION: *Bledius.* Supra-antennal horns absent. Clypeal tubercles or laminae present and moderately large to small or absent. Gular sutures confluent to submentum and sharply divergent at base. Labrum with deep (figs. 26, 84) or shallow (figs. 239, 285) median emargination; emargination continuous with midlongitudinal groove; anterior margin often feebly reflexed. Labial palpus with second segment longer than, equal to, or shorter, than length of first and third segments; basal and second segment each with one seta. Hypopharynx as in figures 340, 341, 343–347, 351–353, 356–359, 362–371, 375–377, 381–383, 387–410. Maxillary palpus as in figure 8. Galea with numerous, long, spine-like setae. Mandibles bidentate (figs. 30, 52) or tridentate (figs. 209–232, 268).

Pronotal shape variable. Pronotal horn absent. Pronotal lateral marginal bead present and entire. Protergosternal suture present and approximately parallel to marginal bead for most of length then curved and convergent near apex (figs. 244, 279). Procoxal fissure usually open for entire length (fig. 257), occasionally (see for example *B. turgidus* fig. 244 and *B. viriosus* fig. 252) closed for most of length and open only at ventral edge. Protrochantin exposed for entire length of fissure or only at base of fissure for a few species. Prosternal process present. Prosternum with small, densely setigerous pit anterior to procoxa (except *B. viriosus* which lacks it). Elytra with or without small membranous lobe on posterior margin; epipleural ridge present and complete.

Abdomen with posterior margin of tergum VIII emarginate and margin entire.

Aedeagus (figs. 23, 205) trilobed. Median lobe dorsoventrally flattened apically; base bulbous; dorsal surface membranous; ventral surface sclerotized, with midlongitudinal membranous stripe on apical portion and, occasionally, with membranous patches near

TABLE 2

**Measurements (in Millimeters) of the Head, Prothorax, and Elytra of Adults of the *annularis* Group**

(The mean, standard deviation, and sample size are given in that order for each sample.)

| | Head Width | Interocular Width | Pronotal Width | Pronotal Length | Elytral Length | Head Width / Interocular Width | Pronotal Width / Pronotal Length | Elytral Length / Pronotal Length |
|---|---|---|---|---|---|---|---|---|
| *albonotatus* | | | | | | | | |
| ♂ | 0.71 0.02 20 | 0.46 0.01 20 | 0.86 0.03 20 | 0.68 0.02 20 | 1.11 0.04 20 | 1.58 0.02 20 | 1.28 0.02 20 | 1.65 0.06 20 |
| ♀ | 0.71 0.02 20 | 0.46 0.01 20 | 0.86 0.04 20 | 0.66 0.03 20 | 1.10 0.04 20 | 1.57 0.02 20 | 1.30 0.03 20 | 1.65 0.04 20 |
| *aurantius* | 0.50 0.01 20 | 0.34 0.01 20 | 0.59 0.02 20 | 0.52 0.02 20 | 0.68 0.02 20 | 1.46 0.02 20 | 1.14 0.02 20 | 1.30 0.03 20 |
| *bicolor* | 0.65 0.02 20 | 0.44 0.02 20 | 0.72 0.03 20 | 0.61 0.02 20 | 0.92 0.03 20 | 1.48 0.02 20 | 1.19 0.02 20 | 1.52 0.02 20 |
| *cedarensis* | 0.91 0.02 6 | 0.64 0.01 6 | 1.16 0.03 6 | 0.98 0.02 6 | 1.08 0.02 6 | 1.43 0.03 6 | 1.18 0.02 6 | 1.09 0.02 6 |
| *clarus* | | | | | | | | |
| California, L.A. Co. | 0.49 0.01 8 | 0.35 0.01 8 | 0.57 0.01 8 | 0.51 0.01 8 | 0.61 0.02 8 | 1.40 0.02 8 | 1.12 0.01 8 | 1.18 0.03 8 |
| California, Ojai | 0.49 0.02 20 | 0.35 0.02 20 | 0.58 0.02 20 | 0.51 0.02 20 | 0.63 0.03 20 | 1.39 0.04 20 | 1.12 0.02 20 | 1.22 0.03 20 |
| *confusus* | 0.64 0.01 20 | 0.46 0.01 20 | 0.76 0.02 20 | 0.62 0.02 20 | 0.74 0.04 20 | 1.41 0.02 20 | 1.22 0.03 20 | 1.20 0.04 20 |
| *diagonalis* | | | | | | | | |
| Arizona, Tucson (small form) | 0.69 0.02 20 | 0.44 0.01 20 | 0.79 0.03 20 | 0.62 0.02 20 | 0.93 0.03 20 | 1.55 0.02 20 | 1.26 0.03 20 | 1.50 0.05 20 |
| California, Palm Springs (small form) | 0.69 0.02 20 | 0.44 0.01 20 | 0.77 0.02 20 | 0.60 0.02 20 | 0.89 0.03 20 | 1.55 0.03 20 | 1.27 0.03 20 | 1.48 0.04 20 |
| California, Arroyo Grande (rectangulate form) | 0.68 0.01 9 | 0.44 0.01 9 | 0.81 0.02 9 | 0.66 0.02 9 | 1.01 0.04 9 | 1.56 0.03 9 | 1.23 0.03 9 | 1.52 0.05 9 |
| California, Lake Arrowhead (small form) | 0.68 0.02 20 | 0.44 0.02 20 | 0.79 0.03 20 | 0.64 0.03 20 | 0.98 0.04 20 | 1.52 0.02 20 | 1.25 0.02 20 | 1.54 0.04 20 |
| California, various localities (rectangulate forms) | 0.81 0.04 14 | 0.52 0.02 14 | 0.96 0.03 14 | 0.78 0.02 14 | 1.14 0.03 14 | 1.56 0.03 14 | 1.24 0.03 14 | 1.48 0.03 14 |
| California, San Vicente (large form) | 0.76 0.02 20 | 0.48 0.02 20 | 0.92 0.03 20 | 0.74 0.03 20 | 1.11 0.04 20 | 1.57 0.03 20 | 1.23 0.03 20 | 1.50 0.04 20 |

TABLE 2—(*Continued*)

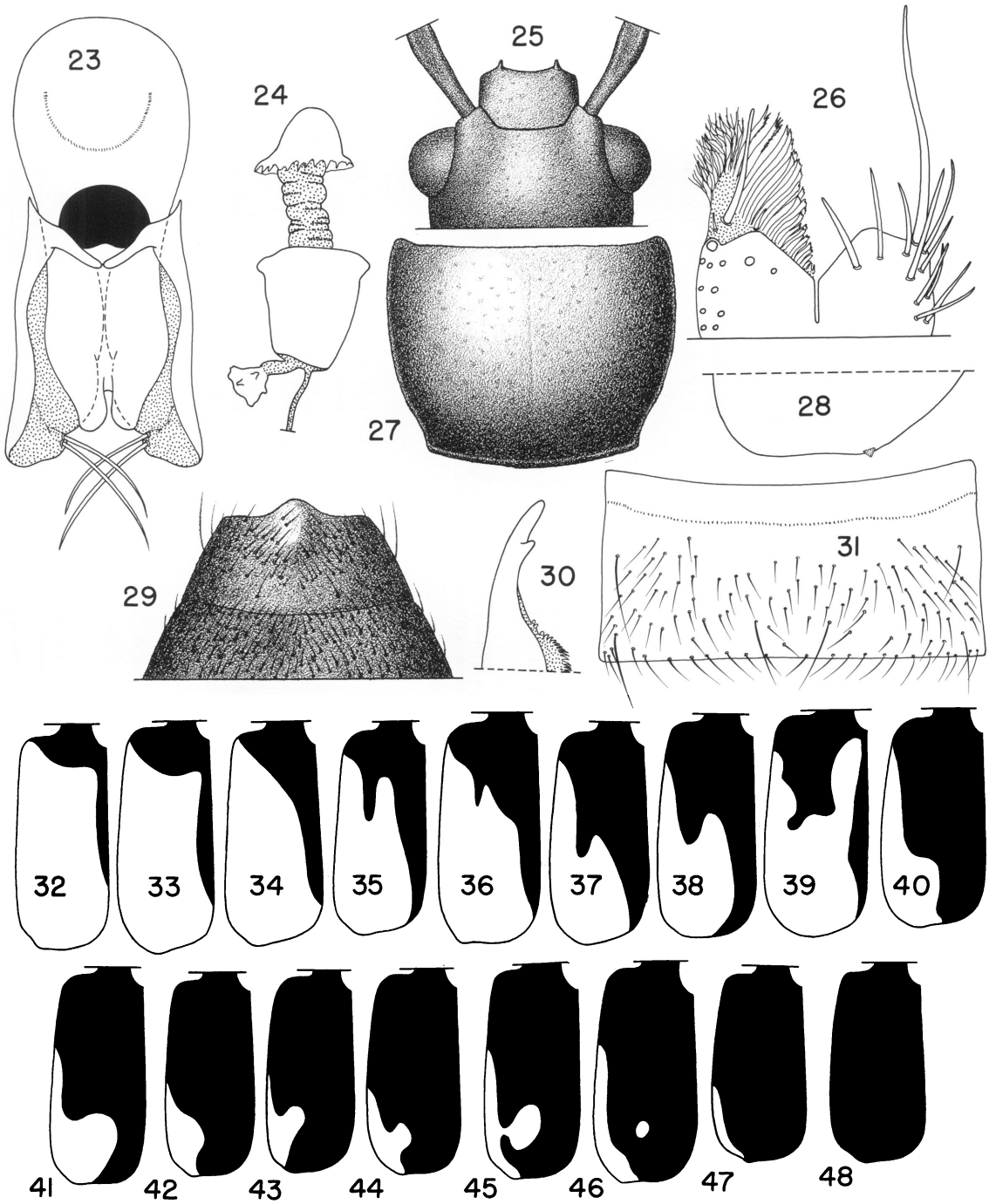
| | Head Width | Interocular Width | Pronotal Width | Pronotal Length | Elytral Length | Head Width / Interocular Width | Pronotal Width / Pronotal Length | Elytral Length / Pronotal Length |
|---|---|---|---|---|---|---|---|---|
| *gentilis* | | | | | | | | |
| Colorado, Garland | 0.54 0.01 20 | 0.36 0.01 20 | 0.62 0.02 20 | 0.52 0.02 20 | 0.70 0.03 20 | 1.48 0.03 20 | 1.20 0.03 20 | 1.36 0.03 20 |
| Arizona, Santa Catalina Mountains | 0.56 0.02 20 | 0.37 0.02 20 | 0.63 0.03 20 | 0.52 0.02 20 | 0.78 0.03 20 | 1.51 0.03 20 | 1.18 0.02 20 | 1.46 0.03 20 |
| Oregon, Florence and Sucker Creek | 0.52 0.01 20 | 0.34 0.01 20 | 0.60 0.02 20 | 0.51 0.01 20 | 0.74 0.01 20 | 1.54 0.03 20 | 1.19 0.03 20 | 1.46 0.08 20 |
| *gracilis* | 0.47 0.01 20 | 0.32 0.01 20 | 0.53 0.01 20 | 0.47 0.02 20 | 0.47 0.01 20 | 0.32 0.01 20 | 0.53 0.01 20 | 0.47 0.02 20 |
| *habrus* | | | | | | | | |
| British Columbia, Mt. Revelstoke | 0.68 0.02 18 | 0.48 0.01 18 | 0.78 0.02 18 | 0.66 0.02 18 | 0.84 0.04 18 | 1.42 0.02 18 | 1.18 0.02 18 | 1.27 0.03 18 |
| Alaska, Hess Creek | 0.61 0.02 20 | 0.45 0.02 20 | 0.72 0.03 20 | 0.63 0.03 20 | 0.80 0.04 20 | 1.38 0.02 20 | 1.15 0.02 20 | 1.28 0.03 20 |
| *jucundus* | | | | | | | | |
| ♂ | 0.78 0.02 10 | 0.52 0.02 10 | 0.97 0.04 10 | 0.85 0.05 10 | 1.06 0.04 10 | 1.48 0.03 10 | 1.14 0.02 10 | 1.25 0.04 10 |
| ♀ | 0.78 0.02 10 | 0.53 0.02 10 | 0.96 0.03 10 | 0.83 0.03 10 | 1.08 0.04 10 | 1.47 0.02 10 | 1.15 0.01 10 | 1.29 0.02 10 |
| *laticollis* | | | | | | | | |
| Various localities | 0.78 0.04 20 | 0.54 0.03 20 | 0.92 0.06 20 | 0.77 0.06 20 | 0.96 0.06 20 | 1.45 0.03 20 | 1.20 0.02 20 | 1.25 0.07 20 |
| California, La Grange | 0.80 0.02 20 | 0.54 0.02 20 | 0.96 0.04 20 | 0.78 0.04 20 | 1.02 0.03 20 | 1.47 0.02 20 | 1.23 0.02 20 | 1.33 0.05 20 |
| *melanocolus* | 0.61 0.02 20 | 0.41 0.02 20 | 0.71 0.02 20 | 0.59 0.02 20 | 0.88 0.03 20 | 1.50 0.03 20 | 1.20 0.02 20 | 1.47 0.04 20 |
| *monticola* | | | | | | | | |
| California, Yuba Pass | 0.49 0.01 20 | 0.36 0.01 20 | 0.52 0.02 20 | 0.46 0.02 20 | 0.59 0.03 20 | 1.37 0.02 20 | 1.14 0.02 20 | 1.28 0.05 20 |
| Oregon, Mt. Hood | 0.48 0.01 8 | 0.36 0.01 8 | 0.52 0.02 8 | 0.46 0.01 8 | 0.54 0.02 8 | 1.35 0.02 8 | 1.15 0.03 8 | 1.19 0.03 8 |
| *naius* | | | | | | | | |
| *nardus* | 0.67 0.02 3 | 0.46 0.01 3 | 0.75 0.06 3 | 0.62 0.06 3 | 0.69 0.06 3 | 1.46 0.01 3 | 1.21 0.02 3 | 1.12 0.01 3 |
| Washington, Tenino | 0.64 0.01 21 | 0.44 0.01 21 | 0.77 0.02 21 | 0.68 0.02 21 | 0.95 0.03 21 | 1.46 0.02 21 | 1.41 0.03 21 | 1.41 0.04 21 |
| British Columbia, various localities | 0.58 0.02 18 | 0.39 0.01 18 | 0.64 0.03 18 | 0.56 0.02 18 | 0.80 0.03 18 | 1.48 0.03 18 | 1.16 0.03 18 | 0.43 0.04 18 |

TABLE 2—(*Continued*)

| | Head Width | Interocular Width | Pronotal Width | Pronotal Length | Elytral Length | Head Width / Interocular Width | Pronotal Width / Pronotal Length | Elytral Length / Pronotal Length |
|---|---|---|---|---|---|---|---|---|
| *newelli* | | | | | | | | |
| ♂ | 0.85 0.02 10 | 0.60 0.02 10 | 1.17 0.05 10 | 0.96 0.04 10 | 1.09 0.04 10 | 1.41 0.01 10 | 1.21 0.02 10 | 1.13 0.03 10 |
| ♀ | 0.85 0.02 10 | 0.61 0.02 10 | 1.06 0.04 10 | 0.88 0.02 10 | 1.08 0.04 10 | 1.40 0.02 10 | 1.20 0.01 10 | 1.23 0.02 10 |
| *omega* | 0.63 0.02 20 | 0.39 0.01 20 | 0.75 0.02 20 | 0.57 0.02 20 | 0.90 0.03 20 | 1.63 0.03 20 | 1.31 0.02 20 | 1.58 0.95 20 |
| *parvicollis* | 0.78 0.02 19 | 0.51 0.01 19 | 0.96 0.03 19 | 0.77 0.03 19 | 1.24 0.05 19 | 1.52 0.02 19 | 1.22 0.02 19 | 1.57 0.04 19 |
| *persimilis* | 0.50 0.01 20 | 0.34 0.01 20 | 0.59 0.02 20 | 0.52 0.02 20 | 0.69 0.02 20 | 1.49 0.03 20 | 1.14 0.03 20 | 1.33 0.03 20 |
| *phytosinus* | 0.51 0.01 3 | 0.35 0.01 3 | 0.56 0.01 3 | 0.46 0.02 3 | 0.59 0.02 3 | 1.47 0.05 3 | 1.22 0.1 3 | 1.30 0.1 3 |
| *ruficornis* | | | | | | | | |
| California, Yorkville | | | | | | | | |
| ♂ | 0.66 0.02 10 | 0.44 0.01 10 | 0.79 0.03 10 | 0.68 0.03 10 | 0.95 0.04 10 | 1.49 0.02 10 | 1.18 0.02 10 | 1.41 0.04 10 |
| ♀ | 0.68 0.02 10 | 0.45 0.01 10 | 0.75 0.02 10 | 0.64 0.02 10 | 0.96 0.03 10 | 1.50 0.03 10 | 1.18 0.02 10 | 1.51 0.03 10 |
| South Dakota, Spearfish | 0.66 0.02 20 | 0.44 0.01 20 | 0.74 0.02 20 | 0.61 0.02 20 | 0.92 0.03 20 | 1.46 0.07 20 | 1.21 0.02 20 | 1.51 0.03 20 |
| New York, Croton Point Park | 0.61 0.02 18 | 0.43 0.02 18 | 0.67 0.02 18 | 0.56 0.02 18 | 0.73 0.04 18 | 1.42 0.02 18 | 1.20 0.02 18 | 1.32 0.02 18 |
| *suturalis* | | | | | | | | |
| Washington, Packwood (small form) | 0.48 0.01 20 | 0.29 0.01 20 | 0.53 0.01 20 | 0.44 0.01 20 | 0.69 0.02 20 | 1.60 0.03 20 | 1.20 0.02 20 | 1.56 0.03 20 |
| Yukon Territory, Dawson City (small form) | 0.49 0.01 20 | 0.32 0.01 20 | 0.56 0.01 20 | 0.46 0.01 20 | 0.71 0.02 20 | 1.52 0.03 20 | 1.21 0.03 20 | 1.54 0.03 20 |
| Washington, Packwood (medium form) | 0.58 0.01 20 | 0.38 0.01 20 | 0.68 0.02 20 | 0.59 0.02 20 | 0.86 0.02 20 | 1.54 0.03 20 | 1.16 0.03 20 | 1.46 0.04 20 |
| Idaho, Sand Point (medium form) | 0.58 0.02 20 | 0.38 0.01 20 | 0.68 0.02 20 | 0.58 0.02 20 | 0.86 0.04 20 | 1.52 0.02 20 | 1.17 0.02 20 | 1.49 0.04 20 |
| New Mexico, Quemado (medium form) | 0.59 0.02 20 | 0.39 0.01 20 | 0.68 0.02 20 | 0.55 0.02 20 | 0.85 0.02 20 | 1.54 0.03 20 | 1.23 0.02 20 | 1.54 0.04 20 |
| California, Idyllwild (large form) | 0.65 0.02 20 | 0.42 0.01 20 | 0.76 0.02 20 | 0.66 0.02 20 | 0.96 0.03 20 | 1.51 0.02 20 | 1.14 0.03 20 | 1.44 0.04 20 |
| California, north of Ojai (large form) | 0.66 0.01 16 | 0.44 0.01 16 | 0.77 0.03 16 | 0.68 0.02 16 | 0.99 0.04 16 | 1.51 0.02 16 | 1.14 0.02 16 | 1.47 0.03 16 |

TABLE 2—(*Continued*)

| | Head Width | Interocular Width | Pronotal Width | Pronotal Length | Elytral Length | Head Width / Interocular Width | Pronotal Width / Pronotal Length | Elytral Length / Pronotal Length |
|---|---|---|---|---|---|---|---|---|
| *tarandus* | | | | | | | | |
| Newfoundland, various localities | 0.61 0.02 20 | 0.41 0.02 20 | 0.72 0.03 20 | 0.59 0.02 20 | 0.85 0.03 20 | 1.48 0.03 20 | 1.24 0.02 20 | 1.45 0.04 20 |
| Oregon, Reedsport | 0.57 0.01 20 | 0.38 0.01 20 | 0.69 0.02 20 | 0.54 0.02 20 | 0.87 0.04 20 | 1.51 0.02 20 | 1.26 0.03 20 | 1.61 0.06 20 |
| Washington, Longmire | 0.54 0.02 17 | 0.35 0.02 17 | 0.63 0.03 17 | 0.49 0.02 17 | 0.82 0.04 17 | 1.55 0.03 17 | 1.28 0.02 17 | 1.66 0.04 17 |
| *tau* | 0.71 0.02 20 | 0.45 0.01 20 | 0.84 0.03 20 | 0.66 0.03 20 | 1.06 0.04 20 | 1.60 0.02 20 | 1.27 0.02 20 | 1.62 0.05 20 |
| *turgidus* | | | | | | | | |
| Colorado | | | | | | | | |
| ♂ | 0.87 0.04 5 | 0.63 0.02 5 | 1.15 0.09 5 | 1.01 0.08 5 | 1.08 0.07 5 | 1.37 0.03 5 | 1.13 0.01 5 | 1.06 0.01 5 |
| ♀ | 0.84 0.02 5 | 0.62 0.01 5 | 1.11 0.06 5 | 0.94 0.04 5 | 1.04 0.05 5 | 1.35 0.01 5 | 1.18 0.03 5 | 1.10 0.04 5 |
| Montana, West Yellowstone | | | | | | | | |
| ♂ | 0.83 0.02 5 | 0.60 0.01 5 | 1.10 0.02 5 | 0.94 0.02 5 | 1.02 0.03 5 | 1.38 0.01 5 | 1.16 0.01 5 | 1.09 0.01 5 |
| ♀ | 0.82 0.01 5 | 0.61 0.01 5 | 1.05 0.02 5 | 0.91 0.02 5 | 1.04 0.03 5 | 1.37 0.02 5 | 1.15 0.02 5 | 1.13 0.01 5 |
| Manitoba, Riding Mtn. Nat. Park | | | | | | | | |
| ♂ | 1.04 0.03 10 | 0.76 0.01 10 | 1.33 0.03 10 | 1.16 0.03 10 | 1.24 0.03 10 | 1.38 0.02 10 | 1.15 0.01 10 | 1.08 0.03 10 |
| ♀ | 1.04 0.04 10 | 0.76 0.04 10 | 1.26 0.06 10 | 1.11 0.05 10 | 1.23 0.05 10 | 1.37 0.03 10 | 1.15 0.03 10 | 1.12 0.03 10 |
| *venus* | 0.71 0.02 20 | 0.44 0.01 20 | 0.88 0.03 20 | 0.74 0.03 20 | 1.02 0.03 20 | 1.58 0.02 20 | 1.19 0.02 20 | 1.38 0.03 20 |
| *villosus* | 0.72 0.02 20 | 0.50 0.01 20 | 0.82 0.02 20 | 0.74 0.02 20 | 0.99 0.04 20 | 1.45 0.02 20 | 1.11 0.02 20 | 1.33 0.04 20 |
| *viriosus* | | | | | | | | |
| ♂ | 0.80 0.02 10 | 0.57 0.02 10 | 1.03 0.04 10 | 0.86 0.04 10 | 1.02 0.04 10 | 1.42 0.02 10 | 1.20 0.02 10 | 1.20 0.02 10 |
| ♀ | 0.81 0.03 10 | 0.58 0.02 10 | 0.98 0.05 10 | 0.81 0.04 10 | 1.03 0.06 10 | 1.40 0.02 10 | 1.22 0.02 10 | 1.27 0.02 10 |
| *zophus* | | | | | | | | |
| Washington, American River | 0.77 0.02 20 | 0.51 0.01 20 | 0.89 0.03 20 | 0.75 0.02 20 | 1.15 0.05 20 | 1.52 0.03 20 | 1.19 0.03 20 | 1.54 0.05 20 |
| Washington, Tenino | 0.81 0.01 20 | 0.54 0.02 20 | 0.95 0.02 20 | 0.81 0.02 20 | 1.23 0.03 20 | 1.51 0.02 20 | 1.18 0.02 20 | 1.53 0.94 20 |
| British Columbia, various localities | 0.75 0.02 7 | 0.50 0.01 7 | 0.90 0.03 7 | 0.74 0.01 7 | 1.18 0.04 7 | 1.50 0.02 7 | 1.22 0.03 7 | 1.60 0.04 7 |




FIGS. 23–48. *Bledius albonotatus.* 23. Aedeagus. 24. Spermatheca. 25. Head. 26. Labrum, left setae and right epipharyngeal lobe removed. 27. Pronotum. 28. Elytron, right, apex, setae omitted. 29. Sternites VII and VIII, male. 30. Mandible, left. 31. Tergum V. 32–48. Elytra, left, variation of color pattern. 32–38. San Nicholas Island, California. 39. San Gregorio, California. 40. San Nicholas Island, California. 41–43. Winchester Bay, Oregon. 44. Long Beach, British Columbia. 45–46. Cambria, California. 47. Vancouver, British Columbia. 48. Wellington, British Columbia.

middle; ostium at apex. Parameres extending from ventral surface around to dorsal surface and enveloping dorsal surface; median surface membranous and capable of being inflated (when paramere is dried, the median surface can be scooped out) or cylindrical (fig. 183); parameres broad or slender, extending beyond apex of median lobe.

Spermatheca as shown in figures 24, 53, 158, 118, 219, 243.

DISCUSSION: The species of the *annularis* group can be further divided into those that have bidentate mandibles and those with tridentate mandibles. Both groups have a Holarctic distribution. The *annularis* group includes a large number of species, most of them difficult to identify.

### 4. *Bledius albonotatus* Mäklin

Figures 23–49, 340–352; Table 2

*Bledius albonotatus* Mäklin, 1853, p. 193. Keen, 1895, p. 170. (Type locality: "castellum Nicolajevsk peninsulae Kenai." A map in Mannerheim (1853) shows a "Nikolajewsche Redoute, on the Kenai Peninsula in Alaska." *Bledius albonotatus* was probably found near this fort. According to Orth (1967), near the village of Kenai was formerly a Redoute Saint Nikolaus. The type locality for *B. albonotatus* then is probably at or near the village of Kenai, Alaska. Holotype in the Museum Zoologicum Universitatis of Helsinki, Finland. Type examined).

*Bledius ornatus* LeConte, 1863, p. 53; 1877, pp. 226, 230. Fall, 1901, p. 75. Hatch, 1957, p. 104. Moore, 1964, pp. 273, 274, 277, 280–282; 1974. (Type locality: San Francisco, California. Type in the Museum of Comparative Zoology, Harvard University. Type examined). NEW SYNONYM.

*Bledius albidipennis* Bernhauer, 1912, p. 171. (Type locality: California, Laguna Beach. Lectotype designated here; Labels: Laguna Bch, S Cal Baker/7942/albidipennis Bernh. Typus/Lectotype label. Lectotype in the Field Museum of Natural History. Type examined but lacking head and prothorax). NEW SYNONYM.

DIAGNOSIS: The males of this bidentate species can be distinguished from other bidentate species of the *annularis* group by the large, low, conical tumescence of abdominal sternite VIII (fig. 29) and the broad, shallow emargination of sternite VII (fig. 29). The median setae of sternites VII and VIII are medioposteriorly directed. Most specimens

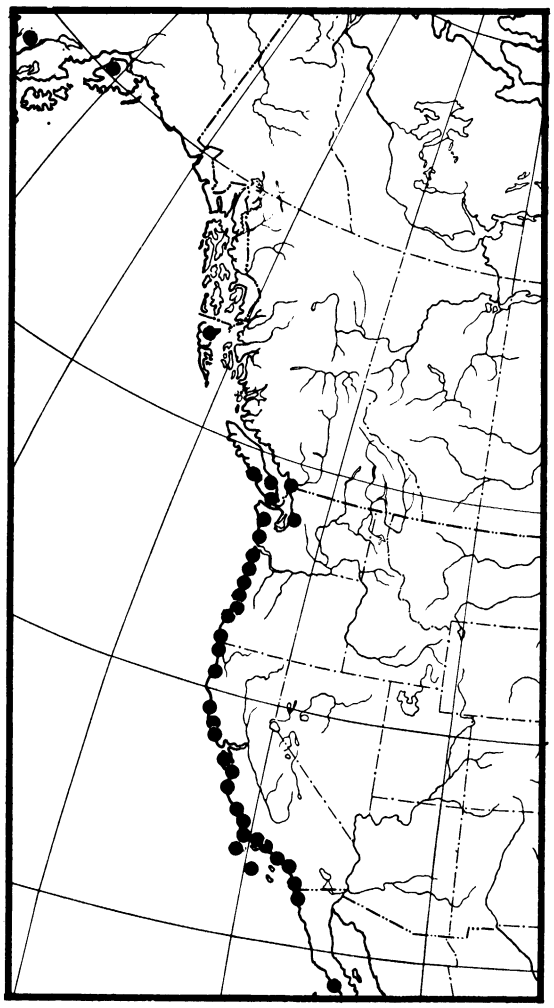


FIG. 49. Distribution of *Bledius albonotatus* in western North America.

of the species are easily recognized by the irregular shape of the yellowish or whitish lateroapical spot (figs. 32–47) of the bicolored elytra, the yellowish or whitish elytral epipleuron, the strongly acute, salient anterior pronotal angles (fig. 27), and the presence of narrow, acute clypeal tubercles (fig. 25). The lateroposteriorly directed patch of setae on the lateral base of the abdominal terga (figs. 31, 342) separates *albonotatus* from all species but *zophus*.

A few specimens of a series from San Nicholas Island off the California coast have a very narrow elytral sutural stripe with most of the

disk pale yellowish brown (figs. 32–34). These individuals may be identified by using the characters given above exclusive of the elytral color pattern.

DESCRIPTION: *annularis* group.

Length 3.2 to 5.5 mm.

Color black (some individuals are reddish to dark reddish brown but these are teneral adults). Elytra usually bicolored, generally with small (figs. 42–47) to moderately large (figs. 40, 41) to large (figs. 32–39) whitish yellow to brownish yellow to occasionally pale yellowish brown lateroapical spot; spot occasionally covering nearly entire elytral disk and occasionally with mesial spot separated (fig. 46); elytra occasionally with disk entirely black, yellowish brown spot absent (fig. 48); epipleuron pale, same color as lateroapical spot. Antennae dark brown to brown. Legs black to reddish brown to yellowish brown, often mottled yellowish brown and reddish brown; when black, metatibia and metatarsi yellowish brown.

Dorsum of head shining dully, not polished, surface with dense microgranulate ground sculpturing and dense fine punctation (fig. 25); pubescence long; dorsum nearly flat to slightly convex; postocular median depression and transverse depression very feeble or absent. Clypeus shining dully, with dense microgranulate ground sculpturing; punctation fine; anterior margin with moderately long, acute, spiniform tubercle on lateral portion. Eyes moderately large to large. Width of head 0.65 to 0.82 mm.; interocular width 0.41 to 0.51 mm.; head width/interocular width 1.52 to 1.63. Labrum with anterior margin slightly reflexed; anterior margin deeply emarginate (fig. 26). Mandibles (fig. 30) bidentate; basal tooth small to moderately large. Antennomeres 3 to 7 without ridge encircling apex.

Pronotum 0.75 to 0.97 mm. wide; 0.56 to 0.78 mm. long; pronotal width/pronotal length 1.21 to 1.33; pronotum moderately strongly convex (fig. 27); lateral margin broadly curved to strongly constricted basal fifth; basal angles rectangulate; anterior angles acute and strongly produced beyond remainder of anterior margin. Pronotal surface shining dully and with dense microgranulate ground sculpturing; punctation as prominent as ground sculpturing, dense and moderately coarse; pubescence long; midlongitudinal groove moderately well developed. Prohypomeron shining dully, with well developed ground sculpturing. Procoxal fissure open for entire length; protrochantin exposed. Prosternal setigerous pit well developed. Elytra 0.98 to 1.29 mm. long; elytral length/pronotal length 1.55 to 1.77; elytra densely and finely punctate; pubescence short and posteriorly directed; membranous lobe of posterior margin short, dorsally directed and surrounded by sclerotized lobe (fig. 28); posterior margin broadly rounded.

Abdominal tergal pubescence moderately dense, long, and posteriorly or mediposteriorly directed except for lateroposteriorly directed laterobasal portion (figs. 31, 342); terga IV to VI moderately deeply impressed at base. Tergum VIII with isodiametric polygonal ground sculpturing. Sternites IV to VIII of female unmodified. Sternites IV to VI of male with flattened median region, IV feebly flattened, V more strongly flattened and VI more strongly flattened than V. Sternite VII with median region flattened to about same degree as VI; posterior margin broadly and shallowly emarginate. Sternite VIII of male with low, rounded, broad, median tumescence (fig. 29). Male with pubescence of VI generally posteriorly directed but with setae laterad of midline pointed slightly mesad of posterior direction; sternite VII with pubescence mediposteriorly directed in and adjacent to flattened area; sternite VIII with pubescence laterad of median tumescence mediposteriorly directed.

Spermatheca as in figure 24.

Aedeagus with long, moderately stout setae near apex of parameres (fig. 23); parameres broad.

SEXUAL DIMORPHISM: The male has abdominal sternites IV to VIII modified (fig. 29) as indicated in the description. Males may be distinguished by these modifications from the female which lacks sternal modifications.

VARIATIONS: The color of the legs is progressively paler from black in the north to yellowish brown in the south. In particular, from Etolin Point and the Kenai Peninsula, Alaska south to southern British Columbia, the legs are black to dark reddish brown with the mesotibia somewhat paler and the metatibia yellowish brown. The procoxae may have yellowish infusions. From southern

British Columbia through Washington and into Oregon the legs are dark reddish brown to reddish brown, the mesotibia and metatibia are usually paler, the leg may have spots of yellowish brown and the yellowish infusions on the procoxae increase in size.

I have studied few specimens from southern Oregon south to near San Francisco but I have seen that the legs are notably paler on those from between Humboldt and Mendocino counties. From just north of San Francisco at Point Reyes to San Francisco the legs are reddish brown to pale reddish brown. South of San Francisco the legs are pale reddish brown. At Pismo Beach they are yellowish brown and remain so southward into northern Baja California.

As indicated in figures 32 to 48 the size and shape of the lateroapical spot of the elytron varies from small (figs. 42–47) to moderately large (figs. 40, 41) to large (figs. 36–37) to covering nearly the entire elytron (figs. 32–35). Usually there is a medially extended lobe (figs. 37–45). There seems to be no strongly geographical pattern to the variation; however, the small spot (fig. 47) occurs only rarely in the north but not at all to the south. At Wellington, British Columbia, three of 11 specimens have an entirely black elytral disk (fig. 48). The largest spots (figs. 32–40) are found only in the south, and in fact all are known from San Gregorio, Cambria, and San Nicolas Island, California. Moore (1964, p. 277) reports some specimens with only a dark basal band, with the remainder of the disk pale. I have not seen these. Also at Cambria, California, the pale mesial lobe that extends onto the disk is partially (fig. 45) to entirely (fig. 46) separated from the lateroapical portion. The remainder of the specimens examined have a lateroapical spot similar to those of figures 41 to 44; these patterns are found throughout the geographical range.

The anterior pronotal angles are not as produced and acute in those from the south as in those from the north.

One, evidently, teratological male from San Gregorio, California, has low, rounded, densely setigerous, tumescence near the middle of the pronotum adjacent to the lateral margin.

SYNONYMY: *Bledius albonotatus* Mäklin and *B. ornatus* LeConte represent the same species. The holotype of *albonotatus* has clypeal tubercles (fig. 25), produced anterior pronotal angles (fig. 27), and a yellowish brown elytral epipleuron and lateroapical elytral spot. The specimen is a male and has the unique broadly emarginate sternite VII and medioapical tumescence of sternite VIII. These are all characteristics of what other authors have called *B. ornatus* (LeConte, 1863, 1877; Fall, 1901; Hatch, 1957; Moore, 1964, 1974).

LeConte (1877, p. 230) considered *albonotatus* to be close to *ornatus* but Moore (1964) dismisses this because "the description of the latter [*albonotatus*] mentions that the legs are dark." The holotype of *albonotatus* indeed does have dark legs which distinguish it from populations in the southern part of the range, but as discussed under Variation this color difference represents geographic variation.

*Bledius albidipennis* Bernhauer is a junior synonym of *albonotatus* but the evidence to support this decision is slightly less decisive than is the case with *albonotatus* and *ornatus*. The segments of the body most important for identification of *Bledius*, the head and prothorax, are missing from the holotype of *albidipennis*. However, the abdomen of *albidipennis* has lateroposteriorly directed tergal pubescence of the lateral region with that of the median region posteromedially directed. The only two species of *Bledius* in the western coastal region of the United States with this pattern of abdominal tergal pubescence are *albonotatus* (figs. 31, 342) and *zophus* (fig. 112). The type of *albidipennis* has yellowish elytra with a dark reddish brown basal and sutural stripe and was collected on the seacoast under seaweed. *Bledius zophus* is eliminated from further consideration because its elytra are unicolored black to dark reddish and generally the species is found inland. On the other hand, although *albonotatus*, a coastal species, generally has largely black elytra with a yellowish lateroapical spot and epipleuron, some populations from the southern part of the range (*albidipennis* is from Orange County, California) have large yellowish elytra with a dark basal and sutural stripe (figs. 32–34; see Variation and also Moore, 1964, p. 277). The conspecificity of *albonotatus* and *albidipennis* is further supported by Bernhauer's description (1912). The most useful charac-

ters mentioned by Bernhauer for recognition of *albidipennis* are the pointed anterior pronotal angles, the curved, posteriorly convergent, lateral pronotal margins, and produced posterior basal angles. These, especially the pointed anterior pronotal angles, are all characteristic of *albonotatus*. The remaining characters given in the description of *albidipennis* do not preclude *albonotatus*.

HABITAT AND DISTRIBUTION: The species is known at coastal localities from Etolin Point and the Kenai Peninsula, Alaska, south through British Columbia, Washington, Oregon, California and into central Baja California, Mexico (fig. 49; see Appendix I for localities).

Fall and Cockerell (1907) and Snow (1906), based on collections made by Snow, reported the species from Santa Fe Canyon, New Mexico. Since all other localities for *albonotatus* are coastal I borrowed these specimens to verify the identification. Two specimens in the collection at University of Kansas identified as *ornatus* (=*albonotatus*) and collected in New Mexico by Snow were *B. turgidus*.

Moore (1964) reports *albonotatus* (as *ornatus*) is restricted to "the sand of the landward shore of a sandbar which separates an estuary from the ocean . . . ." Commenting further, Moore (1964) indicates he found the species in northern Baja California on the edge of a lagoon in a salt marsh. The lagoon was not connected to the ocean and apparently had not been for about 20 years at the time of collection. The species was collected from dark, muddy sand that lacked salt incrustation. In 1974, Moore further reported on *ornatus* stating the habitat to be damp sand flats near freshwater ponds formed by streams flowing toward the ocean.

In both Oregon and California I have found the species associated with moist sand flats near freshwater streams flowing into or toward the ocean, never in a strongly saline habitat. The species is restricted largely to coastal habitats but several miles upstream from the coast along the Smith River near Reedsport, Oregon I collected 17 specimens. This is the only collection of the species from so far inland that is known to me.

DISCUSSION: Since *albonotatus* was described (Mäklin, 1853) it has been referred to only once by its correct name (Keen, 1895); all other workers (LeConte, 1877; Fall, 1901; Hatch, 1957; Moore, 1964, 1974) have used *ornatus*, a name supplied by LeConte (1863). Hatch (1957) used *albonotatus* for *divisus* (=*tarandus*) which was originally described from more easterly localities. Uses of the name *albonotatus* prior to the present work must be examined carefully to attempt to determine what the workers mean. For example, although both LeConte (1877, p. 230) and Moore (1964, p. 277) seem to regard *albonotatus* and *ornatus* as different their concept of *albonotatus* is unclear but they both may be referring to the western populations of what I call *tarandus*. Furthermore, one of the specimens in LeConte's collection of *albonotatus* is actually *tarandus* (=*divisus*).

### 5. **Bledius venus**, new species

Figures 50–54, 349–351; Table 2

HOLOTYPE: Male. California: San Luis Obispo County: 13.6 miles ENE Arroyo Grande, Huasna Creek, 900 feet, May 25, 1981, collected by Lee Herman, deposited in the American Museum of Natural History.

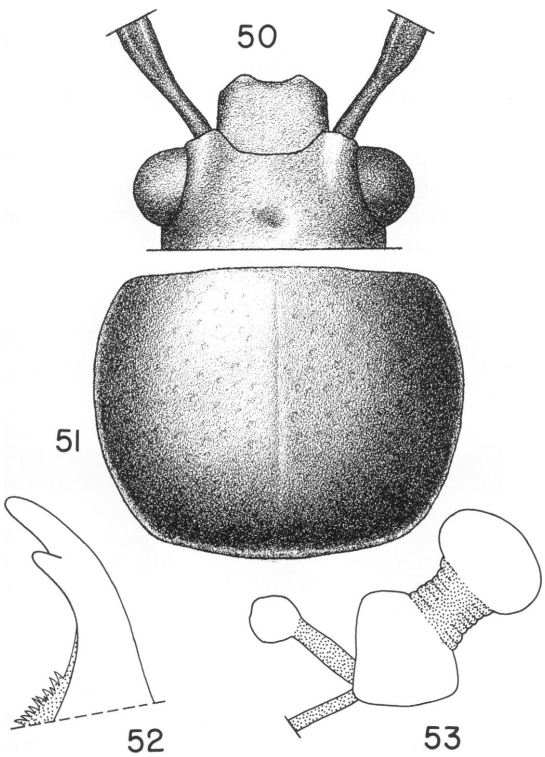
PARATYPES: 206 with same data as holotype; 182 deposited with holotype, four deposited in each of the following collections: British Museum (Natural History), Field Museum of Natural History, National Museum of Natural History, Smithsonian Institution, Museum of Comparative Zoology, Harvard University, Canadian National Collection, and California Academy of Sciences.

DIAGNOSIS: This species is distinguished from all other species of the *annularis* group with bidentate mandibles by the feeble, sparse punctation and strongly developed ground sculpturing of the median third of abdominal sternites IV and V (figs. 349, 350). By contrast, the abdominal sternites of all other species have weak ground sculpturing and distinct, strong, dense to moderately dense setigerous punctation (fig. 348). *Bledius venus* is further characterized by the rounded pronotal basal angles (fig. 51), the moderately dark elytral epipleuron, and the absence of a membranous lobe on the posterior margin of the elytra.

DESCRIPTION: *annularis* group.

Length 4.1 to 5.6 mm.

Color black to reddish brown with reddish




FIGS. 50–53. *Bledius venus*. 50. Head, dorsal view. 51. Pronotum. 52. Mandible, right. 53. Spermatheca.

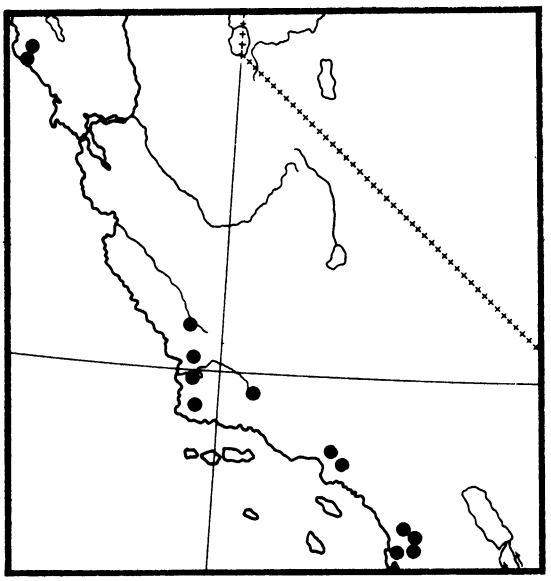


FIG. 54. Distribution of *Bledius venus* in southern and central California.

brown to yellowish brown elytra. Head black to dark reddish brown. Prothorax and abdomen dark reddish brown to reddish brown. Elytra dark reddish brown to reddish brown to dark yellowish brown to yellowish brown; when dark often with poorly defined paler apical spot and when yellowish brown often with narrow reddish brown sutural stripe; yellowish brown elytra often with infusions of reddish brown and reddish brown elytra often with infusions of yellowish brown; epipleuron dark. Legs reddish brown with paler tibiae. Antennae reddish brown.

Dorsum of head shining dully, not polished, surface with dense microgranulate ground sculpturing and moderately dense fine, shallow punctation (fig. 50); pubescence moderately long; dorsum nearly flat to slightly convex; postocular median depression well developed and deep; postocular transverse groove absent or feebly developed. Clypeus shining dully, with dense microgranulate ground sculpturing; punctation feeble; anterior margin with low, broad, transverse, lamina near lateral margin. Eyes moderately large to large. Width of head 0.66 to 0.74 mm.; interocular width 0.42 to 0.47 mm.; head width/interocular width 1.55 to 1.63. Labrum with weakly reflexed anterior margin; anterior margin deeply emarginate. Mandibles bidentate (fig. 51); basal denticle large to small. Antennomeres 3 to 7 without ridge or carina encircling apex.

Pronotum 0.83 to 0.93 mm. wide; 0.69 to 0.79 mm. long; pronotal width/pronotal length 1.16 to 1.24; pronotum moderately strongly convex (fig. 51); lateral margin broadly curved to distinct, rounded basal angles; basal fifth sinuate rarely; anterior angles rounded and even with anterior margin or feebly produced beyond. Pronotal surface shining dully and with dense microgranulate ground sculpturing; punctation as prominent as ground sculpturing, moderately dense and moderately deep. Midlongitudinal groove shallow to moderately deep. Prohypomeron shining dully, with well developed ground sculpturing. Procoxal fissure open for entire length; protrochantin exposed. Prosternal setigerous pit well developed. Elytra 0.96 to

1.06 mm. long; elytral length/pronotal length 1.32 to 1.43; elytra densely and finely punctate; pubescence short and posteriorly directed; posterior margin without membranous lobe; posterior margin broadly rounded.

Abdominal tergal pubescence sparse, moderately long and posteriorly or medioposteriorly directed; terga IV to VI moderately deeply impressed basally. Tergum VIII with transverse polygonal ground sculpturing. Sternites III, VI and VII with moderately dense to sparse, uniform pubescence; sternites IV and V with moderately dense, uniform pubescence laterally but pubescence sparse to nearly absent from median third; ground sculpturing of sternites III, VI, VII and lateral regions of IV and V strong and distinct; ground sculpturing of median third of sternites IV and V very strong and most prominent surface feature of region (figs. 349, 350).

Spermatheca as in figure 53.

Aedeagus with small setae near apex of parameres; parameres broad.

SEXUAL DIMORPHISM: None.

VARIATION: The color of the elytra varies from dark reddish brown to yellowish brown. There are many intergrades and no geographical pattern to the variation is evident. Although the number of localities for the species is small there seems to be a decrease in the length of the basal mandibular denticle from the southern to the northern part of the range of the species.

HABITAT AND DISTRIBUTION: The species is known only in California, from San Diego County north to Mendocino County (fig. 54; see Appendix I for localities). I have collected the species in several localities. Near Arroya Grande along Huasna Creek, where it was particularly abundant, I found it in very moist, coarse-grained sand that was spotted with patches of algae. Along the Salinas River I found *venus* in a similar habitat. North of Cuyama I found the species in moist, unvegetated sand near the edge of the Cuyama River. These three localities account for over 375 of the specimens examined.

During July 1976, I spent several days near Yorkville in Mendocino County, California, looking for *venus*. Although one specimen was obtained there on July 24, 1954 by H. B. Leech and two others at Gualala, I did not collect more. The species is either more abundant at other times of the year, is rare at that locality, or I did not find the habitat.

DISCUSSION: This species has been misidentified as *apicalis* by Fall (two specimens) and two paratypes of *parvicollis* Casey (paratypes 7 and 8) are *B. venus*.

ETYMOLOGY: From the Latin *Venus* for the goddess of love.

### 6. *Bledius diagonalis* LeConte

Figures 55–77, 346–348; Table 2

*Bledius diagonalis* LeConte, 1863, p. 52; 1877, pp. 226, 230. Casey, 1889, p. 65. Fall, 1901, p. 75. Moore, 1964, p. 277, 280. (Type locality: San Diego, California. Type in Museum of Comparative Zoology, Harvard University. Type examined).

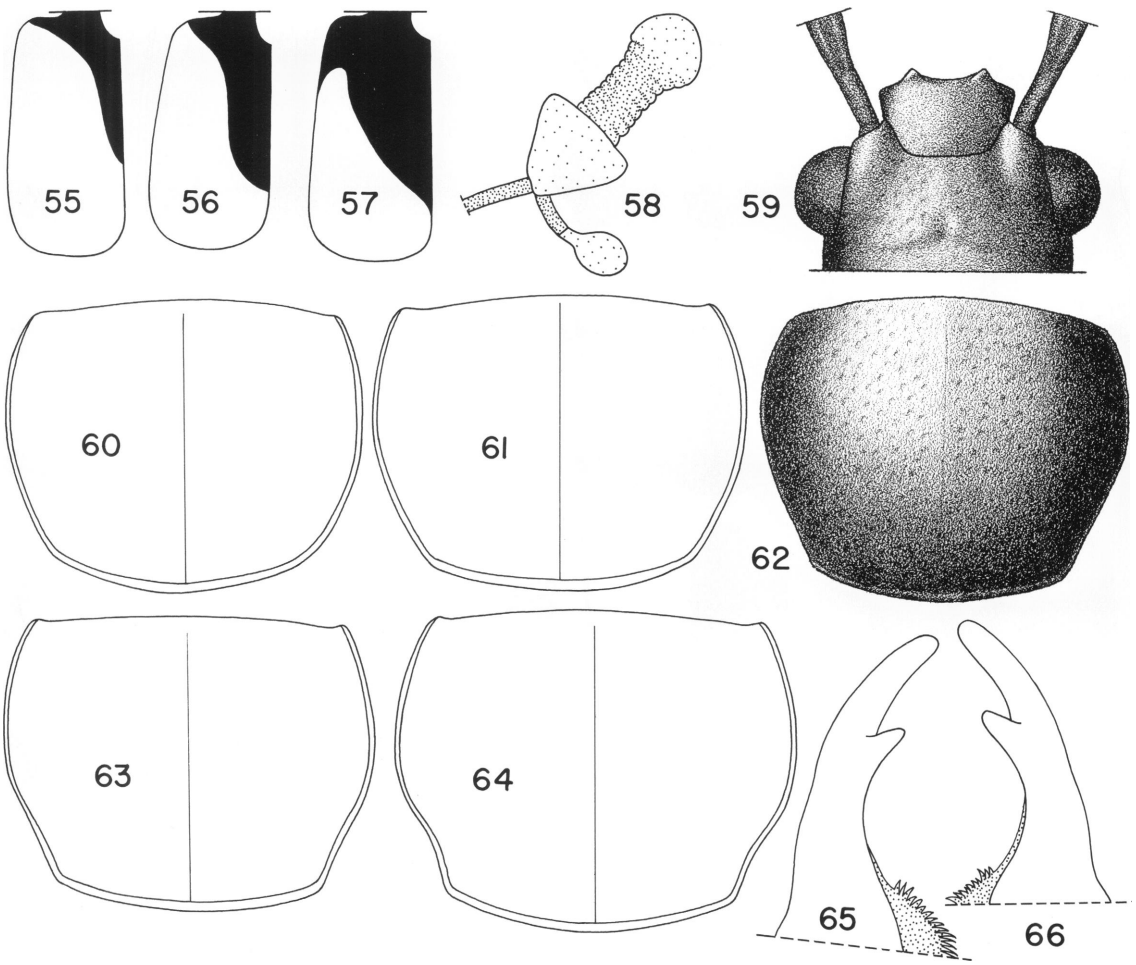
*Bledius apicalis* Fall, 1910, p. 112. (Type locality: California, Raymond. Type in the Museum of Comparative Zoology, Harvard University). NEW SYNONYM.

DIAGNOSIS: This species may be distinguished from other members of the *annularis* group with bidentate mandibles by the rounded (figs. 60–62, 70) to rectangulate (figs. 63, 64) basal angles of the pronotum, dark elytral epipleuron, absence of a membranous lobe on the posterior elytral margin, and the densely punctate, weakly sculptured abdominal sternites (fig. 348). Specimens of *diagonalis* that have rectangulate basal angles may be distinguished from *parvicollis* by the paler elytra that lack a black (or dark reddish brown) stripe along the posterior margin (compare figs. 85–89 to figs. 55–57) and (usually) by the larger basal mandibular denticle (compare figs. 65, 66, 75 to figs. 80–81).

DESCRIPTION: *annularis* group.

Length 4.5 to 5.2 mm.

Color black to reddish brown. Elytra reddish brown to yellowish brown and bicolored to unicolorous. Head and prothorax black to dark reddish brown. Elytra concolorous reddish brown and often with pale lateroapical infusion to bicolored (figs. 55–57, 71–74) with portion adjacent to suture reddish brown to dark reddish brown and with yellowish brown lateroapical portion to largely yellowish brown with moderately large reddish brown sutural stripe; demarcation between darker and paler region often indistinct with paler region gradually becoming darker from lat-

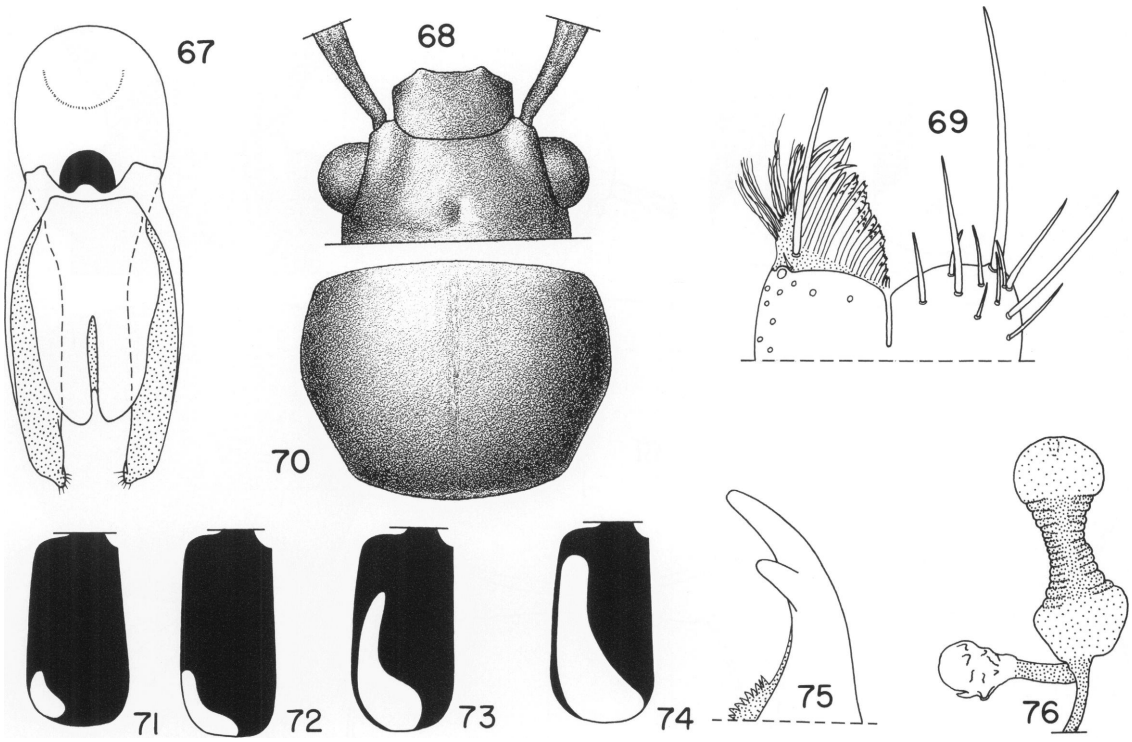



FIGS. 55–66. *Bledius diagonalis,* California populations. 55–57. Elytron, left, variation of color pattern. 58. Spermatheca. 59. Head, dorsal view. 60–63. Pronotum, variation of shape, San Vicente Valley, California. 64. Pronotum, variation of shape, Raymond, California. 65. Mandible, left. 66. Mandible, right.

eral portion toward suture; darker sutural region narrow to broad when elytra bicolored; epipleuron dark. Abdomen dark reddish brown. Legs and antennae reddish brown.

Dorsum of head (figs. 59, 68) shining dully, not polished; surface with dense microgranulate ground sculpturing; punctation moderately coarse and moderately dense; pubescence moderately long; dorsum slightly convex; postocular depression well developed; postocular transverse depression moderately well developed to feeble. Clypeus shining dully, with dense microgranulate ground sculpturing; punctation feeble; anterior margin with moderately large, broad lamina near lateral margin. Eyes moderately large to large. Width of head 0.64 to 0.88 mm.; interocular width 0.41 to 0.56 mm.; head width/interocular width 1.50 to 1.65. Labrum (fig. 69) with anterior margin weakly reflexed and deeply emarginate. Mandibles (figs. 65, 66, 75) bidentate; basal denticle large. Antennomeres 3 to 7 without ridge or carina encircling apex.

Pronotum 0.72 to 1.02 mm. width; 0.57 to 0.82 mm. long; pronotal width/pronotal length 1.18 to 1.32; pronotum (figs. 62, 70) moderately strongly convex; lateral margin




FIGS. 67–76. *Bledius diagonalis.* Arizona populations. 67. Aedeagus, dorsal view. 68. Head, dorsal view, punctation omitted. 69. Labrum, setae of left side and epipharyngeal lobe of right side omitted. 70. Pronotum, punctation omitted. 71–74. Elytron, left, variation of color pattern. 75. Mandible, right. 76. Spermatheca.

broadly curved, basal third strongly to slightly sinuate; basal angles rounded (figs. 60–62, 70) to rectangulate (figs. 63, 64); anterior angles rounded and even with remainder of anterior margin or slightly produced beyond anterior margin. Pronotal surface shining dully; surface with dense microgranulate ground sculpturing and shallow, dense punctation; punctation less prominent than ground sculpturing; pubescence moderately long; midlongitudinal groove moderately well developed. Prohypomeron shining dully, with well-developed ground sculpturing. Procoxal fissure open for entire length. Prosternal setigerous pit well developed. Elytra 0.83 to 1.20 mm. long; elytral length/pronotal length 1.40 to 1.62; elytra densely and finely punctate; pubescence short and posteriorly directed; posterior margin without membranous lobe; posterior margin broadly rounded.

Abdominal tergal pubescence moderately long and mediposteriorly directed; terga IV to VI moderately deeply impressed basally. Tergum VIII with transverse polygonal ground sculpturing. Sternites with uniformly dense pubescence and moderately strong ground sculpturing (fig. 348); sternites unmodified.

Spermatheca as in figures 58, 76.

Aedeagus with patch of short setae near apex of parameres (fig. 67); parameres broad.

SEXUAL DIMORPHISM: None.

VARIATION: Elytral color intergrades from uniformly reddish brown to bicolored reddish brown with pale yellowish lateroapical infusions (figs. 71–72) to largely yellowish brown with a moderately large, reddish brown sutural stripe (figs. 55–57, 73, 74). The basal angles of the pronotum vary gradually from strongly rounded (figs. 60–62, 70) to rectangulate (figs. 63, 64). Specimens from Raymond and Arroyo Grande, California, have

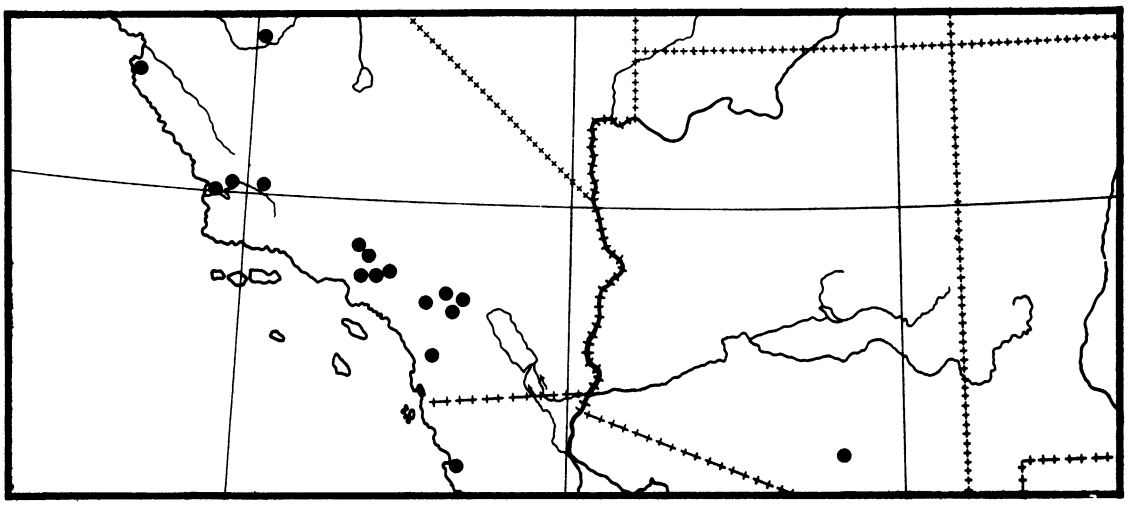


FIG. 77. Distribution of *Bledius diagonalis* in southwestern United States.

the most strongly angulate basal angles of the pronotum but specimens with strongly angulate basal angles are found at other localities.

Some specimens from Palm Springs and Arroyo Grande, California have significantly shorter basal mandibular denticles than shown in figures 65, 66, 75. I attribute this to wear since the size of the denticle intergrades from large to small within the sample (see also Discussion).

SYNONYMS: Fall (1910) in his description of *apicalis* provides no characters to separate it from *diagonalis*. The basal angles of the pronotum of the type of *diagonalis* are more rounded than are those of the type of *apicalis* but are still strongly angulate. However, these differences intergrade (figs. 60–64) and I find no other characters that will separate the two (see Discussion also).

HABITAT AND DISTRIBUTION: The species is known from Monterey and Madera counties, California south to San Diego County into northern Baja California, Mexico eastward to Arizona (fig. 77; see Appendix I for localities).

LeConte (1877) indicates that in California the species was collected in a salt marsh. Moore (1964), who has collected at many Pacific coastal beaches and salt marshes, states he was unable to find the species in salt marshes. Moore, however, did collect the specimens from San Vicente Valley, San Diego County, California, but no habitat information was associated with the specimens. I collected it in the Santa Catalina Mountains, Arizona, on the shore and in the streambed of a drying stream. The species was both in exposed sand and in sand under drying algal mats. I collected 64 specimens of the small form from the sandy shores of a small stream north of Lake Arrowhead in the San Bernardino Mountains of California.

DISCUSSION: Three overlapping forms of *B. diagonalis* can be recognized, a "rectangulate form" (with rectangulate basal angles of the pronotum; figs. 63, 64), a large form, and a small form. The small form has a small pronotum (length 0.57 to 0.68 mm., and width 0.72 to 0.84 mm.), short elytra (0.83 to 0.97 mm.), rounded basal angles of the pronotum (fig. 70) and has been collected near Tucson, Arizona, and near Los Angeles, California. In the samples from these two areas the pronotum exhibits only a slight tendency toward more strongly angulate basal angles. The large form has a large pronotum (0.69 to 0.80 mm. long; 0.86 to 0.98 mm. wide), long elytra (1.02 to 1.19 mm.), rounded (figs. 60–62) to strongly angulate (fig. 63) basal angles of the pronotum, and is found in California from Monterey County south to northern Baja California. The rectangulate form is represented by only 15 specimens from Ma-

dera and San Luis Obispo counties, California (seven Arroyo Grande, six Raymond, two "Cal."). In the rectangulate form the basal angles of the pronotum are rectangulate (figs. 63, 64) but the size is intermediate between the large and small forms. The distinctive rectangulate basal pronotal angles of the rectangulate form intergrade to the rounded basal pronotal angles found among most of the specimens of the small form (fig. 70) and most of those of the large form (figs. 60–62) through intermediates, those with moderately strongly (fig. 63) to strongly (fig. 64) rectangulate basal angles, found among the large form.

The large and small forms can be separated by small differences of the elytral length. Excluding a sample of the small form from near Lake Arrowhead, California, the longest elytron of the small form is 0.97 mm., the shortest elytron of the large form is 1.02 mm. The large form is represented by 55 specimens and the small by 218. One specimen each of the large and small forms were collected together at the same locality (Pasadena) on the same date ("4-6-16"). Other specimens of each were collected at different localities in Riverside County, California. In southwestern California the large form is known by 50 specimens and the small by 170 specimens. The gap in elytral length is bridged by specimens of the rectangulate form where the elytra vary from 0.96 to 1.20 mm. and by specimens from near Lake Arrowhead (Raymond specimens 1.12 to 1.20 mm.; Arroyo Grande specimens 0.98 to 1.08 mm.; "California" specimens 0.96 to 1.04 mm.).

During the spring of 1981, I collected a sample of 64 specimens of the small form from near Lake Arrowhead, California, in which 40 percent of the specimens that were measured were intermediate (between the large and small forms) for elytral length. The elytral length of this sample ranged from 0.88 to 1.05 mm.

In Fall's collection of *apicalis* all three forms of *diagonalis* are represented as are two specimens of *venus*.

### 7. *Bledius parvicollis* Casey

Figures 78–90, 363; Table 2

*Bledius parvicollis* Casey, 1889, p. 65. Fall, 1901, p. 76. (Type locality: California, Mendocino County, Gualala. Type in the National Museum of Natural History, Smithsonian Institution. Type examined).

*Bledius kincaidi* Hatch, 1957, p. 103. (Type locality: Washington, Chehalis. Lectotype in the National Museum of Natural History, Smithsonian Institution, designated here. The lectotype is mounted on a card with another specimen. The specimen on the left of the card has crushed-in depressions on the pronotum. The other, on the right, is undamaged and I select is as the lectotype). NEW SYNONYM.

DIAGNOSIS: *Bledius parvicollis* with bidentate mandibles can be distinguished from other bidentate species of the *annularis* group by the dark elytral epipleuron, bicolored elytra (figs. 85–89) with a broad, dark, sutural stripe, dark posterior margin, and a bright reddish brown lateral spot and rectangulate basal angles of the pronotum (fig. 83). The basal third of the pronotum is moderately strongly constricted and convergent to the basal angles.

There might be difficulty with the separation of *parvicollis* and *tarandus*. They are easily separated by size; *tarandus* is significantly smaller (for length of each species see descriptions; for other measurements see table 2). Further, the basal third of the pronotum of *parvicollis* (fig. 83) is more gradually constricted than for most individuals of *tarandus* (fig. 96) and the parameres of *parvicollis* are longer relative to the length of the median lobe (compare fig. 78 to fig. 91).

Some specimens of *parvicollis* have black elytra with only a vague suggestion of a lateromedial spot. In the Key, these individuals go to near *zophus* and *nardus* where the form of the pronotum will separate *parvicollis* from the others. *Bledius parvicollis* may be confused with specimens of *diagonalis* that have rectangulate basal angles of the pronotum; *parvicollis* has a small basal denticle on the mandibles, and the posterior edge of the elytra is black.

DESCRIPTION: *annularis* group.

Length 4.5 to 5.5 mm.

Color black to dark reddish brown, apex of abdomen often slightly paler. Elytra (figs. 85–89) usually bicolored black with bright reddish brown to pale reddish brown lateral spot; sutural stripe black and broad basally, tapering apically; posterior margin black; lat-

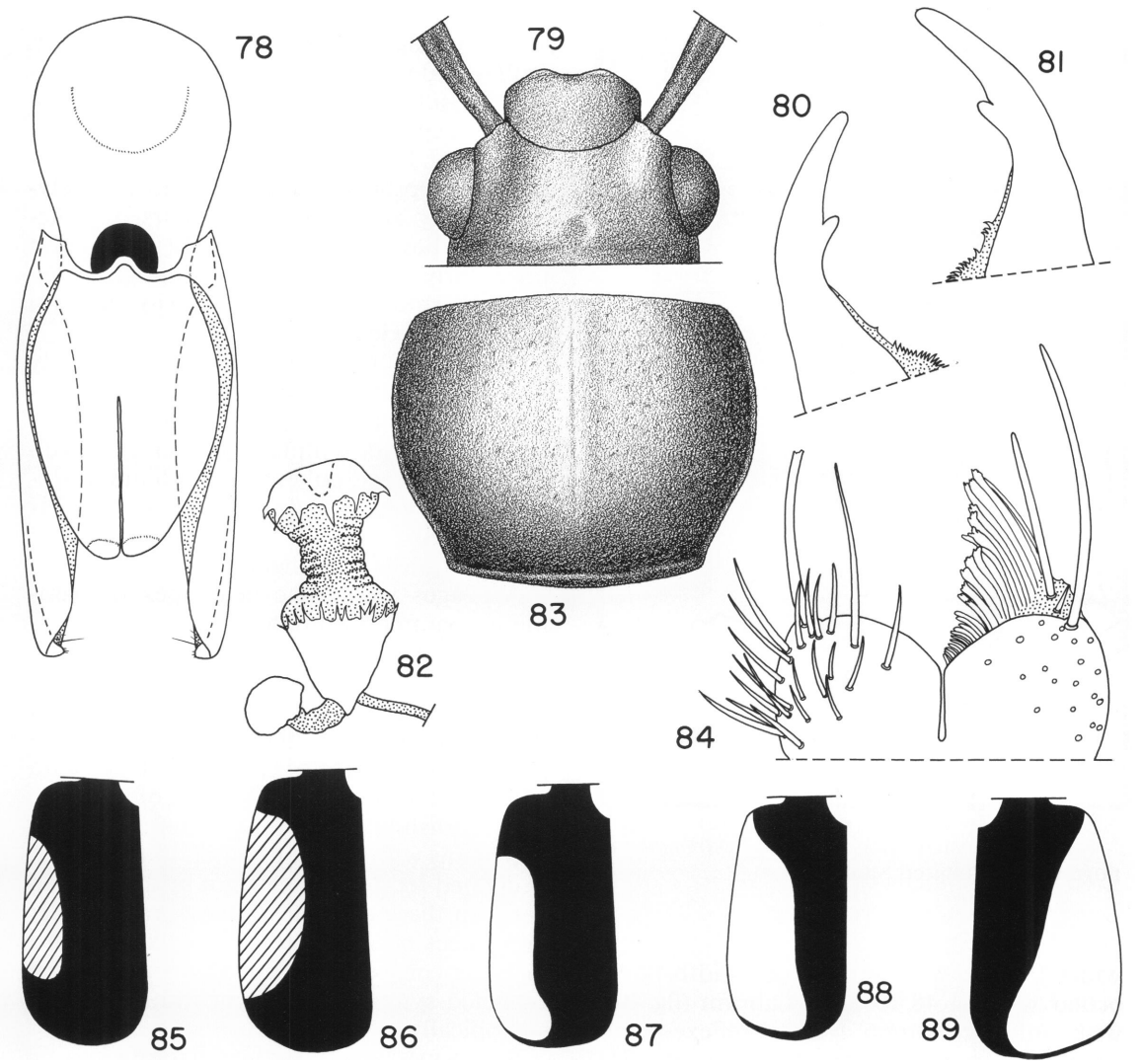



FIG. 78–89. *Bledius parvicollis.* 78. Aedeagus, dorsal view. 79. Head, dorsal view. 80. Mandible, left. 81. Mandible, right. 82. Spermatheca. 83. Pronotum. 84. Labrum, left epipharyngeal and right setae removed. 85–89. Elytron, variation of color pattern. 85. Washington. 86. Washington. 87. California. 88. Washington. 89. California.

eral spot large (figs. 87–89) to moderately large or reduced to dark reddish black, feeble spot (figs. 85–86); epipleuron black. Legs dark reddish brown to reddish brown. Antennae dark reddish brown.

