

A REVISION OF THE GROUND  
BEETLES BELONGING TO  
*SCAPHINOTUS*, SUBGENUS  
*BRENNUS* (COLEOPTERA,  
CARABIDAE)

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## INTRODUCTION

THE PRESENT REVIEW is an effort to bring together the existing knowledge of the beetles of the genus *Scaphinotus*, subgenus *Brennus*, and to provide a means of identifying them.

Roeschke (1907), who reviewed the group most recently, considered *Brennus* to be a subgenus of the genus *Scaphinotus*. He recognized 11 species and 12 subspecies, five varieties, and three aberrations. Although his work is comprehensive and important, he apparently did not have sufficient comparative material for the American species, and he undoubtedly did not see Casey's types, for otherwise he probably would not have considered Casey's *cupripennis* and *confusus* as subspecies of *marginatus*; *convergens* as a subspecies of *obliquus*; and *catenulatus* as a subspecies of *punctatus*.

Before the publication of Roeschke's monograph, more or less complete works on *Brennus* had been written by LeConte and Horn. LeConte (1868) recognized 11 species of *Brennus* and placed them in the genus *Cychrus*. Horn (1878) recognized *Cychrus*, *Scaphinotus*, *Pemphus*, and *Brennus* as "divisions" of *Cychrus* and separated *Brennus* into two groups: one with the species that have an elevated crest at the front of the head, such as *cristatus* and *rugiceps*; the other with the beetles that have no elevation. Neither of these works is adequate at the present time for the identification of *Brennus*. They provide no illustrations, which are useful in character comparison; no description of the many variations in local forms; the keys are based mainly on sexual characters of the males (number of the papillose segments of the anterior tarsi); and it is almost impossible to identify the females.

Casey (1897, 1914, 1920) described 28 new species and seven new subspecies of *Brennus*, almost none of which is valid in the light of present knowledge.

Lapoue (1932), who rearranged the Cychrini, considered *Brennus* to be a separate genus with three subgenera: *Brennus*, *Pemphus*, and *Neocychrus*. He did not describe species and more or less followed Roeschke's classification of the genus. He did not, however, give any reason for his treatment of

Casey's species, some of which, contrary to Roeschke, Lapoue recognized as valid species or subspecies.

Van Dyke (1924) described the distinctive *Brennus johnsoni* from the Olympic Mountains of Washington, and two new forms (*bullatus* and *grandis*) from the mountains of California. He regarded the latter two as subspecies of *subtilis*, although in my opinion *bullatus* is not a subspecies, but a species quite different from *subtilis*, and *grandis* is only a variety of *bullatus*.

Hatch's recent work (1953) contained only four species of *Brennus* found in the Pacific Northwest, and Lindroth ([1962]), in his work on Canada and Alaska, recorded only *marginatus* from most of this region and *johnsoni* from Vancouver Island and the Olympic Mountains.

In the present work I recognize 15 species of *Brennus*, one of which has two subspecies, *rugiceps rugiceps* Horn and *rugiceps incipiens* Casey. Some forms, such as *bullatus*, *crenatus*, and *roversi*, previously described by Roeschke (1907) as subspecies, are separate species in my opinion. Others, such as *striatus*, *fulleri*, and *hoppingi*, cannot be regarded as distinct subspecies because there are many intermediate specimens found in neighboring, or even in the same, localities.

Nearly all the species of *Brennus* inhabit the forests and ravines in California mountain ranges and can be collected under logs and rocks during almost the entire year. *Scaphinotus (Brennus) marginatus* lives in the tundra and on the slopes of the Rocky Mountains in Canada, southern Alaska, and the Aleutian Islands. *Scaphinotus (Brennus) johnsoni* is restricted to the Olympic Mountains and Vancouver Island. These two non-California species were found from the middle, or from the end, of May until late in August.

Both Roeschke's and Casey's works referred to numerous subspecies in *Brennus*. These subspecies were often described in such relative terms as "smaller," "larger," and "wider," or (in *marginatus*) were based on degrees of color difference. Not only is the range of variation much greater within a

species than was described by Roeschke or Casey, but these variations do not always follow geographic lines. The species therefore cannot easily be divided into subspecies.

I have seen many new and interesting varieties of *Brennus*, which, if desirable, could be considered subspecies, such as *marginatus* from the eastern part of Washington State or *obliquus* from Madera County in California. However, I do not consider them to be subspecies of the already known species of *Brennus* because they are not distinctly geographically isolated.

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## SYSTEMATIC ACCOUNTS

### GENUS SCAPHINOTUS

#### SUBGENUS BRENNUS MOTSCHULSKY

*Brennus* MOTSCHULSKY, 1865, p. 311.

Comparatively large beetles, 10 to 25 mm. long. Black or dark brown, some, such as *marginatus* and *johnsoni*, with bronze or purple luster. Head elongated, as is usual in *Scaphinotus*; labrum bifurcate, with four setae at base and two long lobes; genae in front of eyes widened laterally into more or less prominent processes, which vary in size (figs. 15, 16); front smooth, slightly wrinkled without punctation, in *cristatus* and *rugiceps incipiens* with elevated crest and tubercles, or deep creases (in *rugiceps rugiceps*). Antennae long, reaching well beyond humeri, pubescent only from fifth segment, third and fourth segments each with two rows of long setae, eight to 10 in number; first segment about same length as following two together, but slightly or considerably stouter. Inner part of maxillae with long setae or long, soft hair between moderately long teeth.<sup>1</sup>

Pronotum cordiform, mostly wider than long, in some specimens as long as wide, in others longer than wide; sides arcuate anteriorly, their posterior half usually oblique or sinuate, at base parallel, convergent or, rarely, divergent; front angles generally projecting and rounded; hind angles mostly not extending beyond base of pronotum, except in *punctatus*; base straight or slightly arcuate (in *oreophilus* and *riversi*); lateral margin narrow; apical marginal bead often incomplete, but may be distinct and wide (*cristatus*); disk smooth or finely wrinkled, more strongly so toward base and median line, with a few creases closer to base, but in no case punctate.

Pronotum at least slightly convex, more so in *cristatus* and *riversi*, less so in other species; deep median line dividing disk into two spheres; basal and apical lines also well impressed, rarely disappearing; in many individuals two side lines forming a more or less distinct, heart-shaped design. Prosternal process in most specimens more or less stout, with slightly pointed tip.

<sup>1</sup> This character, according to Van Dyke, is very difficult to evaluate, and I agree with him.

Elytra oblong-oval, moderately convex with 10 to 18 well-impressed striae; intervals slightly or more distinctly convex, in some specimens divided by additional rows of punctures or punctate striae; elytral margin narrow; tip of elytra slightly pointed. Epipleura sparsely punctate and slightly wrinkled.

Setae orbitalis (near eyes) and setae gularis present or absent; pronotum with one seta on each side near middle; posterior seta on metacoxa invariably present,<sup>2</sup> anterior seta present or absent; seta on metatrochanter, except in *bullatus*. Males with one seta on each side of anal segment, except in *cordatus* which has two setae; females with one or two pairs of setae analis, rarely with three setae on each side of anal segment (see table 1).

Anterior and middle femora with pore punctures in the front part; anterior tarsi of male slightly dilated and bearing brush of papillae on ventral side, extending from apical portion of first segment to basal portion of fourth; fourth segment, and in some species (*striatopunctatus* and *bullatus*) also third segment, glabrous. Male and female genitalia without striking difference between the species.

DISCUSSION: The species of the subgenus *Brennus* show great variability in characters among the different species and within a single species. The shape of the pronotum is a good diagnostic character. In most species of *Brennus* the pronotum is wider than long, but in some species, such as *punctatus* and some varieties of *crenatus*, it is as wide as long, and in some individuals it is longer than wide (figs. 90, 97); the sides of the pronotum in the posterior half are oblique and convergent at the base in *marginatus*, *riversi*, and *obliquus* (figs. 77, 82, 83, 94), or sinuate and parallel at the base in the majority of the species of *Brennus* (figs. 84, 86, 98, 99). *Obliquus* and *marginatus*, however, may have the posterior sides of the pronotum sinuate and convergent at the base and, in some individuals nearly parallel at the base. The base of the pronotum, which is usually straight, is slightly arcuate in *oreophilus* and *riversi* and in some

<sup>2</sup> Roeschke (1907, p. 170) stated, incorrectly, that this seta is absent from *Brennus*.

TABLE 1

CHAETOTAXY OF THE SPECIES OF *Scaphinotus* SUBGENUS *Brennus*

Species	Seta Orbitalis	Seta Gularis	Anterior Seta on Metacoxa	Posterior Seta on Metacoxa	Seta on Meta- trochanter	Number of Setae Analis	
						Male	Female
<i>rugiceps</i>	Present	Present or absent	Present	Present	Present	1	2
<i>cristatus</i>	Present	Present or absent	Present	Present	Present	1	2
<i>cordatus</i>	Present	Present	Present	Present	Present	2	2
<i>marginatus</i>	Present	Present	Present	Present	Present	1	2
<i>obliquus</i>	Absent	Absent	Present	Present	Present	1	2
<i>interruptus</i>	Present	Present	Present	Present	Present	1	1 or 2
<i>johnsoni</i>	Present	Present	Present	Present	Present	1	2
<i>oreophilus</i>	Absent	Present or absent	Present	Present	Mostly present	1	1
<i>riversi</i>	Absent	Mostly absent	Present	Present	Present	1	2 rarely 1
<i>punctatus</i>	Mostly absent	Present	Absent	Present	Present	1	1
<i>subtilis</i>	Absent	Absent	Absent	Present	Present	1	1
<i>bullatus</i>	Absent	Absent	Absent	Present	Absent	1	1
<i>striatopunctatus</i>	Absent	Present	Absent	Present	Present	1	1
<i>ventricosus</i>	Present	Present	Present	Present	Present	1	2
<i>crenatus</i>	Mostly present	Present or absent	Mostly present	Present	Present	1	1 or 2

individuals of *punctatus*, in the last-named mostly because of the extending hind angles (figs. 90, 93, 94).

The elytral striae in many species (*cristatus*, *rugiceps*, *marginatus*, *interruptus*, and *obliquus*) are wavy and irregular, often difficult to count toward the sides and apex; the intervals are convex and form elongated or shorter tegulae on the sides and apex (figs. 39, 61, 65-67). Other species, such as *crenatus*, *oreophilus*, *riversi*, and *cordatus*, have regular, straight striae, usually easy to count, except on the sides and apex. In *ventricosus* and *striatopunctatus* the elytral striae become irregular and wavy lateral to the thirteenth or the fourteenth striae, and the intervals tend to form short tegulae (figs. 43, 71). In *oreophilus*, and especially in *punctatus*, there are large punctures which extend onto the adjacent intervals; therefore the striae seem to be less regular, and they are nearly impossible to count. In *subtilis* only feeble traces of striae remain, but rows of regular and well-impressed punctures replace them. The elytral striae in *bullatus* and some varieties of *ven-*

*tricosus* (*lativentris*, *fuchsianus*) are often feebly impressed, numerous, and irregular, and are also difficult to count.

In *cordatus*, *johnsoni*, *marginatus*, and *cristatus* the tip of the prosternal process is, in most instances, rounded (figs. 45-47, 54); in *punctatus* the tip is longer and pointed, and the entire process is slender (figs. 51, 52); and in the remaining species of *Brennus* the process is stouter and has a slightly pointed tip (figs. 48, 53, 55).

As is stated above, the male genitalia do not greatly differ among the species. In *marginatus*, *cristatus*, *bullatus*, and *crenatus*, however, the penis, which is more slender than in other species (figs. 100-102, 104-107, 120, 136), has a long, pointed tip. On the other hand, in *striatopunctatus* the tip of the penis is broadly rounded or even truncate (figs. 126-128), especially when compared with that of *ventricosus* which is pointed (figs. 130, 131).

The subgenus *Brennus* is a distinct group, and it differs considerably from the other subgenera of the genus *Scaphinotus*. It is closely



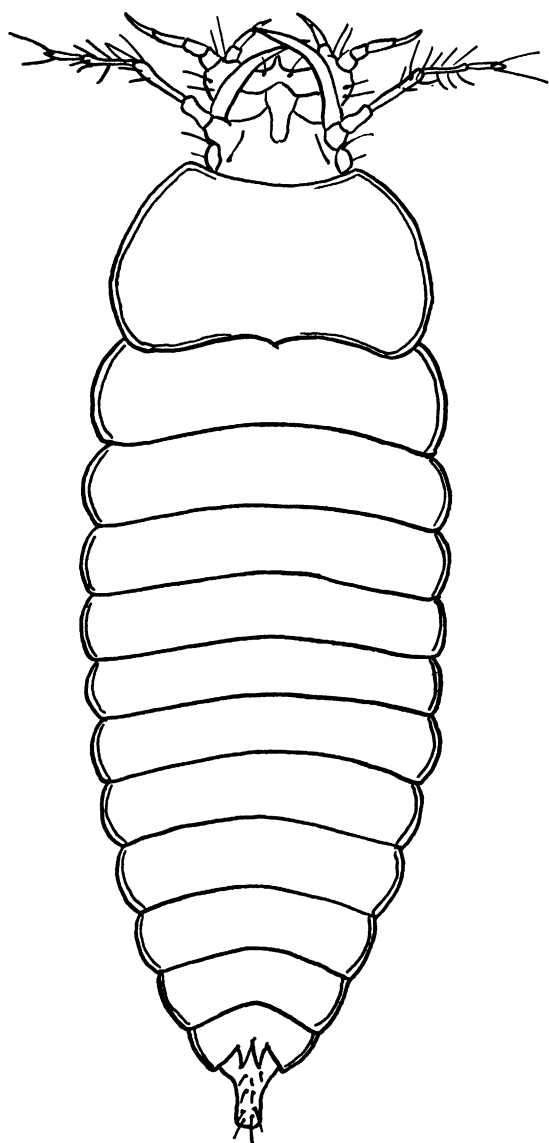


FIG. 1. Larva of *Scaphinotus (Brennus)* *striatopunctatus* (Chaudoir).

related to the subgenus *Pemphus* (or *Stenocantharis*, with its single species, *angusticollis*). *Pemphus*, however, lacks the characteristic features of *Brennus*. It has no pore punctures at the front of the anterior and middle femora; the genae, although widened, are not distinctly notched as in *Brennus* (fig. 13); the inner part of the maxillae have long, strong teeth; the first segment of the front tarsi is nearly entirely covered with a thick brush of papillae; the legs are longer than

those of *Brennus*; and the elytral sculpture is less pronounced, with irregular, indistinct striae.

The subgenus *Pseudonomaretus*, the species of which also have widened genae (fig. 11), differs from *Brennus* as follows: basal setae present on the pronotum; anterior tarsi of males much wider than in *Brennus*; genae less conspicuous, except for one species, *manni*.

The species of the subgenus *Maronetus* have the third and fourth segments of the antennae pubescent, whereas the species of *Brennus* have them glabrous, with only eight to 10 long setae.

The subgenus *Neocychrus* is easily separated from *Brennus* by the laterally widened, prominent genae (fig. 14). The other subgenera, *Scaphinotus*, *Irichroa* (which may or may not be valid), *Nomaretus*, and *Steniridia*, all have simple genae (fig. 12).

In all I have examined 7301 beetles of *Brennus* and also Casey's, Horn's, LeConte's, Van Dyke's, and Dejean's types and have secured a description of Motschulsky's types from Moscow State University.

#### KEY TO THE SPECIES AND SUBSPECIES OF THE GENUS

##### *Scaphinotus*, SUBGENUS *Brennus* MOTSCHULSKY

1. Head at front with median crest and tubercles or deep, transverse wrinkles (figs. 17, 18, 25); antennae with basal segment often stout, much wider than following ones (figs. 26, 27); elytra with irregular, often wavy striae (figs. 61, 62 65-67) . . . . . 2
- Head at front without crest, smooth or with lighter transverse wrinkles (fig. 15); antennae with basal segment normal, not wider than length of second segment (figs. 15, 16) . . . . . 5
- 2(1). Head with deep, transverse furrow immediately behind eyes, with distinct middle crest at front; genae strongly widened, projecting forward below eyes (figs. 19-21, 25) . . . *cristatus* (Harris)
- Head without furrow behind eyes, at front with smaller tubercles or smaller middle crest (fig. 18), or heavy transverse wrinkles or creases, with or without tubercles (fig. 17) . . . . . 3
- 3(2). Larger beetles, from 16 to 28 mm.; elytra with feebly impressed, numerous striae, more than 20 in number, irregular and often difficult to count; intervals flat or

- feebly convex (fig. 69); setae orbitalis, metacoxalis anterior, and seta on metatrochanter absent. . . . . *bullatus* Van Dyke  
 Smaller, from 13 to 18 mm.; elytra with well-impressed striae, 17-18 in number, intervals convex; setae orbitalis, metacoxalis anterior, and seta on metatrochanter present . . . . . 4
- 4(3). Clypeus flat or slightly convex; antennae with basal segment not wider at its apex than length of second segment; crest on head without furrow, with transverse wrinkles or creases, with or without tubercles (fig. 17). Oregon . . . . .  
 . . . . . *rugiceps rugiceps* (Horn)  
 Clypeus strongly or moderately spherical; antennae with basal segment stout, its apex as wide as or wider than length of second segment; crest on head with deep, although short longitudinal furrow and tubercles (fig. 18). Northwestern California . . . . .  
 . . . . . *rugiceps incipiens* (Casey)
- 5(1). Elytra with more than 20 striae, even though irregular and difficult to count; as large as 28 mm. . . . . 6  
 Elytra with 18 or fewer striae; seldom as large as 25 mm., usually less . . . . . 7
- 6(5). Setae orbitalis, metacoxalis anterior, and seta on metatrochanter absent; anterior tarsi of males with brush of papillae underneath first two segments; pronotum more slender, in many cases with slightly angulated sides (figs. 89, 91). . . . .  
 . . . . . *bullatus* Van Dyke  
 Setae orbitalis, metacoxalis anterior, and seta on metatrochanter present; anterior tarsi of males with brush of papillae underneath first three segments; pronotum distinctly wider, with evenly arcuate sides (figs. 98, 99) . . . . .  
 . . . . . *ventricosus* (Dejean)
- 7(5). Elytra on disk and sides with wavy striae, irregular toward sides and often difficult to count; intervals toward sides tending to form elongated tegulae (figs. 65-67). If striae more regular, their number fewer than 16 . . . . . 8  
 Elytra on disk with straight striae, usually 17-18 (in *cordatus* 12-14) in number, may be irregular and slightly wavy only toward sides (figs. 43, 44, 63, 64, 68-70); intervals toward sides with tegulae, if present, not elongated (figs. 43, 71) . . . . . 11
- 8(7). Setae orbitalis absent; elytra with 17-18 striae, rarely 19-20 (figs. 65, 66); pronotum with sides oblique or slightly sinuate in posterior half, at base convergent; disk slightly wrinkled, finely granulated; labrum short (figs. 82, 83) . . . . . *obliquus* (LeConte)  
 Setae orbitalis present; elytra with 14-16 striae, if more (*johnsoni*, some varieties of *marginatus*) then pronotum either strongly wrinkled, at base with parallel sides, or elytra with purple or metallic luster, at least at margin . . . . . 9
- 9(8). Pronotum with sides oblique or sinuate in posterior half, at base convergent (figs. 77, 80), rarely nearly parallel (figs. 78, 79); elytra often with metallic or purple luster, margin green, golden, bluish purple or purple . . . . .  
 . . . . . *marginatus* (Fischer)  
 Pronotum with sides parallel at base, or nearly so; elytra with or without metallic luster . . . . . 10
- 10(9). Elytra in many cases with purple or metallic luster, with more than 18 striae, usually 19-20 (figs. 56, 60) . . . . .  
 . . . . . *johnsoni* Van Dyke  
 Elytra without metallic luster, seldom faint blue margin; number of striae 14-16 (fig. 67) . . . . .  
 . . . . . *interruptus* (Ménétriés)
- 11(7). Elytra very shiny, with deep punctures of striae reflecting light, feebly convex, striae 12-14 in number, often resembling furrows, especially on sides (figs. 59, 63); two setae on each side of anal segment in both sexes; anterior tarsi of males with brush of papillae underneath first four segments . . . . .  
 . . . . . *cordatus* (LeConte)  
 Elytra less shiny, punctures of striae not reflecting light, striae 17-18 in number, even if deep, not furrow-like (figs. 64, 68, 70); anterior tarsi of males with brush of papillae underneath first two or first three segments; one seta on each side of anal segment in males, one or two in females . . . . . 12
- 12(11). Elytra with rows of punctures, but not striate, or with only traces of striae (fig. 70); setae orbitalis and metacoxalis anterior absent; one seta on each side of anal segment in both sexes. . . . .  
 . . . . . *subtilis* (Schaum)  
 Elytra striatopunctate; setae variable. . . . . 13
- 13(12). Pronotum with sides convergent at base; base slightly arcuate (figs. 93, 94) . . . . . 14  
 Pronotum with sides parallel at base, or nearly so (figs. 90, 96-99); base straight (except in *punctatus* which may occa-



- sionally have slightly arcuate base) . . . . . 15
- 14(13). Head (in lateral view) not depressed between eyes, or only slightly so (fig. 22); pronotum with sides slightly sinuate in posterior half; at base without depression, or with slight one, behind impressed basal line (fig. 93); one seta on each side of anal segment in both sexes . . . . . *oreophilus* (Rivers)  
Head (in lateral view) with distinct or moderate depression between eyes (fig. 23); pronotum with sides oblique in posterior half; at base with strong depression (fig. 94); males with one seta, females mostly with two setae, on each side of anal segment. . . . . *riversi* Roeschke
- 15(13). Elytral striae with large punctures spread on adjacent intervals; intervals convex, especially on sides, with confluent punctures (figs. 41, 64); pronotum slender, as long as wide or longer than wide, in many cases with projecting hind angles and slightly arcuate base (fig. 90); anterior seta on metacoxa absent; seta orbitalis, except in some local varieties, absent . . . . . *punctatus* (LeConte)  
Elytral striae with smaller punctures (figs. 43, 44, 68); pronotum wider than long (figs. 95, 98, 99), or, if longer than wide, elytral punctures small, even on sides (fig. 44) . . . . . 16
- 16(15). Setae orbitalis and metacoxalis anterior absent; one seta on each side of anal segment in both sexes; anterior tarsi of males with brush of papillae underneath first two segments; penis with rounded tip (figs. 126-129) . . . . . *striatopunctatus* (Chaudoir)  
Setae orbitalis and metacoxalis anterior present<sup>1</sup>; males with one, females with two seta on each side of anal segment; anterior tarsi of males with brush of papillae underneath first three segments; penis with pointed tip (figs. 130-136) . . . . . 17
- 17(16). Pronotum distinctly wider than long (figs. 98, 99); elytral striae on sides wavy, irregular, difficult to count, intervals toward sides tending to form shorter tegulae (fig. 71); labrum stouter (fig. 43); penis with shorter and stouter

tip (figs. 130, 131) . . . . . *ventricosus* Dejean  
Pronotum only slightly wider than long, in some specimens longer than wide (figs. 96, 97); elytral striae toward sides regular, easy to count (in some examples may be slightly irregular only at the margin); intervals not forming tegulae (fig. 72); labrum slender (fig. 44); penis with longer, thinner tip (figs. 132, 136) . . . . . *crenatus* (Motschulsky).

#### *Scaphinotus (Brennus) cristatus* (Harris)

Figures 2, 19-21, 25-28, 38, 39, 47, 73-75, 100-102, 138

*Cychnus cristatus* HARRIS, 1839, p. 200. Type locality not specified, probably northwestern California. Type is lost, according to Roeschke (1907). Transferred to *Brennus* by Horn (1878).

*Cychnus reticulatus* MOTSCHULSKY, 1852, p. 292. Type locality: California. Type in the Museum of Zoology, Moscow State University, Soviet Union. Synonymized by Csiki (1927).

*Brennus basalis* CASEY, 1897, p. 311. Type locality: Santa Cruz, California. Type in the United States National Museum, Washington, D. C. Synonymized by Roeschke (1907).

*Brennus duplicatus* CASEY, 1897, p. 312. Type locality: California. Type in the United States National Museum, Washington, D. C. Synonymized by Roeschke (1907).

**DESCRIPTION:** Black or brown. Head with middle crest and deep furrow behind eyes (figs. 19-21, 25). Crest of front of head mostly with rounded ridge, usually formed by two tubercles, one in middle of crest, another projecting over furrow behind eyes. Front tubercle usually rounded, with two tips, but in some specimens front tubercle inconspicuous or nearly obsolete (fig. 19). Sides of head also carinate, with deep impression from base of antennae toward eyes; genae large, distinctly visible beneath eyes; clypeus more or less spherical; antennae long, approximately half of length of body; basal antennal segment stout, in some specimens (particularly from Ben Lomond, Santa Cruz County) as long as or even longer than following two segments, with tip as wide as length of second segment (fig. 26). Many specimens with basal antennal segment shorter than following two, but still stout, many, however, with moderately stout segment (fig. 27), or even hardly larger than in other species of *Brennus* (fig. 28).

Pronotum cordiform (figs. 73-75); about as long as wide or slightly wider than long;

<sup>1</sup> Some varieties of *crenatus* from higher altitudes lack these setae. These varieties differ, however, from *striatopunctatus* in the sexual characters of the male, smaller size (less than 16 mm.), and smaller elytral punctures.

average length, 3.9 mm., range from 3.2 to 5.0 mm.; average width, 4.3 mm., range from 3.5 to 4.6 mm.; sides arcuate, at base slightly diverging or parallel; apical marginal bead either wide, like a collar, and rugose (fig. 73, 75), or narrow and often obsolete (fig. 74); disk convex, divided by median line into two spheres, which may be smooth, or moderately or strongly wrinkled; basal line of pronotum strongly impressed, apical one less so.

Elytra with almost obsolete humeri; 17 to 18 irregular and wavy striae, which tend to double, difficult to count, especially toward sides; punctures of striae fine, and distinct lines connecting them mostly strongly impressed; intervals on sides convex, forming irregular tegulae; lateral margin dark, seldom with faint blue luster.

Seta orbitalis present; seta gularis usually present; seta metacoxalis anterior with rare exceptions present; males with one seta analis on each side of anal segment, females with two or, rarely, one or three setae.

Ventral side of body smooth, shining; sides of abdomen slightly wrinkled. Anterior tarsi of male with three segments papillose on ventral side, the first one near its tip (one-fourth or one-third of segment). Some specimens having a few long papillae on fourth segment. Penis with slender tip, usually thinner than in *rugiceps* or some other species of *Brennus*. Styli of female genitalia also thinner than in *rugiceps* (figs. 100-102 and 138).

Average length of body, 18 mm., range from 11 to 24 mm.; average width, 7.9 mm., range from 6.5 to 9.0 mm.

**DISTRIBUTION:** From southern Oregon to Monterey, California, and even to Los Angeles, where it is rare. More abundant in northern coastal regions of California.

