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Revision of the Genus *Phyllotreta* Chevrolat of America North of Mexico Part I. The Maculate Species (Coleoptera: Chrysomelidae, Alticinae)

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Revision of the Genus *Phyllotreta* Chevrolat of America North of Mexico Part I. The Maculate Species (Coleoptera: Chrysomelidae, Alticinae)

Abstract

Members of the genus *Phyllotreta* are small flea beetles (1.8–3.6 mm long), most of which inhabit open areas of disturbed or cultivated vegetation, but a few of which inhabit woodlands. They feed almost exclusively on the plant family Cruciferae, and several species are of economic importance as pests of cultivated crucifers.

This is a revision of the maculate species of *Phyllotreta* Chev. known to occur in America north of Mexico. The aedeagus and spermatheca, the male and female antennae, and the elytral color pattern are illustrated for each of the 27 species. A key to the species is presented. The biology for each species has been summarized and the distribution is given.

Nine new species of *Phyllotreta* are described: ***P. arcuata***, ***P. attenuata***, ***P. bisinuata***, ***P. constricta***, ***P. dolichophalla***, ***P. emarginata***, ***P. ramosoides***, ***P. spatulata***, and ***P. utanula***.

Two new synonyms are given: *P. aequalis* Hatch (= *P. denticornis* Horn) and *P. ampicornis* Chittenden (= *P. denticornis* Horn). In addition, new synonyms of seven former varieties/variations (= subspecies) include: *P. armoraciae* var. *biplagiata* Chittenden (= *P. armoraciae* (Koch)); *P. decipiens* var. *ordinata* Chittenden (= *P. decipiens* Horn); and *P. sinuata* var. *discedens* Weise, *P. sinuata* var. *monticola* Weise, *P. vittata* var. *artivitta* Chittenden, *P. vittata* var. *lineolata* Chittenden, and *P. vittata* var. *vernica* Chittenden (all five = *P. striolata* (Fabricius)).

Lectotypes are designated for six species: *P. armoraciae* (Koch), *P. decipiens* Horn, *P. denticornis* Horn, *P. lepidula* (LeConte), *P. liebecki* Schaeffer, and *P. oregonensis* (Crotch).

Neotypes are designated for three species: *P. bi-*

pustulata (Fabricius), *P. striolata* (Fabricius), and *P. zimmermanni* (Crotch).

Three species, known only from females, are considered *incertae sedis*: *P. alberta* Chittenden, *P. obtusa* Chittenden, and *P. perspicua* Chittenden.

The male of *P. oblonga* Chittenden is described for the first time. Two of the new species, *P. arcuata* and *P. bisinuata*, have the wings reduced or vestigial.

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Introduction

Phyllotreta is a cosmopolitan flea beetle genus of about 150 species, of which about 44 occur in the Nearctic Region. Two of the nearctic maculate species, *P. armoraciae* and *P. striolata*, are regarded as introductions from Eurasia. Also, a third Eurasian species, *P. undulata*, is included, but its establishment in the United States is questionable.

This partial revision of the genus *Phyllotreta* includes only the maculate species known to occur in

America north of Mexico. A key to these species is presented. The biology for each species has been summarized and the distribution is given. This revision is based on a study of about 13,100 specimens; in addition, the types of most of the immaculate species, including their male genitalia, were studied.

The genus *Phyllotreta* was proposed by Chevrolat (1837) in the third edition of the DeJean Catalogue of Coleoptera and included 14 species, two occurring north of Mexico. Crotch (1873), in the first American publication of a comprehensive nature treating the North American chrysomelids, described all the new species he recognized in the LeConte and Horn collections. Chapuis (1875) was the first to present a complete classification of the Alticinae. He placed *Phyllotreta* in the group "Aphthonites" which was later considered of tribal rank. Horn (1889) monographed the Alticinae of America north of Mexico, the only time this has been done. He slightly altered Chapuis' classification and placed *Phyllotreta*, along with *Longitarsus*, *Glyptina*, and *Aphthona*, in the group "Aphthonae" which is, with the addition of *Palaeothona* (? = *Lupraea*), now considered the tribe Aphthonini. However, there currently is no generally accepted tribal classification for the Alticinae.

Horn (1889) presented the first really comprehensive revision of *Phyllotreta*. The most recent revision was by Chittenden (1927), and in it, 17 new species and five new varieties or subspecies were described. Even though 16 of his new species are valid, unfortunately, his key is poor and his descriptions are somewhat inaccurate and inadequate. He studied neither the aedeagi nor the spermathecae; the former provide the critical characters used for the separation of many species.

This genus contains many species of economic importance (see the Biology section for the genus and for each species). Biological work has recently been done and is being continued on several species by researchers at Cornell University (see Root & Tahvanainen, 1969; Feeny et al., 1970; Tahvanainen, 1972; and Hicks, 1972). J. K. Nielsen of Denmark is now the most active researcher/publisher of *Phyllotreta* biological studies, especially with respect to host plant interrelationships (see Nielsen, 1977, 1978a, 1978b; and Nielsen et al., 1977, 1979).

Methods

Measurements

For the key, comparative measurements were made at 16× for the beetle length (whole beetle, one mea-

surement), at 64× for antennal segments and stripe width, and at 160× for the spermatheca. All measurements, including those below, were made using a Leitz Model TS binocular dissecting microscope with ocular grid (1 mm divided into 40 parts).