Dorsum (fig. 79) of head shining dully, not polished surface with dense microgranulate ground sculpturing, and fine, shallow, moderately dense punctation; pubescence moderately long; dorsum slightly convex; postocular median depression feeble to moderately well developed and transverse postocular groove feeble to absent. Clypeus shining dully, with dense microgranulate ground sculpturing; punctation feeble; anterior margin with small, broad lamina near lateral margin. Eyes moderately large to large. Width head 0.75 to 0.81 mm.; interocular

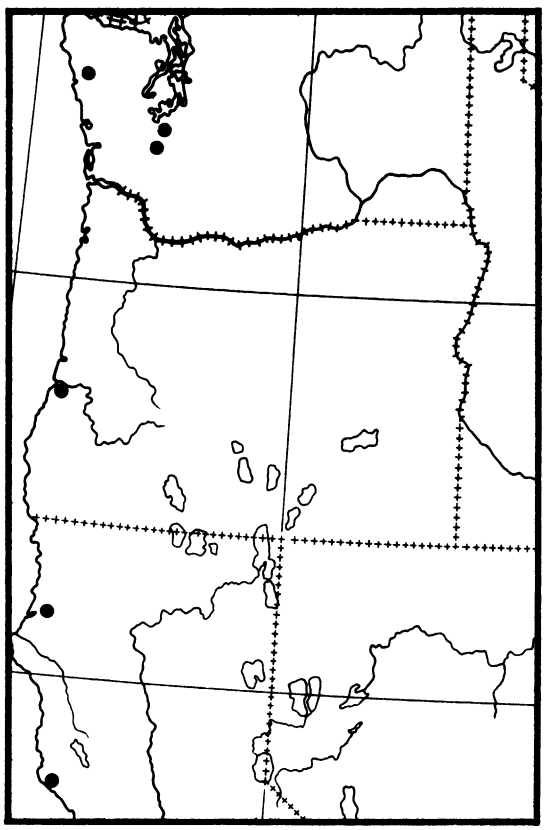


FIG. 90. Distribution of *Bledius parvicollis* in northwestern United States.

width 0.50 to 0.52 mm.; head width/interocular width 1.48 to 1.57. Labrum (fig. 84) with anterior margin weakly reflexed and deeply emarginate. Mandible (figs. 80, 81) bidentate; basal tooth small. Antennomeres 3 to 7 without ridge or carina encircling apex.

Pronotum 0.91 to 1.00 mm. wide; 0.74 to 0.83 mm. long; pronotal width/pronotal length 1.18 to 1.25; pronotum (fig. 83) moderately strongly convex; lateral margins broadly rounded to gradually convergent basal third; basal angles rectangulate; anterior angles rounded and even with remainder of anterior margin. Pronotal surface shining dully, surface with dense microgranulate ground sculpturing; punctation dense, shallow, and less prominent than ground sculpturing; pubescence moderately long; midlongitudinal groove moderately well developed and present on low, weakly developed, rounded ridge. Prohypomeron shining dully, with well-developed ground sculpturing. Procoxal fissure open for entire length; protrochantin exposed. Prosternal setigerous pit well developed. Elytra 1.12 to 1.32 mm. long; elytral length/pronotal length 1.52 to 1.66; elytra densely and moderately coarsely punctate; pubescence moderately long and posteriorly directed; posterior margin without membranous lobe; posterior margin broadly rounded.

Abdominal tergal pubescence moderately dense, moderately long, and medioposteriorly directed. Tergum VIII with transverse polygonal ground sculpturing. Sternites with uniformly dense pubescence; ground sculpturing well developed; sternites VI to VIII unmodified.

Spermatheca as in figure 82.

Aedeagus with setae near apex of parameres; parameres broad (fig. 78).

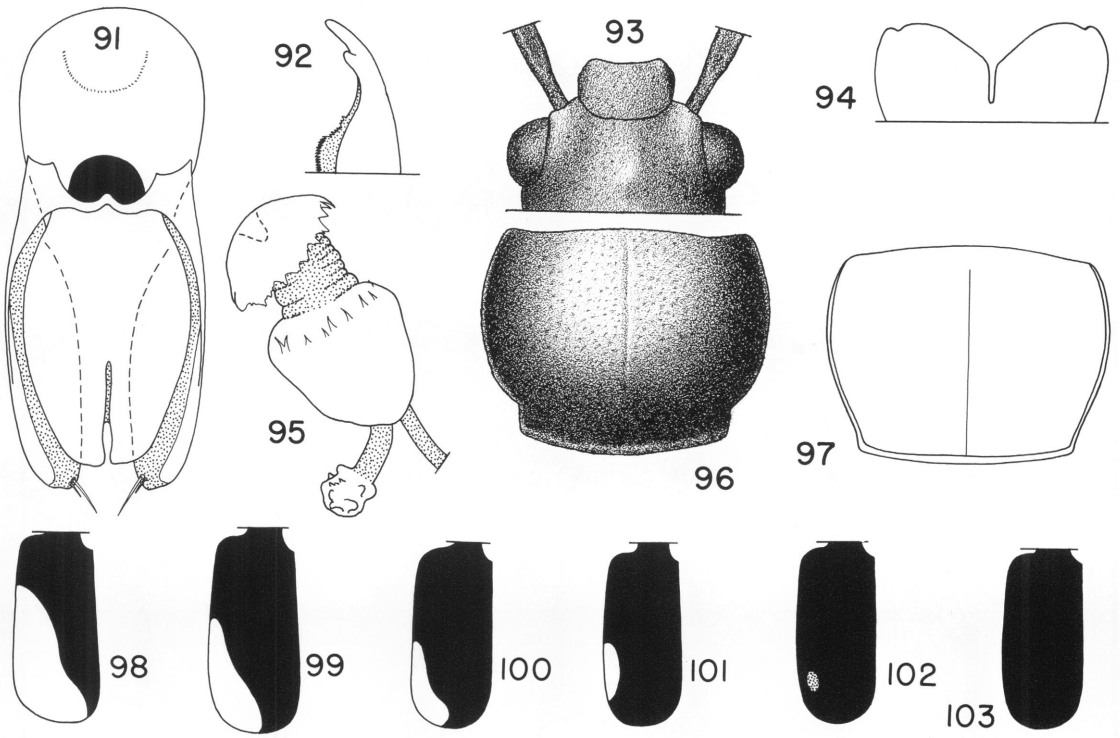
SEXUAL DIMORPHISM: None.

VARIATION: There are two forms of *parvicollis*; one has a large, bright reddish brown triangular spot on a black elytron (figs. 87–89). The other form has a largely black elytra with small, paler, poorly defined, often feeble dark reddish black spot (figs. 85–86). Several specimens with larger, brighter, more strongly defined reddish brown spot bridge the gap between these extremes. There are no other differences between these forms so I regard them as conspecific. Both forms have been collected sympatrically, synchronically, and syntopically.

SYNONYMS: *Bledius kincaidi*, described by Hatch (1957) is the distinctly bicolored form of *parvicollis* (as in fig. 89). The type of *parvicollis* has a feeble reddish spot near the lateral margin of the largely black elytra (as in fig. 85). The types of these two nominal species represent the ends of a continuum of variation of the elytral color (see Variation).

HABITAT AND DISTRIBUTION: The species is known from the coastal range of California, Oregon, and Washington and has been collected infrequently, and in short series (fig. 90; see Appendix I for localities).

The only available habitat information is a collection from near Tenino, Washington, where five specimens were taken on a sandy




FIGS. 91–103. *Bledius tarandus*. 91. Aedeagus, dorsal view. 92. Mandible, right. 93. Head, dorsal view. 94. Labrum, setae and epipharyngeal lobes removed. 95. Spermatheca. 96. Pronotum. 97. Pronotum. 98–103. Elytron, left, variation of color pattern. 98. Newfoundland. 99. Alberta. 100. Yukon Territory. 101. Newfoundland. 102, 103. Wyoming.

sloping shore of the Deschutes River in moist sand near the edge of the water.

### 8. *Bledius tarandus* Herman

Figures 91–104, 343; Table 2

*Bledius tarandus* Herman, 1970, p. 379 (proposed to replace *divisus* LeConte, 1863, that is preoccupied by *divisus* Marsham, 1802).

*Bledius divisus* LeConte, 1863, p. 53; 1977, pp. 226, 229. Hatch, 1957, p. 104 (as *albonotatus*). (Type locality: Nebraska, Platte River Valley. Type in the Museum of Comparative Zoology, Harvard University. Type examined).

DIAGNOSIS: This species may be distinguished from all other bidentate species of the *annularis* group by the dark elytral epipleura, bicolored elytra with from one-half to three-fourths of the disk black and the remaining lateroapical portion reddish brown to yellowish brown, black to dark reddish brown legs, rectangulate basal angles of the pronotum, lack of a membranous lobe on the posterior margin of the elytra, and small size. This species might be confused with *B. parvicollis* but can be separated not only by the significantly smaller size (see length in descriptions and table 2 for other measurements), but also by the dark reddish brown legs, and more strongly impressed pronotal midlongitudinal groove. The pronotum of this species is generally (fig. 96) but not always (fig. 97) more strongly constricted basally than is *B. parvicollis* (fig. 83). The population of *tarandus* in California with pale elytral epipleura can be distinguished from other such species (i.e., *albonotatus, tau, omega, suturalis, incomptus*) by the characters given in the Key.

DESCRIPTION: *annularis* group.

Length 2.5 to 4.0 mm.

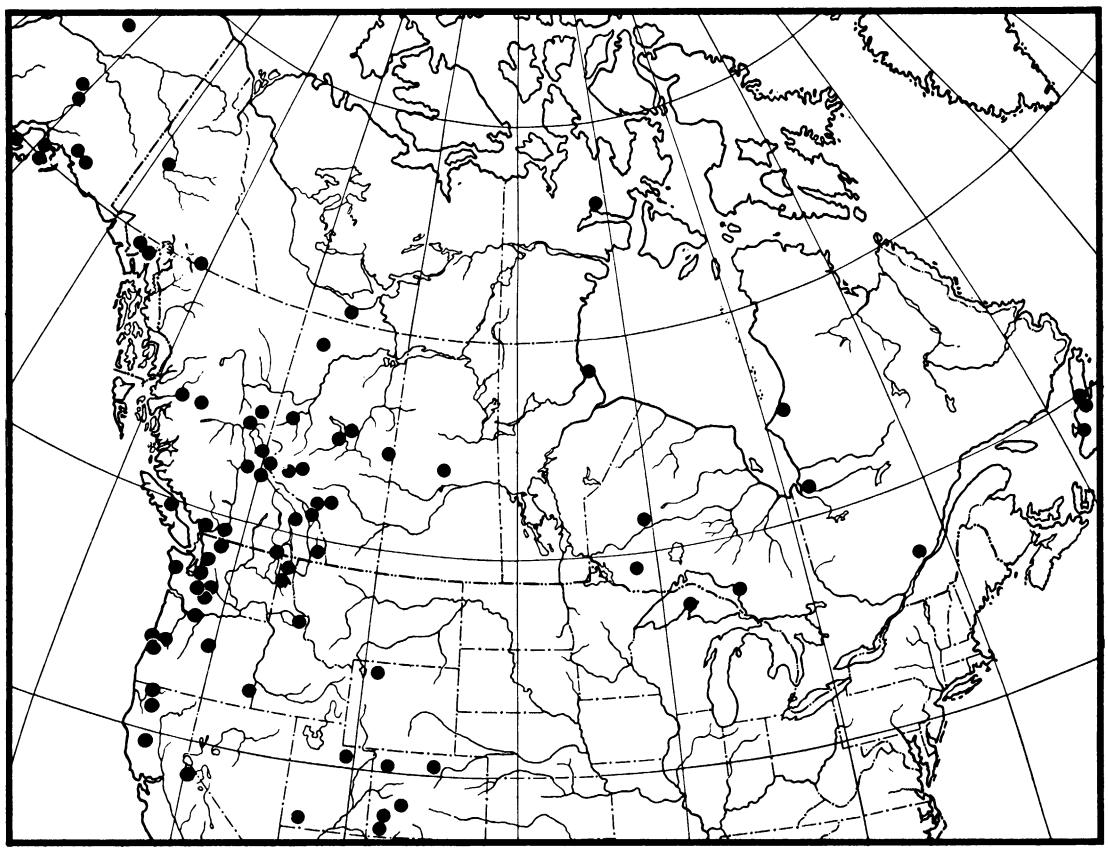


FIG. 104. Distribution of *Bledius tarandus* in northern North America.

Color black. Elytra usually bicolored (figs. 98–101) with broad black sutural stripe and large to small lateroapical reddish brown to yellowish brown spot; elytra occasionally entirely black (fig. 103) or spot occasionally small and feeble (fig. 102). Elytral sutural stripe diagonally directed, broad basally, and tapered apically; lateroapical spot occupying from about one-thirtieth to about one-half of disk; elytral epipleuron usually black to dark reddish brown, some individuals with apical quarter to third pale reddish brown and others with epipleuron partially or entirely yellowish brown. Legs and antennae dark reddish brown.

Dorsum of head (fig. 93) shining dully, not polished; surface with dense microgranulate ground sculpturing and dense, fine, shallow punctation; pubescence moderately long; dorsum weakly convex; middorsal region with shallow to moderately deep, median, postocular depression; postocular, transverse depression absent to poorly developed. Clypeus shining dully, with dense, microgranulate ground sculpturing; anterior margin often with low, broad, rounded lamina near lateral margin. Eyes moderately large. Width of head 0.51 to 0.64 mm.; interocular width 0.32 to 0.44 mm.; head width/interocular width 1.43 to 1.61. Labrum (fig. 94) with anterior margin weakly reflexed and deeply emarginate. Mandibles (fig. 91) bidentate, basal tooth small. Antennomeres 3 to 7 without ridge or carina encircling apex.

Pronotum 0.58 to 0.76 mm. wide; 0.44 to 0.62 mm. long; pronotal width/pronotal length 1.22 to 1.35; pronotum (fig. 96) moderately strongly convex; anterior four-fifths of lateral margin broadly curved, basal fifth strongly to gradually constricted (fig. 97) to

well-developed (fig. 96), rectangulate basal angles; anterior angles strongly produced (fig. 96) to even with anterior margin (fig. 97). Pronotal surface shining dully; surface with dense microgranulate ground sculpturing and moderately deep to shallow, dense punctation; punctation less prominent than ground sculpturing; pubescence moderately long; midlongitudinal groove moderately well developed. Prohypomeron shining dully, with well-developed ground sculpturing. Procoxal fissure open for entire length; protrochantin exposed. Prosternal setigerous pit weakly developed. Elytra 0.72 to 0.98 mm. long; elytral length/pronotal length 1.37 to 1.72; elytra finely punctate; pubescence short and posteriorly directed; posterior margin without membranous lobe; posterior margin broadly rounded.

Abdominal tergal pubescence short and moderately dense; terga III to VI with posteriorly or medioposteriorly directed pubescence; terga IV to VI moderately deeply impressed basally. Tergum VIII with isodiametric polygonal ground sculpturing. Sternites with uniformly dense pubescence; ground sculpturing moderately to weakly developed; sternites VII and VIII unmodified.

Spermatheca as in figure 95.

Aedeagus with setae near apex of parameres (fig. 91); parameres broad.

SEXUAL DIMORPHISM: None.

VARIATION: The ratio elytral length/pronotal length is smaller in the sample from Newfoundland than in those from Oregon or Washington. This variation is due to the slightly longer pronotum of the Newfoundland sample. The pronotal length overlaps slightly with the sample from Oregon. Inasmuch as there are no other consistent differences between the eastern and western samples, I regard them to be conspecific.

The smallest individuals are from Longmire, Washington (table 2) and in general the largest from Newfoundland. In both samples the measurements overlap with those of a sample from Oregon. There are no other characters that will distinguish the specimens from the three areas.

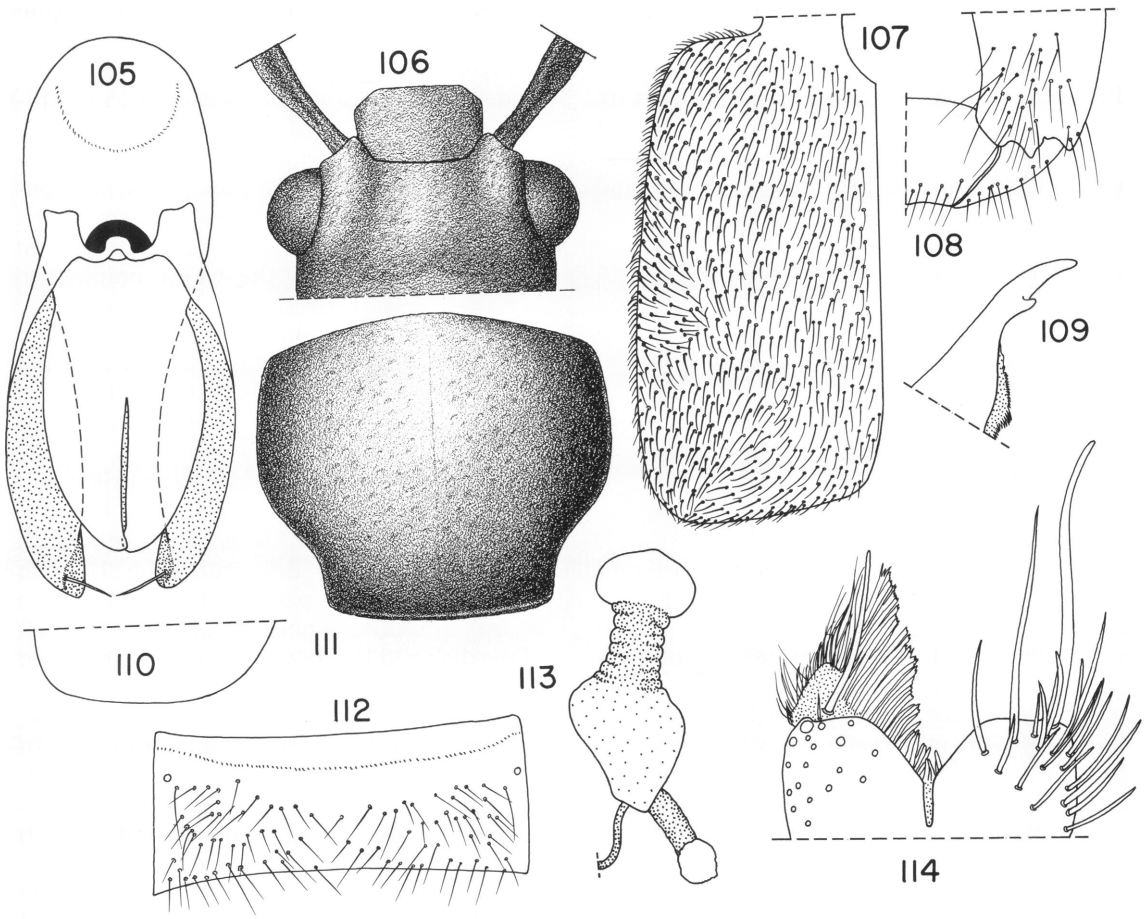
At scattered localities in British Columbia, Idaho, Washington, and Oregon the normally black elytral epipleuron has a black basal portion and yellowish brown to reddish brown apical region. The size of the paler region varies from about one-fourth to one-third of the epipleural length. No other characters distinguish the 32 specimens with bicolored epipleura from others of the species.

All the specimens known from California (seven examples from five localities) have entirely pale, yellowish brown elytral epipleura. Near Lolo Pass in Idaho one specimen from a sample of five has the whole epipleuron yellowish brown, and two others have the apical two-thirds yellowish brown. There are no other characters that differentiate the specimens from California and Idaho from others of *tarandus* that have black elytral epipleura.

The pale elytral spot varies from bright yellowish and occupying as much as half the dorsal surface (fig. 98) to being so small and dark as to be barely discernible (fig. 102). In samples from most parts of the continent the elytral spot covers about a quarter to a half of the disk and is yellowish to yellowish brown to pale reddish brown. At scattered localities in Alberta, British Columbia, Washington, Wyoming, and Colorado the average size of the elytral spot is reduced and at four localities (in Alberta, British Columbia, and Wyoming) six specimens (from a total of 159) lack the spot and have black elytra (fig. 103). The variation of the size and color of the elytral spot is gradual and not accompanied by other changes. Although samples with the small dark elytral spot are all from the west, there are no other obvious geographical or ecological correlates. Specimens with large, yellowish elytral spots have been collected from localities in close proximity to those with the small dark spot, as well as from further north and from lower and higher elevations.

HABITAT AND DISTRIBUTION: The species has a transcontinental distribution with records across Canada from Newfoundland to Yukon Territory into Alaska. The range extends north to above the Arctic Circle in Alaska and north of the Hudson Bay in the Northwest Territories and south along the Rocky Mountains to southern Utah and Colorado (fig. 104; see Appendix I for localities).

The species is collected abundantly especially in the northern part of its range. It is found in moist sand on the edge of both lakes




FIGS. 105–114. *Bledius zophus.* 105. Aedeagus, dorsal view. 106. Head, dorsal view. 107. Elytron, left. 108. Procoxa, anterior view. 109. Mandible, left. 110. Elytron, right, apex. 111. Pronotum. 112. Tergum V. 113. Spermatheca. 114. Labrum, setae of left side and epipharyngeal lobe of right side removed.

and streams. At Lesser Slave Lake, Alberta, and Great Slave Lake, Northwest Territories, during July 1975, *B. tarandus* was extremely abundant with hardly any other species of *Bledius* occurring with it. At Lesser Slave Lake *B. tarandus* was most abundant at the high water level. *Bledius tarandus* can be found on the shore of lakes, rivers, and streams throughout its range. Generally it lives in open, unvegetated, moist sand and is associated with freshwater habitats. At Winchester Bay, Oregon, the species is found near the ocean, but in an open sandy area moistened by a freshwater stream.

DISCUSSION: *Bledius tarandus* (=*divisus*) has been discussed in the literature infrequently (LeConte, 1863, 1877). Hatch (1957) mistakenly referred to the western populations as *B. albonotatus.* Herman (1970) replaced *divisus* LeConte, which is preoccupied by *divisus* Marsham, with *tarandus.*

LeConte (1863, p. 53) suggested that *fasciatus* Say may be a variety of *tarandus* (=*divisus*). This is doubtful, however, since Say (1823) states that *fasciatus* has rounded pronotal basal angles, and a dusky stripe at the interior base and suture. The pronotal basal angles of *tarandus* are rectangulate and the elytra are black with a small to large pale lateroapical spot.

A specimen in the LeConte collection identified as *albonotatus* is actually *tarandus*.

### 9. **Bledius zophus**, new species
Figures 105–115, 352–354; Table 2

LeConte, 1877, pp. 226, 227. Casey, 1889, p. 65. Hatch, 1957, p. 104 (cited as *Bledius longipennis*).

HOLOTYPE: Wyoming: Sheridan County: 42 miles W Sheridan, Prune Creek, at Prune Creek Campground, 7400 feet, July 25, 1978, collected by Lee Herman, deposited in the American Museum of Natural History.

PARATYPES: Seventy with same data as holotype and deposited with holotype; two deposited in each of the following collections: British Museum (Natural History), Field Museum of Natural History, National Museum of Natural History, Smithsonian Institution, Museum of Comparative Zoology, Harvard University, Canadian National Collection, California Academy of Sciences.

DIAGNOSIS: This species can be separated from all other species of the *annularis* group except *nardus* by the strongly and abruptly constricted pronotal base (fig. 111), dark reddish brown to black to dark metallic blue unicolorous elytra, deep labral emargination (fig. 114), and bidentate mandibles (fig. 109). It can be distinguished from *nardus* by the medially or posteromedially directed elytral pubescence of the lateromedial region (compare figs. 121 and 122 to 107). Furthermore, *zophus* is larger (table 2), has lateroposteriorly directed pubescence on the laterobasal area of abdominal terga IV to VI (fig. 112), transverse polygonal ground sculpturing of abdominal tergum VIII (fig. 354; this sculpturing is a weak defraction grating), and less dense pubescence of the anterior procoxal surface (compare fig. 108 to 120). Because some specimens of *diagonalis* have unicolored dark elytra they may be confused with *zophus* but the shape of the pronotum (compare fig. 111 to figs. 60–64, 70) will distinguish each species. Some individuals of *zophus* have bicolored elytra, dark reddish brown with a paler lateral or subapical spot, and can be distinguished from other species with bicolored elytra by the shape of the pronotum.

DESCRIPTION: *annularis* group.

Length 4.1 to 5.5 mm.

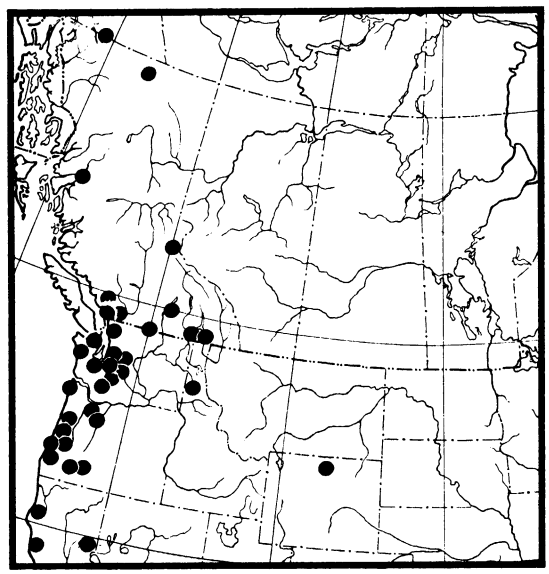


FIG. 115. Distribution of *Bledius zophus* in western United States and Canada.

Color black to very dark reddish brown with black to dark reddish brown elytra, some individuals with paler lateral or subapical spot, occasionally elytra black with metallic blue cast; elytral epipleuron concolorous with disk. Legs black to dark reddish brown; antennae dark reddish brown.

Dorsum (fig. 106) of head shining dully, not polished; surface with dense microgranulate ground sculpturing and dense, fine, shallow, punctation; pubescence long; middorsal region broadly rounded and with shallow to moderately deep, median, postocular depression. Clypeus shining dully, with dense microgranulate ground sculpturing; punctation feeble; anterior margin without tubercles or laminae but with small anteriorly directed, flattened ridge on each side. Eyes moderately large (fig. 106). Width of head 0.71 to 0.83 mm.; interocular width 0.48 to 0.56 mm.; head width/interocular width 1.42 to 1.55. Labrum with feebly reflexed anterior margin; anterior margin deeply emarginate (fig. 114). Mandibles bidentate; basal tooth small (fig. 109). Antennomeres 3 to 7 without ridge or carina encircling apex.

Pronotum 0.83 to 1.00 mm. wide; 0.70 to 0.84 mm. long; pronotal width/pronotal length 1.12 to 1.23; pronotum strongly con-

vex (fig. 111); anterior two thirds of lateral margin moderately broadly arcuate to nearly straight, basal third strongly constricted to well-developed, rectangulate basal angles; anterior angles even with anterior margin. Pronotal surface shining dully; surface with dense microgranulate ground sculpturing and moderately deep to shallow, dense punctation; punctation less prominent than, to as prominent as, ground sculpturing; pubescence long; midlongitidunal groove moderately well developed. Prohypomeron shining dully, with well-developed ground sculpturing. Procoxal fissure open for entire length to slightly closed at dorsal portion to only narrowly open (as in fig. 117); protrochantin exposed to slightly concealed at dorsal part of fissure to only narrowly exposed. Prosternal setigerous pit well developed. Elytra 1.07 to 1.29 mm. long; elytral length/pronotal length 1.45 to 1.67; elytra densely and moderately coarsely punctate; pubescence long and posteriorly directed on disk, lateroposteriorly directed on apical portion, and medioposteriorly directed near middle of lateral side of disk (fig. 107); membranous lobe of posterior margin absent (fig. 110); posterior margin broadly rounded.

Abdominal tergal pubescence moderately dense and long; median region of terga III to VII with posteriorly or medioposteriorly directed pubescence and lateral region with lateroposteriorly directed pubescence (fig. 112). Tergum VIII with transverse polygonal ground sculpturing (fig. 354). Sternites with uniformly dense pubescence; ground sculpturing moderately well developed. Sternites VI, VII, and VIII unmodified. Terga IV to VI deeply impressed at base.

Spermatheca as in figure 113.

Aedeagus with long, prominent setae near apex of parameres (fig. 105); parameres broad.

SEXUAL DIMORPHISM: None.

VARIATION: The elytra of *zophus* are generally black to dark reddish brown. Some with reddish brown elytra have a paler spot near the apex or lateral side and some have black infusions. Other individuals from scattered localities throughout the range of the species have a metallic blue cast to the black elytra. These color variations grade into one another and there are no other characters that support recognition of more than one species.

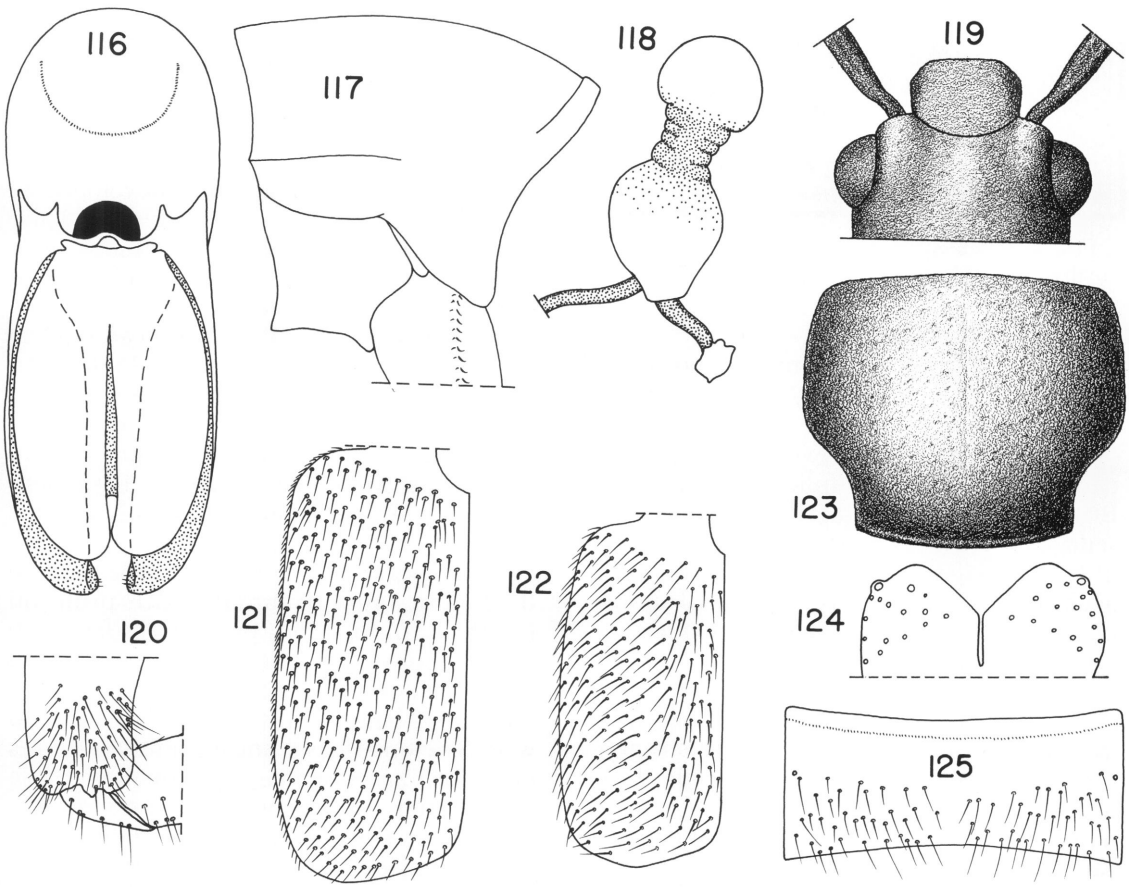
HABITAT AND DISTRIBUTION: The species is known from as far north as Yukon Territory, through British Columbia, Washington, and Oregon to at least as far south as Mendocino County, California. The species has been collected once in the Sierra Nevada Mountains of California and a large sample was taken in the Big Horn Mountains of northern Wyoming. Although in Washington and Oregon the species has been collected most frequently west of the Cascade Mountains, it has been recorded to the east, for example near Yakima, Washington, and according to Hatch (1957, cited as *longipennis*) in northern Idaho (fig. 115; see Appendix I for localities).

The species can be found on the sandy shores of rivers and streams near the edge of the water and/or among the nearby vegetation. Even when *zophus* is found near the ocean it lives near fresh water. At Winchester Bay, Oregon, for example, *zophus* lives near a small rivulet from a tree-covered bank. The trickle disappears into the sand a short distance from the bank but the species lives in the moistened sand and among nearby vegetation. On the edge of rivers and streams the species often seems to occupy the moister parts of the habitat. For example, near Tenino, Washington, on the Deschutes River *zophus* is found nearer the edge of the water than *nardus*.

DISCUSSION: The true *Bledius longipennis* Mäklin is unknown (see Discussion under *Bledius longipennis*) so that most specimens heretofore identified as *longipennis* and most citations in the literature to *longipennis* refer to the species I have named *zophus*.

*Bledius nardus* and *zophus* can be separatedly by the size, and elytral, procoxal, and abdominal characters given in the Key and diagnoses. However, the size, procoxal pubescence, and abdominal sculpturing overlap in a few individuals. The elytral and abdominal pubescence seems to be constant. Although these species are difficult to separate I recognize them because they are separable and can be collected sympatrically where they occupy different habitats (see Habitat and Distribution).

*Bledius talpa,* a European beetle, is even more similar to *zophus* than is *nardus*. The less dense elytral punctation, metallic blue




FIGS. 116–125. *Bledius nardus.* 116. Aedeagus, dorsal view. 117. Prothorax, left lateral view. 118. Spermatheca. 119. Head, dorsal view. 120. Procoxa, anterior view. 121. Elytron, left, Washington. 122. Elytron, left, Montana. 123. Pronotum. 124. Labrum, setae and epipharyngeal lobes removed. 125. Tergum V.

elytra, and isodiametric polygonal ground sculpturing of the eighth abdominal tergum of *talpa* separates it from *zophus.* Although the elytral color and abdominal sculpturing of some more northern individuals of *zophus* are similar to *talpa,* the two can still be separated by the denser elytral punctation of *zophus.* Considering the geographical disjunction and slight anatomical differences of *talpa* and *zophus,* I regard them as separate species for the present. Further collecting and study may indicate otherwise.

Although *zophus* is known only as far north and west as Yukon Territory it may be in Alaska and although *talpa* is known in eastern Europe, Russia, and the Scandinavian region it may be found across Asia into eastern Asia. There is already some evidence for a more easterly distribution of *talpa.* Motschulsky (1860) reported *talpa* on the Amur River in eastern Asia. I have not studied Motschulsky's material and I am uncertain whether the specimen represents *talpa, zophus, nardus* or some other species.

ETYMOLOGY: From the Greek *zophos* for darkness, dusk, the nether world.

### 10. **Bledius nardus**, new species

Figures 116–126, 355–357; Table 2

HOLOTYPE: Washington: Clallam County: 18 miles E Clallam Bay, Deep Creek, July 15,

FIG. 126. Distribution of *Bledius nardus* in northwestern United States.

1978, collected by Lee Herman, deposited in the American Museum of Natural History.

PARATYPES: Twenty-five with same data as holotype, 19 deposited with holotype; one deposited in each of the following collections: British Museum (Natural History), Field Museum of Natural History, National Museum of Natural History, Smithsonian Institution, Museum of Comparative Zoology, Harvard University, Canadian National Collection, California Academy of Sciences.

DIAGNOSIS: *Bledius nardus* can be distinguished from all other species of the *annularis* group except *zophus* by the strongly, abruptly constricted pronotal base (fig. 123), dark unicolorous elytra, deep labral emargination (fig. 124), and bidentate mandibles. It can be separated from *zophus* by the posteriorly directed elytral pubescence of the lateromedial region (compare figs. 121 and 107). Further, *nardus* is smaller (table 2), has posteriorly or medially directed pubescence on the laterobasal are of abdominal terga IV to VI (compare figs. 125 and 112), isodiametric polygonal ground sculpturing of abdominal tergum VII (compare fig. 354 to 355), more dense pubescence of the anterior procoxal surface (compare figs. 108 and 120), and short setae on the parameres (fig. 116). The specimens of *diagonalis* with dark, unicolored elytra may be distinguished from *nardus* by the shape of the pronotum (see figs. 123 and 60–64, 70).

DESCRIPTION: *annularis* group.

Length 2.6 to 4.5 mm.

Color black to dark reddish brown; elytra dark reddish brown to occasionally black; epipleuron and disk concolorous. Legs dark reddish brown to reddish brown; antennae reddish brown.

Dorsum (fig. 119) of head shining dully, not polished; surface with dense microgranulate ground sculpturing and with dense, feeble, fine, shallow punctation; pubescence moderately long; middorsal region broadly rounded; middorsal postocular depression and postocular groove feebly developed to absent. Clypeus shining dully, with dense granulate ground sculpturing and moderately dense, feeble punctation; anterior margin without tubercles or laminae. Eyes moderately large (fig. 119). Width of head 0.52 to 0.66 mm.; interocular width 0.36 to 0.46 mm.; head width/interocular width 1.41 to 1.52. Labrum (fig. 124) with anterior margin slightly reflexed; anterior margin deeply emarginate. Mandibles bidentate; basal denticle small. Antennomeres 3 to 7 without ridge or carina encircling apex.

Pronotum 0.58 to 0.80 mm. wide; 0.51 to 0.71 mm. long; pronotal width/pronotal length 1.10 to 1.22; pronotum (fig. 123) strongly convex; anterior two-thirds of lateral margin moderately broadly rounded to parallel sided, basal third strongly constricted to well-developed basal angles; anterior angles even with anterior margin; pronotal surface shining dully; surface with dense microgranulate ground sculpturing and shallow, dense punctation; punctation less prominent than ground sculpturing; pubescence moderately long; midlongitudinal groove moderately well developed. Prohypomeron shining dully, with well-developed ground sculpturing. Procoxal fissure (fig. 117) narrowly open for entire length to slightly closed at dorsal edge; protrochantin narrowly exposed to slightly concealed at dorsal portion of fissure. Prosternal setigerous pit moderately well developed. Elytra 0.74 to 1.00 mm. long; elytral length/pronotal length 1.31 to 1.49; elytra moderately densely and moderately coarsely to coarsely punctate; pubescence long; pubescence adjacent to elytral suture and on lateral side of disk posteriorly directed; pubescence on median portion of disk posteriorly (fig. 121), lateroposteriorly, or laterally directed (fig. 122); pubescence of apical region lateroposteriorly to laterally directed; posterior margin without membranous lobe; posterior margin broadly rounded.

Abdominal tergal pubescence moderately

dense and long; terga (fig. 125) III to VII with posteriorly or medioposteriorly directed pubescence; terga IV to VI deeply impressed at base. Tergum VIII with isodiametric polygonal ground sculpturing (fig. 355). Sternites with uniform pubescence; ground sculpturing moderately well developed. Sternites VII and VIII unmodified.

Spermatheca as in figure 118.

Aedeagus with several microsetae near apex of parameres (fig. 116); parameres broad.

SEXUAL DIMORPHISM: None.

VARIATION: *Bledius nardus* varies in size and elytral pubescence. A larger form lives in southern Washington, Oregon, and northern California and a smaller one in northern Washington, British Columbia, Idaho, Montana, and Wyoming. The larger form tends to have the pubescence of the median portion of the elytral disk posteriorly directed (fig. 121), whereas in the smaller form the middiscal elytral pubescence tends to be laterally directed (fig. 122). Individuals of both forms have similarly lateroposteriorly directed elytral pubescence that bridges the extremes.

HABITAT AND DISTRIBUTION: The species is known from southern British Columbia through Washington, Oregon, and northern California east to Idaho, Montana, and Wyoming (fig. 126; see Appendix I for localities).

The species lives near streams and rivers. Near Tenino, Washington, on the shore of the Deschutes River, *nardus* was collected further from the edge of the water and in dryer sand than was *zophus*.

DISCUSSION: *Bledius nardus* and *zophus* are so similar that before obtaining field data and sufficiently large samples for them I regarded *nardus* simply as a smaller variant of *zophus*. After finding both the larger and smaller forms at the same locality but in different habitats on the Deschutes River near Tenino, Washington, I was forced to reassess the two forms. Further study revealed slight differences in details of the pubescence, sculpturing, and aedeagus. *Bledius nardus* and *zophus* are now known to have broadly overlapping ranges and to occur sympatrically at scattered localities in California, Oregon, Washington, and British Columbia.

ETYMOLOGY: From the Latin *nardus* for a perfumed oil and referring to the strong, sweet-smelling oil secreted by and characteristic of *Bledius* species.

### 11. *Bledius tau* LeConte

Figures 127–140, 362; Table 2

*Bledius tau* LeConte, 1877, pp. 226, 230. (Type locality: New York. Type in Museum of Comparative Zoology, Harvard University).

DISCUSSION: *Bledius tau* can be separated from all other members of the *annularis* group with bidentate mandibles except *omega* by the bicolored elytra (figs. 129–134) on which the lateroapical pale spot is large and often reaches the elytral suture, the pale elytral epipleuron, the scattered, medioposteriorly or posteriorly directed pubescence of the abdominal terga, the rectangulate pronotal basal angles (fig. 135), and slightly to moderately produced anterior pronotal angles.

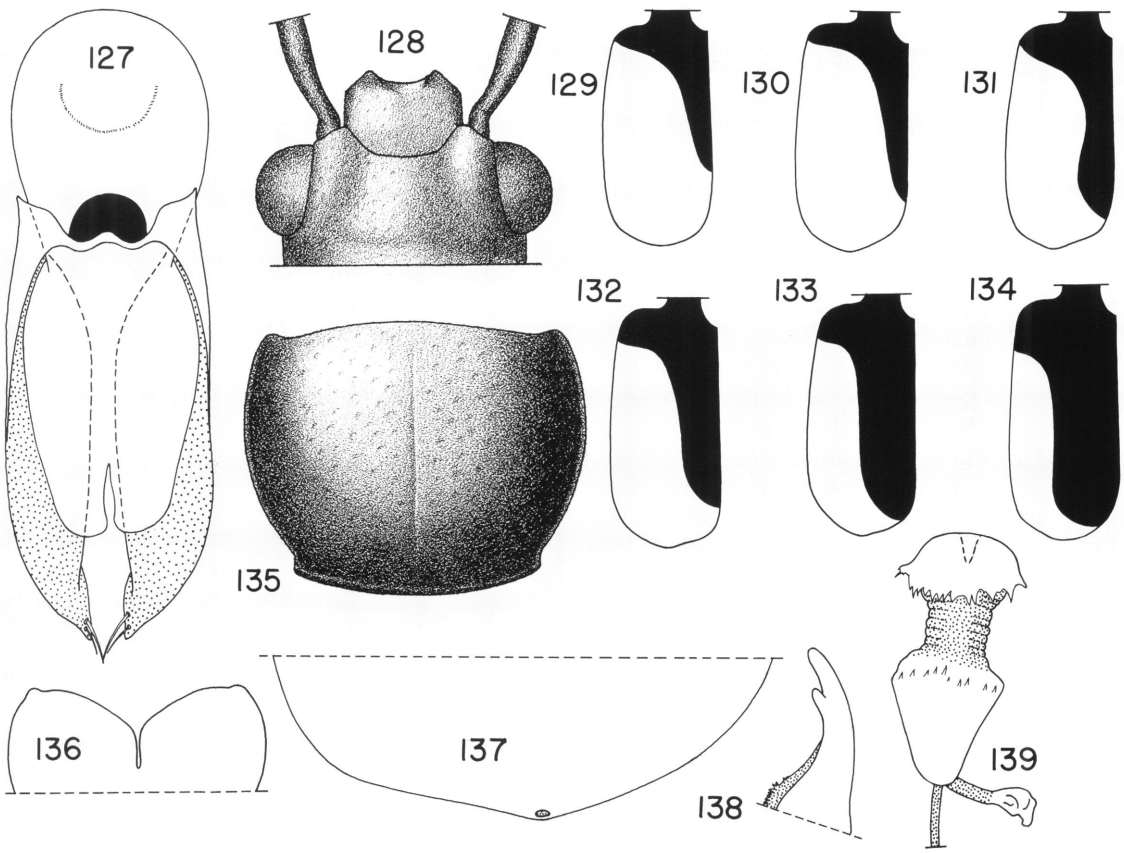
Separation of *tau* and *omega* is more difficult. Generally *tau* has pale procoxae and mesocoxae that are yellowish brown to pale reddish yellow or orange, and sparser and coarser pronotal punctation. The elytral sutural stripe is evenly pigmented from the base apically (figs. 129–134) and *tau* is generally larger than *omega*.

DESCRIPTION: *annularis* group.

Length 3.6 to 5.0 mm.

Color black to dark reddish brown with bicolored black and pale reddish brown to whitish yellow elytra. Head, prothorax and abdomen black to dark reddish brown. Elytra bicolored (figs. 129–134), sutural stripe black, broad basally, extending from suture to humeral angle, strongly constricted near base and straight to tapered toward apex, stripe not always reaching elytral apex; stripe evenly pigmented; sutural stripe occasionally pale medially and darkly pigmented basally and apically; lateroapical spot pale reddish brown or pale reddish orange to yellowish brown to occasionally whitish yellow; spot moderately large to large; epipleuron yellowish brown. Legs yellowish brown to pale reddish brown or pale reddish orange; procoxae and mesocoxae occasionally with brownish infusions at base. Antennae reddish brown.

Dorsum (fig. 128) of head shining dully, not polished; surface with dense, microgranulate ground sculpturing and moderately




FIGS. 127–139. *Bledius tau.* 127. Aedeagus, dorsal view. 128. Head, dorsal view. 129–134. Elytron, left, variation of color pattern, Newfoundland. 135. Pronotum. 136. Labrum, setae and epipharyngeal lobes removed. 137. Elytron, right, apex. 138. Mandible, right. 139. Spermatheca.

coarse and moderately dense punctation; pubescence moderately long; dorsum slightly convex; median postocular depression and postocular groove feeble to well developed. Clypeus shining dully, with dense microgranulate ground sculpturing; anterior margin with well-developed, flattened, dorsoanteriorly directed laminae near lateral margin. Eyes moderately large to large. Width of head 0.64 to 0.77 mm.; interocular width 0.38 to 0.48 mm.; head width/interocular width 1.55 to 1.64. Labrum (fig. 136) with anterior margin feebly reflexed and deeply emarginate. Mandibles (fig. 138) bidentate; basal denticle small. Antennomeres 3 to 7 without ridge or carina encircling apex.

Pronotum 0.70 to 0.92 mm. wide; 0.54 to 0.72 mm. long; pronotal width/pronotal length 1.20 to 1.31; pronotum (fig. 135) moderately strongly convex; lateral margin strongly curved to strongly constricted basal eighth; basal portion strongly rectangulate; anterior angles strongly to moderately strongly produced. Pronotal surface moderately strongly shining; punctation as prominent as to more prominent than ground sculpturing, moderately dense and moderately coarse; pubescence moderately long; midlongitudinal groove moderately to strongly developed. Prohypomeron shining dully, with well-developed ground sculpturing. Procoxal fissure open for entire length; protrochantin exposed. Prosternal setigerous pit well developed. Elytra 0.88 to 1.14 mm. long; elytral length/pronotal length 1.54 to 1.75; elytra densely and moderately coarsely punctate;

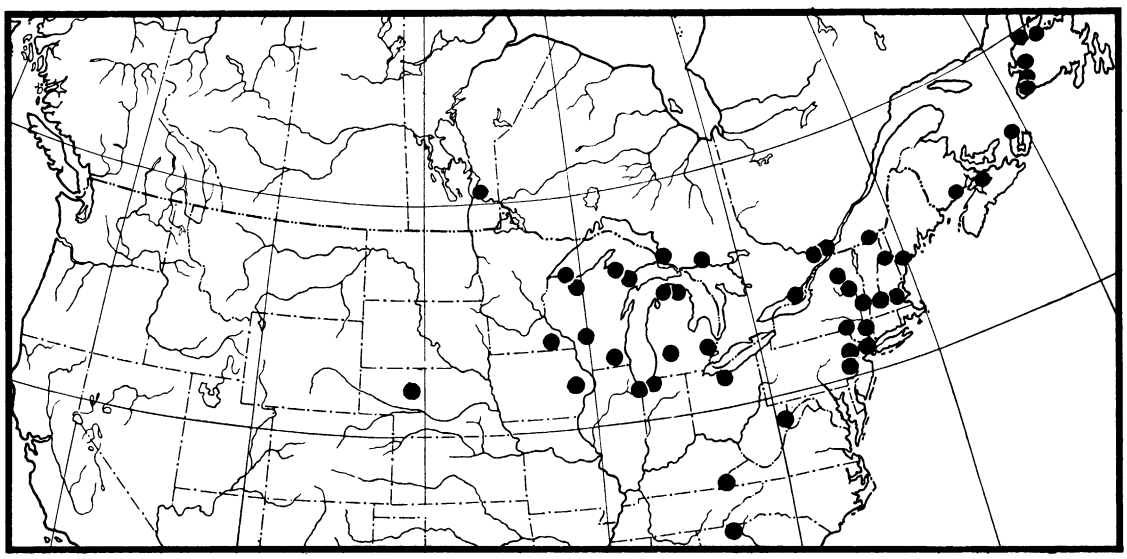


FIG. 140. Distribution of *Bledius tau* in the United States and Canada.

pubescence moderately long and posteriorly directed; membranous lobe of posterior margin small (fig. 137, as in fig. 360) and surrounded by small sclerotized lobe of posterior marginal bead; posterior margin broadly rounded.

Abdominal tergal pubescence sparse, moderately long, and posteriorly to posteromedially directed; terga IV to VI deeply impressed basally. Tergum VIII with isodiametric polygonal ground sculpturing. Sternites with moderately dense, uniform pubescence and moderately well developed ground sculpturing. Sternites VII and VIII unmodified.

Spermatheca as in figure 139.

Aedeagus with moderately long setae near apex of parameres (fig. 127); parameres broad.

SEXUAL DIMORPHISM: None.

VARIATION: In a small sample of six specimens from Sandy Hill, New York, the elytral sutural stripe is diffuse and weakly pigmented; one specimen has the sutural stripe darkly pigmented basally and apically and weakly pigmented medially. The coxae are pale yellowish brown on all but one specimen for which the coxae are feebly pigmented.

The procoxae have the basal edge darkly pigmented in some individuals and two specimens from Indian Lake, New York, have the basal third of the procoxae pigmented. All of these individuals have a darkly and evenly pigmented elytral sutural stripe. (See also Discussion under *omega*).

HABITAT AND DISTRIBUTION: This species lives in northeastern North America from Newfoundland, Nova Scotia, and Maine across to the Great Lakes into Minnesota and Iowa. In midwestern United States the species occurs as far south as Indiana and in the east it is found down the Appalachians to northern Georgia (fig. 140; see Appendix I for localities).

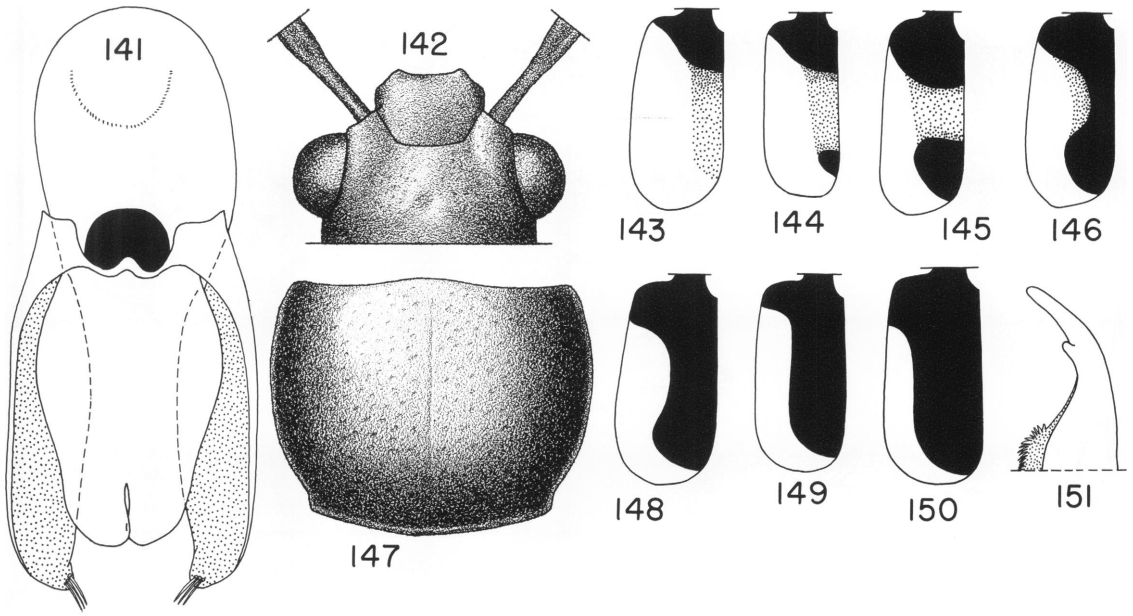
The species has been collected on the sandy shores of streams, rivers, and lakes. Near Mouth of Seneca, West Virginia, *tau* was collected from near the water on the sandy shore of a river

DISCUSSION: *Bledius tau* is only poorly distinguished from *omega* but for further remarks on the problem see Discussion under *omega*.

### 12. **Bledius omega**, new species

Figures 141–152, 358–361; Table 2

HOLOTYPE: Male. Wisconsin: Ashland County: 15 miles SSE Ashland, Marengo River, August 3, 1978, collected by Lee Herman, deposited in the American Museum of Natural History.




FIGS. 141–151. *Bledius omega*. 141. Aedeagus, dorsal view. 142. Head, dorsal view. 143–146. Elytron, left, variation of color pattern. 143. North Dakota. 144. South Dakota. 145. South Dakota. 146. Montana. 147. Pronotum. 148–150. Elytron, left, variation of color pattern. 148. Montana. 149. South Dakota. 150. Manitoba. 151. Mandible, right.

PARATYPES. Twenty-seven with same data as holotype, 21 deposited with holotype; one deposited in each of the following collections: British Museum (Natural History), Field Museum of Natural History, National Museum of Natural History, Smithsonian Institution, Museum of Comparative Zoology, Harvard University, Canadian National Collection, California Academy of Sciences.

DIAGNOSIS: The pale, yellowish to whitish elytral epipleuron, bicolored elytra (figs. 143–146, 148–150), large pale lateral elytral spot, medioposteriorly to posteriorly directed abdominal tergal pubescence, and rectangulate basal pronotal angles (fig. 147) distinguish this species from other bidentate members of the *annularis* group except *tau*. *Bledius omega* can be separated from *tau* by the dark procoxae and mesocoxae, generally small size and generally denser, finer pronotal punctation. Frequently the elytral sutural stripe of *omega* is dark basally and apically but noticeably paler near the middle (figs. 144–146) or fading completely apically (fig. 143). The sutural stripe, even when evenly pigmented (fig. 148) is often wider apically than medially. This elytral color variation is in contrast to *tau* which is evenly pigmented and not expanded apically (see Discussion).

DESCRIPTION: *annularis* group.

Length 3.4 to 4.5 mm.

Color black to dark reddish brown with yellowish to whitish and black to dark to pale reddish brown bicolored elytra. Head, pronotum and abdomen black to dark reddish brown. Elytra (figs. 143–146, 148–150) bicolored; lateral spot moderately large to large, whitish yellow to yellowish brown to occasionally pale reddish brown; sutural stripe evenly pigmented throughout (figs. 148–150) to paler medially (figs. 144–146) to paler on apical two-thirds (fig. 143); sutural stripe black to dark reddish brown, to with base black to dark reddish brown with pale reddish brown median portion with dark reddish apical portion, to with base black and apical two-thirds pale reddish brown; apical portion of stripe often expanded apically to about same width as median portion; epipleuron yellowish brown. Legs yellowish brown to pale reddish

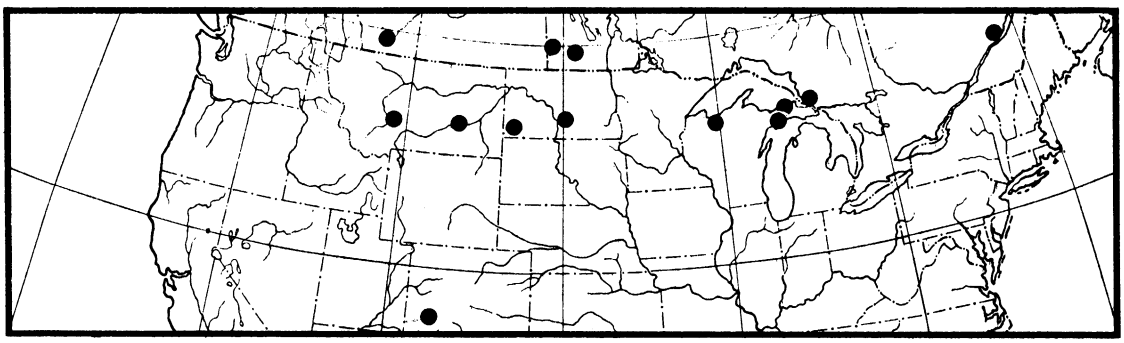


FIG. 152. Distribution of *Bledius omega* in the United States and Canada.

brown; procoxae and mesocoxae brown with infusions to yellow to reddish brown at apex. Antennae reddish brown.

Dorsum (fig. 142) of head shining dully, not polished; surface with dense, microgranulate ground sculpturing and moderately coarse and moderately dense punctation; pubescence moderately long; dorsum slightly convex; median postocular depression deep to moderately deep and postocular transverse groove feeble to absent. Clypeus shining dully, with dense microgranulate ground sculpturing; anterior margin with well-developed, small, dorsoanteriorly directed laminae. Eyes moderately large to large. Width of head 0.59 to 0.67 mm.; interocular width 0.36 to 0.42 mm.; head width/interocular width 1.58 to 1.71. Labrum with anterior margin feebly reflexed and deeply emarginate. Mandibles (fig. 151) bidentate; basal denticle small. Antennomeres 3 to 7 without ridge or carina encircling apex.

Pronotum 0.72 to 0.80 mm. wide; 0.54 to 0.61 mm. long; pronotal width/pronotal length 1.26 to 1.34; pronotum (fig. 147) moderately strongly convex; lateral margin strongly curved to strongly constricted basal sixth; basal portion strongly rectangulate; anterior angles strongly to moderately strongly produced. Pronotal surface moderately strongly shining; punctation less prominent than to as prominent as ground sculpturing, dense and fine to moderately coarse; pubescence moderately long; midlongitudinal groove moderately deep. Prohypomeron shining dully, with well-developed ground sculpturing. Procoxal fissure open for entire length; protrochantin exposed. Prosternal setigerous pit well developed. Elytra 0.84 to 0.96 mm. long; elytral length/pronotal length 1.48 to 1.70; elytra densely and moderately coarsely punctate; pubescence moderately long and posteriorly directed; membranous lobe of posterior margin (fig. 360) small and surrounded by small sclerotized lobe of posterior marginal bead; posterior margin broadly rounded.

Abdominal tergal pubescence moderately dense, moderately long and posteromedially directed; terga IV to VI deeply impressed basally. Tergum VIII with isodiametric polygonal ground sculpturing. Sternites with moderately dense, uniform pubescence and moderately well-developed ground sculpturing. Sternites VII and VIII unmodified.

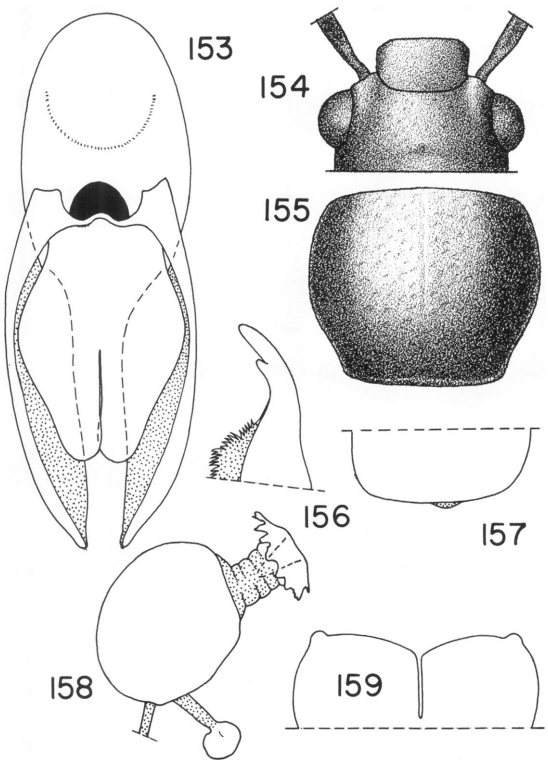
Spermatheca as in figures 139.

Aedeagus (fig. 141) with moderately long apical setae on parameres; parameres broad.

SEXUAL DIMORPHISM: None.

VARIATION: The elytral sutural stripe varies from evenly pigmented to weakly pigmented (paler) medially. Some individuals have the apical three-fourths weakly pigmented. The dark pigmentation of the procoxae and mesocoxae may have infusions of yellowish brown giving a paler cast. These variations are not geographically correlated.

HABITAT AND DISTRIBUTION: *Bledius omega* is known from across southern Canada and the northern United States from Alberta and Montana to New York. Specimens are known from Colorado and Quebec (fig. 152; see Appendix I for localities). At localities in North Dakota, Montana, Wisconsin, and Ontario, I collected the species on open sand flats adjacent to rivers.




FIGS. 153–159. *Bledius gentilis.* 153. Aedeagus, dorsal view. 154. Head, dorsal view. 155. Pronotum. 156. Mandible, right. 157. Elytron, right, apex. 158. Spermatheca. 159. Labrum, setae and epipharyngeal lobes removed.

DISCUSSION: I have concluded that *tau* and *omega* represent two species, although I have some doubt. They can be consistently separated by coxal color. The procoxae and mesocoxae are dark in *omega* and pale in *tau.* However, at Sandy Hill, New York, two specimens of a small sample of *tau* have dark infusions on the coxae. Several other specimens of *tau* from Indian Lake, New York, have slightly darker infusions on the basal third of the coxae. About two-thirds of the specimens of a large sample of *tau* from Mouth of Seneca, West Virginia have dark infusions at the basal edge to about the basal third of the procoxae. Other specimens examined either have entirely pale coxae or have pale coxae with slightly darker infusions along the basal edge. In all cases, however, the darker pigmentation is feeble or, occasionally, moderately strong. In *Bledius omega,* on the other hand, the dark pigmentation of the coxae is strong (except in teneral specimens) and extends either the entire length of the coxae or to about the apical fifth where the color is slightly paler.

The elytral sutural stripe of *tau* is usually darkly and evenly pigmented, and is parallel-sided to tapered apically (figs. 129–134). In *omega* the sutural stripe (figs. 143–146, 148–150) is usually expanded apically, is less darkly pigmented than on *tau,* and is darkly pigmented at the base and apex but weakly pigmented at the middle.

In a sample of six specimens of *tau* from Sandy Hill, New York, one has sutural coloration similar to that described for *omega.* The others have a weakly and diffusely pigmented sutural stripe. Throughout the geographical range of *omega* individuals are found that have an evenly but diffusely pigmented elytral stripe and a few specimens have been studied that have the sutural stripe restricted to the sutural bead of the elytra.

Although the elytral color pattern is helpful to distinguish *tau* and *omega,* the confusion that might result when specimens of the two species have similar elytral color can be resolved by procoxal color and by examining the variability of other specimens of the series.

At two localities, one near Ashland, Wisconsin, the other at Batchawana, Ontario, individuals of both species were collected together at the same time. In the Wisconsin sample *tau* was represented by one specimen among 17 of *omega.* In two subsequent attempts to find both species at the Ashland locality the result was 54 specimens of *omega* and none of *tau* but I was able to collect a long series of *tau* at a locality about 30 air miles away on the shore of Lake Superior. At Batchawana, Ontario, on the shore of Lake Superior, two specimens of *tau* and one of *omega* were obtained. At each locality elytral and procoxal color clearly distinguish the two species. At Ashland, the specimen of *tau* is significantly larger than those of *omega* but at Batchawana the three specimens are similar in size, all about the average size of *omega.*

Since the species can be distinguished consistently by the coxal color, and usually by

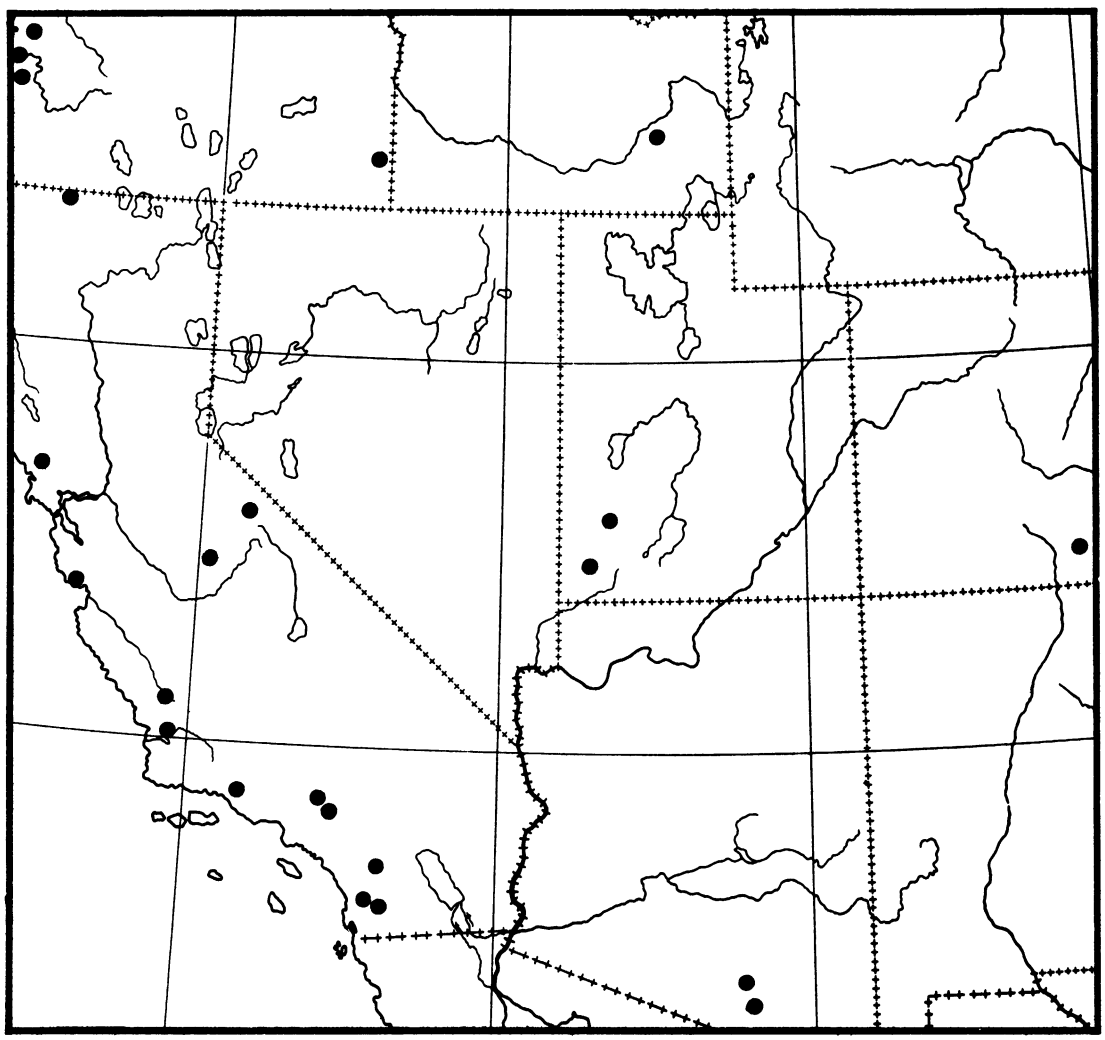


FIG. 160. Distribution of *Bledius gentilis* in western United States.

the elytral color, and since they occur together around Lake Superior but retain their differentiating features, I regard *tau* and *omega* as separate species. Variation of the coxal coloration causes some doubt but further collecting should help clarify the problem.

ETYMOLOGY: From the Greek *omega,* the last letter of the Greek alphabet.

### 13. *Bledius gentilis* Casey

Figures 153–160, 397–398; Table 2

*Bledius gentilis* Casey, 1889, p. 59. Fall 1901, p. 76; 1910, p. 111. (Type locality: California, Sonoma County, Santa Rosa. Type in National Museum of Natural History, Smithsonian Institution. Type examined).

*Bledius adustus* Casey, 1889, p. 62. Fall, 1910, p. 113. (Type locality: Colorado, Garland. Type in National Museum of Natural History, Smithsonian Institution. Type examined). NEW SYNONYM.

*Bledius transitus* Fall, 1919, p. 26 (proposed to replace *fratellus* Fall, preoccupied by *fratellus* Eppelsheim, 1885). NEW SYNONYM.

*Bledius fratellus* Fall, 1910, p. 112. (Type locality: California, Pasadena. Holotype in Museum of Comparative Zoology, Harvard University).

DIAGNOSIS: This species can be separated from the other bidentate members of the *an-*

*nularis* group by the presence of the membranous lobe on the posterior margin of the elytra (fig. 157), and the transversely bicolored or unicolorous elytra. The species is small, has a well-developed pronotal midlongitudinal groove, a moderately strongly constricted basal third of the pronotum (fig. 155), and fine pronotal punctation. The pale coxae and femora of *gentilis* separate it from *melanocolus*.

DESCRIPTION: *annularis* group.

Length 2.6 to 4.0 mm.