**RECORDS:** I have seen specimens from the following localities: *Oregon*: Curry County: Pistol River. *California*: Del Norte County: Creston City. Humboldt County: Eureka, Richardson Red Wood Grove, Arcata, Whitmore in Klamath Valley, Weott, Blocksburg, Fort Seward, Green Point. Trinity County: Hayfork. Mendocino County: Mendocino, Caspar, Comptche, Willits. Lake County: Middletown. Nevada County: Nevada City, Franktown. Sonoma County: Anapolis, Duncan Mill, Cloverdale, Eldridge, Fort Rose,

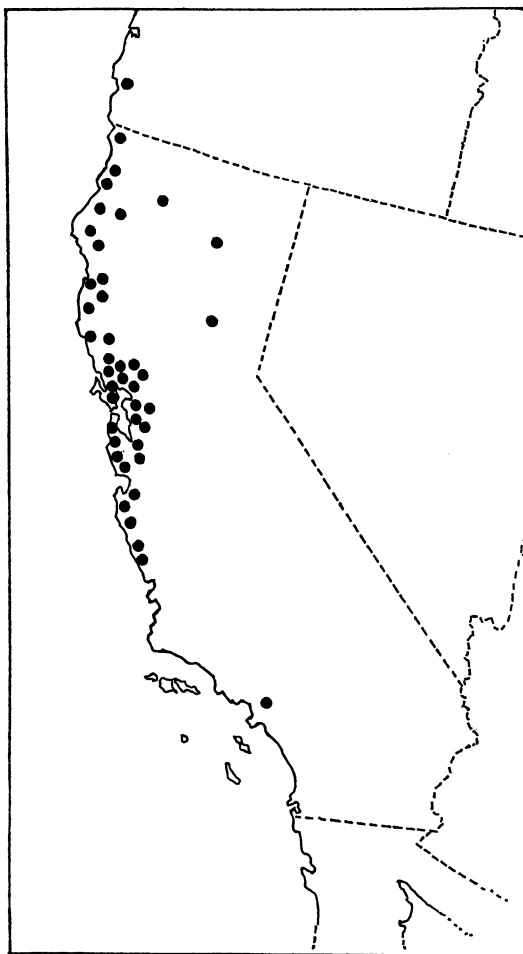


FIG. 2. Distribution of *Scaphinotus* (*Brennus*) *cristatus* (Harris).

Glen Ellen, Guerneville, Mesa Grande, Sonoma. Napa County: Napa, Saint Helena Mountains. Marin County: Corte Madera, Bolinas, Lagunitas, Madera, Mill Valley, Muir Wood, Sausalito, Taylorville, Willow Camp. San Francisco. San Mateo County: La Honda, San Mateo, Pescadero. Contra Costa County: Marsh Creek, Mt. Diablo. Alameda County: Berkeley, Diamond, Oakland. Santa Cruz County: Ben Lomond, Big Basin, Corralitos, Boulder Creek, Santa Cruz, Mt. Hermon, Swanton. Santa Clara County: Los Gatos, Stevens Creek, Santa Clara, Los Uvas. Monterey County: Big Sur, Carmel, Monterey, Jamesburg. Los Angeles County: Los Angeles, Mint Canyon.

**DISCUSSION:** In spite of the great variabil-



ity of *cristatus* it is readily identified because of the peculiar crest on the head and the deep furrow immediately behind the eyes (figs. 19–21, 25). Individuals vary randomly, however, in the shape of the crest, the width of the apical marginal bead of the pronotum, and in the sculpture of the disk. All gradations of these characters are found. For instance, of 396 specimens examined, 265, or 67 per cent, have a large front tubercle on the head, and the tip of this tubercle is divided by a small furrow (actually the front tubercle has two tips); 72 specimens, or 18 per cent, have the front tubercle small, with one tip, and 59 specimens, or 15 per cent, have the front tubercle nearly obsolete. Many examples with an obsolete tubercle were found in California, in Humboldt County (39 specimens of 54), Marin County (35 specimens of 38), and in Berkeley, Alameda County (14 specimens of 15). Single examples with a small or obsolete front tubercle were collected in San Francisco, in Ben Lomond, Santa Cruz County, and in Santa Clara County.

The apical marginal bead of the pronotum may be quite wide and resemble a collar. Of 429 beetles examined specifically for this character (the width of the apical marginal bead), 298 examples, or 69 per cent (collected chiefly in Ben Lomond, Santa Cruz County), had a wide apical bead. The apical bead was narrow in 54 specimens, or 13 per cent. In 77 specimens, or 18 per cent, it was incomplete or obsolete. Examples with a narrow or incomplete apical marginal bead prevailed in Arcata, Humboldt County (27 beetles of 28), in Blocksburg, Humboldt County (four specimens of five), in Humboldt County, without further locality (29 specimens of 32), in Comptche, Mendocino County (of seven specimens not a single one had a wide bead), in Mendocino County without further locality (19 specimens of 21), and in Anapolis, Sonoma County (two specimens of four). Single individuals with a narrow, incomplete, and obsolete apical marginal bead were found nearly everywhere, yet south of Sonoma County they are rare.

The sculpture of the pronotum is also variable. Of 434 specimens examined for this character, only 115, or 27 per cent, have the disk of the pronotum heavily wrinkled, especially at the base and sides; 144, or 33 per

cent, have the pronotum moderately wrinkled; and 175, or 40 per cent, have it smooth. Thus in nearly every locality it is possible to find all three varieties of sculpture, but in some places one or the other kind of sculpture prevails. Examples with strongly wrinkled pronotum were seen from Arcata, Humboldt County (26 specimens of 28), from Blocksburg, Humboldt County (four of five), from Humboldt County without specification of locality (19 of 28), from Creston City, Del Norte County (all nine specimens) from Comptche, Mendocino County (five of seven), from Diamond, Alameda County (four of six), from Big Sur and Jamesburg in Monterey County (all seven specimens), and from Monterey (four of five). Beetles with a smooth pronotum prevail in Ben Lomond, Santa Cruz County (37 examples of 62), in Big Basin, Santa Cruz County (21 examples of 23), in Santa Cruz County without further locality (eight examples of 11), and in Santa Clara County, also without further locality (four of six).

The variation in the elytral sculpture of *cristatus* is less distinct than that in the form of the crest on the head or in the sculpture of the pronotum and cannot be attributed to any particular locality.

Motschulsky's *reticulatus* was considered by Roeschke (1907) a subspecies of *cristatus* and differs from the nominate subspecies by having the pronotum wider than long, with a broad, apical, marginal bead and smooth sides, and also by distinctly striatopunctate elytra with convex intervals. Nominate *cristatus*, as described by Roeschke, has the pronotum longer than wide, heavily wrinkled on the sides, the apical marginal bead absent, the elytral striae shallow, and the intervals flat. The area of distribution, as given by Roeschke (1907), for *cristatus* is southwestern Oregon and northwestern California, and for *reticulatus* from Mendocino County south to Monterey. My observations show that some of the characters given by Roeschke vary randomly among populations, and they were not consistently correlated with the geographic ranges of the "subspecies." The length and width of the pronotum and the elytral sculpture are variable regardless of locality, and the majority of specimens have the pronotum as wide as long throughout the

entire range of the species. In the area of Roeschke's *reticulatus* the broad apical marginal bead of the pronotum and the smooth sides are presented together in some specimens, but in Marin County, 29 of 31 beetles have a broad bead, but only seven have the pronotal sides smooth; in Alameda County all 18 specimens have a broad bead, but only one has a smooth pronotum; in Monterey County 16 of 19 examples have a broad bead and only one has a smooth pronotum. The opposite can also be found, as in Mendocino and Sonoma counties where the majority of specimens have a narrow or obsolete bead (as described by Roeschke for the other subspecies, *cristatus*), but many of them have a smooth or moderately wrinkled pronotum. It is true that the broad bead prevails in some of the counties, south of Sonoma, as stated for Santa Cruz, Santa Clara, and Monterey counties, and the incomplete bead farther north, but it is not correlated with the sculpture of the pronotum, and in many places these characters are mixed. In view of this variability and lack of concordance of characters, I do not think we can recognize any subspecies.

Casey's *basalis* and *duplicatus* are synonyms. According to Casey (1897), they differ from *cristatus* by having two tubercles on the crest of the head, whereas in *cristatus* the front tubercle is obsolete. This character, however, is variable in *cristatus*.

**MATERIAL EXAMINED:** Four hundred ninety-six specimens (240 males and 256 females).

#### *Scaphinotus (Brennus) rugiceps*

Figures 3, 17, 18, 30, 48, 49, 76, 103, 139, 140

**DESCRIPTION:** Black, more or less shiny. Head at front with obtuse crest; genae moderately dilated; labrum bifurcate, lobes shorter than those in *marginatus* and *johnsoni* (fig. 30); basal antennal segment as in *cristatus*; clypeus either flat or spherical (see table 2). Pronotum about as long as wide or slightly wider than long; average length, 4.0 mm., range from 3.5 to 4.0 mm.; average width, 4.1 mm., range from 3.5 to 4.5 mm.; sides strongly arcuate at front, sinuate or oblique in posterior half, in some specimens forming more or less distinct side angles, at base convergent (*rugiceps rugiceps*) or nearly parallel

(*rugiceps incipiens*); apical marginal bead, with a few exceptions, incomplete, conspicuous only toward sides, but with longitudinal wrinkles; disk usually more or less wrinkled, with well-impressed median line, apical line mostly less distinct (fig. 76).

Elytra oval, convex, with 16 to 18 striae, irregular, often impossible to count on sides; intervals tending to form elongated tegulae.

Seta orbitalis present in most specimens; if absent, minute pore punctures not visible among wrinkles near eyes; seta metacoxalis anterior and seta gularis present in most cases; males with one seta, rarely with two setae, on each side of anal segment; females with two setae, rarely with one seta. Ventral side smooth or lightly wrinkled. Anterior tarsi of male with three first segments dilated and bearing brush of papillae on ventral sides, first segment with papillae in apical part only, fourth segment also with a few papillae. Penis of usual form for *Brennus* (fig. 103), slightly wider at base. Female genitalia with more or less pointed styli, with furrow near tip and long seta (figs. 139, 140).

Average length, 15.7 mm., range from 13 to 18 mm.; average width, 7.5 mm., range from 6.5 to 9.0 mm.

**DISCUSSION:** Although *rugiceps* is not so readily identifiable as *cristatus*, it still differs from the other species of *Brennus* by the crest on the head, which has either tubercles or deep creases and transverse wrinkles.

There are two forms of *rugiceps*; one is found in southern Oregon, the other in northwestern California. They differ more or less distinctly in several characters (see table 2), with some exceptions. For instance, in Oregon (range of *rugiceps rugiceps*) beetles were found with tubercles on the crest, as in *incipiens*, instead of the usual creases: in Junction City (one of six), in Eugene (one of 21), in Douglas (four of six), near Pistol River (two of four), in Josephine (seven of 23), and in Union Creek (one of three). In general the populations in Josephine County (Cave Junction, Grants Pass) seem to be more variable than those from other localities in Oregon. Quite a few beetles (15 of 64 examined) found in Josephine County have the sides of the pronotum nearly parallel at the base, as in *incipiens*, and one has a stout basal antennal segment. None, however, has a spherical

TABLE 2

VARIATIONS IN THE HEAD AND THE PRONOTUM OF *Scaphinotus (Brennus) rugiceps*

<i>rugiceps rugiceps</i> (Oregon)	<i>rugiceps incipiens</i> (California)
Clypeus flat, or nearly so (70 specimens of 72, or 97%)	Clypeus spherical, at least moderately so (59 specimens of 63, or 93%)
Crest on head (fig. 17) without furrow, with creases and tubercles or with creases and wrinkles (141 specimens of 158, or 88%); more distinct tubercles in 17 specimens of 158	Crest on head (fig. 18) with short furrow in middle and with four tubercles (106 specimens of 150, or 70%)
Basal antennal segment not stout, its tip not wider than length of second segment (70 specimens of 101, or 69%)	Basal antennal segment stout, its tip wider than or as wide as length of second segment (85 specimens of 89, or 97%)
Sides of pronotum at base convergent (130 specimens of 151, or 85%)	Sides of pronotum at base parallel or nearly so (82 specimens of 149, or 55%)

clypeus, which is characteristic of the subspecies from California.

The populations of California are even more variable, yet the majority of specimens have the crest on the head with four tubercles, and a short, but distinct longitudinal furrow between them (106 specimens of 150). Those without tubercles, but with creases and transverse wrinkles, were found in Del Norte County (one of 69 examined), in Green Point, Humboldt County (one of 15 examined), in Hay Fork and Preacher's Ride, Trinity County (one of seven examined and one of two). In every population, however, a few specimens have creases and tubercles, but the furrow is inconspicuous, as in subspecies *rugiceps*, and in some localities these varieties prevail. For instance, in Carville, Trinity County, three specimens of four have creases and tubercles, and only one has distinct tubercles; in Nash Mine, Trinity County, four specimens have creases and one has tubercles; and in Hayfork, Trinity County, five specimens have creases and two have tubercles. Other characters are more constant. Thus the clypeus is spherical, or at least distinctly convex (only four specimens of 63 examined, all from Del Norte County, have a flat clypeus), and the basal antennal segment is stout, except for isolated specimens (Humboldt County, one of six; Carville, Trinity County, one of three; Farmlodge, Trinity

County, one of four). The sides of the pronotum, however, are distinctly parallel in 55 per cent of the beetles examined for this character (see table 2). Examples with parallel sides are found together with those that have the sides of the pronotum convergent at the base, as in the subspecies *rugiceps* from Oregon. Therefore it is not without some hesitation that I recognize these subspecies.

***Scaphinotus (Brennus) rugiceps rugiceps***  
(Horn)

*Cychnus rugiceps* HORN, 1872, p. 142. Type locality: Oregon. Type in the Academy of Natural Sciences of Philadelphia. Transferred to *Brennus* by Horn (1878).

*Brennus porcatus* CASEY, 1897, p. 328. Type locality: California. Type in the United States National Museum, Washington, D. C. New synonymy.

*Brennus compositus* CASEY, 1897, p. 332. Type locality: California. Type in the United States National Museum, Washington, D. C. New synonymy.

*Brennus rugiceps congener* CASEY, 1914, p. 28. Type locality: Oregon. Type in the United States National Museum, Washington, D. C. Synonymized by Csiki (1927).

In the type of *rugiceps* and the majority of this subspecies from southwestern Oregon there is a crest on the head but no distinct tubercles, only creases and wrinkles (fig. 17); the basal antennal segment is not so stout as

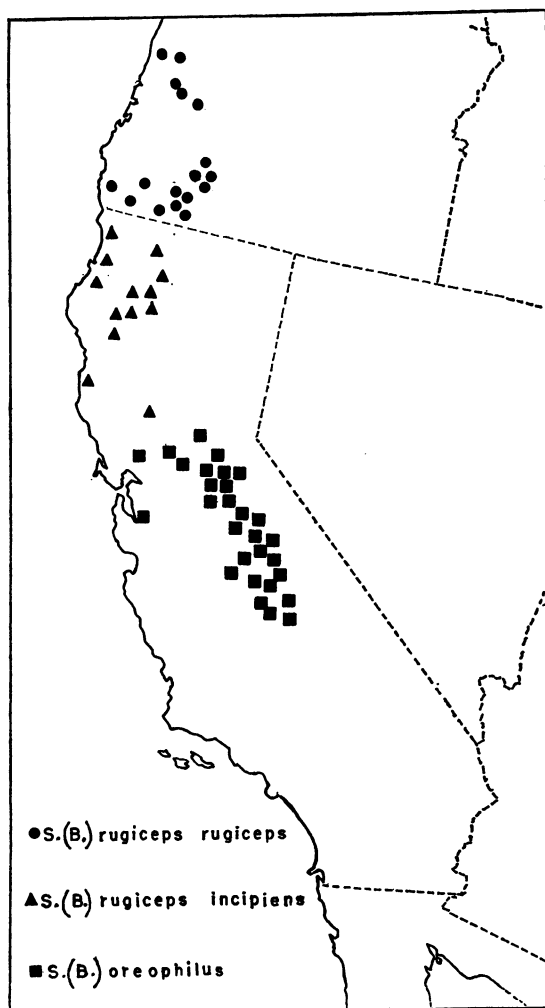


FIG. 3. Distribution of *Scaphinotus (Brennus) rugiceps rugiceps* (Horn), *S. (B.) rugiceps incipiens* (Casey), and *S. (B.) oreophilus* (Rivers).

in the California subspecies; and the pronotum is slightly wider than long, the sides sinuate in their posterior half, at base convergent (fig. 17). The elytra have wavy striae that become irregular and difficult to count on the sides, after the ninth or tenth striae; the intervals tend to form tegulae.

RECORDS: I have seen specimens from the following localities: *Oregon*: Benton County: Corvallis. Lane County: Junction City, Eugene, McCredie Springs. Lincoln County: Cottonwood Lake. Douglas County: Diamond Lake. Curry County: Pistol River. Josephine County: Cave Junction, Grants

Pass. Jackson County: Talent, Medford, Eagle Point, Hare Creek, Union Creek, Siskiyou, Ashland, Lake Creek, Prospect. Klamath County: Crater Lake, Cascade Mountains, Aspen Lake.

Casey's types (both males) of *porcatus* and *compositus*, which were placed by Roeschke (1907) as synonyms of *interruptus*, are in my opinion synonyms of *rugiceps rugiceps*. They have irregular and difficult to count striae, 18 in number, as in *rugiceps rugiceps*; the head at the front has heavy, transverse wrinkles; and the pronotum has the sides convergent at the base, not parallel as in *interruptus*.

Casey's congener from Oregon is also a synonym of *rugiceps rugiceps*, with the crest on the head formed by wrinkles and tubercles.

MATERIAL EXAMINED: One hundred sixty-seven specimens (72 males and 95 females).

***Scaphinotus (Brennus) rugiceps incipiens* (Casey)**

*Brennus incipiens* CASEY, 1897, p. 313. Type locality: northern California. Type in the United States National Museum, Washington, D. C.

Casey's type has creases and tubercles on the head, the basal antennal segment is moderately thick, and the pronotum has the sides at the base not exactly parallel. Many specimens from California, especially from Humboldt County, have larger and stouter basal antennal segments and more distinct tubercles of the crest on the head than Casey's type of *incipiens* (fig. 18).

The subspecies *incipiens* is found in northwestern California.

RECORDS: *California*: Del Norte County. Siskiyou County. Humboldt County: Green Point, Mad River, Orick, Mt. Corbel. Trinity County: Carrville, Farm Lodge, Nash Mine, Big Flat Coffee Creek, Preacher's Ride, Trinity Alps, Zenia, Hayfork. Mendocino County: Mendocino, Castle Peak. Colusa County: Paradise Creek.

MATERIAL EXAMINED: One hundred sixty specimens (85 males and 75 females).

***Scaphinotus (Brennus) marginatus* (Fischer)**

Figures 4, 29, 40, 58, 61, 62, 77-80, 104-107, 141, 142

*Cychrus marginatus* FISCHER, 1822, p. 79. Type



locality: Unalaska. Type in Dresden Museum, Germany. Transferred to *Brennus* by Motschulsky (1865).

*Brennus marginatus* var. *fulleri* HORN, 1878, p. 179. Type locality: Oregon. Type in the Academy of Natural Sciences of Philadelphia. Synonymized by Csiki (1927).

*Cychnus marginatus* var. *gracilis* GÉHIN, 1885, p. 76. Type locality: Mexico (error for United States or Canada). Type in the Muséum National d'Histoire Naturelle, Paris. Synonymized by Roeschke (1907).

*Brennus cupripennis* CASEY, 1897, p. 334. Type locality: Easton, Washington. Type in the United States National Museum, Washington, D. C. Synonymized by Csiki (1927).

*Brennus insularis* CASEY, 1897, p. 334. Type locality: Queen Charlotte Island, Canada. Type in the United States National Museum, Washington, D. C. Synonymized by Roeschke (1907).

*Brennus confusus* CASEY, 1897, p. 336. Type locality: (not given). Type in the United States National Museum, Washington, D. C. Synonymized by Csiki (1927).

*Brennus marginatus* var. *fallax* ROESCHKE, 1907, p. 174. Type locality: Oregon. Type in the Vogt collection, Zoölogisch Museum, Universiteit van Amsterdam. Synonymized by Csiki (1927).

*Brennus columbianus* CASEY, 1920, p. 180. Type locality: Victoria, British Columbia, Canada. Type in the United States National Museum, Washington, D. C. Synonymized by Hatch (1953).

*Brennus marginatus montanicus* CASEY, 1920, p. 182. Type locality: Helena, Montana. Type in the United States National Museum, Washington, D. C. Synonymized by Csiki (1927).

*Brennus marginatus wrangelli* CASEY, 1920, p. 182. Type locality: Fort Wrangell, Alaska. Type in the United States National Museum, Washington, D. C. Synonymized by Csiki (1927).

*Brennus oregonus* CASEY, 1920, p. 182. Type locality: Oregon. Type in the United States National Museum, Washington, D. C. Synonymized by Hatch (1953).

**DESCRIPTION:** Black or light brown, in many cases with purple or metallic luster and golden, green, bluish, or purple elytral margin. Head smooth, with light, rarely heavy, transverse wrinkles at front between eyes; front slightly convex; genae incised, but barely visible on dorsal side in front of eyes; labrum with lobes longer than those in *rugiceps*, *interruptus*, or *obliquus* (figs. 29, 40).

Pronotum as long as wide or slightly wider, rarely longer than wide; average length, 3.1 mm., range from 2.5 to 4.0 mm.; average

width, 3.5 mm., range from 3.0 to 4.6 mm.; sides arcuate at front, oblique or slightly sinuate in posterior half, at base convergent, rarely nearly parallel; lateral margin of pronotum narrow, as seems to be usual for *Brennus*; apical marginal bead usually distinct; disk feebly convex; median, basal, and apical lines usually well impressed; surface finely wrinkled, more so toward base, individuals with strongly wrinkled disk much more rare (figs. 77–80); purple luster on pronotum; if present, much fainter than on elytra.

Elytra in most specimens oblong-oval, in some more slender and elongated toward tip; elytral striae deeply impressed and punctate, irregular, wavy, but usually easy to count, 12 to 14, rarely 15 to 16, and seldom 18 in number; intervals convex, tending to form elongated (in rare cases shorter) tegulae, especially on sides and apex; color from light brown to black, in many cases with distinct purple, metallic, or coppery luster and golden green, bright green, coppery, or purple margin (figs. 58, 61).

Setae orbitalis and gularis present and both long; metacoxa with anterior and posterior setae (one specimen from Laggan, Canada, with two front and two hind setae); males with one seta, females with two setae, on each side of anal segment. In a few cases male with two setae analis, and females with three setae. Ventral side of body usually smooth and shining. Anterior femur with sparse, minute punctures; middle femur in most species with two to three punctures fewer than in other species of *Brennus*; some specimens have no punctures on middle femur. Anterior tarsi of male with three segments dilated and brush of papillae underneath, the first segment in its apical half or third, fourth segment also may have a few papillae. Penis slender, with long, thin tip (figs. 104–107). Female genitalia typical for *Brennus*, styli nail-like or leaflike (figs. 141, 142).

Average length, 14.0 mm., range from 10 to 19.5 mm.; average width, 5.7 mm., range from 4 to 7 mm.

**DISTRIBUTION:** This species is found from the Aleutian Islands and southwestern Alaska south to northern California and eastward in Canada to Alberta, possibly farther toward Hudson Bay. In the United States *marginatus*

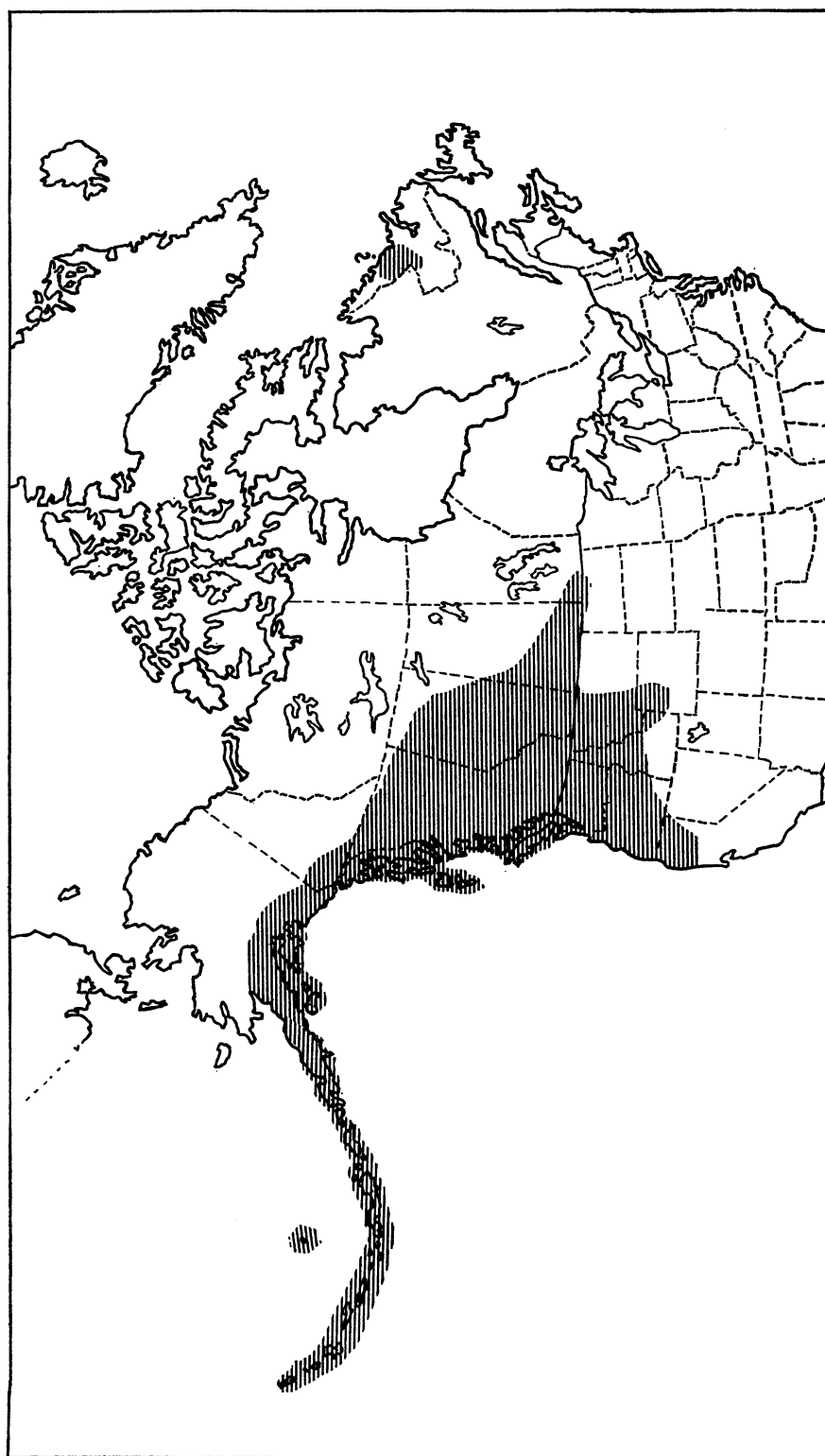


FIG. 4. Distribution of *Scaphinotus (Brennus) marginatus* (Fischer).

occurs as far east as Montana and Wyoming. The species is common on the Aleutian Islands, the southern coast and offshore islands of Alaska, the western provinces of British Columbia and nearby islands, and also in Alberta, Washington, and Oregon. The species is more rare in Montana, Idaho, and Wyoming. I have seen a number of beetles from "Hudson Bay Territory," which I assume were collected to the west of Hudson Bay, and one specimen from even farther east, Labrador, collected by H. Trener.

**RECORDS:** I have seen specimens from the following localities: *Alaska:* Aleutian Islands: Kiska, Adak, Nazan Bay of Atka Ogmok, on Umnak, Unalaska (Glacier River, Makushin Bay, and Dutch Harbor), Akutan Bay, Deer Island, Lake Karluk on Kodiak Island. Afognak. St. Paul Island (the last locality, according to Lindroth [1962], is doubtful). *Alaska Peninsula:* Mt. Douglas, Aleutian Range, Mt. Pavlov, Wide Bay. *Prince of Wales Island:* Point Baker, Port of Protection. *Annette Island:* Channel Wales, Metlakatla. *Baranof Island:* Sitka. *Wrangell Island.* *Kenai Peninsula:* Seward. Spenard, Palmer, Valdez, Cordova, Haines, Skagway, Juneau, Ketchikan, Richardson Highway, and Beaverpoint (the last one not found on a map).

*British Columbia:* Graham Island: Massett, Queen Charlotte. *Vancouver Island:* Courtenay, Port Alberni, Nanaimo, Wellington, Duncan, Sidney, Langford, Victoria, Parksville, Youbou, Mt. Arrowsmith, Goldstream, Tofino, Beaver Point, Tod Inlet. *New Westminster Province:* New Westminster. *Skeena Province:* Skeena, Terrace, Prince Rupert. *Fraser Valley Province:* Steelhead, Alvin. *Yale Province:* Trinity Valley, Mara, Vernon, Peachland, Oliver, Lumby. *Kootenay West Province:* Kaslo, Wynnadel, Creston (Head of Lizard Creek and Goat Road). *Kootenay East Province:* Kimberley (St. Mary Lake and Pond Island), Fernie, Haney, Elko (Phyllis Canyon). *Cariboo Province:* Merritt, Salmon Arm Lake, Hunter Range, North Bend, Peace River. *Smoky River.* *Glacier National Park.* *Stikine Mountains.*

*Alberta:* Peace River Province: Jasper (Jonas Camp), Meadow Creek, Last Lake. *Wetaskiwin Province:* Pemberton Hill. Ed-

monton East Province: Edmonton. *Edmonton West Province:* Bilby. *Macleod Province:* Claresholm. *Calgary West Province:* Lake Louise in Banff National Park, Laggan (not found on a map). *Lethbridge Province:* Watterton Lake, Happy Valley, Boom Creek.

*Washington:* San Juan Island: Friday Harbor. *Whidbey Island:* Couppville. *Whatcom County:* Mt. Baker. *Scagit County:* Deception Pass Island. *Snohomish County:* Chase Lake, Monroe, Glacier. *King County:* Seattle, North Bend, Skykomish, Sol Duc Hot Springs, Vashon. *Clallam County:* Port Angeles, Forks. *Jefferson County:* Olympic National Park, Olympic Hot Springs. *Grays Harbor County:* Quinault Lake, Humptulips, Hoquiam, Montesano. *Mason County:* Manson, Rosedale. *Kitsap County:* Kitsap, Key Port. *Pierce County:* Longmire Spring, Carbon River in Rainier Mountains, Green Water Camp, Puyallup, Sylvant. *Thurston County:* Hurricane Hill in Olympic Mountains. *Chelan County:* Chelan, Rock Creek. *Pacific County:* South Bend, Pacific. *Clark County:* Vancouver. *Skamania County.* *Trout Lake.* *Kittitas County:* Easton, Kittitas. *Yakima County:* Yakima, Bumping River, Indian Forest Reservation. *Walla Walla County:* Kooskoskie. *Lincoln County:* Creston Lake. *Spokane County:* Spokane, Paradise Valley. *Asotin County:* Asotin, Blue Mountains.

*Oregon:* Clatsop County: Astoria, Olney, Cannon Beach. *Columbia County:* Deer Island, Scappoose. *Washington County:* Dilley, Forest Grove. *Multnomah County:* Gresham, Portland, Multnomah. *Clackamas County:* Colton, Marmot, Willamette Pass. *Marion County:* Salem. *Hood River County:* Hood River, Mt. Hood. *Lincoln County:* Newport, Valsetz. *Benton County:* Blodgett, Corvallis, Mary's Peak. *Lane County:* Bear Spring Creek, Glenada, Eugene, McKenzie Bridge, Triangle Lake, Vida. *Coos County:* Marshfield. *Douglas County:* Anlauf, Drain, Roseburg. *Jackson County:* Medford. *Deschutes County:* Sisters. *Umatilla County:* Umatilla, Free Water, Tollgate Road, Pendleton. *Wallowa County:* Minam, Wallowa. *Grant County:* Prairie City. *Harney County:* Harney, Blue Mountains.

*Montana:* Lincoln County: Eurica, Rexford. *Flathead County:* Kalispell. *Missoula*

County: Missoula, Seeley Lake. Lewis and Clark County: Helena. Powell County: Niger Hill. Bitter Root Mountains.

*Idaho*: Bonner County: Priest River, Priest Lake. Latah County: Moscow, Cedar Mountains. Nez Perce County: Waha Lake.

*Wyoming*: Lincoln County: Cotton Wood Lake.

*California*: Humboldt County: Eureka. Port Chester? (this last locality was not found on a map).

DISCUSSION: This species shows considerable variation in the color and brilliancy of the elytral margin and, mainly because of this variation, Casey (1897, 1920) described five new species and two subspecies of *marginatus*. I have examined many specimens collected in different localities (see tables 3 and 4). As a rule, beetles with metallic luster on the elytra and brilliant margins are found

in the coastal areas of Alaska, British Columbia, and Washington State. The beetles with darker elytra, without a metallic luster or distinct purple tint, prevail in the interior provinces of British Columbia, the interior counties of Washington, in Oregon, Montana, Idaho, and Wyoming. According to Lindroth ([1962]) the limit between the two variations in southern British Columbia seems to run between Oliver (dark specimens) and Manning Park (bright specimens).

My observations show a more complicated pattern. In the Aleutian Islands and Alaska Peninsula, beetles with dark purple or dark metallic luster are found together with more brilliantly colored ones. Some specimens also have a faint bluish tint. Many are dark, with only faint traces of luster, but not so black as the majority of specimens from Montana, Idaho, or Wyoming, although in some speci-

TABLE 3  
VARIATION (NUMBER OF SPECIMENS) IN THE COLOR OF THE ELYTRA IN  
*Scaphinotus (Brennus) marginatus*

Locality	Elytra with Distinct Purple or Metallic Luster	Elytra Dustier, Luster Faint	Elytra Dark, With- out Luster or With Only Traces
Aleutian Islands and Alaska Peninsula	172	98	104
St. Paul, Prince of Wales, Annette, and Wrangell islands	158	28	25
Alaska (mainland)	48	42	8
Vancouver Island	145	24	8
British Columbia, coastal provinces <sup>a</sup>	41	9	8
British Columbia, interior provinces <sup>b</sup>	5	17	88
Alberta	3	18	51
Washington, coastal counties <sup>c</sup>	161	70	49
Washington, interior counties <sup>d</sup>	19	4	77
Oregon, coastal counties <sup>e</sup>	21	42	87
Oregon, interior counties <sup>f</sup>	33	40	35
Montana	3	—	8
Idaho	—	1	25
Wyoming	1	—	5
California	—	—	2

<sup>a</sup> British Columbia coastal provinces include New Westminster, Skeena, Fraser Valley, and the offshore islands.

<sup>b</sup> British Columbia interior provinces include Cariboo, Kootenay, and Yale.

<sup>c</sup> Washington coastal counties include Clallam, Grays Harbor, King, Kitsap, Jefferson, Mason, Pierce, Thurston, Skagit, the western part of Snohomish, Whatcom, and the offshore islands.

<sup>d</sup> Washington interior counties include Asotin, Chelan, Kittitas, the eastern part of Snohomish, Spokane, Yakima, and Walla Walla.

<sup>e</sup> Oregon coastal counties include Benton, Clatsop, Columbia, Coos, Douglas, the western part of Lane, Lincoln, Marion, Washington, and Yamhill.

<sup>f</sup> Oregon interior counties include Clackamas, Deschutes, Hood River, Harney, Grant, Jackson, the eastern part of Lane, Umatilla, Wallowa, and Multnomah.



TABLE 4  
VARIATION (NUMBER OF SPECIMENS) IN THE COLOR OF THE ELYTRAL MARGIN  
IN *Scaphinotus (Brennus) marginatus*

Locality	Golden Green	Green	Bluish Green	Golden	Coppery	Purple	Bluish Purple	Dark, no Luster
Aleutian Islands and Alaska Peninsula	282	58	7	7	15	3	1	1
Prince of Wales, Annette, and Wrangell islands	39	109	54	1	5	—	—	2
Alaska (mainland)	57	10	2	19	10	—	—	—
Vancouver Island	50	71	38	4	3	1	4	—
British Columbia, coastal provinces	22	19	9	3	4	1	—	—
British Columbia, interior provinces	6	3	40	15	—	26	20	7
Alberta	5	8	32	—	—	14	9	4
Washington, coastal counties	84	64	81	4	2	—	3	14
Washington, interior counties	12	10	17	—	12	13	3	51
Oregon, coastal counties	23	15	57	15	16	8	2	6
Oregon, interior counties	30	13	15	18	11	1	—	10
Montana	1	—	2	—	—	1	6	1
Idaho	2	2	5	—	4	3	1	9
Wyoming	—	—	4	—	—	—	—	2
California	—	—	2	—	—	—	—	—

mens the purple or metallic luster is inconspicuous. Even the beetles with bright metallic luster seem to be less brilliant than those from the coast of Alaska and British Columbia. It is also possible to find dark bronze specimens. The elytral margin of *marginatus* from the Aleutian Islands is generally golden green or brilliant green, rarely any other color. There are examples of *marginatus* with dark bronze or dark metallic elytra on Unalaska, Umnak, and other islands farther from the mainland, whereas on Kodiak, Prince of Wales, and Annette islands, closer to the shore of Alaska, brilliant purple beetles prevail.

On the mainland of Alaska and in the coastal regions of British Columbia, most of the beetles are bright, with a distinct purple or reddish purple luster on the elytra and a shining golden green, bright green, rarely bluish green (Vancouver Island) margin. Most of the British Columbia specimens have a slight bluish tint toward the tip of the elytra.

In the interior provinces of British Columbia, although in the western part of the province, the majority of the beetles are dustier,

with a faint purple luster, often only traces of it, and a bluish green, golden, or purple elytral margin.

To the east of British Columbia in Alberta and eastward, where *marginatus* is more rare than on the Pacific coast, most of the beetles are dark without luster, or with a faint purple luster, but even in this region it is possible to find brilliant purple examples, as, for instance, those from Pemberton Hill, Leduc Province.

In the state of Washington, as in British Columbia, on the coast or nearby, the majority of specimens have a distinct purple luster on the elytra and a golden green or bluish green margin. Those from interior counties are dustier, and even the margin has only traces of luster or none. Some specimens of *marginatus* from Washington have a bluish tint on the elytra.

In Oregon there is no distinct difference among beetles of coastal or interior counties. There are many dark specimens without a trace of purple luster, but those that have it often also have a light bluish tint. Beetles only from McKenzie in Lane County have a rather distinct metallic luster on the elytra.

The elytral margin in specimens from Oregon shows all shades of green, bluish, golden, and purple.

In Montana, Idaho, and Wyoming, where *marginatus* is not abundant, dark specimens prevail.

The two specimens from California, which I saw, were also dark, and the elytral margin was a faint bluish green.

A single specimen from Labrador, far from the range of the species, has a beautiful purple luster on the elytra and a brilliant golden green margin. Rare specimens of *marginatus* are of unusual color. In British Columbia on Big Castle Island and at Duncan Channel some specimens have shiny golden elytra, or a bicolored elytral margin; others are green near the humeri, golden toward the tip, or purple toward the humeri and bluish on the tip. A few beetles collected in Eugene, Oregon, have a vermilion margin.

Hatch (1953) reported that, in a conversation with Van Dyke, Van Dyke had suggested that the purplish cupreous population of *marginatus* might be subdivided as follows: typical *marginatus* in Alaska; subspecies *insularis* Casey, a large and robust form, on Queen Charlotte, Vancouver, and San Juan islands; subspecies *cupripennis* Casey, a brilliantly colored form with roughly sculptured elytra, in the forests west of the Cascade Mountains and, according to Roeschke (1907), also in Easton, Kittitas County, Washington; subspecies *confusus* Casey, a less brilliant form from the bogs west of the Cascade Mountains; and subspecies *fulleri* Horn, an obscurely purplish form in western Washington and western Oregon. Hatch himself is not satisfied with this classification, although he believes one like it may ultimately prevail.

Lindroth ([1962], p. 23) wrote that the change of color in *marginatus* reminded him of that in *Zacotus matthewsi*. In the sugar-beet regions of the Ukraine I have seen specimens of *Harpalus psittaceus* that were dark and grayish in color near lakes and swamps, and other specimens of the same species that were light or dark green in nearby fields higher in elevation.

Lindroth ([1962], p. 23) further expressed the opinion, with which I agree, that color alone does not provide an adequate basis for

subspecific division. He stated, however, that there seems to be a correlation between the color and the elytral sculpture in the species *marginatus*, of which dark, inland specimens have a more regular elytral sculpture. If there is such a correlation I certainly failed to see it. Beetles with completely irregular elytral striae, which are impossible to count, are comparatively rare and are found in many different localities inland, as well as on the Pacific coast. The great majority of specimens of *marginatus* have wavy, easy-to-count striae even on the sides where they are at least slightly irregular. In specimens from some localities the striae are so irregular that they are nearly impossible to count (fig. 62), for instance, those from Vancouver Island in Nanaimo, Sidney, Ted Inlet, those from Oregon, Douglas County (Anlauf and Rosenberg), and those from some parts of eastern Washington. At the same time in nearby localities (Parksville, Port Alberni, Douglas Mountains on Vancouver Island, and in most of Oregon and Washington), the majority of beetles have the normal, easy-to-count elytral striae.

Roeschke (1907) recognized one subspecies of *marginatus*, *fulleri* Horn, and three varieties: *cupripennis* and *confusus* Casey and *fallax* described by Roeschke himself. The five other species and subspecies of Casey, and Géhin's *gracilis*, are considered by Roeschke as synonyms.

Lindroth ([1962]) was inclined to consider them all synonyms of *marginatus*, as am I.

Géhin's *gracilis* is supposed to be smaller than *marginatus*, darker, with less-impressed striae, less convex intervals, and with a green margin on the elytra. I have not seen this type, but Géhin's description fits any less-shiny specimen of *marginatus*. It is also apparent that the type locality for *gracilis* is incorrect, as the species is not found in Mexico.

Horn's *fulleri*, which I have examined, is only a dark variety of *marginatus* often found in Oregon, the interior counties of Washington, and British Columbia, and farther east in Alberta, Montana, Idaho, and Wyoming.

The variety *fallax* Roeschke, which was considered to be a subspecies by Hatch (1953), is dark like *fulleri* and, judged by Roeschke's description, differs from *mar-*

*ginatus* in the darker color and bluish elytral margin (Horn's *fulleri* is supposed to have a purple elytral margin, which, apparently has faded in the type). As is said above, it is impossible to divide *marginatus* by the color of the elytra, and especially by the color of the elytral margin.

All Casey's new species related to *marginatus*, such as *cupripennis*, *insularis*, *confusus*, and *columbianus*, and the subspecies *montanicus* and *wrangelli*, the types of which I have examined, are synonyms of *marginatus* and hardly, if at all, different from it. Only Casey's *oregonus* has irregular elytral striae that are difficult to count. But, as stated above, beetles with the same elytral sculpture are also found in some parts of eastern Washington and on Vancouver Island, so *oregonus* (from Oregon) is only a variety of *marginatus* and a synonym.

**MATERIAL EXAMINED:** Two thousand ninety-eight specimens (1026 males and 1072 females).

***Scaphinotus (Brennus) johnsoni* Van Dyke**

Figures 24, 31, 56, 57, 60, 81, 108, 109, 143, 144

*Scaphinotus johnsoni* VAN DYKE, 1924, p. 3. Type locality; Olympic Mountains, Washington. Type in the California Academy of Sciences, San Francisco.

**DESCRIPTION:** Chocolate or reddish brown with or without faint, purple luster on elytra; head lightly or moderately transversely wrinkled at front (fig. 24); genae slightly incised, as in *marginatus*; labrum bifurcate, its lobes two and a half to three times longer than wide (fig. 31), longer than in *obliquus*, *interruptus*, or in *angusticollis* of the subgenus *Pemphus*, which *johnsoni* resembles more than any species of *Brennus*.

Pronotum as long as wide, or slightly wider than long, average length, 4.1 mm., range from 3.5 to 4.5 mm.; average width, 4.3 mm., range from 4.0 to 4.5 mm. (to the naked eye, however, pronotum appearing longer than wide, because of long, oblique, posterior sides, at base becoming parallel or nearly so); apical marginal bead narrow but distinct; disk feebly convex, strongly or moderately wrinkled, smoother toward sides (fig. 81).

Elytra oblong-oval, humeri obliterated, striae punctate, 19 to 20 in number, slightly irregular, more so toward sides, very much as

in *angusticollis* (subgenus *Pemphus*), but type of *johnsoni* (examined) has more regular elytral striae, third, sixth, ninth, and twelfth striae formed by elongated punctures, not striate; in some specimens only twelfth striae with scattered punctures, some other striae incomplete and not straight (figs. 56, 57, 60).

Setae orbitalis and gularis, present, both long; metacoxa with posterior and anterior setae; males with one seta, females with two setae, on each side of anal segment. Legs long, but shorter than in *Scaphinotus (Pemphus) angusticollis*, front femur with two to four setigerous punctures, very much as in *marginatus*, middle femur with one or two, rarely four, punctures; anterior tarsi of male with first three segments dilated and papillose on ventral side, first segment with papillae in apical third only, in some cases fourth segment also with a few papillae. Penis not so slender as in *marginatus* (figs. 108, 109). Styli of female genitalia rather slender, apparently more elongated than those of *marginatus* (figs. 143, 144).

Average length, 16.0 mm., range from 13.0 to 18.5 mm.; average width, 6.7 mm., range from 6.0 to 7.0 mm.

**DISCUSSION:** This is a rare species that is restricted to the southern part of Vancouver Island and the Olympic Mountains in northern Washington, and is found at altitudes of from 1000 to 3200 feet. I have seen specimens from Mt. Arrowsmith on Vancouver Island and from the Olympic Mountains (Hoh River, Forks, Sol Duc Hot Springs, and Ozette).

*Scaphinotus (Brennus) johnsoni* resembles *marginatus* and *S. (Pemphus) angusticollis*. The last-mentioned species belongs to another subgenus and differs from *Brennus* in the shorter labrum (figs. 32), complete absence of the purple luster from the elytra and elytral margin, the more dilated segments of the anterior tarsi of the male, and the less-impressed, more irregular elytral striae. From *marginatus* this species differs in the sculpture of the elytral striae (figs. 56, 57, 60), the more heavily wrinkled pronotum (fig. 81), which has nearly parallel sides at the base, and a stouter penis (figs. 108, 109).

**MATERIAL EXAMINED:** Fourteen specimens (five males and nine females).

**Scaphinotus (Brennus) obliquus (LeConte)**

Figures 5, 65, 66, 82, 83, 113, 116, 117

*Cychrus obliquus* LECONTE, 1868, p. 61. Type locality: Sacramento, California. Type in the Museum of Comparative Zoology, Cambridge, Massachusetts. Transferred to *Brennus* by Horn (1878).

*Brennus convergens* CASEY, 1897, p. 326. Type locality: Siskiyou County, California. Type in the United States National Museum, Washington, D. C. Synonymized by Csiki (1927).

*Brennus opacicollis* CASEY, 1897, p. 327. Type locality: Oregon. Type in the United States National Museum, Washington, D. C. Synonymized by Roeschke (1907).

*Brennus sculptipennis* CASEY, 1897, p. 327. Type locality: California. Type in the United States National Museum, Washington, D. C. Synonymized by Roeschke (1907).

**DESCRIPTION:** Black or dark brown. Head, and especially pronotum, dull; front convex with fine, transverse wrinkles, in some specimens with heavier wrinkles; labrum with shorter lobes, as in *interruptus* and *rugiceps* (fig. 30); first antennal segment normal, only slightly or not at all wider than following segments.

Pronotum feebly convex, slightly wider than long, average length, 3.5 mm., range from 3 to 4 mm.; average width, 4 mm., range from 3.3 to 4.5 mm.; widest part close to middle or a little before it; sides arcuate at front, oblique or sinuate in their posterior half, convergent at base (fig. 82), rarely nearly parallel; side margins of pronotum narrow, apex not conspicuously emarginate, apical marginal bead in many cases incomplete or absent; median and apical lines well impressed, basal line less conspicuous; disk finely wrinkled, more so at base, slightly or not at all convex.

Elytra oval, convex, more shining than pronotum; striae, usually 17 to 18 in number, in some specimens 16, wavy, irregular, toward sides difficult to count after ninth or tenth striae; punctures of striae small. One specimen from Coarsegold, Madera County, has more than 25 irregular striae, but this is an exception. Number of striae often differing on each elytron (16 on one side, 17 or 18 on other); intervals, as a rule, narrower than in *interruptus*, except in those specimens with

fewer striae; toward suture line intervals flat or feebly convex, on sides distinctly convex, forming elongated tegulae (figs. 65, 66).

Seta orbitalis absent (among 458 beetles examined only one had seta orbitalis, near one eye); seta gularis mostly absent; anterior seta on metacoxa, with very few exceptions; males with one seta, rarely with two setae, on each side of anal segment; females with two setae, a few with one or three setae. Males with first three segments of anterior tarsi dilated and bearing brush of papillae underneath; first segment with brush in apical two-thirds only. Penis short and with swollen basal part, especially in specimens from Shasta, Siskiyou, and Trinity counties, California, less swollen in specimens from Sierra, Nevada, El Dorado, and Plumas counties

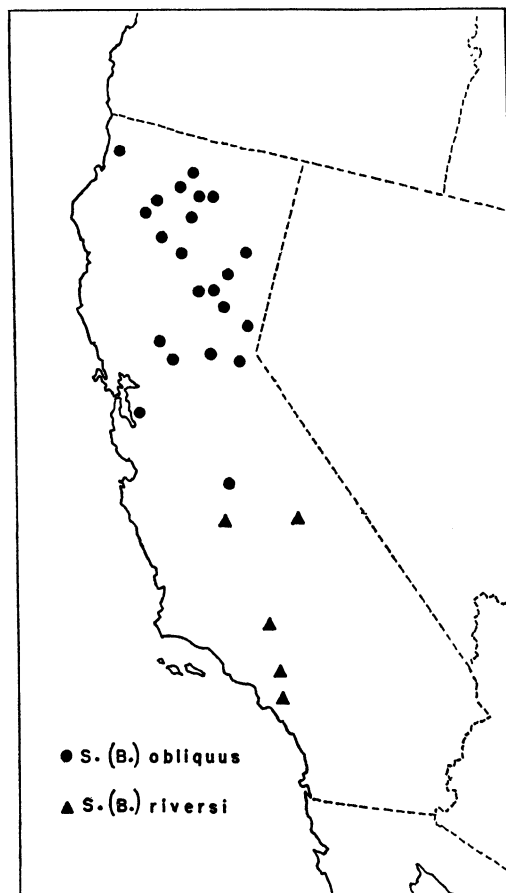


FIG. 5. Distribution of *Scaphinotus (Brennus) obliquus* (LeConte), and *S. (B.) riversi* Roeschke.



(figs. 131, 116, 117). Female genitalia as in other species of *Brennus*.

Average length, 15.8 mm., range from 12.5 to 19.0 mm.; average width, 7.0 mm., range from 5.5 to 8.0 mm.

DISTRIBUTION: *Scaphinotus (Brennus) obliquus* is abundant in the northern part of California, from Siskiyou County to Eldorado. It is apparently more rare along the seacoast and in Oregon, and virtually absent from south of Alameda County, California.

RECORDS: I have seen specimens from the following localities: *Oregon. California:* Del Norte County: Klamath. Siskiyou County: Castle Lake, Dunsmuir, McCloud River, Soda Springs, Sisson, Shasta Retreat. Shasta County: Castella, Clayton, Hatchet Creek, Shingletown, Shasta. Trinity County: Carville. Plumas County: Keddie, Massack Mill, Meadow Valley, Quincy. Butte County: Butte. Lassen County: Lassen Volcanic National Park, Warner Valley. Sierra County: Downieville, St. Charles Hills. Nevada County: Fallen Leaf, Lake Tahoe. El Dorado County: El Dorado, Strawberry Valley, Tallac Lake (Shingle Springs). Yolo County: Yolo, Davis. Alameda County: Oakland Camp. Sacramento County: Sacramento. Madera County: Coarsegold, Madera.

DISCUSSION: *Scaphinotus (Brennus) obliquus* belongs to the same group as *interruptus* and *rugiceps*—beetles with irregular, wavy striae on the elytra. Occasionally it is not easy to identify them. Specimens of *rugiceps incipiens* with a crest with tubercles or heavy creases at the front of the head can be differentiated from *obliquus*, but *rugiceps rugiceps* from Oregon, which has only transverse wrinkles, is similar to *obliquus*, although *obliquus* differs from *rugiceps* in the absence of the seta orbitalis and in having the basal antennal segment less stout and the pronotum more oblique.

*Scaphinotus (Brennus) obliquus* differs from *interruptus* in the form of the pronotum, of which the sides are convergent at the base, not parallel as are those of *interruptus*, in the more numerous, less regular elytral striae, in the more convex intervals, and in the absence of a seta orbitalis. Some specimens of *obliquus*, mostly from the northern part of the range of the species (Siskiyou, Shasta,

and Trinity counties) have the elytral sculpture more as in *interruptus*, in many specimens with wider, convex intervals, the tegulae toward the sides more distinct and elongated and the striae well impressed, concealing the small punctures. Many of them have the posterior sides of the pronotum sinuate (fig. 83), and, in a few, the sides are nearly parallel at the base.

In some instances *obliquus* from Sierra, Nevada, and El Dorado counties have the elytral sculpture as in *oreophilus*—the tegulae shorter, the intervals less convex, and the striae less impressed, and therefore the punctures more conspicuous. The sides of the pronotum in the posterior half are distinctly oblique. *Brennus oreophilus*, which also lacks a seta orbitalis, has straight but not wavy elytral striae, interrupted by large punctures. A seta gularis is usually absent from *obliquus* but is commonly present in *oreophilus*. The base of the pronotum is straight in *obliquus* and slightly arcuate in *oreophilus*.

Casey's *convergens* from Siskiyou County, according to Casey (1897), differs from *obliquus* in having a narrower, longer pronotum, with the basal line narrower than the head. Roeschke (1907), who placed *convergens* as a subspecies of *obliquus*, described it as having more arcuate sides to the pronotum, which tend to become parallel close to the base; the elytral striae more irregular, and the intervals more convex. Casey's type, however, which I saw in Washington, has the sides of the pronotum convergent at the base, and only one paratype (a female) has them nearly parallel. As for the elytral sculpture, it is the same as in many other specimens of *obliquus*, regardless of the locality. Therefore I consider *convergens* to be a synonym of *obliquus*.

Both of Casey's types (*sculptipennis* from California and *opacicolis* from Oregon) hardly differ, if at all, from most of the specimens of *obliquus*; therefore both these names are synonyms. All the characters that Casey termed "different" are relative and, as he frequently admitted, variable. I would say that the "differences" are hardly distinguishable.

MATERIAL EXAMINED: Four hundred seventy-three specimens (252 males and 221 females).

**Scaphinotus (Brennus) interruptus**  
(Ménétriés)

Figures 6, 67, 84-86, 111, 114, 115

*Cychnus interruptus* MÉNÉTRIÉS, 1844, p. 54. Type locality: California. Type in the Academy of Sciences, Leningrad, Soviet Union. Transferred to *Brennus* by Motschulsky (1865).

*Cychnus constrictus* LECONTE, 1853, p. 398. Type locality: San Jose, California. Type in the Museum of Comparative Zoology, Cambridge, Massachusetts. Synonymized by Csiki (1927).

*Cychnus dissolutus* SCHAUM, 1863, p. 72. Type locality: Sacramento, California. Type in the Zoologisches Museum, Berlin. Synonymized by Csiki (1927).

*Brennus politus* CASEY, 1897, p. 330. Type locality: Hoopa Valley, Humboldt County, California. Type in the United States National Museum, Washington, D. C. Synonymized by Csiki (1927).

*Brennus sinuatus* CASEY, 1897, p. 330. Type locality: California. Type in the United States National Museum, Washington, D. C. Synonymized by Roeschke (1907).

*Brennus corpulentus* CASEY, 1897, p. 331. Type locality: Oakland, Alameda County, California. Type in the United States National Museum, Washington, D. C. Synonymized by Roeschke (1907).

*Brennus integer* CASEY, 1914, p. 29. Type locality: California. Type in the United States National Museum, Washington, D. C. Synonymized by Csiki (1927).