Color black to dark reddish brown, with unicolorous dark reddish brown to bicolored reddish brown and yellowish brown elytra. Head, prothorax, and abdomen black to dark reddish brown. Elytra unicolorous dark reddish brown to reddish brown to bicolored with yellowish brown to reddish brown apical stripe and dark reddish brown to reddish brown basal region; apical stripe transverse and occupying nearly one-half to one-eighth of apical region; pale stripe moderately well defined to poorly defined and occasionally extending anteriorly along lateral margin; apical stripe usually pale reddish brown when poorly defined and with dark reddish brown base. Legs yellowish brown to pale reddish brown. Antennae reddish brown.

Dorsum (fig. 154) of head shining dully, not polished; surface with dense microgranulate ground sculpturing; punctation moderately dense, fine and shallow; pubescence moderately long; dorsum of head broadly and shallowly convex; postocular median depression shallow but distinct; postocular transverse depression feebly developed. Clypeus shining dully, with dense microgranulate ground sculpturing; punctation feeble; anterior margin without tubercles or laminae. Eyes moderately large. Width of head 0.50 to 0.59 mm.; interocular width 0.32 to 0.39 mm.; head width/interocular width 1.42 to 1.58. Labrum (fig. 159) with weakly reflexed, broadly and shallowly emarginate anterior margin. Mandibles bidentate; basal denticle small (fig. 156). Antennomeres 3 to 7 without ridge or carina encircling apex.

Pronotum 0.56 to 0.66 mm. wide; 0.45 to 0.57 mm. long; pronotal width/pronotal length 1.14 to 1.25; pronotum (fig. 155) moderately strongly convex; lateral margin broadly and shallowly curved to moderately strongly constricted basal third; basal angles rounded but distinct; anterior angles rounded and even with anterior margin. Pronotal surface shining dully, with dense microgranulate ground sculpturing; punctation dense, shallow, fine, and less prominent than ground sculpturing; pubescence moderately long; midlongitudinal groove moderately well developed. Prohypomeron dully shining, with well developed ground sculpturing. Procoxal fissure open for entire length; protrochantin exposed. Prosternal setigerous pit small and with few setae. Elytra 0.62 to 0.83 mm. long; elytral length/pronotal length 1.29 to 1.52; elytra densely and moderately coarsely punctate; pubescence posteriorly directed; posterior margin with small to minute membranous lobe; posterior margin broadly rounded.

Abdominal tergal pubescence moderately dense, moderately long and medioposteriorly directed; terga IV to VI moderately deeply impressed basally. Tergum VIII with isodiametric polygonal ground sculpturing. Sternites with uniformly dense pubescence; ground sculpturing moderately well developed. Sternites VII and VIII unmodified.

Spermatheca as in figure 158.

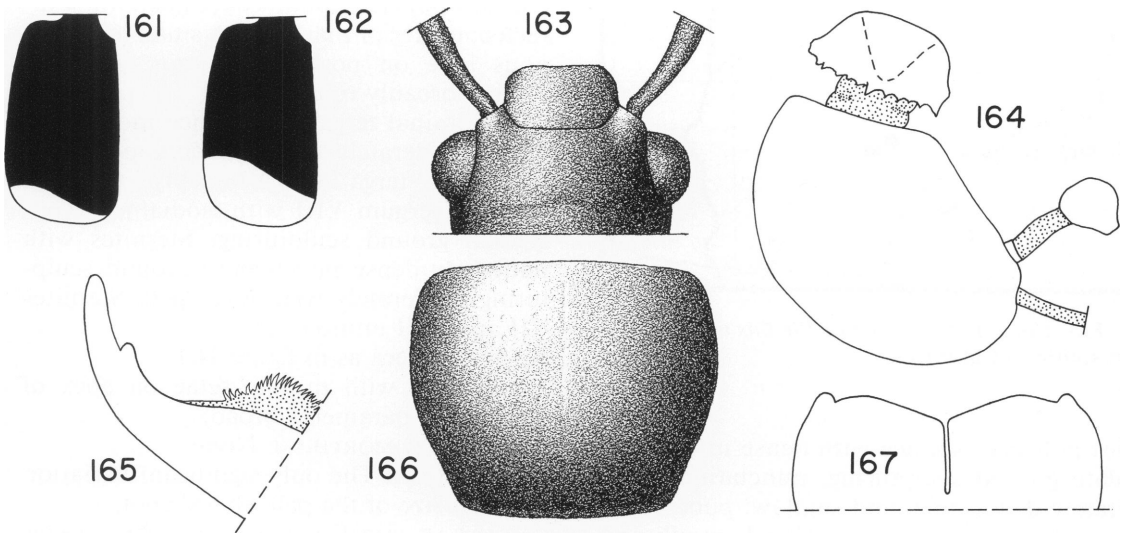
Aedeagus with minute setae on apex of parameres (fig. 153); parameres broad.

SEXUAL DIMORPHISM: None.

VARIATION: Generally the samples from Idaho, Oregon, and northern California have concolorous reddish brown elytra. Some individuals of these samples have a narrow transverse, yellowish brown stripe across the apex. Most specimens studied from Utah, Colorado, Arizona, and southern California also have reddish brown elytra with a narrow to broad yellowish brown apical band but a few have concolorous elytra. The yellowish band is never strongly defined and its presence or absence and size intergrade. Some individuals from southern California have a large transverse elytral stripe that extends anteriorly on the lateral side to nearly the humeral angle.

SYNONYMS: In his description of *adustus* Casey (1889) does not compare *adustus* to *gentilis,* and I am unable to find characters that permit separation. Casey mentions that *adustus* has pale elytral apices and that *gentilis* does not but this character is variable (see Variation) and the type actually has a narrow pale stripe on the apex.

Fall (1910) did not compare *transitus* (as




FIGS. 161–167. *Bledius melanocolus*. 161–162. Elytron, left, variation of color pattern. 163. Head, dorsal view. 164. Spermatheca. 165. Mandible, left. 166. Pronotum. 167. Labrum, setae and epipharyngeal lobes removed.

*fratellus*) to *gentilis* but he does indicate its similarity to *adustus* which I regard as conspecific with *gentilis*. The character (punctation) used by Fall to separate *adustus* and *gentilis* is variable.

HABITAT AND DISTRIBUTION: *Bledius gentilis* is known from the western third of the United States with a dubious record of one specimen from Iowa. In the western United States the species occurs in California, Oregon, Washington, Idaho, Utah, Colorado, and Arizona (fig. 160; see Appendix I for localities). The species has been collected from the sandy or muddy shore of many rivers and streams.

DISCUSSION: Hatch (1957) described *B. oregonensis* and listed it from various localities in the Pacific Northwest. The holotype of *oregonensis* I have synonymized with *B. suturalis*. The paratypes that I have examined from Sucker Creek Canyon, Oregon are *gentilis*.

### 14. **Bledius melanocolus**, new species
Figures 161–168, 368, 369; Table 2

HOLOTYPE: Male. California: San Bernardino County: 30 miles ENE Redlands, South Fork Campground, Santa Ana River, 6300 feet, May 11, 1981, collected by Lee Herman, deposited in the American Museum of Natural History.

PARATYPES: One hundred and five with same data as holotype; 93 deposited with holotype, two deposited in each of the following collections: British Museum (Natural History), Field Museum of Natural History, National Museum of Natural History, Smithsonian Institution, Museum of Comparative Zoology, Harvard University, California Academy of Sciences, Canadian National Collection.

DIAGNOSIS: This species may be separated from all other species of the *annularis* group with bidentate mandibles by the presence of a membranous lobe on the elytral margin, the reddish lateroapical elytral spot, and the dark coxae and femora (see also Discussion of this species).

DESCRIPTION: *annularis* group.

Length 3.6 to 4.5 mm.

Color black with pale reddish brown elytral spot. Elytral disk black to dark reddish brown; lateroapical spot pale reddish brown; spot restricted to lateroapical region or expanded anteriorly along lateral side (figs. 161, 162). Antennae dark reddish brown. Legs reddish brown; coxae and femora dark reddish brown; tibiae and tarsi pale reddish brown.

Dorsum of head (fig. 163) shining dully,

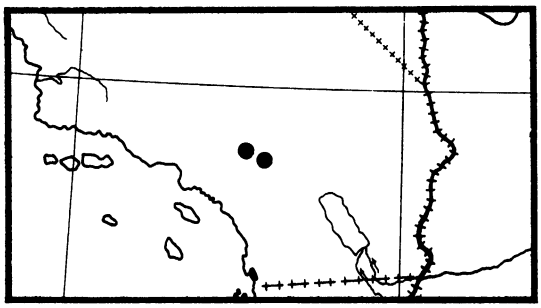


FIG. 168. Distribution of *Bledius melanocolus* in southern California.

not polished; surface with dense microgranulate ground sculpturing; punctation moderately dense, fine, and shallow; pubescence moderately long; dorsum of head broadly and shallowly convex; postocular median depression shallow but distinct; postocular transverse depression feebly developed. Clypeus shining dully, with dense, microgranulate ground sculpturing; punctation feeble; anterior margin without tubercles or laminae. Eyes moderately large. Width of head 0.59 to 0.64 mm.; interocular width 0.39 to 0.44 mm.; head width/interocular width 1.43 to 1.56. Labrum (fig. 167) with feebly reflexed, broadly and moderately deeply emarginate anterior margin. Mandibles (fig. 165) bidentate; basal denticle large. Antennomeres 3 to 7 without ridge or carina encircling apex.

Pronotum 0.68 to 0.76 mm. wide; 0.56 to 0.62 mm. long; pronotal width/pronotal length 1.16 to 1.23; pronotum (fig. 166) moderately strongly convex; lateral margin broadly and shallowly curved to moderately strongly constricted, sinuous basal third; basal angles rounded but distinct; anterior angles rounded and even with anterior margin. Pronotal surface shining dully, with dense microgranulate ground sculpturing; punctation dense, shallow, fine, and equally prominent with ground sculpturing; pubescence moderately long; midlongitudinal groove well developed. Prohypomeron shining dully, with well developed ground sculpturing. Procoxal fissure open for entire length; protrochantin exposed. Prosternal setigerous pit moderately large and with many setae. Elytra 0.82 to 0.95 mm. long; elytral length/pronotal length 1.41 to 1.54; elytra densely and moderately coarsely punctate; pubescence posteriorly directed; posterior margin with small membranous lobe on posterior margin; posterior margin broadly rounded.

Abdominal tergal pubescence moderately dense, moderately long, and medioposteriorly directed; terga IV to VI deeply impressed basally. Tergum VIII with isodiametric polygonal ground sculpturing. Sternites with uniformly dense pubescence; ground sculpturing moderately well developed. Sternites VII and VIII unmodified.

Spermatheca as in figure 164.

Aedeagus with minute setae on apex of parameres; parameres broad.

SEXUAL DIMORPHISM: None.

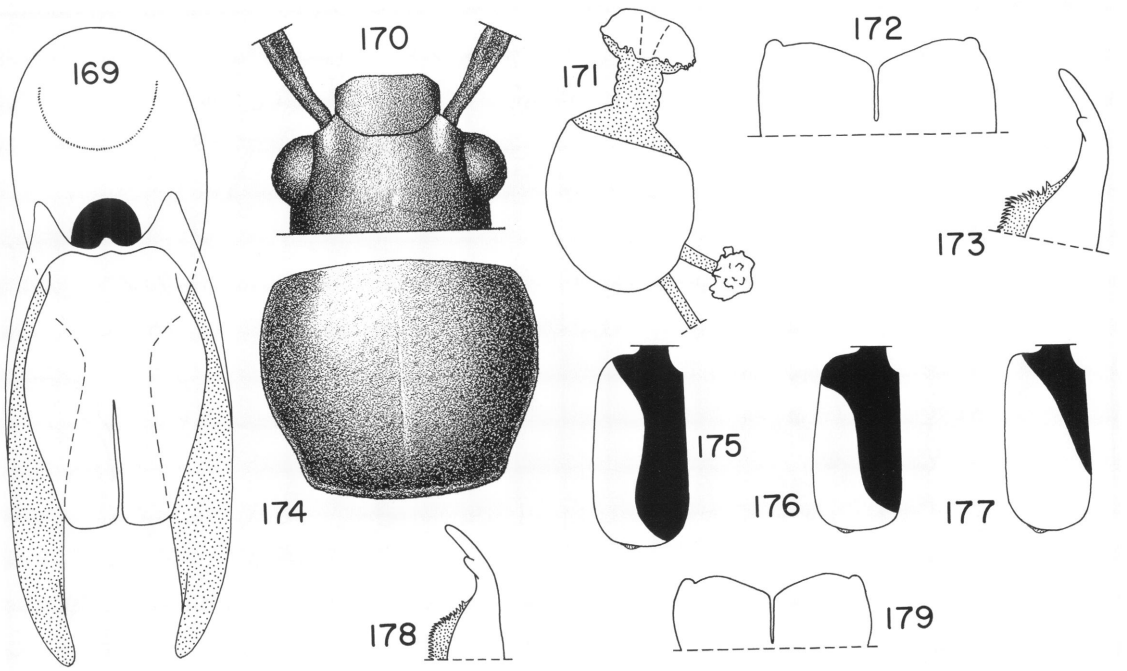
VARIATION: The only significant variation is in the size of the pale elytral spot.

HABITAT AND DISTRIBUTION: This species is known from only two localities in southern California (fig. 168; see Appendix I for localities) where it was collected at 3300 to 6300 feet elevation from partly vegetated sand.

DISCUSSION: I have some doubts about the status of this species but the only way to resolve them is more collections of *adustus* and *suturalis*—the two species that are most similar to *melanocolus*.

*Bledius melanocolus* is distinguished from *suturalis* by the reddish lateroapical elytral spot that contrasts with the black elytra and the more shallowly emarginate labrum. The elytra of *suturalis* are yellowish with a narrow to broad blackish sutural stripe. The pronotal punctation of *melanocolus* is finer than that of *suturalis*. The elytral color pattern of *melanocolus* and *adustus* is similar but the paler spot of *melanocolus* is located lateroapically but is across the apex, or across the apex and up the lateral side, or is absent in *adustus*. *Bledius melanocolus* is larger than *adustus*, has a more shallowly emarginate labrum, more finely punctate pronotum, more darkly pigmented legs, and longer parameres (relative to the length of the median lobe).

In Oregon there is a form of *suturalis* (described as *oregonensis* Hatch) that has a diffuse, poorly developed sutural stripe on the elytra. This form is easily distinguished by the elytral color pattern and color of the legs (pale in Oregon samples of *suturalis*) but the pronotal punctation is fine in both *melanocolus* and this form of *suturalis* from Oregon.




FIGS. 169–179. *Bledius suturalis*. 169. Aedeagus, dorsal view. 170. Head, dorsal view. 171. Spermatheca. 172. Labrum, setae and epipharyngeal lobes removed, medium form. 173. Mandible, medium form. 174. Pronotum. 175–177. Elytron, left, variation of color pattern. 178. Mandible, right, small form. 179. Labrum, setae and epipharyngeal lobes removed, small form.

However, I have seen no specimens that link *melanocolus* to *suturalis* through something like the Oregon form of *suturalis*.

ETYMOLOGY: This name is a combination of the Greek *melanos* for black and *kolon* for limb or leg and refers to the black legs of this species.

### 15. *Bledius suturalis* LeConte

Figures 169–180, 344, 345; Table 2

*Bledius suturalis* LeConte, 1863, p. 54; 1877, pp. 226, 231. Fall, 1910, p. 113. (Type locality: Arizona, banks of Gila River. Type in Museum of Comparative Zoology, Harvard University. Type examined).

*Bledius luteipennis* LeConte, 1877, p. 227. Fall, 1901, p. 75. (Type locality: California, San Bernardino. Type in Museum of Comparative Zoology, Harvard University. Type examined). NEW SYNONYM.

*Bledius pleuralis* LeConte, 1877, p. 229. Fall, 1901, p. 75. (Type locality: California, San Bernardino. Type in the Museum of Comparative Zoology, Harvard University. Type examined). NEW SYNONYM.

*Bledius medialis* Fall, 1910, p. 113. Hatch, 1957, p. 103. (Type locality: British Columbia, Vancouver Island. Type in Museum of Comparative Zoology, Harvard University. Type examined). NEW SYNONYM.

*Bledius oregonensis* Hatch, 1957, p. 103. (Type locality: Oregon, Condon. Holotype in collection at the National Museum of Natural History, Smithsonian Institution. Type examined). NEW SYNONYM.

DIAGNOSIS: There are no unique features by which this species may be separated from all other bidentate members of the *annularis* group so a combination of characters must be used. The species is small, has bicolored elytra (figs. 175–177) with a black to dark reddish brown sutural stripe, and yellowish brown to pale reddish brown lateral spot, a membranous lobe on the posterior margin of the elytra, a pronotum (fig. 174) with gradually convergent to sinuate lateral margins, rectangulate pronotal basal angles and anterior pronotal angles that are rounded and even with the anterior margin. The pale to dark

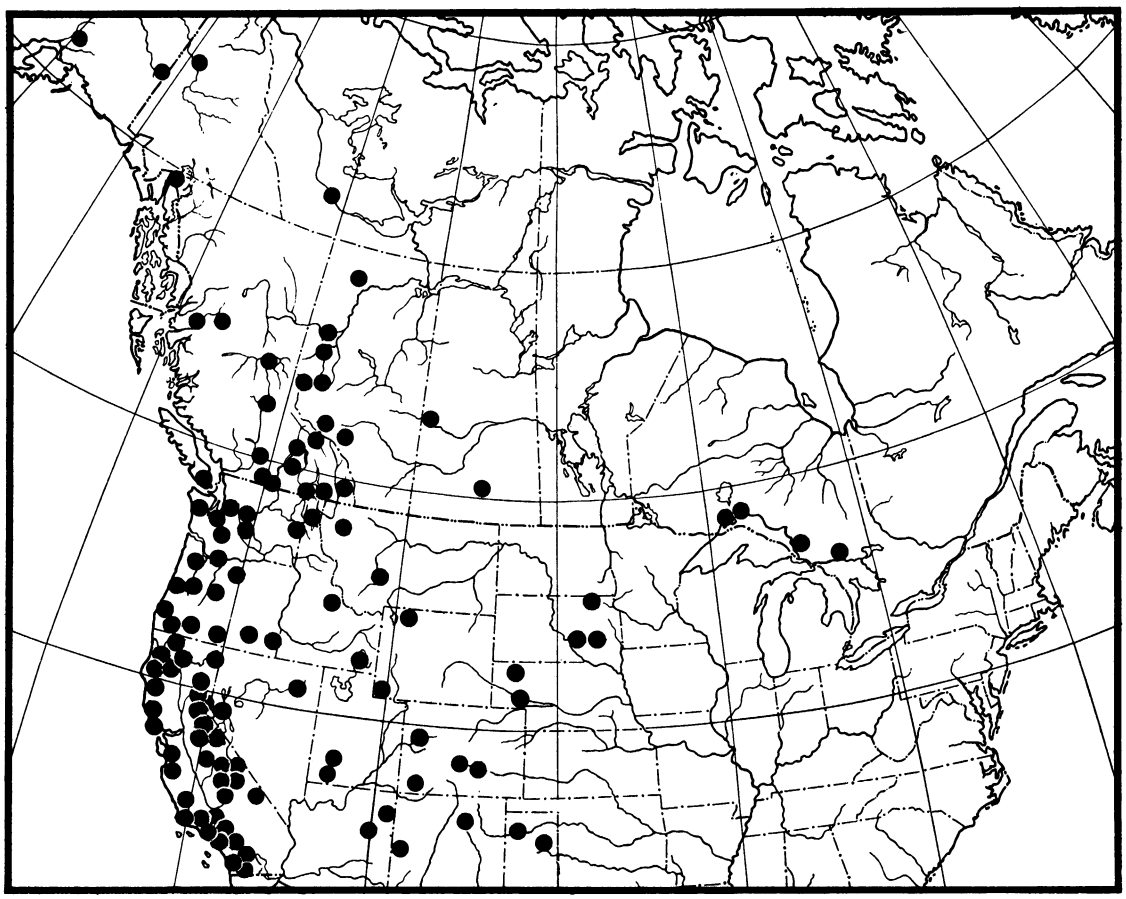


FIG. 180. Distribution of *Bledius suturalis* in the United States and Canada.

elytral epipleuron is yellowish brown to reddish brown to black.

DESCRIPTION: *annularis* group.

Length 2.3 to 5.2 mm.

Color black to dark reddish brown with bicolored yellowish and blackish elytra. Head, prothorax, and abdomen black to dark reddish brown. Elytra usually bicolored (figs. 175–177) with black to dark reddish brown sutural stripe, and yellowish brown to pale reddish brown lateroapical spot; sutural stripe narrow and confined to stripe adjacent to suture to broad and covering nearly entire disk; edge of stripe often well defined but usually diffuse; stripe darkest, nearly black at base of suture; rare individuals without distinct sutural stripe but with broad, diffusely reddish brown elytra with nearly black spot near base of suture and with gradually paler, nearly yellowish brown, lateroapical region; epipleuron dark, black to dark reddish brown, to pale yellowish brown or reddish brown and concolorous with lateroapical spot, intermediates with epipleuron darker than lateroapical spot but paler than sutural stripe. Legs pale reddish brown. Antennae reddish brown.

Dorsum (fig. 170) of head shining dully, not polished; surface with dense, microgranulate ground sculpturing; punctation fine, shallow, and sparse to moderately dense; pubescence moderately long; dorsum broadly and weakly convex; postocular median depression moderately deep; postocular transverse depression feeble to absent. Clypeus shining dully, with dense microgranulate ground sculpturing; punctation feeble; anterior margin without tubercles or laminae. Eyes moderately large. Width of head 0.46 to 0.69

mm.; interocular width 0.29 to 0.46 mm.; head width/interocular width 1.47 to 1.60. Labrum (fig. 172) with moderately deeply emarginate, slightly reflexed anterior margin. Mandibles (fig. 173) bidentate; basal denticle small. Antennomeres 3 to 7 without ridge or carina encircling apex.

Pronotum 0.51 to 0.82 mm. wide; 0.41 to 0.71 mm. long; pronotal width/pronotal length 1.09 to 1.28; pronotum (fig. 174) moderately strongly convex; lateral margin broadly and shallowly curved to sinuate basal third; basal angles well developed and weakly rectangulate to rounded but distinct; anterior angles rounded and even with remainder of anterior margin. Pronotal surface shining dully, with dense microgranulate ground sculpturing; punctation less prominent than ground sculpturing, shallow, fine, and moderately dense; pubescence moderately long; midlongitudinal groove deep to moderately deep. Prohypomeron shining dully with well-developed ground sculpturing. Procoxal fissure open for entire length; protrochantin exposed. Prosternal setigerous pit moderately well developed. Elytra 0.64 to 1.07 mm. long; elytral length/pronotal length 1.37 to 1.60; elytra densely and moderately coarsely punctate; pubescence moderately long and posteriorly directed; posterior margin with membranous lobe; posterior margin broadly rounded.

Abdominal tergal pubescence moderately sparse to dense, moderately long, and medioposteriorly directed; terga IV to VI deeply impressed at base. Tergum VIII with isodiametric polygonal ground sculpturing. Sternites with uniformly dense pubescence; ground sculpturing weakly developed. Sternites VII and VIII unmodified.

Spermatheca as figure 171.

Aedeagus without setae on parameres (fig. 169); parameres broad.

SEXUAL DIMORPHISM: None.

VARIATION: Size, pronotal punctation, and elytral color are the most variable characters of *suturalis*. The elytral sutural stripe (figs. 175–177) is usually distinct though the edges may be diffuse rather than sharply delimited. The sutural stripe is broad to moderately broad to confined to a narrow stripe immediately adjacent to the suture. Individuals with a narrow stripe confined to the suture are found abundantly in southern California. Rare individuals have almost entirely reddish brown elytra that gradually become paler lateroapically and blend gradually from reddish brown to yellowish brown.

Most commonly, however, there are two forms of this species, one with dark elytral epipleura, the other with pale epipleura. Most specimens from the eastern part of the range (Alberta, Montana, Nebraska, Utah, Arizona, Texas, and New Mexico) have dark epipleura and those from the west (British Columbia, Idaho, Washington, Oregon, and California) have the pale epipleura. However, the form with the dark epipleura is also scattered through the western part of the range but in lower frequency than in the eastern region. The darker form is found at a low incidence with the pale one at localities in Saskatchewan, Washington, Oregon, and Idaho. What appear to be intermediates, in which the epipleura are pigmented but not as darkly as in the "typical" dark form, are known from Montana, Wyoming, Nebraska, South Dakota, Colorado, California, Oregon, and Washington. These intermediates provide the intergradation between the pale and dark forms to support the contention that they are conspecific.

*Bledius suturalis* is noticeably variable in size, the length varying from 2.3 to 5.2 mm. More significantly there are three distinguishable forms based on size, small, medium, and large. As a representative measurement for this discussion, data for the head width will be examined. The other measurements vary similarly. The head width of the small form is 0.46 to 0.50 mm., the medium form is 0.54 to 0.61 mm., and the large form is 0.61 to 0.69. These data are from the seven samples included in table 1. The medium and large forms overlap slightly at 0.61 mm.; the measurements are distributed bimodally. The small form is separated from the other two. To examine the differences of the three forms, I measured the width of the head for 200 more specimens from 29 localities. Rather than select these 200 specimens randomly, I sought specimens that appeared to bridge the two gaps. Forty-four specimens had a head width of 0.60 to 0.62 mm.; the large and medium forms are definitely linked. Only 18 specimens were found that filled the break

(0.51 to 0.53 mm.) between the small and medium forms. Thus, the three forms overlap in size, the small and medium forms slightly (in terms of numbers of individuals), and the large and medium forms more broadly. Were measurements taken from only randomly selected specimens the trimodal characters of the species would remain.

The small form is known from numerous specimens and many localities in Washington, Montana, Alaska, British Columbia, and Alberta, but from few localities and few specimens in southern California. However, while seeking specimens that would bridge the gap (0.51 to 0.53 mm.) between the small and medium forms only five of the 18 specimens were from three Canadian localities; all the others were from southern California, seven of them from near Santa Maria. Despite the intergradation the small and medium forms were found together at Packwood, Washington, without intermediates.

The large form is found abundantly in southern California where it is the predominant one. In contrast to the small form which is distinguished from the other two only by size, the large one frequently has sparser pronotal punctation, and sparser pubescence of abdominal terga IV and V. Typically, the elytral epipleuron of the large form is yellow and the elytral sutural stripe is narrow, tapering posteriorly, and restricted to near the elytral suture. Differences of the pronotum, elytra, and abdomen are bridged by numerous intermediates.

The medium form is more abundant and has a wider geographical range than the other two. In southern California the large form is most common; in western Canada the small and medium form are equally common.

The random variation of the pronotal convexity and the distinctness of the pronotal basal angles does not correlate with variation of elytral color, pronotal punctation, or size.

SYNONYMS: In addition to the original description, *suturalis* was described and named four other times.

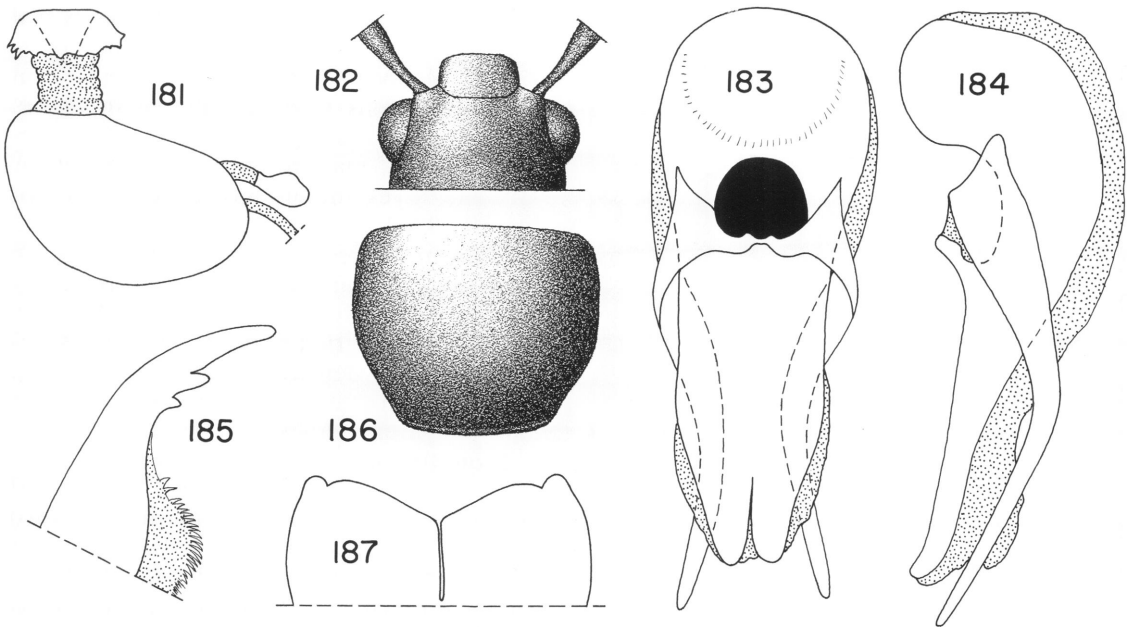
LeConte (1877) in describing *luteipennis* indicated the elytra were uniformly brownish yellow, thus separating it from *suturalis* with bicolored black and yellow elytra. Actually the type of *luteipennis* has bicolored elytra but the reddish brown sutural stripe is narrow and confined to the area immediately adjacent to the suture; most of the elytron is yellowish as are the epipleura. LeConte gives no other characters to separate *luteipennis* from *suturalis,* and the other features he does mention all fall within the normal range of variation.

However, the type of *luteipennis* falls within the range of variation of a large form of *suturalis* that is found in southern California. This larger form intergrades at various localities with the medium form (see Variation). The type of *luteipennis* is not as large as other representatives of the large form and actually falls within the range of size for the medium form but the pronotal punctation and abdominal pubescence is sparse as in the larger form. *Bledius luteipennis* is simply a size and color variant of *suturalis* that is found more abundantly in southern California than in other parts of the range.

LeConte (1877) separates *pleuralis* from *suturalis* by the dark elytral epipleuron of *pleuralis* in contrast to the pale ones of *suturalis.* I have seen individuals throughout the range of *suturalis* that seem to be intermediate, that is, the elytral epipleuron is not as dark as in the dark form but is darker than in the pale form. Further, the type of *suturalis* actually has a slightly darkened epipleura and is intermediate between the forms with the dark or pale epipleura. Although after separating *suturalis* and *pleuralis* LeConte (1877) then compared *pleuralis* and *divisus* (=*tarandus*), *suturalis* and *pleuralis* are actually more similar and cannot be separated without resort to the epipleural pigmentation. The two, *suturalis* and *pleuralis,* are simply color variants.

I could find no characters to separate *suturalis* and *medialis* Fall. The characters provided by Fall (1910) are individually variable and therefore useless. Fall admits in the original description, however, that the differences he uses "may be entirely due to slight individual variation . . . ."

The holotype of *oregonensis* Hatch represents a relatively rare variation of the elytral color pattern. The elytral sutural stripe is not distinct but the elytra are dark, almost black, near the suture and have a reddish brown disk. The disk is gradually paler reddish brown lateroapically blending gradually into a broad, diffuse and poorly defined yellowish brown lateroapical spot. Although I have not seen




FIGS. 181–187. *Bledius persimilis.* 181. Spermatheca. 182. Head, dorsal view. 183. Aedeagus, dorsal view. 184. Aedeagus, lateral view. 185. Mandible, left. 186. Pronotum. 187. Labrum, setae and epipharyngeal lobes removed.

other specimens with exactly the same elytral color pattern as in *oregonensis,* I have seen variation that tends toward that of *oregonensis.* Those few specimens are from Oregon and Idaho and are otherwise inseparable from other more "typical *suturalis*" specimens of the same series. *Bledius oregonensis* also has distinct but rounded basal angles of the pronotum. This variation is found in scattered populations and intergrades with specimens that have more strongly angulate basal angles. The holotype, but for the elytral color and pronotal shape, is indistinguishable from other members of *suturalis* and corresponds to it in the characters diagnostic for *suturalis.*

HABITAT AND DISTRIBUTION: This species is known from the western two-thirds of North America. It occurs in Canada from Alaska across Canada to Ontario north of the Great Lakes and south through British Columbia into the United States from Idaho and Washington, south through Oregon, California, Nevada, Arizona, New Mexico, and Texas then back north through Colorado, Utah, Wyoming, Nebraska, South Dakota, and Montana (fig. 180; see Appendix I for localities). Only the small form occurs in Alaska, the Yukon Territory, and around the Great Lakes.

The species has been collected on the shore of many western rivers and streams on open unvegetated sand flats and occasionally in temporarily moist soil.

NATURAL HISTORY: A specimen of *suturalis* was collected in association with *Dyschirius laevifasciatus* Horn at Creston, British Columbia and three specimens with *Dyschirius interior* Fall near Moose Jaw, Saskatchewan, by Carl Lindroth.

DISCUSSION: Although the holotype of *oregonensis* is synonymous with *suturalis,* the paratypes from Oregon that I have seen from the California Academy of Sciences and the Field Museum of Natural History are *B. gentilis.*

### 16. *Bledius persimilis* Fall

Figures 181–188, 395, 396; Table 2

*Bledius persimilis* Fall, 1910, p. 110. (Type locality: California, Pomona. Holotype in Museum of Comparative Zoology, Harvard University).

DIAGNOSIS: This species has tridentate mandibles. It is a small species that is similar

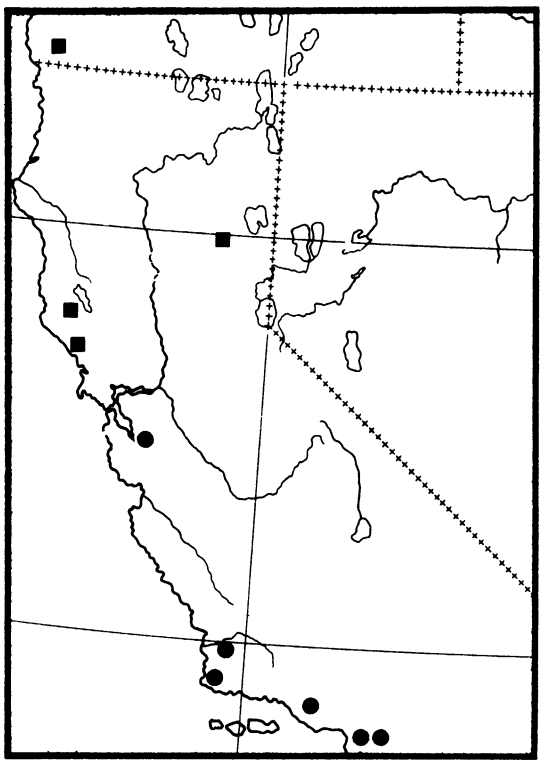


FIG. 188. Distribution of *Bledius persimilis* (dots) and *Bledius gracilis* (squares) in California and Oregon.

to *gracilis* and *gentilis*. The males can be separated most accurately from these two species as well as all other species of the *annularis* group by the configuration of the slender parameres (figs. 183, 184). The female can be identified by association with the male but is likely to be confused with females of *gracilis*. A useful character for separating *persimilis* from *gracilis* is the straight to slightly sinuous basal third to the lateral pronotal margin for *persimilis* (fig. 186) and the more strongly sinuous basal third of the pronotal margin of *gracilis* (fig. 194).

DESCRIPTION: *annularis* group.

Length 3.0 to 3.2 mm.

Color black to reddish brown. Head and abdomen often darker than pronotum and elytra. Antennae reddish brown. Legs yellowish brown.

Dorsum of head (fig. 182) shining dully, not polished; surface with dense microgranulate ground sculpturing; punctation moderately dense, fine, and shallow; pubescence moderately long; dorsum of head broadly and shallowly convex; median postocular depression feeble; postocular transverse depression absent. Clypeus shining dully, with dense, microgranulate sculpturing; punctation feeble; anterior margin without tubercles or laminae. Eyes moderately large. Width of head 0.48 to 0.52 mm.; interocular width 0.32 to 0.36 mm.; head width/interocular width 1.43 to 1.56. Labrum (fig. 187) with feebly reflexed, broadly and moderately deeply emarginate anterior margin. Mandibles tridentate; basal denticle small to minute (fig. 185). Antennomeres 3 to 7 without ridge or carina encircling apex.

Pronotum 0.57 to 0.63 mm. wide; 0.49 to 0.54 mm. long; pronotal width/pronotal length 1.10 to 1.17; pronotum (fig. 186) strongly convex; lateral margin with anterior two-thirds straight to broadly and shallowly curved and with basal third straight to slightly sinuate and convergent to base; basal angles rounded but well developed and distinct; anterior angles rounded and even with anterior margin. Pronotal surface shining dully, with dense microgranulate ground sculpturing; punctation dense, shallow, fine and equal in prominence to ground sculpturing; pubescence moderately long; midlongitudinal groove shallow and weakly developed but distinct. Prohypomeron shining, with well-developed ground sculpturing. Procoxal fissure open for entire length; protrochantin exposed. Prosternal setigerous pit small and with few setae. Elytra 0.66 to 0.71 mm. long; elytral length/pronotal length 1.28 to 1.38; elytra densely and moderately coarsely punctate; pubescence posteriorly directed; posterior margin with membranous lobe; posterior margin broadly rounded.

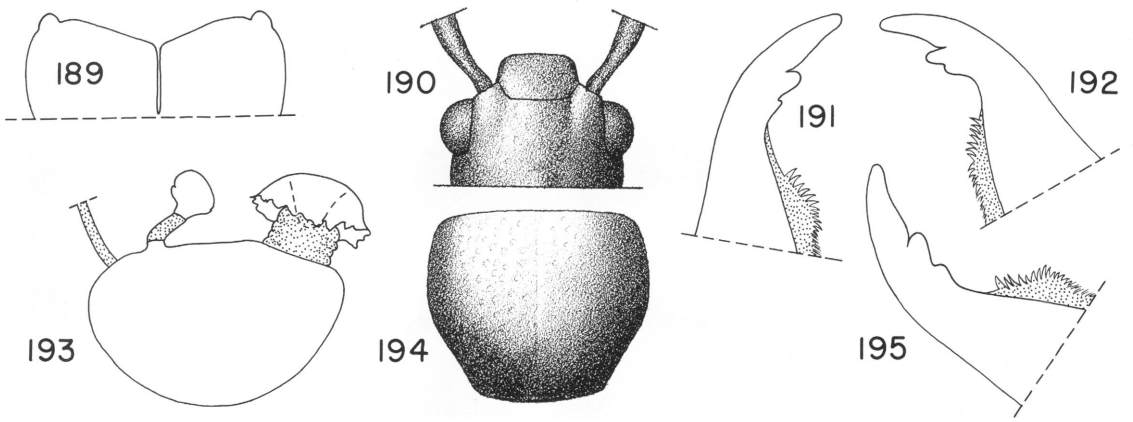
Abdominal tergal pubescence moderately dense, moderately long, and medioposteriorly directed; terga IV to VI moderately deeply impressed basally. Tergum VIII with isodiametric polygonal ground sculpturing. Sternites with uniformly dense pubescence; ground sculpturing moderately well developed. Sternites VII and VIII unmodified.

Spermatheca as in figure 181.

Aedeagus with minute setae on apex of parameres; parameres slender and sinuous (figs. 183, 184).

SEXUAL DIMORPHISM: None.

VARIATION: The color varies from dark




FIGS. 189–195. *Bledius gracilis.* 189. Labrum, setae and epipharyngeal lobes removed. 190. Head, dorsal view. 191–192. Mandibles, variation of denticulation. 191. Left. 192. Right. 193. Spermatheca. 194. Pronotum. 195. Mandible, variation of denticulation, left.

reddish brown to reddish brown and the basal (third) mandibular denticle is often quite small as a result of wear.

HABITAT AND DISTRIBUTION: This species is known from only a few localities in southern California (fig. 188; see Appendix I for localities).

DISCUSSION: This tiny species is one of the few with aedeagal characters that differentiate it from others of the genus.

### 17. *Bledius gracilis* Casey

Figures 188–195, 393, 394; Table 2

*Bledius gracilis* Casey, 1889, p. 60. Fall, 1901, p. 76; 1910, p. 111. (Type locality: California, Mendocino County, Soda Springs, Anderson Valley. Lectotype in National Museum of Natural History, Smithsonian Institution. Type examined).

DIAGNOSIS: This species has tridentate mandibles but often the basal one is worn and the mandibles have only two denticles (figs. 191, 192, 195). Individuals with two denticles are similar to specimens of *gentilis* that lack the pale, transverse, apical elytral stripe but can be separated from *gentilis* by the smaller size, coarser pronotal punctation, and more broadly and deeply emarginate labrum (fig. 189). Individuals with tridentate mandibles are similar to *persimilis* but can be separated by the broad parameres of *gracilis* that contrast with the slender ones of *persimilis.* In the Key *gracilis* runs to near the *annularis* complex but can be separated as indicated in the Key.

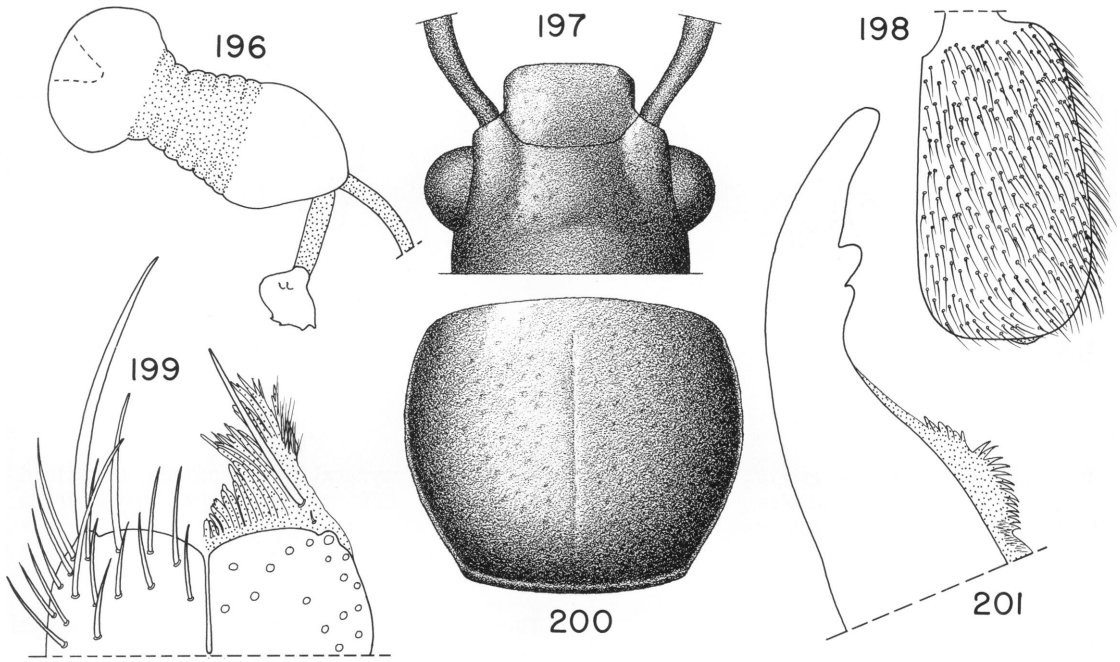
DESCRIPTION. *annularis* group.

Length 2.5 to 3.2 mm.

Color reddish brown to nearly black. Head and abdomen dark reddish brown to nearly black. Pronotum nearly black to reddish brown. Elytra dark reddish brown to reddish brown. Antennae reddish brown. Legs yellowish brown.

Dorsum of head (fig. 190) shining dully, not polished; surface with dense microgranulate ground sculpturing; punctation moderately dense, fine, and shallow; pubescence moderately long; dorsum of head broadly and shallowly convex; postocular median depression shallow but distinct; postocular transverse depression absent. Clypeus shining dully, with dense microgranulate ground sculpturing; punctation feeble; anterior margin without tubercles or laminae. Eyes moderately large. Width of head 0.46 to 0.49 mm.; interocular width 0.31 to 0.33 mm.; head width/interocular width 1.43 to 1.52. Labrum (fig. 189) with feebly reflexed, broadly and moderately deeply emarginate anterior margin. Mandibles tridentate; basal denticle small to feeble and often worn off (figs. 191, 192, 195). Antennomeres 3 to 7 without ridge or carina encircling apex.

Pronotum 0.52 to 0.56 mm. wide; 0.44 to 0.49 mm. long; pronotal width/pronotal length 1.10 to 1.15; pronotum (fig. 194)




FIGS. 196–201. *Bledius villosus*. 196. Spermatheca. 197. Head, dorsal view. 198. Elytron, right. 199. Labrum, left epipharyngeal lobe and setae of right side removed. 200. Pronotum. 201. Mandible, left.

strongly convex; lateral margin broadly and shallowly curved to moderately strongly constricted basal third; basal angles strongly rectangulate to slightly rounded; anterior angles rounded and even with anterior margin. Pronotal surface shining dully to moderately strongly and with scattered polished spots; surface with dense microgranulate ground sculpturing; punctation dense, moderately deep, moderately coarse, and more prominent than ground sculpturing; pubescence moderately long; midlongitudinal groove well developed. Prohypomeron shining and with well-developed ground sculpturing. Procoxal fissure open for entire length; protrochantin exposed. Prosternal setigerous small and with few setae. Elytra 0.61 to 0.66 mm. long; elytral length/pronotal length 1.28 to 1.39; elytra moderately densely and moderately coarsely punctate; pubescence posteriorly directed; posterior margin with moderately large membranous lobe; posterior margin broadly rounded.

Abdominal tergal pubescence moderately dense, moderately long, and medioposteriorly directed; terga IV to VI moderately deeply impressed basally. Tergum VIII with isodiametric polygonal ground sculpturing. Sternites with uniformly dense pubescence; ground sculpturing feebly developed. Sternites VII and VIII unmodified.

Spermatheca as in figure 193.

Aedeagus with minute setae on apex of parameres; parameres broad.

SEXUAL DIMORPHISM: None.

VARIATION: This species has tridentate mandibles but the small basal denticle is often worn so it is minute or absent.

HABITAT AND DISTRIBUTION: This species is known from only a few localities in California and Oregon (fig. 188; see Appendix I for localities). It was collected from sand flats along a creek near Yorkville, California.

### 18. *Bledius villosus* Casey

Figures 196–202, 375; Table 2

*Bledius villosus* Casey, 1889, p. 57. Fall, 1901, p. 76. Hatch, 1957, pp. 100, 103. (Type locality: California. Type in the National Museum of

Natural History, Smithsonian Institution. Type examined).

DIAGNOSIS: This species is distinguishable from all the other species of the *annularis* group by the long pubescence, especially on the elytra (fig. 198) and abdomen. The posterior margin of the elytra has a membranous lobe and the basal denticle of the mandibles is small to minute (fig. 201).

DESCRIPTION: *annularis* group.

Length 4.5 to 5.5 mm.

Color black to dark reddish brown with bright reddish brown elytra and elytral epipleuron and pale reddish brown legs and antennae; elytra black along suture.

Dorsum (fig. 197) of head strongly shining but not polished, with well-developed microgranulate ground sculpturing; punctation well developed, dense, and moderately deep; pubescence long; dorsum with low, median, undivided tumescence and well-developed median and transverse postocular depressions. Clypeus shining strongly, with well developed microgranulate ground sculpturing; punctation moderately well developed; anterior margin with small, weak to feeble tubercle near lateral margin. Eyes moderately large. Width of head 0.69 to 0.82 mm.; interocular width 0.48 to 0.56 mm.; head width/interocular width 1.41 to 1.48. Labrum (fig. 199) with feebly reflexed and moderately deeply emarginate anterior margin. Mandibles (fig. 201) tridentate; middle denticle large; basal denticle small to minute to feeble (when mandible is worn). Antennomeres 3 to 7 without ridge or carina encircling apex.

Pronotum 0.77 to 0.99 mm. wide; 0.71 to 0.90 mm. long; pronotal width/pronotal length 1.08 to 1.15; pronotum (fig. 200) strongly convex; lateral margin gradually and shallowly curved to basal third; basal third straight to slightly sinuate to distinct but rounded basal angles; anterior angles rounded and even with anterior margin. Pronotal surface shining dully to moderately strongly with well-developed microgranulate ground sculpturing; punctation dense, moderately deep, and more prominent than ground sculpturing; pubescence long; midlongitudinal groove well developed. Prohypomeron strongly shining, with weak to moderately strong ground sculpturing. Procoxal fissure open for entire length; protrochantin exposed. Prosternal setigerous pit well developed. Elytra 0.94 to 1.29 mm. long; elytral length/pronotal length 1.28 to 1.44; elytra densely and coarsely punctate; pubescence (fig. 198) long and posteriorly to slightly lateroposteriorly directed; posterior margin with membranous lobe; posterior margin broadly rounded.

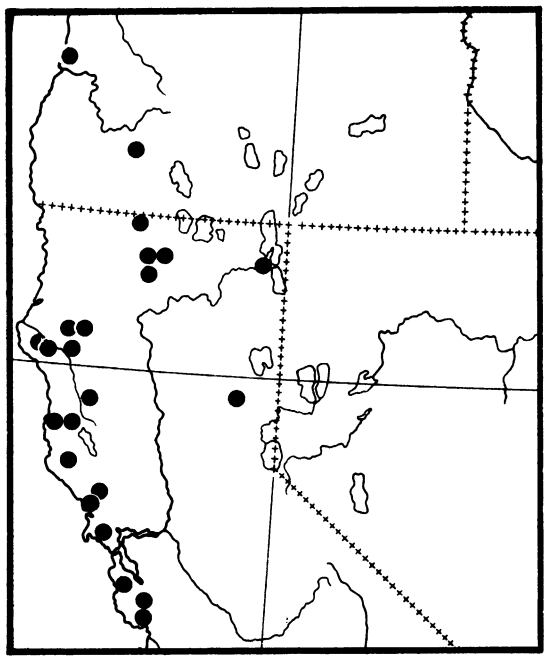


FIG. 202. Distribution of *Bledius villosus* in California and Oregon.

Abdominal tergal pubescence long, moderately dense, and posteriorly directed; terga IV to VI deeply impressed at base. Tergum VIII with transverse polygonal ground sculpturing. Sternites with uniformly dense pubescence; ground sculpturing feeble. Sternites VII and VIII unmodified.

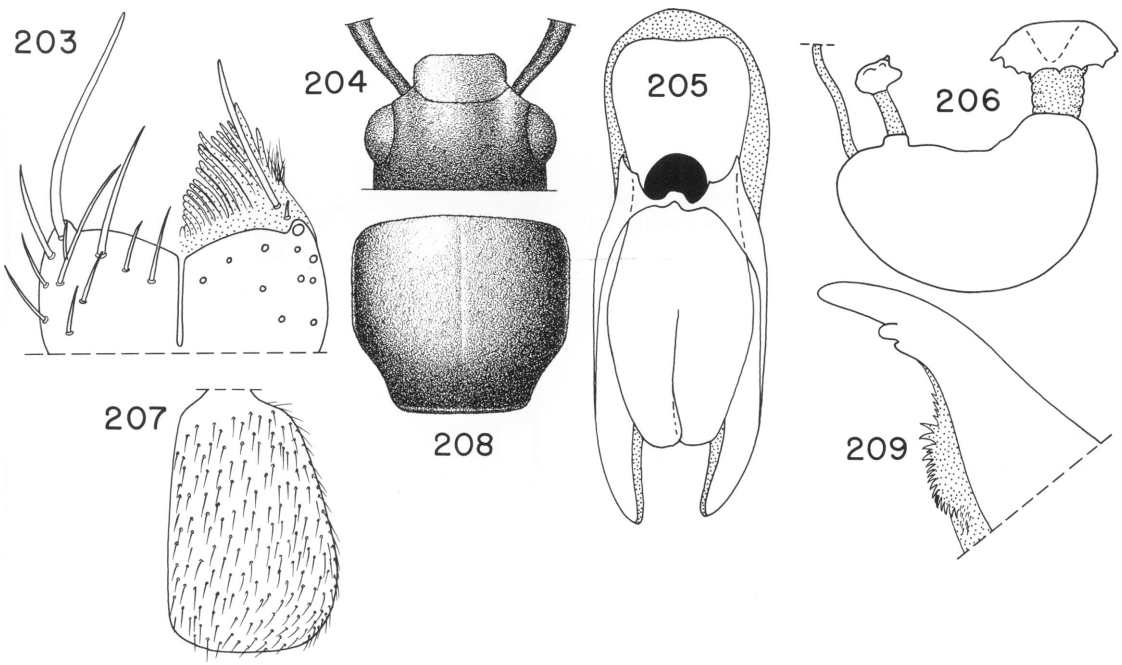
Spermatheca as in figure 196.

Aedeagus without setae on parameres; parameres broad.

SEXUAL DIMORPHISM: None.

VARIATION: The basal denticle of the mandibles is small to minute and in some individuals with well-worn mandibles the basal tooth is difficult to discern.

HABITAT AND DISTRIBUTION: This species is known from west central Oregon south to




FIGS. 203–209. *Bledius clarus*. 203. Labrum, left epipharyngeal lobe and setae of right side removed. 204. Head, dorsal view. 205. Aedeagus, dorsal view. 206. Spermatheca. 207. Elytron, right. 208. Pronotum. 209. Mandible, right.

near Monterey Bay, California (fig. 202; see Appendix I for localities). Near McCloud, California, specimens were found in both vegetated and unvegetated sand along the edge of a stream.

### 19. *Bledius clarus* Fall

Figures 203–210, 401, 402; Table 2

*Bledius clarus* Fall, 1901, p. 228. (Type locality: Pomona, California. Type in the Museum of Comparative Zoology, Harvard University. Type examined).

DIAGNOSIS: The orange to reddish orange pronotum and elytra and black to dark reddish brown head and abdomen and small size will separate this species from all other species of the *annularis* group that have tridentate mandibles except *aurantius*. *Bledius clarus* can be separated from *aurantius* by the sparser pronotal and elytral pubescence and punctation of *clarus* (fig. 207).

DESCRIPTION: *annularis* group.

Length 2.7 to 3.6 mm.

Color of head and abdomen black to dark reddish brown; prothorax and elytra orange to reddish orange; legs and antennae pale yellowish orange.

Dorsum (fig. 204) of head shining dully, not polished; microgranulate ground sculpturing well developed; punctation spare, fine, and shallow; pubescence moderately long; dorsum broadly and shallowly convex; median postocular depression weakly developed and punctiform; postocular transverse depression feebly developed to absent. Clypeus shining dully, with well-developed microgranulate ground sculpturing; punctation feeble; anterior margin without tubercles or laminae. Eyes moderately large. Width of head 0.46 to 0.52 mm.; interocular width 0.33 to 0.39 mm.; head width/interocular width 1.33 to 1.46. Labrum (fig. 203) with feebly reflexed, broadly and moderately deeply emarginate anterior margin. Mandibles (fig. 209) tridentate; basal denticles closely associated; middle denticle small; basal denticle minute. Antennomeres 3 to 7 without ridge or carina encircling apex.

Pronotum 0.54 to 0.62 mm. wide; 0.49 to 0.55 mm. long; pronotal width/pronotal length 1.10 to 1.18 mm.; pronotum (fig. 208) moderately strongly convex; anterior two-thirds of lateral margin nearly straight to slightly curved, basal third strongly and sinuously convergent to base; basal angles rounded but distinct and well developed; anterior angles rounded and even with anterior margin. Pronotal surface polished to strongly shining; microgranulate ground sculpturing well developed to poorly developed; punctation sparse, fine, shallow, and as prominent as or more prominent than ground sculpturing; pubescence moderately long; midlongitudinal groove moderately well developed. Prohypomeron strongly shining and with well developed ground sculpturing. Procoxal fissure open for entire length; protrochantin exposed. Prosternal pit small and with few setae. Elytra 0.58 to 0.69 mm. long; elytral length/pronotal length 1.13 to 1.27; elytra with sparse (fig. 207), moderately coarse setigerous punctation; pubescence long and posteriorly directed except for medially directed pubescence on lateroapical region; posterior margin with membranous lobe; posterior margin broadly rounded.

Abdominal tergal pubescence moderately long, moderately dense, and mediposteriorly directed; terga IV to VI deeply impressed at base. Tergum VIII with isodiametric polygonal ground sculpturing. Sternites with uniformly dense pubescence; ground sculpturing moderately well developed. Sternites VII and VIII unmodified.

Spermatheca as in figure 206.

Aedeagus without setae on parameres (fig. 205); parameres broad and straight.

SEXUAL DIMORPHISM: None.

HABITAT AND DISTRIBUTION: *Bledius clarus* is known only from southern California where Fall (1901, p. 75) considered it "not common." I have collected it from seven of the 11 known localities (fig. 120; see Appendix I for localities) and found 83 of the 92 specimens reported herein. I found the species in heavily shaded banks that were lightly covered with moss and leaves near Oceanside, California, along the San Luis Rey River. Along the Cuyama River north of Ojai, California, I collected *clarus* from fine-grained sandy vegetated banks.

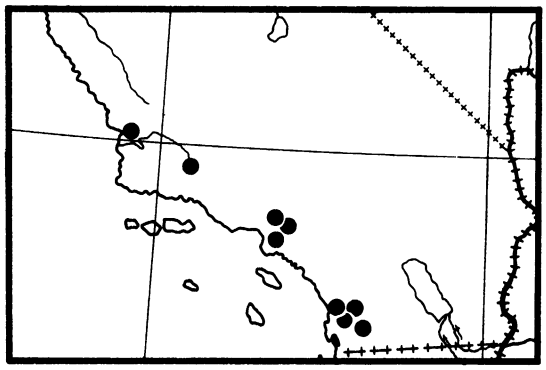


FIG. 210. Distribution of *Bledius clarus* in southern California.

DISCUSSION: *Bledius aurantius* and *clarus* are so similar that they are easily confused. Subtle differences of the density of elytral and pronotal punctation consistently distinguish them but further, the pronotum of *clarus* is polished to strongly shining with weakly to moderately developed ground sculpturing, the pronotal midlongitudinal groove is shallower and the ratio of the elytral length/pronotal length is smaller. The pronotum of *aurantius* with stronger ground sculpturing is less lustrous, the midlongitudinal groove is deeper, and the elytral-pronotal length ratio is larger.

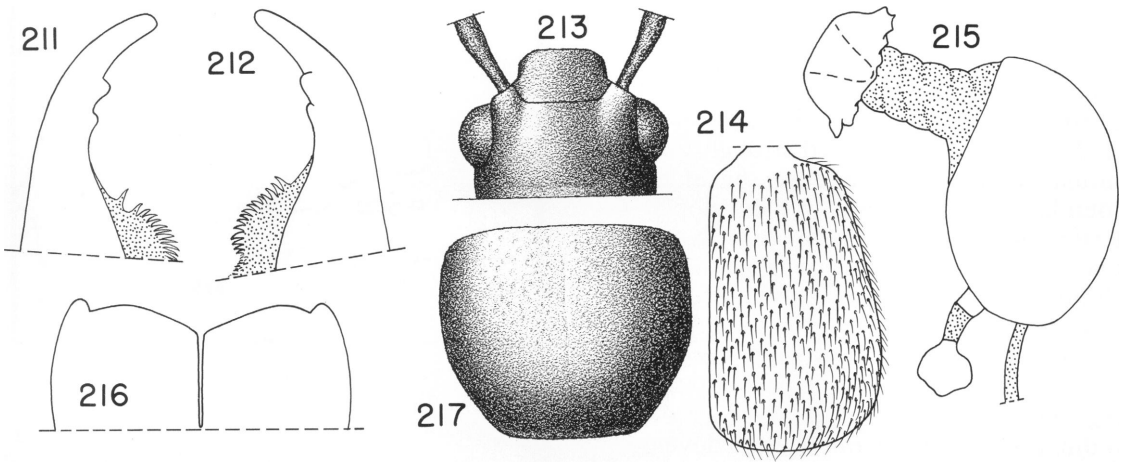
The two species were collected synchronically and syntopically at two nearby localities along streams that join a few miles from where the beetles were found. Each species was also found allotopically at several other places.

### 20. **Bledius aurantius**, new species

Figures 211–218, 399, 400; Table 2

HOLOTYPE: California: Ventura County: 41 miles N Ojai, Cuyama River, 3700 feet, May 18, 1981, collected by Lee Herman, deposited in the American Museum of Natural History.

PARATYPES: Fifty with same data as holotype; 38 deposited with holotype, two deposited in each of the following collections: British Museum (Natural History), Field Museum of Natural History, National Museum of Natural History, Smithsonian Institution, Museum of Comparative Zoology, Harvard University, California Academy of Sciences, Canadian National Collection.




FIGS. 211–217. *Bledius aurantius*. 211–212. Mandibles. 211. Left. 212. Right. 213. Head, dorsal view. 214. Elytron, right. 215. Spermatheca. 216. Labrum, setae and epipharyngeal lobes removed. 217. Pronotum.

DIAGNOSIS: This species can be separated from all species of the *annularis* group except *clarus* by the orange to reddish orange pronotum and elytra. *Bledius aurantius* is distinguished from *clarus* by the denser pronotal and elytral pubescence and punctation (fig. 214).

DESCRIPTION: *annularis* group.

Length 3.0 to 4.0 mm.

Color of head and abdomen dark reddish brown to black; prothorax and elytra orange to reddish orange; antennae and legs pale yellowish orange.

Dorsum of head (fig. 213) shining dully, not polished; microgranulate ground sculpturing well developed; punctation moderately dense, fine, and shallow; pubescence moderately long; dorsum broadly and shallowly convex; dorsum without median postocular depression but with transverse postocular depression shallowly to feebly developed. Clypeus shining dully, with well-developed microgranulate ground sculpturing; punctation feeble; anterior margin without tubercles or laminae. Eyes moderately large. Width of head 0.47 to 0.52 mm., interocular width 0.32 to 0.36 mm.; head width/interocular width 1.42 to 1.51. Labrum (fig. 216) with feebly reflexed, broadly, and moderately deeply emarginate anterior margin. Mandibles (figs. 211, 212) tridentate; basal two denticles closely associated; middle denticle small, basal denticle minute and often worn to near absence. Antennomeres 3 to 7 without ridge or carina encircling apex.

Pronotum 0.57 to 0.63 mm. wide; 0.49 to 0.56 mm. long; pronotal width/pronotal length 1.11 to 1.18; pronotum moderately strongly convex; lateral margin with anterior two-thirds nearly straight to slightly curved to basal third; basal third of lateral margin sinuate and convergent to base; basal angles rounded but distinct and well developed; an-

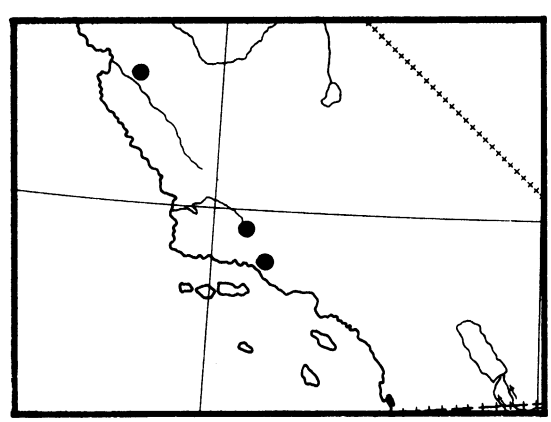
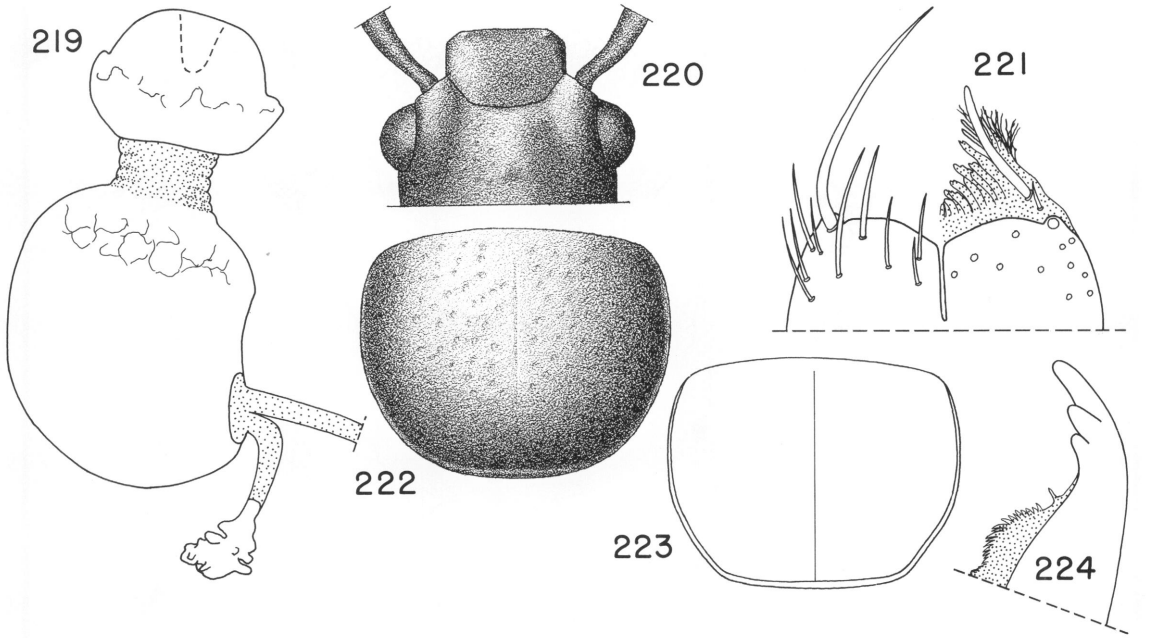


FIG. 218. Distribution of *Bledius aurantius* in southern California.




FIGS. 219–224. *Bledius confusus*. 219. Spermatheca. 220. Head, dorsal view. 221. Labrum, setae of right side and epipharyngeal lobes of left side removed. 222, 223. Pronotum. 224. Mandible, right.

terior angles rounded and even with anterior margin. Pronotal surface shining dully, not polished; microgranulate ground sculpturing well developed; punctation dense, fine, shallow, and equally prominent with ground sculpturing to slightly more prominent; pubescence moderately long; midlongitudinal groove well developed. Prohypomeron strongly shining, with well developed ground sculpturing. Procoxal fissure open for entire length; protrochantin exposed. Prosternal pit small and with few setae. Elytra 0.63 to 0.71 mm. long; elytral length/pronotal length 1.25 to 1.34; elytra with dense (fig. 214), moderately coarse setigerous punctation; pubescence moderately long and posteriorly directed except for medially directed pubescence on lateroapical region; posterior margin with membranous lobe; posterior margin broadly rounded.

Abdominal tergal pubescence moderately long, moderately dense, and medioposteriorly directed; terga IV to VI deeply impressed at base. Tergum VIII with isodiametric polygonal ground sculpturing. Sternites with uniformly dense pubescence; ground sculpturing weakly developed. Sternites VII and VIII unmodified.

Spermatheca as in figure 215.

Aedeagus without setae on parameres; parameres broad and straight.

SEXUAL DIMORPHISM: None.

HABITAT AND DISTRIBUTION: This species is known from two counties in southern California (fig. 218; see Appendix I for localities). Two thirds of the known specimens were collected from a fine grained, sandy, unvegetated bank along the shore of the Cuyama River north of Ojai, California.

DISCUSSION. See the Discussion for *clarus*.

ETYMOLOGY: This name is from the Latin *aurantium* for orange and refers to the orange pronotum and elytra of this species.

### 21. *Bledius confusus* LeConte

Figures 219–225, 390–392; Table 2

*Bledius confusus* LeConte, 1877, p. 228. Blatchley, 1910, p. 466. (Type locality: Lake Superior. Type in Museum of Comparative Zoology, Harvard University. Type examined).

DIAGNOSIS: *Bledius confusus* can be sepa-

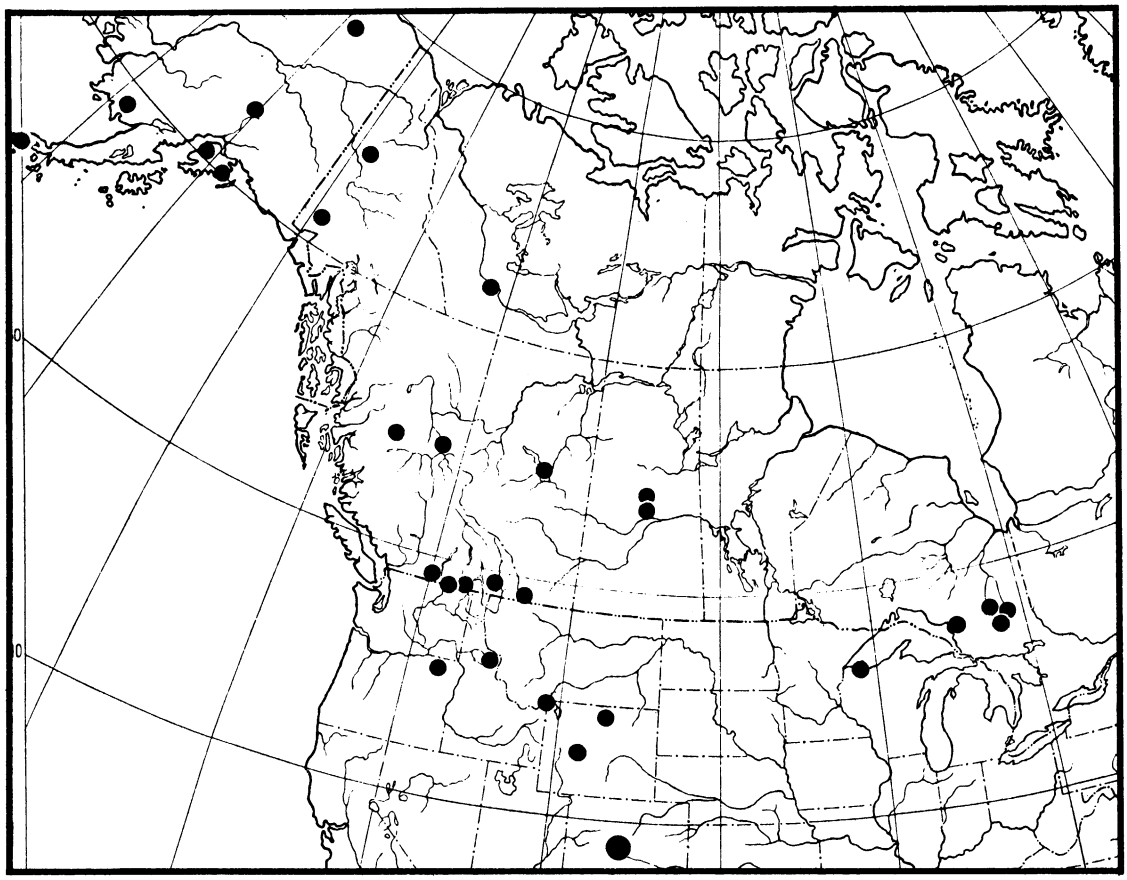


FIG. 225. Distribution of *Bledius confusus* in the United States and Canada.

rated from all other tridentate species of the *annularis* group by the rounded basal angles of the pronotum (fig. 222), the coarse, dense pronotal punctation, short elytra and presence of a membranous lobe on the posterior margin of the elytra. *Bledius confusus* and *B. laticollis* are similar but can be separated by the darker color, smaller size and more coarsely punctate pronotum of *confusus* (fig. 222).