*Brennus beringi* CASEY, 1920, p. 179. Type locality: Saint Paul Island, Alaska (apparently an error in the locality). Type in the United States National Museum, Washington, D. C. Synonymized by Lindroth ([1962]).

*Brennus parvicollis* CASEY, 1920, p. 176. Type locality not given. Type in the United States National Museum, Washington, D. C. New synonymy.

*Brennus procerus* CASEY, 1920, p. 179. Type locality: Piedmont, Alameda County, California. Type in the United States National Museum, Washington, D. C. New synonymy.

**DESCRIPTION:** Black or dark brown, many individuals with faint blue luster on elytral margin, in a few also on pronotum. Head shinier than in *obliquus*, front slightly convex, with distinct transverse wrinkles, seldom inconspicuous; labrum as in *rugiceps* (fig. 30), with lobes shorter than those of *marginatus*; basal antennal segment only slightly wider than following segments.

Pronotum about as wide as long or slightly

wider than long; average length, 3.6 mm., range from 3.0 to 4.3 mm.; average width, 4.1 mm., range from 3.5 to 4.5 mm. (many beetles from Humboldt, Trinity, and Butte counties have slender pronotum); sides of pronotum sinuate or nearly oblique in their posterior half, at base parallel or indistinctly convergent (figs. 84-86); apical marginal bead narrow, but usually distinct, although in many incomplete; disk feebly convex with well-impressed middle, basal, and apical lines, moderately or more heavily wrinkled.

Elytra oval, convex, striae irregular, wavy, fewer than 18 in number; in majority of specimens number of striae 15 to 16, rarely 17, many specimens with no more than 14 striae and some with only 12 (beetles with reduced number of striae occur more often near and around San Francisco Bay). Striae usually with well-impressed although small punctures, which often disappear toward sides, being hidden in deep striae; intervals wider than those in *obliquus*, more so on disk, even examples with 16 striae having wider intervals, which become convex and form tegulae closer to elytral margin (fig. 67).

Setae orbitalis and gularis (with rare exceptions), and anterior seta on metacoxa present; males with one seta, females with one or two setae, on each side of anal segment, rarely with three setae. Anterior tarsi of males with three segments dilated and bearing brush of papillae underneath, first segment in apical half or apical third, fourth segment mostly with a few papillae, often completely glabrous, seldom entirely covered with papillae.

Penis, as usual in *Brennus*, with pointed tip, at base slightly enlarged, not so strongly as in *obliquus* (figs. 111, 114, 115); female genitalia as in *obliquus*.

Average length, 16.5 mm., range from 13 to 20 mm.; average width, 7.5 mm., range from 6 to 9 mm.

**DISTRIBUTION:** This species is abundant in California, from Humboldt County south to Monterey, and eastward in Placer, Eldorado, Amador, Calaveras, and Tuolumne counties; much more rare north of Humboldt County, in Oregon, and south of Monterey.

**RECORDS:** I have seen specimens from the following localities: *Oregon*. *California*: Del Norte County: White Ranch, Klamath. Sis-

kiyou County: Dunsmuir. Humboldt County: Hoopa Valley, Blocksburg, Eureka, Fort Seward, Green Point Ranch, Mt. Korbel, Upper Mad River, Van Duzen River, Willow Creek. Trinity County: Carville, Hayfork, Island Mountain. Shasta County: Hazel Creek, Patter Creek, Shasta. Mendocino County: Anchor Bay, Comptche, Cummings, north fork of the Navarro River, Ukiah. Glenn County: Stonyford. Lake County: Adams Spring, Lower Lake, Middletown, Mt. Herdin. Yolo County: Yolo, Davis Meadow. Sonoma County: Annapolis, Bennet Mountains, Bodega Head, Cazadero, Cloverdale, Fort Ross, Guerneville, Healdsburg, Kenwood, Mesa Grande, Santa Rosa, Sonoma, Spring Mountains. Napa County: Napa, Calistoga, Monticello, Pope Valley, Sequoia Reservation, St. Helena, White Cave (St. Helena). Solano County: Green Valley. Placer County: Dutch Flat. Butte County: Butte, Chico, Oroville, Richardson. Sierra County: Downieville, St. Charles. Nevada County: Nevada City. El Dorado County: Pacific House, Pacific Grove, Placerville, Pollock Pines, Riverton, Whitehall. Amador County: Amador, Licking Fork on Mokelumne River, Sutter Creek, Volcano. Calaveras County: Angeles Camp, Big Trees, Mokelumne Hill, Mokelumne River, Murphys. Contra Costa County: Clayton, Mt. Diablo, Wild Cat Canyon. Marin County: Bolinas, Fairfax, Lagunitas, Mill Valley, Muir Woods, Taylorville, Sausalito. San Francisco. Alameda County: Berkeley Hill, Strawberry Canyon in Berkeley, Livermore, Mills College, Oakland, Piedmont. Santa Clara County: Alma, Alum Rock Canyon, Gilroy Hot Spring, Los Uvas Creek, Palo Alto, Santa Clara, San Jose. San Mateo County: Menlo Park, Montara, Moss Beach, San Mateo, San Pedro Valley, Stanford University. Santa Cruz County: Ben Lomond, Felton, Mt. Hermon, Santa Cruz. Tuolumne County: Tuolumne. San Benito County: San Benito. Monterey County: Carmel, Pacific Grove, Monterey. Los Angeles County: Los Angeles. Tulare County: Kaweah. Riverside County: Riverside.

**DISCUSSION:** Several authors (Ménétriés, 1844; Horn, 1878; Roeschke, 1907) have written that *interruptus* strongly resembled *ventricosus* and that it was difficult to sepa-

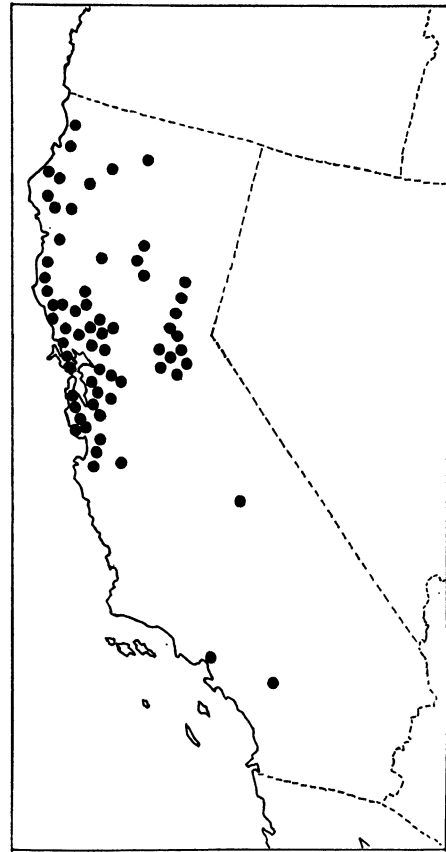


FIG. 6. Distribution of *Scaphinotus (Brennus) interruptus* (Ménétriés).

rate them. Actually, they differ in a number of characters: *interruptus* has the elytral striae wavy, the intervals on the sides forming or tending to form longer tegulae, and the number of striae, with a few exceptions, is not more than 16. Specimens from only a few areas, such as Montara in San Mateo County, are difficult to assign specifically. The specimens of *interruptus* from Montara resemble *ventricosus* in having the striae of the elytra more regular and less wavy, but the number of striae is different, not more than 14 in *interruptus*, not fewer than 17 in *ventricosus*. Also *interruptus* is smaller than *ventricosus*; it averages 14 mm. and the range is from 13 to 16 mm., whereas *ventricosus* (Montara specimens) averages 20 mm., with a range of from 15.5 to 22.5 mm.

Some specimens of *interruptus* with the sides of the pronotum slightly convergent at

the base resemble those of *obliquus*, but *obliquus* lacks a seta orbitalis, which is present in *interruptus*, and *obliquus* has more numerous and more irregular elytral striae, and more distinctly convergent sides of the pronotum.

LeConte's type of *constrictus*, which I have examined, differs hardly, if at all, from other individuals of *interruptus*. It has 14 wavy and irregular striae, intervals that tend to form elongated tegulae, and the sides of the pronotum are parallel at the base. This specimen comes from San Jose, Santa Clara County, California, and bears, in addition to the usual type label, two other labels: "*C. constrictus* LeConte-*ventricosus* Motsch." and "*C. interruptus* Men.-*ventricosus* Chaud."

Schaum's *dissolutus* from Sacramento was considered by Roeschke (1907) a subspecies of *interruptus* and, according to him, was found in Sierra, Nevada, Placer, and Eldorado counties, and also in the northern part of Humboldt County. It was said to differ from typical specimens of *interruptus* in having more numerous elytral striae (16 to 18), the formation by the convex intervals of short and not elongated tegulae, larger and more distinct elytral punctures, and an almost oblique pronotum. Actually specimens of *interruptus* with 18 elytral striae rarely occur (only 2% of 731 specimens examined), the great majority having 15 to 16 striae. The punctures of the elytral striae are mostly small, although numerous and distinct, but some variation in the size of the puncture is found in *interruptus* wherever it occurs. The great majority of specimens have elongated tegulae and specimens with shorter tegulae are found throughout the range of this species. The sides of the pronotum in *interruptus* are usually parallel at the base, rarely slightly convergent, and only in single specimens are they distinctly convergent. Among the 819 specimens examined seven (fewer than 1%) have distinctly convergent sides of the pronotum at the base. Beetles with slightly convergent sides of the pronotum are found nearly everywhere, together with specimens that have the sides of the pronotum parallel at the base. Therefore the characters given by Roeschke (1907) for *dissolutus* are variable and do not differ geographically.

Casey's *politus* from Humboldt County, which was considered by Roeschke (1907) to

be another subspecies of *interruptus*, supposedly differs from *interruptus* in the oblique sides of the pronotum, not parallel at the base, and in having more numerous elytral striae (16 to 18, as in *dissolutus*); *politus* presumably is a form intermediate between *interruptus* and *dissolutus*, to judge by Roeschke's description. Actually, the type of *politus*, which I have seen, has only slightly convergent sides of the pronotum at the base, and in other characters it hardly differs from the majority of specimens of *interruptus*. Casey himself hesitated to consider *politus* as a separate species. It is only a variety and a synonym of *interruptus*.

Casey's *sinuatus* is also a synonym. Later, in 1920, Casey admitted that what he had described as *sinuatus* was actually *interruptus*.

Casey's *corpulentus*, smaller in size and with slightly more wrinkled head and pronotum, is also a synonym, as is Casey's *integer*, the specimens of which are typical of *interruptus*, only smaller.

Casey's *procerus* is a more distinct variety, although I think it is a synonym of *interruptus*. The elytra of *procerus* are more elongated than those of most of the specimens of *interruptus*, the striae are very irregular and difficult to count, and the punctures are also scattered in intervals; in all other characters it is like *interruptus*.

Casey's *parvicollis* and *beringi* are synonyms of *interruptus*. The type of *beringi* undoubtedly was incorrectly labeled (St. Paul Island, Alaska), as was stated by Lindroth [(1962)]. *Brennus interruptus*, with all its individual varieties, is restricted to California and does not reach Alaska. I have seen only one specimen collected in Oregon (by Edwards), and Roeschke had two from the same state.

MATERIAL EXAMINED: One thousand fifteen specimens (512 males and 503 females).

#### **Scaphinotus (Brennus) cordatus (LeConte)**

Figures 7, 42, 46, 59, 63, 87, 110, 112, 137

*Cychnus cordatus* LECONTE, 1853, p. 399. Type locality: San Jose, California. Type in the Museum of Comparative Zoology, Cambridge, Massachusetts. Transferred to *Brennus* by Horn (1878).

*Brennus cordatus vernicatus* CASEY, 1920, p. 183.



Type locality: San Francisco Bay, California. Type in the United States National Museum, Washington, D. C. Synonymized by Csiki (1927).

*Brennus cordatus rufitarsis* CASEY, 1920, p. 184.

Type locality: Santa Cruz, California. Type in the United States National Museum, Washington, D. C. Synonymized by Csiki (1927).

**DESCRIPTION:** Small and smooth, very shiny, with elytral punctures reflecting light as from a mirror; dark brown or reddish brown, with feebly convex elytra.

Head more or less flat, with light depressions on sides and a small, transverse depression behind eyes; genae incised, small; labrum with long, slender lobes; maxillae with sharp teeth and a few silken hairs between them; basal antennal segment about as long as following two segments, and at apex not wider than length of second segment.

Pronotum heart-shaped, slightly wider than long, average length, 3.2 mm., range from 2.5 to 3.5 mm.; average width, 3.8 mm., range from 3.2 to 4.2 mm. Sides evenly arcuate, becoming parallel or, rarely, hardly convergent at base; apical marginal bead thin, but distinct, in some specimens slightly obliterated at middle; disk hardly convex, very smooth; apical, median, and basal lines well impressed (figs. 87).

Elytra feebly convex or flat, with about 12 to 14 striae, which on sides and apex become deep, like furrows, and which are often broken into shorter pieces; punctures of striae large, spreading into adjacent intervals; punctures on elytral margin still larger; intervals only slightly convex, more so on sides. In some specimens, however, striae almost uninterrupted and therefore seeming to be more regular (figs. 59, 63).

Setae orbitalis and gularis and both setae on metacoxa present and long. Males and females with two setae on each side of anal segment; rarely males having one seta and females three.

Ventral side as smooth and shiny as dorsal side; anterior tarsi of male with four segments bearing brush of papillae underneath, first one on tip only, fourth segment may have only a few papillae; prosternal process rounded (fig. 46). Male genitalia of usual form for *Brennus* (figs. 110, 112), basal part of penis not enlarged, tip pointed, or, in some males, slightly truncate, although not

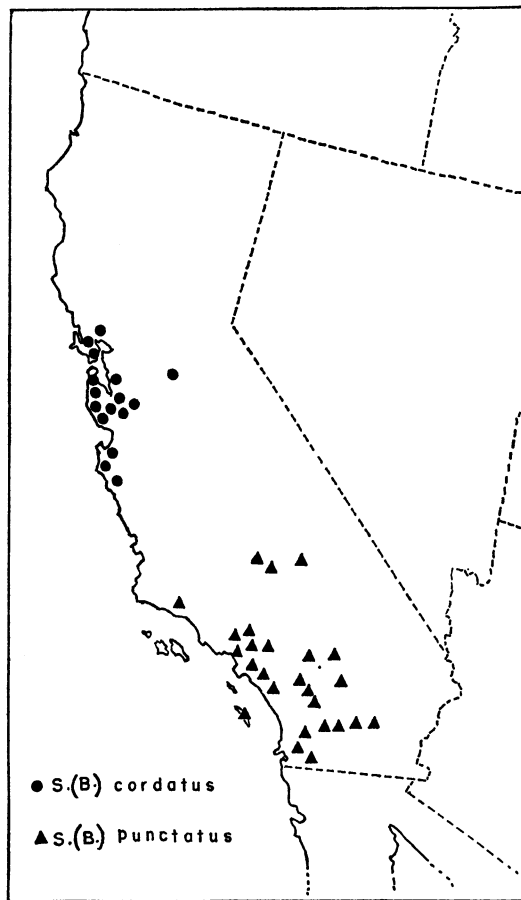


FIG. 7. Distribution of *Scaphinotus (Brennus) cordatus* (LeConte), and *S. (B.) punctatus* (LeConte).

so distinctly as in *striatopunctatus*. Female genitalia as in *rugiceps* and other species of *Brennus*, styli not so slender as those of *cristatus* (fig. 137).

Average length, 12.1 mm., range from 11 to 15 mm.; average width, 4.8 mm., range from 4 to 6 mm.

**DISTRIBUTION:** This species is found mostly in the central coastal regions of California.

**RECORDS:** I have seen specimens from the following localities: *California*: Sonoma County: Sonoma. Marin County: Mt. Tamalpais, Woodacre, Lagunitas, San Rafael, Camp Taylor. San Francisco County: San Francisco Bay. San Mateo County: San Bruno, San Mateo. Alameda County: Crystal Springs. Santa Clara County: Santa Clara, San Jose, Wright. Santa Cruz County: Santa

Cruz Mountains, Mt. Hermon, Alma, Big Basin. Calaveras County: San Andreas Lake. Monterey County: Monterey, Arbolado.

DISCUSSION: This is a distinct species which differs from all other species of *Brennus* in the fact that its elytra are shiny and mirror-like. The elytra, furthermore, are less convex than those of other species and have fewer striae (except for *marginatus* and *interruptus*).

Casey's subspecies *vernificatus* and *rufitarsis* are synonyms of *cordatus*. Casey (1920) admitted that "it is impossible at present to determine the true relationship of these three forms."

MATERIAL EXAMINED: One hundred seventeen specimens (63 males and 54 females).

**Scaphinotus (*Brennus*) *subtilis* (Schaum)**

Figures 8, 55, 70, 88, 118, 119

*Cychrus subtilis* SCHAUM, 1863, p. 70. Type locality: California (Sacramento on type label). Type in the Zoologisches Museum, Berlin. Transferred to *Brennus* by Horn (1878).

DESCRIPTION: Black, head smooth, rarely with light transverse wrinkles; genae incised, slightly projecting before eyes, on dorsal side.

Pronotum wider than long, average length, 3.9 mm., range from 3.0 to 4.5 mm.; average width, 4.4 mm., range from 3.5 to 5.0 mm.; sides in their posterior half sinuate, at base mostly slightly convergent, rarely nearly parallel (among 134 specimens examined, 66% had sides convergent at base); side margins more or less elevated; apical marginal bead mostly incomplete; base straight; disk feebly convex, smooth, or slightly wrinkled; median line well impressed, apical and basal lines less so. Some specimens have shallow depression in front of basal line (fig. 88).

Elytra oval, convex, with about 16 to 18 regular rows of punctures, but not striate, or only with traces of striae; intervals flat (fig. 70).

Seta orbitalis, seta gularis, and anterior seta on metacoxa absent (of 134 beetles examined, only two, or 1.5%, had a seta orbitalis, 9% had a seta gularis, and not a single specimen had an anterior seta on the metacoxa). Males and females with one seta on each side of anal segment, as in *striatopunctatus*. Also, as in the latter, anterior tarsi of males of *subtilis* having only two segments

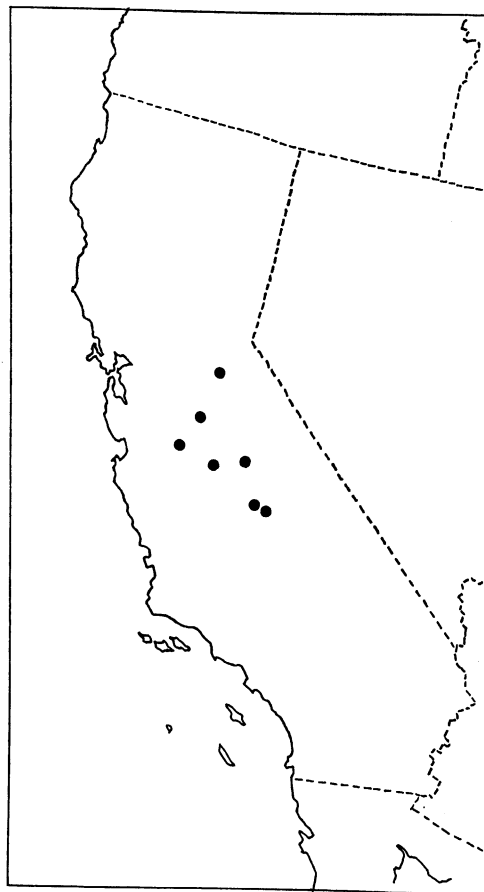


FIG. 8. Distribution of *Scaphinotus* (*Brennus*) *subtilis* (Schaum).

with brush of papillae on ventral side. Penis slender, not wider at base, and with pointed tip (figs. 118, 119), not rounded at apex as in *striatopunctatus*. Female genitalia of form typical for *Brennus*.

Average length, 17.5 mm., range from 14 to 22 mm., average width, 8.3 mm., range from 7 to 10 mm.

DISTRIBUTION: This species occurs in California, away from the coast, mostly on the western side of the Sierra Nevada.

RECORDS: I have seen specimens from the following localities: *California*: Calaveras County: Mokelumne Hill. Mariposa County: Mariposa. Madera County: Coarsegold. Fresno County: Camp Greely, Dunlap, Fresno. Tulare County: Colony Road, Camp Redstone, Kaweah, Giant Forest, Lindsay, Hot Spring, Springville, Visalia (all these

places in Tulare County, except Visalia, are in, or close to, Sequoia National Park). Kern County.

**DISCUSSION:** In general, *subtilis* is easy to identify because of the absence of elytral striae, which are replaced by neat rows of punctures. I have seen only one specimen with more or less distinct striae, and this specimen can be distinguished from the rather similar specimens of *striatopunctatus* by its more rounded, more convex elytra, and the fact that the sides of the pronotum are convergent, not parallel, at the base. Also the tip of the penis is pointed in *subtilis*, but rounded in *striatopunctatus*. As stated by Van Dyke (1924), however, *subtilis* is undoubtedly an offshoot of *striatopunctatus*.

Van Dyke (1924) described two subspecies of *subtilis* (*bullatus* from Fresno County and *grandis* from Tulare County). I consider *bullatus* to be a different species, and *grandis* a synonym of *bullatus*. The size, elytral pattern, genitalia, and other characters are quite different in *bullatus*, or *grandis*, and in *subtilis* (see description of *bullatus*).

**MATERIAL EXAMINED:** One hundred thirty-four specimens (73 males and 61 females).

***Scaphinotus (Brennus) bullatus* Van Dyke,  
new status**

Figures 9, 16, 69, 89, 91, 92, 120, 121, 150

*Scaphinotus subtilis bullatus* VAN DYKE, 1924, p. 3. Type locality: Roaring River, South Fork of Kings River Canyon, Fresno County, California. Type in the California Academy of Sciences, San Francisco.

*Scaphinotus subtilis grandis* VAN DYKE, 1924, p. 4. Type locality: Cedar Creek, Tulare County, California. Type in the California Academy of Sciences, San Francisco. New synonymy.

**DESCRIPTION:** Black or dark brown. Head at front with heavy, transverse wrinkles (only 11% of 75 beetles examined have a smooth head), whereas in *subtilis* head usually smooth or only slightly wrinkled; genae prominent, distinctly larger than those of *subtilis*, projecting beneath front of eyes (fig. 16).

Pronotum in many specimens with sides slightly angulated at middle (variety of *bullatus*; fig. 91), in posterior half sides oblique, at base mostly parallel, rarely convergent and, exceptionally, even divergent; in *subtilis* sides of pronotum mostly convergent,

lateral margins more elevated than those of *subtilis*. Average length of pronotum, 5.1 mm., range from 4.5 to 7.0 mm.; average width, 5.8 mm., range from 4.7 to 7.3 mm. Beetles with pronotum as long as wide and with evenly arcuate, not angulated sides not uncommon (variety "*grandis*"; fig. 92).

Elytral striae feebly impressed, but more conspicuous than those of *subtilis*, with finer punctures; striae numerous, more than 20, irregular and difficult to count, especially on sides. If number of striae fewer than 20, as in true *subtilis*, then intervals divided by rows of punctures, at least in apical part of elytra (fig. 69).

Setae orbitalis, gularis, and metacoxalis anterior, absent from most specimens, as is also true of *subtilis*; seta on metatrochanter invariably present in *subtilis*, absent from *bullatus*, yet 14 per cent of 75 specimens examined had this seta on one metatrochanter only. Males and females with one seta on each side of anal segment. Ventral side as in *subtilis*, smooth or slightly wrinkled; males with brush of papillae on ventral side of two segments of anterior tarsi, these segments apparently less dilated than in *subtilis*, and hardly wider than those of females. Penis with long, slender tip (figs. 120, 121), distinctly narrower than that of *subtilis*. Female genitalia of usual form.

Larger than *subtilis*, average length, 23.2 mm., range from 16 to 28 mm.; average width, 10.6 mm., range from 7.5 to 12.5 mm. Smaller specimens, 16 or 18 mm., rare.

**DISTRIBUTION:** This species occupies the same general area as *subtilis*, but is often found at higher altitudes.

**RECORDS:** I have seen specimens from the following localities: *California*: El Dorado County: El Dorado. Mariposa County: El Portal, Yosemite National Park. Fresno County: Cedar Grove, Kings River, Roaring River, South Fork of Kings River, Camp Greely. Tulare County: Cedar Creek, Colony Mill, Kaweah, Springville (all these localities in Tulare County are in Sequoia National Park).

**DISCUSSION:** Van Dyke (1924) described *bullatus* and *grandis* as subspecies of *subtilis*, but, as is said above, *bullatus* and *subtilis* are different species. Both are in the same or adjacent localities, and there are no inter-

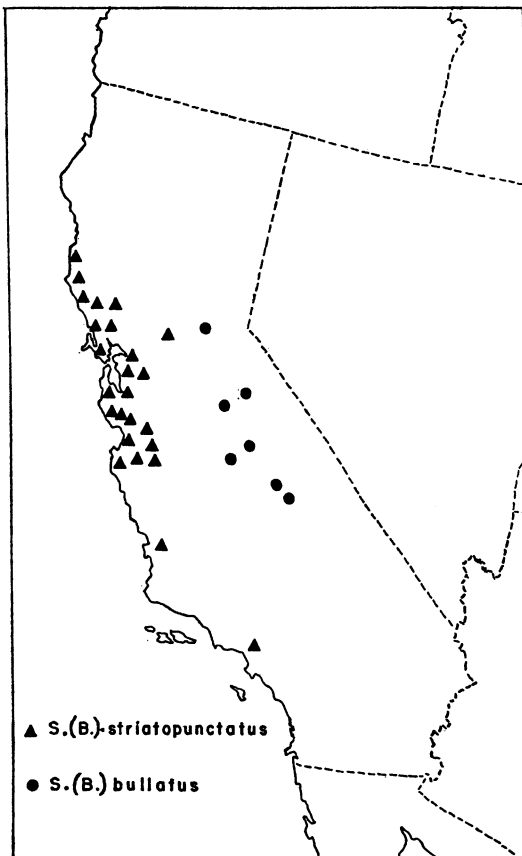


FIG. 9. Distribution of *Scaphinotus* (*Brennus*) *bullatus* Van Dyke and *S. (B.) striatopunctatus* (Chaudoir).

mediate forms. They can be distinguished by many characters, mentioned above in the description. As for *grandis*, it is only a variety, and I consider it a synonym of *bullatus*. According to Van Dyke (1924), it differs from *bullatus* by having broader elytra, with poorly defined striae, but more distinct punctures, more or less arranged in rows and with double rows in the intervals. I have seen the types and paratypes and find the difference between the two forms very relative. The type of *bullatus* has the punctures arranged in irregular rows that are difficult to count; the type of *grandis* has faint traces of striae. It seems to me that a more distinct difference is in the shape of the pronotum; the sides are slightly angulated in *bullatus* and evenly arcuate in "*grandis*." Specimens with all of

the variations in the shape of the pronotum (sides angulated or not, more or less strongly arcuate) are found in the same areas.

**MATERIAL EXAMINED:** Seventy-five specimens (36 males and 39 females).

***Scaphinotus* (*Brennus*) *oreophilus* (Rivers)**

Figures 3, 22, 35–37, 53, 93, 122, 123, 145, 148, 149

*Cychnus* (*Brennus*) *oreophilus* RIVERS, 1890b, p. 11. Type locality: Shingle Springs, El Dorado County, California. Type in Vogt collection, Zoologisch Museum, Universiteit van Amsterdam. Transferred to *Scaphinotus* by Roeschke (1907).

*Scaphinotus* (*Brennus*) *oreophilus* HOPPINGI ROESCHKE, 1907, p. 182. Type locality: Kings River, Fresno County, California. Type in Vogt collection, Zoologisch Museum, Universiteit van Amsterdam. Synonymized by Csiki (1927).

*Brennus oreophilus humeralis* CASEY, 1914, p. 30. Type locality: Mokelumne Hill, Calaveras County, California. Type in the United States National Museum, Washington, D. C. Synonymized by Csiki (1927).

**DESCRIPTION:** Black or dark brown. Head smooth or with more or less distinct transverse wrinkles at front; behind eyes a slight depression, a few with distinct depression (fig. 22).

Pronotum wider than long, average length, 3.8 mm., range from 3.0 to 4.5 mm.; average width, 4.4 mm., range from 3.5 to 5.5 mm.; examples with pronotum as wide as long rare; sides of pronotum in posterior half oblique or sinuate, at base convergent; base slightly arcuate, therefore hind angles slightly projecting, some specimens with a straight base; disk slightly convex, in many nearly flat, with strongly impressed median line; apical and basal lines less impressed; depression at base of pronotum shallow, in some specimens hardly conspicuous, rarely quite distinct; surface of pronotum slightly wrinkled or smooth, with heavier wrinkles at base; apical marginal bead often obliterated at middle (fig. 93).

Elytra with 18 regular striae, which after thirteenth or fourteenth striae become difficult to count because of large, scattered punctures; punctures closer to suture line moderately large, seldom as large as in *punctatus*, and quite rarely small or inconspicuous; inter-

vals moderately wide, slightly convex or flat, but at sides, where punctures become larger, intervals apparently narrower and more convex.

Seta orbitalis invariably absent (among 534 beetles examined only one had a seta near one eye); seta gularis present in most cases; seta anterior on metacoxa present; seta on metatrochanter, which is present in all species of *Brennus* except *bullatus*, may be absent from *oreophilus*; males and females with one seta on each side of anal segment. Anterior tarsi of males with three segments dilated and brush of papillae on ventral side, first segment in its apical part only. Penis like that in other species of *Brennus*, with pointed tip, base not at all, or hardly, stouter (figs. 122, 123). Female genitalia with pointed styli, which seem to be stouter than in *riversi* (figs. 145, 148, 149).

Average length, 16 mm., range from 13 to 20 mm., average width of elytra, 7 mm., range from 6 to 9 mm.

DISTRIBUTION: This species is found in Utah and in the central parts of California.

RECORDS: I have seen specimens from the following localities: *Utah*: Moab. *California*: Yolo County: Yolo, Davis Meadow. Napa County: Napa, Santa Helena. Sacramento County: Sacramento, Michigan Bar. El Dorado County: El Dorado, Placerville. Amador County: Amador, Mokelumne River, Jackson, Sutter Creek, Volcano. Calaveras County: Murphys, Glencoe, Mokelumne Hill. Tuolumne County: Tuolumne National Park, Phoenix Cape, Twain Harte. Mariposa County: Mariposa, El Portal, Yosemite Valley. Alameda County: Oakland. Madera County: Bass Lake, Coarsegold, North Fork, Sugar Pine. Fresno County: Fresno, Camp Greely, Dunlap, Eshon Valley, Shaver Lake. Tulare County: Cedar Grove, Cedar Creek, Belnap Creek in Camp Nelson, Colony Mill, Damnear, Mt. Ash, Giant Forest, Hot Spring, Kaweah, Marble Fork, South Fork River at Kaweah, Pine Flat, Potwisha, McIntyre Creek near Porterville in Sequoia National Park, Twin Lake, Watson Spring.

DISCUSSION: Roeschke (1907) considered *oreophilus*, *riversi*, and *hoppingi* to be subspecies, but *oreophilus* and *riversi* differ from

each other in a number of characters, and I consider them to be separate species. *Scaphinotus (Brennus) oreophilus* has only a slight depression behind the eyes, but *riversi* has in most cases a strong depression (among the 331 specimens of *oreophilus* examined for this character, only 4% had a distinct depression). The last segment of the palpi labiales of *oreophilus* is distinctly wider in the males, when compared with females, but only slightly wider in the males of *riversi*. The pronotum is wider than long in *oreophilus* and the depression at the base is shallow or inconspicuous, whereas *riversi* has the pronotum as long as wide and a deep depression at the base. Even were the depression in *oreophilus* more distinct, it is situated behind the basal line, not in front of it as in *riversi* (fig. 94). Therefore, after much consideration and study I have decided to separate *oreophilus* and *riversi* specifically.

Roeschke's *hoppingi* is only a slight variation of *oreophilus* and a synonym. According to Roeschke (1907), *hoppingi* comes from the southern arm of Kings River, Fresno County, California, and differs in its narrow pronotum with more angulated (?) sides (probably more sinuate sides), in the larger punctures on the elytral striae, as in *punctatus*, the large intervals, and the absence of the anterior seta from the metacoxa. I have seen two paratypes of *hoppingi*, and I found no distinct difference between them and *oreophilus*. The pronotum in those two paratypes is 4.3 mm. wide and 4.0 mm. long, with the sides strongly sinuate toward the base; the elytral punctures are not so large as those of *punctatus*, and the seta anterior on the metacoxa is present in both specimens. Furthermore, specimens listed as *hoppingi* are found in every area where characteristic examples of *oreophilus* occur.

Casey's subspecies *humeralis*, from Mokelumne Hill, is another synonym of *oreophilus*, which hardly, if at all, differs from it.

Some specimens of *oreophilus* resemble *obliquus*, but the elytral striae of *obliquus* are irregular and wavy, and the base of the pronotum is straight; *oreophilus*, on the other hand, has regular striae, except on the sides where, because of the scattered punctures, the striae seem to be wavy, and in *oreophilus*

also the base of the pronotum is slightly arcuate.

**MATERIAL EXAMINED:** Five hundred eighty-five specimens (304 males and 281 females).

***Scaphinotus (Brennus) riversi* Roeschke,  
new status**

Figures 5, 23, 33, 34, 94, 146, 147

*Scaphinotus (Brennus) oreophilus riversi* ROESCHKE, 1907, p. 182. Type locality not designated, but indicated as in high mountains of Sierra Nevada of Tulare and Kern counties, California. Type in Vogt collection, Zoölogisch Museum, Universiteit van Amsterdam.

**DESCRIPTION:** Black or dark brown. Head distinctly wrinkled between eyes, in many cases with heavy, transverse wrinkles at front; depression behind eyes (fig. 23); last segment of palpi labiales in males only slightly wider than in females (figs. 33, 34).

Pronotum as long as wide, or even longer than wide (fig. 94), average length, 4.3 mm., range from 3.3 to 4.8 mm.; average width, 4.4 mm., range from 3.3 to 5.0 mm.; sides of pronotum in posterior half distinctly oblique, longer than in *oreophilus*; base of pronotum with deep depression, making disk convex.

Elytra as described for *oreophilus*, but punctures of striae smaller, intervals not invariably convex.

Seta orbitalis absent, seta gularis absent from many specimens, seta anterior on metacoxa present; males with one seta, females with two setae, in a few cases with three setae or, quite rarely, with one seta, on each side of anal segment. Male and female genitalia like those described for *oreophilus*, but styli of females a little more slender (figs. 146, 147).

Average length, 17.1 mm., range from 13 to 20 mm.; average width, 7.3 mm., range from 6 to 9 mm.

**DISTRIBUTION:** Apparently *riversi* is more abundant in Sequoia National Park, Tulare County, California, and more rare in other counties of California. It is often found at higher altitudes than *oreophilus*, which is also abundant in Sequoia National Park, but I have seen many specimens collected at the same altitude as *oreophilus*—from 3000 to 5000 feet.

Only single specimens of *oreophilus*, how-

ever, are found at altitudes of 7000 to 9000 feet, where *riversi* is apparently abundant. Two perfect examples of *oreophilus* were found near Twin Lake, at an altitude of about 9000 feet, but this is an exception.

**RECORDS:** I have seen specimens of *riversi* from the following localities: *California:* Tulare County: Atwell Mill, Belnap Creek in Camp Nelson, Hot Springs, Giant Forest, Kern River, Jordan Peak, Lemon Cove, Monache Lake, McIntyre Creek near Porterville, Round Meadow, Red Wood Meadow, Mt. Slate (all these places are in Sequoia National Park). *Fresno County:* Kings River, Cedar Grove. *Kern County:* Serra Alto. *Los Angeles County:* Los Angeles, El Monte.

**DISCUSSION:** As stated above, *riversi* was described by Roeschke (1907) as a subspecies of *oreophilus*, but it differs in many characters and is often found in the same or adjacent localities. A few specimens might be regarded as intermediate between *oreophilus* and *riversi*, but these, when closely examined, can be assigned to one or the other species.

The most distinct difference between these two species is the form of the pronotum. In *riversi* it is more slender (average length, 4.3 mm., average width, 4.4 mm.), with longer, oblique sides in the posterior half, and with a deep depression at the base. In *oreophilus* the pronotum is wider than long (average length, 3.8 mm., average width, 4.4 mm.), the sides of the pronotum in the posterior half are shorter than in *riversi*, and the depression at the base is shallow or absent. The head of *riversi* is more distinctly wrinkled, and the depression behind the eyes is deeper (among the 136 specimens examined, 95% had a wrinkled head and 63% a deep depression). In *oreophilus*, among the 331 beetles examined for this character, only 12 per cent had a well-wrinkled head (in 88% it was smooth), and only 4 per cent had a deep depression behind the eyes.

According to Roeschke (1907), the elytra in *riversi* have flat intervals, and the punctures of the striae are smaller than those of *oreophilus*. I agree that the beetles with large elytral punctures are rare in *riversi* but common in *oreophilus*, but this difference is less obvious than that of the form of the pronotum or the head.



In any case, I think these are separate species. The difference is especially evident in Sequoia National Park, where these two species meet but remain distinct. If they were subspecies, quite a number of intermediate characters would appear. Among the 251 beetles that I examined from Sequoia National Park only 20 could not be separated at first glance; these I examined more carefully. The females are easier to identify than the males.

**MATERIAL EXAMINED:** One hundred forty-two specimens (67 males and 75 females).

***Scaphinotus (Brennus) punctatus* (LeConte)**

Figures 7, 41, 51, 52, 64, 90, 124, 125

*Cychrus punctatus* LECONTE, 1874, p. 69. Type locality: Fort Tejon (Kern County), California. Type in the Museum of Comparative Zoology, Cambridge, Massachusetts. Transferred to *Brennus* by Motschulsky (1865).

*Cychrus minus* HORN, 1874, p. 20. Type locality: Santa Ana River, San Bernardino, California. Synonymized by Csiki (1927).

*Brennus gravidus* CASEY, 1897, p. 317. Type locality: Southern California. Type in the United States National Museum, Washington, D. C. Synonymized by Roeschke (1907).

*Brennus catenulatus* CASEY, 1897, p. 324. Type locality: Southern California. Type in the United States National Museum, Washington, D. C. Synonymized by Csiki (1927).

**DESCRIPTION:** Black or dark brown. Head and pronotum dull or feebly shining; head smooth or slightly wrinkled; genae feebly incised.

Pronotum slender, as long as wide, in some specimens slightly longer than wide, in others slightly wider than long. Average length, 4.0 mm., range from 3.0 to 4.7 mm.; average width, 4.1 mm., range from 3.0 to 5.0 mm.; sides of pronotum sinuate in posterior half, at base parallel, rarely slightly convergent; hind angles in many cases projecting a little beyond base, base thus appearing to be slightly arcuate, as in *oreophilus*; disk not strongly convex, moderately or feebly wrinkled, median line well impressed apical and basal lines less so.

Elytra oval, with about 18 well-impressed striae and large punctures that usually occupy nearly one-half of adjacent intervals, on sides punctures quite large, much larger than toward suture line, in some specimens

even confluent; striae straight, appearing chainlike because of large punctures, after tenth or twelfth becoming irregular and difficult to count; intervals convex, often even on disk, at least slightly so (fig. 64).

Seta orbitalis absent, except in specimens from San Ysidro, San Diego County, California, and some individuals from Santa Barbara County; seta gularis present in most cases, but of 426 beetles examined, 37 per cent had lost this seta; anterior seta on metacoxa absent, rarely two posterior setae instead of one seta; males and females with one seta on each side of anal segment, some females with two setae analis (5% of 158 females examined). Ventral side smooth, but epipleura distinctly, if not coarsely, punctate, rarely smooth with sparse punctures. Prosternal process more or less slender, with pointed tip (figs. 51, 52). Anterior tarsi of males with either two or three papillose segments on ventral side. Penis, as in most species of *Brennus*, with more or less pointed apex (figs. 124, 125). Female genitalia of usual form.

Average length 15.8 mm., range from 12.0 to 19.5 mm.; average width 7.3 mm., range from 6.0 to 9.0 mm.

**DISTRIBUTION:** This species is found in southern California and Baja California.

**RECORDS:** I have seen specimens from the following localities: *California*: Santa Barbara County: Gaviota. Kern County: Brown's Flat, Fort Tejon, Havilah, Piute Mountains. Los Angeles County: Los Angeles, Azusa, Claremont (San Antonio), Glendale, Newhall, Monrovia, Pasadena, Rivera, San Gabriel, Tanbark Flat in San Gabriel Mountains, Silver Lake, Tropico, Verdugo, Mt. Wilson, Whittier. San Bernardino County: Colton, Desert Canyon, Lytle Creek, Mill Creek, San Antonio Canyon, Warners. Riverside County: Granston Range, Glen Ivy Hot Springs, Idyllwild, Palm Springs (Andreas Canyon), San Jacinto Mountains. Orange County: Orange, Santa Ana River. San Diego County: San Diego, Alvarado, Chula Vista, Cuyamacha Lake, Dulzura, Julian, Miramar, Mission Valley. Mt. Palomar, Poway, Romona, San Ysidro. Sierra Nevada (without indication what part of it). Santa Catalina Island: Avalon. *Mexico*: Baja California.

**DISCUSSION:** The majority of species of

the subgenus *Brennus* have a brush of papillae on the ventral side of three segments of the anterior tarsi. Some, such as *striatopunctatus*, *subtilis*, and *bullatus*, have only two papillose segments. This character is constant for every other species of *Brennus*, but it is variable in *punctatus*, the males of which may have a brush of papillae on either three or two segments of the anterior tarsi. The males of *punctatus* from Kern County, California, invariably have two papillose segments on the ventral side (all four localities from which I saw specimens). Those from San Bernardino and Los Angeles counties have three papillose segments (in all 14 localities from which I saw the males). In Santa Barbara, Riverside, and San Diego counties, both varieties occur, although seldom in the same localities. For instance, in Riverside County the males with a brush of papillae on two segments are found in Grandston Range, Idyllwild, and Palm Springs; those with three papillose segments occur in Glen Ivy Hot Springs. The majority of males from the city of Riverside have three papillose segments (nine of 11 males that I examined). Males with three papillose segments are found in Alvarado, Miramar, and San Ysidro in San Diego County. The males from all the other localities listed above in the records have two papillose segments. It seems that, if both varieties occur in the same area, which is rare, the three-segmented males prevail.

This tarsal character is also unstable in some other species of the Carabidae, such as *Calosoma inquisitor* of Europe, which may have a brush of papillae on the ventral side of either three or four segments of the anterior tarsi. In *Calosoma sayi* and *Callisthenes luxatum* some males have the anterior tarsi quite glabrous on the ventral side, as do the females.

In many instances LeConte's *punctatus* resembles *crenatus*, which also occurs in southern California. In some localities (San Ysidro, San Diego County) it is even difficult to separate them, because *punctatus* from that place has a seta orbitalis, the males have three segments of the anterior tarsi papillose underneath, as in *crenatus*, and the elytral punctures are much smaller than in most individuals in *punctatus*. Most individuals of

*punctatus*, however, differ from those of *crenatus* in the larger elytral punctures, which become especially large and often confluent on the sides of the elytra, and by the absence of the setae orbitalis and metacoxalis anterior, which are present in most individuals of *crenatus*. Specimens from San Ysidro differ from *crenatus* in the elytral striae, which are irregular on the sides, often difficult to count, and by the punctures, which on the sides are much larger than on the disk. Also the anterior seta on the metacoxa is absent from *punctatus*. The species *crenatus* has the elytral striae regular, easy to count even on the sides of the elytra, the elytral punctures are only slightly larger on the sides than on the disk, and the anterior seta on the metacoxa is present.

Horn's *mimus*, which was considered by Roeschke (1907) a subspecies of *punctatus*, is, in my opinion, a synonym. I have examined both types (LeConte's *punctatus*, a male, and Horn's *mimus*, a female), and except for the sex, they hardly differ from each other. Horn himself (1874) admitted that "... with the exception of the tarsal characters of the males this species [*mimus*] cannot in description be distinguished from *punctatus*, the only noticeable superficial difference being that *punctatus* has the striae much less and the punctures rather more distinct." The males of *mimus*, according to Horn (1874) and other authors, have a brush of papillae underneath three segments of the anterior tarsi, and the males of *punctatus*, on two segments. But, as shown above, this tarsal character is not constant in *punctatus*. The elytral punctures of Horn's *mimus* are supposed to be smaller than those of *punctatus*, and, according to Roeschke (1907), the intervals less convex, because the striae are less impressed. With the exception of the specimens from San Ysidro, all of which (of 55 examined) have smaller punctures and flat intervals, specimens of *punctatus* may have "smaller" or "larger" elytral punctures regardless of the number of papillose segments on the anterior tarsi of the males. The females associated with these males of either kind of tarsi are virtually indistinguishable.

Casey's *catenulatus*, which Roeschke (1907) considered to be another subspecies of *punctatus*, differs, according to Casey (1897), in

the form of the pronotum, with the sides becoming parallel for some distance before the base. I have seen specimens from the same localities, with the sides of the pronotum as stated, as well as some with the sides parallel at a very short distance before the base, and also individuals intermediate between the two. This character is not constant in *punctatus*; therefore *catenulatus* is another synonym of *punctatus*.

Casey's *gravidus*, with the pronotum as in *catenulatus* and strongly impressed elytral striae, hardly differs from the other specimens of *punctatus* and is also a synonym.

**MATERIAL EXAMINED:** Five hundred eleven specimens (283 males and 228 females).

***Scaphinotus (Brennus) striatopunctatus***  
(Chaudoir)

Figures 9, 50, 68, 95, 126-129, 153, 154

*Cychrus striatopunctatus* CHAUDOIR, 1844, p. 476. Type locality: California. Type in the Muséum National d'Histoire Naturelle, Paris. Transferred to *Brennus* by Motschulsky (1865).

*Brennus decipiens* CASEY, 1897, p. 316. Type locality: near Monterey, California. Type in the United States National Museum, Washington, D. C. Synonymized by Roeschke (1907).

*Brennus subdepressus* CASEY, 1920, p. 177. Type locality: Monterey, California. Type in the United States National Museum, Washington, D. C. New synonymy.

**DESCRIPTION:** Very dark brown or black. Head lightly wrinkled, in some specimens more distinctly wrinkled; genae well incised, but not unusually large; labrum with long and stout lobes, as in *ventricosus*.

Pronotum distinctly wider than long, average length, 4.5 mm., range from 3.5 to 5.0 mm.; average width, 5.6 mm., range from 4.5 to 7.0 mm.; extremes with narrow, or unusually wide, pronotum rare; sides of pronotum sinuate in posterior half, at base parallel; disk slightly convex, finely wrinkled, median line well impressed, basal and apical lines in many less distinct; base with heavy longitudinal creases or wrinkles; hind angles not projecting beyond straight base (fig. 95).

Elytra convex, with about 18 striae, of which 12 or 14 are regular, distinctly punctate; others (on sides) irregular, difficult to count (beetles with easy-to-count, very regu-

lar striae, not overlapping at margin, very rare); intervals slightly convex, more so on sides and apical part and, in some specimens, divided by rows of punctures or additional broken and punctate striae, conspicuous mostly on sides and apex. Of 515 specimens examined, 30 per cent had no, or only scattered, punctures dividing the intervals; 10 per cent had rows of punctures extending to the disk and nearly to the base of the elytra, the remainder had rows of punctures on the sides and the apex only (fig. 68).

Seta orbitalis absent, not more than 4 per cent of the specimens examined (515) have it, and, even among these, the majority have a seta near one eye only. Seta gularis mostly present, although short and often inconspicuous; anterior seta on metacoxa absent. Males and females with one seta on each side of anal segment, exceptions rare, among 246 females examined only six (3%) had two setae analis. Ventral side smooth, on sides slightly wrinkled; males with only two segments of anterior tarsi having brush of papillae on ventral side, the first segment in its apical third only.

Penis with rounded or even truncate tip, not pointed as in *ventricosus* and other species of the subgenus *Brennus*, base not widened, in general penis appearing to be slender (figs. 126-129). Female genitalia of usual form (figs. 153, 154). It seems, however, that the styli in the female genitalia of *striatopunctatus* are stouter than in *ventricosus*.

This is a comparatively large species: average length, 19.7 mm., range from 14 to 24 mm.; average width, 8.8 mm., range from 6 to 10 mm. The largest specimens (19 to 24 mm.) were collected in Mendocino, Sonoma, Napa, San Francisco, Alameda, and Santa Cruz counties, California; the smallest (14-15 mm.), in Monterey and San Mateo counties.

**DISTRIBUTION:** *Scaphinotus (Brennus) striatopunctatus* is abundant in the coastal counties of California, from Mendocino to Los Angeles, but is most abundant near San Francisco and San Pablo bays.

**RECORDS:** I have seen specimens from the following localities: *California:* Mendocino County: Mendocino, Boonville. Sonoma County: Sonoma, Annapolis, Cazadero, Santa Rosa, Sobre Vista, Stillwater Cove.

Napa County: Napa, Santa Helena. Sacramento County: Mills College, Sacramento. Marin County: Las Lagunitas Creek, Taylorville. Contra Costa County: Mt. Diablo, Rodeo. San Francisco and the surrounding area (Golden Gate Park, San Bruno Hill, Twin Peaks, Daly City). Alameda County: Berkeley, Oakland, Piedmont. San Mateo County: Half Moon Bay, Menlo Park, Montara, Moss Beach, Pescadero. Santa Cruz County: Alma, Ben Lomond, Capitola, Santa Cruz. Monterey County: Monterey, Big Sur, Carmel, Pacific Grove, Paraiso Hot Springs, Soledad. San Benito County: Pinnacles Mountains. San Luis Obispo County: San Luis Obispo, Atascadero, Cambria Pines. Los Angeles County: Los Angeles, Coquillet. Santa Lucia at the elevation of 5000 feet (not found on a map).

DISCUSSION: *Scaphinotus (Brennus) striatopunctatus* resembles *ventricosus* in the head, the pronotum, and especially the elytra. It differs from *ventricosus* in the sexual characters of the males, with two segments of the anterior tarsi papillose on the ventral side, not three segments, as in *ventricosus*, and the penis with rounded tip, not pointed as in *ventricosus*. Also *striatopunctatus* has no seta orbitalis (exceptions are very rare) and has no anterior seta on the metacoxa, these setae being present in *ventricosus*. The females of *striatopunctatus* have one seta on each side of anal segment (in rare cases, two), not two setae as does *ventricosus*.

Some slender specimens of *striatopunctatus* with large punctures of the elytral striae resemble *punctatus*, but the latter has a slender pronotum, not wider than long, and has a pointed tip on the penis, not rounded as in *striatopunctatus*.

Casey's species *decipiens* and *subdepressus* are synonyms of *striatopunctatus*; they do not differ from it in any respect.

MATERIAL EXAMINED: Five hundred fifteen specimens (279 males and 236 females).

*Scaphinotus (Brennus) ventricosus* (Dejean)

Figures 10, 15, 43, 71, 98, 99, 130, 131

*Cychrus ventricosus* DEJEAN, 1831, p. 527. Type locality: California. Type in the Muséum National d'Histoire Naturelle, Paris. Transferred to *Brennus* by Motschulsky (1865).

*Cychrus lativentris* MOTSCHULSKY, 1850, p. 358.

Type locality: Not indicated. Type in the Museum of Zoology, Moscow State University, Soviet Union. Synonymized by Csiki (1927).

*Cychrus alternatus* MOTSCHULSKY, 1859, p. 162. Type locality: California. Type in the Museum of Zoology, Moscow State University, but not found in Motschulsky's collection. New synonymy.

*Cychrus ovalis* MOTSCHULSKY, 1859, p. 162. Type locality: California. Type in the Museum of Zoology, Moscow State University, Soviet Union. New synonymy.

*Cychrus fuchsianus* RIVERS, 1890a, p. 71. Type locality: Sonoma, California. Type in Vogt collection, Zoologisch Museum, Universiteit van Amsterdam. Synonymized by Csiki (1927).

*Brennus symmetricus* CASEY, 1897, p. 319. Type locality: California. Type in the United States National Museum, Washington, D. C. Synonymized by Roeschke (1907).

*Brennus strictus* CASEY, 1897, p. 322. Type locality: California. Type in the United States National Museum, Washington, D. C. Synonymized by Roeschke (1907).

*Brennus brevicollis* CASEY, 1920, p. 178. Type locality: Mokelumne Hill, California. Type in the United States National Museum, Washington, D. C. New synonymy.

DESCRIPTION: Black or very dark brown. Head, as is characteristic of *Brennus*, with incised conspicuous, but not unusually large genae; labrum with long, but stout lobes, not more than twice longer than wide; front moderately or slightly wrinkled (fig. 15).

Pronotum in most specimens distinctly wider than long, although in some appearing longer than wide (if not measured); average length, 4.5 mm., range from 4.0 to 6.0 mm.; average width, 5.4 mm., range from 4.3 to 7.0 mm.; sides of pronotum arcuate at front, straighter in posterior half, invariably parallel at base; median, basal, and apical lines well impressed; disk feebly convex, moderately or finely wrinkled; hind angles not extending beyond straight base (figs. 98, 99).

Elytra distinctly striatopunctate, with 17 to 18 regular striae and not large, but conspicuous punctures, in majority of beetles striae after thirteenth or fourteenth becoming wavy, irregular, and difficult to count; intervals on sides tending to form short tegulae, very much as in *striatopunctatus* (fig. 71). In some varieties, such as "*lativentris*" and "*fuchsianus*," intervals divided by additional striae or rows of punctures and therefore number of striae (which become very irregu-

lar) more than 20. Epipleura sparsely or moderately densely punctate and wrinkled, usually more roughly than those of *crenatus*.

Seta orbitalis and anterior seta on metacoxa present, with rare exceptions; seta gularis present in most specimens. Males with one seta, females with two setae, on each side of anal segment, rarely one seta (2.5% of 115 females examined), as found in *striatopunctatus*, or three setae (3.5%). Anterior tarsi of males with brush of papillae on ventral side of three segments. Penis with more or less pointed tip (figs. 130, 131), in no instance rounded or truncate as in *striatopunctatus* (figs. 126–129). Female genitalia as characteristic in *Brennus*.

Average length, 20.1 mm., range from 15.5 to 25.0 mm.; average width, 9.0 mm., range from 6.5 to 12.0 mm.

**DISTRIBUTION:** *Scaphinotus (Brennus) ventricosus* is also a California beetle, more abundant near and around San Francisco and in Alameda and San Mateo counties. Its range extends, however, as far north as Oregon and as far south as Monterey and San Luis Obispo, where another species, *crenatus*, prevails.

**RECORDS:** I have seen specimens from the following localities: *Oregon* (only one specimen). *California*: Trinity County: Island Mountains, Helena. Mendocino County: Mendocino. Sonoma County: Cloverdale, Eldridge, Healdsburg, Fort Rose, Santa Rosa, Schellville, Sobre Vista. Marin County: Corte Maderas, Point Reyes Station, Sausalito, Taylorville. Napa County: Childs Valley. San Francisco County: City of San Francisco and surrounding areas (Bruno Hill, Presidio). Contra Costa County: Mt. Diablo, Danville, Martinez. Alameda County: Berkeley, Livermore, Niles, Oakland, Piedmont. El Dorado County: El Dorado. Amador County: Amador, Jackson. Calaveras County: Licking Fork on Mokelumne Hill. San Mateo County: Menlo Park, Montara. Santa Cruz County: Ben Lomond, Capitola, Mt. Hermon, Santa Cruz Mountains. Santa Clara County: Alma, Los Gatos, Palo Alto, Rock Canyon. Tuolumne County: Tuolumne. Mariposa County: Yosemite Park. Monterey County: Monterey, Carmel, Corral de Tierra, Stone Canyon. Fresno County: Priest Valley. San Luis Obispo County: Paso Robles. Santa Catalina Island: Avalon.