DESCRIPTION: *annularis* group.

Length 3.0 to 4.0 mm.

Color black and reddish brown. Head, pronotum, and abdomen black to dark reddish brown. Elytra dark reddish brown to reddish brown; epipleuron concolorous with disk. Legs and antennae reddish brown.

Dorsum of head (fig. 220) shining dully, not polished; microgranulate ground sculpturing well developed; punctation moderately dense, shallow, and feeble; pubescence moderately long; dorsum of head broadly and shallowly convex; dorsum of head with weakly to moderately well-developed median and transverse postocular depressions. Clypeus shining dully; microgranulate ground sculpturing well developed; punctation feeble; anterior margin with small rounded, moderately developed tubercles near lateral margin. Eyes moderately large. Width of head 0.60 mm. to 0.66 mm.; interocular width 0.42 to 0.47 mm.; head width/interocular width 1.37 to 1.44. Labrum (fig. 221) with feebly reflexed, shallowly emarginate anterior margin. Mandibles (fig. 224) tridentate; middle denticle large, basal denticle small; basal two denticles closely associated, moderately separated. Antennomeres 3 to 7 without ridge or carina encircling apex.

Pronotum 0.69 to 0.79 mm. wide; 0.57 to

0.66 mm. long; pronotal width/pronotal length 1.19 to 1.26; pronotum (fig. 222) moderately strongly convex; lateral margins with anterior three-fifths broadly curved, basal two-fifths slightly to moderately sinuate; basal angles feebly (fig. 222) to moderately well developed (fig. 223) but rounded; anterior angles rounded and even with anterior margin. Pronotal surface shining dully; microgranulate ground sculpturing well developed; punctation dense, coarse, moderately deep, and more prominent than ground sculpturing; pubescence moderately long; midlongitudinal groove shallow to moderately well developed. Prohypomeron shining dully to strongly and with well-developed sculpturing. Procoxal fissure open for entire length and protrochantin exposed. Prosternal pit moderately well developed and with a few long setae. Elytra 0.61 to 0.79 mm. long; elytral length/pronotal length 1.08 to 1.28; elytra moderately coarsely and densely punctate; pubescence moderately long and posteriorly directed; posterior margin with membranous lobe; posterior margin broadly rounded.

Abdominal tergal pubescence moderately long and medioposteriorly directed; terga IV to VI moderately deeply impressed at base. Tergum VIII with isodiametric polygonal ground sculpturing. Sternites with uniformly dense pubescence; ground sculpturing moderately well developed. Sternites VII and VIII unmodified.

Spermatheca as in figure 219.

Aedeagus without setae on parameres; parameres broad.

SEXUAL DIMORPHISM: None.

HABITAT AND DISTRIBUTION: This species is broadly distributed, occurring from western Alaska across Canada and the northern United States to Wisconsin (fig. 225; see Appendix I for localities). It has been collected from the sandy shores of numerous streams and rivers but usually in small numbers at each locality.

DISCUSSION: Although most specimens of *B. honestus* have strongly angulate basal angles of the pronotum thereby separating them from *confusus,* some individuals of *honestus* have rounded basal angles of the pronotum and pronotal punctation similar to that of *confusus.* Often these individuals are distinguishable from *confusus* by the orangish brown elytra and finer elytral punctation. Some specimens of *confusus* have elytral coloration similar to *honestus* and when combined with a similar pronotal shape the two species can be separated only by association with other conspecific specimens of a series. *Bledius honestus* has been included in the *annularis* complex.

### 22. *Bledius laticollis* LeConte

Figures 226–235, 364, 365; Table 2

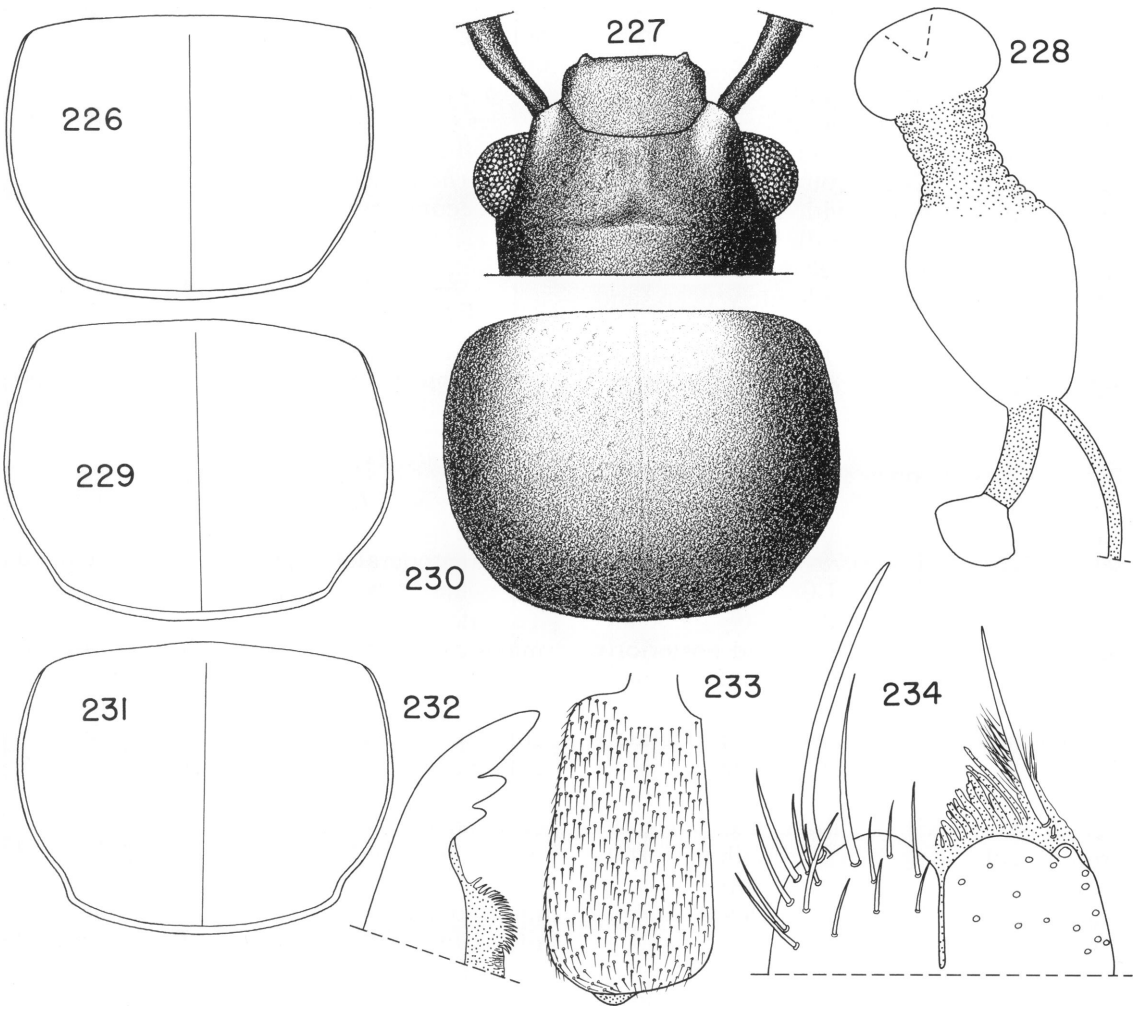
*Bledius laticollis* LeConte, 1877, p. 227. Casey, 1889, pp. 57, 58. Hatch, 1957, p. 101. (Type locality: California, San Diego. Type deposited in Museum of Comparative Zoology, Harvard University. Type examined).

DIAGNOSIS. *Bledius laticollis* can be recognized by the lack of (fig. 230) or feebly (fig. 226) to moderately (figs. 229, 231) developed but rounded basal angles of the pronotum. The lateral margins of the pronotum of some males curve gradually from the anterior angles to the base, and the basal angles are absent. In most individuals, however, the even curve of the lateral pronotal margin is broken near the base by a feeble to moderately strong sinuous curve that produces distinct, rounded basal angles. These basal angles are feeble in the male and moderately well developed in the female. Other features that aid recognition of *laticollis* are the small basal denticle of the mandibles, the nearly flat dorsum of the head, the weakly convex pronotum, and the membranous lobe of the elytra. *Bledius laticollis* is larger and has finer pronotal punctation (fig. 230) than *confusus* (fig. 222). *Bledius laticollis* and *phytosinus* are similar but the pronotal punctation of the latter is fine (fig. 305) and difficult to see and the labrum is more broadly emarginate and less strongly reflexed.

DESCRIPTION: *annularis* group.

Length 3.1 to 5.0 mm.

Color dark reddish brown to reddish brown. Head, pronotum, and abdomen dark reddish brown (often nearly black) to reddish brown, pronotum often paler than head. Elytra reddish brown to yellowish brown; epipleuron concolorous with or slightly darker than disk; apical and lateral portions of disk often paler than central portion. Legs and antennae pale reddish brown.




FIGS. 226–234. *Bledius laticollis.* 226. Pronotum, LaGrange, California. 227. Head, dorsal view. 228. Spermatheca. 229. Pronotum, Willow Creek, California. 230. Pronotum. 231. Pronotum, Willow Creek, California. 232. Mandible, left. 233. Elytron, left. 234. Labrum, setae of right side and left epipharyngeal lobe omitted.

Dorsum (fig. 227) of head shining dully, not polished; microgranulate ground sculpturing well developed; punctation moderately dense, shallow, and moderately well developed to weak; pubescence moderately long; dorsum of head with broad, low, feebly to poorly developed tumescence, dorsum nearly flat in male and tumescence poorly developed in female; tumescence without median groove; dorsum of head with moderately to weakly developed median, postocular depression and weakly to feebly developed transverse postocular depression. Clypeus shining dully; microgranulate ground sculpturing well developed; punctation feeble; anterior margin with small well-developed to moderately developed tubercle near lateral margin, tubercle slightly more acute in male and more rounded in female. Eyes moderately large. Width of head 0.63 to 0.85 mm.; interocular width 0.46 to 0.61 mm.; head width/interocular width 1.36 to 1.52. La-

brum (fig. 234) with weakly to moderately reflexed, shallowly emarginate anterior margin. Mandibles (fig. 232) tridentate; middle denticle moderately large; basal denticle small, left basal denticle smaller than right; basal denticle of left mandible closely associated with middle, basal denticle of right mandible more distinctly separated from middle denticle. Antennomeres 3 to 7 without ridge or carina encircling apex.

Pronotum 0.77 to 1.06 mm. wide; 0.62 to 0.89 mm. long; pronotal width/pronotal length 1.16 to 1.27; pronotum (fig. 230) weakly convex; lateral margin of male gradually and evenly curved from anterior margin to base and basal angles absent (fig. 230) or gradually curved to basal third and basal third slightly sinuate to produce feeble (fig. 226) basal angles; lateral margin of female gradually curved to moderately strongly sinuate basal third; basal angles of female moderately (figs. 229, 231) distinct but rounded; anterior angles rounded and even with anterior margin. Pronotal surface shining dully; microgranulate ground sculpturing well developed; punctation moderately dense, shallow, and more prominent than ground sculpturing; pubescence moderately long; midlongitudinal groove moderately well developed. Procoxal fissure open for entire length, protrochantin exposed. Prosternal setigerous pit well developed. Elytra 0.83 to 1.09 mm. long; elytral length/pronotal length 1.13 to 1.41; elytra densely and moderately coarsely punctate; pubescence (fig. 233) moderately long; pubescence posteriorly directed on disk and medially directed at lateral portion of apex; posterior margin with membranous lobe; posterior margin broadly rounded.

Abdominal tergal pubescence moderately long and mediposteriorly directed terga IV to VI moderately deeply impressed at base. Tergum VIII with isodiametric polygonal ground sculpturing. Sternites with uniformly dense pubescence; ground sculpturing weakly to moderately well developed. Sternites VII and VIII unmodified.

Spermatheca as in figure 228.

Aedeagus with microsetae on parameres; parameres broad.

SEXUAL DIMORPHISM: The dorsum of the head of the males is nearly flat, the median tumescence poorly developed, the lateral margins of the pronotum are evenly curved from the anterior angles to the base with, at best, a slightly sinuate basal third, the basal

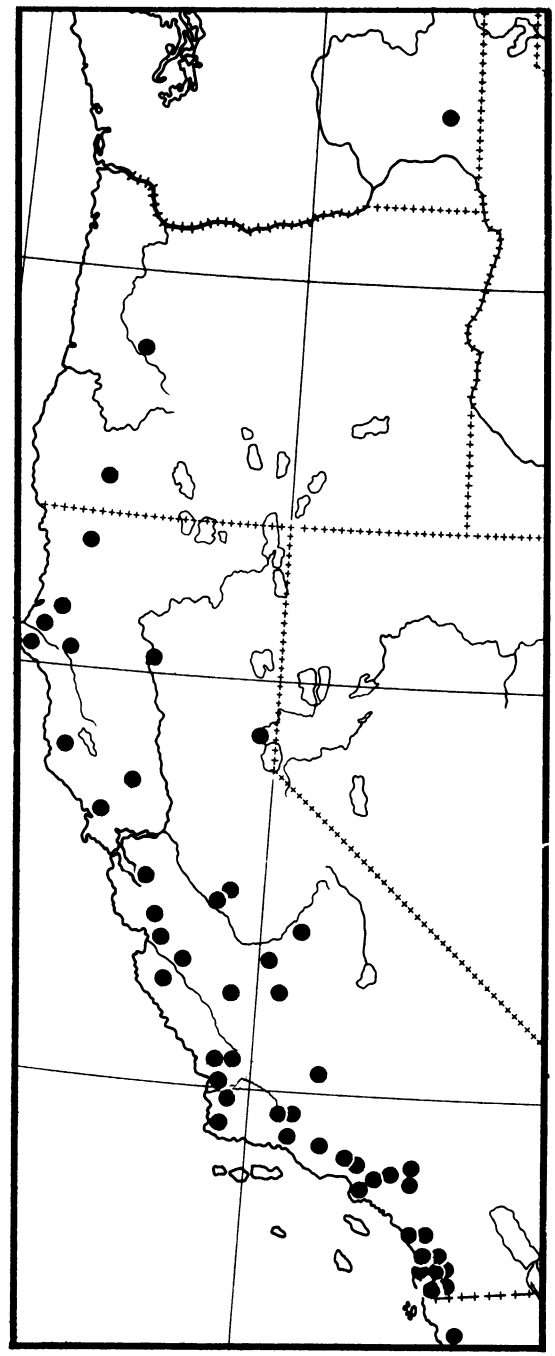
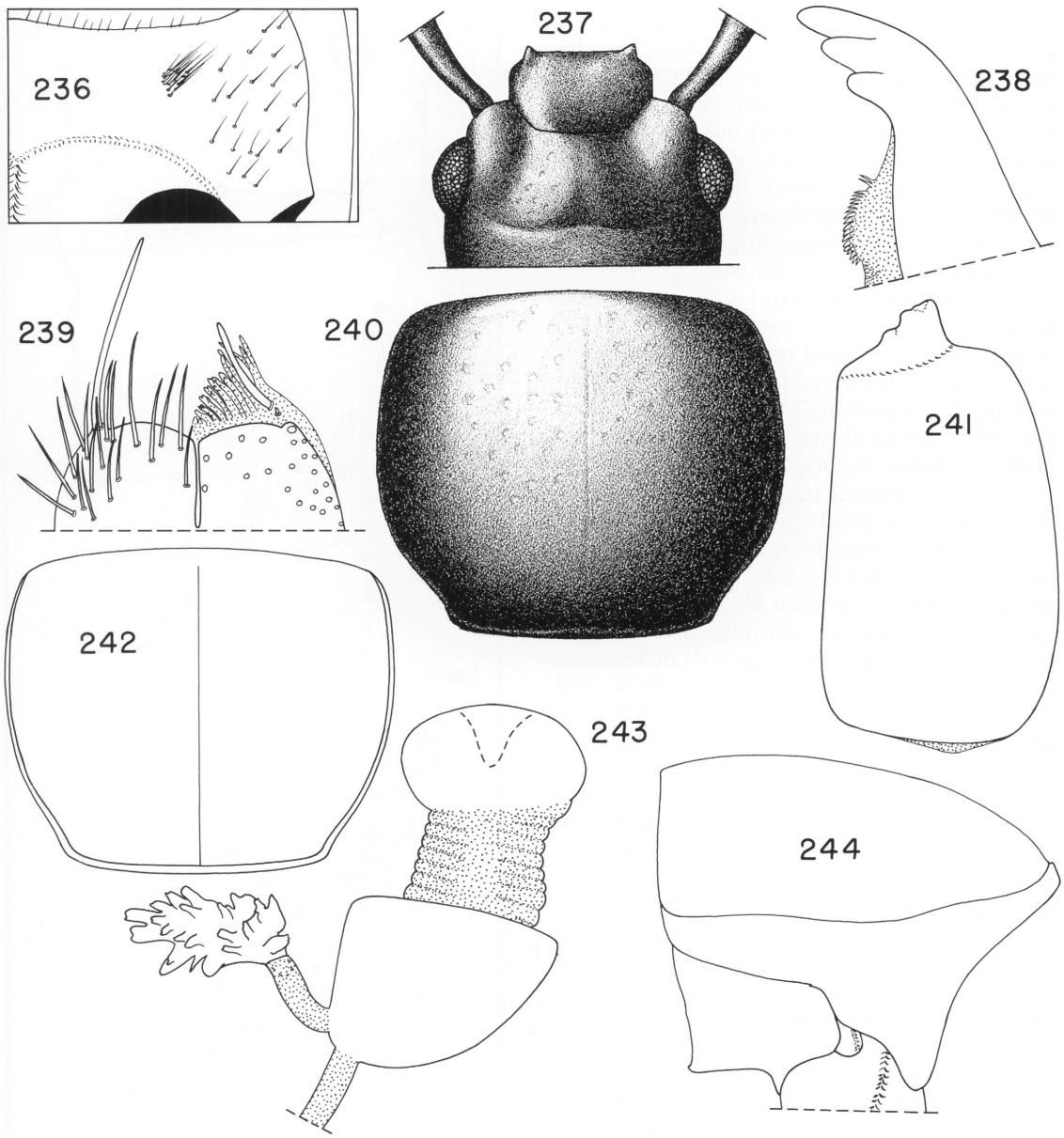


FIG. 235. Distribution of *Bledius laticollis* in western United States.




FIGS. 236–244. *Bledius turgidus*. 236. Prosternum, left side. 237. Head, dorsal view. 238. Mandible, right. 239. Labrum, left epipharyngeal and right setae omitted. 240. Pronotum. 241. Elytron, right, setae removed. 242. Pronotum, variation. 243. Spermatheca. 244. Prothorax, lateral view.

pronotal angles are absent or slightly developed but rounded. The head of the female has a weakly developed median tumescence, and the lateral margins of the pronotum are sinuate at the basal third. The basal pronotal angles of the female are distinct but rounded. The pronotum of the male is slightly longer and wider than that of the female.

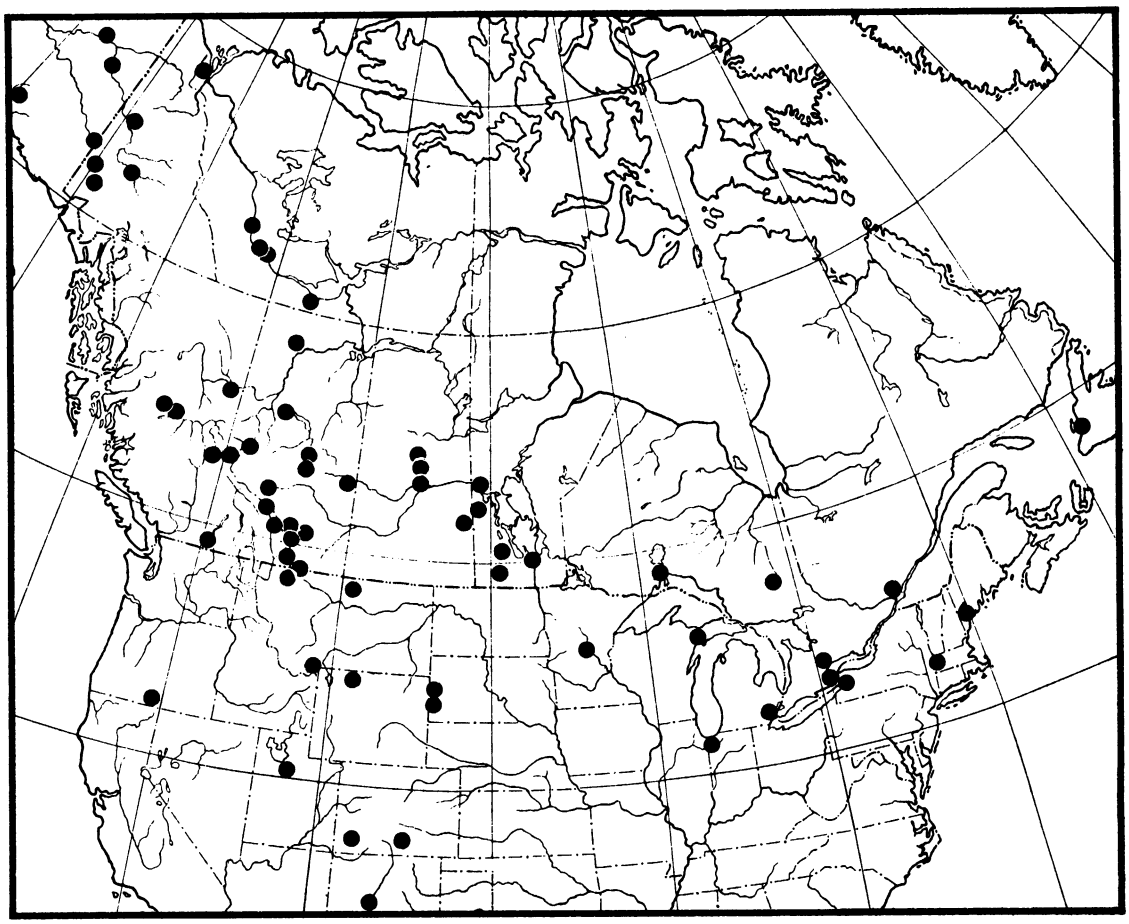


FIG. 245. Distribution of *Bledius turgidus* in the United States and Canada.

HABITAT AND DISTRIBUTION: *Bledius laticollis* is known principally from California but some specimens have been collected in Oregon and Washington (fig. 235; see Appendix I for localities). This species is collected commonly from the sandy flats adjacent to streams and rivers. Along the Cuyama River in California hundreds of specimens were found in moist to wet unvegetated gravel and salt encrusted sand close to the water.

DISCUSSION: Specimens with well-developed basal angles of the pronotum are more common in the northern part of the range. The seven specimens examined from Dillon Creek, Siskiyou County, California, exhibit nearly the full range of variation of the basal angles. The specimens with strongly developed basal angles run to the *annularis* complex in the Key and can be correctly identified only by association in a sample with others that have rounded basal angles.

### 23. *Bledius turgidus* Casey

Figures 236–245, 405–408; Table 2

*Bledius turgidus* Casey, 1889, p. 52. Snow, 1906, p. 171 (misidentified as *B. ornatus*). Fall and Cockerell, 1907, p. 168 (misidentified as *B. ornatus*). Notman, 1920, p. 696. (Type locality: Fort Garland, Colorado. Type in National Museum of Natural History, Smithsonian Institution. Type examined).

*Bledius borealis* Blatchley, 1910, p. 465. (Type locality: near Pine, Lake County, Indiana. Holotype in Purdue University. Type examined). NEW SYNONYM.

*Bledius bowronensis* Hatch, 1957, p. 105. (Type locality: Bowron Lake, British Columbia. Holotype in National Museum of Natural History, Smithsonian Institution. Type examined). NEW SYNONYM.

DIAGNOSIS: *Bledius turgidus* can be distinguished from other species of the *annularis* group by the strongly rectangulate base of the robust, coarsely punctate pronotum (fig. 240), partially open procoxal fissure (fig. 244), short elytra, membranous lobe on the posterior elytral margin (fig. 241), and low, medially divided ridge on the dorsum of the head (fig. 237). The species is similar to *newelli* and *viriosus*. The pronotum of *viriosus* (fig. 250) and of the males of *newelli* (fig. 258) is strongly convex and the basal portion of the lateral margins of the pronotum are strongly constricted, whereas the pronotum of *turgidus* is moderately strongly convex and the basal portion of the lateral margin of the pronotum is gradually convergent. *Bledius turgidus* can be separated from *viriosus* by the strongly developed setigerous prosternal pit (fig. 236), less dense pronotal punctation (compare fig. 240 to fig. 250) and smaller elytral length/pronotal length (1.04 to 1.15). The habitus of *turgidus* and of the females of *newelli* is similar but the two species are easily separated by the procoxal fissure, which is partially closed in *turgidus* (fig. 244) and entirely open in *newelli* (fig. 257). *Bledius turgidus* is distinguished from *cedarensis* by its sparser pronotal punctation (compare fig. 240 to fig. 265), posteriorly directed elytral pubescence and partially closed procoxal fissure.

DESCRIPTION: *annularis* group.

Length 4.7 to 8.0 mm.

Color black to dark reddish brown with reddish elytra. Head, pronotum and abdomen black to dark reddish brown. Elytra entirely reddish to light reddish brown, or base, suture and epipleuron black to dark reddish brown with paler disk. Legs and antennae reddish brown.

Dorsum (fig. 237) of head shining dully, not polished; microgranulate ground sculpturing well developed; punctation moderately dense to dense, well developed, and moderately deep; pubescence moderately long; dorsum of head with broad, midlongitudinal, rounded tumescence; tumescence with moderately strong, midlongitudinal groove in male, and weak groove in female; dorsum of head with well-developed median and transverse postocular depressions. Clypeus shining dully; microgranulate ground sculpturing well developed; punctation moderately well developed to feeble; anterior margin with well-developed tubercle near lateral margin in male, and with weakly to feebly developed tubercle near lateral margin in female. Eyes small to moderately large. Width of head 0.81 to 1.11 mm.; interocular width 0.59 to 0.81 mm.; head width/interocular width 1.33 to 1.44. Labrum (fig. 239) with feebly reflexed; shallowly emarginate anterior margin. Mandibles (fig. 238) tridentate; basal and middle denticles large; denticles well separated from one another. Antennomeres 3 to 7 without ridge or carina encircling apex.

Pronotum 1.02 to 1.38 mm. wide; 0.89 to 1.20 mm. long; pronotal width/pronotal length 1.12 to 1.21; pronotum (fig. 240) moderately strongly convex; lateral margin of male moderately strongly curved to basal angles (fig. 240); lateral margins of female (fig. 242) with anterior two-thirds nearly straight to slightly curved, basal third convergent to basal angles; basal angles moderately strongly rectangulate; anterior angles rounded and even with anterior margin. Pronotal surface shining dully; microgranulate ground sculpturing well developed; punctation moderately dense, moderately deep, and more prominent than ground sculpturing; pubescence moderately long; midlongitudinal groove shallow to moderately well developed. Prohypomeron shining dully, ground sculpturing well developed. Procoxal fissure with ventral portion open and with protrochantin exposed, dorsal portion closed and protrochantin concealed (fig. 244). Prosternal setigerous pit well developed (fig. 236). Elytra 0.98 to 1.32 mm. long; elytral length/pronotal length 1.04 to 1.17; elytra densely and moderately coarsely punctate; pubescence moderately long and posteriorly directed; posterior margin with broad membranous lobe (fig. 241); posterior margin broadly rounded.

Abdominal tergal pubescence moderately long and medioposteriorly directed; terga IV to VI deeply impressed basally. Tergum VIII with isodiametric polygonal ground sculp-

turing. Sternites with uniformly dense pubescence; ground sculpturing well developed. Sternites VII and VIII unmodified.

Spermatheca as in figure 243.

Aedeagus with scattered apical and subapical microsetae on parameres; parameres broad.

SEXUAL DIMORPHISM: The male has well-developed clypeal tubercles, a more robust prothorax in which the lateral margins (fig. 240) are strongly rounded, and a broad mid-longitudinal tumescence on the dorsum of the head (fig. 237) that has a shallow median groove. The female has feebly developed clypeal tubercles, the prothorax is less robust with the anterior two-thirds of the lateral margins (fig. 242) nearly straight, and the tumescence of the dorsum of the head is moderately developed and the median groove feeble. The pronotum of the male is slightly longer and wider than that of the female.

VARIATION: Specimens collected in Manitoba are significantly larger than most of those from other parts of the geographical range.

HABITAT AND DISTRIBUTION: *Bledius turgidus* occurs from Alaska across Canada to Newfoundland and, in the west, as far north as near the mouth of the McKenzie River south to central New Mexico. In the east it has been found only as far south as the southern edge of Lake Michigan (fig. 245; see Appendix I for localities). The species has been collected in the banks of both shaded and sunny waterways and in vegetated or unvegetated soil.

NATURAL HISTORY: Near Endako, British Columbia *B. turgidus* was collected with *Dyschirius politus* Dej.

SYNONYMS: When Blatchley (1910) described *borealis* he included it in the *annularis* group and thereby precluded comparison of it with *turgidus,* which then was part of the *semiferrugineus* group. At that time, the two groups were separated by the open (*annularis* group) or closed (*semiferrugineus* group) procoxal fissure. The ventral portion of the procoxal fissure of *turgidus* (and *borealis*) is open and the dorsal portion closed (fig. 244). Casey interpreted the fissure as closed and put *turgidus* in the *semiferrugineus* group; Blatchley considered the fissure to be open and placed *borealis* in the *annularis* group. Comparison of the two nominal species reveals no characters that permit their segregation as species.

Hatch in his description of *bowronensis* did not compare it with *turgidus.* The holotype of *bowronensis* has all the features characteristic of *turgidus* including the partially closed procoxal fissure, the tridentate mandibles, the robust, coarsely punctate pronotum with rectangulate basal angles, and the short elytra. I find no characters to separate *bowronensis* and *turgidus.*

DISCUSSION: Casey (1889) placed *turgidus* in the *semiferrugineus* group but Blatchley (1910) included it (under the name *borealis*) in the *annularis* group. Characters of the hypopharynx and the presence of a well-defined prosternal setigerous pit in *turgidus* support the contention that it should be in the *annularis* group.

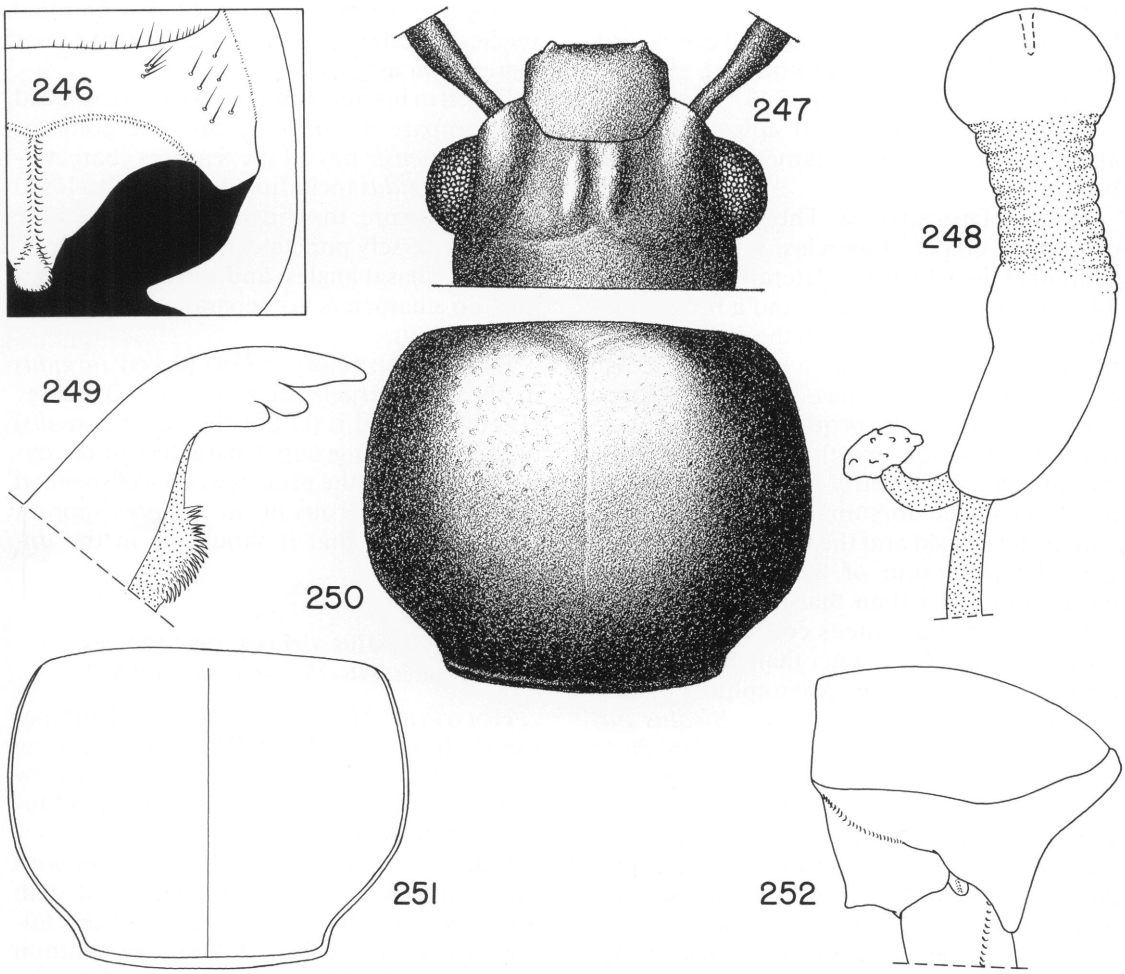
### 24. **Bledius viriosis**, new species

Figures 246–253, 366, 367; Table 2

HOLOTYPE: Male. South Dakota: Pennington County, 5.7 miles SSW Hill City, Spring Creek, 5500 feet, June 16, 1961, collected by Lee Herman, deposited in the American Museum of Natural History.

PARATYPES: One hundred twenty-six with same data as holotype; 114 deposited with holotype, two deposited in each of the following collections: British Museum (Natural History), Field Museum of Natural History, National Museum of Natural History, Smithsonian Institution, Museum of Comparative Zoology, Harvard University, California Academy of Sciences, Canadian National Collection.

DIAGNOSIS: *Bledius viriosus* can be distinguished from other species of the *annularis* group by the tridentate mandible (fig. 249), the partially closed procoxal fissure (fig. 252), and the feebly developed prosternal setigerous pit (fig. 246). Further, the basal angles of the pronotum are well developed (fig. 250), and the pronotum is densely punctate. In the male, the pronotum is extremely convex (fig. 250) and robust and the dorsum of the head has two low, parallel ridges (fig. 247). *Bledius viriosus* is similar to *turgidus* and *newelli* but can be separated from the former by the poor-




FIGS. 246–252. *Bledius viriosus.* 246. Prosternum, left side. 247. Head, dorsal view. 248. Spermatheca. 249. Mandible, left. 250. Pronotum, male. 251. Pronotum, female. 252. Prothorax, lateral view.

ly developed setigerous prosternal pit (fig. 246) and the larger elytral length/pronotal length ratio (1.16 to 1.32) and from the latter by the slightly closed procoxal fissure (fig. 252) and denser pronotal punctation (fig. 250).

DESCRIPTION: *annularis* group.

Length 4.0 to 5.1 mm.

Color black and dark reddish brown. Head, pronotum, and abdomen black. Elytra dark reddish brown to reddish brown; epipleuron concolorous with disk. Legs pale reddish brown to yellowish brown. Antennae reddish brown.

Dorsum (fig. 247) of head shining dully, not polished; microgranulate ground sculpturing well developed; punctation moderately dense and feeble; pubescence moderately long; dorsum of head with broad, midlongitudinal, rounded, elongate tumescence; tumescence with feeble midlongitudinal groove that divides tumescence into two parallel ridges; dorsum of head with moderately well-developed median and transverse postocular depressions. Clypeus shining dully; microgranulate ground sculpturing well developed; punctation feeble; anterior margin with small, moderately well-developed tubercles near lateral margin. Eyes moderately large. Width of head 0.76 to 0.87 mm.; interocular width 0.53 to 0.62 mm.; head width/interocular

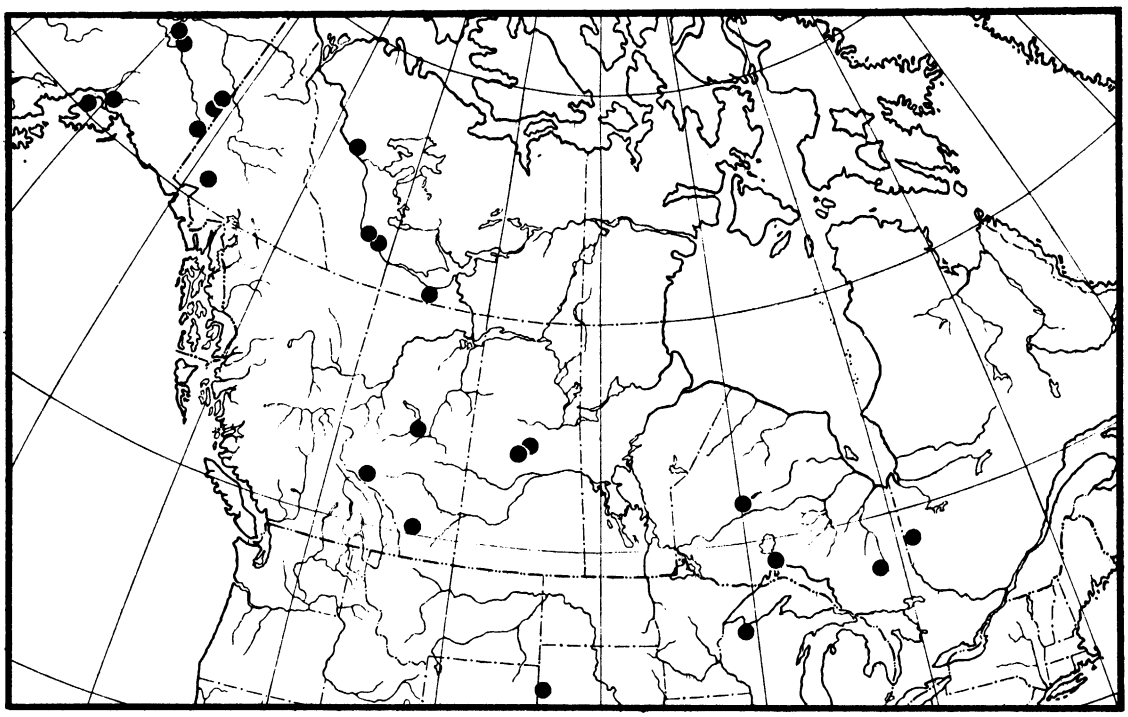


FIG. 253. Distribution of *Bledius viriosus* in the United States and Canada.

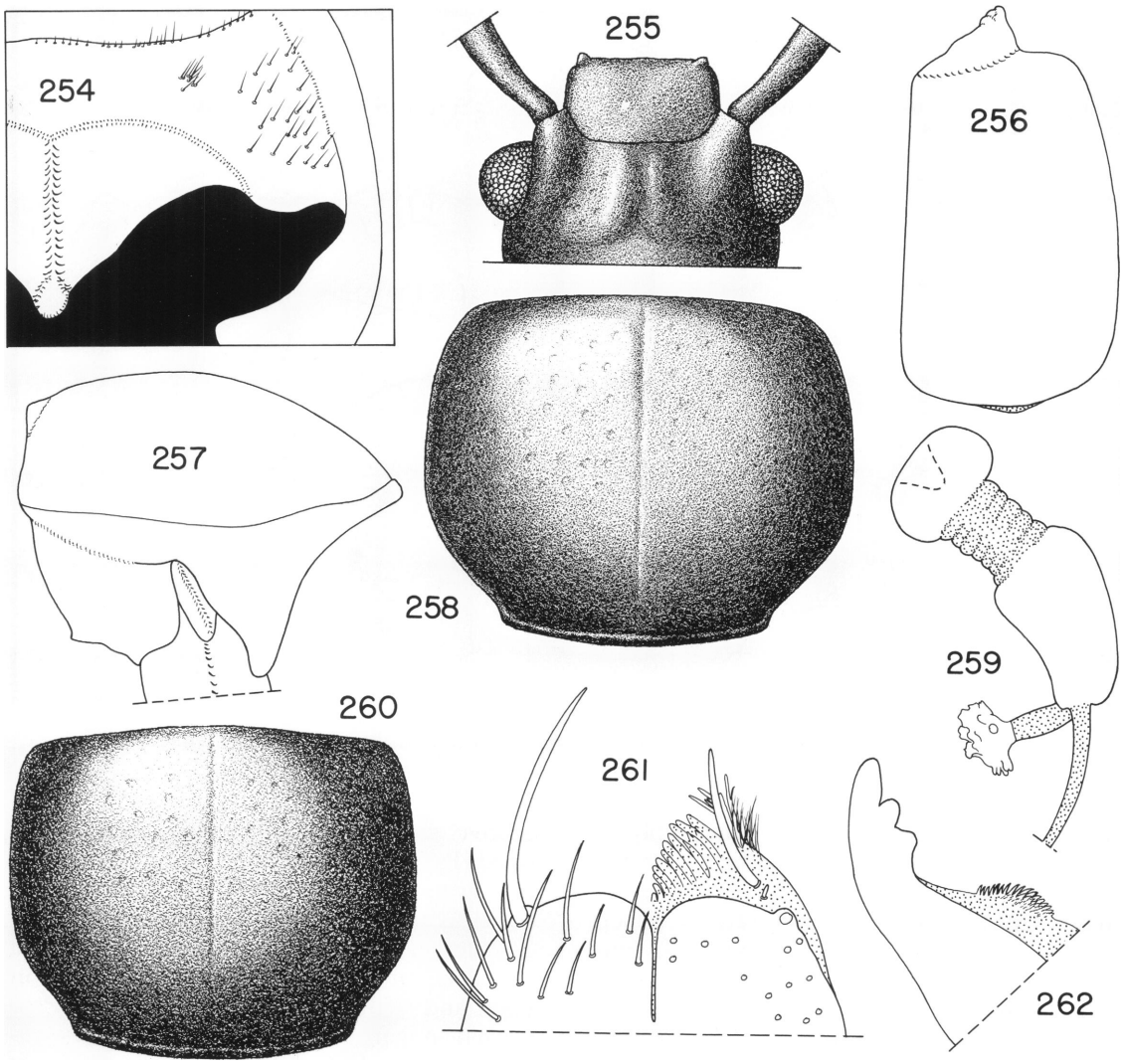
width 1.37 to 1.46. Labrum with feebly reflexed, shallowly emarginate anterior margin. Mandibles (fig. 249) tridentate; middle and basal denticles large and moderately well separated. Antennomeres 3 to 7 without ridge or carina encircling apex.

Pronotum 0.91 to 1.09 mm. wide; 0.74 to 0.92 mm. long; pronotal width/pronotal length 1.18 to 1.25; pronotum extremely convex in male (fig. 250) and moderately strongly convex in female; lateral margins of male (fig. 250) with anterior half gradually curved and convergent to anterior angles, basal half curved and convergent to base; lateral margins of female (fig. 251) with anterior half gradually and shallowly curved and convergent to anterior angles, basal half curved and convergent to base; basal angles well developed and strongly rectangulate; anterior angles rounded and even with anterior margin. Pronotal surface shining dully; microgranulate ground sculpturing well developed; punctation dense, moderately deep, and more prominent than ground sculpturing; pubescence moderately long; midlongitudinal groove shallow to moderately well developed. Prohypomeron strongly to dully shining, ground sculpture well developed. Procoxal fissure with dorsal portion closed (fig. 252) to slightly open and with protrochantin concealed or slightly exposed ventral portion open and with protrochantin exposed. Prosternal setigerous pit feeble and with few setae (fig. 246). Elytra 0.94 to 1.12 mm. long; elytral length/pronotal length 1.16 to 1.32; elytra densely and moderately coarsely punctate; pubescence moderately long and posteriorly directed; posterior margin with membranous lobe.

Abdominal tergal pubescence moderately long and medioposteriorly directed; terga IV to VI deeply impressed basally. Tergum VIII with isodiametric polygonal ground sculpturing. Sternites with uniformly dense pubescence; ground sculpturing well developed. Sternites VII and VIII unmodified.

Spermatheca as in figure 248.

Aedeagus with small, scattered, apical and subapical setae on parameres; parameres broad.




FIGS. 254–262. *Bledius newelli.* 254. Prosternum, left side. 255. Head, dorsal view. 256. Elytron, right, setae omitted. 257. Prothorax, lateral view, setae omitted. 258. Pronotum, male. 259. Spermatheca. 260. Pronotum, female. 261. Labrum, left epipharyngeal and right setae removed. 262. Mandible, right.

SEXUAL DIMORPHISM: In the male, the tumescence on the dorsum of the head is divided midlongitudinally into a pair of widely separated, parallel ridges (fig. 247); the pronotum is extremely convex (fig. 250) and the lateral margins are strongly convergent anteriorly. By contrast, in the female the tumescence of the head is medially divided by a shallow groove, the pronotum is strongly convex, and the lateral margins of the pronotum are moderately convergent anteriorly (fig. 251). The pronotum of the male is slightly longer and wider than that of the female.

VARIATION: The specimens from Wisconsin and Ontario have the procoxal fissure closed for a greater portion of the length than do specimens from other parts of the range.

HABITAT AND DISTRIBUTION: This species is known from scattered localities. It occurs from Alaska across Canada to western Quebec. It has been found in the contiguous United States only in South Dakota and Wis-

consin (fig. 253; see Appendix I for localities). In the Black Hills of South Dakota, *B. viriosus* was found abundantly in shaded, vegetated soil adjacent to Spring Creek.

DISCUSSION: A specimen from California (Monterey Co., Hastings Natural History Res., November 3, 1938) is similar to *viriosus*. It was collected far south of all the other specimens of the species and differs from *viriosus* by having well-developed prosternal pits, open procoxal fissures, and more finely punctate elytra. Until more specimens are available, I consider this specimen unidentifiable.

ETYMOLOGY: From the Latin *viriosus* for robust or strong and referring to the robust prothorax.

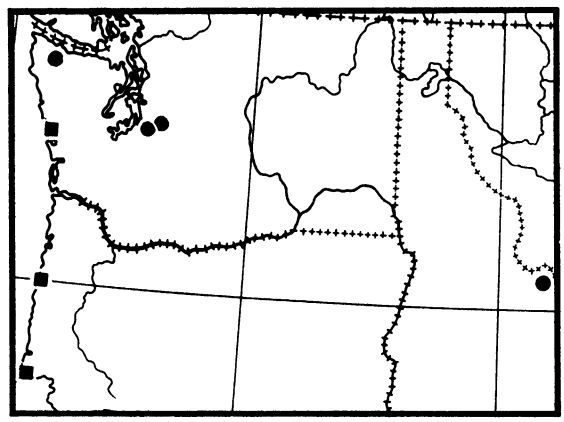


FIG. 263. Distribution of *Bledius newelli* (squares) and *Bledius cedarensis* (dots) in northwestern United States.

### 25. *Bledius newelli* Hatch

Figures 254–263, 409, 410; Table 2

*Bledius newelli* Hatch, 1957, p. 105. (Type locality: Winchester Bay, Lane County, Oregon. Holotype deposited in National Museum of Natural History, Smithsonian Institution. Type examined).

DIAGNOSIS: *Bledius newelli* can be separated from other species of the *annularis* group by the short elytra, presence of a midlongitudinal groove on the long tumescence of the dorsum of the head (fig. 255), the strongly rectangulate basal angles of the pronotum (figs. 258, 260), tridentate mandibles (fig. 262), and, in the male, the robust, strongly convex pronotum. This species can be confused with *turgidus* or *viriosus*. The entirely open procoxal fissure (fig. 257) of *newelli* will permit separation from both species. The posteriorly directed elytral pubescence, sparser pronotal punctation, and entirely open procoxal fissure of *newelli* separate it from *cedarensis*.

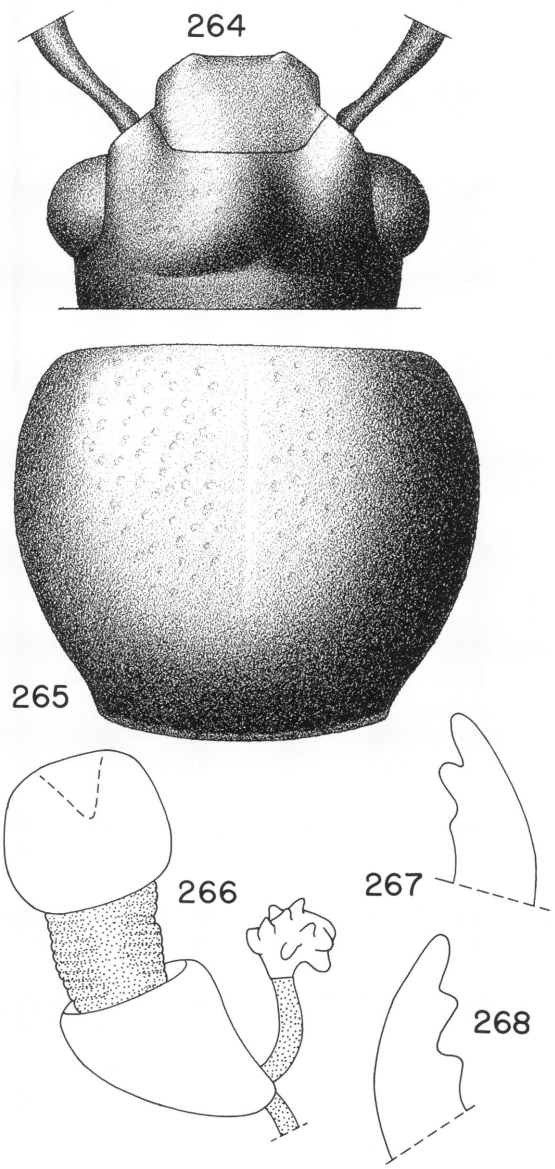
DESCRIPTION: *annularis* group.

Length 4.0 to 5.7 mm.

Color black and reddish brown. Head, pronotum, and abdomen black. Elytra reddish to reddish brown to blackish red; epipleuron and disk concolorous. Leg and antennae reddish brown.

Dorsum (fig. 255) of head shining dully, not polished; microgranulate ground sculpturing weil developed; punctation well developed, moderately dense, and moderately deep; pubescence moderately long; dorsum with midlongitudinal broad tumescence; tumescence with median, moderately deep depression; dorsum with well-developed median and moderately developed transverse, postocular depression. Clypeus shining dully; microgranulate ground sculpturing well developed; punctation feeble; anterior margin with small, well-developed tubercle near lateral margin. Eyes moderately large. Width of head 0.77 to 0.90 mm.; interocular width 0.54 to 0.64 mm.; head width/interocular width 1.38 to 1.43. Labrum (fig. 261) with feebly reflexed, shallowly emarginate anterior margin. Mandibles (fig. 262) tridentate; middle and basal denticles large; denticles well separated from one another. Antennomeres 3 to 7 without ridge or carina encircling apex.

Pronotum 0.96 to 1.23 mm. wide; 0.81 to 1.01 mm. long; pronotal width/pronotal length 1.18 to 1.24; pronotum extremely convex in male (fig. 258) and strongly convex in female (fig. 260); lateral margin with anterior half straight and slightly convergent anteriorly, basal half gradually curved and convergent to base; basal angles strongly rectangulate and well developed; anterior angles rounded and even with anterior margin. Pronotal surface shining dully; microgranulate ground sculpturing well developed; punctation more prominent than ground sculpturing, dense and moderately deep, pubescence moderately long; midlongitudinal groove well developed; prohypomeron dully shining with




FIGS. 264–268. *Bledius cedarensis.* 264. Head, dorsal view. 265. Pronotum, female. 266. Spermatheca. 267. Mandible, right, apex. 268. Mandible, left, apex.

well-developed ground sculpturing; procoxal fissure open (fig. 257) for entire length and protrochantin exposed over full length of fissure. Prosternal setigerous pit well developed (fig. 254). Elytra 1.01 to 1.15 mm. long; elytral length/pronotal length 1.07 to 1.27; elytra densely and moderately coarsely punctate; pubescence moderately long and posteriorly directed; posterior margin with broad, short membranous lobe (fig. 256); posterior margin broadly rounded.

Abdominal tergal pubescence moderately long and medioposteriorly directed; terga IV to VI moderately deeply impressed basally. Tergum VIII with isodiametric polygonal ground sculpturing. Sternites with uniformly dense pubescence; ground sculpturing well developed. Sternites VII and VIII unmodified.

Spermatheca as in figure 259.

Aedeagus without setae on parameres; parameres broad.

SEXUAL DIMORPHISM: The pronotum of the male (fig. 258) is long, wider, and more strongly convex than that of the female (fig. 260). In contrast to the female, the male has short elytra compared to the pronotal length (see table 2, Elytral length/pronotal length).

HABITAT AND DISTRIBUTION: *Bledius newelli* is known only from a few localities near the ocean in Washington and Oregon (fig. 263; see Appendix I for localities). It has been collected from sparsely vegetated, moist sand flats near beach dunes.

DISCUSSION: A specimen from California (Monterey County, Hastings Natural History Res., Nov. 3, 1938) is similar to *newelli* but differs by its smaller size and more densely punctate pronotum. It was collected far south of the other specimens of *newelli.* Until other specimens are available, I cannot identify it.

### 26. *Bledius cedarensis* Hatch
Figures 263–268; Table 2

*Bledius cedarensis* Hatch, 1957, p. 101. (Type locality: Cedar Mountain, Washington. Holotype in National Museum of Natural History, Smithsonian Institution. Type examined).

DIAGNOSIS: *Bledius cedarensis* can be separated from other species of the *annularis* group by the robust form, rectangulate basal angles of the pronotum (fig. 265), the tridentate mandibles (figs. 267, 268), densely and coarsely punctate pronotum (fig. 265), partially closed procoxal fissure, short elytra, membranous lobe on the elytral margin, and lateroposteriorly directed elytral pubescence. The species is similar to *turgidus, viriosus,*

and *newelli*. The lateroposteriorly directed elytral pubescence of *cedarensis* distinguishes it from these three species which have posteriorly directed pubescence. Further, *turgidus* and *newelli* have sparser pronotal punctation than *cedarensis* (compare fig. 265 to figs. 240 and 258). The procoxal fissure of *newelli* is open (fig. 257); the margins of the fissure meet dorsally in *cedarensis*; the fissure is closed for part or most of its length in *viriosus* (fig. 252) and *turgidus* (fig. 244). The pronotum of *viriosus* (fig. 250) which is densely punctate is more strongly convex than that of *cedarensis* (fig. 265) and the ratio of the elytral length/pronotal length is smaller in *cedarensis* than in *viriosus*.

DESCRIPTION: *annularis* group.

Length 4.7 to 5.6 mm.

Color reddish brown to black. Head reddish brown to black. Pronotum reddish brown to dark reddish brown. Elytra reddish brown. Abdomen reddish brown to dark reddish brown. Legs and antennae reddish brown.

Dorsum of head shining dully, not polished; microgranulate ground sculpturing well developed; punctation dense, moderately coarse, and moderately deep; pubescence moderately long; dorsum with broad, midlongitudinal, low tumescence; tumescence with or without feeble, midlongitudinal depression; dorsum with well-developed median and transverse postocular depressions. Clypeus shining dully; microgranulate ground sculpturing well developed; punctation feeble; anterior margin with well-developed tubercle near lateral margin; tubercle larger in male than in female. Eyes moderately large. Width of head 0.89 to 0.93 mm.; interocular width 0.62 to 0.65 mm.; head width/interocular width 1.38 to 1.47. Labrum with feebly reflexed, shallowly emarginate anterior margin. Mandibles tridentate; basal and middle denticles large; right mandible (fig. 267) with basal two denticles closely associated; left mandible (fig. 268) with basal two denticles well separated. Antennomeres 3 to 7 without ridge or carinae encircling apex.

Pronotum 1.14 to 1.22 mm. wide; 0.96 to 1.01 mm. long; pronotal width/pronotal length 1.15 to 1.20; pronotum (fig. 265) strongly convex, slightly more convex in male than female; anterior seven eighths of lateral margin broadly and moderately strongly curved to strongly constricted basal eighth; basal angles moderately strongly rectangulate; anterior angles rounded and even with anterior margin. Pronotal surface shining dully; microgranulate ground sculpturing well developed; punctation dense, moderately deep, and more prominent than or equally prominent to ground sculpturing; pubescence moderately long; midlongitudinal groove shallow. Prohypomeron shining dully, ground sculpturing well developed; procoxal fissure open, margins overlapping near dorsal edge of fissure; protrochantin exposed. Prosternal setigerous pit well developed. Elytra 1.04 to 1.09 mm. long; elytral length/pronotal length 1.06 to 1.13; elytra densely and moderately coarsely punctate; pubescence moderately long; setae adjacent to suture and near lateral margin posteriorly directed, setae of central region lateroposteriorly directed; posterior margin with membranous lobe; posterior margin broadly rounded.

Abdominal tergal pubescence long and posteriorly or medioposteriorly directed; terga IV to VI deeply impressed basally. Tergum VIII with isodiametric polygonal ground sculpturing. Sternites with uniformly dense pubescence; ground sculpturing well developed. Sternites VII and VIII unmodified.

Spermatheca as in figure 266.

Aedeagus not examined.

SEXUAL DIMORPHISM: The male has larger clypeal tubercles, more strongly convex pronotum, and is more robust than the female.

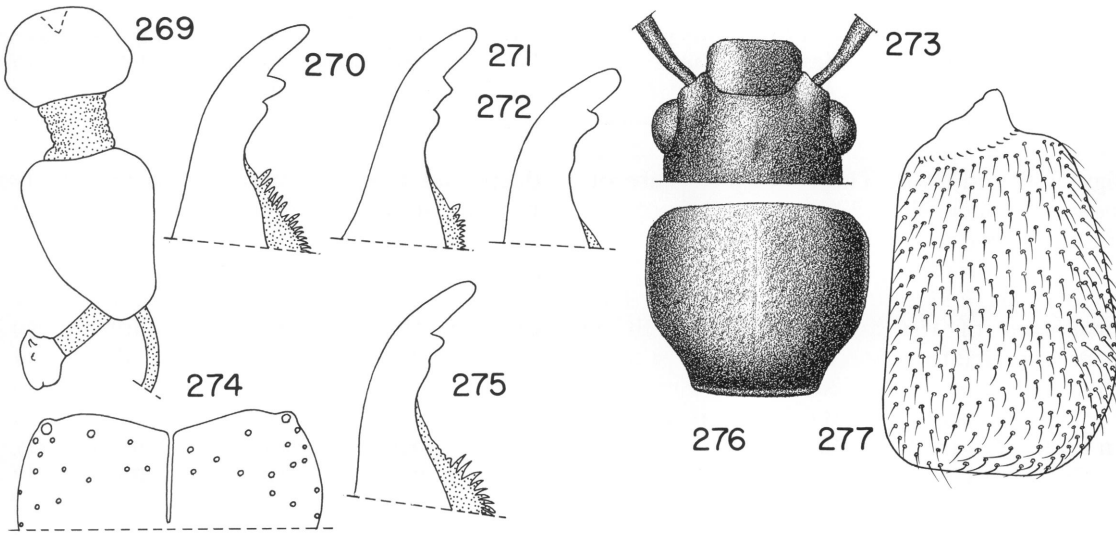
VARIATION: The color is darker and the pronotal ground sculpturing is more strongly developed in the specimens from Idaho than in those from Washington. Since the specimens from the two states are otherwise indistinguishable, they are regarded as conspecific.

HABITAT AND DISTRIBUTION: This species is known from only a few localities in Washington and Idaho (fig. 263; see Appendix I for localities).

### 27. *Bledius monticola* Casey

Figures 269–278, 381–386; Table 2

*Bledius monticola* Casey, 1889, p. 58. Fall, 1901, p. 76; 1910, p. 111. (Type locality: California, Lake Tahoe, 6200 feet. Type in National Mu-




FIGS. 269–277. *Bledius monticola.* 269. Spermatheca. 270–272. Mandible, right, variation of denticles. 273. Head, dorsal view. 274. Labrum, setae and epipharyngeal lobes omitted. 275. Mandible, variation of denticles. 276. Pronotum. 277. Elytron, right.

seum of Natural History, Smithsonian Institution. Type examined).

DIAGNOSIS: *Bledius monticola* can be separated from other species of the *annularis* group by the absence of the membranous lobe of the elytra (fig. 277), the short, coarsely and densely punctate elytra (fig. 384), the medially directed setae on the apical portion of the elytra (fig. 277), the truncate posterior margin of the elytra (fig. 277), the strongly constricted basal third of the pronotum (fig. 276) and, when present, the small to minute basal (third) denticle of the mandibles (figs. 270–272, 275).

DESCRIPTION: *annularis* group.

Length 2.3 to 3.1 mm.

Color black and reddish brown. Head, pronotum, and abdomen black to blackish brown. Elytra reddish brown to dark reddish brown; elytral epipleuron concolorous with disk to slightly paler. Legs reddish brown. Antennae blackish brown.

Dorsum (fig. 273) of head shining dully, not polished; microgranulate ground sculpturing well developed; punctation moderately dense and feeble; pubescence moderately long; dorsum of head with poorly developed to feeble median tumescence; tumescence without median groove; dorsum of head with moderately well-developed to weak median, postocular depression; transverse postocular depression feebly developed to absent. Clypeus shining dully; microgranulate ground sculpturing well developed; punctation feeble; anterior margin without tubercles or laminae. Eyes small. Width of head 0.46 to 0.52 mm.; interocular width 0.33 to 0.39 mm.; head width/interocular width 1.14 to 1.38. Labrum (fig. 274) with weakly reflexed and broadly moderately deeply emarginate anterior margin. Mandibles (figs. 270, 271) usually tridentate; basal denticle of tridentate mandibles small and well developed to minute and evident as small, rounded swelling (figs. 272, 275); mandibles occasionally bidentate, basal (third) denticle worn off. Antennomeres 3 to 7 without ridge or carina encircling apex.

Pronotum 0.49 to 0.58 mm. wide; 0.43 to 0.51 mm. long; pronotal width/pronotal length 1.09 to 1.21; pronotum (fig. 276) strongly convex; lateral margins with anterior two-thirds nearly straight and nearly parallel to slightly curved and with basal third strongly constricted and convergent to base; basal angles strongly rectangulate; anterior angles rounded and even with anterior margin. Pronotal surface shining dully; microgranulate

(figs. 385, 386) ground sculpturing well developed; punctation dense, shallow, and well developed but obscured by strong ground sculpturing; pubescence moderately long; midlongitudinal groove well developed. Prohypomeron shining dully, ground sculpturing strong. Procoxal fissure open for entire length and protrochantin exposed. Prosternal setigerous pit small and with few setae. Elytra 0.52 to 0.64 mm. long; elytral length/pronotal length 1.14 to 1.38; elytra densely and coarsely punctate (fig. 384); pubescence moderately long and directed posteriorly to slightly lateroposteriorly on disk and medially directed at apical portion (fig. 277); posterior margin without membranous lobe; posterior margin truncate.

Abdominal tergal pubescence moderately long and medioposteriorly directed; terga IV to VI deeply impressed at base. Tergum VIII with isodiametric polygonal ground sculpturing. Sternites with uniformly dense pubescence; ground sculpturing moderately well developed to weak. Sternites VII and VIII unmodified.

Spermatheca as in figure 269.

Aedeagus with microsetae on parameres; parameres broad.

SEXUAL DIMORPHISM: None.

VARIATION: Although this species usually has tridentate mandibles, on some individuals the basal mandibular denticle has been worn off and the mandibles are bidentate. These specimens can be identified in the sections of the Key that include both the bidentate species and the tridentate ones.

HABITAT AND DISTRIBUTION: *Bledius monticola* has been collected only in northern Oregon and north-central California where it has been collected only a few times (fig. 278; see Appendix I for localities). The species has been found at elevations of 4000 to 6700 feet. Although it has been collected along the shore of streams at these elevations in both Oregon and California, the species is most abundant in moist soil near springs.

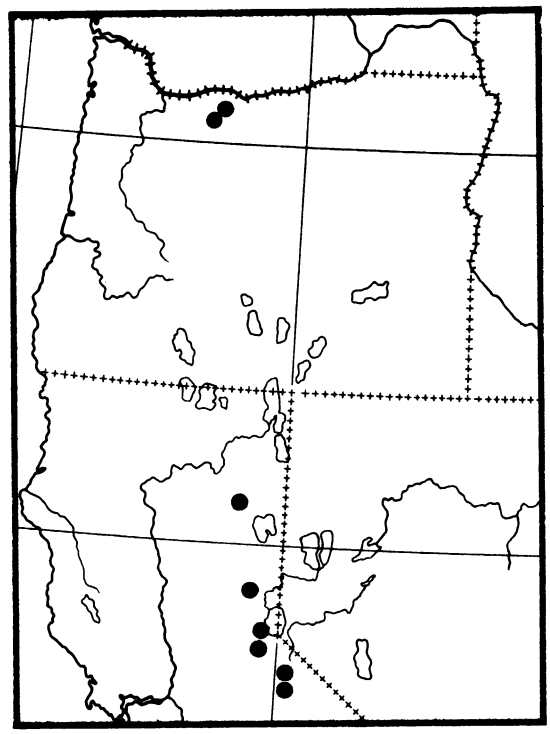


FIG. 278. Distribution of *Bledius monticola* in Oregon and California.

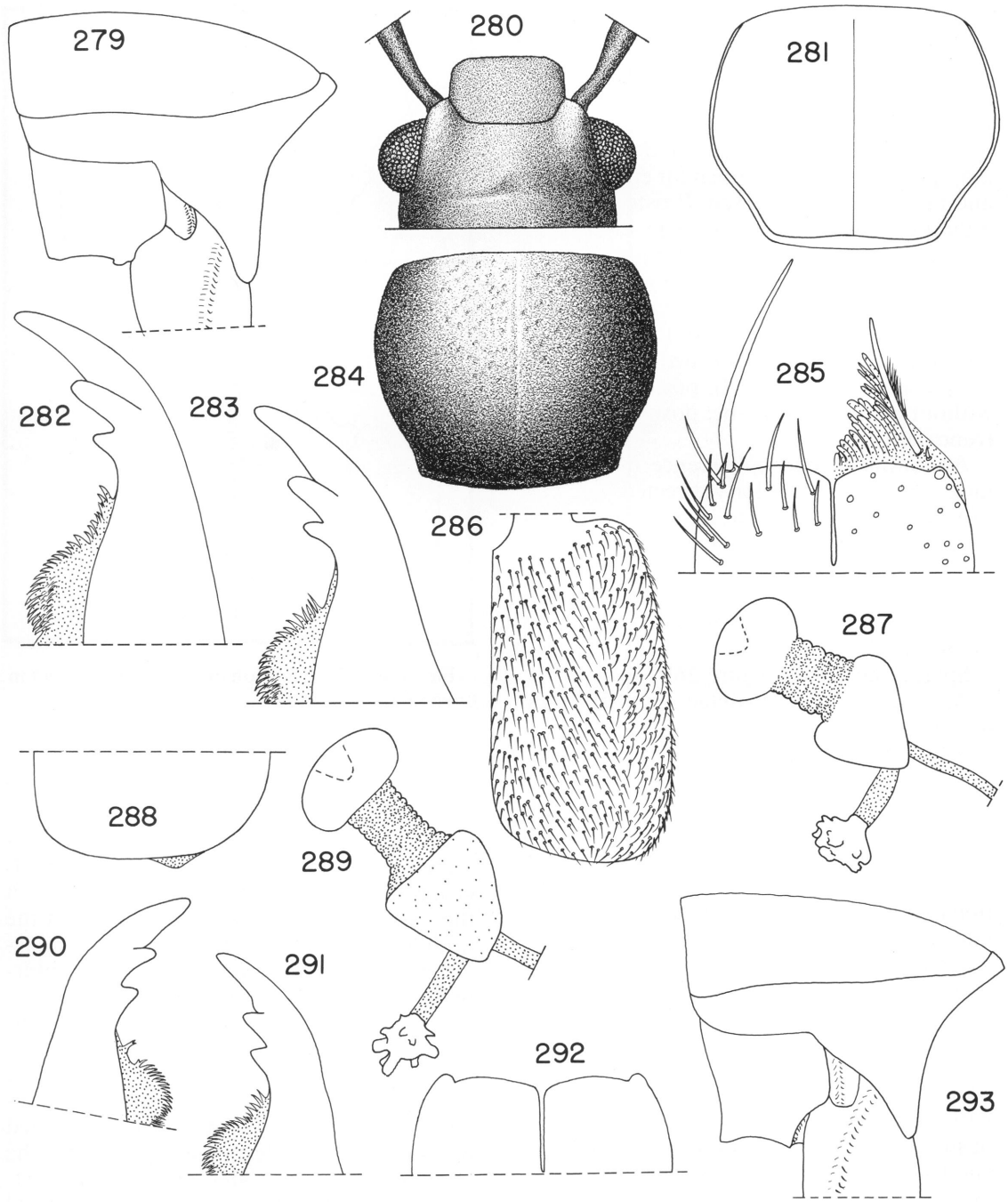
### 28. *Bledius ruficornis* LeConte

Figures 279–287, 294, 376–381; Table 2

*Bledius ruficornis* LeConte, 1863, p. 53; 1877, pp. 226, 229. Casey, 1889, pp. 63, 64. Fall, 1901, p. 75; 1910, pp. 112, 113. Hatch, 1957, p. 100. (Type locality: California, San Francisco. Type in Museum of Comparative Zoology, Harvard University. Type examined).

DIAGNOSIS: *Bledius ruficornis* can be separated from other species of the *annularis* group by the tridentate mandibles in which the basal denticle is well separated from the middle one (figs. 282, 283), the dense punctation and strong granulate ground sculpturing of the pronotum (figs. 379, 380), the rectangulate basal angles of the pronotum (figs. 281, 284), the absence of membranous lobe on the posterior elytral margin (fig. 286), and the slightly closed dorsal portion of the procoxal fissure (fig. 279). The pattern formed by the elytral pubescence is also useful. The setae of the disk are lateroposteriorly directed; the setae of the lateral portion of the apical region are posteromedially directed (figs. 286, 378).