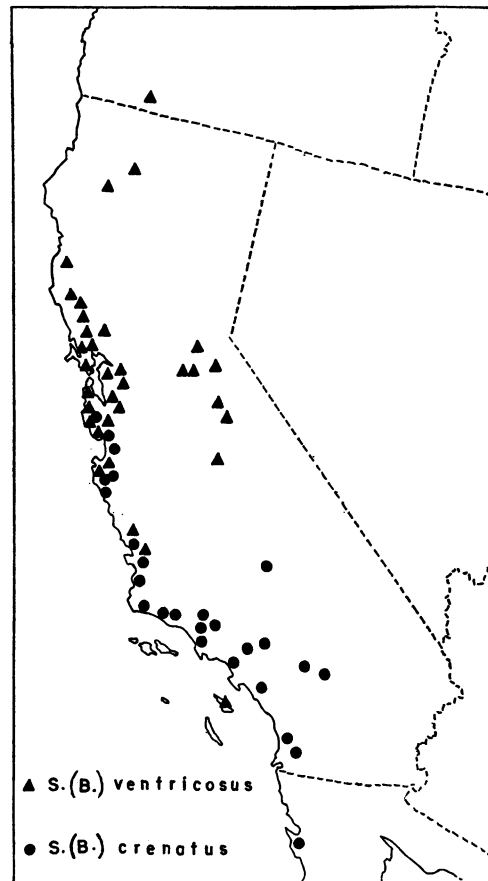


FIG. 10. Distribution of *Scaphinotus (Brennus) ventricosus* (Dejean) and *S. (B.) crenatus* (Motschulsky).

**DISCUSSION:** *Scaphinotus (Brennus) ventricosus* is a variable species. Chaudoir (1844) and Roeschke (1907) thought that *ventricosus* was very much like *interruptus*. Chaudoir even suggested that Ménétériés' *interruptus* was the same species as *ventricosus* (a synonym), and Roeschke (1907) thought that cross breeding might occur between the two species. Horn (1878) said that *ventricosus* was much more like *striatopunctatus*, and I agree with him.

The type of *ventricosus*, which was kindly sent to me by Mr. Guy Colas of the Muséum National d'Histoire Naturelle of Paris, is 20 mm. long, has the pronotum only slightly wider than long (5 mm. wide and 4.5 mm. long); the elytra have distinct striae, with punctures larger than in *crenatus*; the striae,

although possible to count, become wavy and irregular toward the sides and apex, on the left elytron after the fourteenth striae, with intervals which tend to form tegulae; on the right elytron the striae seem to be more regular, and only toward the apex wavy, with intervals forming tegulae; the epipleura are sparsely punctate and wrinkled, distinctly rougher than in *crenatus*. In general the type of *ventricosus* is smoother than the majority of beetles of this species.

As in every other species, *ventricosus* shows variations in size and in the sculpture of the elytra, the most striking of which is "*lativentris*," robust and rough individuals with the elytral intervals divided by additional rows of punctures or punctate striae, often irregular and overlapping, and which, if possible to count, are no fewer than 20 or 25 in number. These varieties are found together with the usual specimens of *ventricosus*, but are absent from San Francisco, Alameda, and San Mateo counties where specimens of *ventricosus*, without additional rows of punctures in the elytral intervals, are abundant. The pronotum of *ventricosus* is invariably wider than long, especially in robust specimens, less so in more slender beetles.

Small specimens of *ventricosus* may resemble *interruptus*, and both species have been collected in Montara, San Mateo County: some examples are even difficult to separate. *Brennus ventricosus* has 17 or 18 elytral striae, straight on the disk, becoming irregular and wavy after the tenth striae, whereas *interruptus* from the same county has no more than 14 striae, wavy on the disk and sides, but more regular on the sides than in *ventricosus*, and not difficult to count. Also *interruptus* is usually smaller than *ventricosus*.

More commonly *ventricosus* resembles *striatopunctatus*—mostly those specimens of *ventricosus*, in which the elytral intervals are divided by additional rows of punctures. They differ, however, in the sexual characters of the males and in the chaetotaxy. The males of *ventricosus* have a brush of papillae on the ventral side on three segments of the anterior tarsi; the males of *striatopunctatus* have two papillose segments on the ventral side. The tip of the penis is pointed in *ventricosus* and rounded in *striatopunctatus*. A seta orbitalis and an anterior seta on the metacoxa are

present in *ventricosus*, absent from *striatopunctatus*. Most females of *ventricosus* have two setae on each side of the anal segment; those of *striatopunctatus* have one seta.

In any case, the considerable confusion that exists in the "*ventricosus*" group is due to several factors: the variability of the species; the fact that, as Motschulsky (1859) stated, Eschscholtz had distributed different species under the name *ventricosus*, and the fact that Roeschke (1907) listed *crenatus* Motschulsky as a subspecies of *ventricosus*. I consider *crenatus* to be a separate species. It differs from *ventricosus* in the following ways: it is smaller and more slender; the labrum has longer lobes (in some individuals more than twice to as much as three times longer than wide); the narrow pronotum is either slightly wider than long or as long as wide and, in some specimens, even longer (figs. 96, 97); the elytral striae are more regular, not wavy toward the sides as in *ventricosus*; the intervals do not tend to form tegulae and are not divided by additional rows of punctures, which is the case in many specimens of *ventricosus*, especially in the varieties "*fuchsianus*" and "*lativentris*"; the elytral epipleurae are smoother; and the penis is more slender, with a longer tip (figs. 132, 136).

Motschulsky's *lativentris*, thought by Roeschke (1907) to be a subspecies of *ventricosus*, and Rivers' *fuchsianus*, considered by Roeschke an aberration of *ventricosus*, are both only varieties of this species, hence synonymous. Specimens of these forms are often found in the same localities as specimens of *ventricosus*, and there are many intermediates. Actually, *fuchsianus* is an intermediate between the variety *lativentris*, with its numerous (20 to 25) and irregular elytral striae, and other specimens of *ventricosus*. The elytral striae are less irregular in the variety *fuchsianus* than in *lativentris* and fewer (about 18 or 20), but they are more irregular than in other individuals of *ventricosus*.

Motschulsky's *alternatus* and *ovalis* were considered by Roeschke (1907) to be aberrations of *striatopunctatus*. The description of the type of *ovalis*, which I received from Dr. Zhelikhovsky of the Zoological Museum of Moscow State University, and especially the



fact that the type has a seta orbitalis and an anterior seta on the metacoxa, indicate that *ovalis* is a variety of *ventricosus-laticollis* with less-impressed striae and consequently flatter elytral intervals. The type of *alternatus* was not found in Motschulsky's collection, but, according to Roeschke (1907), it closely resembles *ovalis* and apparently is another variety of *ventricosus*.

Casey's *symmetricus*, known only from the type, was considered by Roeschke (1907) to be a synonym of *ventricosus-crenatus*. It has the pronotum as in *crenatus*, but the elytra more as in *ventricosus*, only more elongated than in most specimens of this species. The elytral striae are thickly punctate, with punctures also scattered in the intervals, mostly in the fifth and sixth intervals and also on the sides of the elytra and on the apex. The striae after the fourteenth and the fifteenth are irregular, impossible to count, and the intervals tend to form short tegulae. The penis of the type is more like that of *crenatus*, with a longer, slender tip. It is an interesting variety, and the only reason that I synonymize it with *ventricosus* instead of *crenatus* is that *crenatus* has no such elytral sculpture, whereas some specimens of *ventricosus* have the pronotum only slightly wider than long and a slender penis.

Casey's *strictus* which Casey (1897) claimed differed from *ventricosus* in its constricted pronotum, and Casey's *brevicollis*, with rounded sides to the pronotum (Casey, 1920), are very much like most specimens of *ventricosus*, except that the type of *brevicollis*, a female, has only one seta on each side of the anal segment, as in *striatopunctatus*. These two Casey species are synonyms of *ventricosus*.

**MATERIAL EXAMINED:** Two hundred ninety-one specimens (149 males and 142 females).

***Scaphinotus (Brennus) crenatus*  
(Motschulsky)**

Figures 10, 44, 72, 96, 97, 132-136, 151, 152

*Cychnus crenatus* MOTSCHULSKY, 1859, p. 161. Type locality: California. Type in the Museum of Zoology, Moscow state University, Soviet Union. Transferred to *Brennus* by Motschulsky (1865).

*Cychnus striatus* LECONTE, 1859, p. 63. Type locality: Fort Tejon, California. Type in the

Museum of Comparative Zoology, Cambridge, Massachusetts. Synonymized by Csiki (1927).

*Brennus gentilis* CASEY, 1897, p. 322. Type locality: near Monterey, California. Type in the United States National Museum, Washington, D. C. Synonymized by Roeschke (1907).

*Brennus productus* CASEY, 1914, p. 29. Type locality: California. Type in the United States National Museum, Washington, D. C. Synonymized by Csiki (1927).

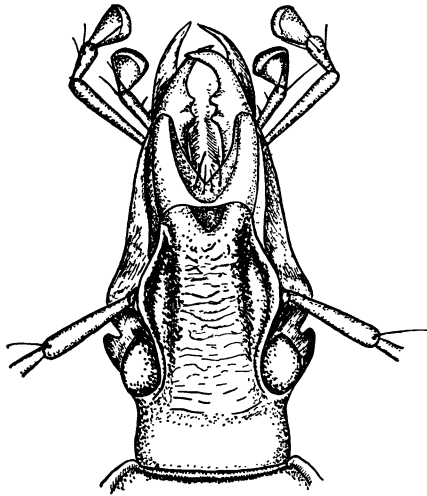
*Brennus montereyensis* CASEY, 1920, p. 177. Type locality: Monterey, California. Type in the United States National Museum, Washington, D. C. New synonymy.

**DESCRIPTION:** Smaller and more slender than *ventricosus*; brown or black. Head moderately, transversely wrinkled at front; genae conspicuously incised, as in *ventricosus*, quite visible in front and underneath eyes; labrum with longer and narrower lobes than those of *ventricosus*, not less than 2.5 to three times longer than wide.

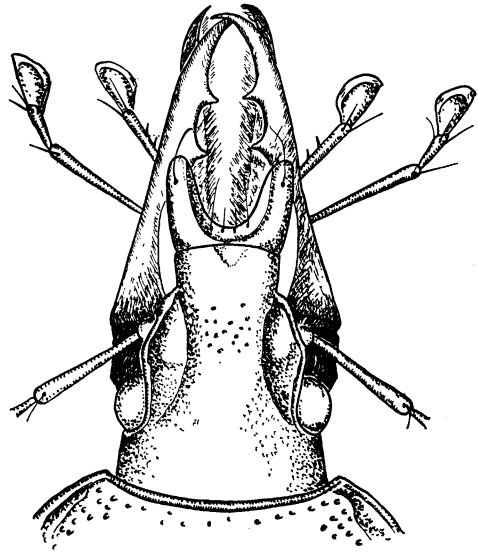
Pronotum not much wider than head, slightly wider than long, or about as long as wide, in some specimens longer than wide; average length, 4.1 mm., range from 3.3 to 4.7 mm.; average width, 4.3 mm., range from 3.3 to 5.0 mm.; sides arcuate at front, straighter posteriorly, distinctly parallel at base; disk finely wrinkled or nearly smooth; middle, basal, and apical lines conspicuous; two spheres of disk, divided by median line, more or less convex; hind angles not extending beyond base (figs. 96, 97).

Elytra oval, with 17 to 18 regular, deep striae, with small, but conspicuous and numerous punctures; striae easy to count up to the very margin, rarely, last two or three striae becoming slightly irregular; intervals convex, but not forming tegulae, and without rows of additional punctures dividing intervals as in most specimens of *ventricosus* (figs. 71, 72).

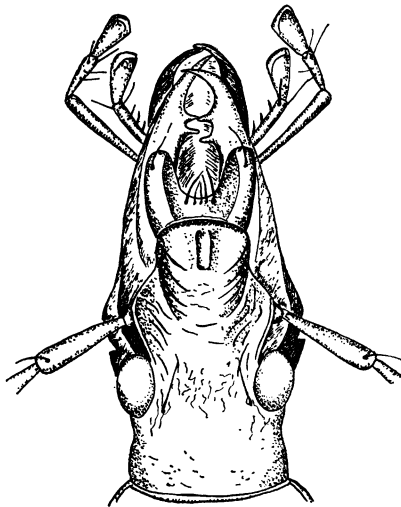
Seta orbitalis present in most specimens (absent from 37% of 500 beetles examined); seta gularis also present in most specimens (about 20% of the beetles examined had lost it); seta anterior on metacoxa present, except in small specimens found on higher elevations. Males invariably with one seta on each side of anal segment; most females with two setae. All males examined (280) with a brush of papillae on ventral side of three segments of anterior tarsi, these segments dilated,



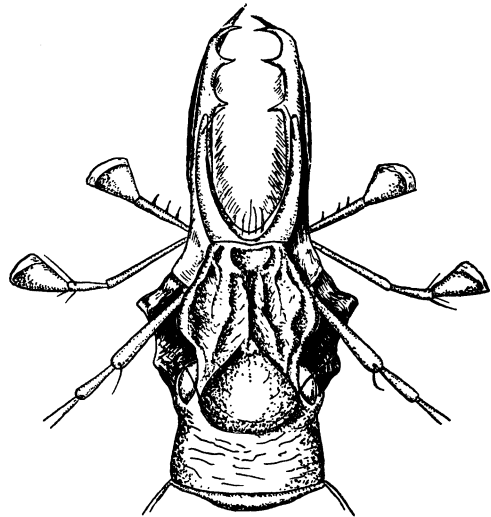
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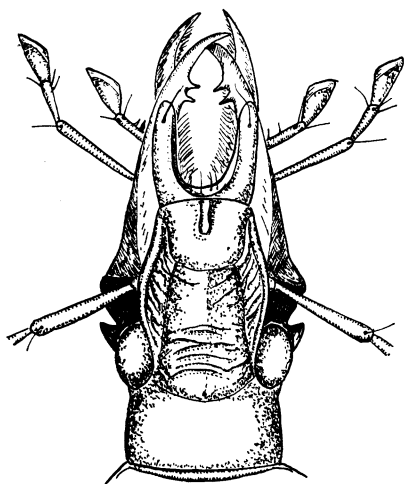
FIGS. 11-14. Heads of *Scaphinotus*, dorsal view. 11. *S. (Pseudonomareetus) manni* Wickham. 12. *S. (Scaphinotus) viduus* (Dejean). 13. *S. (Pemphus) angusticollis* Mannerheim. 14. *S. (Neocyclus) angulatus* (Harris).

the first segment in its apical half or apical third. Penis more slender than in *ventricosus*, with longer, narrower tip (figs. 132-136). Female genitalia of usual form (figs. 151, 152).

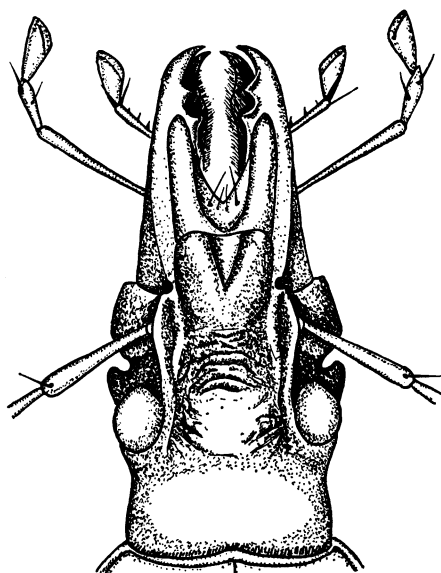
Species smaller than *ventricosus*; average length, 17.1 mm, range from 13 to 22 mm.; average width, 7.6 mm., range from 5.5 to

9.5 mm. Large specimens occur rarely.

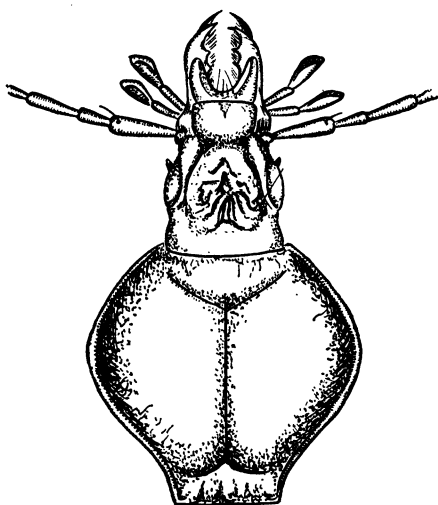
DISTRIBUTION: *Scaphinotus (Brennus) crenatus* is found in the southern part of California, and is more abundant in the coastal areas, from Monterey to Los Angeles, south to Baja California, Mexico. Single specimens may also be found north of Monterey, as far as Sonoma County.



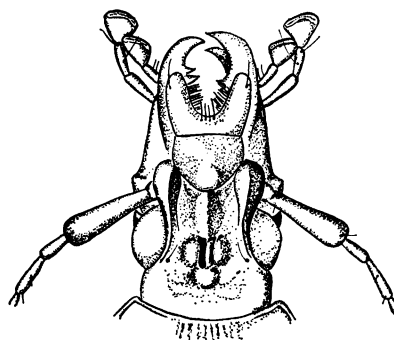
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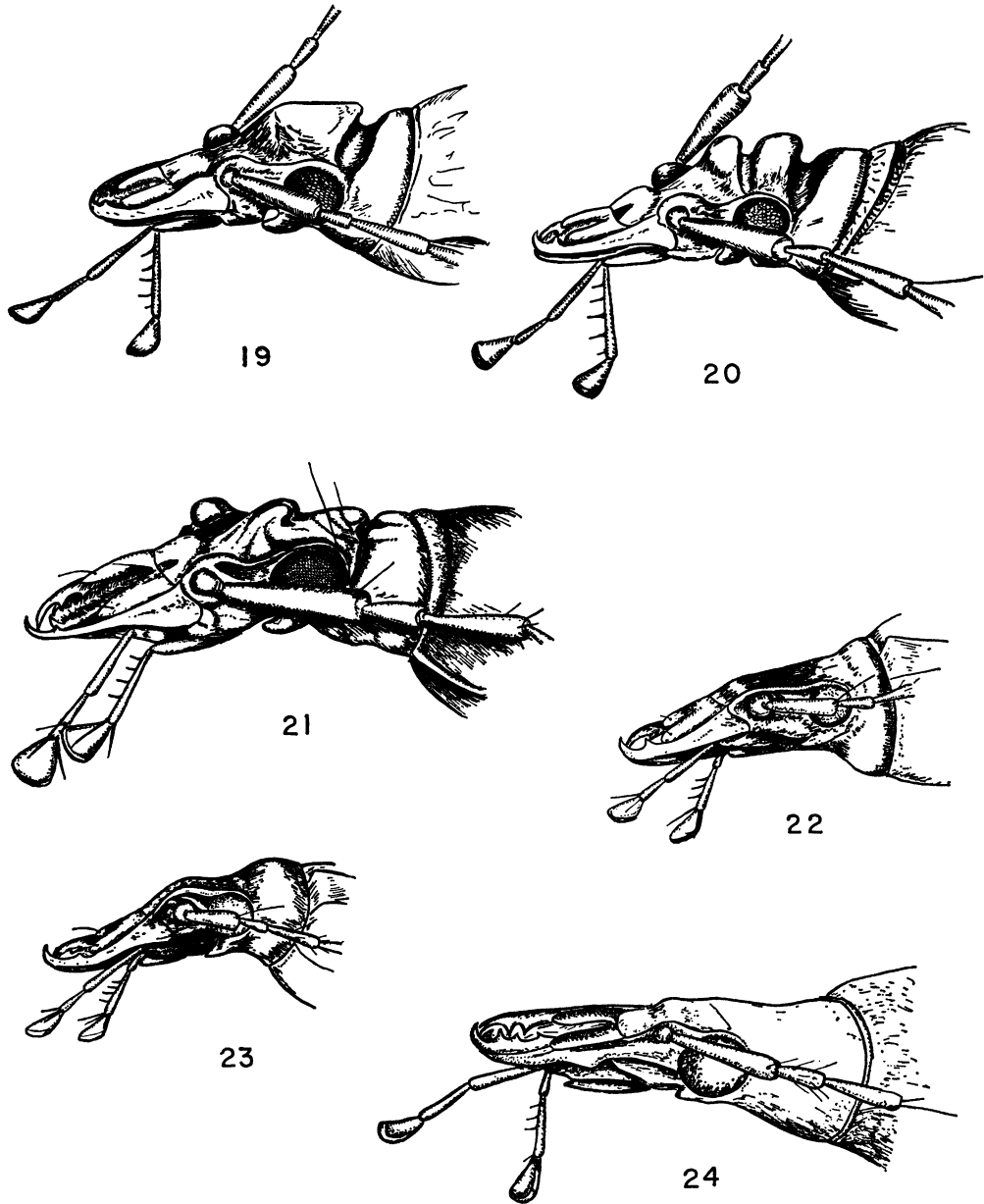


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FIGS. 15-18. Heads of *Scaphinotus (Brennus)*, dorsal view. 15. *S. (B.) ventricosus* (Dejean). 16. *S. (B.) bullatus* Van Dyke. 17. Head and pronotum of type of *S. (B.) rugiceps rugiceps* (Horn). 18. *S. (B.) rugiceps incipiens* (Casey).

RECORDS: I have seen specimens from the following localities: *California*: Sonoma County Sonoma. Santa Cruz County: Santa Cruz, Watsonville. Monterey County: Monterey, Carmel, Big Sur, Pacific Grove. San Luis Obispo County: San Luis Obispo, Cambria Pine, Cayucos, Halcyon, Klau. Santa Barbara County: Gaviota Pass, Carpinteria, Mt.

Figuera. Kern County: Fort Tejon. Ventura County: Wheeler Springs, Ojai, San Antonio Canyon, Santa Paula, Wheeler Ridge. Los Angeles County: Los Angeles, Albright, Cold Water, Glendale, Pasadena, Mt. Wilson, Soldiers Home. San Bernardino County: Lytle Creek, San Bernardino Mountains. Orange County: Orange, Cypress Point. San



FIGS. 19-24. Heads of *Scaphinotus* (*Brennus*), side view. 19-23. From California. 19-21. *S. (B.) cristatus* (Harris). 19. From Humboldt County. 20. From Monterey County. 21. From Santa Cruz County. 22. *S. (B.) oreophilus* (Rivers) from Bass Lake, Madera County. 23. *S. (B.) riversi* Roeschke from Sequoia National Park, Tulare County. 24. *S. (B.) johnsoni* Van Dyke from Olympic Mountains, Washington.

Diego County: San Diego, Miramar, Mt. Palomar, San Ysidro. *Mexico*: Baja California: Natividad. Hidalgo: Arbolado. This last locality is in southern Mexico, so is probably an error.

DISCUSSION: The species *crenatus* was considered by Roeschke (1907) a subspecies of *ventricosus*, but *crenatus* differs from *ventricosus* in the smaller, more slender form, narrower pronotum, more regular, easy-to-count

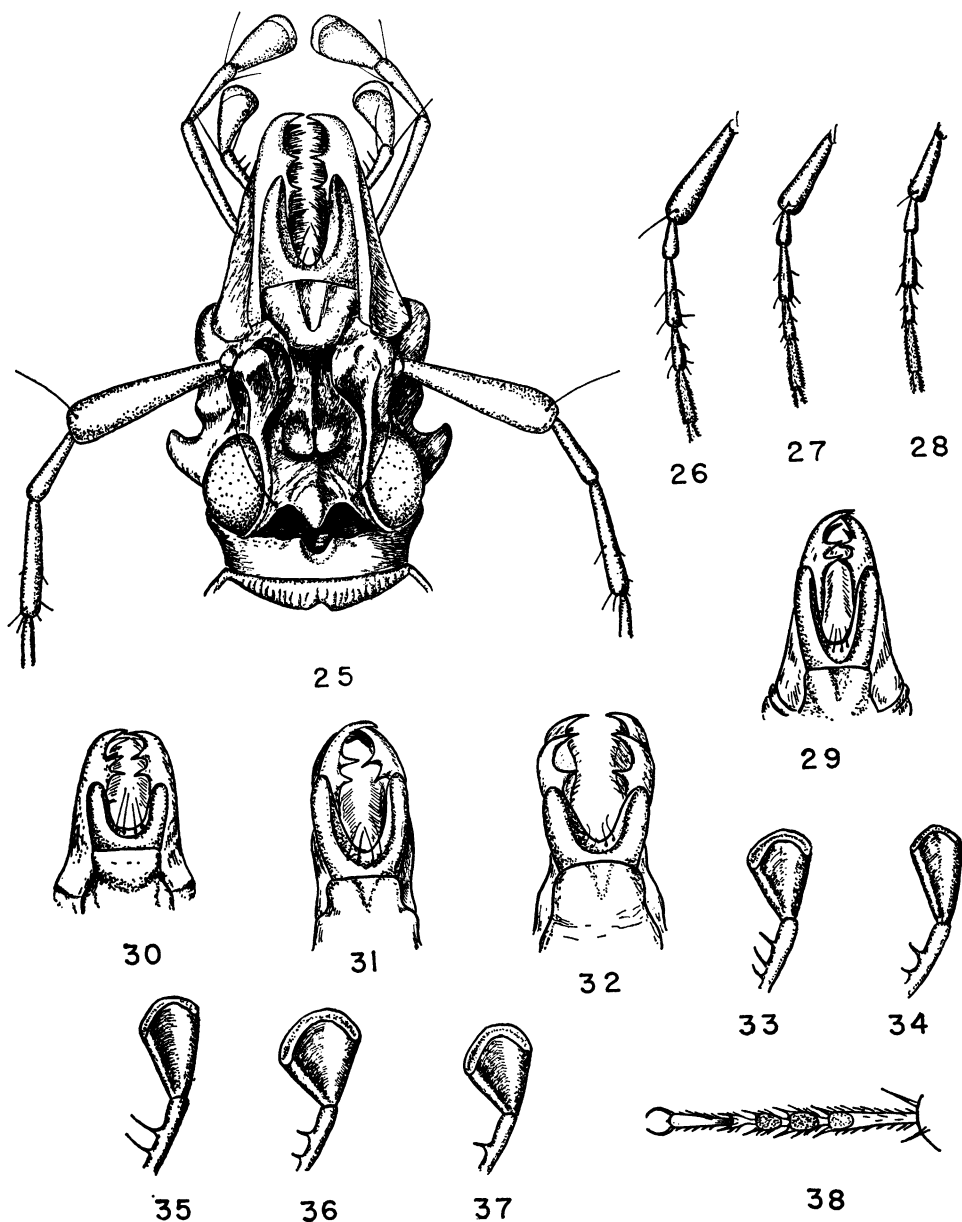
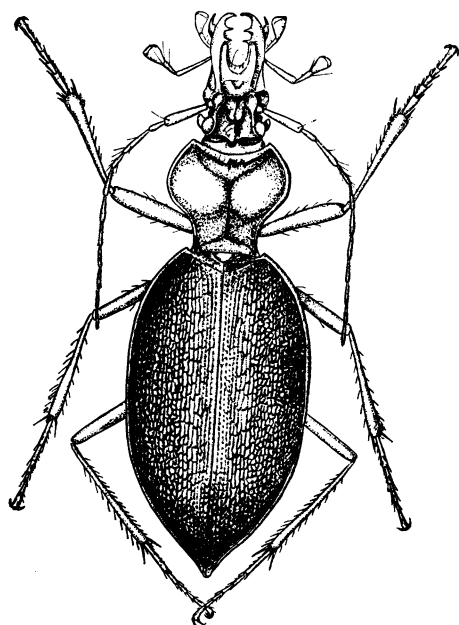


FIG. 25. Head of *Scaphinotus (Brennus) cristatus* (Harris) from Ben Lomond, Santa Cruz County, California.

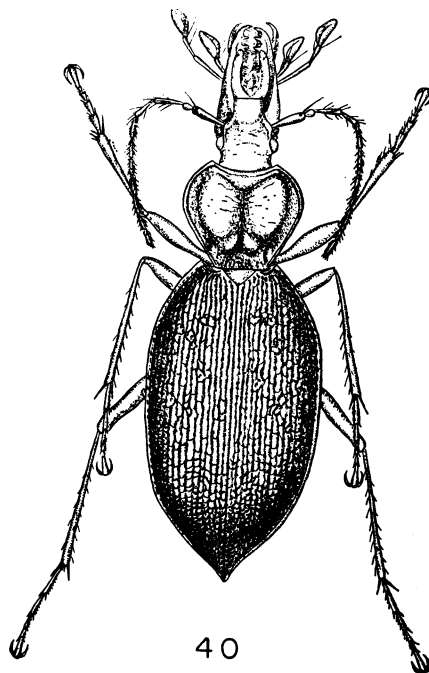
FIGS. 26-28. First five antennal segments of *Scaphinotus (B.) cristatus* (Harris) from California. 26. From Santa Cruz County. 27. From Sonoma County. 28. From Humboldt County.

FIGS. 29-32. Labrum and mandibles of *Scaphinotus*, dorsal view. 29. *S. (Brennus) marginatus* (Fischer). 30. *S. (B.) rugiceps* (Horn). 31. *S. (B.) johnsoni* Van Dyke. 32. *S. (Pemphus) angusticollis* (Mannerheim).

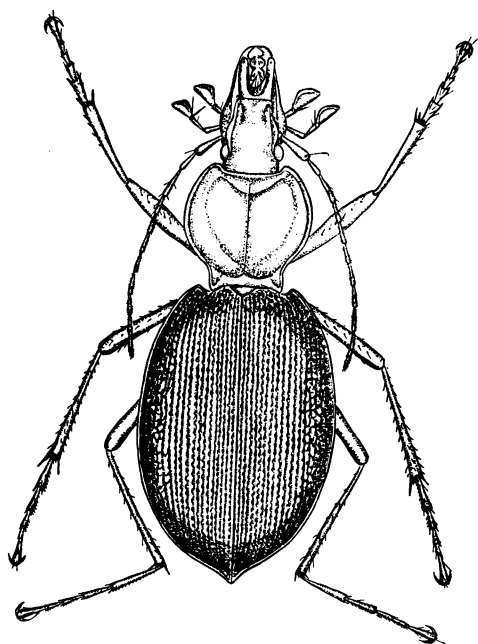
FIGS. 33-37. Last segment of palpi labiales of *Scaphinotus (Brennus)* from California. 33-34. *S. (B.) riversi* Roeschke from Sequoia National Park, Tulare County. 33. Male. 34. Female. 35-37. *S. (B.) oreophilus* (Rivers). 35. Female from Tulare County. 36. Male from Sacramento County. 37. Male from Tulare County. 38. Front tarsi of *S. (B.) cristatus* (Harris), ventral view.



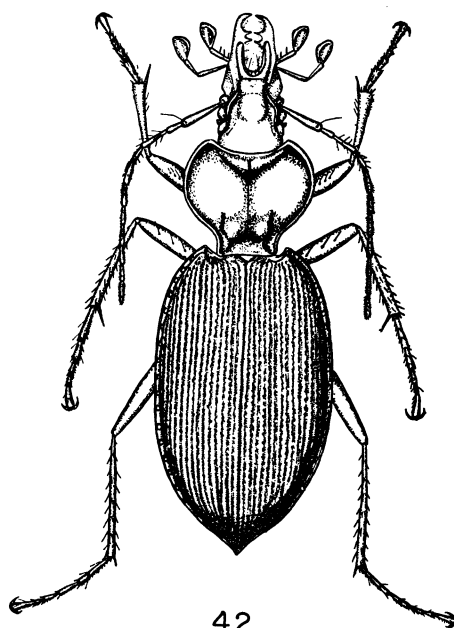
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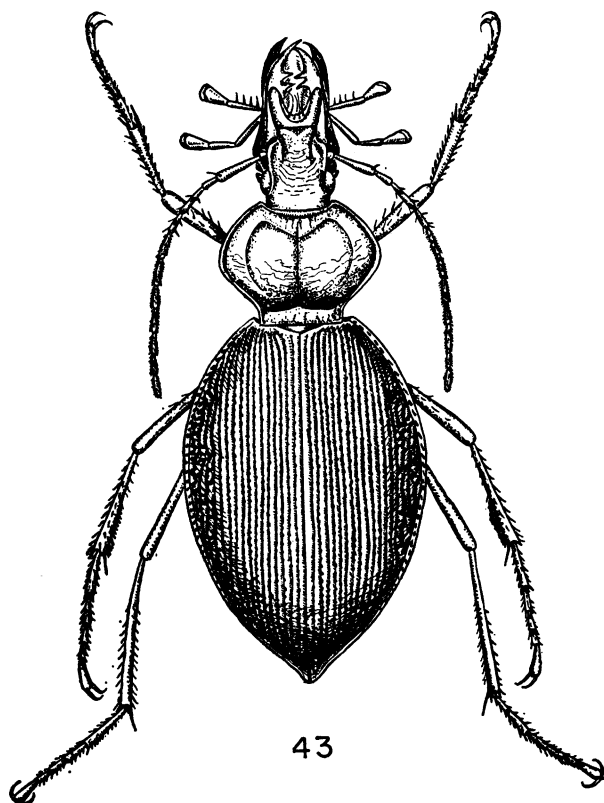
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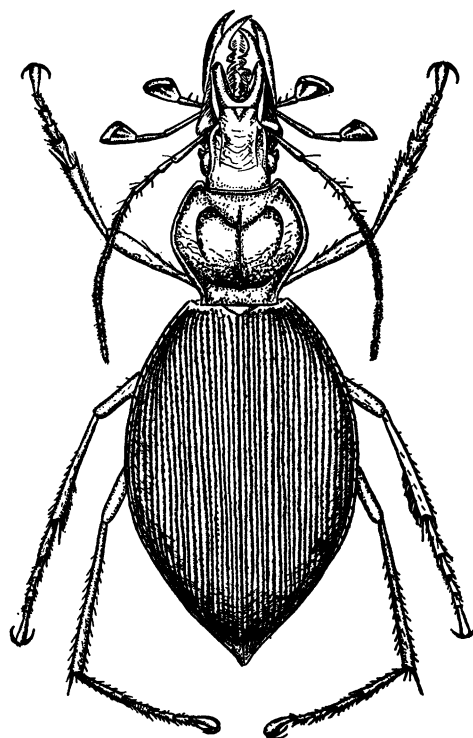
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FIGS. 39-42. *Scaphinotus* (*Brennus*), dorsal view. 39. *S. (B.) cristatus* (Harris) from Santa Cruz County, California. 40. *S. (B.) marginatus* Fischer from Alaska. 41. *S. (B.) punctatus* (LeConte) from Los Angeles, California. 42. *S. (B.) cordatus* (LeConte) from San Francisco, California.

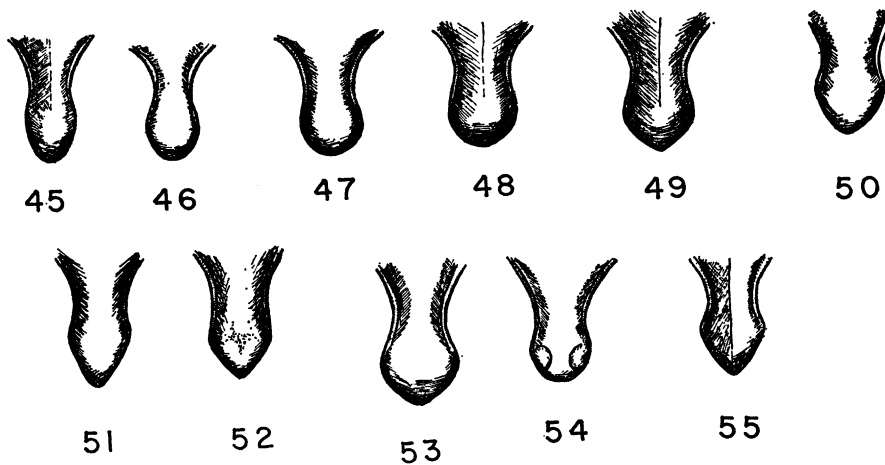




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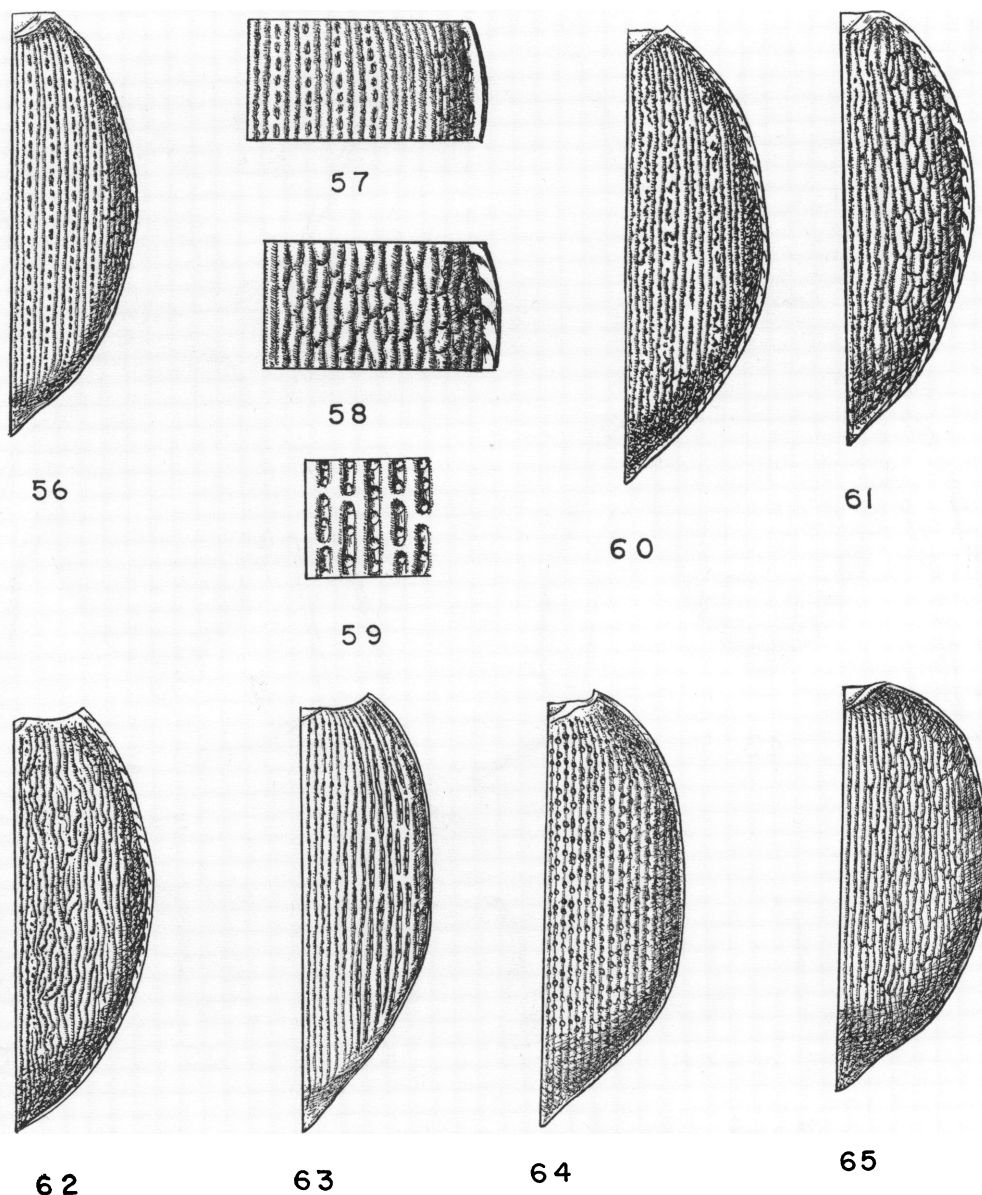
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FIGS. 43, 44. *Scaphinotus* (*Brennus*), dorsal view. 43. *S. (B.) ventricosus* (Dejean). 44. *S. (B.) crenatus* (Motschulsky).

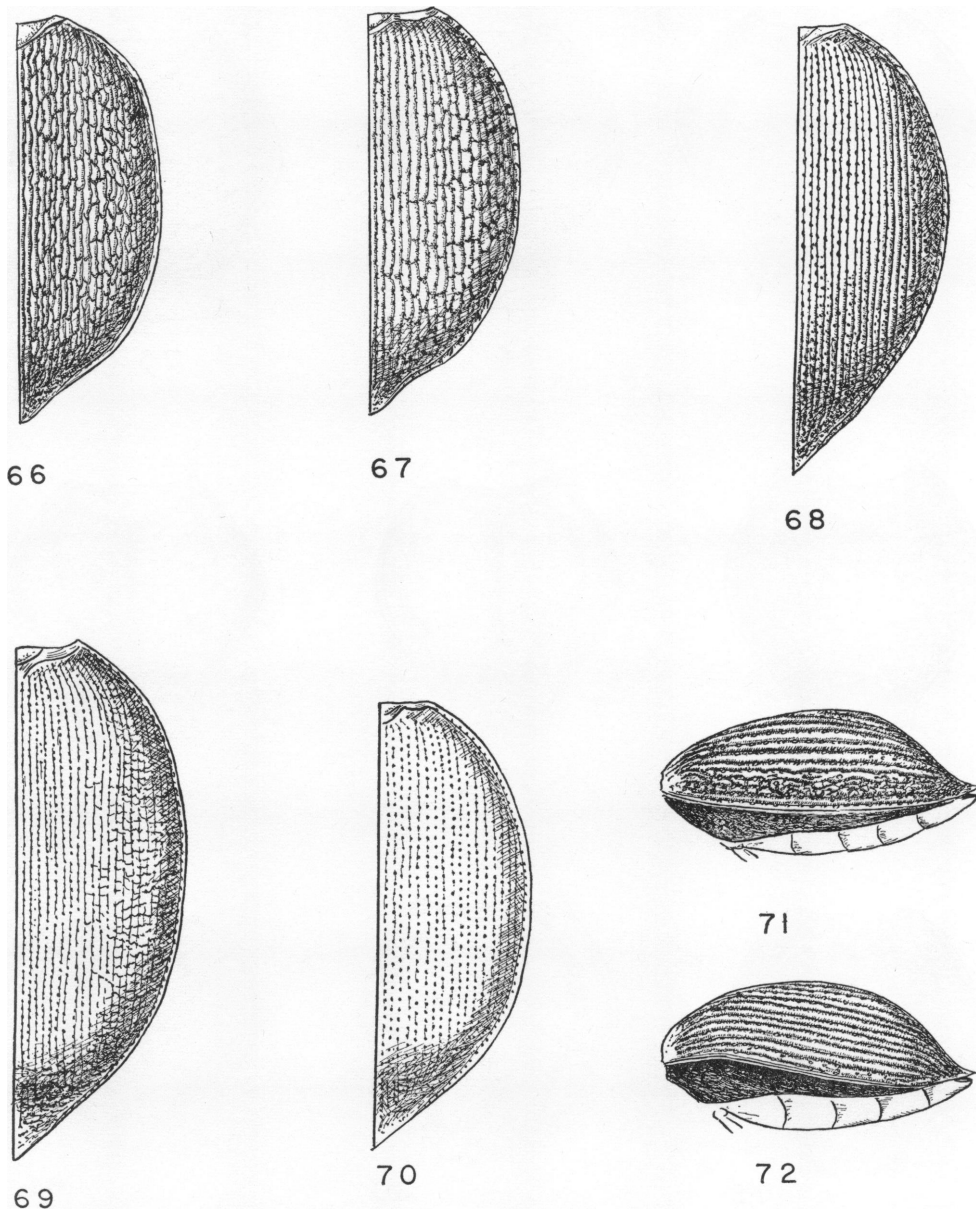
FIGS. 45-55. Prosternal process of *Scaphinotus* (*Brennus*), ventral view. 45. *S. (B.) marginatus* (Fischer). 46. *S. (B.) cordatus* (LeConte). 47. *S. (B.) cristatus* (Harris). 48, 49. *S. (B.) rugiceps* (Horn). 50. *S. (B.) striatopunctatus* (Chaudoir). 51, 52. *S. (B.) punctatus* (LeConte). 53. *S. (B.) oreophilus* (Rivers). 54. *S. (B.) johnsoni* Van Dyke. 55. *S. (B.) subtilis* (Schaum).



FIGS. 56-65. Right elytra of *Scaphinotus* (*Brennus*), dorsal view. 56, 57, 60. *S. (B.) johnsoni* Van Dyke. 56. From Olympic Mountains, Washington. 57. Part of right elytra. 60. From Mt. Arrowsmith, Vancouver Island. 58, 61, 62. *S. (B.) marginatus* (Fischer). 58. Part of right elytron. 61. From British Columbia. 62. From eastern Washington. 59-65. From California. 59, 63. *S. (B.) cordatus* (LeConte). 59. Part of right elytron. 63. From Marin County. 64. *S. (B.) punctatus* (LeConte) from Mission Valley, San Diego County. 65. *S. (B.) obliquus* (LeConte) from Plumas County.

elytral striae, longer lobes of the labrum, and the fact that the penis is more slender, with a narrower tip. Also *crenatus* occurs in some of the same localities as *ventricosus*.

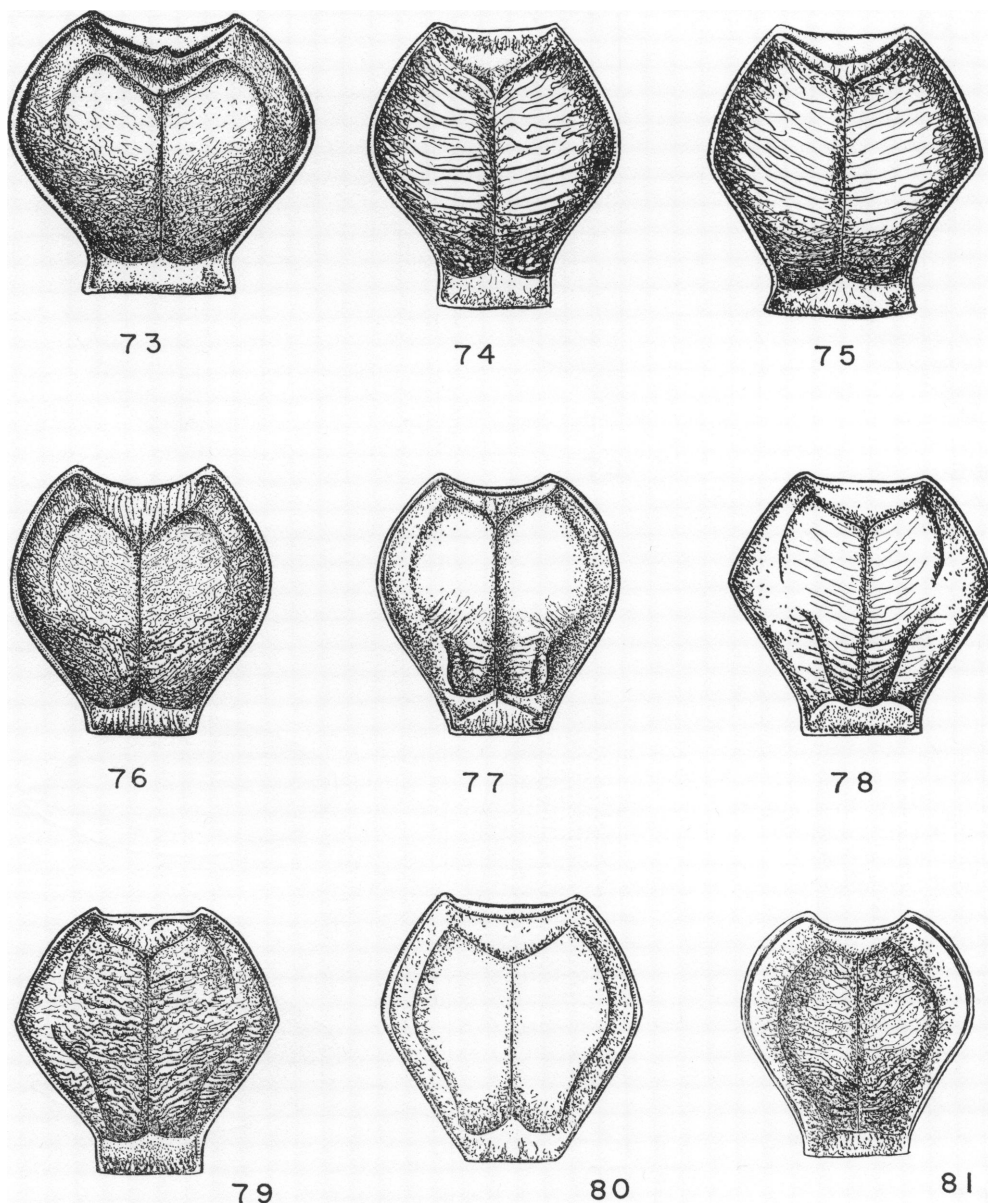
*Scaphinotus* (*Brennus*) *crenatus* shows even more variation in characters than *ventricosus*. The specimens found in the coastal areas of Monterey and San Luis Obispo



FIGS. 66-72. Right elytra. of *Scaphinotus (Brennus)* from California. 66-70. Dorsal view. 71, 72. Side view. 66. *S. (B.) obliquus* (LeConte) from Shasta County. 67. *S. (B.) interruptus* (Ménétriés) from Mendocino County. 68. *S. (B.) striatopunctatus* (Chaudoir) from Alameda County. 69. *S. (B.) bullatus* Van Dyke from Fresno County. 70. *S. (B.) subtilis* (Schaum) from Tulare County. 71. *S. (B.) ventricosus* (Dejean) from San Mateo County. 72. *S. (B.) crenatus* (Motschulsky) from San Luis Obispo County.

counties have the pronotum slightly wider than long, rarely as long as wide, the anterior sides of the pronotum distinctly arcuate, and the posterior sides straighter. To the south

of San Luis Obispo and Kern counties a variety, which was described by LeConte (1859) as *striatus*, occurs. It has a narrow pronotum, in many cases distinctly longer than wide,

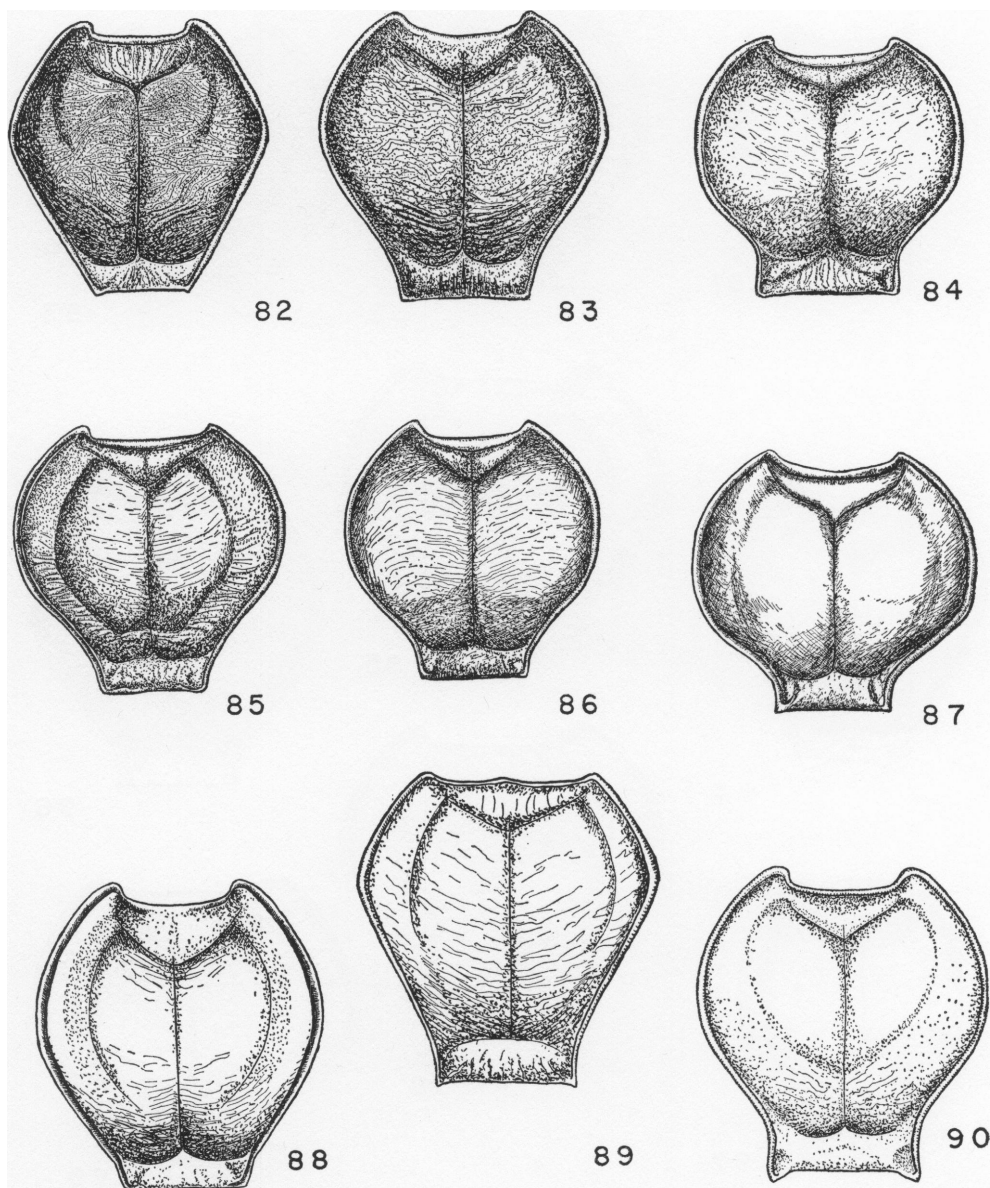


FIGS. 73-81. Pronotum of *Scaphinotus* (*Brennus*), dorsal view. 73-75. *S. (B.) cristatus* (Harris) from California. 73. From Santa Cruz County. 74. From Humboldt County. 75. From Monterey County. 76. *S. (B.) rugiceps* (Horn) from Oregon. 77-80. *S. (B.) marginatus* (Fischer). 77. From Blue Mountains, Washington, common individual. 78. From Olympic Mountains, Washington, rare individual. 79. From California, rare individual. 80. Type of Horn's *fulleri*. 81. *S. (B.) johnsoni* Van Dyke from Olympic Mountains, Washington.

or as long as wide, sides that are hardly arcuate (fig. 97), and a penis with a very long, slender tip (fig. 136). Such specimens are found in Halcyon (southern part of San Luis Obispo County), to the east in Kern County

and in Los Angeles, Ventura, and Riverside counties, in Lytle Creek, San Bernardino County, and in San Diego County.