In couplet 32 that distinguishes *monticola* and *ruficornis,* I have used elytral length, mandibular dentition, and characteristics of the shape of the posterior elytral margin. The western populations of *ruficornis* are signifi-




FIGS. 279–287. *Bledius ruficornis*. 279. Prothorax, lateral view. 280. Head, dorsal view. 281. Pronotum, male. 282–283. Mandible, right. 284. Pronotum, female. 285. Labrum, left epipharyngeal lobe and right setae removed. 286. Elytron, right. 287. Spermatheca.

FIGS. 288–293. *Bledius bicolor*. 288. Elytron. right, apex, setae removed. 289. Spermatheca. 290–291. Mandibles. 290. Left. 291. Right. 292. Labrum, setae and epipharyngeal lobes removed. 293. Prothorax, lateral view.

cantly larger than *monticola* but in the sample of *ruficornis* from New York the specimens are nearly as small as *monticola.*

*Bledius ruficornis* and *bicolor* can be separated by the membranous lobe on the posterior margin of the elytra (fig. 288) of the latter species. In other respects the species are similar.

DESCRIPTION: *annularis* group.

Length 3.0 to 5.1 mm.

Color black to reddish brown. Head, pronotum, and abdomen black to dark reddish brown to reddish brown. Elytra reddish brown to dark reddish brown with black infusions; elytral epipleuron concolorous with elytral disk or darker. Legs pale reddish brown. Antennae dark ground sculpturing, first segment yellowish brown to reddish brown.

Dorsum (fig. 280) of head shining dully, not polished; microgranulate ground sculpturing well developed; punctation dense, shallow, and feeble; pubescence moderately long; dorsum of head of female broadly and feebly rounded; dorsum of head of male often with broad, low, midlongitudinally divided tumescence, median groove feeble to moderately deep or dorsum broadly convex; dorsum of head with well-developed median postocular depression and feeble to well-developed transverse postocular depression. Clypeus shining dully; microgranulate ground sculpturing well developed; punctation feeble, anterior margin with feeble to small tubercle near lateral margin in female, and small moderately to weakly developed tubercle in male. Eyes moderately large. Width of head 0.55 to 0.77 mm.; interocular width 0.36 to 0.52 mm.; head width/interocular width 1.38 to 1.54. Labrum (fig. 285) with feebly reflexed, shallowly emarginate anterior margin. Mandibles (figs. 282, 283) tridentate; middle denticle large; basal denticle large to moderately large and well separated from middle denticle. Antennomeres 3 to 7 without ridge or carina encircling apex.

Pronotum 0.59 to 1.01 mm. wide; 0.48 to 0.86 mm. long; pronotal width/pronotal length 1.14 to 1.24; pronotum (fig. 284) strongly convex; lateral margin of male (fig. 281) with anterior two-thirds strongly curved to strongly convergent basal third; lateral margin of female (fig. 284) with anterior two-thirds moderately strongly curved and moderately strongly convergent basal third; basal angles rectangulate; anterior angles rounded and even with anterior margin. Pronotal surface shining dully; microgranulate ground sculpturing well developed (figs. 379, 380); punctation dense, moderately deep, and equal in prominence to ground sculpturing; pubescence moderately long; midlongitudinal groove shallow to moderately well developed. Prohypomeron shining dully, ground sculpturing strong. Procoxal fissure (fig. 279) open for most of length but closed at dorsal edge; protrochantin exposed except at dorsal portion of procoxal fissure. Prosternal setigerous pit well developed. Elytra 0.67 to 1.07 mm. long; elytral length/elytral width 1.25 to 1.57; elytra densely and moderately coarsely punctate (fig. 378); pubescence moderately long; pubescence posteriorly directed adjacent to suture, lateroposteriorly directed on disk, medioposteriorly directed on lateral portion, and posteromedially directed on lateroapical region (fig. 286); posterior margin without membranous lobe (fig. 286); posterior margin broadly rounded.

Abdominal tergal pubescence moderately long and medioposteriorly directed; terga IV to VI moderately deeply impressed at base. Tergum VIII with feebly transverse polygonal ground sculpturing. Sternites with uniformly dense pubescence; ground sculpturing moderately well developed. Sternites VII and VIII unmodified.

Spermathaca as in figure 287.

Aedeagus with apical microsetae on parameres; parameres broad.

SEXUAL DIMORPHISM: The male often has a midlongitudinally divided tumescence on the dorsum of the head and the lateral margins of the pronotum (fig. 281) are often strongly rounded anteriorly and strongly convergent posteriorly, and the pronotum is often strongly convex. The dorsum of the head of the female (fig. 280) is broadly rounded and lacks a median groove and the pronotum is moderately strongly rounded anteriorly and moderately strongly convergent posteriorly. The pronotum of the male is slightly longer and wider than that of the female.

VARIATION: For a species with such an ex-

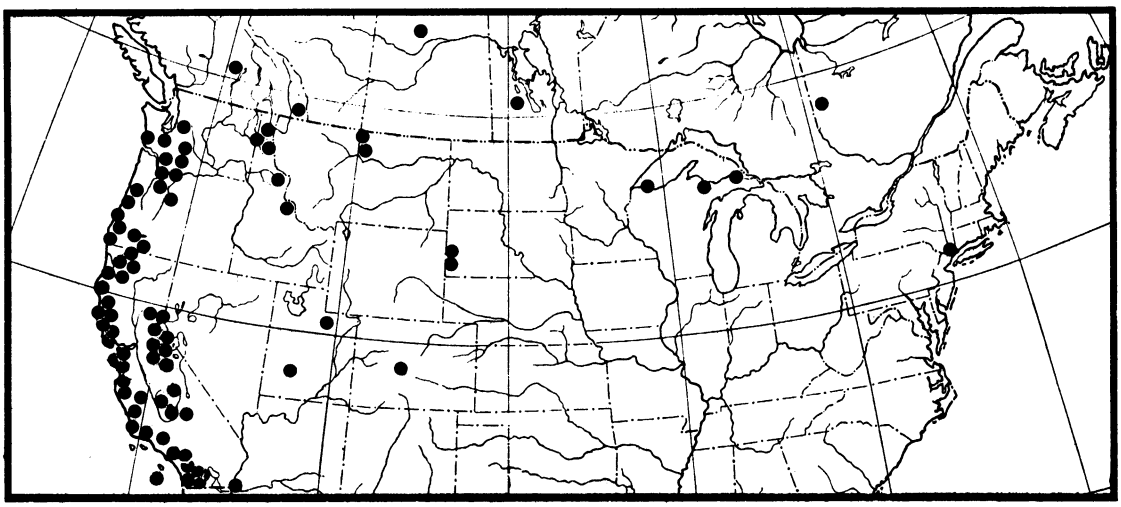


FIG. 294. Distribution of *Bledius ruficornis* in the United States and Canada.

tensive distribution the anatomical variation is slight. Size is the most notable; those from the eastern part of the geographical range are smaller than those from the western part.

HABITAT AND DISTRIBUTION: *Bledius ruficornis* has been found at numerous localities in Washington, Oregon, and California south to Baja California and at scattered localities across Canada and the United States to Wisconsin and Michigan, New York, and Quebec. In the western United States it is found from Idaho and Montana south into South Dakota, Utah, Colorado, and western Arizona (fig. 294; see Appendix I for localities). Not only are the localities in the eastern part of the range scattered but the size of the samples (in collections) are small. In California, Oregon, and Washington the species is collected frequently and often in large numbers. The species has been collected from sea level to as high as 9000 feet but it has been collected in the large numbers and most frequently at sea level to about 4000 feet elevation. The species is usually found in shaded, vegetated banks of streams and rivers.

### 29. *Bledius bicolor* Casey

Figures 288–293, 295, 402, 404; Table 2

*Bledius bicolor* Casey, 1889, p. 64. Fall, 1901, p. 76. (Type locality: California, Napa County, Yountville. Type in National Museum of Natural History, Smithsonian Institution. Type examined).

*Bledius rusticus* Fall, 1901, pp. 75, 229. (Type locality: Pomona, California. Type in Museum of Comparative Zoology, Harvard University. Type examined). NEW SYNONYM.

DIAGNOSIS: *Bledius bicolor* is similar to *ruficornis*. *Bledius bicolor* has a membranous lobe (fig. 288) on the posterior margin of each elytron but *ruficornis* lacks it (fig. 286). This is the only character that separates the two (see Discussion).

DESCRIPTION: *annularis* group.

Length 3.5 to 5.0 mm.

Color reddish brown. Head black to dark reddish brown. Pronotum reddish brown usually with strong reddish cast. Elytra reddish brown often with yellowish cast. Abdomen reddish brown to dark reddish brown.

Dorsum of head shining dully, not polished; microgranulate ground sculpturing well developed; punctation dense, shallow, and feeble; pubescence moderately long; dorsum of head broadly convex, male often with weakly developed median tumescence with feeble midlongitudinal groove; dorsum of head with well-developed median postocular depression and moderately to feebly developed postocular transverse groove; postocular depression deeper in male than in female. Clypeus shining dully; microgranulate ground sculpturing well developed; puncta-

tion feeble; anterior margin without tubercles or with feebly developed tubercles. Eyes moderately large. Width of head 0.60 to 0.69; interocular width 0.40 to 0.46; head width/interocular width 1.45 to 1.52. Labrum (fig. 292) with feebly reflexed, shallowly emarginate anterior margin. Mandibles tridentate; middle denticle large; basal denticle smaller and well separated from middle denticle, particularly on left mandible (figs. 290, 291). Antennomeres 3 to 7 without ridge or carina encircling apex.

Pronotum 0.64 to 0.77 mm. wide; 0.54 to 0.64 mm. long; pronotal width/pronotal length 1.13 to 1.23; pronotum strongly convex; lateral margin with anterior two-thirds broadly curved to strongly constricted, sinuate basal third; basal angles rectangulate; anterior angles rounded and even with anterior margin. Pronotal surface shining dully; microgranulate ground sculpturing; punctation dense, moderately deep, and equal in prominence to ground sculpturing; pubescence moderately long; midlongitudinal groove shallow. Prohypomeron shining, ground sculpturing well developed. Procoxal fissure open for most of length but slightly closed at dorsal edge of fissure (fig. 293). Prosternal setigerous pit well developed. Elytra 0.86 to 0.96 mm. long; elytral length/elytral width 1.47 to 1.61; elytra moderately densely and coarsely punctate; pubescence moderately long; pubescence posteriorly directed adjacent to suture lateroposteriorly directed on disk, medioposteriorly directed on lateral portion, and posteromedially directed on lateroapical portion; posterior margin with membranous lobe (fig. 288); posterior margin broadly rounded.

Abdominal tergal pubescence moderately long and medioposteriorly directed; terga IV to VI moderately deeply impressed at base. Tergum VIII with isodiametric and feebly transverse polygonal ground sculpturing. Sternites with uniformly dense pubescence; ground sculpturing moderately well developed. Sternites VII and VIII unmodified.

Spermatheca as in figure 289.

Aedeagus with apical microsetae on parameres; parameres broad.

SEXUAL DIMORPHISM: The males often have a deeper postocular depression on the dorsum of the head.

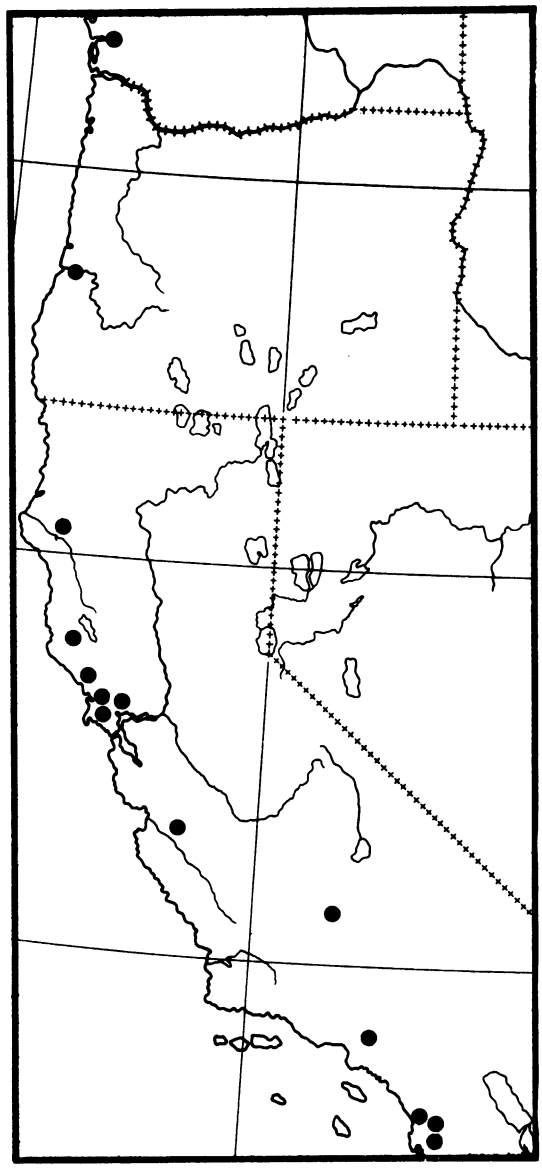
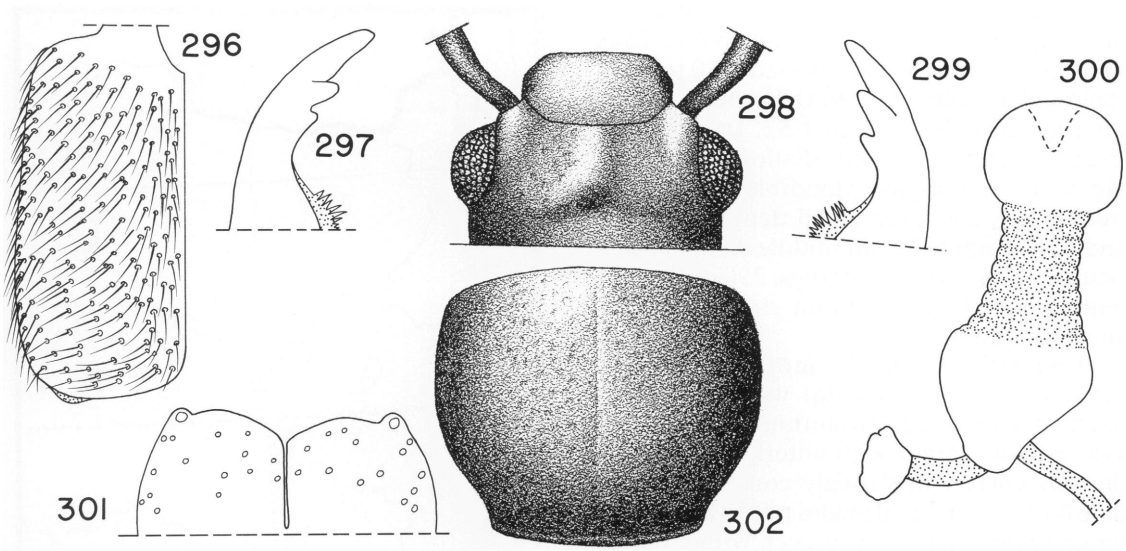


FIG. 295. Distribution of *Bledius bicolor* in California, Washington, and Oregon.

SYNONYMS: Fall (1901, pp. 229, 230) compared *rusticus* with *luteipennis* from which it can be distinguished by many characters rather than with *bicolor* from which it is inseparable.

HABITAT AND DISTRIBUTION: This species is known only from Washington, Oregon, and California (fig. 295; see Appendix I for localities). This species has been collected from shaded, vegetated soil near streams.




FIGS. 296–302. *Bledius habrus.* 296. Elytron, left. 297. Mandible, left. 298. Head, dorsal view. 299. Mandible, right. 300. Spermatheca. 301. Labrum, setae, and epipharyngeal lobes removed. 302. Pronotum.

DISCUSSION: *Bledius bicolor* looks like *ruficornis* except that it has a membranous lobe on the posterior margin of the elytra; *ruficornis* lacks this membranous lobe. Further, the pronotum of *bicolor* tends to have a strong reddish cast but that of *ruficornis* is more brownish. The pronotum of the males of *ruficornis* is usually robust and strongly convex with strongly rounded lateral margins; that of the female is more gently developed. The pronotum of the males and females of *bicolor* is gently developed, similar to that of the female of *ruficornis,* and without the strong sexual dimorphism seen in *ruficornis.* The head of the male of *ruficornis* often has a middorsal, longitudinally divided tumescence; the female lacks it. The head of the male of *bicolor* has at best a feebly developed tumescence on the head; the median groove is feebly developed when present.

These differences suggest the continued recognition of both *bicolor* and *ruficornis.* I have examined more than 2300 specimens of *ruficornis* but only 136 of *bicolor.* These species warrant further consideration and study. The two have been collected together at seven localities that have been marked with an asterisk in the Material Examined (Appendix I).

A specimen in the Fall collection determined by him to be *rusticus* I tentatively regard to be a third specimen of *phytosinus.*

### 30. **Bledius habrus**, new species
Figures 296–303, 370–374; Table 2

HOLOTYPE: British Columbia: 22 miles W Chetwynd, Pine River, July 14, 1975, collected by Lee Herman, deposited in the American Museum of Natural History.

PARATYPES: Four with same data as holotype and deposited with holotype.

DIAGNOSIS: *Bledius habrus* is distinguished from other species of the *annularis* group by the tridentate mandibles (figs. 297, 299), coarsely punctate elytra (fig. 374), membranous lobe on the posterior margin of the elytra, the long, laterally directed pubescence of the elytra (fig. 296) and the rectangulate basal angles of the pronotum (fig. 302).

DESCRIPTION: *annularis* group.

Length 3.1 to 4.1 mm.

Color entirely black with reddish brown legs and antennae to entirely reddish brown. Reddish brown individuals with dark reddish brown head, reddish brown pronotum and abdomen, paler reddish brown elytra, and reddish brown legs and antennae.

Dorsum (fig. 298) of head shining dully, not polished; microgranulate ground sculpturing well developed; punctation dense, shallow, and feeble; pubescence moderately long; dorsum of head broadly convex; dorsum of head with well-developed median and transverse postocular depressions. Clypeus shining dully; microgranulate ground sculpturing well developed; punctation feeble; anterior margin without tubercles or laminae or with feeble tumescence near lateral margin. Eyes moderately large. Width of head 0.57 to 0.71 mm.; interocular width 0.41 to 0.50 mm.; head width/interocular width 1.34 to 1.47. Labrum (fig. 301) with feebly reflexed, shallowly emarginate anterior margin. Mandibles (figs. 297, 299) tridentate; middle denticle large and moderately separated from moderately large basal denticle. Antennomeres 3 to 7 without ridge or carina encircling apex.

Pronotum 0.66 to 0.83 mm. wide; 0.56 to 0.69 mm. long; pronotal width/pronotal length 1.11 to 1.21; pronotum (fig. 302) strongly convex; lateral margin moderately strongly curved to moderately strongly to strongly sinuate basal third; basal angles rectangulate; anterior angles rounded and even with anterior margin. Pronotal surface shining dully; microgranulate ground sculpturing well developed (figs. 372, 373); punctation dense, moderately deep, and equal in prominence to ground sculpturing; pubescence long; midlongitudinal groove shallow to moderately well developed. Prohypomeron moderately shining, ground sculpturing well developed. Procoxal fissure open for entire length; protrochantin exposed. Prosternal setigerous pit well developed. Elytra 0.72 to 0.91 mm. long; elytral length/elytral width 1.20 to 1.33; elytra densely and coarsely punctate (fig. 374); pubescence long; pubescence (fig. 296) posteriorly directed along sutural quarter of disk and laterally to posterolaterally directed on remaining three-fourths of disk; posterior margin with membranous lobe; posterior margin broadly rounded.

Abdominal tergal pubescence moderately long and medioposteriorly directed; terga IV to VI deeply impressed basally. Tergum VIII with feebly transverse polygonal ground sculpturing. Sternites with uniformly dense pubescence; ground sculpturing feebly developed. Sternites VII and VIII unmodified.

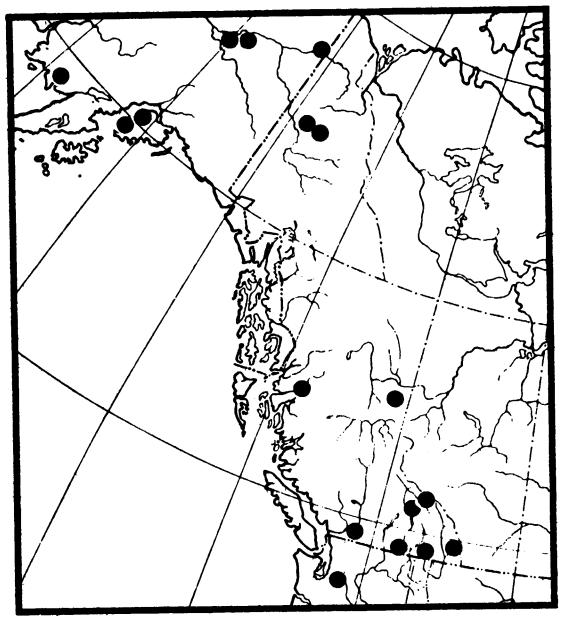


FIG. 303. Distribution of *Bledius habrus* in western United States and Canada.

Spermatheca as in figure 300.

Aedeagus without setae on parameres; parameres broad.

SEXUAL DIMORPHISM: None.

VARIATION: In general the specimens from the north are small (see table 2) and dark (black) and those from the south are large and pale (reddish brown) but there are exceptions.

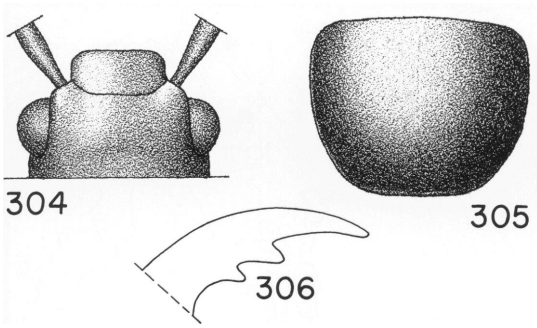
HABITAT AND DISTRIBUTION: *Bledius habrus* is known from Alaska, Yukon Territory, British Columbia, and Washington (fig. 303; see Appendix I for localities).

ETYMOLOGY: From the Greek *habros* for pretty or graceful.

### 31. *Bledius phytosinus* LeConte
Figures 304–307; Table 2

*Bledius phytosinus* LeConte, 1877, p. 231. Casey, 1889, p. 71. Fall, 1901, p. 75. (Type locality: southern California. Lectotype in the Museum of Comparative Zoology, Harvard University. Type examined).

*Bledius lecontei* Duvivier, 1883, p. 187, not Sharp, 1887 or Bernhauer, 1905. (Duvivier proposed this name to replace *phytosinus* LeConte which he thought was preoccupied by *phytosinus* Fauvel. However, the Fauvel name, which is now




FIGS. 304–306. *Bledius phytosinus*. 304. Head, dorsal view. 305. Pronotum. 306. Mandible, left, apical portion.

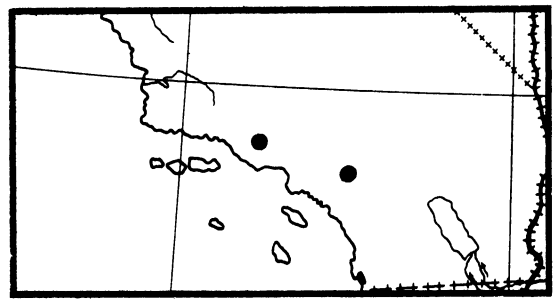


FIG. 307. Distribution of *Bledius phytosinus* in southern California.

in *Blediotrogus,* was published in 1878, a year after the LeConte name).

DIAGNOSIS: *Bledius phytosinus* is similar to *confusus* and *laticollis*. It can be distinguished from *confusus* by its smaller size (table 2), paler color, and more feeble pronotal punctation (fig. 305). The two species are found in different parts of North America (see also Discussion). *Bledius phytosinus* and *laticollis* are quite similar and are from the same region. The pronotal punctation of *phytosinus* (fig. 305) is fine and difficult to see but that of *laticollis* is coarser and prominent. The emargination of the labrum of *phytosinus* is broader and the anterior margin of the labrum of *laticollis* is more strongly reflexed.

DESCRIPTION: *annularis* group.

Length 2.6 to 2.8 mm.

Color reddish brown. Head and abdomen dark reddish brown. Pronotum and elytra reddish brown, elytra paler than pronotum. Legs and antennae pale reddish brown to yellowish brown. (The lectotype, a callow adult, is yellowish brown.) One specimen has pale, yellowish brown elytral apices.

Dorsum of head (fig. 304) shining dully, not polished, microgranulate ground sculpturing well developed; punctation moderately dense, shallow, and feeble. Pubescence moderately long; dorsum of head broadly and shallowly convex; dorsum of head with weakly developed median depression; postocular transverse depression absent. Clypeus shining dully; microgranulate ground sculpturing well developed; punctation feeble; anterior margin without tubercles. Eyes moderately large. Width of head 0.50 to 0.53 mm.; interocular width 0.33 to 0.36 mm.; head width/interocular width 1.42 to 1.51. Labrum with broad, moderately deeply emarginate anterior margin. Mandibles (fig. 306) tridentate (see Discussion); middle denticle large; basal denticle small and separate from middle denticle. Antennomeres 3 to 7 without ridge or carina encircling apex.

Pronotum 0.54 to 0.57 mm. wide; 0.44 to 0.48 mm. long; pronotal width/pronotal length 1.15 to 1.26; pronotum moderately strongly convex (fig. 305); lateral margins with anterior two-thirds nearly parallel to broadly and shallowly curved basal third nearly straight to broadly rounded and convergent to basal angles; basal angles present, rounded, and weakly developed; anterior angles rounded and even with anterior margin. Pronotal surface shining dully; microgranulate ground sculpturing well developed; punctation dense, feeble, shallow, and less prominent than ground sculpturing; pubescence moderately long; midlongitudinal groove moderately to weakly developed. Prohypomeron shining and with weakly developed ground sculpturing. Procoxal fissure open for entire length and protrochantin exposed. Prosternal pit moderately well developed and with a few long setae. Elytra 0.58 to 0.61 mm. long; elytral length/pronotal length 1.22 to 1.36; elytra moderately coarsely and densely punctate; pubescence moderately long and posteriorly directed; posterior margin with membranous lobe; posterior margin broadly rounded.

Abdominal tergal pubescence dense, moderately long and medioposteriorly directed;

terga IV to VI moderately deeply impressed at base. Tergum VIII with isodiametric polygonal ground sculpturing. Sternites with uniformly dense pubescence; ground sculpturing moderately well developed. Sternites VII and VIII unmodified.

Specimen not dissected, spermatheca and aedeagus not examined.

SEXUAL DIMORPHISM: Not known.

HABITAT AND DISTRIBUTION: The species is known only from southern California (fig. 307; see Appendix I for localities).

DISCUSSION: Although I have included *phytosinus* in the Key and redescribed it, I am not entirely sure of the identity of the species. I have studied the lectotype, another that I collected, and a third specimen that I tentatively determined to be *phytosinus* found among a series of three specimens of *rusticus* in the H. C. Fall collection (Museum of Comparative Zoology).

Despite the difficulty of identifying *phytosinus,* after comparison to other species, it does seem to be different. Discovery of other specimens should permit a more explicit differentiation. The lectotype is a callow adult and is fragile. Dissection of mouthparts and genitalia were not made. I was able to see only the first two mandibular denticles of the lectotype but the specimens I collected and the one from the Fall collection have tridentate mandibles.

*Bledius phytosinus* runs to *confusus* in the key. Characters separating these species have already been discussed. Furthermore, *confusus* is from north central North America, not southern California.

In southern California, only *laticollis, bicolor,* and *ruficornis,* all with tridentate mandibles, are similar to *phytosinus. Bledius laticollis* is considerably larger than *phytosinus* and has strong pronotal punctation. The basal angles of *laticollis* and *phytosinus* are either absent or weakly developed. *Bledius ruficornis* is separated from *phytosinus* by the absence of the membranous lobe on the posterior margin of the elytra, the pattern of the elytral pubescence, the longer elytra, the strong pronotal punctation and ground sculpturing, the strongly developed basal angles of the pronotum, and the larger size. *Bledius bicolor,* with the membranous lobe on the elytral margin, is large, has more strongly developed basal angles of the pronotum, has longer elytra, and usually has the elytral pubescence arranged in the same pattern as found for *ruficornis*; these characters separate it from *phytosinus.*

### 32. **Bledius jucundus**, new species

Figures 308–315, 387–389; Table 2

HOLOTYPE: Male. Utah: Summit Co.: 8.4 miles ESE Kamas, Beaver Creek, 7400 feet, June 10, 1981, collected by Lee Herman, deposited in the American Museum of Natural History.

PARATYPE: Seventy with same data as holotype, 58 deposited with holotype, two deposited in each of the following collections: British Museum (Natural History), Field Museum of Natural History, National Museum of Natural History, Smithsonian Institution, Museum of Comparative Zoology, Harvard University, Canadian National Collection, California Academy of Sciences.

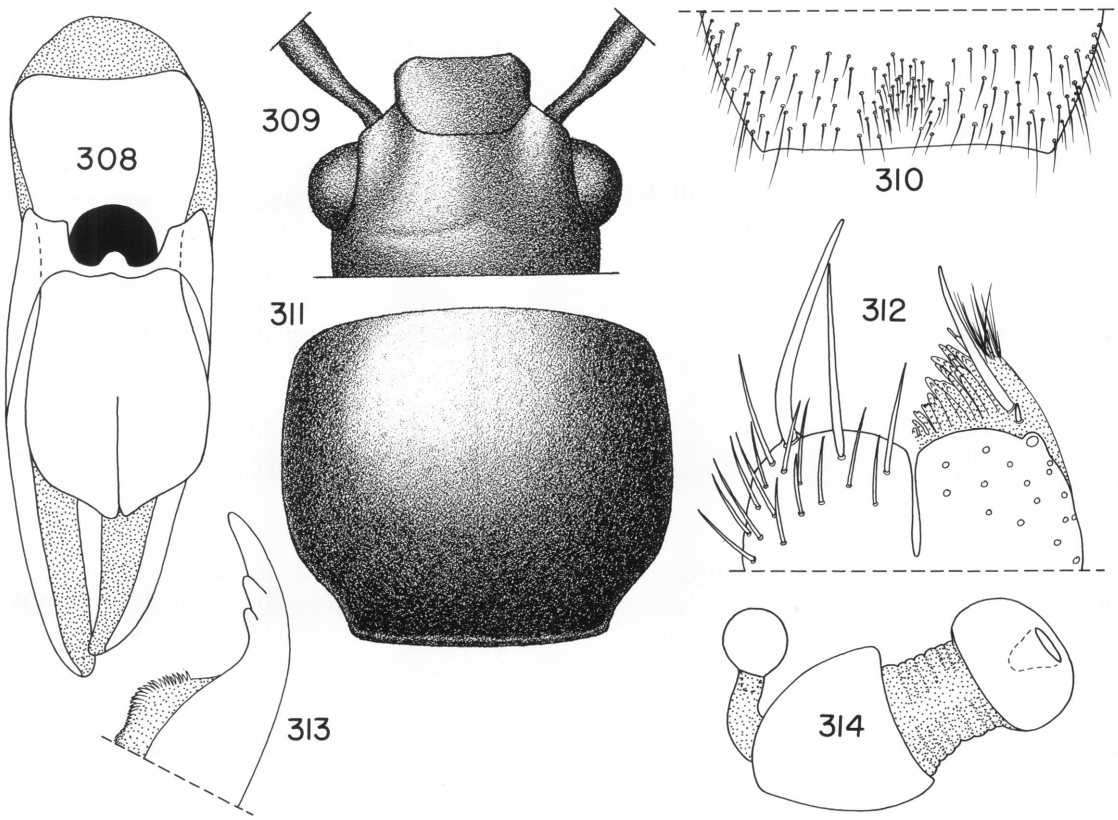
DIAGNOSIS: The males of this species can be distinguished from all others of the *annularis* group by the patch of dense pubescence on sternites VI and VII (fig. 310). The females cannot be separated from species in the *annularis* complex except by association with the male. The species has rectangulate basal angles of the pronotum (fig. 311), a small basal tooth on the tridentate (fig. 313) mandibles, shallow pronotal punctation and a membranous lobe on the posterior margin of the elytra.

DESCRIPTION: *annularis* group.

Length 4.2 to 5.5 mm.

Color black to dark reddish brown with dark reddish brown to reddish brown elytra. Elytral epipleuron concolorous with or darker than elytral disk. Legs pale reddish brown. Antennae pale reddish brown basally and dark reddish brown apically.

Dorsum (fig. 309) of head shining dully, not polished; microgranulate ground sculpturing well developed; punctation fine, shallow, and moderately dense; pubescence moderately long; dorsum with broad low tumescence and well-developed median and transverse postocular depressions. Clypeus shining dully, with well-developed microgranulate ground sculpturing; punctation feeble; anterior margin without tubercles or




FIGS. 308–314. *Bledius jucundus*. 308. Aedeagus, dorsal view. 309. Head, dorsal view. 310. Sternite VII, male. 311. Pronotum. 312. Labrum, left epipharyngeal lobe and setae of right side removed. 313. Mandible, right. 314. Spermatheca.

laminae, or with feeble, low, broad, rounded tubercles near lateral margin. Eyes moderately large. Width of head 0.72 to 0.82 mm.; interocular width 0.50 to 0.55 mm.; head width/interocular width 1.41 to 1.51. Labrum (fig. 312) with feebly reflexed, moderately deeply emarginate anterior margin. Mandibles (fig. 313) tridentate; middle denticle large; right basal denticle moderately large; left basal denticle small. Antennomeres 3 to 7 without ridge or carina encircling apex.

Pronotum 0.89 to 1.06 mm. wide; 0.73 to 0.94 mm. long; pronotal width/pronotal length 1.11 to 1.18; pronotum (fig. 311) moderately strongly convex; lateral margin gradually and shallowly curved to strongly constricted basal seventh; basal angles rectangulate; anterior angles rounded and even with anterior margin. Pronotal surface shining dully with well-developed microgranulate ground sculpturing; punctation moderately dense, fine, shallow and less prominent than to as prominent as ground sculpturing; pubescence moderately long; midlongitudinal groove shallow but distinct. Prohypomeron strongly shining, with well developed ground sculpturing. Procoxal fissure open for entire length; protrochantin exposed. Prosternal setigerous pit moderately well developed. Elytra 0.98 to 1.12 mm. long; elytral length/pronotal length 1.20 to 1.32; elytra densely and moderately coarsely punctate; pubescence moderately long and posteriorly directed; posterior margin with membranous lobe; posterior margin broadly rounded.

Abdominal tergal pubescence moderately long, moderately dense, and medioposteriorly directed; terga IV to VI moderately deeply impressed at base. Tergum VIII with slightly

transverse polygonal ground sculpturing. Sternites of female with uniformly dense pubescence; sternites III to V of male with uniformly dense pubescence; sternites VI and VII (fig. 310) of male with denser, median patch of pubescence; ground sculpturing well developed. Sternum VIII unmodified.

Spermatheca as in figure 314.

Aedeagus with microsetae on parameres (fig. 308); parameres broad.

SEXUAL DIMORPHISM: The males have a dense patch of pubescence on sternites VI and VII (fig. 310). The sternal pubescence of the females is of uniform density.

VARIATION AND DISCUSSION: The twenty-four specimens from near West Yellowstone, Montana are only tentatively considered to be conspecific with those from southern Colorado. In contrast to the males from Colorado, those from Montana have smaller, less dense, more difficult to discern patches of pubescence on sternites VI and VII. In other respects the specimens from the two states are similar.

DISTRIBUTION AND HABITAT: This species is known only from southern Colorado where it was collected at 7600 feet (2316 m.) and 8200 feet (2499 m.), southern Montana, where it was found at 6500 feet (1981 m.), and Utah where it was collected at 7300 and 7400 feet (2225 and 2256 m.). Near Kamas, Utah, the species was collected by the edge of Beaver River in muddy soil that was partially vegetated. The shore was shaded by a dense stand of bushes.

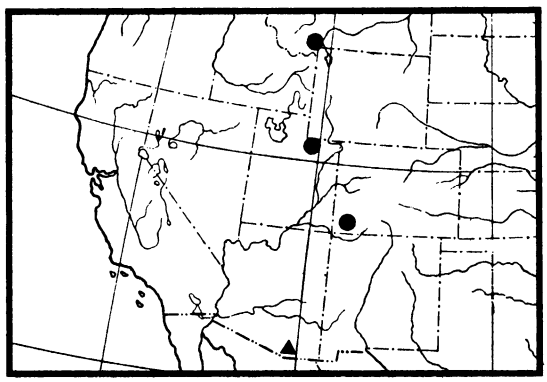


FIG. 315. Distribution of *Bledius jucundus* (dots) and *Bledius naius* (triangle) in western United States.

### 33. **Bledius naius**, new species
Figures 315–320; Table 2

HOLOTYPE: Male. Arizona: Santa Rita Mountains, Madera Canyon, July 29, 1968, collected by D. E. Bright, deposited in the Canadian National Collection.

PARATYPES: Two females with same locality data as holotype, both collected by R. H. Crandall, one on August 1–6, 1965 and deposited in the University of California, Riverside, the other on July 25, 1972 and deposited in the American Museum of Natural History.

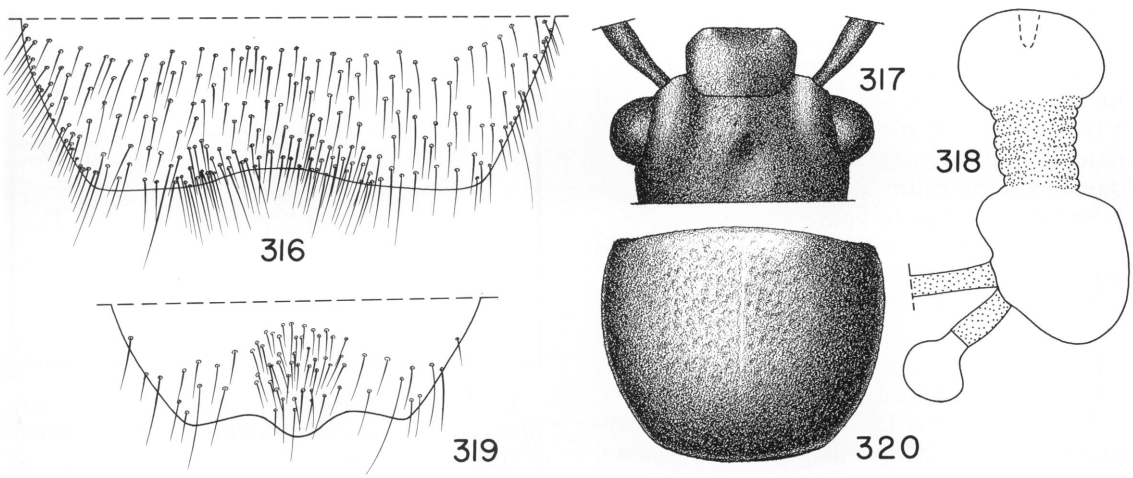
DIAGNOSIS: The males of this species are separated from those of all other species of the *annularis* group by the emargination of sternite VII that is bordered by dense pubescence (fig. 316). Other features, common to both sexes, that will aid in recognition of the species are the dense, coarse punctation and strong ground sculpturing of the pronotum (fig. 320), the rounded basal angles and salient anterior angles of the pronotum (fig. 320), and the absence of the membranous lobe of the elytra. The mandibles are tridentate in males and bidentate in females.

DESCRIPTION: *annularis* group.

Length 3.6 to 4.0 mm.

Color dark reddish brown to nearly black with slightly paler elytra; legs and antennae reddish brown.

Dorsum (fig. 317) of head shining dully, with strong microgranulate ground sculpturing; punctation dense and feeble; pubescence moderately long; dorsum with broad, median tumescence and deep, large, median postocular depression; postocular transverse depression absent. Clypeus shining dully, with well-developed microgranulate ground sculpturing; punctation feeble; anterior margin with small, broad, rounded tubercle near lateral margin. Eyes moderately large. Width of head 0.64 to 0.69 mm.; interocular width 0.44 to 0.48 mm.; head width/interocular width 1.45 to 1.47. Labrum with reflexed, feebly emarginate anterior margin. Mandibles of male tridentate, middle denticle large, basal denticle small to minute and closely associated with middle denticle; mandibles of female bidentate. Antennomeres 3 to 7 without ridge or carina encircling apex.




FIGS. 316–320. *Bledius naius*. 316. Sternite VII, male. 317. Head, dorsal view. 318. Spermatheca. 319. Sternum VIII, male. 320. Pronotum.

Pronotum 0.71 to 0.81 mm. wide; 0.59 to 0.68 mm. long; pronotal width/pronotal length 1.19 to 1.22; pronotum (fig. 320) moderately strongly convex; lateral margin gradually curved to base; basal angles moderately to feebly developed and rounded; anterior angles rounded but produced anteriorly. Pronotal surface shining dully; microgranulate ground sculpturing coarse; punctation dense, moderately deep, and as prominent as ground sculpturing; pubescence moderately long; midlongitudinal groove feebly developed. Prohypomeron polished to dully shining and with feeble to well-developed ground sculpturing. Procoxal fissure open for entire length; protrochantin exposed. Prosternal setigerous pit feeble, evident as shallow depression with a few setae. Elytra 0.66 to 0.76 mm. long; elytral length/pronotal length 1.11 to 1.13; elytra densely and coarsely punctate; pubescence moderately long and posteriorly directed; posterior margin without membranous lobe; posterior margin broadly rounded.

Abdominal tergal pubescence moderately long, moderately dense, and posteriorly directed; terga IV to VI moderately deeply impressed at base. Tergum VIII with isodiametric, polygonal ground sculpturing. Sternites of female and sternites III to VI of male with uniformly dense pubescence; sternite VII of male with median patch of long, dense pubescence adjacent to posterior margin (fig. 316); sternum VIII of male with median patch of long, dense pubescence (fig. 319); ground sculpturing of sternites feeble. Sternite VII with broad, moderately deep, median emargination of posterior margin; emargination bordered by dense pubescence.

Spermatheca as in figure 318.

Aedeagus without setae on apex of parameres; parameres broad.

SEXUAL DIMORPHISM: The males have tridentate mandibles, less distinct basal angles of the pronotum, a dense patch of pubescence on sternite VII (fig. 316) and sternum VIII (fig. 319) and an emargination of the posterior margin of sternite VII. The females have bidentate mandibles, slightly more distinct basal pronotal angles, and the abdominal sternites are unmodified.

HABITAT AND DISTRIBUTION: This species is known only from the Santa Rita Mountains in south central Arizona (fig. 315; see Appendix I for locality). Nothing is known of its habitat. It was collected at least once by black light; the other two specimens may also have come to light. I attempted to find the species in Madera Canyon, Arizona during early June 1981. Although the stream was still flowing, I was unsuccessful at finding *naius*. The three previous collections were made in late July and early August, after the

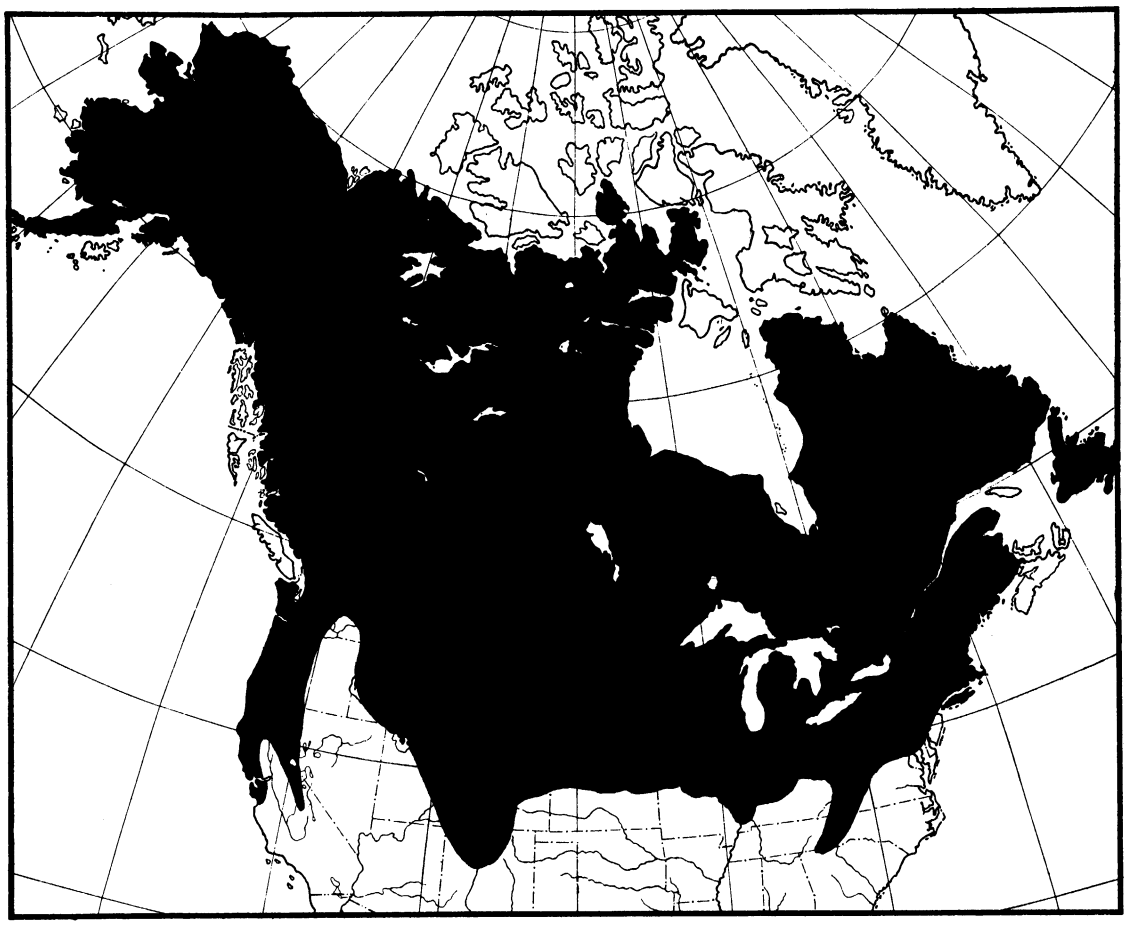


FIG. 321. Distribution of the *Bledius annularis* complex in northern North America.

summer rains; the species may be active only during that period.

ETYMOLOGY: From the Greek *nai* for yes.

### 34. *annularis* COMPLEX
Figure 321

DISCUSSION: Species of the *annularis* complex can be distinguished as a group by the presence of a shallowly emarginate labrum, tridentate mandibles, rectangulate basal angles of the pronotum, setigerous prosternal pit, procoxal fissure that is open for the entire length, protergosternal suture, and membranous lobe on the posterior margin of the elytra, and the absence of sternal modifications of the abdomen. The punctation of the head, pronotum, and elytra is coarse to fine, dense to sparse, and well defined to obscure. The microgranulate ground sculpturing of the head and pronotum is strong to fine.

The *annularis* complex is composed of species that remain after all the more objectively recognizable species have been extracted. The complex is a phenetic group and is probably polyphyletic. Although the variation of size, proportions, punctation, pubescence, sculpturing, and color is significant among the species of the group, the species cannot be objectively identified. I can sort samples of specimens to species but I am unable to communicate how I have done so. Most specimens from one locality may be sorted into homogenous groups but there are often specimens that cannot be put into any

of the groups. Among different localities it is often possible to form larger groups but as more localities are added the homogeneity diminishes, the number of specimens that cannot be placed increases, and the differences between the groups are increasingly subjective. The characters that I use, but find difficulty in communicating, are so subjective that a specimen that varies slightly from others collected at the same locality is difficult to identify. The question inevitably arises: is a specimen conspecific with but slightly divergent from the other specimens of the series or is it a different species? This same dilemma extends to samples from different localities: do two samples represent two slightly different species or one variable species? I have sought characters, or an approach that would enable me to resolve the complex in a manner that I could communicate objectively the species that I recognize subjectively. I have been unsuccessful. The problem is tantalizing and seems only to require more effort, more careful observation. I have been studying and collecting specimens of this complex at irregular intervals since 1965 always with the optimism that everything would fall into a communicable pattern. After examining 7062 North American specimens, the problem remains unsolved.

My studies show that there are nine named species in the complex plus others that are undescribed. Unfortunately, the characters that I use to identify these species are subjective and variable. The differences include subtle divergence of the coarseness, depth, density, and size of the cephalic, pronotal, and elytral punctation, degree of pronotal convexity, coarseness of the cephalic and pronotal ground sculpturing, density and length of the abdominal pubescence, luster of the pronotum and head, and color and size (and proportions) of the head, eyes, pronotum, and elytra. All of these kinds of characters have been used to distinguish the other species of *Bledius* (Herman, 1972, 1976; LeConte, 1877; Blatchley, 1910; Portevin, 1929; Lohse, 1964) but in the *annularis* complex the differences are less discrete, more subtle, more variable, and more apt to intergrade. Using those characters, most of the 7000 specimens fit into one of the species but many are intermediates that bridge the small gaps between species. With few exceptions, one species grades to another until most of the dozen forms are linked by intermediate forms. However, any two (or more) specimens chosen from this overlapping series of groups may represent startling disparity. Even the few species that evidently do not intergrade with others are separated by characters that are subtle and difficult to communicate objectively.

An approach that might prove fruitful but which I have not yet attempted is the use of multivariate statistical techniques. I plan to use this approach in my next attempt to discriminate the species of this complex. However, rather than continue in this impasse, I chose to publish the species that have been resolved with the intention of returning to this knotty problem.

In North America the nominal species that are included in the *annularis* complex are: *annularis, breretoni, honestus, languidus, mysticus, nebulosus, sinuatus, stabilis,* and *washingtonensis.* The Old World species that are included will be listed and discussed in Part IV of my work on *Bledius.*

The North American species of the *annularis* complex are found widely in the northern half of North America. The species and specimens are common in Canada and Alaska and increasingly uncommon southward. The species evidently occupy cool temperate to cold regions and in the southernmost parts of the geographical range they are found in montane areas. The southern edge of the range, as shown in figure 321, is approximate. The species may occur farther south but if they do they are likely to be uncommon and found at scattered localities.

### *Bledius annularis* LeConte

*Bledius annularis* LeConte, 1863, p. 53; 1877, pp. 226, 228. Casey, 1889, p. 62. Blatchley, 1910, p. 466. Hatch, 1957, p. 102. (Type locality: Lake Superior. Lectotype in Museum of Comparative Zoology, Harvard University. Type examined).

*Bledius languidus* Casey, 1889, p. 63. Fall, 1910, p. 112. Hatch, 1957, p. 102. (Type locality: Huntington, Oregon. Type in the National Museum of Natural History, Smithsonian Institution. Type examined. This species was placed as a junior synonym of *annularis* by Hatch, 1957).

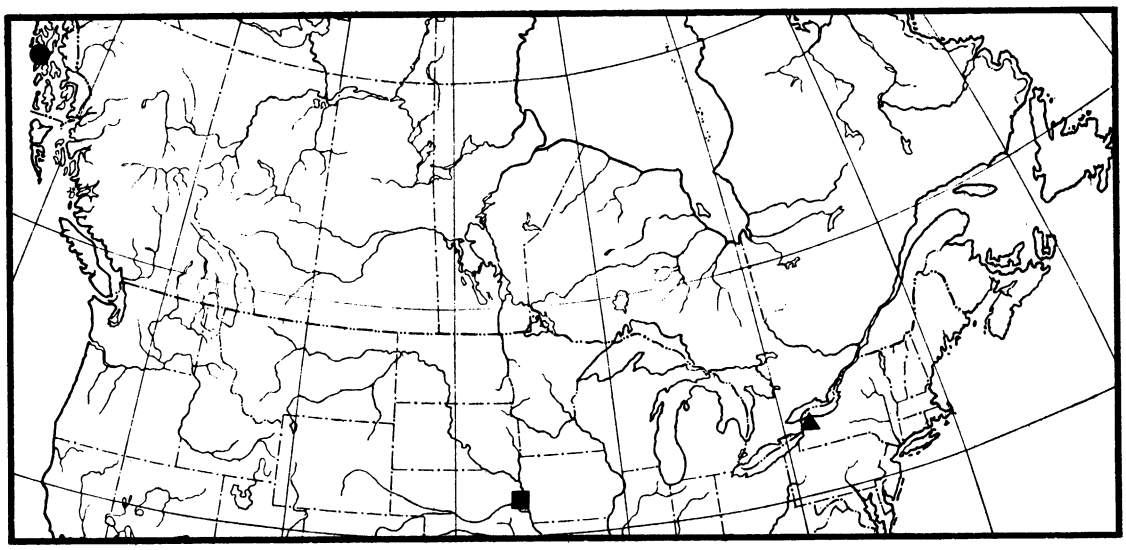


FIG. 322. Type locality of *Bledius longipennis* (dot), *Bledius fasciatus* (square), and *Bledius verticalis* (triangle) in the United States and Canada.

### *Bledius brereton*i Hatch

*Bledius brereton*i Hatch, 1957, p. 100. (Type locality: Pullman, Washington. Holotype in National Museum of Natural History, Smithsonian Institution. Type examined).

### *Bledius honestus* Casey

*Bledius honestus* Casey, 1889, p. 66. (Type locality: Catskill Mountains, Shokan, New York. Type in National Museum of Natural History, Smithsonian Institution. Type examined).

### *Bledius mysticus* Fall

*Bledius mysticus* Fall, 1910, p. 111. Hatch, 1957, p. 102. (Type locality: Washington. Type in Museum of Comparative Zoology, Harvard University. Type examined).

### *Bledius nebulosus* Casey

*Bledius nebulosus* Casey, 1889, p. 57. (Type locality: Iowa. Type in National Museum of Natural History, Smithsonian Institution. Type examined).

### *Bledius sinuatus* LeConte

*Bledius sinuatus* LeConte, 1877, p. 228. Casey, 1889, p. 59, 60. Fall, 1910, p. 111. (Type locality: Illinois. Type in Museum of Comparative Zoology, Harvard University. Type examined).

### *Bledius stabilis* Casey

*Bledius stabilis* Casey, 1889, p. 61. Blatchley, 1910, p. 465, 466. (Type locality: Allegheny County, Pennsylvania. Type in National Museum of Natural History, Smithsonian Institution. Type examined).

### *Bledius washingtonensis* Hatch

*Bledius washingtonensis* Hatch, 1957, p. 102. (Type locality: Cedar Mountain, Washington. Holotype in National Museum of Natural History, Smithsonian Institution. Type examined).

## UNKNOWN SPECIES

In addition to the unresolved species of the *annularis* complex there are three others that cannot be identified. The types are lost and the descriptions are inadequate for identification.

### *Bledius longipennis* Mäklin

Figure 322

*Bledius longipennis* Mäklin, 1852, p. 318. (Type locality: Baranof Island. "Insula Sitka" was stated to be the locality for this species, but there is now no place with this name. However, a map in Mannerheim (1853) indicates that Sitka Island is what is now called Baranof Island. Holotype is supposed to be in the Museum Zoolo-

gicum Universitatis of Helsinki, Helsinki, Finland, but was not found).

DISCUSSION: The identity of *longipennis* Mäklin is problematical. The type is supposed to be deposited in the Museum Zoologicum Universitatis of Helsinki, but Dr. H. Silfverberg reports in letters 1967, 1976, that he was unable to find it or any notes pertaining to it.

To resolve this problem, I spent several days on Baranof Island in July 1980, attempting to collect *longipennis* and to learn what other species of *Bledius* occur there. I searched the shores of all the lowland streams and rivers that I could reach; some of them must have been accessible to Russian collectors during the nineteenth century. Although I found what appeared to be suitable sandy habitats along the Indian and Starrigavan rivers, I was unsuccessful at collecting either *longipennis* or any other species of *Bledius*. My work was hampered by the continual rain because evidence of burrow construction was obscured.

*Bledius longipennis* cannot be identified from the original description. LeConte (1877) applied the name to a specimen from British Columbia, but did not indicate the basis of his interpretation of Mäklin's species. Subsequent authors (Casey, 1889; Hatch, 1957) and others have followed LeConte's usage and unknowingly have included two similar species under the name *longipennis*. Of the two, *nardus* is more similar to Mäklin's description of *longipennis* in that its size (2.6–4.5 mm.) includes that given for *longipennis* by Mäklin (1⅔ lines or 3.5 mm.), whereas the other species *zophus* is larger (4.1–5.5 mm.). However, only *zophus* occurs sufficiently far north to potentially occur on Baranof Island. The type locality of *longipennis* (fig. 322) is at about 57°N (Sitka—Baranof Island). *Bledius zophus* (fig. 115) is found to about 60°N (Swift River, Yukon Territory), but *nardus* (fig. 126) has been collected only to about 49°N (Creston, British Columbia). Using the available information on *longipennis* there is no defensible means of selecting *nardus, zophus,* or any other species of *Bledius* as representing Mäklin's *longipennis*. In lieu of finding the type of *longipennis,* collecting species of *Bledius* from Baranof Island that fit Mäklin's description, or obtaining other new information, I will consider *Bledius longipennis* Mäklin to be an unidentified species.

### *Bledius fasciatus* (Say)

Figure 322

*Oxytelus fasciatus* Say, 1823, p. 156. (Type locality: Engineer Cantonment Nebraska: north of Omaha, Missouri River, [41°25′N, 95°43′W]. Holotype apparently lost).

*Bledius fasciatus* (Say): LeConte, 1863, p. 53.

DISCUSSION: I am unable to establish the identity of *Bledius fasciatus*. The species was described in *Oxytelus* (Say, 1823) and transferred to *Bledius* by Erichson (1840, p. 780) who neither saw the species nor indicated his reasons for moving it. LeConte (1859, p. 100) accepted Erichson's opinion and later (1863, p. 53) suggested that "It is possible that *Oxytelus fasciatus* Say may be a variety of this species" [*Bledius divisus*]. However, although in his revision of North American *Bledius* LeConte (1877) redescribed four (*armatus, cordatus, emarginatus,* and *pallipennis*) of the six species of *Bledius* that had been described by Say (1823, 1834), he omitted two, *melanocephalus* and *fasciatus*. Except in catalogues, *Bledius fasciatus* has not been cited by subsequent authors. *Bledius melanocephalus* can be identified now (Herman, 1976).

From among the characteristics of *fasciatus* cited by Say (1823) I interpret and summarize in the following paragraphs those that I regard to be most relevant for identification of the species.

> The head is black, the pronotum is piceous black; the elytra are pale yellowish with a dusky stripe at the interior base and suture and the abdomen is reddish with a definite dusky band at tip of each tergum. Mandibles piceous.
>
> The head is impunctate and covered with munite granules. The pronotum has rather large distinct punctures and the posterior margin is rounded and the basal angles absent. The elytra have numerous rather large distinct punctures.
>
> The length is less than three-twentieths of an inch [3.8 mm.].
>
> The species was found near the Engineer Cantonment.

LeConte's suggestion that *fasciatus* is a variety of *Bledius divisus* (now *tarandus*) can be

eliminated from consideration immediately because the elytra of *tarandus* are black with only a small yellowish (or reddish) spot, the basal angles of the pronotum are strongly angulate, the pronotal and elytral punctation is fine and the abdomen is black.

The Engineer Cantonment, which is the type locality (fig. 322), was about 20 miles north of Council Bluffs, Iowa, on the west shore of the Missouri River in Nebraska, at 41°25′03″N and 95°43′53″W (Bell, 1957, p. 85 and map; James, 1905, p. 262).

Among the species that occur in or near eastern Nebraska are the following: *Microbledius forcipatus,* and *M. playanus,* and *Bledius analis, assimilis, bellicus, coulteri, emarginatus, flavipennis, gravidus, ineptus, mandibularis, melanocephalus, nitidicollis, notialus, pallipennis, rotundicollis, rubiginosus, semiferrugineus, strenuus, suturalis,* and *tau.*

Based on size *Microbledius playanus* (2 to 3.3 mm.), *M. forcipatus* (1.7 to 2.6 mm.), *Bledius melanocephalus* (2.1 to 3.2 mm.) and *B. emarginatus* (1.8 to 2.7 mm.) can be eliminated as being too small and *B. bellicus* (4.7 to 7 mm.), *gravidus* (5 to 6.5 mm.), *mandibularis* (6 to 11 mm.), *notiatus* (4.5 to 7 mm.), *pallipennis* (8 to 11 mm.), *rotundicollis* (5.5 to 9 mm.), *rubiginosus* (4 to 6.5 mm.), *semiferrugineus* (4 to 7 mm.), and *strenuus* (4 to 8 mm.) are eliminated as being too large.

The seven remaining species that fall within the geographic and size range of *fasciatus* are: *analis* (3.5 to 4.8 mm.), *assimilis* (3.4 to 4.1 mm.), *flavipennis* (3.5 to 6.0 mm.), *ineptus* (3.5 to 5.5 mm.), *nitidicollis* (3.5 to 4.5 mm.), *suturalis* (3.0 to 4.1 mm.), and *tau* (3.6 to 5.0 mm.). These seven species do not fit the description of *fasciatus* in various ways. *Bledius analis* has a notable, black abdominal tip, the elytra are reddish, and the pronotum has basal angles. *Bledius assimilis* has reddish orange elytra and distinct basal angles. *Bledius suturalis* has fine pronotal punctation and the pronotal basal angles are well developed. *Bledius flavipennis, ineptus, nitidicollis,* and *tau* all have well-developed protonal basal angles.

Since Say mentions no unique or particularly distinctive characteristics for *fasciatus* it is difficult to know which species he was describing.

### *Bledius verticalis* Notman
Figure 322

*Bledius verticalis* Notman, 1921, p. 148. (Type locality: Westfield, Chautauqua County, New York. Holotype apparently lost).

DISCUSSION: I have been unable to find the holotype of this species which was supposed to be deposited in the Staten Island Museum of Art and Science, New York City. I have also been unsuccessful in deducing the identity of *verticalis* from Notman's description.

I have extracted and interpreted from Notman's description the following characters as being those most salient to the identification of *verticalis.* The form is somewhat robust with a length of 5.5 mm. The color is black and the elytra bright rufous with a black stripe along the base and narrowly along the suture. The head has well-developed postocular median and transverse grooves. The prothorax has rounded scarcely distinct basal angles and coarse, dense punctation on the dorsal surface. The elytra are one-third longer than the thorax (elytral length/pronotal length 1.33) and the abdomen is broader than the elytra.

Excluding species that I have grouped into the unresolved *annularis* complex there are nine species that are found or may be found near the type locality of *verticalis* which is near the southeastern shore of Lake Erie (fig. 322). The nine are *confusus, emarginatus, omega, ruficornis, suturalis, tarandus, tau, turgidus,* and *viriosus.*

*Bledius confusus, emarginatus,* and *tarandus* are eliminated; they are all 4 mm. or less in length. Further, *confusus* has not been found as far east as Lake Erie, nor *tarandus* as far south. *Bledius tarandus* has black elytra with a reddish or yellowish lateroapical spot; the elytra of *verticalis* are bright rufous with blackish along the base and suture. *Bledius confusus* has indistinct pronotal basal angles and dense pronotal punctation but is too small and has dark elytra.

*Bledius ruficornis* is nearly the right size but the species has been obtained only once in New York (along the Hudson River just north of New York City) and these individuals were among the smaller specimens of the species, about 3 to 4 mm. long. The procoxal fissure of *ruficornis* is closed near the dorsal edge;

the fissure of *verticalis* is said to be widely open.

*Bledius suturalis* has been reported from the northern shores of lakes Superior and Huron but individuals of these populations of *suturalis* are about 2.5 to 3.5 mm. long. The elytra of *suturalis* (from the east) are yellowish brown laterally with a broad, dark sutural stripe, not bright rufous with a narrow sutural stripe.

*Bledius viriosus* is nearly the right size, the largest individuals being just over 5 mm., the species is robust, the color black to dark reddish brown, the pronotal punctation is dense, and the elytra about one third longer than the prothorax but the species has rectangulate, not rounded, pronotal basal angles, has dark, not bright rufous elytra, and the procoxal fissure is closed on the dorsal portion, not widely open.

*Bledius omega,* which has been found near lakes Superior and Michigan, is too small (3.4 to 4.5 mm.), the elytra too pale (bicolored yellowish brown and reddish brown to black), the basal angles of the pronotum too rectangulate, the abdomen too narrow, and the elytra too long (table 2) to be *verticalis.*

*Bledius tau* is found near all the Great Lakes and at 3.6 to 5 mm. falls near the size range of *verticalis.* Further similarities include the widely open procoxal fissures, and the well-developed postocular cephalic depression and reddish spot on the lateral side of the elytra of some individuals. However, in contrast to *verticalis, tau* has rectangulate, not rounded, basal angles of the pronotum, a broad, not narrow, elytral sutural stripe, long elytra (more than one half longer than the pronotum), and an abdomen that is narrower, not broader than the elytra.

The last candidate is *turgidus* which at first consideration seems to be the most likely. The species is robust, has bright rufous elytra that usually have a narrow black stripe along the base and suture, has well-developed transverse and median postocular grooves, has dense, coarse pronotal punctation, and an abdomen that is often as wide as or wider than the elytra. The size of *turgidus* (4.7 to 8.0 mm.) includes that of *verticalis* (5.5 mm.). Unfortunately, Notman indicates that the basal angles of the pronotum of *verticalis* are rounded and scarcely distinct and that the procoxal fissure is widely open. *Bledius turgidus* has characteristically well-developed, strongly angulate basal angles of the pronotum, and procoxal fissures that are closed dorsally.

*Bledius verticalis* could be one of the species included in the *annularis* complex but the rounded, indistinct basal angles of the pronotum of *verticalis* seem to preclude it from that group the members of which have well-developed basal angles. Species of this complex from the eastern United States are about 3 to 4 mm. long.

It seems unlikely that *verticalis* represents a species that I have not studied but this may be so.

### *aequatorialis* Group—A New Species

Since delimiting this group, I have collected specimens of an interesting new species that lives on the coast of Texas.

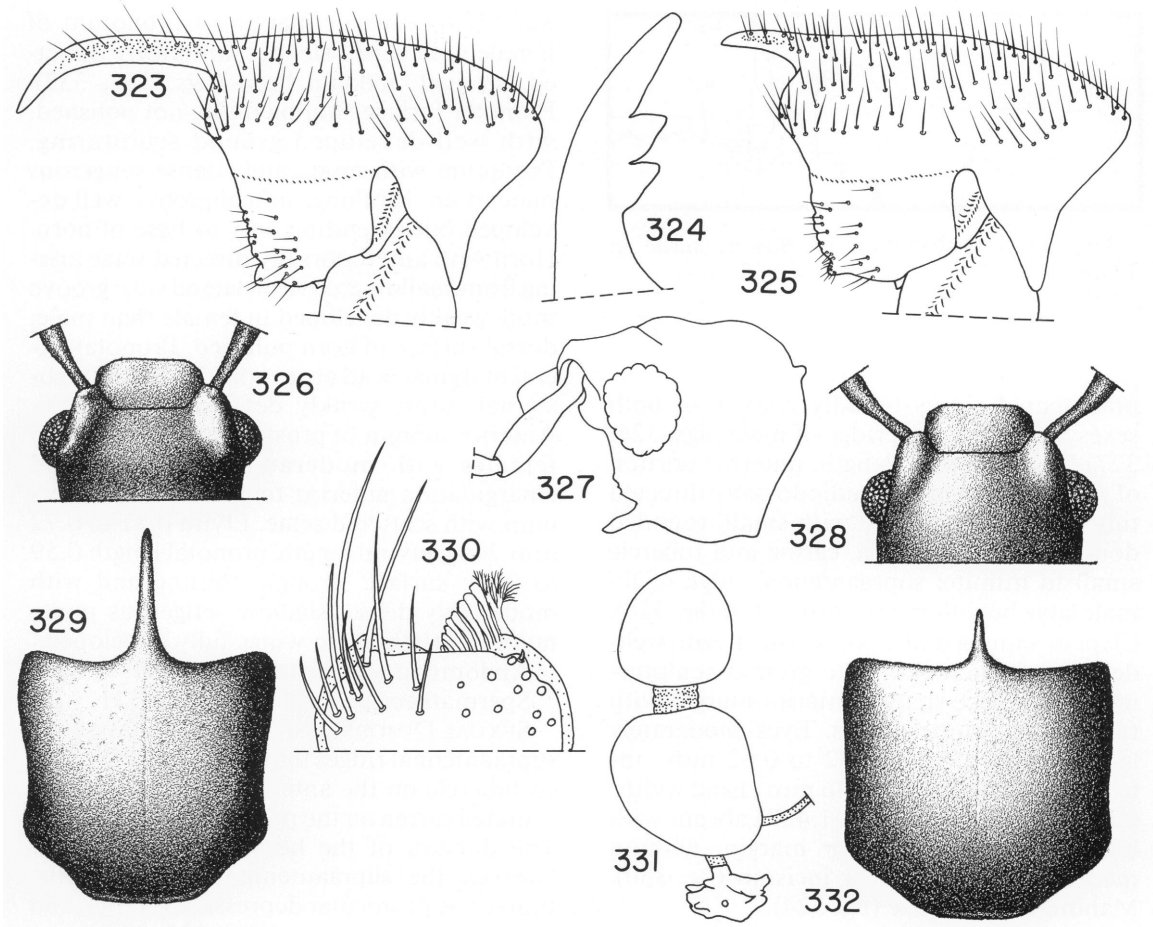
#### 35. **Bledius susae**, new species

Figures 323–333, 411–414; Table 3

Holotype: Male. Texas: Aransas County: 4 miles S Rockport, route 35, April 27, 1981, sand flat near road, collected by Lee Herman, deposited in the American Museum of Natural History.

Paratypes: Seventy males, 50 females, with same data as holotype. 64 males and 44 females deposited with the holotype; one male and one female deposited in each of the following collections: British Museum (Natural History), Field Museum of Natural History, National Museum of Natural History, Smithsonian Institution, Museum of Comparative Zoology, Harvard University, California Academy of Sciences, Canadian National Collection.

Diagnosis: This species can be separated from all the species in the *aequatorialis* group by the tridentate mandibles (fig. 324) and the absence of the pronotal lateral marginal bead (figs. 323, 325). Further, the males are distinguished by their rudimentary supraantennal horns (figs. 326, 327); the females are




FIGS. 323–332. *Bledius susae.* 323. Prothorax, lateral view, male. 324. Mandible, left, apex. 325. Prothorax, lateral view, female. 326. Head, dorsal view, male. 327. Head, lateral view, male. 328. Head, dorsal view, female. 329. Pronotum, male. 330. Labrum, setae of right side and epipharyngeal lobe of left side removed. 331. Spermatheca. 332. Pronotum, female.

unique in their possession of a pronotal horn (figs. 325, 332). See revised key to species of the *aequatorialis* group under Discussion following the Description.