These beetles with a long and narrow pronotum resemble *punctatus*, but the punc-

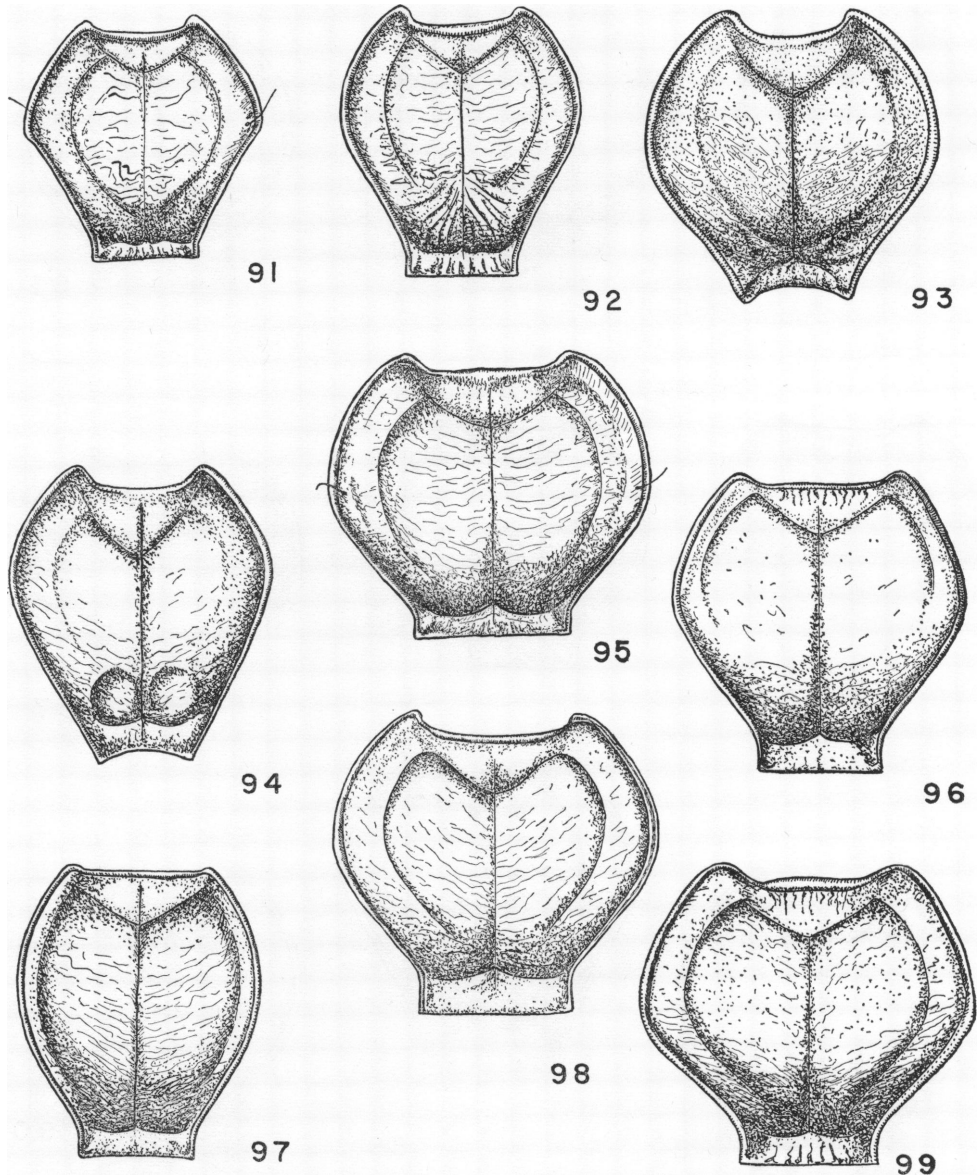


FIGS. 82-90. Pronotum of *Scaphinotus (Brennus)* from California, dorsal view. 82, 83. *S. (B.) obliquus* (LeConte) from Shasta County. 84-86. *S. (B.) interruptus* (Ménétriés). 84. From San Mateo County, common individual. 85. From El Dorado County, rare individual. 86. From Sierra County, rare individual. 87. *S. (B.) cordatus* (LeConte). 88. *S. (B.) subtilis* (Schaum) from Fresno County. 89. *S. (B.) bullatus* Van Dyke from El Dorado County. 90. *S. (B.) punctatus* (LeConte) from Mission Valley, San Diego County.

tures of their elytral striae are much smaller than in *punctatus*, the seta anterior on the metacoxa, which is absent from *punctatus*, is present in *crenatus*, and the hind angles of the pronotum do not project beyond the base.

In the San Bernardino Mountains, at an elevation of 3000 feet and over, in Santa Barbara County on Mt. Figuera at an altitude of 4000 feet, at Gaviota Pass at only 200 feet, and in Klau, San Luis Obispo County,



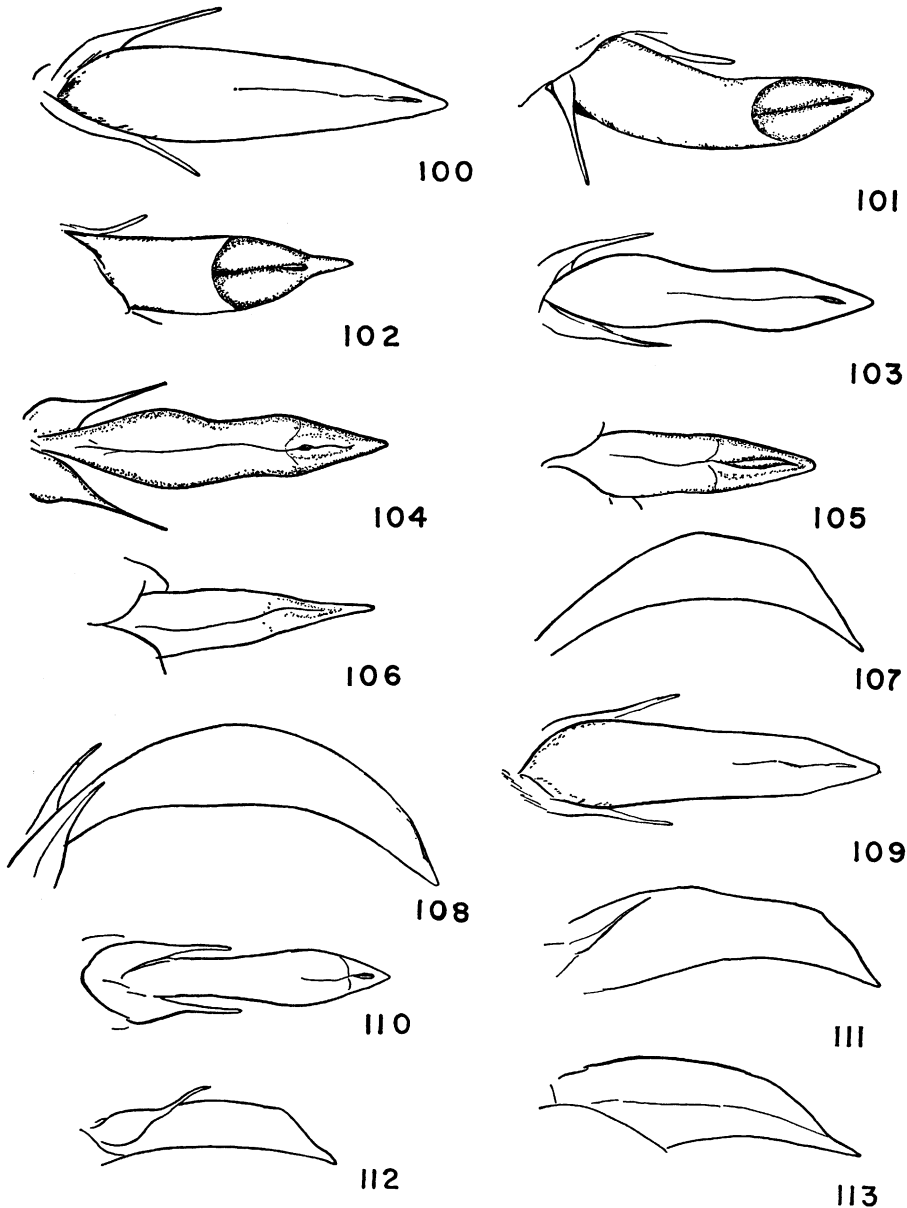


FIGS. 91-99. Pronotum of *Scaphinotus* (*Brennus*) from California, dorsal view. 91, 92. *S. (B.) bullatus* Van Dyke. 91. Allotype of Van Dyke's *bullatus*. 92. Allotype of Van Dyke's *grandis*. 93. *S. (B.) oreophilus* (Rivers) from Madera County. 94. *S. (B.) riversi* Roeschke from Tulare County. 95. *S. (B.) striatopunctatus* (Chaudoir) from Alameda County. 96, 97. *S. (B.) crenatus* (Motschulsky). 96. From San Luis Obispo County. 97. From San Diego County. 98, 99. *S. (B.) ventricosus* (Dejean). 98. Dejean's type. 99. From San Francisco.

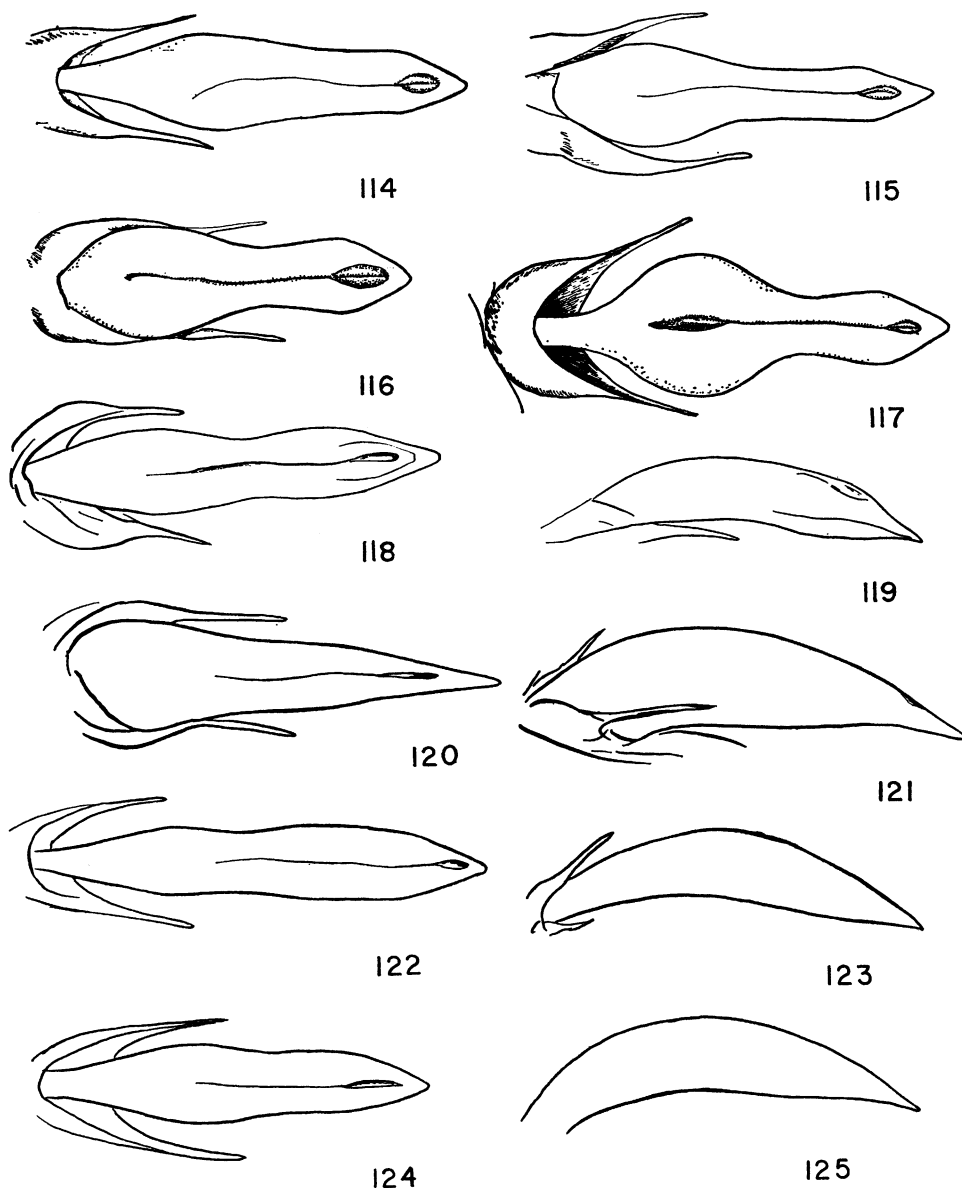
at an altitude of 1113 feet, still another variety of *crenatus* is found. Most of the specimens from these localities are small, from 13 to 15 mm., rarely larger; the pronotum is slightly wider than long, as in the specimens

from Monterey County and the coastal areas of San Luis Obispo County; the elytral striae are irregular on the sides; the setae orbitalis and metacoxalis anterior are often missing; the females may have only one seta on each





FIGS. 100-113. Male genitalia of *Scaphinotus* (Brennus). 100-102. *S. (B.) cristatus* (Harris) (all from Ben Lomond, Santa Cruz County, California). 103. *S. (B.) rugiceps* (Horn) from Oregon. 104-107. *S. (B.) marginatus* (Fischer). 104, 105. From Key Port, Washington. 106. From Harney, Oregon. 107. From Forest Grove, Oregon, side view. 108, 109. *S. (B.) johnsoni* Van Dyke from Olympic Mountains, Washington. 108. Side view. 110, 112. *S. (B.) cordatus* (LeConte) from California. 112. Side view. 111. *S. (B.) interruptus* (Ménétriés) from Marin County, California, side view. 113. *S. (B.) obliquus* (LeConte) from Shasta County, California, side view.

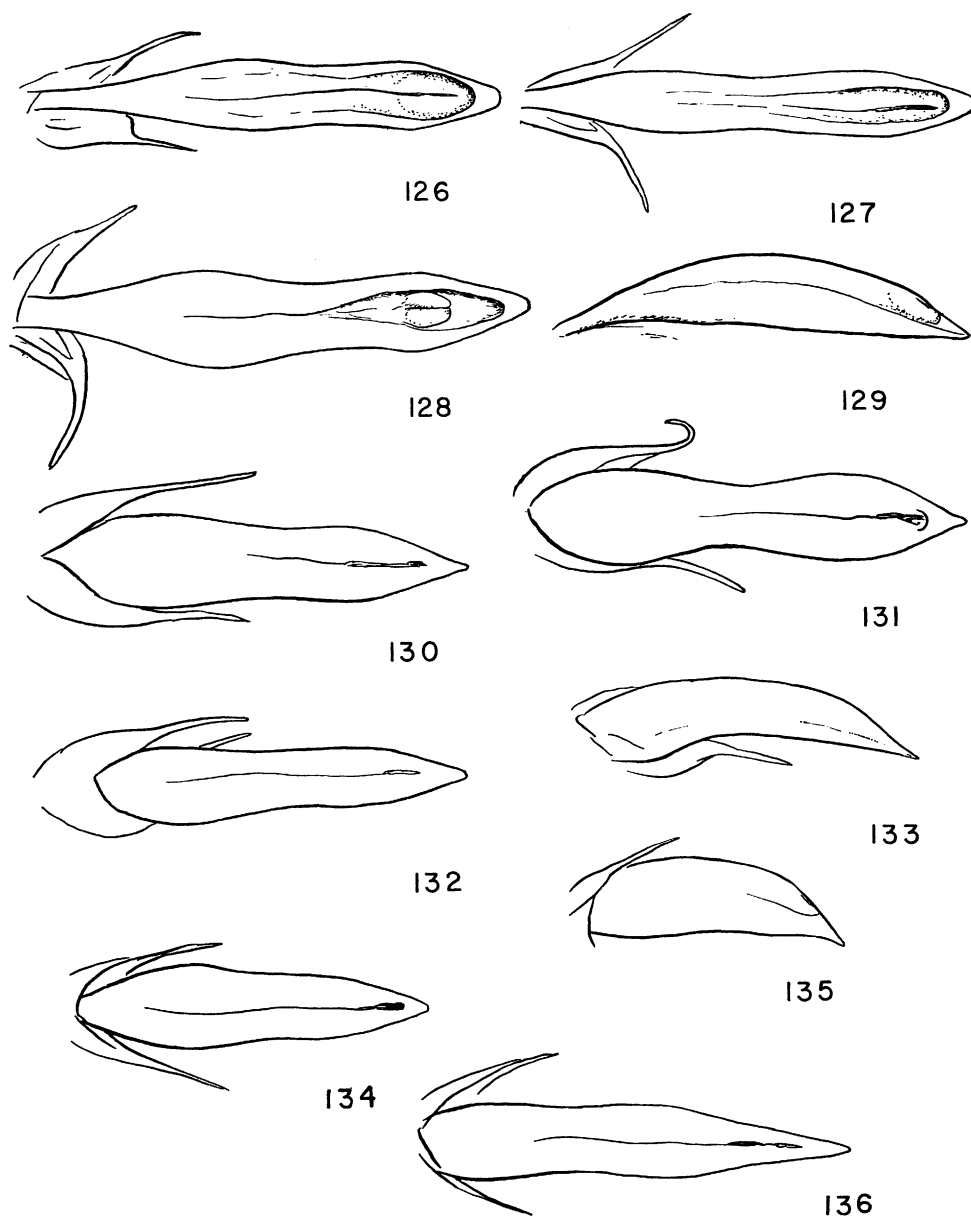


FIGS. 114-115. Male genitalia of *Scaphinotus* (*Brennus*) from California. 114, 115. *S. (B.) interruptus* (Ménétriés). 114. From Marin County. 115. From Mendocino County. 116, 117. *S. (B.) obliquus* (LeConte) from Shasta County. 118, 119. *S. (B.) subtilis* (Schaum) from Kaweah, Tulare County. 120, 121. *S. (B.) bullatus* Van Dyke from Tulare County. 121. Side view. 122, 123. *S. (B.) oreophilus* (Rivers) from Madera County. 123. Side view. 124, 125. *S. (B.) punctatus* (LeConte). 125. Side view.

side of the anal segment, as in the males; and the body is slightly shorter and more rounded than in the other specimens of *crenatus*. At first glance these specimens seem to resemble *cordatus*, but they differ from it in the nar-

rower pronotum, with less arcuate sides, the more rounded and more convex elytra, with minute punctures of the striae, and, of course, they are not so shiny as *cordatus*.

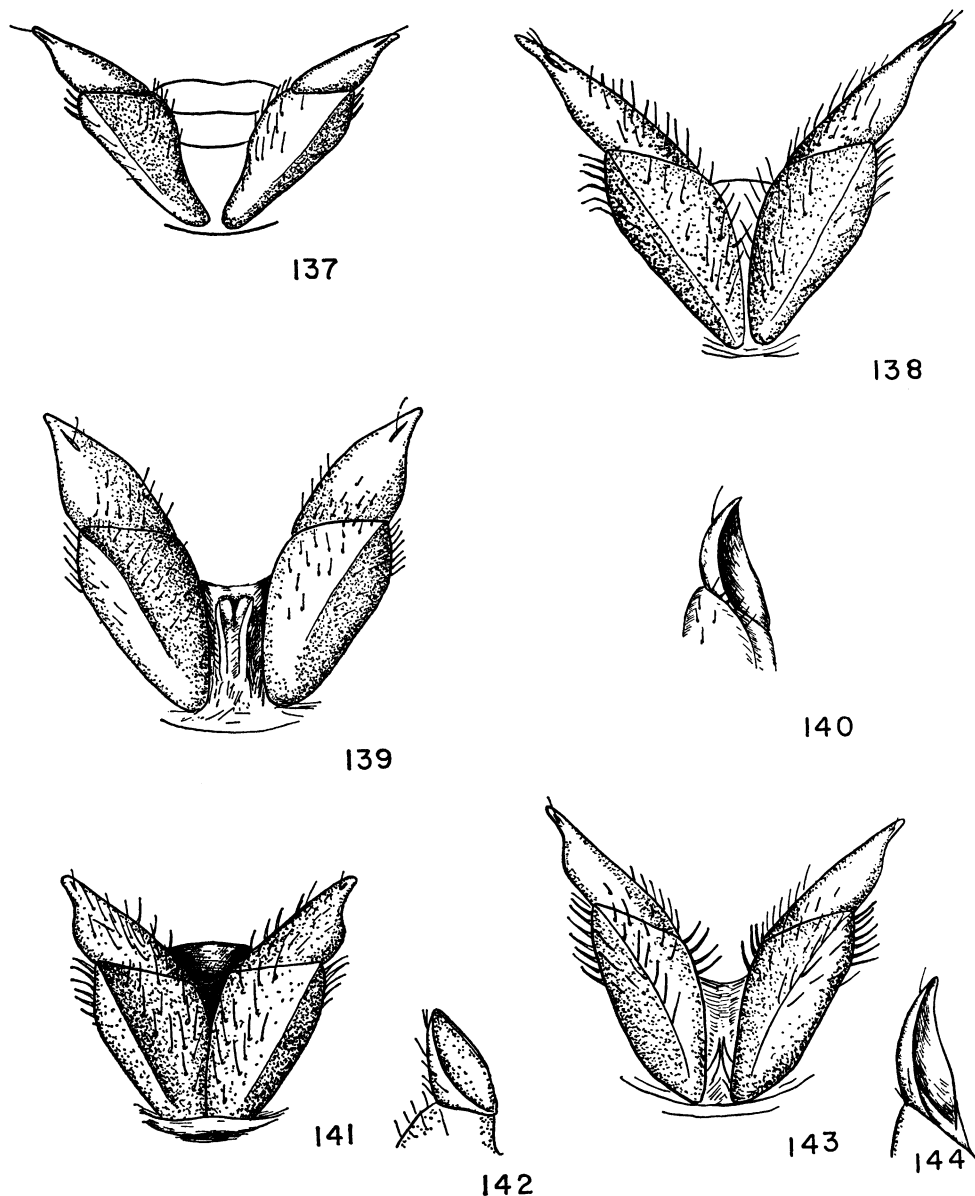
LeConte's *striatus*, as stated above, is a



FIGS. 126-136. Male genitalia of *Scaphinotus (Brennus)* from California. 126-129. *S. (B.) striatopunctatus* (Chaudoir). 126, 129. From Piedmont, Alameda County. 129. Side view. 127, 128. From San Francisco. 130, 131. *S. (B.) ventricosus* (Dejean) from San Mateo County. 132-136. *S. (B.) crenatus* (Motschulsky). 132, 133. From San Luis Obispo County. 133. Side view. 134, 135. From San Bernardino Mountains. 135. Side view. 136. From Los Angeles.

variety of *crenatus*, and there are many individuals that have characters of both *crenatus* and "*striatus*." In some localities they may even occur together. For instance, I saw a

male from Lytle Creek, San Bernardino County, with a long, narrow pronotum, with hardly arcuate sides ("*striatus*") and a female from the same place with a pronotum slightly

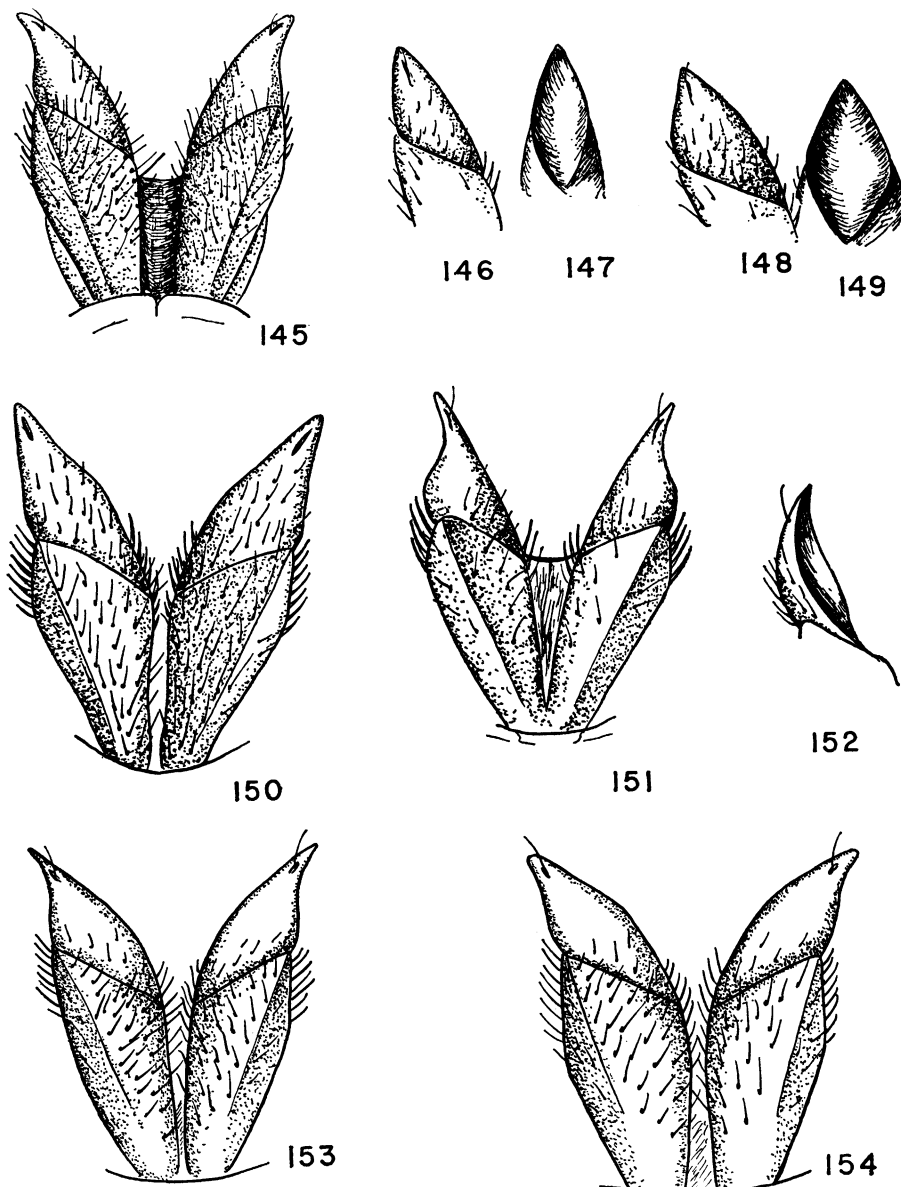


FIGS. 137-144. Female genitalia of *Scaphinotus* (*Brennus*) 137. *S. (B.) cordatus* (LeConte) from Sonoma County, California. 138, *S. (B.) cristatus* (Harris) from Santa Cruz County, California. 139, 140. *S. (B.) rugiceps* (Horn) from Klamath County, Oregon. 140. Styli, side view. 141, 142. *S. (B.) marginatus* (Fischer) from Alberta, Canada. 142. Styli, side view. 143, 144. *S. (B.) johnsoni* Van Dyke from Clallam County, Washington. 144. Styli, side view.

wider than long and with the sides arcuate, as is usual for specimens from Monterey and San Luis Obispo counties. In San Luis Obispo County all three varieties of *crenatus* are found: in Halcyon, the variety "*striatus*"; in Klau, the small, round specimens found

mostly in the mountains; and on the coast of the Pacific Ocean, typical *crenatus*. The two beetles that I saw from Baja California are also like typical specimens of *crenatus*.

Casey's *gentilis* from Monterey, which he compared with LeConte's *striatus*, is actually



FIGS. 145-154. Female genitalia of *Scaphinotus (Brennus)* from California. 145. *S. (B.) oreophilus* (Rivers) from Madera County. 146-149. Styli, dorsal and ventral views. 146, 147. *S. (B.) riversi* Roeschke from Tulare County. 148, 149. *S. (B.) oreophilus* (Rivers) from Tulare County. 150. *S. (B.) bullatus* Van Dyke from Tulare County. 151, 152. *S. (B.) crenatus* Motschulsky from San Luis Obispo County. 152. Styli, side view. 153, 154. *S. (B.) striatopunctatus* (Chaudoir). 153. From Piedmont, Alameda County. 154. From Taylorville, Marin County.

a typical specimen of *crenatus*; therefore the name is a synonym.

Casey's *montereyensis*, also from Monterey, does not differ from typical *crenatus*, and Casey's *productus* (type locality, California)

does not differ from the variety "*striatus*." Both are synonyms of *crenatus*.

MATERIAL EXAMINED: Five hundred thirty-seven specimens (289 males and 248 females).

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## INDEX OF SCIENTIFIC NAMES

Valid names are italicized.

*alternatus* Motschulsky, 170

*basalis* Casey, 143  
*beringi* Casey, 158  
*Brennus* Motschulsky, 139  
*brevicollis* Casey, 170  
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