DESCRIPTION: *aequatorialis* group (for characters see Herman, 1972, p. 156).

Length 3.3 to 4.0 mm.

Color reddish brown and yellowish brown. Head and abdomen dark reddish brown. Prothorax reddish brown. Elytra and legs yellowish brown.

Dorsum of head (figs. 326, 328) shining dully, not polished, with well-developed microgranulate ground sculpturing; male with shallow setigerous punctation only on portion of dorsum posterior to supraantennal ridges, setigerous punctation absent between supraantennal ridges; dorsum of female with shallow setigerous punctation between supraantennal ridges; dorsum of head of male (fig. 326) with broad, shallow, transverse postocular impression; dorsum of female (fig. 328) with postocular impression narrower but deeper than that of male; depression not bi-impressed in either sex and without midlongitudinal ridge; space between su-

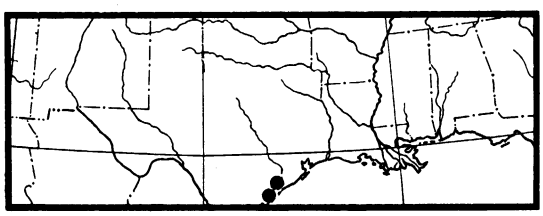


FIG. 333. Distribution of *Bledius susae* in Texas.

praantennal ridges broadly convex in both sexes. Supraantennal ridge of male (figs. 326, 327) high for entire length; anterior portion of ridge with pointed mediodorsally directed tubercle, posterior edge with small, rounded dorsally directed carina, carina and tubercle small to minute; supraantennal ridge of female large but otherwise unmodified (fig. 328). Clypeus shining dully, not polished, with well-developed microgranulate ground sculpturing; pubescence sparse; anterior margin with tubercles or tumescences. Eyes moderately large. Width of head 0.52 to 0.62 mm.; interocular width 0.38 to 0.46 mm.; head width/interocular width 1.28 to 1.40. Labrum with broadly rounded anterior margin, without median emargination or incision (fig. 330). Mandibles tridentate (fig. 324).

Pronotum of male 0.81 to 1.06 mm. long.[7] Pronotum of female 0.66 to 0.82 mm. long; pronotum 0.58 to 0.69 mm. wide; pronotal width/pronotal length of male 0.64 to 0.74 and female 0.81 to 0.89; pronotum of male moderately convex and with long pronotal horn (figs. 323, 329); pronotum of female moderately convex but less strongly so than male and with short pronotal horn (figs. 325, 332); pronotum (figs. 329, 332) pentagonally shaped, anterior four-fifths of lateral margins broadly and shallowly concave and basal fifth strongly convergent; basal angles distinct; anterior margin of pronotum broadly and shallowly emarginate; anterior margin of pronotum of male with long, slender, anteriorly directed, ventrally curved, median horn (figs. 323, 329); anterior margin of pronotum of female with short, slender, anteriorly directed, straight, median horn (figs. 325, 332). Pronotal surface shining dully, not polished, with well-developed ground sculpturing. Pronotum with moderately dense setigerous punctation. Midlongitudinal groove well developed but extending only to base of horn. Horn with anterodorsally directed setae arising from shallow groove on lateral side; groove more weakly developed in female than male; dorsal surface of horn polished. Pronotal lateral marginal bead absent (fig. 323). Protergosternal suture weakly developed (fig. 323). Anterior margin of prosternum of males and females with moderately deep, rounded emargination anterior to procoxae; prosternum with scattered setae. Elytra 0.51 to 0.72 mm. long; elytral length/pronotal length 0.59 to 0.92; surface strongly shining and with moderately dense, shallow setigerous punctation. Metathoracic wings fully developed.

Abdominal segments unmodified.

Spermatheca as shown in figure 331.

SEXUAL DIMORPHISM: The males have large supraantennal ridges that have a small, pointed tubercle on the anterior end and a small, rounded carina on the posterior end (fig. 326). The dorsum of the head lacks pubescence between the supraantennal ridges and the transverse postocular depression is broad and shallow. The pronotum (figs. 323, 329) has a long, median, ventrally curved horn and the pronotum is moderately convex.

The female has unmodified supraantennal ridges (fig. 328). The dorsum of the head has moderately dense pubescence between the supraantennal ridges and the transverse postocular groove is narrower and deeper than that of the male. The pronotum (figs. 325, 332) has a short, slender, median horn and the surface is weakly convex.

DISTRIBUTION AND HABITAT: This species is known from one locality in Texas near the coast of the Gulf of Mexico (fig. 333; see Appendix I for localities). It was collected from open, unvegetated sand flats adjacent to the road at some distance from the ocean.

DISCUSSION: This species possesses all the features that define the *aequatorialis* group (Herman, 1972, p. 156). The female of *susae*

[7] Pronotal length includes the length of the horn.

is unique in that it is the only one of all the species of *Bledius* that possesses a pronotal horn. There are a number of groups of species in the Old World (but only one group in the New World) in which the male has a pronotal horn but in no other species does the female have a pronotal horn.

The species may include both flying and flightless individuals. The first specimen that was captured was attracted to a black light. The flying wings and elytra of specimens in a long series vary in length.

ETYMOLOGY: I dedicate this beautiful species (see frontispiece) with its unique female to my dear friend Sue.

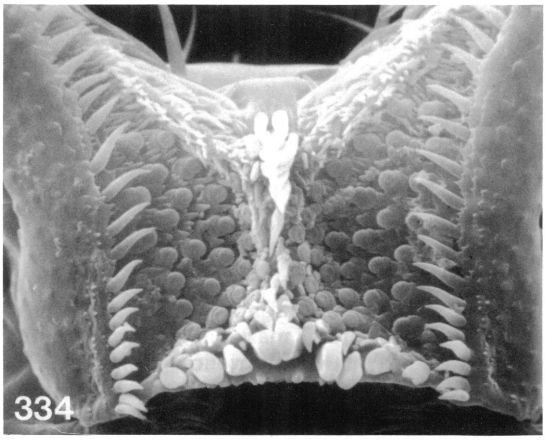
REVISED KEY TO THE SPECIES OF THE *AEQUATORIALIS* GROUP[8]

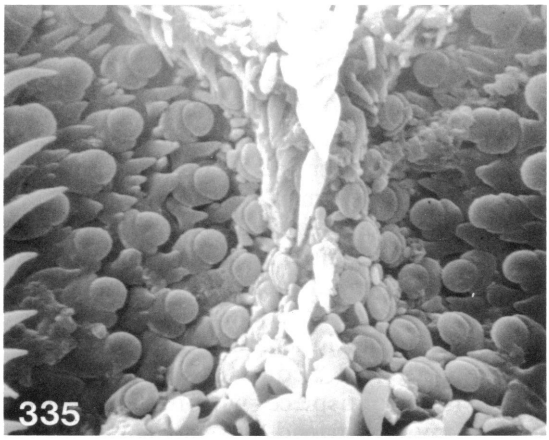
1. Mandibles bidentate ..... 2
   Mandibles tridentate ..... 3

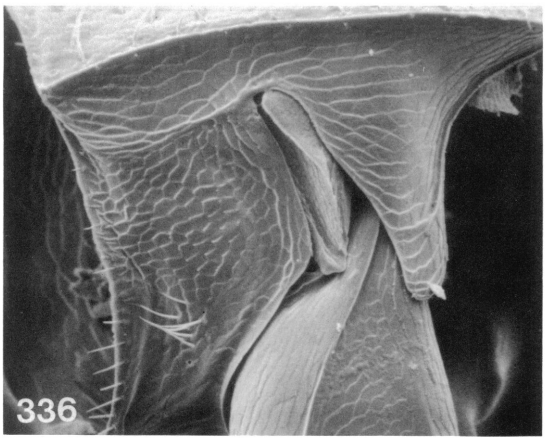
2(1). Pronotal lateral marginal bead present at least on the anterior half ..... *aequatorialis*
   Pronotal lateral marginal bead absent ..... *ceratus*

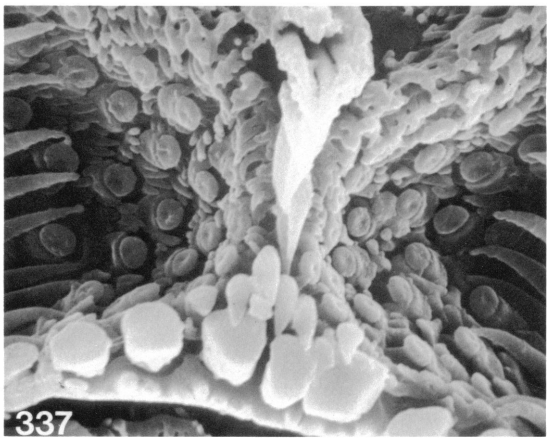
3(1). Pronotal lateral marginal bead present; female without pronotal horn ..... *beattyi*
   Pronotal lateral marginal bead absent (fig. 323); female with pronotal horn (fig. 332) ..... *susae*

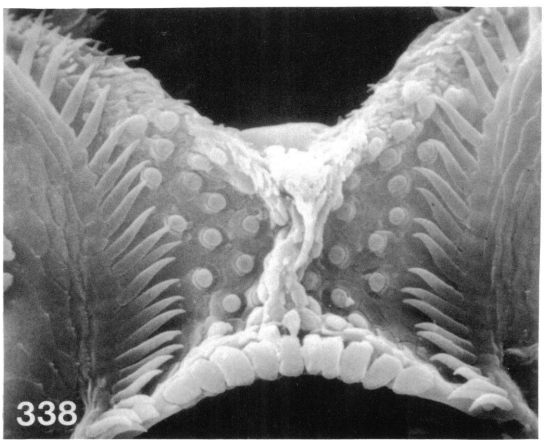
[8] (see Herman, 1972, p. 154)

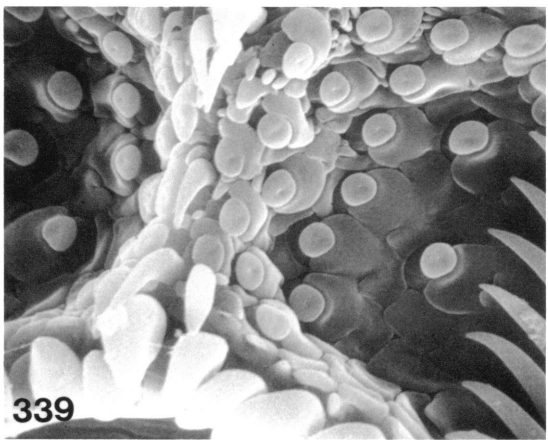


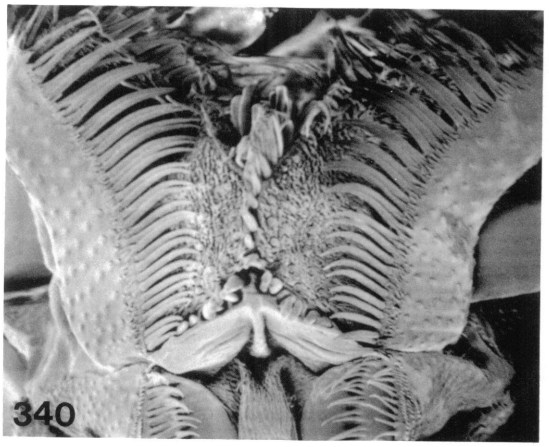



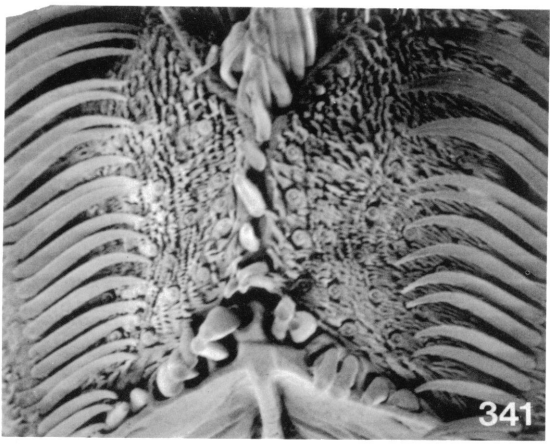



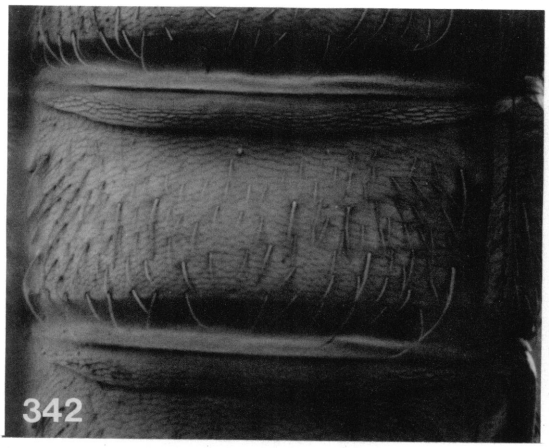

FIGS. 334–336. *Bledius emarginatus.* 334. Hypopharynx, general aspect, ×923. 335. Hypopharynx, central region, ×1420. 336. Prothorax, lateral view, ×185.

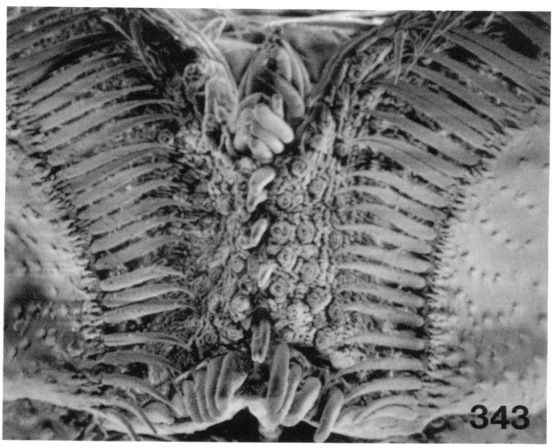
FIG. 337. *Bledius wudus,* hypopharynx, general aspect, ×1704.

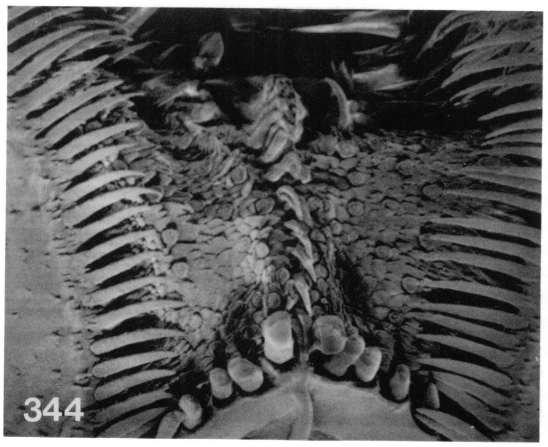
FIGS. 338–339. *Bledius cognatus.* Hypopharynx. 338. General aspect, ×852. 339. Central region, ×1810.



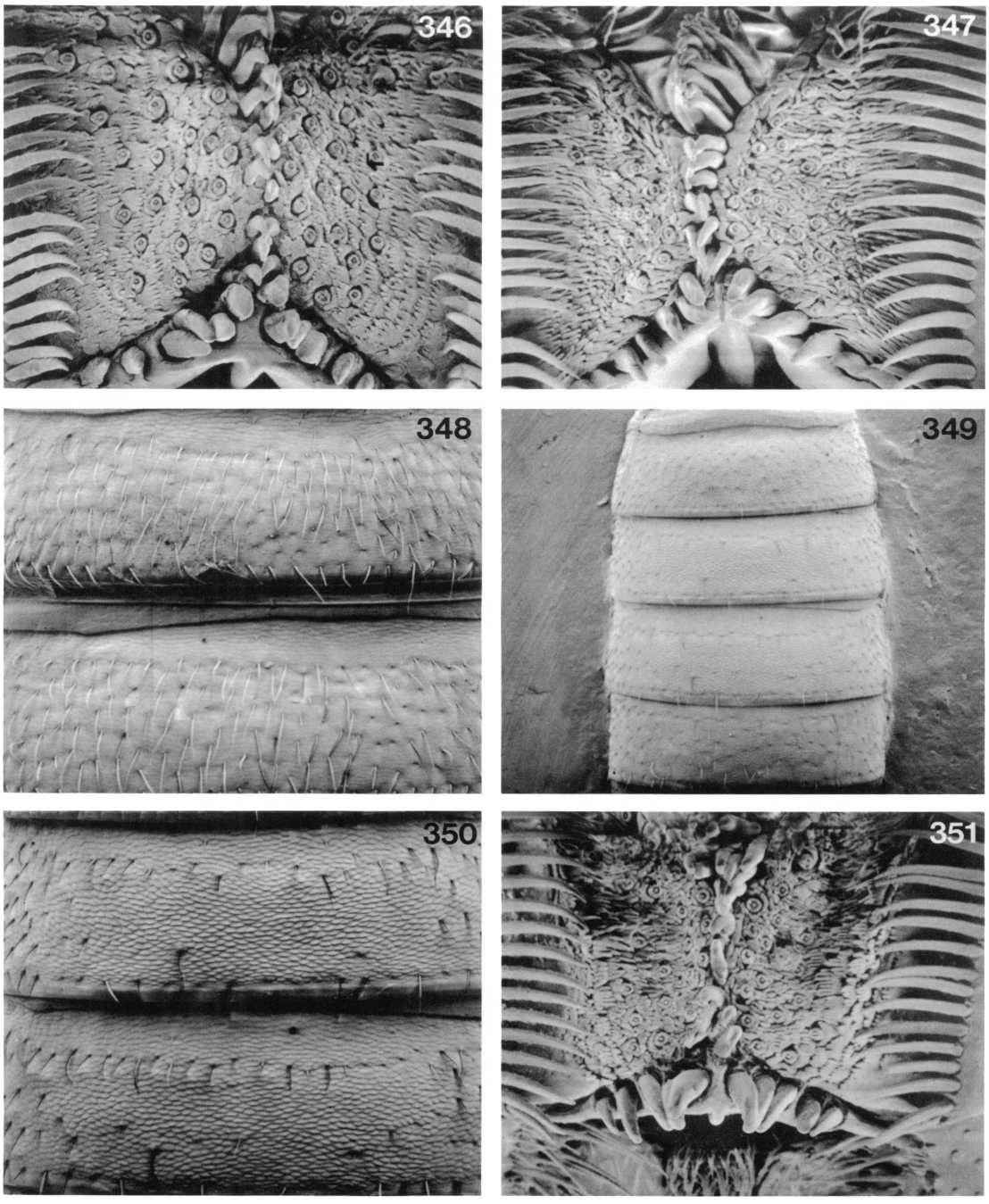





FIGS. 340–342. *Bledius albonotatus.* 340. Hypopharynx, general aspect, ×355. 341. Hypopharynx, central region, ×710. 342. Abdominal tergum V, ×71.

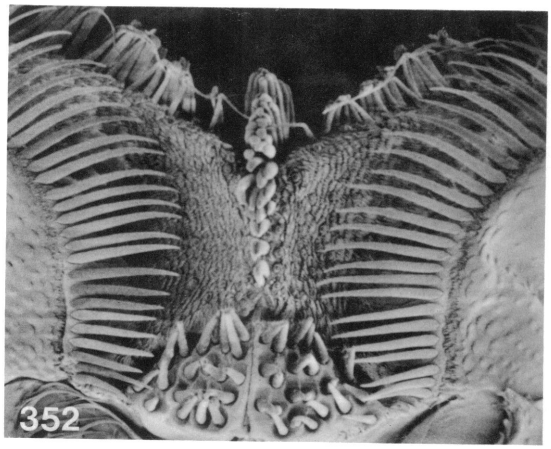
FIG. 343. *Bledius tarandus,* hypopharynx, general aspect, ×710.

FIGS. 344–345. *Bledius suturalis,* hypopharynx. 344. General aspect, ×735. 345. Central region, ×1420.

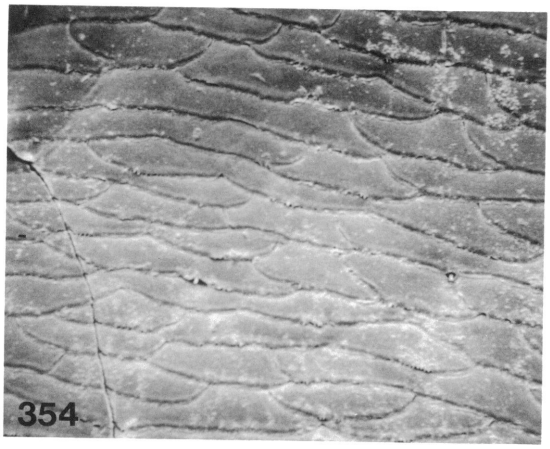


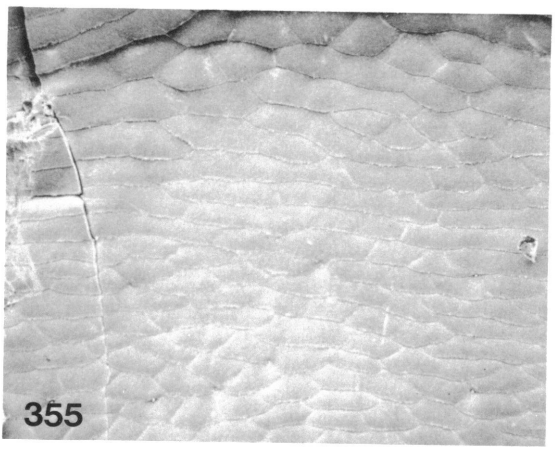

FIGS. 346–348. *Bledius diagonalis.* 346, 347. Hypopharynx, general aspect, ×710. 348. Abdominal sternites V and VI, ×71.

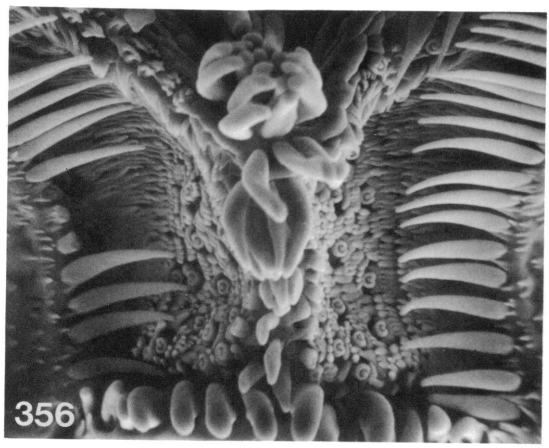
FIGS. 349–351. *Bledius venus.* 349. Abdominal sternites III to VI, ×36. 350. Abdominal sternites IV and V, ×71. 351. Hypopharynx, general aspect, ×710.

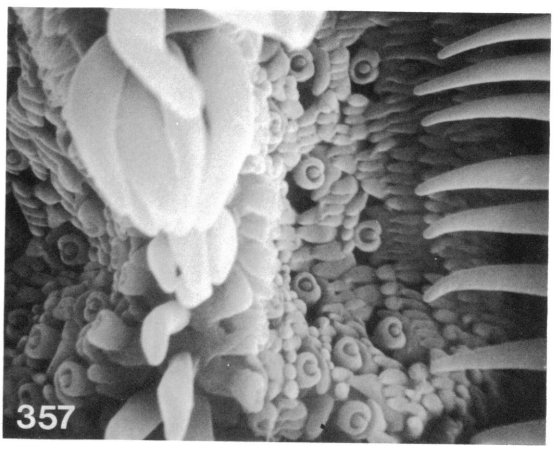






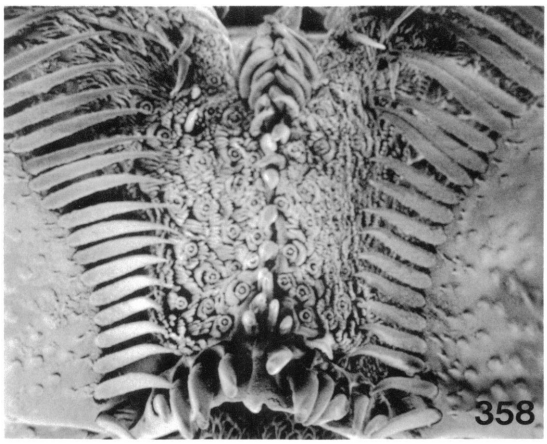



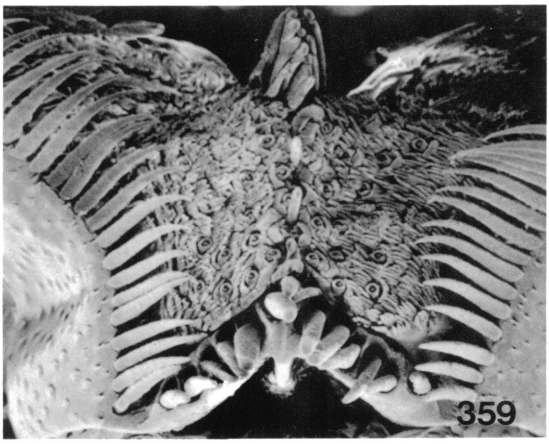



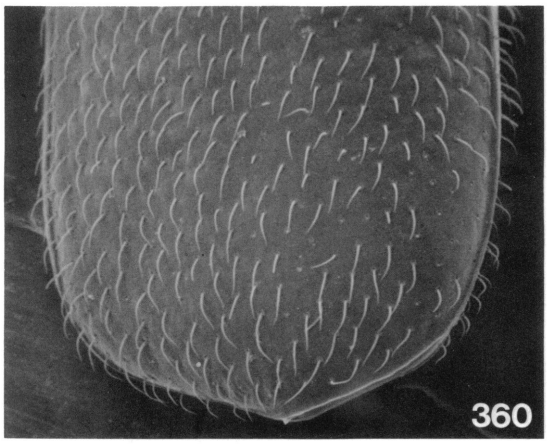




FIGS. 352–354. *Bledius zophus.* 352. Hypopharynx, general aspect, ×355. 353. Hypopharynx, central region, ×1420. 354. Tergum VIII, ×355.

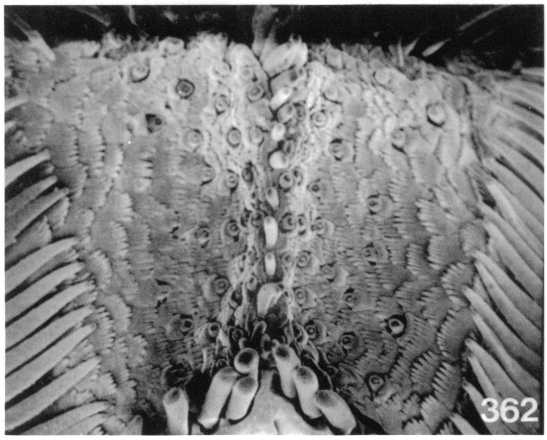
FIGS. 355–357. *Bledius nardus.* 355. Tergum VIII, ×355. 356. Hypopharynx, general aspect, ×923. 357. Hypopharynx, central region, ×1882.

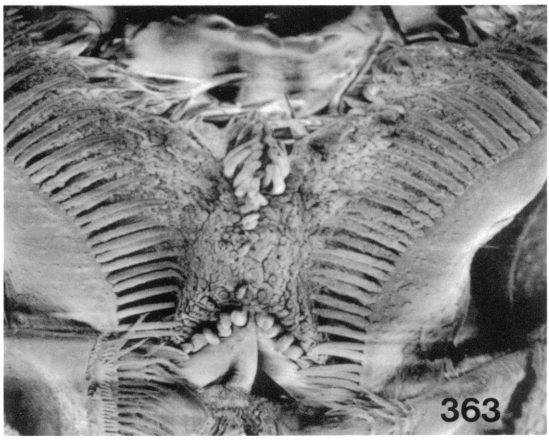




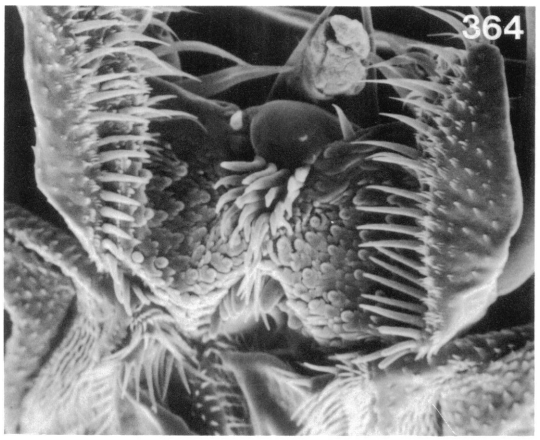


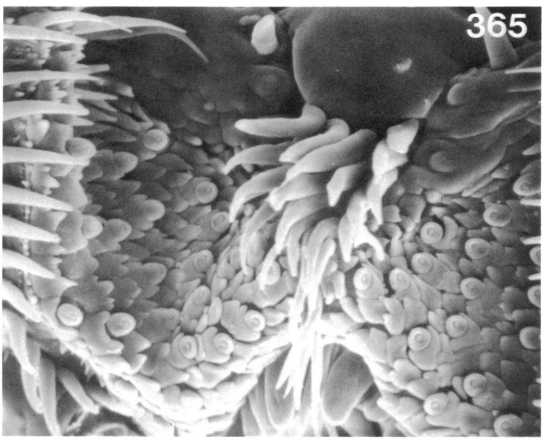



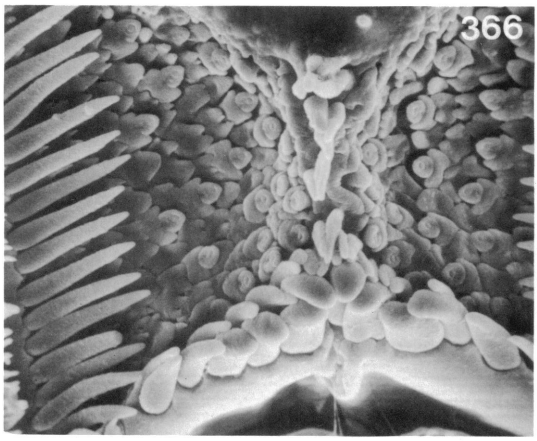

FIGS. 358–361. *Bledius omega.* 358, 359. Hypopharynx, general aspect, ×710. 360. Elytron, right, ×91. 361. Elytral apex, ×447.

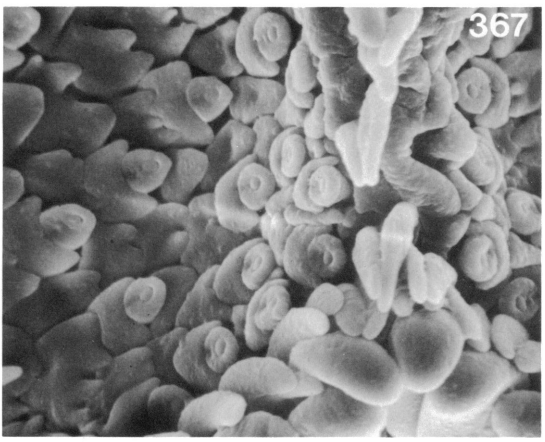
FIG. 362. *Bledius tau,* hypopharynx, general aspect, ×710.

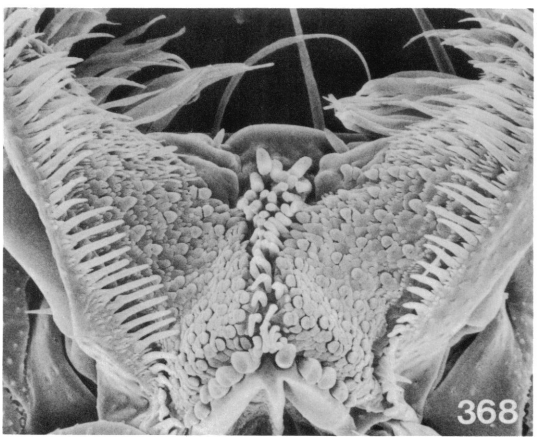
FIG. 363. *Bledius parvicollis,* hypopharynx, general aspect, ×355.

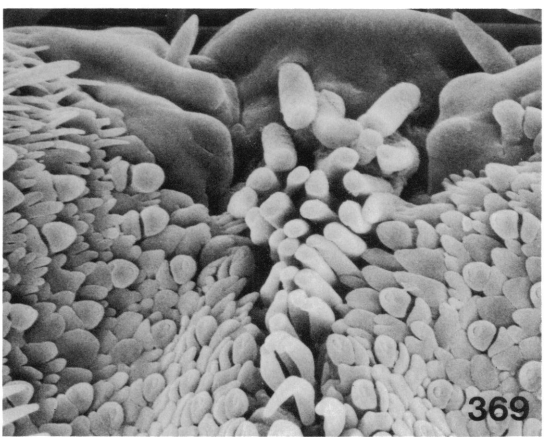


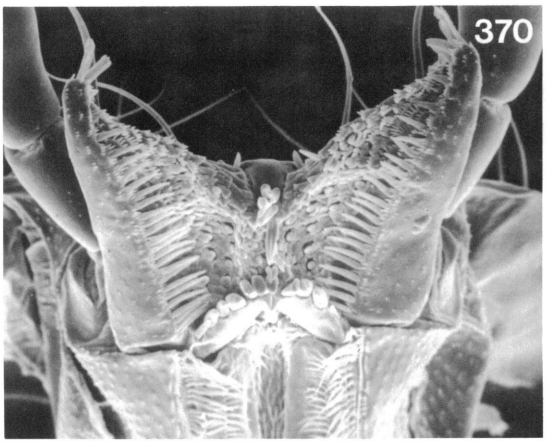



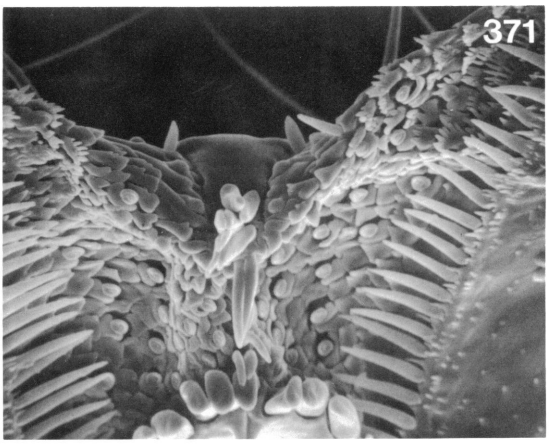



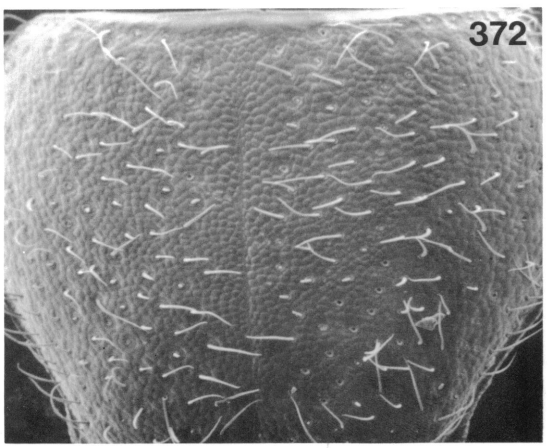



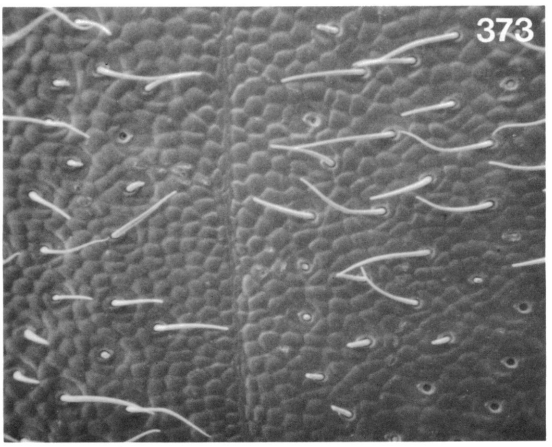



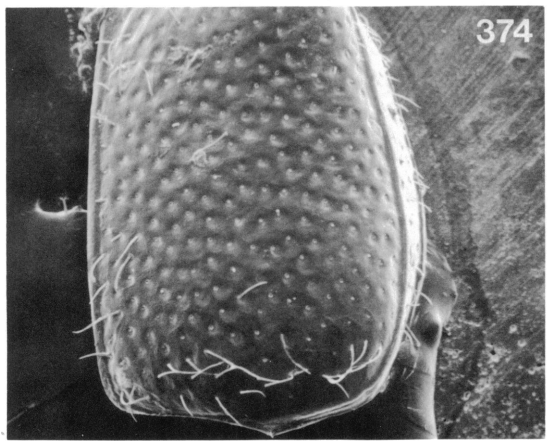

FIGS. 364–365. *Bledius laticollis,* hypopharynx. 364. General aspect, ×426. 365. Central region, ×852.
FIGS. 366–367. *Bledius viriosus,* hypopharynx. 366. General aspect, ×852. 367. Central region, ×1704.
FIGS. 368–369. *Bledius melanocolus,* hypopharynx. 368. General aspect, ×426. 369. Central region, ×1384.

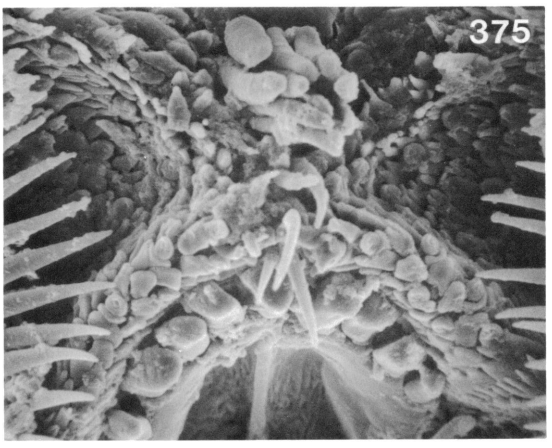


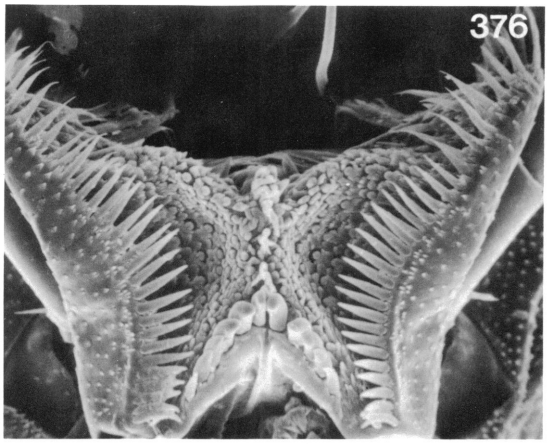



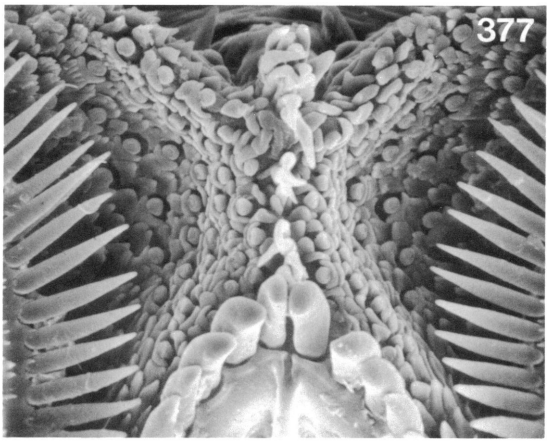



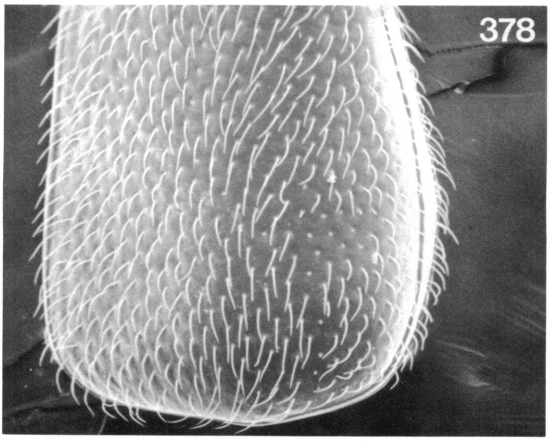



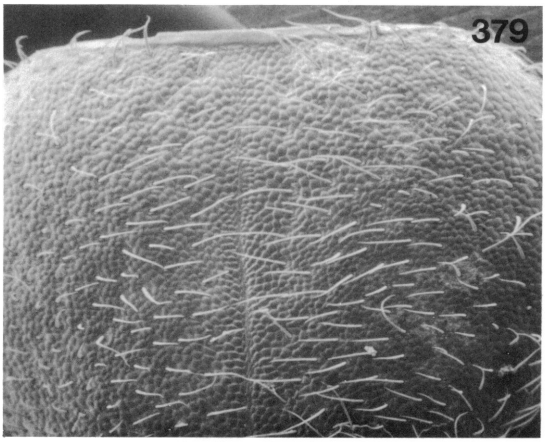



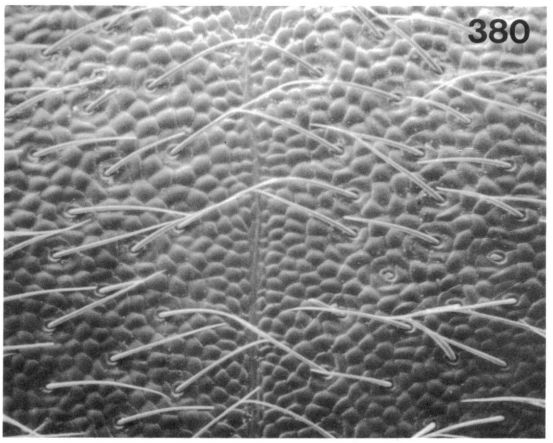

FIGS. 370–374. *Bledius habrus.* 370. Hypopharynx, general aspect, ×337. 371. Hypopharynx, central region, ×675. 372. Pronotum, ×92. 373. Pronotum, central region, ×185. 374. Elytron, right, ×64.
FIG. 375. *Bledius villosus,* hypopharynx, central region, ×799.



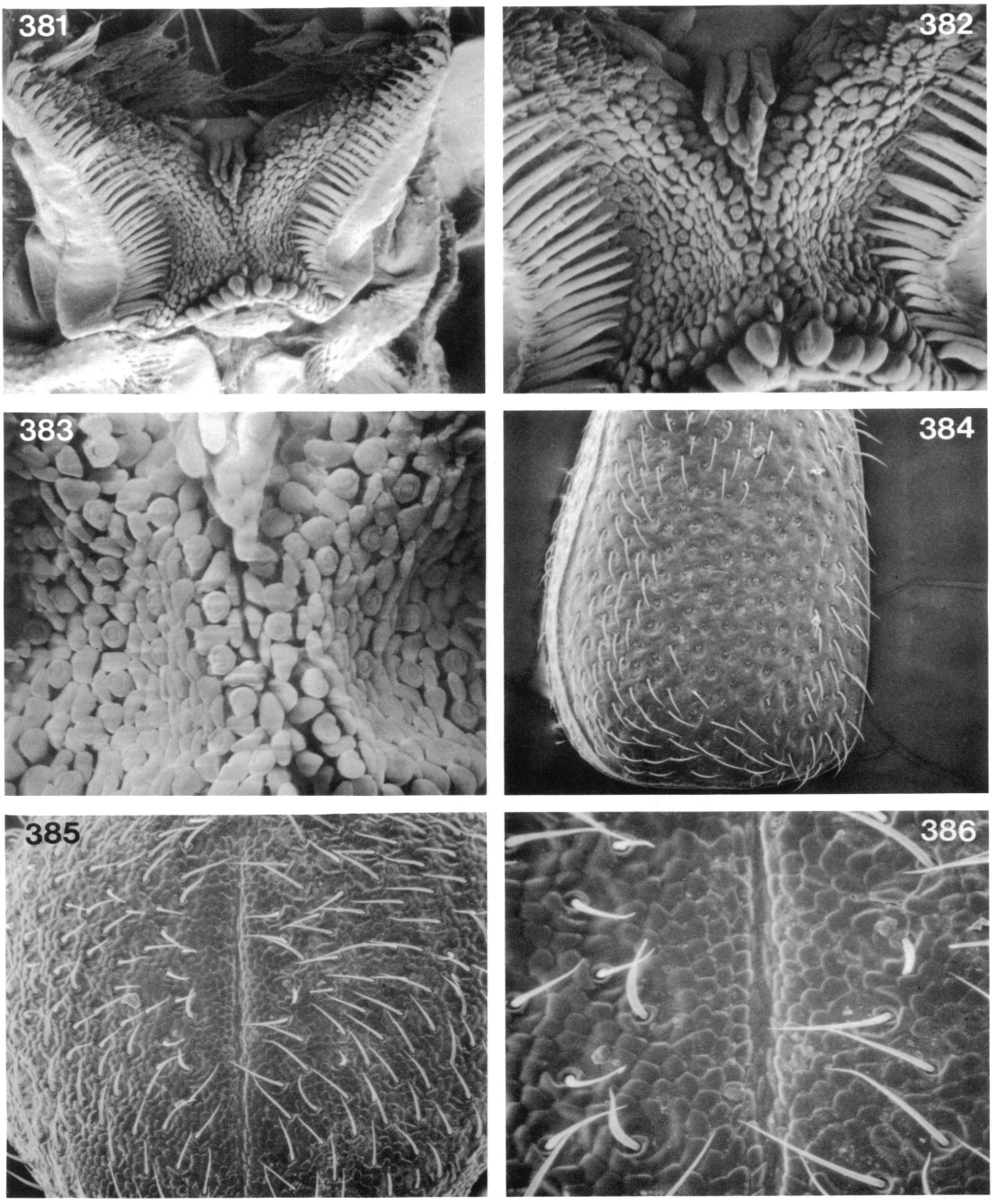



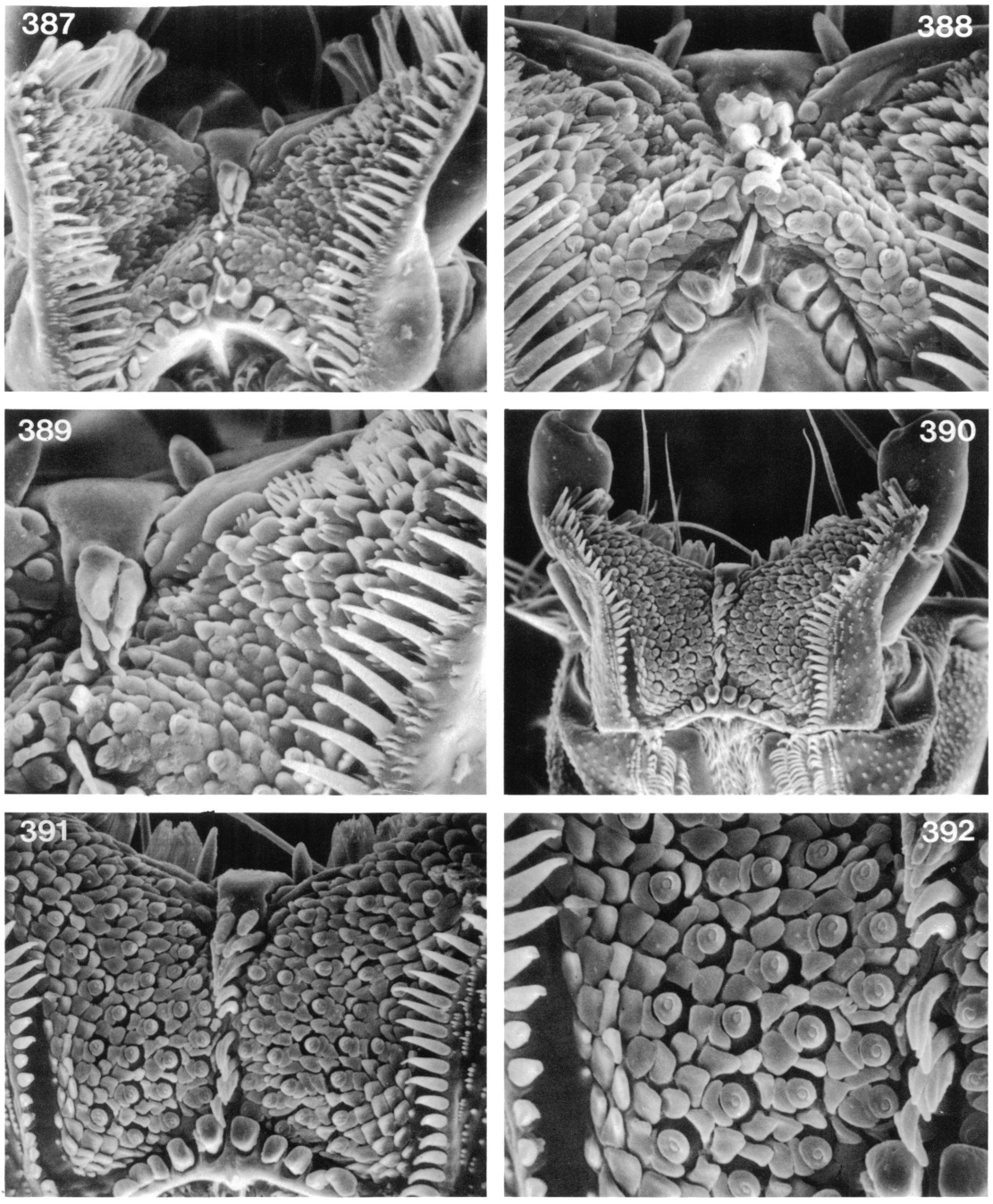




FIGS. 376–380. *Bledius ruficornis*. 376. Hypopharynx, general aspect, ×408. 377. Hypopharynx, central region, ×746. 378. Elytron, right, ×64. 379. Pronotum, anterior portion, ×92. 380. Pronotum, central region, ×185.

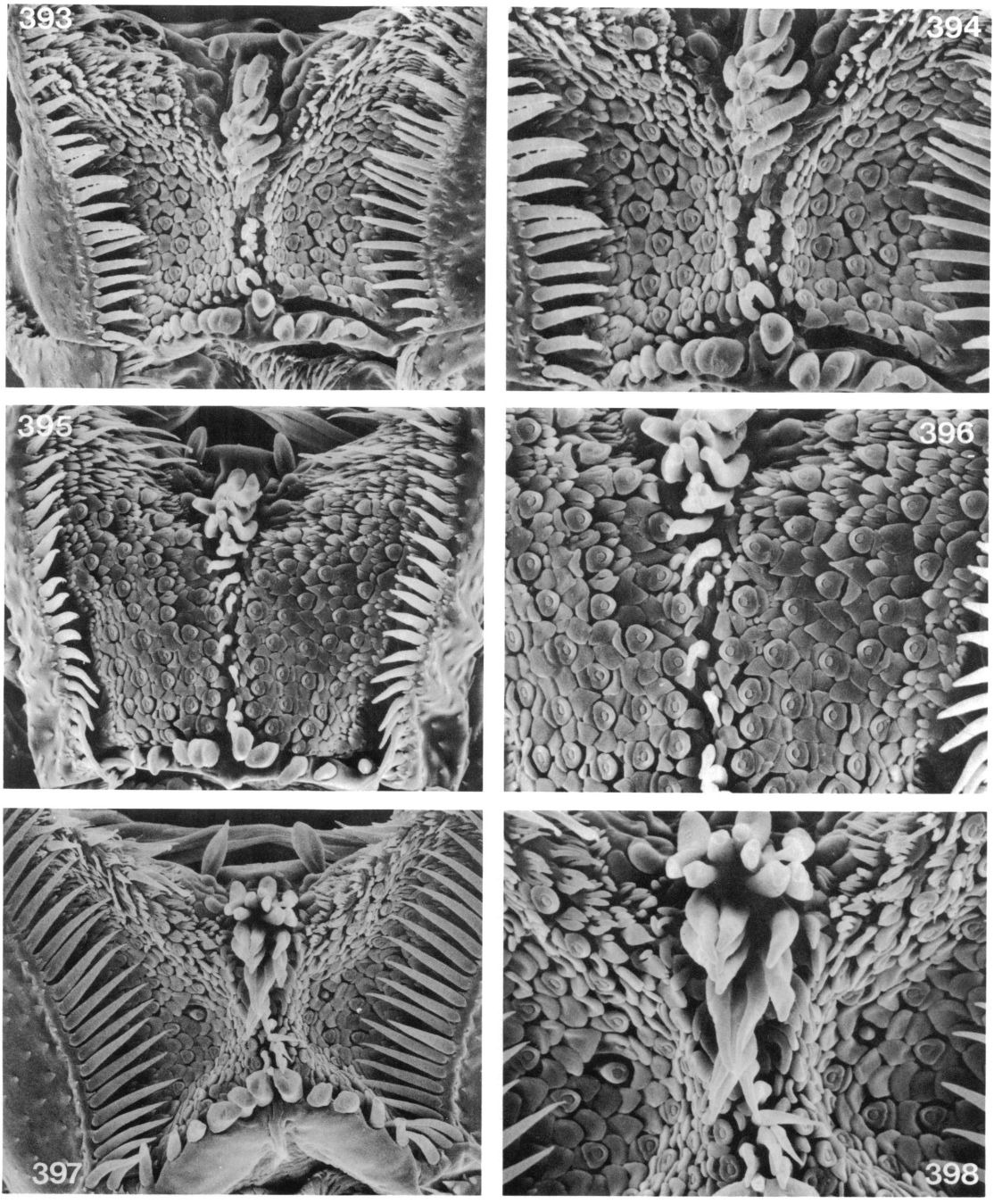



FIGS. 381–386. *Bledius monticola*. 381–383. Hypopharynx. 381. General aspect, ×426. 382. ×852. 383. Central region, ×1775. 384. Elytron, left, ×89. 385. Pronotum, central region, ×135. 386. Pronotum, central region, ×337.

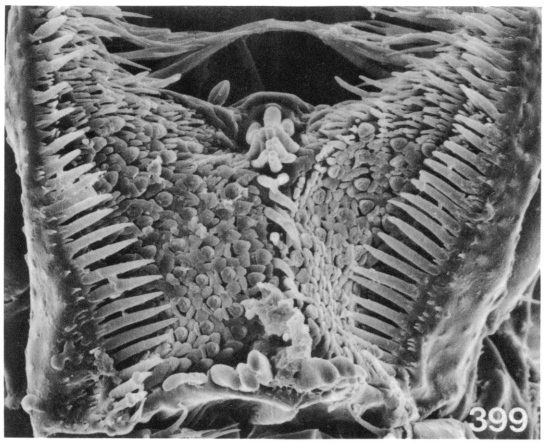


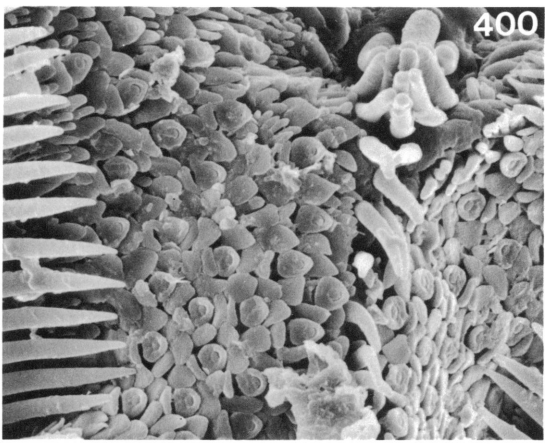

FIGS. 387–389. *Bledius jucundus,* hypopharynx. 387. General aspect, ×426. 388. ×781. 389. Right central region. ×852.

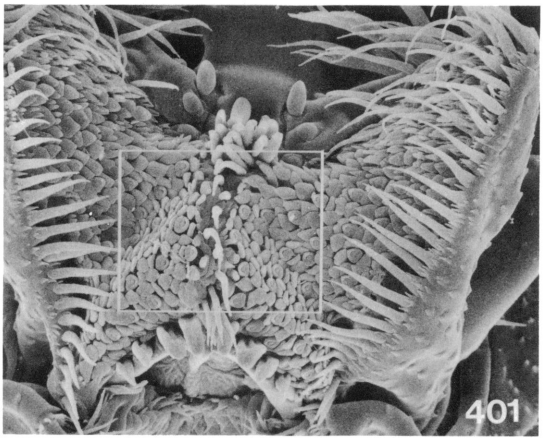
FIGS. 390–392. *Bledius confusus,* hypopharynx. 390. General aspect, ×334. 391. ×657. 392. Left central region, ×1314.

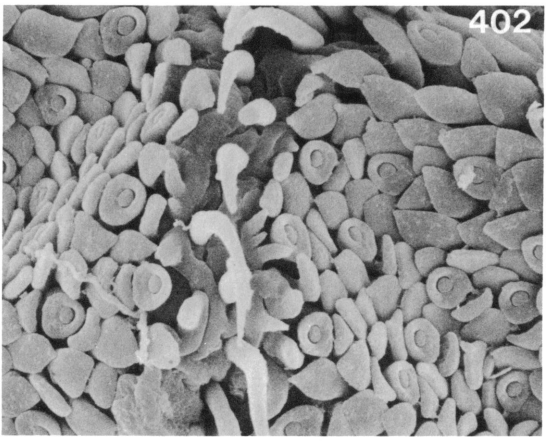


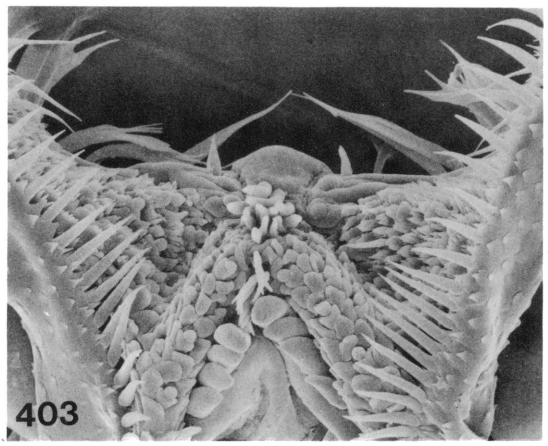

FIGS. 393–394. *Bledius gracilis,* hypopharynx. 393. General aspect, ×639. 394. ×1207.
FIGS. 395–396. *Bledius persimilis,* hypopharynx. 395. General aspects, ×852. 396. Central region, ×1633.
FIGS. 397–398. *Bledius gentilis,* hypopharynx. 397. General aspect, ×746. 398. Central region, ×1420.

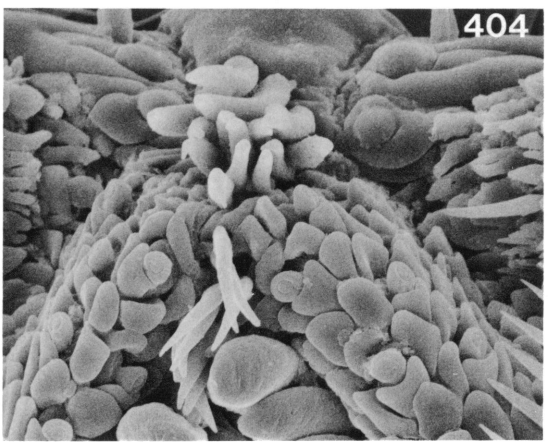


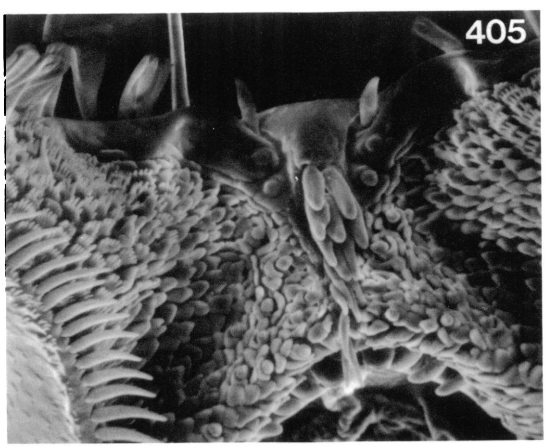



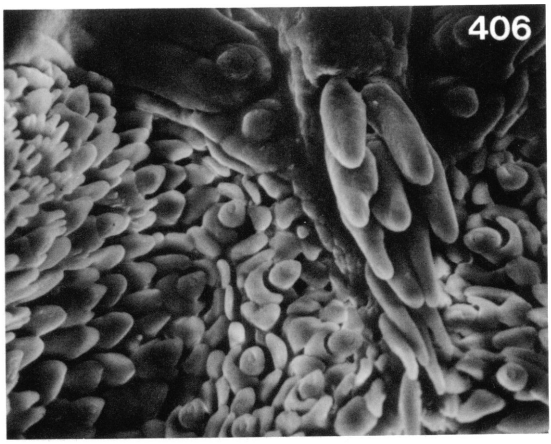



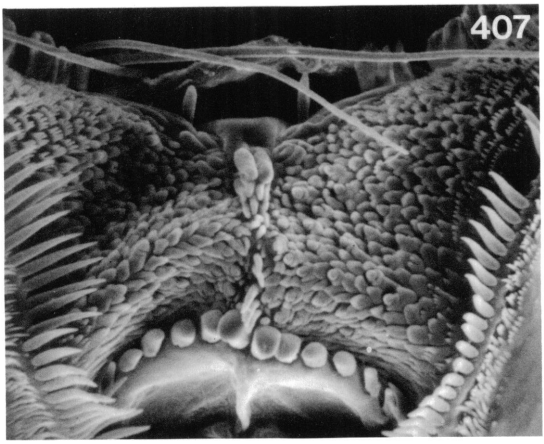

FIGS. 399–400. *Bledius aurantius,* hypopharynx. 399. General aspect, ×781. 400. Central region, ×1400.

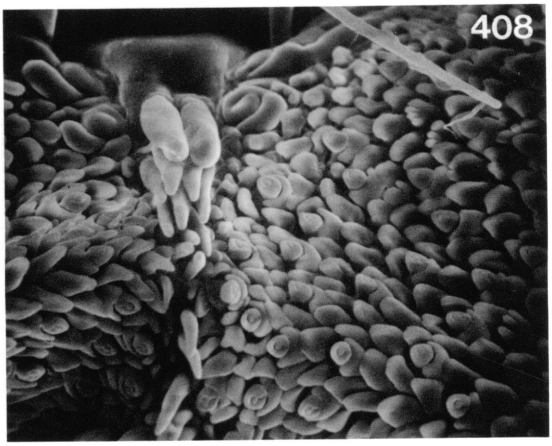
FIGS. 401–402. *Bledius clarus,* hypopharynx. 401. General aspect, ×710. 402. Central region, ×2485.

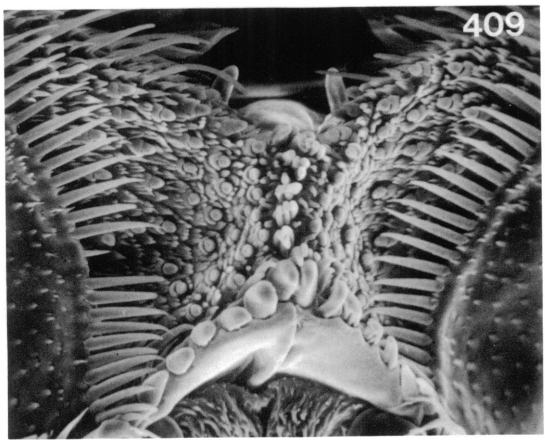
FIGS. 403–404. *Bledius bicolor,* hypopharynx. 403. General aspect, ×568. 404. Central region, ×1775.



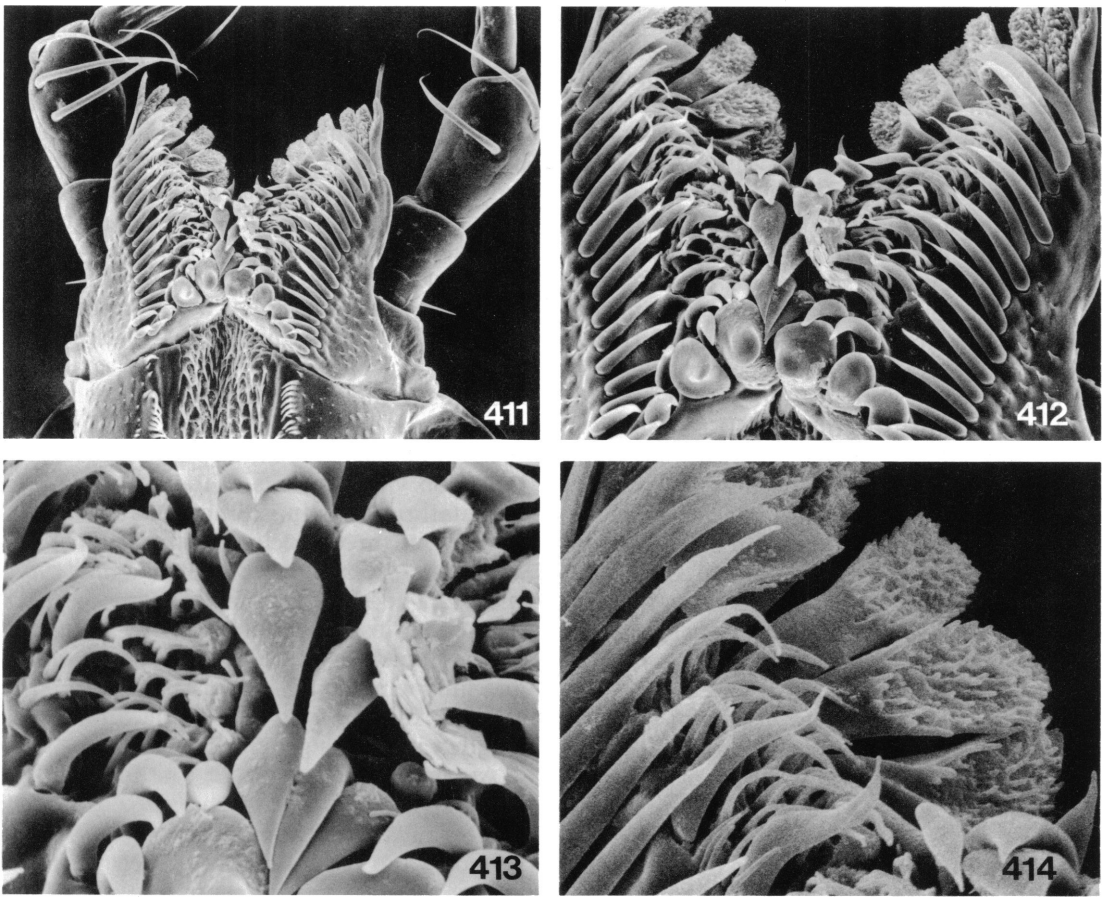





FIGS. 405–408. *Bledius turgidus,* hypopharynx. 405. General aspect, ×497. 406. Central region, ×994. 407. General aspect, ×433. 408. Central region, ×866.

FIGS. 409–410. *Bledius newelli,* hypopharynx. 409. General aspect, ×479. 410. Central region, ×958.




FIGS. 411–414. *Bledius susae,* hypopharynx. 411. General aspect, ×447. 412. ×781. 413. Central region, ×2130. 414. Lobes on anterior edge, ×2130.

# SUMMARY

With completion of this the third part of my revision of *Bledius* for the United States and Canada, I have examined and published the data for over 42,000 specimens, more than 50 percent of which I collected, dealt with the taxonomic disposition of 124 nominal species, described 18 new species, and placed 39 nominal species as junior synonyms (Herman, 1972, 1976, present report).

Before the first part was published (Herman, 1972) there were 110 species of *Bledius* recorded for the United States and Canada. With the completion of Part III, 86 species of *Bledius* are recognized in the same geographical area including 18 that I describe, plus another 12 unresolved species (nine in the *annularis* complex and three indeterminant species). Two new genera, *Microbledius* and *Psamathobledius,* were described (Herman, 1972); *Microbledius* has 10 species; four of them occur in the United States and three of these I described. The other seven were transferred from *Bledius. Psamathobledius* has three species that were transferred from *Bledius*; another species was also transferred from *Bledius* but was placed as a junior synonym.

Prior to my work the species of *Bledius* in the United States and Canada had been apportioned among five species groups: *annularis, armatus, basalis, mandibularis,* and *semiferrugineus.* Three additional groups, *aequatorialis, emarginatus,* and *melanocephalus,* and two genera, *Microbledius* and *Psamathobledius,* were recognized to accommodate the perceived variation. *Bledius susae,* discovered on the coast in Texas, has characters found nowhere else in *Bledius.* The most notable is the presence of a pronotal horn in the *female*!

The taxonomic complexity of *Bledius* is not only reflected by the number of species placed as junior synonyms and number of species groups but more importantly in the degree of intraspecific variability, the frequency of similar narrowly separated species, the difficulty of defining the species in certain species complexes, and the paucity of objectively communicable characters to separate species.

Most species were found to exhibit geographic, allometric, or dimorphic variation. The exceptions are those for which the number of specimens or the geographical range are small but even these species exhibit individual variation in color, size, or integumental sculpturing.

DIMORPHIC VARIATION: Most of the external dimorphic variation is between the males and females. Approximately half of the species discussed in parts I to III exhibit sexual dimorphism and in some cases the males and females had been described as different species. The sexually dimorphic structures are found on various parts of the body.

Metathoracic wing dimorphism was discovered in three species, *Microbledius playanus, Microbledius actitus,* and *Bledius monstratus.* The reduction of the wings of each of the species is accompanied by reduction of the length of the elytra and metathorax and fully winged individuals are rare for each species. In *B. monstratus* wing and elytral length varies in a geographic cline.

ALLOMETRIC VARIATION: The males of the three species of the *aequatorialis* group all exhibit substantial allometric variation of the pronotal and cephalic horns. Such variation can probably be seen in other species, particularly those with cephalic protuberances or horns, but it is not as notable as that in the *aequatorialis* group.

GEOGRAPHIC VARIATION: Nearly half of the species of the three genera show prominent geographical variation. Frequently this variation resulted in description of different forms of a species as separate species. For six species, *Psamathobledius punctatissimus, Bledius mandibularis, B. neglectus, B. politus, B. monstratus,* and *B. albonotatus,* the geographic variation is clinal. Each of the species lives in a linear habitat, the seacoast, so that the cline is easily recognized. For some of the other geographically variable species clinal variation may be present but I did not use the statistical tools required to detect it.

Most species of *Bledius* are distinguished by variation of the shape, convexity, luster, punctation, pubescence, ground sculpturing, size, and color of the head, pronotum, and

elytra. Most of the characters are ones of degree rather than kind. In contrast to the dearth of characters available for delimitation of species is the wealth of features useful to recognize groups of species. These characters are found on all of the major regions of the body and the groundwork laid for the groups in parts I to III will be extended to the species groups throughout the world in Part IV.

GEOGRAPHICAL DISTRIBUTION AND HABITATS: The species of *Bledius* are found throughout the United States and Canada. Species can be collected adjacent to nearly every permanent, natural body of water. The only notable exceptions that I can think of are lakes formed by or rivers obstructed by dams; *Bledius* is very rare in these disturbed places.

Although most species of *Bledius* live adjacent to fresh water, of the species discussed in parts I to III, 23 species of *Bledius,* three species of *Microbledius,* and all of those of *Psamathobledius* live in saline habitats. Some of them live in soil that is heavily encrusted with salt and a few species have been found right at the edge of ocean water. The species in saline habitats usually live in unshaded sand. The species that occur near fresh water, on the other hand, may be in open, sunny, unshaded habitats or partially to heavily shaded places. The species in shaded habitats are often, but not always, in smaller numbers. The species that are found in open, sunny, unshaded places are often present in vast numbers and there may be many—up to 14 species—at one such locality.

The 39 species of the *annularis* group that occur in the New World are distributed across the northern part of North America with the southernmost populations occurring in the mountains of the east and west. The group has a Holarctic distribution and many species are known in the Old World. One, perhaps two, species in the New World are found in saline habitats; the others are restricted to freshwater environments.

Five of the six species of the *basalis* group are restricted to saline habitats of the eastern coast of North America. The sixth is found in swampy places in the southeastern United States. Other species of the group also occur in the Old World.

The three species of the *emarginatus* group that occur in the Nearctic region are found in eastern North America. Two of them are restricted to the southeast and the third is widespread. They are all associated with freshwater habitats. Other species of the group occur widely in the New World.

Four of the five species of the *mandibularis* group occur in saline habitats; one of them is found on the eastern coast, one on the southern coast, and two on the western coast. The species from the east coast and one from the west coast are found on the shores of inland salt lakes and salt flats at scattered localities throughout the arid regions of North America. The fifth species is found along rivers throughout the prairie regions of the United States. The five species of the group are restricted to North America and some Caribbean Islands.

The four species of the *aequatorialis* group are found in saline habitats. Three of them live adjacent to the Caribbean Sea, the fourth is found on the Pacific coast in Ecuador and the Galapagos Islands. The group is restricted to the New World.

In Canada and the United States the *semiferrugineus* group is represented by 12 species. All of them live in freshwater habitats and are found in most parts of the United States and southern Canada. A few species are known from Mexico, Central and South America and many are described in the Old World.

The single species of the *melanocephalus* group is found in freshwater habitats in the prairies of the United States and Canada.

The *armatus* group, with 14 species, is restricted to North America. They occur widely in the United States from east to west and from the south into Canada where a few species are found, one as far north as the Northwest Territories. Two are restricted to decaying kelp that is buried by sand along the Pacific coast; this habitat is unique among the species of *Bledius.* One is found along the east coast of the United States. The others are associated with inland saline, alkaline, or freshwater habitats. One is found in all three habitats. The group is restricted to North America.

The species of *Microbledius* are restricted

to the New World. Some occur in saline habitats, others near bodies of fresh water. The four species that are in the United States occur either along the eastern coast or inland in the southwestern two-thirds of the country.

At present there are only three New World species in *Psamathobledius*. One occurs on the eastern and western coasts of North America and in the Caribbean; the other two occur in the Caribbean region and are found on the coast. Others that are now in *Bledius* are found in other parts of the world and also seem to live in coastal habitats. These species will be transferred in Part IV of this series.

## DESIGNATION OF LECTOTYPES

LeConte described 34 species of *Bledius*, Casey 27, and Fall 19, but of the 80 described, holotypes for only two were selected and published (*fratellus* Fall and *persimilis* Fall). I neglected to designate lectotypes in the first two parts of this monograph (Herman, 1972, 1976) because I had assumed that the type label affixed to the pin for a specimen of each species indicated that a holotype was originally selected. However, these designations were not published and are therefore not valid. To rectify this, lectotypes are designated in this section for all species requiring them. The species are grouped by author and arranged alphabetically. For each designation I have included the data from the labels associated with the specimens. I labeled each type with my lectotype label. Bibliographic references for each species may be found by consulting the three parts of this revision.

Most of the specimens from LeConte's collection bear coded labels indicating the place where collected; I have translated these labels to determine the type localities but others were translated in the original publication.

The authors of other names of *Bledius* in North America designated holotypes. I designated lectotypes earlier (Herman, 1972, 1976) for species described by Erichson.

### LeConte's Species

*Bledius analis.* (Type locality: Illinois. Labels: Yellow label/♂/Type 6537/B. analis Lec/Lectotype label).

*Bledius annularis.* (Type locality: Lake Superior. Labels: Pale bluish label/♂/Type 6540/B. annularis Lec/Lectotype label).

*Bledius basalis.* (Type locality: Coney Island, New York. Labels: Pink label/Coney Isl./Type 6550/B. basalis Lec/Lectotype label).

*Bledius brevidens.* (Type locality: New York. Labels: N.Y./♂/Type 6523/B. brevidens Lec./Lectotype label).

*Bledius cognatus.* (Type locality: North Carolina. Labels: N.C./8225;2/Type 6549/B. cognatus Lec/Lectotype label).

*Bledius confusus.* (Type locality: Lake Superior. Labels: Pale blue label/Type 6541/B. confusus/Lectotype label).

*Bledius cribricollis* (Type locality: San Diego, California. Labels: $Cala_g$/Type 6526/B. cribricollis Lec/Lectotype label).

*Bledius cuspidatus.* (Type locality: Dakota. Labels: Dac/♂/Type 6527/Lectotype label).

*Bledius diagonalis.* (Type locality: San Diego, California. Labels: Cal./Type 6545/B. diagonalis Lec/Lectotype label).

*Bledius dimidiatus.* (Type locality: Enterprise, Florida. Labels: Enterprise; May 24 Fla/796/Type 6551/B. dimidiatus Lec/Lectotype label).

*Bledius divisus.* (Type locality: Platte River Valley, Nebraska. Labels: Green label/Type 6543/B. divisus Lec/Lectotype label).

*Bledius ferratus.* (Type locality: San Diego, California. Labels $Cal._j$/Type 6524/B. ferratus Lec/Lectotype).

*Bledius flavipennis.* (Type locality: San Diego, California. Labels: $Cal._j$/♀/Type 6528/B. flavipennis Lec/Lectotype label).

*Bledius forcipatus.* (Type locality: Fort Yuma, California. Labels. Silver or grayish brown label/♂/Type 6553/B. forcipatus/Lectotype label).

*Bledius fortis.* (Type locality: Galveston, Texas. Labels: Tex./♂/Type 6522/B. fortis Lec./Lectotype label).

*Bledius fumatus.* (Type locality: western States. Labels: Yellow label/Type 6531/B. fumatus Lec/Lectotype label).

*Bledius gularis.* (Type locality: Middle States. Labels: Pink label/Type 6521/Bledius gularis/Lectotype label). Note: In my revision of this species (Herman, 1972) I did not select a type locality.

*Bledius jacobinus.* (Type locality: SanDiego, Cal-

ifornia. Labels: Cala$_j$/♂/Type 6525/B. jacobinus Lec/Lectotype label).

*Bledius laticollis.* (Type locality: San Diego, California. Labels: Cal.$_j$/♂/Type 6537/B. laticollis/ Lectotype labels).

*Bledius luteipennis.* (Type locality: San Bernardino, California. Labels: Cal./Type 6538/B. luteipennis Lec/Lectotype label).

*Bledius nitidiceps.* (Type locality: Los Angeles, California. Labels: Cal h/Type 6532/B. nitidiceps Lec/Lectotype). Note: While revising this species (1976) I arbitrarily designated the type locality as Los Angeles, not knowing that a code to translate the coded labels was available. Coincidentally the specimen labeled as type and the one I selected as the lectotype are from Los Angeles.

*Bledius nitidicollis.* (Type locality: New York. Labels: Pink label/Type 6535/B. nitidicollis Lec/ Lectotype label).

*Bledius opacifrons.* (Type locality: San Diego, California. Labels: Cal./♂/Type 6533/B. opacifrons/Lectotype labels). Note: In my revision of this species (1976) I arbitrarily selected Los Angeles as the type locality because I did not know the coded localities were translated. In designating a lectotype the type locality became San Diego. The specimen from Los Angeles that is part of the original series is in the Horn collection.

*Bledius opaculus.* (Type locality: Maine. Labels: Me/Type 6552/B. opaculus Lec/Lectotype label).

*Bledius ornatus.* (Type locality: San Francisco, California. Labels: Gold label/262/Type 6546/ B. ornatus Lec/Lectotype label).

*Bledius phytosinus.* (Type locality: southern California. Labels: Cal/♂/Type 6548/B. phytosinus Lec/Lectotype label).

*Bledius pleuralis.* (Type locality: San Bernardino, California. Labels: Cal.l./Type 6544/B. pleuralis Lec/Lectotype label).

*Bledius punctatissimus.* (Type locality: southern California. Labels: Cal./Type 6536/B. punctatissimus Lec/Lectotype label).

*Bledius rotundicollis.* (Type locality: Fort Pierre, Nebraska. Labels: Ft. Pierre/♂/Type 6530/B. rotundicollis Lec/Lectotype label). Note: Earlier I cited in error Fort Pierce, Nebraska, as the type locality (Herman, 1972).

*Bledius ruficornis.* (Type locality: San Francisco, California. Labels: Cala./Type 6542/B. ruficornis Lec/Lectotype label).

*Bledius semiferrugineus.* (Type locality: Middle States. Labels: Pink label/Type 6529/B. semiferrugineus Lec/Lectotype label).

*Bledius sinuatus.* (Type locality: Illinois. Labels: Yellow label/Type 6539/B. sinuatus Lec/Lectotype label).

*Bledius suturalis.* (Type locality: Gila River, Arizona. Labels: Silver or grayish brown label/Type 6547/B. suturalis Lec/Lectotype label).

*Bledius tau.* (Type locality: New York. Labels: N. Y./Type 6559/B. tau/Lectotype label).

## Casey's Species

*Bledius adustus.* (Type locality: Garland, Colorado. Labels: Garland, Col 22.6/Type USNM 48172/B. adustus Cas/Lectotype label).

*Bledius agonus.* (Type locality: Utah. Labels: Utah/ Type USNM 48158/B. agonus Cas/Lectotype label).

*Bledius assimilis.* (Type locality: Iowa. Labels: Ia/ Type USNM 48165/B. assimilis Cas/Lectotype label). Note: Earlier (Herman, 1972) I did not select a type locality).

*Bledius bicolor.* (Type locality: Yountville, Napa County, California. Labels: Cal/Type USNM 48174/B. bicolor Cas/Lectotype label).

*Bledius eximius.* (Type locality: San Diego, California. Cal/Type USNM 48157/B. eximius Cas/ Lectotype label).

*Bledius foraminosus.* (Type locality: Lake County, California. Labels: Lake Co, Cal/Type USNM 48163/B. foraminosus Cas/Lectotype label).

*Bledius furtivus.* (Type locality: The Dalles, Oregon. Labels: The Dalles, Oreg./Type USNM 48155/B. furtivus Cas/Lectotype label).

*Bledius gentilis.* (Type locality: Santa Rosa, Sonoma County, California. Labels: Cal./Type USNM 48169/B. gentilis Cas/Lectotype label).

*Bledius gracilis.* (Type locality: Soda Springs, Anderson Valley, Mendocino County, California. Labels: Cal./gracilis 5, paratype 48170/Lectotype label).

*Bledius gravidus.* (Type locality: Albuquerque, New Mexico. Labels: N.:M./Type USNM 48164/B. gravidus Cas/Lectotype label).

*Bledius honestus.* (Type locality: Shokan, Catskill Mountains, New York. Labels: N*Y*/Type USNM 48176/B. honestus Cas/Lectotype label).

*Bledius ignavus.* (Type locality: Rhode Island. Labels: R.I./Type USNM 48177/B. ignavus Cas/ Lectotype label).

*Bledius ineptus.* (Type locality: Albuquerque, New Mexico. Labels: N:M./♂/Type USNM 48159/B. ineptus Cas/Lectotype label).

*Bledius languidus.* (Type locality: Huntington, Oregon. Labels: Huntington, Oregon/Type USNM 48173/B. languidus Cas/Lectotype label).

*Bledius lectus.* (Type locality: Sonoma County,

California/Labels: Cal/Type USNM 48160/B. lectus Cas/Lectotype label).

*Bledius misellus.* (Type locality: Galveston, Texas. Labels: Tex/Type USNM 48178/B. misellus Cas/Lectotype label).

*Bledius monstratus.* (Type locality: San Francisco, California. Labels: Cal/Type USNM 48156/B. monstratus Cas/Lectotype label).

*Bledius monticola.* (Type locality: Lake Tahoe, California. Labels: Ca+/Type USNM 48168/B. monticola Cas/Lectotype label).

*Bledius nebulosus.* (Type locality: Iowa. Labels. .Ia/Type USNM 48167/B. nebulosus Cas/Lectotype label).

*Bledius neglectus.* (Type locality: Rhode Island. Labels: R. I./Type USNM 48179/Lectotype label). Note: Another specimen in the Casey Collection from New York has been labeled as Neotype but there is a specimen from Rhode Island that fits the description of *neglectus* which is labeled Type. Rhode Island is the locality reported with the original description.

*Bledius parvicollis.* (Type locality: Gualala, Mendocino County, California. Labels: Cal/Type USNM 48175/B. parvicollis Cas/Lectotype label).

*Bledius stabilis.* (Type locality: Allegheny County, Pennsylvania. Labels: Penn/Type USNM 48171/B. stabilis Cas/Lectotype label).

*Bledius strenuus.* (Type locality: San Francisco, California. Labels: Cal/Type USNM 48154/B. strenuus Cas./Lectotype label).

*Bledius tenuis.* (Type locality: Nevada. Labels: Nev/Type USNM 48161/B. tenuis Cas/Lectotype label).

*Bledius turbulentus.* (Type locality: Florida. Labels: Fla/Type USNM 48180/B. turbulentus Cas/Lectotype label).

*Bledius turgidus.* (Type locality: Fort Garland, Colorado. Labels: Garland, Col 18.6/Type USNM 48162/B. turgidus Cas/Lectotype label).

*Bledius villosus.* (Type locality: California. Labels: Cal/Type USNM 48166/B. villosus Cas/Lectotype label).

## Fall's Species

*Bledius apicalis.* (Type locality: Raymond, California. Labels: Raymond Cal/May/apicalis Type/MCZ Type 24058/H. C. Fall Collection/ Lectotype label).

*Bledius arizonensis.* (Type locality: Flagstaff, Arizona. Labels: Flagstaff, Ariz A Fenyes/arizonensis Type/MCZ Type 24059/H. C. Fall Collection/Lectotype label).

*Bledius clarus.* (Type locality: Pomona, California. Labels: Pomona 9/6/95 Cal/Type clarus/MCZ Type 24060/H. C. Fall Collection/Lectotype labels).

*Bledius confinis.* (Type locality: El Paso, Texas. Labels: El Paso II-20-89/not in Lec Coll/MCZ Type 24061/H. C. Fall Coll/Bledius confinis Fall/Lectotype label).

*Bledius consimilis.* (Type locality: Thornton, New Mexico. Labels: Thornton, N. M./Aug.92/consimilis Type/MCZ Type 24062/H. C. Fall Collection/Bledius consimilis Fall/Lectotype label).

*Bledius deceptivus.* (Type locality: Kern County, California. Labels: Kern Co. Cal/♀/Type deceptivus/MCZ Type 24063/H. C. Fall Collection/ Lectotype label).

*Bledius dissimilis.* (Type locality: Philadelphia, Pennsylvania. Labels: Phila Pa. Young/dissimilis Type/dissimilis Fall; philadelphicus n.n. Fall; (falli Wend.)/MCZ Type 24064/H. C. Fall Collection/Lectotype label).

*Bledius episcopalis.* (Type locality: Bishop, California. Labels: Bishop VI-II Cal/episcopalis Type/MCZ Type 24065/H. C. Fall Collection/ Lectotype label).

*Bledius fratellus.* (Type locality: Pasadena, California. Holotype was designated).

*Bledius gradatus.* (Type locality: Keeler, California. Labels: Keeler VI Cal/gradatus Type/MCZ Type 24067/H. C. Fall Collection/Lectotype label).

*Bledius medialis.* (Type locality: Vancouver Island, British Columbia. Labels: Vanc. Id 8/24/96/not in Lec Coll/medialis Type/MCZ Type 24068/H. C. Fall Collection/Lectotype label).

*Bledius mysticus.* (Type locality: Washington. Labels: W. T./mysticus Type/Type 24069/H. C. Fall Collection/Lectotype label).

*Bledius persimilis.* (Type locality: Pomona, California. Holotype was designated by Fall).

*Bledius piceus.* (Type locality: Pasadena, California. Labels: Pasadena Cal/June 92/piceus Type MCZ Type 24071/H. C. Fall Collection/Lectotype label).

*Bledius regularis.* (Type locality: Cole, California. Labels: Cole Cal/July 04. 1/regularis Type/MCZ Type 24072/H. C. Fall Collection/Lectotype label).

*Bledius relictus.* (Type locality: mountains near Pomona, California. Labels: Pom. Cal. Mts. 4.30.92/Type relictus/MCZ Type 24073/H. C. Fall Collection/Lectotype label).

*Bledius rusticus.* (Type locality: Pomona, California. Labels: Pom Cal May 16. 91/Type rusticus/ MCZ Type 24074/H. C. Fall Collection/Lectotype label).

*Bledius specularis.* (Type locality: Point Reyes, California. Labels: Pt Reyes, Cal/June 04 18/ specularis Type/MCZ Type 24075/H. C. Fall Collection/Bledius specularis Fall/Lectotype label).

*Bledius tallaci.* (Type locality: Lake Tahoe, Tallac, California. Labels: Tallac, Cal/July/M/tallaci Type/MCZ Type 24076/H. C. Fall Collection/ Bledius tallaci Fall/Lectotype label).

## CONSPECTUS OF CLASSIFICATION

The following list is a summary of the taxonomic changes that I have proposed for *Bledius, Microbledius,* and *Psamathobledius* for the United States and Canada. The species enclosed by parentheses were redescribed and discussed but are found outside of the United States and Canada. Details of my discussion of the taxonomic disposition of each nominal species are found by reference to the bibliographic citation that follows the name of each species in the list.

**Bledius** Leach: Herman, 1970, p. 375; 1972, p. 153.

**aequatorialis** Group:
Herman, 1972, p. 156.
(*aequatorialis* Mutchler: Herman, 1972, p. 169).
(*beattyi* Blackwelder: Herman, 1972, p. 160.
*ceratus* Blackwelder: Herman, 1972, p. 164.
*susae* Herman (present report)

**annularis** Group:
Herman (present report)
*albonotatus* Mäklin: Herman (present report)
*ornatus* LeConte: Herman (present report)
*albidipennis* Bernhauer: Herman (present report)
*aurantius* Herman (present report)
*bicolor* Casey: Herman (present report)
*rusticus* Fall: Herman (present report)
*clarus* Fall: Herman (present report)
*cedarensis* Hatch: Herman (present report)
*confusus* LeConte: Herman (present report)
*diagonalis* LeConte: Herman (present report)
*apicalis* Fall: Herman (present report)
*gentilis* Casey: Herman (present report)
*adustus* Casey: Herman (present report)
*transitus* Fall: Herman (present report)
*fratellus* Fall: Herman (present report)
*gracilis* Casey: Herman (present report)
*habrus* Herman (present report)
*jucundus* Herman (present report)
*laticollis* LeConte: Herman (present report)
*melanocolus* Herman (present report)
*monticola* Casey: Herman (present report)
*naius* Herman (present report)
*nardus* Herman (present report)
*newelli* Hatch: Herman (present report)
*omega* Herman (present report)
*parvicollis* Casey: Herman (present report)
*kincaidi* Hatch: Herman (present report)
*persimilis* Fall: Herman (present report)
*phytosinus* LeConte: Herman (present report)
*ruficornis* LeConte: Herman (present report)
*suturalis* LeConte: Herman (present report)
*luteipennis* LeConte: Herman (present report)
*pleuralis* LeConte: Herman (present report)
*medialis* Fall: Herman (present report)
*oregonensis* Hatch: Herman (present report)
*tarandus* Herman: Herman (present report)
*divisus* LeConte: Herman (present report)
*tau* LeConte: Herman (present report)
*turgidus* Casey: Herman (present paper)
*borealis* Blatchley: Herman (present report)
*bowronensis* Hatch: Herman (present report)
*venus* Herman (present report)
*villosus* Casey: Herman (present paper)
*viriosus* Herman (present report)
*zophus* Herman (present report)

**armatus** Group:
Herman, 1976, p. 105.
*aquilonarius* Herman, 1976, p. 121.
*bellicus* Blackwelder: Herman, 1976, p. 133.
*armatus* (Say): Herman, 1976, p. 134.
*consimilis* Fall: Herman, 1976, p. 111.
*episcopalis* Fall: Herman, 1976, p. 109.
*eximius* Casey: Herman, 1976, p. 136.
*gradatus* Fall: Herman, 1976, p. 137.
*boddyi* Hatch: Herman, 1976, p. 137.
*fenyesi* Bernhauer and Schubert: Herman, 1976, p. 143.
*cribricollis* LeConte: Herman, 1976, p. 143.
*lecontei* Bernhauer: Herman, 1976, p. 143.
*flavipennis* LeConte: Herman, 1976, p. 114.
*cuspidatus* LeConte: Herman, 1976, p. 114.
*agonus* Casey: Herman, 1976, p. 114.
*tenuis* Casey: Herman, 1976, p. 114.
*nelsoni* Hatch: Herman, 1976, p. 114.
*ineptus* Casey: Herman, 1976, p. 123.
*monstratus* Casey: Herman, 1976, p. 140.
*nitidiceps* LeConte: Herman, 1976, p. 150.
*notialus* Herman, 1976, p. 131.
*opacifrons* LeConte: Herman, 1976, p. 153.
*lectus* Casey: Herman, 1976, p. 153.

*piceus* Fall: Herman, 1976, p. 153.
*specularis* Fall: Herman, 1976, p. 153.
*regularis* Fall: Herman, 1976, p. 153.
*condonensis* Hatch: Herman, 1976, p. 153.
*politus* Erichson: Herman, 1976, p. 126.
*nigriceps* Notman: Herman, 1976, p. 126.
*strenuus* Casey: Herman, 1976, p. 144.
*furtivus* Casey: Herman, 1976, p. 144.
*arizonensis* Casey: Herman, 1976, p. 144.

**basalis** Group:
Herman, 1976, p. 80.
*basalis* LeConte: Herman, 1976, p. 96.
*ignavus* Casey: Herman, 1976, p. 96.
*misellus* Casey: Herman, 1976, p. 96.
*cordatus* (Say): Herman, 1976, p. 81.
*dimidiatus* LeConte: Herman, 1976, p. 85.
*neglectus* Casey: Herman, 1976, p. 90.
*opaculus* LeConte: Herman, 1976, p. 88.
*thinopus* Herman, 1976, p. 86.
*turbulentus* Casey: Herman, 1976, p. 94.

**emarginatus** Group:
Herman (present report)
*cognatus* Leconte: Herman (present report)
*emarginatus* (Say): Herman (present report)
*troglodytes* Erichson: Herman (present report)
*wudus* Herman (present report)

**mandibularis** Group:
Herman, 1972, p. 173.
*ferratus* LeConte: Herman, 1972, p. 189.
*fortis* LeConte: Herman, 1972, p. 180.
*jacobinus* LeConte: Herman, 1972, p. 200.
*actus* Herman, 1972, p. 200.
*lecontei* Sharp: Herman, 1972, p. 200.
*mandibularis* Erichson: Herman, 1972, p. 191.
*brevidens* LeConte: Herman, 1972, p. 192.
*pallipennis* (Say): Herman, 1972, p. 173.
*gularis* LeConte: Herman, 1972, p. 174.

**melanocephalus** Group:
Herman, 1976, p. 98.
*melanocephalus* (Say): Herman, 1976, p. 99.
*confinus* Fall: Herman, 1976, p. 99.

**semiferrugineus** Group:
Herman, 1972, p. 204.
*analis* LeConte: Herman, 1972, p. 230.
*assimilis* Casey: Herman, 1972, p. 243.
*coulteri* Hatch: Herman, 1972, p. 240.
*foraminosus* Casey: Herman, 1972, p. 209.
*deceptivus* Fall: Herman, 1972, p. 209.
*relictus* Fall: Herman, 1972, p. 209.
*fumatus* LeConte: Herman, 1972, p. 219.
*gravidus* Casey: Herman, 1972, p. 217.
*missionensis* Hatch: Herman, 1972, p. 217.
*nitidicollis* LeConte: Herman, 1972, p. 229.
*philadelphicus* Fall: Herman, 1972, p. 234.
*falli* Wendeler: Herman, 1972, p. 234.
*dissimilis* Fall: Herman, 1972, p. 234.
*mixtus* Notman: Herman, 1972, p. 234.
*dickersoni* Notman: Herman, 1972, p. 234.
*rotundicollis* LeConte: Herman, 1972, p. 228.
*rubiginosus* Erichson: Herman, 1972, p. 224.
*semiferrugineus* LeConte: Herman, 1972, p. 205.
*canaliculatus* Notman: Herman, 1972, p. 205.
*tallaci* Fall: Herman, 1972, p. 221.

UNRESOLVED SPECIES
**annularis** Complex:
Herman (present report)
*annularis* LeConte: Herman (present report)
*breretoni* Hatch: Herman (present report)
*honestus* Casey: Herman (present report)
*languidus* Casey: Herman (present report)
*mysticus* Fall: Herman (present report)
*nebulosus* Casey: Herman (present report)
*sinuatus* LeConte: Herman (present report)
*stabilis* Casey: Herman (present report)
*washingtonensis* Hatch: Herman (present report)

UNKNOWN SPECIES
*fasciatus* (Say): Herman (present report)
*longipennis* Mäklin: Herman (present report)
*verticalis* Notman: Herman (present report)

**Microbledius** Herman, 1972, p. 118
*actitus* Herman, 1972, p. 127.
*forcipatus* (LeConte): Herman, 1972, p. 131.
*litoreus* Herman, 1972, p. 129.
*playanus* Herman, 1972, p. 121.

**Psamathobledius** Herman, 1972, p. 136
(*caribbeanus* Blackwelder: Herman, 1972, p. 145).
(*microcephalus* Fauvel: Herman, 1972, p. 148).
*punctatissimus* (LeConte): Herman, 1972, p. 140.
*esposus* (Blackwelder): Herman, 1972, p. 140.

## APPENDIX I: MATERIAL EXAMINED

*Bledius albonotatus* Mäklin
Figure 49

Specimens: 1161.

Canada: **British Columbia:** Vancouver Island, Tofino, July; 11 mi. S Tofino, Long Beach, May; Vancouver Island, Metchosin, West of Victoria, May; Victoria, June; Vancouver Island, Clayquot, June; Vancouver, June; Boundary Bay, S of Vancouver, June; Wellington, April, May; Queen Charlotte Island, Massett.

Mexico: **Baja California:** La Mision de San Miguel, May; 23 mi. W Punta Prieta, November; La Salina, July; Rosarito, May.

United States: **Alaska:** near Etolin Point, 158°20′W 58°41′N, June; Kenai Peninsula, Nicolajevsk. **California:** *Del Norte Co.:* Crescent City. *Humboldt Co.:* Clam Beach, August; Clam Beach County Park, July; Little River, July. *Los Angeles Co.:* Santa Monica, July, September; Redondo, March. *Marin Co.:* Inverness, July; Point Reyes Peninsula, McClures Beach, July; Point Reyes, June; Dillon Beach, May, July. *Mendocino Co.:* Fort Bragg, August. *Monterey Co.:* Carmel, March, April, September; Carmel, Carmel Bay, October; Big Sur Beach, May; Big Sur, Pfeiffer-Big Sur Beach, October; Monterey, April, June; Pacific Grove, June. *Orange Co.:* Laguna Beach. *San Diego Co.:* Ocean Beach, May, July; San Marcos Creek, September; Batequitas Lagoon, May; Pensaquitos Lagoon, April. *San Francisco Co.:* San Francisco, April, May, September. *San Luis Obispo Co.:* Pismo Beach, July, November; Morro Bay, March; Cambria, Santa Rosa Creek, August. *San Mateo Co.:* Moss Beach, May; San Gregorio, San Gregorio Creek, September. *Santa Barbara Co.:* Santa Barbara, August; Surf, July; Gaviota, November; San Miguel Island, June. *Santa Cruz Co.:* 8 mi. NW Davenport at Waddell Creek, October; Aptos, June. *Sonoma Co.:* Duncan Mills, June; mouth of Russian River, July. *Ventura Co.:* San Nicholas Island, April; Port Hueneme, June. **Oregon:** Ocean Park, June, August, September. *Clatsop Co.:* Cannon Beach, June; Gearhart, June. *Coos Co.:* Charleston, July. *Curry Co.:* 8.5 mi S Gold Beach, June; 0.5 mi. NW Brookings, Harris Beach State Park, July. *Douglas Co.:* Winchester Bay, May, June, July; 5.5 mi. NE Reedsport, Smith River, June. *Lane Co.:* 3 mi. N Florence, Harbor Vista County Park, August; 7 mi. S Florence, Siltcoos Beach, May; Siltcoos Outlet, September; Neptune State Park, July. *Lincoln Co.:* Waldport, June; Newport, July; Neotsu, April. *Tillamook Co.:* Neskowin; Pacific City, May; Barview, June; Cape Lookout State Park, August. **Washington:** *Grays Harbor Co.:* Moclips, April; Pacific Beach; Ocean City State Park, near Ocean City, July. *King Co.:* Seattle; Seattle, Carkeek Park, May. *Pacific Co.:* Seaview, July.

*Bledius annularis* Complex
Figure 321

Specimens: 7062.

This unresolved complex has been discussed in a preceding section. The specimens have been found at numerous localities. I list none of them but rather present a generalized map of the area occupied by the complex.

**Bledius aurantius**, new species
Figure 218

Specimens: 72.

United States: **California:** *San Benito Co.:* 45 mi. SSE Hollister, San Benito River, 1400 feet, May. *Ventura Co.:* 41 mi. N Ojai, Cuyama River, 3700 feet, May; 44 mi. N Ojai, Reyes Creek Campground, Reyes Creek, 3900 feet, May; Fillmore, Santa Clara River, May.

*Bledius bicolor* Casey
Figure 295

Specimens: 137.

An asterisk indicates localities where *ruficornis* and *bicolor* were collected together.

United States: **California:** *Humboldt Co.:* 7.5 mi. S Bridgeville, Mill Creek, 1200 feet, July*. *Kern Co.:* 1 mi. W Glenville, Poso Creek, July. *Los Angeles Co.:* Pasadena*. *Marin Co.:* Tocaloma, Lagunitas Creek, May, June*. *Mendocino Co. Napa Co.:* Yountville. *San Benito Co.:* 45 mi. SSE Hollister, San Benito River, 1400 feet, May. *San Diego Co.:* 8 mi. N Ramona, Pamo Valley, Temescal Creek, 1000 feet, May*; 7.5 mi. E Julian, Banner Creek, 2700 feet, May*; 1 mi. S Lakeview, Los Coches Creek, May*; 15 mi. E Oceanside, San Luis Rey River, 300 feet, May. *San Luis Obispo Co.:* Templeton, Salinas River, 850 feet, May; 6.6 mi. ENE Arroyo Grande, Tar Spring Creek, May*. **Oregon:** *Lane Co.:* 25 mi. E Florence, Siuslaw River, August*. **Washington:** *Pacific Co.:* 14 mi. NW Raymond, July.

*Bledius cedarensis* Hatch
Figure 263

Specimens: 6.

United States: **Idaho:** *Lemhi Co.:* 16.3 mi. N North Fork, North Fork Salmon River, 5200 feet, July. **Washington:** *Clallam Co.:* 8 mi. E Sappho, Camp Creek, July. *King Co.:* Cedar Mountain, May; North Bend, July.

*Bledius clarus* Fall
Figure 210

Specimens: 100.

United States: **California:** *Los Angeles Co.:* Pasadena, June; Pomona; Rivera, April. *San Diego Co.:* 5 mi. N Ramona, Pamo Valley, Temescal Creek, 800 feet, May; 8 mi. N Ramona, Pamo Valley, Temescal Creek, 1000 feet, May; Descanso, Sweetwater River, 3300 feet, May; 15 mi. E Oceanside, San Luis Rey River, 300 feet, May. *San Luis Obispo Co.:* 6.6 mi ENE Arroyo Grande, Tar Spring Creek, May. *Ventura Co.:* 41 mi. N Ojai, Cuyama River, 3700 feet, May; 44 mi. N

Ojai, Reyes Creek Campground, Reyes Creek, 3900 feet, May.

*Bledius cognatus* LeConte
Figure 11

Specimens: 53.

United States: **Alabama:** *Covington Co.:* Florala, January. **Arkansas:** *Lafayette Co.:* Lewisville. *Union Co.:* 4 mi. NE Eldorado, Salt Creek, August; Wilks Oil Fields, under power lines, June. **Florida:** *Leon Co.:* 10 mi. N Tallahassee, Tall Timbers Research Station, March; Tallahassee, July. *Okaloosa Co.:* 3 mi. NW Holt, Blackwater River, at Bryant Bridge, August. *Sarasota Co.:* Myakka River State Park, cabin no. 4, July. **Georgia:** *Baker Co.:* Newton, Emory University Field Station, August. **North Carolina:** *Moore Co.:* 10 mi. SW Southern Pines, August. **South Carolina:** *Aiken Co.:* Aiken, June. **Texas:** *Burnet Co.:* Tiger Mills, September.

*Bledius confusus* LeConte
Figure 225

Specimens: 107.

Canada: **Alberta:** Waterton National Park, Cameron Lake, June; Waterton Park, July; 17 mi. ESE Slave Lake, Otauwau River, July. **British Columbia:** Fernie, Elk River, August; Perow, NE of Houston, June; Oliver, McKinney road, 4500 feet, May; 4 mi. W Rossland, June; 4 mi. W Midway, June; 17 mi. E McLeod Lake, July. **Northwest Territories:** 2 mi. NE Fort Simpson, July. **Ontario:** *Algoma Co.:* Michipicoten River, S of Wawa. *Sudbury Co.:* 40 km. NE Gogama, Mattagami River, August; near Mattagami River, August; 30 km. SW Foleyet, August. **Saskatchewan:** 56 mi. N Prince Albert, Bittern Creek, June; Prince Albert National Park, 10 mi. W Waskesiu, June. **Yukon Territory:** Alaska Highway, mile 1120, July; Dempster Highway, mile 32, July.

United States: **Alaska:** Alaska Peninsula, Cold Bay, July; Cold Bay, August; Denali State Park, Byers Creek at Highway 1, June; Kenai Peninsula, 11.5 mi. N Seward, Snow River, July; Kenai Peninsula, 1.5 mi. SW Soldotna, June; Prudhoe Bay Road, Nutriwik Creek, 149°45′W 67°55′N, 2300 feet, July; 7.5 mi. NNW Dillingham, Red Bluff, Wood River, 158°33′W 59°8′30″N, July. **Colorado. Idaho:** Fort Sherman, April. *Idaho Co.:* 20.7 mi. WSW Lolo Pass. Squaw Creek, 3150 feet, July. **Montana:** *Gallatin Co.:* 23 mi. NNW West Yellowstone, Beaver Creek, 6500 feet, July. **Oregon:** *Umatilla Co.:* Tollgate, June. **Wisconsin:** *Bayfield Co.:* 10 mi. NE Cornucopia, Lake Superior, August. **Wyoming:** *Fremont Co.:* 10 mi. SW Lander, Middle Fork Popo Agie River, 7100 feet, June. *Sheridan Co.:* 42 mi. W Sheridan, Prune Creek, Prune Creek Campground, 7400 feet, July.

*Bledius diagonalis* LeConte
Figure 77

Specimens: 357.

Mexico: **Baja California:** 17 mi. S Ensenada, June (large form).

United States: **Arizona:** *Pima Co.:* 10 mi. NE Tucson, near Catalina Highway, Santa Catalina Mountains, 3000 feet, May (small form); Santa Catalina foothills, February (small form); Catal[ina] Springs (small form); Tucson, Sabino Canyon, March (small form). **California:** *Kern Co.:* (large form). *Los Angeles Co.:* Pasadena, April (large and small forms); Palmdale (large form). *Madera Co.:* Raymond, May (rectangulate form). *Monterey Co.:* Carmel (large form). *Riverside Co.:* Palm Canyon, April (small form); Banning, May (small form); Palm Springs (small form); Pinon Flat, San Jacinto Mountains, May (large form). *San Bernardino Co.:* 8 mi. N Lake Arrowhead, route 173, 5100 feet, May (small form); Lake Arrowhead, July (small form). *San Diego Co.:* San Vicente Valley, June (large form); San Diego (large form). *San Luis Obispo Co.:* Arroyo Grande, creek near Santa Manuela school, April (rectangulate form); 13.6 mi. ENE Arroyo Grande, 900 feet, May (rectangulate form).

*Bledius emarginatus* (Say)
Figure 18

Specimens: 1377.

Canada: **Ontario:** Trenton, July, August; Ottawa, June; Dirleton, October; Walsingham, SW Simcoe, June. **Quebec:** Kazabazua, August; Montreal, June; Berthierville, May; Joliette.

United States: **Alabama:** Silver Hill, July. *Clay Co.:* Pyziton. *Mobile Co.:* Mobile, June; Theodore, June. *Macon Co.:* LaPlace, near Tuskeege, June. *Montgomery Co.:* Barachias, June, October. *Washington Co.:* Leroy, June. *Wilcox Co.:* Flatwood, June. **Arkansas:** *Hempstead Co.:* Hope, June, July, August. *Ouachita Co.:* Camden, June. *Pulaski Co.:* Little Rock, May. *Sebastian Co.:* Fort Smith, September. *Sevier Co.:* 5 mi. E DeQueen. *Union Co.:* 0.6 mi. SE New Hope, gravel road, July; 3.3 mi. SE Gatesville, August. **Connecticut:** *Hartford Co.:* East Hartford, May. **Georgia:** *Crawford Co.:* Roberta, April. *Floyd Co.:* Mount Berry, May. **Illinois:** *Alexander Co.:* Olive Branch, September; Horseshoe Lake, July. *Champaign Co.:* Homer, September. *Cook Co.:* Chicago, July. *Pike Co.:* Pine Lake, Nr. Pittsfield, August; Pittsfield, September. **Indiana:** *Laporte Co.:* Laporte. *Orange Co.:* West Baden Springs, July. *Pike Co.:* Rogers, June. *Tippecanoe Co.:* Lafayette, May, August. *Vanderburgh Co.:* Evansville, July. **Iowa:** *Johnson Co.:* Iowa City. **Kansas:** *Clay Co.:* 1 mi. S Clay Center, Republican River at route 15, Au-

gust. *Douglas Co.:* Lawrence, May, August. *Leavenworth Co.:* Leavenworth, September. *Riley Co.:* September. *Shawnee Co.:* Topeka, July. *Sumner Co.:* Ashton. **Kentucky:** *Rowan Co.:* Morehead, September. **Louisiana:** *Caddo Par.:* Shreveport, June, July. *Concordia Par.:* 10 mi. E Ferriday, August. *East Baton Rouge Par.:* Baton Rouge, June, October. *Madison Par.:* Tallulah, July. *Orleans Par.:* Harahan, July, August. *Rapides Par.:* Forest Hill, September. *Terrebonne Par.:* Schreiver, June. **Maryland:** Claiborne, September. *Montgomery Co.:* Plummer's Island, May. *Prince Georges Co.:* Marlboro, May. **Massachusetts:** *Franklin Co.:* Northfield, August. *Hampden Co.:* Springfield, September; Chicopee, September. *Hampshire Co.:* Northampton, August; Amherst, July. *Middlesex Co.:* Framingham, August; Tyngsboro, Merrick River, April; Hopkinton, August. **Michigan:** *Macomb Co.:* E of Memphis, July, August. *Midland Co.:* June, July, August. *Wayne Co.:* Detroit. **Mississippi:** Keelersfield, August. *George Co.:* Lucedale, April. *Greene Co.: Hancock Co.:* Bay St. Louis, June. *Harrison Co.:* Gulfport, August. *Perry Co.:* New Augusta, March. **Missouri:** *Mississippi Co.:* Charleston, May. *St. Louis Co.:* St. Louis, Jefferson Barracks, May. **Montana:** *Rosebud Co.:* Forsyth, Yellowstone River, August. **Nebraska:** *Cuming Co.:* West Point. *Douglas Co.:* 14 mi. E Wahoo, Platte River, June; Two Rivers State Park, August. **New Jersey:** *Essex Co.:* Orange. *Warren Co.:* 1 mi. SW Belvidere, Delaware River, June; Phillipsburg, July, August. **New York:** *Tompkins Co.:* Ithaca, June. **North Carolina:** *Dare Co.:* Cape Hatteras National Seashore, Oregon Inlet, July. *Guilford Co.:* Gibsonville, June. *Robeson Co.* **North Dakota:** *Burleigh Co.:* Bismarck. **Ohio:** *Morgan Co.:* 8 mi. NNW McConnelsville, July. **Oklahoma:** *Creek Co.:* Sapulpa, June. *Marshall Co.:* University of Oklahoma Biological Station, June. *Tulsa Co.:* Tulsa, June. **Pennsylvania:** *Allegheny Co.:* Allegheny. *Monroe Co.:* Delaware Water Gap, Delaware River, June, August. *Northampton Co.:* 7 mi. N Easton, Delaware River, June; Easton, June. *Westmoreland Co.:* Jeannette, July. **South Carolina:** *Oconee Co.:* Clemson. **South Dakota:** *Brookings Co.:* Brookings, July, August. *Buffalo Co.:* Fort Thompson, August, September. **Tennessee:** *Carter Co.:* Elizabethton, September. *Cumberland Co.:* Cumberland Mountain State Park, July. *Humphreys Co.:* Hurricane Mills, September. *Knox Co.:* Knoxville, June. **Texas:** *Colorado Co.:* Columbus. *Fort Bend Co.:* Richmond, Brazos River, June. *Hale Co.:* Plainview, August. *Lee Co.:* Fedor. *Montague Co.:* 2 mi. SW Forestburg, May. **Virginia:** Newport News, Fort Monroe. *Fairfax Co.:* Great Falls, September. *Lee Co.:* Pennington Gap. *Nansemond Co.:* Deep Creek; Lake Drummond, September; NW shore of Lake Drummond, August. *Shenandoah Co.:* Hawkinstown, July. **West Virginia:** Justice, July. *Jackson Co.:* Millwood, June; Cottageville, July; Ripley, June. *Lincoln Co.:* Hamlin, July. *Pocahontas Co.:* Marlington, July. *Tyler Co.:* Sisterville, June. **Wisconsin:** *Ashland Co.:* 15 mi. SSE Ashland, Marengo River, August.

*Bledius gentilis* Casey
Figure 160

Specimens: 391.

United States: **Arizona:** *Pima Co.:* Santa Catalina foothills, May; 10 mi. NE Tucson, Santa Catalina Mountains, 3000 feet, May; Tucson, Bear Canyon, March; Catalina Mountains, April, May. *Santa Cruz Co.:* Santa Rita Mountains, Madera Canyon, 4400 feet, June; Santa Rita Mountains, May. **California:** *Madera Co.:* Bass Lake, July. *Mono Co.:* Bodie, 8475 feet, July. *Riverside Co.:* 7.7 mi. SE Idyllwild, Herkey Creek Park, San Jacinto Mountains, 4500 feet, June; 12.9 mi. SE Idyllwild, Morris Creek, 4500 feet, June. *San Bernardino Co.:* 19.5 mi. N Crestline, route 138, 3100 feet, May; 10.8 mi. N Lake Arrowhead, 4600 feet, May. *San Diego Co.:* 7.5 mi. E Julian, Banner Creek, 2700 feet, May; 0.7 mi. E Ramona, Hatfield Creek, 1400 feet, May; 6.5 mi. SE Ramona, San Vicente Creek, 1400 feet, May. *San Luis Obispo Co.:* 13.6 mi. ENE Arroyo Grande, Huasna Creek, 900 feet, May; Templeton, Salinas River, 850 feet, May. *Siskiyou Co.:* Cole, July. *Santa Cruz Co.:* Santa Cruz. *Sonoma Co.:* Santa Rosa. *Ventura Co.:* 7.1 mi. ESE Ojai, Sisar Creek, 1500 feet, May. **Colorado:** *Costilla Co.:* Garland, June. **Idaho:** *Bannock Co.:* Pocatello. **Iowa:** *Johnson Co.:* Iowa City. **Oregon:** *Benton Co.:* Blodgett, June. *Douglas Co.:* Scottsburg, August. *Lane Co.:* 25 mi. E Florence, Siuslaw River, August. *Malheur Co.:* Sucker Creek Canyon, June. **Utah:** *Beaver Co.:* 8.9 mi. E Beaver, Beaver River, at Ponderosa Picnic Area, 6900 feet, June. *Iron Co.:* 5 mi. SE Cedar City, August.

*Bledius gracilis* Casey
Figure 188

Specimens: 46.

United States: **California:** *Mendocino Co.:* 4.2 mi. S Yorkville, Dry Creek, 1000 feet, July; Soda Springs, Anderson Valley. *Plumas Co.:* 16 mi. N Quincy, June. *Sonoma Co.:* Guerneville, May. **Oregon:** *Josephine Co.:* 0.5 mi. S Cave Junction, Illinois River State Park, East Fork Illinois River, July.

**Bledius habrus**, new species
Figure 303

Specimens: 110.

Canada: **British Columbia:** Mount Revelstoke, July; Fernie, May; 22 mi. W Chetwynd, Pine Riv-

er, July; 4 mi. W Midway, June; 10 mi. E Rogers Pass, Glacier National Park, June; 8 mi. W Creston, June; 7 mi. E Terrace, June; 20 mi. E Hope, Manning Park, June; Terrace. **Yukon Territory:** Dempster Highway, mile 60, 3500 feet, July; 11 mi. W Elsa, July.

United States: **Alaska:** Wales Highway, mile 24, Hess Creek, 149°10′W, 65°40′N, 600 feet, July; between Rapid River and Rampart House, June; 7.5 mi. NNW Dillingham, Wood River, Red Bluff, 150°33′W, 59°8′N, June; Steese Highway, mile 76, Upper Chatanika River, July; Kenai Peninsula, 12 mi. N Homer, Anchor River Campground, 450 feet, June; Kenai Peninsual, Anchor River at Highway 1, June; Kenai Peninsula, Crook Creek at Highway 1, S of Kasilof, June. **Washington:** *Kittitas Co.:* Easton.

**Bledius jucundus**, new species
Figure 315

Specimens: 135.

United States: **Colorado:** *Dolores Co.:* 27 mi. NE Dolores (Montezuma Co.) 2.7 mi. up Fish Creek from main road, Fish Creek, 8200 feet, July; 19 mi. NE Dolores (Montezuma Co.), West Dolores River, 7600 feet, July. **Montana:** *Gallatin Co.:* 23 mi. NNW West Yellowstone, Beaver Creek, 6500 feet, July. **Utah:** *Summit Co.:* 7 mi. ESE Kamas, Beaver Creek, 7300 feet, June; 8.5 mi. ESE Kamas, Beaver Creek, 7400 feet, June.

*Bledius laticollis* LeConte
Figure 235

Specimens: 865.

Mexico: **Baja California:** Guadalupe, May; 7.2 mi. N Guadalupe, Carretera 3, April.

United States: **California:** *Alameda Co.:* Niles Canyon, May. *Fresno Co.:* 15 mi. NE Clovis, May; Coalinga, May. *Kern Co.:* 4 mi. E Caliente, Caliente Creek, March. *Humboldt Co.:* Bear River, June; Carlotta River, Van Duzen River, June; Korbel, June; Willow Creek, June. *Los Angeles Co.:* Pasadena, February, March, April, May; Pico, February; San Fernando, May; Azusa, May; San Marino, May; Pomona; Saugus, April; Hynes, April, May; Griffith Park; Rivera, April. *Madera Co.:* Northfork, May. *Mendocino Co.:* Yorkville, April. *Monterey Co.:* Stone Canyon, April: Paraiso Hot Springs, May. *Nevada Co.:* Truckee, 5800 feet, August. *Riverside Co.:* Temecula, March; Temecula Canyon, Santa Margarita River, 750–800 feet, July; Riverside, April. *San Benito Co.:* 45 mi. SSE Hollister, San Benito River, 1400 feet, May; Hollister, San Benito River, 400 feet, May. *San Bernardino Co.:* San Bernardino; Colton, May. *San Diego Co.:* San Diego; Mission Valley, April, May; El Monte Oaks, January, March, April; Poway; Coronado, The Willows, March; Campo Lake, April; Isham Creek, May; San Vicente Valley, April; Foster; El Capitan Dam, April; 5 mi. N Ramona, Pamo Valley, Temescal Creek, 800 feet, May; 8 mi. N Ramona, Pamo Valley, Temescal Creek, 1000 feet, May; 6.5 mi. SE Ramona, San Vicente Creek, 1400 feet, May; Descanso, Sweetwater River, 3300 feet, May; 15 mi. E Oceanside, San Luis Rey River, 300 feet, May; *San Luis Obispo Co.:* 13.6 mi. ENE Arroyo Grande, Huasna Creek, 900 feet, May; Templeton, Salinas River, 850 feet, May; mountains W of La Panza, May. *Santa Barbara Co.:* Lompoc, Santa Ynez River, May; 27 mi. ENE Santa Maria, Cuyama River, 1100 feet, May; 14 mi. SE Santa Maria, Sisquoc River, May. *Santa Clara Co. Siskiyou Co.:* 70 mi. E Willow Creek, Klamath River Valley, June. *Sonoma Co.:* Duncan Mills, June; Guerneville, May. *Stanislaus Co.:* La Grange, February, May; 16 mi. W Patterson, Adobe Creek, April. *Tehama Co.:* Red Bluff, March. *Trinity Co.:* Mad River at route 36, June. *Tulare Co.:* Kaweah, 1000 feet, April. *Ventura Co.:* Ojai Valley; 41 mi. N Ojai, Cuyama River, 3700 feet, May; 44 mi. N Ojai, Reyes Creek Campground, Reyes Creek, 3900 feet, May; Fillmore, Santa Clara River, May. *Yolo Co.:* 2 mi. N Rumsey Creek, Cache Creek, November. **Oregon:** *Jackson Co.:* Shady Cove, Rogue River, May. *Lane Co.:* Walterville, June. **Washington:** *Whitman Co.:* St. John, June.

**Bledius melanocolus**, new species
Figure 168

Specimens: 116.

United States: **California:** *San Bernardino Co.:* 30 mi. ENE Redlands, Santa Ana River, South Fork Campground, 6300 feet, May; 10 mi. S Hesperia, route 173, 3300 feet, May.

*Bledius monticola* Casey
Figure 278

Specimens: 170

United States: **California:** Lake Tahoe. *Alpine Co.:* 22 mi. NE Strawberry (Tuolumne Co.), Clark Fork River near Cottonwood Creek, 5800 feet, July; 26.5 mi. NE Strawberry (Tuolumne Co.) near Clark Fork River, 6400 feet, July. *El Dorado Co.:* 5 mi. SW Kyburz, 4000 feet, May; 3 mi. E Kyburz, 5500 feet, August. *Lassen Co.:* Facht, May. *Sierra Co.:* 14 mi. E Sierra City, Yuba Pass, 6700 feet, June; 6.5 mi. E Sierra City, North Yuba River, 5600 feet, June; 10 mi. E Sierra City, North Yuba River, 6200 feet, June. *Tuolumne Co.:* 6 mi. N Summit Range Station, 4 mi. N Strawberry, July. **Oregon:** *Clackamas Co.:* Mount Hood, July; Mount Hood, near Barlow Pass, 4000 feet, June. *Hood River Co.:* 20 mi. SSW Mount Hood, Mount Hood Meadow Ski Area, nr. Umbrella Falls, E Fork Hood River, 5200 feet; July; 37 mi. S Hood River, S Fork Iron Creek, 4240 feet, July; 11 mi. S Mount Hood, Powder Springs, 4000 feet, July;

10 mi. S Mount Hood, Clinger Springs, 4300 feet, July.

**Bledius naius**, new species
Figure 315

Specimens: 3.

United States. **Arizona:** *Santa Cruz Co.:* Santa Rita Mountains, Madera Canyon, July, August.

**Bledius nardus**, new species
Figure 126

Specimens: 237.

Canada: **British Columbia:** Wynndel, July; 4 mi. W Midway, June; 8 mi. W Creston, June.

United States: **California:** *Del Norte Co.:* Creston City, July. *Humboldt Co.:* Korbel, June. **Idaho:** Challis National Forest, Twin Creek Forest Camp, 5000 feet, July. *Idaho Co.:* 20.7 mi. WSW Lolo Pass, Squaw Creek, 3150 feet, July. *Lemhi Co.:* 16.3 mi. N North Fork, North Fork Salmon River, 5200 feet, July. **Montana:** *Missoula Co.:* 27 mi. WSW Lolo, West Fork Lolo Creek, 4200 feet, July; 1.5 mi. SW Lolo Hot Springs, Lee Creek, 4200 feet, July. **Oregon:** *Benton Co.:* Blodgett, June; 2 mi. S Blodgett, Mulkey Creek, 500 feet, July. *Douglas Co.:* Scottsburg, August. *Lane Co.:* 25 mi. E Florence, Siuslaw River, August. **Washington:** *Clallam Co.:* 18 mi. E Clallam Bay, Deep Creek, July; 8 mi. E Sappho, Camp Creek, July. *Cowlitz Co.:* 6 mi. W Spirit Lake, North Fork Toutle River, 2200 feet, July. *Jefferson Co.:* Olympic National Park, Queets Ranger Station, May. *King Co.:* North Bend, July. *Lewis Co.:* Randle, Cowlitz River, July. *Skamania Co.:* Mount St. Helens, Spirit Lake, Bear Creek, 3200 feet, July. *Thurston Co.:* 7 mi. E Tenino, Deschutes River, July; Tenino. **Wyoming:** Yellowstone National Park. *Park Co.:* 42.5 mi. W Cody, Shoshone River, 6400 feet, July.

*Bledius newelli* Hatch
Figure 263

Specimens: 201.

United States: **Oregon:** *Douglas Co.:* Winchester Bay, April, June, July. *Tillamook Co.:* Pacific City, May. **Washington:** *Grays Harbor Co.:* Ocean City State Park, near Ocean City, July; Ocean Shores at Point Brown, July.

**Bledius omega**, new species
Figure 152

Specimens: 141.

Canada: **Alberta:** Lethbridge, August. **Manitoba:** Aweme, July; Brandon, June, July, August. **Ontario:** 43 mi. N Sault St. Marie, near Batchawena Carp River at Lake Superior, July. **Quebec:** Portneuf, St. Leonard, September.

United States: **Colorado:** *Dolores Co.:* 19 mi. NE Dolores (Montezuma Co.), West Dolores River, July. **Michigan:** *Schoolcraft Co.:* Floodwood, July; Manistique, July. **Montana:** *Broadwater Co.:* Townsend, Missouri River, August. *Rosebud Co.:* Forsythe, Yellowstone River, August. **New York. North Dakota:** *Burleigh Co.:* July. *Slope Co.:* Little Missouri River at U.S. route 12, August. **Wisconsin:** *Ashland Co.:* 15 mi. SSE Ashland, Marengo River, August, September.

*Bledius parvicollis* Casey
Figure 90

Specimens: 24.

United States: **California:** *Mendocino Co.:* Gualala. *Humboldt Co.:* Blue Lake, June. **Oregon:** *Douglas Co.:* 13 mi. E Reedsport, Loon Lake, August. **Washington:** *Jefferson Co.:* Olympic National Park, Queets Ranger Station, May. *Lewis Co.:* Chehalis, May. *Thurston Co.:* 7 mi. E Tenino, Deschutes River, July; Tenino.

*Bledius persimilis* Fall
Figure 188

Specimens: 53.

United States: **California:** *Los Angeles Co.:* Pomona, June; Los Angeles, April. *San Luis Obispo Co.:* 15.7 mi. SE Santa Margarita, Salinas River, 1500 feet, May. *Santa Barbara Co.:* Lompoc, Santa Ynez River, May. *Santa Clara Co. Ventura Co.:* Fillmore, Santa Clara River, May.

*Bledius phytosinus* LeConte
Figure 307

Specimens: 3.

United States: **California:** "Southern California" (Lectotype). *Los Angeles Co.:* Pomona, April. *Ventura Co.:* Fillmore, Santa Clara River, May.

*Bledius ruficornis* LeConte
Figure 294

Specimens: 2351.

An asterisk refers to localities from which specimens of *ruficornis* and *bicolor* were collected together.

Canada: **British Columbia:** Fernie, August; Corbin, July; Salmon Arm, October. **Manitoba:** Riding Mountain National Park, Whirlpool River at route 19, June. **Quebec:** Duparquet, May. **Saskatchewan:** 19 mi. W Shellbrook, July.

Mexico: **Baja California:** Rancho Espandado, May.

United States: **Arizona:** *Yuma Co.:* Yuma, April. **California:** Glacier Point, 7705 feet, May; Mount Silliman, 8000 feet, August; Lampsons Ro R. R. Flat, 1800 feet, July; Redwood Park, August; Lake Tahoe; Santa Cruz Mountains; Stanford University, Los Trancos Creek, May; Sequoia National Park, Alta Meadows, 9000 feet, July. *Alameda Co.:* Berkeley, March; hill behind Oakland, May. *Alpine Co.:* 26.5 mi. NE Strawberry (Tuolumne Co.), Clark Fork River near Cottonwood Creek, 5800 feet, July. *Calaveras Co.:* Mokelumne Hill, 1500 feet, October. *Contra Costa Co.:* Mount Dia-

blo, April. *Eldorado Co.:* 5 mi. SW Kyburz, 4000 feet, May; Strawberry Valley, November. *Fresno Co.:* King's River, 4800 feet, July; King's River, Bubbs Creek, July; Los Gatos Canyon, divide to mouth Mount Diablo Ridge, June. *Humboldt Co.:* Jordan Creek, May; Willow Creek, June; 7.5 mi. S Bridgeville, Mill Creek*, 1200 feet, July. Redwood Creek, Redwood Valley, 3 mi. N of road to Hoopa, 650 feet, June; Bridge, Van Duzen River, June. *Imperial Co.:* Salton Sea, February. *Lassen Co.:* Facht, May. *Los Angeles Co.:* San Clemente Island, June; Pasadena*, January, February, March, October; Pomona; Whittier; Los Angeles, July. *Marin Co.:* Tocaloma, Lagunitas Creek*, May, June; Cypress Ridge, April; Taylor State Park, May; Taylor State Park, tributary of Lagunitas Creek, May; near Muir Woods, November; Lagunitas, June, August. *Mariposa Co.:* Wawona, June. *Mendocino Co.:* Twin Rocks, July; Ukiah, September; W of Mailliard, Redwoods State Park, Mill Creek, September, November; 3 mi. S Dos Rios on Longvale–Dos Rios road, South Eel River, July; Mendocino, July; 2.5 mi. S Yorkville, Dry Creek, 1000 feet, July; 4.2 mi. S Yorkville, Dry Creek, 1000 feet, July; 4.4 mi. S Yorkville, Rancheria Creek, 1000 feet, July; 8 mi. NW Boonville, Navarro River, 200 feet, July. *Monterey Co.:* Jamesburg, November; Tassajara Hot Springs, May. *Napa Co.:* St. Helena, July. *Nevada Co.:* Truckee, 5800 feet, August. *Placer Co.:* 5 mi. W Tahoe City, Bear Creek, 6500 feet, August; Lake Tahoe, Tahoe Pines, 6200 feet, August. *Riverside Co.:* Idyllwild, Strawberry Creek, 5300 feet, June; 12.9 mi. SE Idyllwild, Morris Creek, 4500 feet, May; 7.7 mi. SE Idyllwild, Herkey Creek Park, San Jacinto Mountains, 4500 feet, June; Temecula Canyon, Santa Margarita River, May; San Bernardino National Forest, James Res., Lake Fulmore, May; Banning, June. *San Bernardino Co.:* 7 mi. N Crestline, Mojave River, 3700 feet, May; 2 mi. N Crestline, 4400 feet, May; 30 mi. ENE Redlands, South Fork Campground, Santa Ana River, May; Idlewild, July. *San Diego Co.:* Cuyamaca, July; San Jacinto Mountains, Pine cover, May; 1.5 mi. S Julian, Pine Hill Road, 3900 feet, May; 7.5 mi. E Julian, Banner Creek, 2700 feet, May*; 1 mi. S Lakeview, Los Coches Creek, May*; 6.5 mi. SE Ramona, San Vicente Creek, 1400 feet, May; 5 mi. N Ramona, Pamo Valley, Temescal Creek, 800 feet, May; 8 mi. N Ramona, Pamo Valley, Temescal Creek, 1000 feet, May*; 0.7 mi. E Ramona, Hatfield creek, 1400 feet, May; 7.5 mi. NE Ramona, 1600 feet, May; 10 mi. NNW Descanso, Wildcat Spring, May; 2 mi. N Descanso, Descanso Creek, 3700 feet, May; Descanso, Sweetwater River, 3300 feet, May; San Vicente Valley, March, April; San Diego, July; Barona Mesa, June; Isham Creek, May; El Monte Oaks, April, Poway. *San Francisco Co.:* San Francisco, May, June. *San Luis Obispo Co.:* 6.6 mi. ENE Arroyo Grande, Tar Spring Creek, May*; Arroyo Grande, Arroyo Grande Creek, May; 15.7 mi. SE Santa Margarita, Salinas River, 1500 feet, May; 8 mi. E Morro Bay, June. *San Mateo Co.:* Portola Park, June; La Honda, May; 25 mi. S Half Moon Bay, Lobitos Creek, November. *Santa Clara Co.:* Los Gatos, June; Saratoga, July. *Santa Cruz Co.:* August; Santa Cruz Mountains, Corralitos, Redwood, May; Santa Cruz Mountains; Zayante, April; 6 mi. N Boulder Creek, October. *Sierra Co.:* 14 mi. E Sierra City, Yuba Pass, 6700 feet, June. *Siskiyou Co.:* 5.4 mi. SE Seiad Valley, O'Neil Creek, 1500 feet, July; Cole, July; Dunsmuir, June; Taylor Creek below road to Taylor Lake, 5400 feet, August; North Russian Creek at J. Joe curve of Sawyers Bar–Etna road, 3800 feet, July. *Sonoma Co.:* Creek by Highway 128 at Alderglen NW of Cloverdale, October; Mill Creek, W of Healdsburg, April; Duncan Mills, June; Korbel, June; Cazadero, March; Guerneville, May. *Trinity Co.:* 4 mi. NW Big Bar, Little French Creek at route 299, July. *Tulare Co.:* Sequoia National Park, Wolverton, 7000–9000 feet, June; Giant Forest, 6400 feet, May; 5 mi. S Pine Flat, White River Camp, White River, 4146 feet, July. *Tuolumne Co.:* Sugar Pine; Pinecrest, July; Yosemite National Park, Aspen Valley, June; 6 mi. N Summit Ranger Station, 4 mi. N Strawberry, July. *Ventura Co.:* 7.1 mi. ESE Ojai, Sisar Creek, 1500 feet, May; 9 mi. ESE Ojai, Sisar Creek, 1200 feet, May; 8 mi. N Ojai, North Fork Matilla Creek, 2000 feet, May; Fillmore, Santa Clara River, May. **Colorado:** Coal Creek Canyon, July; Deer Creek Canyon, July. **Idaho:** Challis National Forest, Twin Creek Forest Camp, July. *Bonner Co.:* Sand Point, July. *Idaho Co.:* 24.5 mi. WSW Lolo Pass, near Jerry Johnson Campground, Lochusa River, July; 20.7 mi. WSW Lolo Pass, Squaw Creek, 3150 feet, July. *Kootenai Co.:* Coeur d'Alene Lake, May. *Lemhi Co.:* 16.3 mi. N North Fork, North Fork Salmon River, 5200 feet, July. *Shoshone Co.:* St. Joe River. **Michigan:** *Chippewa Co.:* White Fish Point, Lake Superior. *Marquette Co.:* Marquette. **Montana:** Bear Paw Mountains. *Hill Co.:* Assiniboine. **New York:** *Westchester Co.:* Croton Point Park, Hudson River, May. **Oregon:** *Coos Co.:* Cape Arago, June; 4 mi. SE Myrtle Point, Middle Fork Coquille River, August. *Curry Co.:* 1 mi. E Gold Beach, Indian Creek, June; 0.5 mi. NW Brookings, Harris Beach State Park, July. *Douglas Co.:* Winchester Bay, June, July; 27.3 mi. NE Reedsport, Smith River Falls, June; 10 mi. N Reedsport, Carter Lake, August. *Hood River Co.:* Mount Hood, Sand Creek, July; 1.5 mi. E Cascade Locks, Herman Creek, July; 5.5 mi. S Mount Hood, East Fork Hood River, 2400 feet, July; 7.2 mi. S Mount Hood, near East Fork Hood River, 2500 feet, July. *Jackson*

*Co.:* 22 mi. ESE Eagle Point, Dead Indian Creek at Dead Indian Soda Spring, near South Fork Butte Creek, 2660 feet, June; Rogue River, June; 19 mi. SE Eagle Point, August. *Jefferson Co.:* 20 mi. NW Warm Springs, Highway 26, June. *Lane Co.:* 25 mi. E Florence, Siuslaw River*, August. *Multnomah Co.:* Multnomah Falls, July. *Sherman Co.:* The Dalles. **South Dakota:** *Custer Co.:* 7 mi. W Custer, Wabash Spring, 5800 feet, June. *Lawrence Co.:* 16 mi. SSW Spearfish, Little Spearfish Creek, 6000 feet, July; *Pennington Co.:* 5.7 mi. SSW Hill City, Spring Creek, 5500 feet, June; 10 mi. S Hill City, June. **Utah:** *Piute Co.:* City Creek Canyon. *Summit Co.:* 16 mi. ESE Kamas, Provo River, 8000 feet, June. **Washington:** *Cowlitz Co.:* 6 mi. W Spirit Lake, North Fork Toutle River, 2200 feet, July. *King Co.:* North Bend, July. *Lewis Co.:* Packwood, Cowlitz River, July; Randle, Cowlitz River, July. *Pierce Co.:* Mount Ranier National Park, Nisqually River, 3900–4000 feet, May, August. *Thurston Co.* **Wisconsin:** *Bayfield Co.:* 10 mi. NE Cornucopia, Lake Superior, August.

**Bledius susae**, new species
Figure 333

Specimens: 122.

United States: **Texas:** *Aransas Co.:* 9 mi. NW Rockport, Goose Island State Park, June; 4 mi. S Rockport, route 35, April.

*Bledius suturalis* LeConte
Figure 180

Specimens: 2459.

Canada: **Alberta:** 5 mi. E Edson, McLeod River, July; 4 mi. W Hinton, Athabasca River, July; 2 mi. N Rocky Mountain House, North Saskatchewan River, July; 94 mi. W Rocky Mountain House, North Saskatchewan River, July; 103 mi. W Rocky Mountain House, North Saskatchewan River, July; 27 mi. E High Level, Ponton River, July; 16 mi. SW Fairview, Peace River, July; 24 mi. E Grande Prairie, Smoky River, July; near Burbank, Blindman and Red Deer rivers, June. **British Columbia:** Vancouver Island. 2 mi. S Salmo, June; 13 mi. W Osoyoos, June; 16.5 mi. NE Prince George, Salmon River, July; mountains between Hope and Okanagan, September; Vernon, August; Glenemma, Salmon River, July; Shuswap River, July; Keremeos, July; Vernon, Okanagan Landing, August; Kamloops; 4 mi. W Midway, June; 16 mi. W Osoyoos, June; Creston, May; Salmon Arm, Salmon River, October. 13 mi. N Smithers, June; NE of Terrace, Zymoetz River, June; Marguerite, N of William's Lake, June; mouth of Pine River, June; Fernie, August; 15 mi. ESE Golden, Kicking Horse River, July; 9 mi. NW Golden, Columbia and Blaeberry Rivers, July. **Northwest Territories:** 8 mi. SE Fort Simpson, June. **Ontario:** Lake Superior Provincial Park, Old Woman Bay, June; 15 km. E Massey, Birch Creek, August; 46 mi. N Hurkett, Black Sturgeon Lake, June; Nepigon, June. **Saskatchewan:** Chaplin Lake, W of Moose Jaw, July; 34 mi. SSE Lloydminster, near Marsden, Manito Lake, July. **Yukon Territory:** 10 mi. E Dawson City, July.

United States: **Alaska:** 15 mi. N Haines, Chilkat River, June; Mile 1250 Alaska Highway, June; Talkeetna River, July. **Arizona:** Gila River. *Apache Co.:* Chinle, July. *Navajo Co.:* Holbrook. *Yavapai Co.:* Camp Verde, Verde River, 3100 feet, June. **California:** Northfork, May; S Gorgonio Mountain, 7000 feet; Tujunga Can., March; Kings Canyon National Park, June; San Lorenzo River, June; Kings River Camp, August; Lassen National Forest, June. Yosemite National Park, Swamp Lake, Miguel Meadow Research Reserve, June. *Alpine Co.:* 22 mi. NE Strawberry (Tuolumne Co.), Clark Fork River, near Cottonwood Creek, 5800 feet, July. *Calaveras Co.:* Mokel[umne] Hill, July. *Eldorado Co.:* Strawberry Valley, September; 5 mi. SW Kyburz, 4000 feet, May. *Fresno Co.:* Paradise Valley, Kings River, July; Wood Creek, Kings River, July; Camp Greeley, 2800 feet, April. *Humboldt Co.:* 7 mi. N Hoopa, Norton Creek, July; Willow Creek at Willow Creek, July. *Inyo Co.:* Lone Pine, June; Oak Creek, 4100 feet, June; Death Valley, Furnace Creek, May. *Kern Co.:* Lake Isabella, July; 5 mi. N Kernville, June. *Lassen Co.:* 8 mi. W Susanville, Susan River at Old Bridge, August. *Los Angeles Co.:* Rivera, April; Pasadena, January, February. Los Angeles. *Madera Co.:* 12.6 mi. SW Oakhurst, Fresno River, 1200 feet, May; Oakhurst, China Creek, 2300 feet, May, July; Sugar Pine. *Marin Co.:* Lagunitas, June, August, September. *Mariposa Co.:* Wawona, June. *Mendocino Co.:* 4.2 mi. S Yorkville, Dry Creek, 1000 feet, July; 8 mi. NW Boonville, Navarro River, 200 feet, July; 3 mi. S Dos Rios on Langvale–Dos Rios road, South Eel River, July. *Modoc Co.:* 9.5 mi. S Cedarville, Cottonwood Creek, 4950 feet, August. *Mono Co.:* Walker, July. *Monterey Co.:* Hastings Natural History Reserve, June. *Nevada Co.:* Truckee, 5800 feet, August. *Placer Co.:* 5 mi. W Tahoe City, Bear Creek, August; Tahoe City, June; Tahoe Pines, Lake Tahoe, 6200 feet, August. *Plumas Co.:* 16 mi. N Quincy, July. *Riverside Co.:* 7.7 mi. SE Idyllwild, Herkey Creek Park, San Jacinto Mountains, 4500 feet, June; 12.9 mi. SE Idyllwild, Morris Creek, 4500 feet, June; Idyllwild, Strawberry Creek, 5300 feet, June. *San Bernardino Co.:* Mojave Desert, Hesperia, June; 10 mi. S Hesperia, route 173, 3300 feet, May; 30 mi. ENE Redlands, South Fork Campground, Santa Ana River, 6300 feet, May; 2 mi. N Crestline, 4400 feet, May; 7 mi. N Crestline, Mojave River, 3700 feet, May; 10.8 mi. N Lake Arrowhead, route 173, 4600 feet, May; 8 mi. N Lake Arrowhead, route

173, 5100 feet, May; San Bernardino. *San Diego Co.:* Descanso, Sweetwater River, 3300 feet, May; Descanso, June; Deluz, March; 5 mi. N Ramona, Pamo Valley, Temescal Creek, 800 feet, May; 8 mi. N Ramona, Pamo Valley, Temescal Creek, 1000 feet, May; 7.5 mi. E Julian, Banner Creek, 2700 feet, May; 15 mi. E Oceanside, San Luis Rey River, 300 feet, May; Pamo Valley, April. *San Luis Obispo Co.:* 15.7 mi. SE Santa Margarita, Salinas River, 2500 feet, May; Templeton, Salinas River, 850 feet, May. *Santa Barbara Co.:* 27 mi. ENE Santa Maria, Cuyama River, 1100 feet, May; 14 mi. SE Santa Maria, Sisquoc River, May. *Santa Clara Co.:* Los Gatos, June. *Shasta Co.:* N of Lassen Volcano National Park, Lost Creek, Twin Bridges road, 4750 feet, August. *Sierra Co.:* 10 mi. E Sierra City, North Yuba River, 6200 feet, June. *Siskiyou Co.:* Shasta Retreat, 2416 feet, July; Dunsmuir; 5.4 mi. SE Seaid Valley, Klamath River, July; 3 mi. E McCloud, Elk Creek, 3200 feet, June; 5.4 mi. SE Seaid Valley, O'Neil Creek, 1500 feet, July; 7 mi NE Sawyers Bar, road to Ana, North Russian Creek, 2900 feet; 5 mi. NE Forks of Salmon, North Fork Salmon River, July; 1.5 mi. NE Cecilville, South Fork Salmon River, July; 3.7 mi. NW Forks of Salmon, Somes Bar–Callahan road, Nordheimer creek, July; 1.1 mi. from Calahan–Etna road, Sugar Creek, July; Taylor Creek, below road to Taylor Lake, 5400 feet, August; McCloud, June; 0.7 mi. W Seiad, Klamath River, August. *Sonoma Co.:* Guerneville, May; Duncan Mills, June, July. *Trinity Co.:* Mad River at Route 36, June; 0.6 mi. E Hyampon, Hayfork Creek, July; 5 mi. NW Hyampon, Big Slide Creek, July; Eagle Creek at Carrville–Callahan road, August; 3 mi. (by air) SW Douglas, Little Brown River at Route 3, August; Mud Creek, Zenia–Alderpoint road, 1500 feet, August. *Tulare Co.:* 23 mi. N Kernville (Kern Co.), South Creek, 4600 feet, May; Gray Meadow, July. *Ventura Co.:* 41 mi. N Ojai, Cuyama River, 3700 feet, May; 44 mi. N Ojai, Reyes Creek Campground, Reyes Creek, 3900 feet, May; 7.1 mi. ESE Ojai, Sisar Creek, 1500 feet, May; Fillmore, Santa Clara River, May. **Colorado:** *Chaffee Co.:* Salida, July. *Dolores Co.:* 19 mi. NE Dolores (Montezuma Co.), West Dolores River, July. *Mesa Co.:* 12 mi. NE Palisades, Plateau Creek, 5100 feet, July. *Pueblo Co.:* 20 mi. E Pueblo, Huerfano River, September. **Idaho:** *Bannock Co.:* Pocatello. *Bonner Co.:* Priest River, June; 8 mi. N Sandpoint, Pack River, September; 11 mi. N Sandpoint, July. *Lemhi Co.:* 37 mi. S Salmon, Salmon River Gorge, July. **Montana:** *Broadwater Co.:* Townsend, Missouri River, August; *Flathead Co.:* Kalispell, June. **Nebraska:** *Garden Co.:* Oshkosh, near North Platte River, September. *Sheridan Co.:* 14 mi. S Hay Springs, Niobrara River, September. **Nevada:** Lake Tahoe. *Elko Co.:* Elko. *Ormsby Co.:* Carson City, July. **New Mexico:** *Catron Co.:* Quemado, Largo River, August. *San Miguel Co.:* Provenir. **Oregon:** *Coos Co.:* 4 mi. SE Myrtle Point, Middle Fork Coquille River, August. *Deschutes Co.:* 3 mi. E Terrebonne, June. *Gilliam Co.:* Condon, June. *Harney Co.:* Frenchglen, June. *Hood River Co.:* Hood River, July. *Jackson Co.:* Shady Cove, Rogue River, May; 22 mi. ESE Eagle Point, Dead Indian Creek, Dead Indian Soda Springs, South Fork Butte Creek, June. *Josephine Co.:* 0.5 mi. S Cave Junction, Illinois River State Park, East Fork Illinois River, July. *Klamath Co.:* S of south entrance to Crater Lake National Park, Ann Creek, June. *Lake Co.:* 17 mi. N Lakeview, Crooked Creek, August. *Lane Co.:* Eugene, July; 25 mi. E Florence, Siuslaw River, August. *Malheur Co.:* Sucker Creek Canyon, June. *Yamhill Co.:* Dayton, July. **South Dakota:** *Beadle Co.:* Huron, May. *Brown Co.:* Hecla, September. *Hyde Co.:* Highmore, May. **Texas:** *Donley Co.:* 4 mi. N Clarendon, near lake, June. *Oldham Co.:* 42 mi. S Dalhart, Canadian River, September. **Utah:** Bellevue, 3400 feet, June. *Beaver Co.:* Beaver, Beaver River, 5900 feet, June. *Kane Co.:* Mount Carmel Junction, East Fork Virgin River, July. **Washington:** Lyons Ferry, September; Spokane Falls. *Chelan Co.:* Leavenworth, July; Wenatchee, July. *Jefferson Co.:* Olympic National Park, Queets Ranger Station, May. *King Co.:* Renton, October. *Kittitas Co.:* Vantage, April; Easton. *Lewis Co.:* Packwood, Cowlitz River, July. *Pierce Co.:* Elbe, Nisqually River, July. *Snohomish Co.:* Cicero, Stillaquamish River, August. *Spokane Co.:* Spokane. *Thurston Co.:* Tenino. **Wyoming:** *Park Co.:* 42.5 mi. W Cody, Shoshone River, 6400 feet, July. *Uinta Co.:* 9.3 mi. SE Evanston, 7200 feet, June.

*Bledius tarandus* Herman
Figure 104

Specimens: 1306.

Canada: **Alberta:** Lesser Slave Lake Provincial Park, Lesser Slave Lake, July; 8 mi. N Bonnyville, Beaver River, July; 2 mi. N Rocky Mountain House, North Saskatchewan River, July; 4 mi. W Hinton, Athabasca River, July; 27 mi. E High Level, Ponton River, July; 94 mi. W Rocky Mountain House, North Saskatchewan River, July; 5 mi. E Edson, McLeod River, July; 24 mi. E Grande Prairie, Smoky River, July; Slave Lake, Sawridge Creek, July; Banff, August; Innsbreck, July. **British Columbia:** 2 mi. S Salmo, June; Fernie, August; Stanley, June; 7 mi. E Terrace, June; Fort Fraser, Neehako River, June; Zymoetz River, NE of Terrace, June; Haines Highway, mile 50, Klehini River, June; Seymour, June; Hope, June; Vancouver Island, Campbell River, August; 25 mi. W Jasper (Alberta) July; Valemont, July; 22 mi. W Chet-

wynd, Pine River, July; 16.5 mi. NE Prince George, Salmon River, July; 15 mi. ESE Golden, Kicking Horse River, July; 58 mi. W McBride, Slim Creek, July; 24 mi. SE McBride, July. **Manitoba:** Churchill, July. **Newfoundland:** Deer Lake, May, August; Port aux Port Bay, St. George, August; Lomond, June. **Northwest Territories:** Great Slave Lake, Hay River, July; Hay River, shore of Hay River, July; District of Keewatin, north end of Ford Lake, June, July. **Ontario:** 27 mi. S Pickle Lake, June; Lake Superior Provincial Park, June; 12 mi. N Ignace, June. **Quebec:** Portneuf, St. Leonard, September; Great White River, June; Rupert River, June. **Saskatchewan:** 20 mi. S Waskesiu, Prince Albert, National Park, Halkett Lake, June. **Yukon Territory:** 10 mi. E Dawson City, July; Alaska Highway, mile 733, Swift River, June.

Unites States: **Alaska:** Glenn Highway, mile 138, Little Nelchina River, July; McKinley Park, Riley Creek, August; Richardson Highway, mile 58, Tiekel River, August; 15 mi. N Haines, Chilkat River, June; Denali State Park, Byers Creek at Highway 1, June; Kenai Peninsula, Anchor River at Highway 1450 feet, June; Kenai Peninsula, 11.5 mi. N Seward, Snow River, July; Prudhoe Bay Road, Bonanza, 150°40′W 66°40′N, 900 feet, July; Lake Kenai, south end Kenai Mountains, 400 feet, May. **California:** *Alpine Co.:* 22 mi. NE Strawberry (Tuolumne Co.), Clark Fork River near Cottonwood Creek, July. *Lake Co.:* Hullville, June. *Mono Co.:* Walker, July. *Siskiyou Co.:* 5.4 mi. SE Seiad Valley, Klamath River, July; 1.5 mi. NE Cecilville, South Fork Salmon River, July. **Colorado:** *Chaffee Co.:* 9 mi. W Buena Vista, Cottonwood Creek, 9600 feet, July. *Dolores Co.:* 19 mi. NE Dolores (Montezuma Co.), West Dolores River, 7600 feet, July; 27 mi. NE Dolores (Montezuma Co.), 2.7 mi. up Fish Creek from main road, 8200 feet, July. *Larimer Co.:* Estes Park, 7500 feet, July. *Routt Co.:* Yampa River, August. *San Miguel Co.:* 3 mi. W Telluride, San Miguel River, 8700 feet, July. **Idaho:** Bungalow, August. *Bonner Co.:* 11 mi. N Sand Point, Pack River, July; Coolin, Priest Lake, July. *Idaho Co.:* 24.5 mi. WSW Lolo Pass, near Jerry Johnson Campground, Lochusa River, July. **Michigan:** *Keweenaw Co.:* Eagle Harbor, Lake Superior; Point Keweenaw, Lake Superior. **Oregon:** *Crook Co.:* Prineville, July. *Douglas Co.:* Winchester Bay, June, July; Carter Lake, August; Carter Lake, 10 mi. N Reedsport, August. *Hood River Co.:* Hood River. *Lane Co.:* 3 mi. N Florence, Harbor Vista County Park, August; 25 mi. E Florence, Siuslaw River, August; Florence, Munsel Lake, May, July; Florence, June; Siltcoos Outlet, November. *Malheur Co.:* Sucker Creek Canyon, June. **Utah:** *Duchesne Co.:* Stockmore, Duchesne River, September. *Summit Co.:* 16 mi. ESE Kamas, Provo River, 8000 feet, June. *Washington Co.:* 30 mi. E Hurricane, Zion National Park, 4500 feet, July. **Washington:** *Jefferson Co.:* Olympic National Park, Queets Ranger Station, May. *King Co.:* North Bend, July. *Lewis Co.:* Packwood, Cowlitz River, July. *Pierce Co.:* Elbe, Nisqually River, July; Mount Ranier National Park, Longmire, 3000 feet, May; Mount Ranier National Park, White River Camp, June. *Snohomish Co.:* Cicero, Stillaquamish River, August; Monroe, July. *Whatcom Co.:* 11 mi. E Glacier, North Fork Nooksack River, 2100 feet, July; Mount Baker National Forest, Silver Fir Campground, 2000 feet, July. **Wyoming:** *Park Co.:* 42.5 mi. W Cody, Shoshone River, 6400 feet, July.

*Bledius tau* LeConte
Figure 140

Specimens: 493.

Canada: **Manitoba:** Victoria Beach, July, August. New Brunswick: Penobsquis, July. **Newfoundland:** Stephenville Crossing, Harrys River, July; Spruce Brook, June, July; Deer Lake, May, July; Deer Lake, South Brook, June; South Branch, July; Springdale, June; Kingspoint, June; Piccadilly, July; Hampden, June, July; Little River, July. **Nova Scotia:** Portaupique, July; Cape North, May. **Ontario:** LaRose Forest, near Bourget, June; 43 mi. N Sault St. Marie, near Batchawana, Carp River at Lake Superior, July; Prince Edwards County, April, May; 15 mi. E Massey, Birch Creek, August. **Quebec:** Menphremagog Lac, June; Hudson Heights, July.

United States: **Georgia:** *Rabun Co.:* Clayton, 2000–3700 feet, June. **Indiana:** Tremont, May. *Porter Co.:* Indiana Dunes State Park, July, August; Beverly Shores, June. **Iowa:** *Benton Co.:* Cedar Rapids, May. **Maine:** *Oxford Co.:* Paris, July. **Massachusetts:** *Franklin Co.:* Northfield, August. *Middlesex Co.:* Tyngsboro, Merrimack River, April. **Michigan:** Huron Mountains, Lake Superior, August. *Cheboygan Co.:* Douglas Lake, July. *Eaton Co.:* Grand Ledge, July. *Emmet Co.:* 2 mi. S Pellston, Maple River, July. *Macomb Co.:* E of Memphis, May. *Marquette Co.:* Marquette, June. **Minnesota:** *Olmstead Co.:* Rochester. **Nebraska:** *Thomas Co.:* Halsey, July. **New Hampshire:** Three Mile Island, May. *Grafton Co.:* Franconia. **New Jersey:** *Bergen Co.:* Rivervale, May; Montvale, May. *Warren Co.:* Phillipsburg, July. **New York:** Port Ontario, July. *Delaware Co.:* Arkville, September. *Franklin Co.:* Upper Saranac, July. *Hamilton Co.:* 2 mi. W Indian Lake, Cedar River at Route 28, July. *Ulster Co.:* Phoenicia, April, June. *Washington Co.:* Sandy Hill, August. **Ohio:** *Erie Co.:* Florence Township, Vermillion River, May. **Pennsylvania:** *Northampton Co.:* Point Pleasant, July; Easton, June. *Monroe Co.:* Delaware Water Gap, Delaware River, June. **Virginia:** *Lee Co.:*

Pennington Gap, July. **West Virginia:** *Pendleton Co.:* Mouth of Seneca, North Fork South Branch Potomac River, July. **Wisconsin:** *Ashland Co.:* 15 mi. SSE Ashland, Marengo River, September. *Bayfield Co.:* 10 mi. NE Cornucopia, Lake Superior, August. *Juneau Co.:* 6 mi. NW New Lisbon, June. *Rock Co.:* Lake Koshkonong near Edgerton, July.

*Bledius turgidus* Casey
Figure 245

Specimens: 506.

Canada. **Alberta:** Whitford Lake, May; Kananaskis, Forest Experiment Station, June; near Burbank, Blindman and Red Deer rivers, June; 28 mi. N Athabasca, June; Waterton, July; Edmonton, May, June, August; Flatbush, Pembina River, June; Lake Minnewanka, July; Banff, June; Devon, October; Calgary, July; 17 mi. ESE Slave Lake, Otauwau River, July; 4 mi. W Hinton, Athabasca River, July; 103 mi. W Rocky Mountain House, North Saskatchewan River, July; 27 mi. E Highlevel, Ponton River, July; 8 mi. N Bonnyville, Beaver River, July; 26 mi. W High Prairie, Little Smoky River, July; Moose Lake Provincial Park, 2 mi. N Bonnyville, Moose Lake, July; 20 mi. W Jasper, July; 105 mi. W Rocky Mountain House, Thompson Creek, July; 5 mi. E Edson, McLeod River, July; Banff National Park, 4500 feet, July. **British Columbia:** Bowron Lake, August; Michel; Field, Rocky Mountains, 4800 feet, July; mouth of Trout River, Laird River, June; Vanderhoof, June; Yoho Park, July, August; Glacier National Park, 10 mi. E Rogers Pass, June; 9 mi. NW Golden, Columbia and Blaeberry rivers, July; 15 mi. ESE Golden, Kicking Horse River, July; 22 mi. W Chetwynd, Pine River, July; Valemount, July; 20 mi. W Endako, June; Oliver, Vaseaux Lake, May; Oliver, May. **Manitoba:** Aweme, May; Stony Mountain, June; Porcupine Forest Preserve, Bell River, near Bell Lake, June; Riding Mountain National Park, Lake Katherine, June; Riding Mountain National Park, Whirlpool River at route 19, June; Clearwater Lake Provincial Park, Atikameg Lake at Pioneer Bay, June; Reynolds, June. **Newfoundland:** Stephenville Cross, July. **Northwest Territories:** Aklavik, September; Fort Wrigley, September; 2 mi. SE Fort Simpson, July; 8 mi. SE Fort Simpson, June; 10 mi. NW Fort Simpson, Martin River, June; Fort Simpson, Manners Creek, June; 18 mi. S Hay River, Paradise Garden, Hay River, July. **Ontario:** Toronto; 46 mi. N Hurkett, Black Sturgeon Lake, June; Walsingham, SW Of Simcoe, June. *Sudbury Co.:* Near Mattagami River, August; 40 km. NE Gogama, Mattagami River, August. **Quebec:** Montreal, May, October, November. **Saskatchewan:** 5 mi. N Prince Albert, June; Prince Albert National Park, 20 mi. S Waskesiu, Halkett Lake, June; 56 mi. N Prince Albert, Bittern Creek, June; Canora, June; Burgis, June. **Yukon Territory:** Selkirk, June; Dawson, June; Fortymile, June; Thikani River, at Highway bridge, June; Dawson City, July; Alaska Highway, mile 1120, July; Alaska Highway, mile 1147, Edith Creek, July.

United States: **Alaska:** Beaver, June; Circle, July; Riverside, Tanana River, June; Talkeetna, Talkeetna River, July; Alaska Highway, mile 1252, July; Alaska Highway, mile 1259, July. **Colorado:** Coal Creek Canyon, July; Leavenworth Valley, 9000–10,000 feet, June. *Costilla Co.:* Veta Pass, July; Garland, June. *Dolores Co.:* 19 mi. NE Dolores (Montezuma Co.), West Dolores River, 7600 feet, July. **Connecticut:** *Litchfield Co.:* Litchfield, October. **Indiana:** *Lake Co.:* Pine, May. **Maine:** *Oxford Co.:* Paris, July. **Michigan:** *Delta Co.:* Escanaba, May. *Wayne Co.:* Detroit. **Minnesota:** *Crow Wing Co.:* Brainerd, June. **Montana:** Glacier Park, July. *Gallatin Co.:* 23 mi. NNW West Yellowstone, Beaver Creek, 6500 feet, July. *Hill Co.:* Assiniboine. **New Mexico:** Santa Fe Canyon, 7000 feet, August. *Bernalillo Co.:* Albuquerque, August. **New York:** Mountain Lakes, May. *Erie Co.:* Buffalo. **Oregon:** *Klamath Co.:* 13 mi. NE Bly, near Deming Creek, slopes of Gearhart Mountain, 6100 feet, July. **South Dakota:** *Custer Co.:* 7 mi. WSW Custer, Northpole Spring, 5550 feet, June. *Lawrence Co.:* 16 mi. SSW Spearfish, Little Spearfish Creek, 6000 feet, July. *Pennington Co.:* 5.7 mi. SSW Hill City, Spring Creek, 5550 feet, June. **Utah:** *Utah Co.:* Provo, April. **Wyoming:** *Park Co.:* 42.5 mi. W Cody, Shoshone River, 6400 feet, July.

**Bledius venus**, new species
Figure 54

Specimens: 479.

United States: **California:** *Los Angeles Co.:* Saugus, April. *Mendocino Co.:* Gualala; 2 mi. S Yorkville, Rancheria Creek, July. *San Diego Co.:* San Vicente Valley, March, April, June; Pamo Valley, April; Mission Valley, April; Foster; 5 mi. N Ramona, Pamo Valley, Temescal Creek, 800 feet, May; 8 mi. N Ramona, Pamo Valley, Temescal Creek, 1000 feet, May; Descanso, Sweetwater River, 3300 feet, May; San Diego. *San Luis Obispo Co.:* 13.6 mi. ENE Arroyo Grande, Huasna Creek, 900 feet, May; Templeton, Salinas River, 850 feet, May. *Santa Barbara Co.:* Lompoc, Santa Ynez River, May; 27 mi. ENE Santa Maria, Cuyama River, 1100 feet, May. *Ventura Co.:* 41 mi. N Ojai, Cuyama River, 3700 feet, May.

*Bledius villosus* Casey
Figure 202

Specimens: 130.

United States: **California:** *Humboldt Co.:* Bridgeville, Van Duzen River, June; Weott, July;

7.5 mi. S Bridgeville, Mill Creek, 1200 feet, July. *Glenn Co.:* 25 mi. W Elk Creek, Estell Creek, Logan Basin, 3450 feet, July. *Marin Co.:* Langunitas, August, September. *Mendocino Co.:* 12.5 mi. W Willits, James Creek, and Highway 20, October; 8 mi. NW Boonville, Navarro River, 200 feet, July; Mendocino. *Modoc Co.:* 3 mi. S Lake City, Soldier Creek, July. *Plumas Co.:* Mohawk, June. *Santa Cruz Co.:* Felton, September; Zayante, August; San Lorenzo River, June. *Santa Clara Co.:* Los Gatos, June. *San Mateo Co. Shasta Co.:* Castle Crag. July. *Siskiyou Co.:* McCloud, June; 3 mi. E McCloud, Elk Creek, June; Shasta Springs, July; Dunsmuir, June; Cole, July. *Sonoma Co.:* Mill Creek, W of Healdsburg, April; Guerneville, May. *Trinity Co.:* Mud Creek, Zenia–Alder Point road, 1500 feet, August; 3 mi. (by air) SW Douglas City, Little Brown Creek at route 3, August; 10 mi SW Big Bar, Corral Creek at Hyampon–Big Bar road, August. **Oregon:** *Jackson Co.:* Prospect, August. *Lane Co.:* 25 mi. E Florence, Siuslaw River, August.

**Bledius viriosus**, new species
Figure 253

Specimens: 189.

Canada: **Alberta:** 105 mi. W Rocky Mountain House, Thompson Creek, July; 17 mi. ESE Slave Lake, Otauwau River, July; Calgary, May. **British Columbia:** Emld (?) Lake, June. **Northwest Territories:** 10 mi. SE Fort Simpson, June; 4 mi. S Hay River, 2.3 mi. E junction routes 2 and 5, July; 10 mi. NW Fort Simpson, Martin River, June; Norman Wells, June. **Ontario:** 21 mi. N Pickle Lake, June; Nepigon, June. *Sudbury Co.:* near Mattagami River, August. **Quebec:** Duparquet, June. **Saskatchewan:** 19 mi. W Shellbrook, July; 56 mi. N Prince Albert, Bittern Creek, June. **Yukon Territory:** Alaska Highway, mile 1120, July.

United States: **Alaska:** Anchorage, Eagle River, June; Taylor Highway, mile 43, July; Taylor Highway, mile 82, July; Wales Highway, mile 24, Hess Creek, 149°10′W, 65°40′N, 600 feet, July; Alaska Highway, mile 1252, July; Alaska Highway, mile 1259, July; Fairbanks, August; Kenai Peninsula, 2 mi. NE Soldotna, June. **South Dakota:** *Pennington Co.:* 5.7 mi. SSW Hill City, Spring Creek, 5550 feet, June. **Wisconsin:** *Ashland Co.:* 3 mi. E Clam Lake, Dingdong Creek, August.

**Bledius wudus**, new species
Figure 22

Specimens: 562.

United States: **Florida:** *Alachua Co.:* Gainesville, March, August; Gainesville, Hatchet Creek, April; Austin Cary Forest, June–September. *Baker Co.:* Olustee, July. *Bay Co.:* 14 mi. N Panama City, July. *Collier Co.:* Collier Seminole State Park, May. *Dade Co.:* Coconut Grove, March; Miami Springs, August. *Duval Co.:* Jacksonville, August. *Escambia Co.:* Pensacola, August. *Highlands Co.:* Sebring, July, August, September; Archbold Biological Station, October; Lake Placid, Archbold Biological Station, March, April. *Hillsborough Co.:* Tampa, MacDill Field, May. *Indian River Co.:* Indian Bay, May. *Leon Co.:* Centreville, August; 20 mi. N Tallahassee, Tall Timbers Research Station, March; Tallahassee, March, July. *Liberty Co.:* Bristol, Apalachicola River, July. *Nassau Co.:* 11.9 mi. E Callahan, May. *Marion Co.:* Mud Lake, May; 9 mi. SSW Ocala, Kinglsand County Estates, May; Belleview, May. *Okaloosa Co.:* 3 mi. NW Holt, Blackwater River at Bryant Bridge. *Orange Co.:* Winter Park, April. *Putnam Co.:* Georgetown, April; Crescent City, June. *Santa Rosa Co.:* May. *St. Lucie Co.:* Lakewood Park, April, May, June. *Sarasota Co.:* Myakka River State Park, Cabin no. 4, July. *Volusia Co.:* Enterprise, June. *Wakulla Co.:* Panacea, August. **Georgia:** *Charlton Co.:* Okefenokee Swamp, Billy's Island, June, July, August. *Decatur Co.:* Spring Creek, June. *Houston Co.:* Perry, March. *Lanier Co.:* Lakeland, August. *Taylor Co.:* Butler, April. *Thomas Co.:* Thomasville, August. *Ware Co.:* 8 mi. S Waycross, June; Waycross, March; Okefenokee National Wildlife Refuge, Stephen Foster State Park, August. **North Carolina:** *Robeson Co.:* August. **South Carolina:** *Beaufort Co.:* Hilton Head Island, July. *Charleston Co.:* Charleston. *Georgetown Co.:* Litchfield Beach, June.

**Bledius zophus**, new species
Figure 115

Specimens: 506.

Canada: **British Columbia:** Salmon Arm, May; Seymour Creek, June; Mission City, July; Indian River, July; Creston, June, July, August, September, November; 8 mi. W Creston, June; Vancouver, July; Keremeos, July; Zymoetz River, NE Terrace, June; 2 mi. S Salmo, June; Alaska Highway, mile 479.3, Prochniak Creek, July; Valemont, July. **Yukon Territory:** Alaska Highway, mile 733, Swift River, June.

United States: **California:** *Humboldt Co.:* Korbel, June. *Mendocino Co.:* Dimmick State Park, May. *Sierra Co.:* 6.5 mi. E Sierra City, North Yuba River, 5600 feet, June. **Idaho:** Bungalow, August. *Latah Co.:* Boville, June. **Oregon:** *Benton Co.:* Blodgett, June. *Clatsop Co.:* Cannon Beach, June. *Coos Co.:* 4 mi. SE Myrtle Point, Middle Fork Coquille River, August. *Douglas Co.:* Winchester Bay, July; Scottsburg, August; 13 mi. E Reedsport, Loon Lake, August; 27 mi. NE Reedsport, Smith River Falls, June; 29.2 mi. NE Reedsport, Johnson Creek, June. *Hood River Co.:* Mount Hood, Sand Creek, July. *Jackson Co.:* Union Creek, September. *Jefferson Co.:* 20 mi. NW Warm Springs,

Highway 26, June. *Klamath Co.:* S of south entrance to Crater Lake National Park, Ann Creek, June. *Lane Co.:* 25 mi. E Florence, Siuslaw River, July; Florence, Munsel Lake, July; Florence, June; Tide Wayside Park, July. **Washington:** *Clallam Co.:* Port Angeles, June; Sequim, September. *Cowlitz Co.:* 6 mi. W Spirit Lake, North Fork Toutle River, 2200 feet, July; Mount St. Helens, Hoffstadt Creek, July; Toutle River, July. *Jefferson Co.:* Olympic National Park, Queets Ranger Station, May. *King Co.:* North Bend, July; North Bend, Maloney's Grove, May; Green River Gorge, June. *Kittitas Co.:* Easton. *Pierce Co.:* Mount Ranier National Park, Longmire, 3000 feet, May. *Thurston Co.:* Tenino; 7 mi. E Tenino, Deschutes River, July. *Whatcom Co.:* Lake Whatcom, June. *Yakima Co.:* 9 mi. SW American River, July. **Wyoming:** *Sheridan Co.:* 42 mi. W Sheridan, Prune Creek, Campground, Prune Creek, 7400 feet, July.

## APPENDIX II: NEW RECORDS FOR PREVIOUSLY REVISED SPECIES

Since publication of the first two parts of this revision of *Bledius* (Herman, 1972, 1976) I have examined 6336 more specimens of the species discussed in parts I and II. Below I list the new records for species discussed earlier and, where appropriate, include a paragraph indicating extensions of the range. I also include under the name of each species the reference to the published distributional map.

*Microbledius actitus* Herman
Herman, 1972; map 1; p. 124.

Additional specimens: 100.

United States: **Texas:** *Aransas Co.:* 4 mi. S Rockport, route 35, April. *San Patricio Co.:* 6 mi. SE Aransas Pass, April.

These localities are near the type locality.

*Microbledius forcipatus*
Herman, 1972; map 2; p. 129

Additional specimens: 17.

United States: **Arizona:** *Mojave Co.:* Topock, July. *Yuma Co.:* near Imperial Dam. **Nebraska:** *Cuming Co.:* West Point. **Oklahoma:** *Marshall Co.:* University of Oklahoma Biological Station, Lake Texoma, June. **Utah:** *Kane Co.:* Mount Carmel Junction, East Fork Virgin River, July.

These records all fall within the known range of the species.

*Psamathobledius caribbeanus* (Blackwelder)
Herman, 1972; map 4; p. 146

Additional specimens: 7.

West Indies: **Jamaica:** *Manchester:* 3 mi. E Alligator Pond Beach, February. *Saint Catherine. Saint Elizabeth:* Treasure Beach, under seaweed on beach, March. *Westmorland:* Crystal Waters, November.

These are the first Jamaican records for the species.

*Psamathobledius microcephalus* (Fauvel)
Herman, 1972; map 4; p. 146

Additional specimens: 123.

Colombia: **Magdalena:** Lago Torno, March.

The species was reported from Colombia (Herman, 1972) but a specific locality was not given. The specimens included here were collected northeast of Barranquilla near the seacoast on the shore of a saline lake that has the locally applied name "Lago Torno." They were collected from sand flats within sight of the water.

*Psamathobledius punctatissimus* (LeConte)
Herman, 1972; map 3; p. 138

Additional specimens: 269.

Colombia: **Magdalena:** El Rodadero, S of Santa Marta, from sand flat near Ocean, March; Lago Torno, March.

Mexico: **Vera Cruz:** 5 mi. S Tecolutla, June. **Baja California:** La Salina, August; Estero Beach, June. **Nayarit:** Istlan del Rio, September.

United States: **California:** *Riverside Co.:* Granaja Vista Ranch, Santa Ana River, January. *San Diego Co.:* San Marcos Creek, September. **Florida:** *St. Lucie Co.:* 4 mi. N Fort Pierce. **Gerogia:** *Liberty Co.:* St. Catherines Island, April. **Louisiana:** *Plaquemines Parish:* 10 mi. NW Port Sulphur, Mississippi River, November.

West Indies: **Jamaica:** *Trelawny:* Duncans. Vieques Island, April.

The known range of the species now extends further north in California to Riverside County to the western (Mexico) and northern (Colombia) shores of the Caribbean Sea and to Jamaica and further south in Mexico to Nayarit.

*Bledius analis* LeConte
Herman, 1972; map 15; p. 231

Additional specimens: 37.

Canada: **Alberta:** Moose Lake Provincial Park, Moose Lake, 2 mi. N Bonnyville, from shaded vegetated bank, July. **Manitoba:** S of Shilo, junction of route 340 and Souris River, June.

United States: **Arizona:** *Navajo Co.:* Show Low at Highway 77, White Mountain Forest, Apache Indian Reservation, May. **Connecticut:** *Litchfield Co.:* Litchfield, October; Cornwall, July. **Michigan:** *Macomb Co.:* E of Memphis, May, June. **Missouri:** *St. Charles Co.:* St. Charles, July. **Montana:** *Blaine Co.:* 31 mi. E Havre (Will Co.) July. **Ohio:**

*Lucas Co.*, September: *Morgan Co.:* 8 mi. NNW McConnelsville, Muskingum River, July. **Wisconsin:** *Grant Co.:* Boscobel, State Nursery, July. **Wyoming:** *Sheridan Co.:* 0.7 mi. W Leiter, Clear Creek, 3750 feet, July.

These records extend the range to the north in Alberta and Manitoba, to the east in Connecticut and to the west in Wyoming and Arizona. New State records include Montana, Wyoming, Ohio, Wisconsin and Michigan. The record from Arizona requires corrobration.

*Bledius aquilonarius* Herman
Herman, 1972; figure 206

Additional specimens: 92.

Canada: **Alberta:** 103 mi. W Rocky Mountain House, North Saskatchewan River, July; 94 mi. W Rocky Mountain House, North Saskatchewan River, July. **British Columbia:** 15 mi. ESE Golden, Kicking Horse River, July. **Northwest Territories:** Fort Simpson, June; 4 mi. S Hay River, 2.3 mi. E junction routes 2 and 5, moist sand near swamp, July. **Ontario:** 46 mi. N Hurkett, Black Sturgeon Lake, June. *Sudbury Co.:* 40 km. NE Chapleau, August; near Mattagami River, August; 40 km. NE Gogama, Mattagami River, August. **Yukon Territories:** Dawson City, July.

British Columbia is the only new provincial record. The others help to close the large geographical gap between the eastern and western samples.

*Bledius assimilis* Casey
Herman, 1972; map 17; p. 243

Additional specimens: 79.

Canada: **Quebec:** Montreal, June.

United States: **Illinois:** Webster. *Cook Co.:* Chicago, May, June. *DuPage Co.:* Lombard, May, June. **Indiana:** *Tippecanoe Co.:* Lafayette, May. **Michigan:** *Huron Co. Macomb Co.:* E of Memphis, June, July, August. **Nebraska:** *Lancaster Co.:* Lincoln, May. **Ohio:** *Cuyahoga Co.:* Fairview Park, Macbeth Ave., May; Westlake, Bradley Woods Res., May, July. *Huron Co.:* North Fairfield, Ridge Road, sand quarry, June, July; Norwalk, Dublin Road, July. *Medina Co.:* Chatham Township, Ballou Road, June. **Wisconsin:** *Grant Co.:* Boscobel, State Nursery, July. *Kenosha Co.:* June.

The record from Nebraska is a western extension of the known range; the others are within the known range. This is the first report of the species from Ohio.

*Bledius fortis* LeConte
Herman, 1972; map 8; p. 190

Additional specimens: 4.

United States: **Texas:** *Aransas Co.:* 4 mi. S Rockport, route 35, April.

This record is near one that I published in 1972, but then the habitat was unknown. I found *fortis* on a broad sand flat burrowing into the sand among the vegetation.

*Bledius fumatus* LeConte
Herman, 1972; map 11; p. 217

Additional specimens: 29.

United States: **Illinois:** *DePage Co.:* Lombard, June. **Indiana:** Hessville, May. **Michigan:** *Van Buren Co.:* Paw Paw Lake, August. **Wisconsin:** *Ashland Co.:* 15 mi. SE of Ashland, Marengo River, from sand flat, August. *Grant Co.:* Boscobel, State Nursery, July.

The specimens from Ashland County, Wisconsin are the northernmost record for the species.

*Bledius basalis* LeConte
Herman, 1976; figure 89

Additional specimens: 32.

Mexico: **Tamaulipas:** NE of Aldama, September.

United States: **Florida:** *Okaloosa Co.:* Fort Walton Beach, April. **Texas:** *Nueces Co.:* Mustang Island State Park, April.

These new records are within the known range of the species.

*Bledius beattyi* Blackwelder
Herman, 1972; map 5; p. 159

Additional specimens: 104.

Colombia: **Atlantico:** E of Salgar, near Sabanilla, salt flat near salt lake near sea, March. **Magdalena:** El Rodadero, S of Santa Marta, salt flat near sea, March.

The range extension for the species is insignificant but at the time I redescribed the species little was known of its habitat. At both of the above localities the species was found in large number on salt flats adjacent to a saline lake on the sea coast.

*Bledius bellicus* Blackwelder
Herman, 1976; figure 275

Additional specimens. 21.

United States: **Kansas:** *Douglas Co.:* Lawrence, June, July. **Nebraska:** South Bend, May. *Keith Co.:* Ogallala, August. *Lancaster Co.:* Lincoln, June. *Sarpy Co.:* Bellevue, September. *Thomas Co.:* Halsey, July.

These records are within the previously known range of the species.

*Bledius ceratus* Blackwelder
Herman, 1972; map 6, p. 165

Additional specimens: 9.

United States: **Florida:** *Monroe Co.:* Everglades National Park, Flamingo Prairie, July.

West Indies: **Jamaica:** *St Catherine:* Hellshire Hills, August.

This species is now known from the mainland of Florida, not just the Keys, and from Jamaica.

*Bledius consimilis* Fall
Herman, 1976; figure 137

Additional specimens: 112.

United States: **Wyoming:** *Converse Co.:* 5 mi. NW Glenrock, North Platte River, 5000 feet, June. *Fremont Co.:* 13.5 mi. SE Lander, Twin Creek, 5500 feet, June; 4 mi. WSW Lander, Squaw Creek, 5800 feet, June. *Sweetwater Co.:* 5 mi. N Rocksprings, Killpecker Creek, 6300 feet, June.

The localities represent a new state record for the species.

*Bledius cordatus* (Say)
Herman, 1976; figure 17

Additional specimens: 19.

United States: **Texas:** *Nueces Co.:* Mustang Island State Park, April. *San Patricio Co.:* 6 mi. SE Aransas Pass, April.

These records are within the known range of the species.

*Bledius coulteri* Hatch
Herman, 1972; map 16; p. 232

Additional specimens: 12.

Canada: **Manitoba:** Riding Mountain National Park, Whirlpool River at route 19, June; S of Carberry, junction route 340 and Souris River, June.

United States: **Minnesota:** *Douglas Co.:* Alexandria, August. **Washington:** *Walla Walla Co.:* Wallula, March.

These records are within the previously known range.

*Bledius dimidiatus* LeConte
Herman, 1976; figure 17

Additional specimens: 12.

United States: **Florida:** *Highlands Co.:* Lake Istokpoga, March.

This record is within the previously known range.

*Bledius episcopalis* Fall
Herman, 1976; figure 137

Additional specimens: 6.

These additional specimens are from localities already published for the species.

*Bledius eximius* Casey
Herman, 1976; figure 275

Additional specimens: 25.

United States: **Arizona:** *Maricopa Co.:* Phoenix, April. **California:** *Inyo Co.:* 7 mi. NE Panamint Springs, May. *Siskiyou Co.:* Indian Tom Lake, 17 mi. SW of Klamath Falls (Oregon), June. **Nevada:** *Humboldt Co.:* Winnemucca, June. *Lyon Co.:* 5 mi. E Fernley, April. *Pershing Co.:* Woolsey, railroad station, July. **Utah:** *Davis Co.:* Syracuse, April. *Salt Lake Co.:* 8 mi. W Salt Lake City, Great Salt Lake, 4000 feet, June.

The record from Arizona is the first for that state; the others are within the previously known range.

*Bledius fenyesi* Bernhauer and Schubert
Herman, 1976; figure 298

Additional specimens: 273.

United States: **California:** *San Diego Co.:* San Marco Creek. *Santa Barbara Co.:* Carpinteria, May.

Most of the additional specimens are from localities that were published previously.

*Bledius ferratus* LeConte
Herman, 1972; map 8; p. 190

Additional specimens: 304.

Mexico: **Baja del Norte:** Rio Hardy Fish Camp, 100 feet, July; 80 mi. S Mexicali, June; San Felipe, May; La Salina, July, August. **Baja del Sur:** La Paz, near Guayacura Hotel, October; 1 mi. S Loreto, 25 feet, May; 4 mi. W San Jose del Cabo. **Campeche:** Zoh Laguna, April. **Nayarit:** 2 mi. E San Blas, June. **Sinaloa:** 10 mi. S Rosario, June; 20 mi. S Rosario, January; 4 mi. S Villa Union, June. **Sonora:** 26 mi. SE Guaymas, August; 18 mi. E San Luis, 200 feet, August; Desemboque, August.

United States: **California:** *Imperial Co.:* Salton Sea State Park, October; Westmorland, October; 12 mi. NW Niland, Salton Sea, May. *Inyo Co.:* 33 mi. NNE Trona (San Bernardino Co.), near Warm Sulphur Spring, May; 13 mi. NNW Furnace Creek, Death Valley, Salt Creek, June. *San Bernardino Co.:* 72.5 mi. SSE Furnace Creek (Inyo Co.), Death Valley, Saratoga Spring, June. *San Diego Co.:* San Diego, June.

The record from Campeche, Mexico extends the range of the species further south and, more importantly, east to the Caribbean Sea but I suspect the specimen may be mislabelled. I would like to see new collections that corroborate the occurrence of the species near the Caribbean Sea.

*Bledius flavipennis* LeConte
Herman, 1976; figure 178

Additional specimens: 397.

Canada: **Manitoba:** Brandon, June.

United States: **California:** *Imperial Co.:* 12 mi. E Heber, May. *Riverside Co.:* Blythe, June. *San Bernardino Co.:* 72.5 mi. SSE Furnace Creek (Inyo Co.), Death Valley, Saratoga Spring, June. **Nebraska:** *Grant Co.:* 3 mi. S Hyannis, September. **Nevada:** *Humboldt Co.:* Winnemucca, June. *Pershing Co.:* 22 mi. NE Lovelock, Rye Putch Reservoir, Humboldt River, 4000 feet, June; Woolsey railroad station, June, July. *Lyon Co.:* Fort Churchill, July. **New Mexico:** *Chaves Co.:* 17 mi. NE Roswell, June. **Utah:** *Juab Co.:* 1 mi. W Mills, Sevier River, June.

These records are within the previously known range of the species.

*Bledius foraminosus* Casey
Herman, 1972; map 10; p. 205

Additional specimens: 26.

United States: **California:** *Siskiyou Co.:* 3 mi. E McCloud, Elk Creek, 3200 feet, June. **Idaho:** *Latah Co.:* Moscow, April, May. **Oregon:** *Klamath Co.:* S of south entrance Crater Lake National Park, Ann Creek, June; Klamath Falls, July. *Wasco Co.:* Tygh Creek and Highway 197, June. **Washington:** *Walla Walla Co.:* College Place, April.

These records are within the previously known range.

*Bledius fortis* Casey
Herman, 1972; map 8; p. 190

Additional specimens: 34.

Mexico: **Tamaulipas:** La Pesea, September; NE of Aldama, September.

These specimens represent the first records of the species in Mexico, where it may be abundant.

*Bledius gravidus* Casey
Herman, 1972; map 11; p. 217

Additional specimens: 332.

Canada: **Alberta:** 8 mi. N Bonnyville, Beaver River, July; Moose Lake Provincial Park, Moose Lake, 2 mi. N Bonnyville, July; Vermilion Provincial Park, 1 mi. N Vermilion near shore of Vermilion River, July; 26 mi. W High Prairie, Little Smoky River, July; High Level, July; 2 mi. N Rocky Mountain House, North Saskatchewan River, July; 17 mi. ESE Slave Lake, Otauwau River, July; 4 mi. N Two Hills, N of Saskatchewan River; 24 mi. E Grande Prairie, Smoky River, July; 26 mi. SW Fairview, Peace River, July; 5 mi. E Edson, McLeod River, July; 4 mi. W Hinton, Athabasca, July; 7 mi. NW Wainwright, Battle River, July; 23 mi. N Viking, July; 4 mi. N Innisfail, Red Deer River, July. **British Columbia:** Valemount, July; 7 mi. SE McBride, near Beaver Creek, July; 9 mi. NW Golden, Columbia and Blaeberry rivers, July. **Manitoba:** near East Braintree, at junction routes 1 and 308, from temporarily moist sand near stream, June; 16 mi. E Neepawa, temporarily moist soil, June; Spruce Wood Provincial Park, Assiniboine River, June; near Richer, 1.6 mi. E junction routes 1 and 302, June; Porcupine Forest Preserve, Bell River, near Bell Lake, on mossy slightly moist banks, June; S of Carberry, junction route 340 and Souris River, June; Clearwater Lake Provincial Park, Atikameg Lake at Pioneer Bay, June; Mission Flats, June. **Northwest Territories:** 4 mi. S Hay River, 2.3 mi. E junction routes 2 and 5, July; Hay River, on shore of Hay River, July; 10 mi. SE Fort Simpson. **Saskatchewan:** Prince Albert National Park, Halkett Lake, 20 mi. S Waskesiu, June; 16 mi. N and 16 mi. E Lloydminster, at junction route 3 and North Saskatchewan River, July; 56 mi. N Prince Albert, Bittern Creek, June; Prince Albert, North Saskatchewan River, June; 5 mi. N Prince Albert, June; Montreal River at route 2, June; 19 mi. W Shellbrook, July.

United States: **Nebraska:** *Glen Sioux Co. Keith Co.:* Ogallala, August. *Scotts Bluff Co.:* Mitchell, June. **North Dakota:** *Cass Co.:* Fargo, June. **South Dakota:** *Custer Co.:* 7 mi. WSW Custer, North Pole Spring, June. *Fall River Co.:* 5 mi. S Hot Springs, July. **Utah:** *Duchesne Co.:* Duchesne, July. *Garfield Co.:* 8 mi. N Escalante, Blue Spruce Camp, 8000 feet, July. *Utah Co.:* Diamond Fork Canyon, June. **Wyoming:** *Sheridan Co.:* 0.7 mi. W Leiter, Clear Creek, 3750 feet, July.

Many of the records are within the previously known range. Some of the records in British Columbia, Alberta, Saskatchewan, and Manitoba are northern extensions for those provinces. The northernmost records are reported for the species in the Northwest Territories.

*Bledius ineptus* Casey
Herman, 1976; figure 206

Additional specimens: 452.

Canada: **Alberta:** 94 mi. W Rocky Mountain House, North Saskatchewan River, from soil with alkali deposits, July; 23 mi. N Viking, July; 7 mi. NW Wainwright, Battle River, on shaded grassy bank, July. **Manitoba:** 5 mi. N Minnedosa, temporarily moist soil near roadside, July; 16 mi. E Neepawa, June, temporarily moist soil near roadside, June; near Richer, 1.6 mi. E junction routes 1 and 302, edge of rainfall pond, June; near East Braintree, at junctions routes 1 and 308, June; 5 mi. W Dauphin, June; 10 mi. W Dauphin, June; Clearwater Lake Provincial Park, Atikameg Lake at Pioneer Bay, June; S of Carberry, junction route 340 and Souris River, June. **Saskatchewan:** Montreal River at route 2, June; 19 mi. W Shellbrook, June; 5 mi. N Prince Albert, open grassy soil near water on roadside, June; Prince Albert, North Saskatchewan River, June; 56 mi. N Prince Albert, Bittern Creek, June; Manito Lake, 34 mi. SSE Lloydminster near Marsden, from soil with heavy alkali deposits, July; Christopher Lake, July; 10 mi. W Hudson Bay, June.

Mexico: **Tamaulipas:** La Pesca, September.

United States: **Arizona:** *Cochise Co.:* 5 mi. W Portal, 5400 feet, July; Peloncillo Mountains, July; Douglas, June. *Pima Co.:* Molino Basin Station, Santa Catalina Mountains, August. *Yavapai Co.:* Camp Verde, Verde River, June. **Colorado:** *Mesa Co.:* 12 mi. NE Palisade, Plateau Creek, 5100 feet, July. **Kansas:** *Douglas Co.:* Lawrence, July. **Michigan:** *Macomb Co.:* E of Memphis, June, July. **Nebraska:** *Keith Co.:* Ogallala, August. **Nevada:**

*Humboldt Co.:* Winnemucca, June. **Ohio:** *Lake Co.:* Painesville, Elm Street, Salt flats, July. **Texas:** *Aransas Co.:* 4 mi. S Rockport, route 35, April. *San Patricio Co.:* 0.5 mi. W Aransas Pass, April. **Utah:** *Kane Co.:* Mount Carmel junction, east Fork Virgin River, July. *Sevier Co.:* Richfield, July. *Utah Co.:* Utah Lake, east side. *Washington Co.:* Zion National Park. **Wisconsin:** *Sauk Co.:* Prairie du Sac, Wisconsin River, June. **Wyoming:** *Sheridan Co.:* 0.7 mi. W Leiter, Clear Creek, 3750 feet, July.

These records extend the range of the species further north in Alberta, Saskatchewan and Manitoba, and west to Nevada. New state records include Nevada and Wisconsin.

*Bledius jacobinus* LeConte
Herman, 1972; map 9; p. 193

Additional specimens: 138.

Mexico: **Baja del Sur:** SW side of Isla San Francisco, May. **Nayarit:** 2 mi. E San Blas, June. **Oaxaca:** 1 mi. SW Tehuantepec, May. **Sinaloa:** 5 mi. N Mazatlan, July, August; 20 mi. W Rosario, January; Venedio, June.

New records include the first occurrence of the species in Oaxaca and Baja del Sur.

*Bledius mandibularis* Erichson
Herman, 1972; map 9; p. 193

Additional specimens: 132.

United States: **Florida:** *Indian River Co.:* Vero Beach, November. *Taylor Co.:* 28 mi. SE Perry, July. **Louisiana:** *Orleans Par.:* New Orleans. **Nebraska:** *Lancaster Co.:* Lincoln, April, August. **New Mexico:** *Chaves Co.:* 17 mi. NE Roswell, June. **Texas:** *Aransas Co.:* 4 mi. S Rockport, route 35, April. *Nueces Co.:* Mustang Island State Park, April. **Utah:** *Millard Co.:* Delta, June, July. *Salt Lake Co.:* 8 mi. W Salt Lake City, Great Salt Lake, 4000 feet, June.

These new records occur within the known range of the species but it is now reported further south in Utah and further east in Nebraska.

*Bledius melanocephalus* (Say)
Herman, 1976; p. 107

Additional specimens: 31.

United States: **Arkansas:** *Pulaski Co.:* Arkansas River E of Interstate 430 near Lock, June. *Washington Co.:* **Michigan:** *Cheboygan Co.:* June. **Wisconsin:** *Grant Co.:* Boscobel, State Nursery, August. *Sauk Co.:* Prairie du Sac, Wisconsin River, June.

These records extend the range north and east to Wisconsin and Michigan.

*Bledius monstratus* Casey
Herman, 1976; figure 298

Additional specimens: 278.

United States: **California:** *Marin Co.:* Dillon Beach, June, July, September. *San Luis Obispo Co.:* W of Los Oso, S of Morro Bay, June. *Santa Cruz Co.:* 16 mi. S Santa Cruz, Sunset Beach, April. **Oregon:** *Curry Co.:* 8.5 mi. S Gold Beach, June.

These records are within the previously known range for the species.

*Bledius nitidiceps* LeConte
Herman, 1976; figure 340

Additional specimens: 48.

Mexico: **Baja California:** Arroyo Seco, August.

United States: **California:** *Kern Co.:* 28 mi. ENE Lake Isabella, Spanish Needle Creek, 3800 feet, May. *Los Angeles Co.:* 5 mi. W Palmdale, 2800 feet, May. *San Bernardino Co.:* Victorville, Mojave River, 2900 feet, May; 19.5 mi. N Crestline, route 138, 3100 feet, May. *San Diego Co.:* Pamo Valley, May. 0.7 mi. E Ramona, Hatfield Creek, 1400 feet, May; 15 mi. E Oceanside, San Luis Rey River, 300 feet, May. *San Luis Obispo Co.:* 10 mi. W Simmler, May; 13.6 mi. ENE Arroyo Grande, Huasna creek, 900 feet, May. *Ventura Co.:* 41 mi. N Ojai, Cuyama River, 3700 feet, May; 44 mi. N Ojai, Reyes Creek Campground, Reyes creek, 3900 feet, May; Fillmore, Santa Clara River, May; 8 mi. N Ojai, North Fork Matilija Creek, 2000 feet, May; 7.1 mi. ESE Ojai, Sisar Creek, 1500 feet, May; 9 mi. ESE Ojai, Sisar Creek, 1200 feet, May.

Among these records is the first of the species in Baja California; the others are within the previously published range.

*Bledius nitidicollis* LeConte
Herman, 1972; map 14; p. 225

Additional specimens: 100.

United States: **Arkansas:** *Crittenden Co.:* 1 mi. S Mound City, Banks of Dacus Lake, June. *Pulaski Co.:* Arkansas River E of Interstate 430 near Lock, June. **Illinois:** *DuPage Co.:* Lombard, May. **Indiana:** *Tippecanoe Co.:* Lafayette, May. **Kansas:** *Leavenworth Co.:* July. *Riley Co.:* Manhattan, May. **Kentucky:** *Crittenden Co.:* 13 mi. NW Marion at Tolu, Ohio River, August. **Louisiana:** *Concordia Parish:* 10 mi. E Ferriday. **Missouri. Montana:** *Blaine Co.:* 31 mi. E Havre (Hill Co.), July. *Musselshell Co.:* 38 mi. E Roundup, Musselshell River, August. **Nebraska:** *Cuming Co.:* West Point. *Kearne Co.:* Minden, August. *Lancaster Co.:* Lincoln. **Ohio:** *Medina Co.:* Chatham Township, Ballou Road, June. **South Dakota:** *Brown Co.:* Hecla, May. **Wisconsin:** *Grant Co.:* Boscobel, State Nursery, July, August. *Kenosha Co.*

New state records include Louisiana (a southern extension of the range), Wisconsin, Indiana, Kentucky, and South Dakota.

*Bledius notialus* Herman
Herman, 1976; figure 252

Additional specimens: 54.

United States: **Arkansas:** *Pulaski Co.:* Arkansas

River S of Interstate 430 near Lock, June. **Oklahoma:** *Marshall Co.:* University of Oklahoma Biological Station. July.

These records are within the previously known range for the species.

*Bledius opacifrons* LeConte
Herman, 1976; figure 358

Additional specimens: 1310.

Canada: **British Columbia:** 24 mi. S Hundred Mile House, June. **Manitoba:** 10 mi. W Dauphin, June.

United States: **California:** Sunol, September. *Los Angeles Co.:* 5 mi. W Palmdale, 2800 feet, May. *Madera Co.:* Oakhurst, China Creek, 2300 feet, May; 12.6 mi. SE Oakhurst, Fresno River, 1200 feet, May. *Mendocino Co.:* 8 mi. NW Boonville, Navarro River, July. *Monterey Co.:* 10 mi. SE Salinas, Salinas River, 100 feet, May. *Plumas Co.:* 16 mi. N Quincy, June. *San Benito Co.:* 45 mi. SSE Hollister, San Benito River, 1400 feet, May; Hollister, San Benito River, 400 feet, May. *San Diego Co.:* 1 mi. S Lakeview, Los Coches Creek, May; 0.7 mi. E Ramona, Hatfield Creek, 1400 feet, May; 8 mi. N Ramona, Pamo Valley, Temescal Creek, 1000 feet, May; 6.5 mi. SE Ramona, San Vicente Creek, 1400 feet, May; Descanso, Sweetwater River, 3300 feet, May; 15 mi. E Oceanside, San Luis Rey River, 300 feet, May; El Monte Oaks, April. *San Luis Obispo Co.:* Arroyo Grande, Arroyo Grande Creek, May; 6.6 mi. ENE Arroyo Grande, Tar Spring Creek, May; 13.6 mi. ENE Arroyo Grande, Huasna Creek, 900 feet, May; 15.7 mi. SE Santa Margarita, Salinas River, 1500 feet, May; Templeton, Salinas River, 850 feet, May; San Luis Obispo, September. *Santa Barbara Co.:* Lompoc, Santa Ynez River, May; 27 mi. ENE Santa Maria, Cuyama River, 1100 feet, May; 14 mi. SE Santa Maria, Sisquoc River, May. *Siskiyou Co.:* 5.4 mi. SE Seiad Valley, Klamath River, July. *Trinity Co.:* Hayfork Ranger Station, May. *Ventura Co.:* 41 mi. N Ojai, Cuyama River, 3700 feet, May; 44 mi. N Ojai, Reyes Creek Campground, Reyes Creek, 3900 feet, May; Fillmore, Santa Clara River, May; 7.1 mi. ESE Ojai, Sisar Creek, 1500 feet, May; 9 mi. ESE Ojai, Sisar Creek, 1200 feet, May. **Montana:** *Blaine Co.:* 31 mi. E Havre (Hill Co.), July. **Oregon:** *Jackson Co.:* Shady Cove, Rogue River, May. *Josephine Co.:* 15 mi. SW Grants Pass, June; 0.5 mi. S Cave junction, Illinois River State Park, East Fork Illinois River, July. *Wasco Co.:* Tygh Creek, Highway 197, June. **Wyoming:** *Fremont Co.:* 2 mi. WSW Lander, Squaw Creek, 5600 feet, June. *Uinta Co.:* 9.3 mi. SE Evanston, 7200 feet, June.

Extensions of the previously known range include records in British Columbia, Manitoba, Wyoming, and Montana.

*Bledius opaculus* LeConte
Herman, 1976; figure 34

Additional specimens: 2

United States: **Maine:** *Cumberland Co.:* Portland, July. **Massachusetts:** *Barnstable Co.:* Harwich, July.

Maine is a new state record for the species.

*Bledius pallipennis* (Say)
Herman, 1972; map 7; p. 176

Additional specimens: 76.

United States: **Kansas:** *Meade Co. Reno Co.* **Mississippi:** Agricultural College. **Missouri:** Huntsdale. **Nebraska:** *Antelope Co.:* Neligh, June. *Dodge Co.:* Fremont. *Grant Co.:* 3 mi. S Hyannis, September. *Hall Co.:* Alda, May. *Holt Co.:* Spencer Dam, June. *Knox Co.:* 15 mi. NW Crofton, Lewis and Clark Lake, August. *Lancaster Co.:* Lincoln, August. **Texas:** Canadian Lake, July. *Donley Co.:* 4 mi. N Clarendon, near Lake, July. *Hamphill Co.:* 4–8 mi. NE Canadian, June; Canadian, Panhandle National Grasslands Park, June.

These new records are within the known range of *pallipennis* but Missouri is a new state record.

*Bledius philadelphicus* Fall
Herman, 1972; map 16; p. 232

Additional specimens: 133.

Canada: **Ontario:** Prince Edwards County. **Quebec:** Pointe Gatineau, May; Montreal, June, July.

United States: **Maine:** Allagash. *Penobscot Co.:* Orono, May. **Massachusetts:** Monterey, July. *Bristol Co.:* Fall River, May. *Middlesex Co.:* Framingham, August; Natick, April. **Michigan:** *Lapeer Co.:* 1 mi. S Lum, June. *Macomb Co.:* E of Memphis, April, June, July, August. **New Jersey:** *Camden Co. Middlesex Co.:* Avenel. **New York:** *Ulster Co.:* Cherrytown, 4 mi. NNW Kerhonkson, July; Accord, Rondout River, May. *Westchester Co.:* Peekskill, April. **Ohio:** *Cuyahoga Co.:* Westlake, Bradley Wood Reservoir, May, June, August; Cleveland, Rocky River Reservoir, June; Berea, June; Fairview Park, MacBeth Ave, June. *Erie Co. Huron Co.:* Norwalk, Norwalk Reservoir, July; North Fairfield, Ridge Road sand quarry, July. *Summit Co.:* Northampton Township, June. **Pennsylvania:** *Allegheny Co.:* Upper St. Clair Township, April. *Northampton Co.:* 7 mi. N Easton, Delaware River, June. **Wisconsin:** *Ashland Co.:* 15 mi. SE Ashland, Marengo River, August. *Kenosha Co.*

With the publication of these records the range of the species now extends west to Wisconsin and north to Quebec. New state records include Wis-

consin, Ohio, Michigan, Maine, and in Canada, Quebec.

*Bledius politus* Erichson
Herman, 1976; figure 252

Additional specimens: 42.

United States: **Florida:** *Collier Co.:* Collier-Seminole State Park, May. *Highlands Co.:* Lake Letta, between Avon Park and Sebring, October. *Indian River Co.:* Vero Beach, November. *Sarasota Co.:* Myakka River State Park, July. **Texas:** *Hidalgo Co. Kleberg Co.:* Padre Island National Seashore, June. *Nueces Co.:* Mustang Island State Park, April. *San Patricio Co.:* 6 mi. SE Aransas Pass, April.

The new records are within the previously known range of the species.

*Bledius rotundicollis* LeConte
Herman, 1972; map 13; p. 224

Additional specimens: 76.

Canada: **Manitoba:** S of Carberry, junction route 340 and Souris River, June. *Saskatchewan:* 10 mi. W Hudson Bay, June.

United States: **Iowa:** New Albin, May. **Minnesota:** *Hennepin Co.:* Minneapolis, July. *Swift Co.:* 3.5 mi. SW Appleton, Lake Lac Qui Parle, July. **Nebraska:** *Holt Co. Lancaster Co.:* Lincoln, April. **Wisconsin:** *Crawford Co.:* Prairie du Chien, June. *Grant Co.:* Boscobel, State Nursery, July.

Most of these records are within the previously known range of the species. The record in Saskatchewan is a new provincial record.

*Bledius rubiginosus* Erichson
Herman, 1972; map 12; p. 221

Additional specimens: 333.

United States: **Alabama:** *Dallas Co.:* Flatwood, June. **Arkansas:** *Crawford Co.:* July. *Pulaski Co.:* Arkansas River E of Interstate 430 near Lock, June. **Florida:** *Bay Co.:* 14 mi. W Panama City, July. *Washington Co.:* Falling Water State Park, June. **Kansas:** *Leavenworth Co. Riley Co.:* Manhattan, July. *Trego Co.:* 12 mi. S Ogallah, May. **Louisiana:** *Concordia Par.:* 10 mi. E Ferriday, August. **Nebraska:** *Kearne Co.:* Minden, August. **North Carolina:** *Wake Co.:* Raleigh, June. **Oklahoma:** *Marshall Co.:* University of Oklahoma Biological Station, Lake Texoma (Willis), June, July. **South Carolina. Texas.** *Comanche Co.:* Proctor and nearby farms, June. **Virginia:** Routel, Roanoke River, August. **Wisconsin:** *Grant Co.:* Boscobel, State Nursery, July. *Washburn Co. Wood Co.:* Griffith, State Nursery, June.

New records include occurrence of the species in Florida, Alabama, South Carolina, Louisiana, and Wisconsin.

*Bledius semiferrugineus* LeConte
Herman, 1972; map 10; p. 205

Additional specimens: 324.

Canada: **Ontario:** 6 mi. W Richmond, June. **Quebec:** Chinbougamou Provincial Park, August; Bois Verts, Parc des Laurentides, 2800 feet, August; St. Remi, April.

United States: **Arkansas:** *Calhoun Co.:* at junction of Interstate 167 and Ouachita River, May. *Crittenden Co.:* 1 mi. S Mound City, Dacus Lake, June; Wapponoca National Wildlife Refuge, June. *Lawrence Co.:* Lake Charles, July. *Poinsett Co.:* Lake Poinsett, at day, May. **Florida:** 3 mi. SW Lake Marian, March. **Jefferson Co.:** Monticello, July. *Lake Co.:* Leesburg, June. *Sarasota Co.:* Myakka River State Park, Cabin 4, May, June. *Taylor Co.:* 5 mi. S Perry on highway 361, June. *Washington Co.:* Falling Waters State Park, June. **Illinois:** *DuPage Co.:* Lombard, June. *Williamson Co.:* Carterv1lle, August. **Indiana:** *Vanderburgh Co.:* Evanville, July. **Iowa:** *Henry Co.:* Mt. Pleasant, May. *Story Co.:* Ames, June. **Kansas:** *Leavenworth Co.* **Louisiana:** *Madison Par.:* Tallulah, June. **Massachusetts:** *Middlesex Co.:* Natick, April; Holliston, June; Framingham, May; Tyngsboro. **Michigan:** *Lapeer Co.:* 1 mi. S Lum, June. *Macomb Co.:* E of Memphis, June. **Mississippi:** *Forrest Co.:* Camp Shelby, near Hattiesburg, August. **Missouri:** *Jackson Co.:* Raytown, August. *Monroe Co.:* Paris, June. New York: *Monroe Co.:* Rochester, September. *Tompkins Co.:* Ithaca, May. **Ohio:** *Cuyahoga Co.:* Westlake, Bradley Woods Reservoir, May, June. *Erie Co.:* Florence Township, Vermillion River, June. *Huron Co.:* Norwalk, Norwalk Reservoir, July; Northfield, Ridge Road, sand quarry, June, July. *Lorain Co.:* North Ridgeville, July. *Lucas Co. Medina Co.:* Chatham Township, Ballou Road, June. *Morgan Co.:* 8 mi. NNW McConnelsville, Muskingham River, July. **Oklahoma:** *Marshall Co.:* University of Oklahoma Biological Station, July. **Rhode Island:** *Bristol Co.:* Barrington. **South Carolina. Tennessee:** *Cumberland Co.:* Cumberland Mountain State Park, July. **Virginia:** Fort Monroe. **Wisconsin:** *Grant Co.:* Boscobel, State Nursery, July. *Kenosha Co. Washburn Co. Wood Co.:* Griffith, State Nursery, June.

New state records include Oklahoma, Wisconsin, South Carolina, Massachusetts, and Rhode Island.

*Bledius strenuus* Casey
Herman, 1976; figure 323

Additional specimens: 369.

Canada: **Alberta:** 23 mi. N Viking, July; Moose Lake Provincial Park, Moose Lake, 2 mi. N Bon-

nyville, July. **British Columbia:** 13 mi. W Osoyoos, June; Cranbrook, May. **Manitoba:** 5 mi. N Minnedosa, June; Riding Mountain National Park, E edge Clear Lake, June; 5 mi. W Dauphin, June; Clearwater Lake Provincial Park, Atikameg Lake at Pioneer Bay, June. **Ontario:** Rainy River District, July. **Saskatchewan:** Prince Albert National Park, Halkett Lake, 20 mi. S Waskesiu, June.

Mexico: **Chihuahua:** 5 mi. W Parrita, Santa Clara Canyon, June.

United States: **California:** *Alameda Co. Contra Costa Co.:* 2 mi. E Antioch, May. *Fresno Co.:* 8 mi. W Coalinga, highway 199, May. *Inyo Co.:* 2 mi. NE Lone Pine, Owen's River, May; 1 mi. SW Lone Pine Tuttle Creek; 7 mi. NE Panamint Springs, May; Laws, May. *Kern Co.:* 28 mi. ENE Lake Isabella, Spanish Needle Creek, 3800 feet, May; Taft, June; Shafter, September; 6 mi. N, 13.5 mi. E Bakersfield, July; 11.2 mi. N, 1.6 mi. E Bakersfield, August. *Lake Co. Merced Co.:* Merced, May. *Mono Co.:* 20 mi. NW Bridgeport, West Walker River, 6700 feet, June; W shore Mono Lake, 6500 feet, July; Convict Creek, May. *Riverside Co.:* 12.9 mi. SE Idyllwild, Morris Creek, 4500 feet, June; 4 mi. S Palm Desert, Boyd Desert Recreation Center, May. *San Benito Co.:* 45 mi. SSE Hollister, San Benito River, 2400 feet, May. *San Bernardino Co.:* 72.5 mi. SSE Furnace Creek (Inyo Co.), Death Valley, Saratoga Springs, June. *San Luis Obispo Co.:* Pozo, May. *Siskiyou Co.:* Indian Tom Lake, 17 mi. SW Klamath Falls (Oregon), June; Highway 97, Grass Lake, 5000 feet, June. *Stanislaus Co.:* Modesto, June, July; La Grange, July. **Colorado:** 10 mi. SW Ward, Rainbow Lake, 11,000 feet, August. **Idaho:** Malta, July. *Bear Lake Co.:* 1 mi. S Dingle, July. *Bonner Co.:* Clark Fork, May. *Canyon Co.:* Nampa, September; Parma, July, August. *Cassia Co.:* Burley, June. *Latah Co.:* Moscow, 2560 feet, August. *Owyhee Co.:* Indian Cove, July. **Nebraska:** *Cherry Co.:* Valentine Wildlife Refuge, June. *Grant Co.:* 3 mi. S Hyannis, September. *Keith Co.:* Ogallala, August. *Scotts Bluff Co.:* Mitchell, June. *Sioux Co.:* Agate, August. **Nevada:** *Eureka Co.:* 12 mi. W Eureka, 6000 feet, June. *Humboldt Co.:* Winnemucca, July. *Pershing Co.:* Woolsey, railroad station, June; 22 mi. NE Lovelock, Rye Putch Reservoir, Humboldt River, 4000 feet, June. **Oregon:** *Klamath Co.:* Klamath Falls, July. **South Dakota:** *Custer Co.:* 7 mi. WSW Custer, North Pole Spring, 5500 feet, June. *Hughes Co.:* Pierre, July. **Utah:** Calao, August. *Duchesne Co.:* Roosevelt, July. *Garfield Co.:* Escalente. *Grant Co.:* 14 mi. E, 7 mi. S Green River, June. *Juab Co.:* 1 mi. W Mills, June. **Wisconsin:** *Grant Co.:* Boscobel, State Nursery, July. **Wyoming:** *Converse Co.:* 5 mi. NW Glenrocks, North Platte River, 5000 feet, June. *Uinta Co.:* 9.3 mi. SE Evanston, 7200 feet, June. *Weston Co.:* 3 mi. SE Newcastle, 4200 feet, June.

The new records include the first published report of the species in Mexico (Chihuahua) and a new state record in Wisconsin.

*Bledius tallaci* Fall

Herman, 1972; map 12; p. 221

Additional specimens: 4.

United States: **California:** *Sierra Co.:* 6.5 mi. E Sierra City, North Yuba River, 5600 feet, June; 10 mi. E Sierra City, North Yuba River, 6200 feet, June.

This is a new county record for this rarely collected species. To date, I have studied only six specimens.

*Bledius turbulentus* Casey

Herman, 1976; figure 66

Additional specimens: 2.

Bahama Islands: Cat Island, Bennetts Harbor, March.

This is the first report of the species from the Bahama Islands.

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