Each species description includes those specimens representing both the shortest and longest beetles. Table 1 gives a comparative chart of the measurement ranges for Nos. 1–3 and 5–6 below, and Table 2 gives a comparative chart of the antennal segments. The measurements were made in the following manner:

1. Beetle length: sum of elytral length (see No. 6 below) and distance measured along midline from pronotal base to most anterior part of frontal carina; measured at 64×.

2. Beetle width: Measured on a line perpendicular to elytral suture at greatest breadth (about elytral mid-length); measured at 64×.

3. Interocular distance/maximum diameter of eye (IOD/MDE): narrowest separation of eyes on dorsal aspect of head; and maximum diameter of eye, maximum dimension of eye in lateral view; both measured at 160×.

4. Antennal segment length/width: measurements are given in ocular grid units and represent maximum length or width; only half units are estimated, if dimension was only slightly more or less than a unit, this is indicated by a plus or minus sign; measured at 160×.

5. Pronotal length and width: length measured on dorsal midline from basal to anterior edge, and width measured on a line perpendicular to pronotal midline at greatest breadth; measured at 64×.

6. Elytral length and width: length measured along dorsal line from base of scutellum along suture to apex of elytra; for width, see No. 2 above; measured at 64×.

7. Length of aedeagus: measured dorsally or laterally from base of basal foramen to apex; measured at 160×.

8. Length of spermatheca: measured in lateral view from most anterior part of sclerotized portion of spermathecal duct to posteriormost extent of pump; measured at 160×.

9. Length of spermathecal receptacle: measured in lateral view from most anterior part of receptacle to base of pump (transverse line where sclerotization markedly changes intensity).

Genitalia Preparation

The beetle was first softened, the abdomen removed and treated with KOH, and the genitalia dis-

sected out and studied. The genitalia were placed in glycerine in a small polyethylene genitalia vial (males) or mounted on a card beneath the specimen (females). For details about dissection and preparation techniques, see Smith (1979a).

Illustration Preparation

Within each set of illustrations, all comparable structures were drawn at the same magnification; i.e., all antennae were drawn at the same magnification and each one is therefore comparable with all other antennae.

The beetle habitus drawings, as well as those of the antennae and sterna, were made with the aid of a Wild M5 binocular dissecting microscope equipped with a camera lucida. For the habitus drawings, the elytra and pronotal basal margins were drawn viewed perpendicularly to the elytral disk, and the pronotum and head were drawn from the angle where all four pronotal corners were in focus at once. These were put together by matching the basal pronotal angles and using the basal margin drawn from the former orientation.

Male genitalia were placed in a drop of glycerine in a shallow circular depression slide (if necessary, 1 or 2 grains of white sand was used for positioning). The general features were drawn using a Ken-A-Vision technical model microprojector, and the details were added using a Leitz TS binocular dissecting microscope. The spermathecae were drawn with the same microprojector, or if the spermathecal gland was not clearly visible, a camera lucida-equipped phase-contrast Wild M20 compound binocular microscope was used for drawing the spermathecal gland.

Distribution Maps

The maps represent the distribution of specimens personally examined. The localities are recorded in two ways. When a locality within a state or province is known, it is represented by a solid symbol (dot, square, etc.) at this locality. If only a state or provincial locality is known (and no other locality within that state/province is known), it is represented by the same symbol but in open configuration, and it is placed in approximately the center of the state/province.

Systematic Formats

KEY FORMAT—The key to species is artificial and dichotomous, but an explanation is needed about the order of characters within the couplet. If color pattern

will separate the species, it is given first because it is easiest, though it may vary in reliability. Color is followed by morphological characters, principally of the antennae and genitalia. The male genitalia provide the most reliable characters.

SPECIES FORMAT—The descriptions or redescriptions are based on holotypes, lectotypes, or neotypes, with the exception of *P. undulata* for which the location of the type is unknown. All descriptions of variations are placed in parentheses, but no variation is given for punctuation, and measurement ranges are summarized in Table 1. In the Biology section under host plants of adults, an asterisk is used to indicate records which are probably hosts, i.e., plant species belonging in the Cruciferae, Capparidaceae, Limnanthaceae, or Tropaeolaceae. The Habits section includes a summary of the dates of collection.

A detailed listing of the specimens examined is located in the Appendix. The four-letter abbreviations denoting the location of the specimens are listed in the Appendix under List of Abbreviations.

Classification

Subfamily ALTICINAE Illiger

Head rounded, more or less inserted into prothorax; antennae inserted between inner margins of eyes, usually short, often dilated toward tip, rarely pectinate or long and filiform. Pronotum transverse, almost as wide as elytra, less often square or subrectangular; mostly punctate. Elytra usually oblong oval, always covering tergites except rarely with pygidium exposed. Prosternum more or less convex between coxae, very rarely narrow and coxae contiguous. Legs of medium length, rather robust; metafemora always more or less swollen, grooved beneath, almost always with a large extensor apodeme; tibiae most often grooved on outer face; tarsi short, dilated, last segment sometimes globose or swollen; claws appendiculate, rarely bifid or simple.

For a key to the genera of the Alticinae, see Arnett (1963).

Genus *Phyllotreta* Chevrolat

Phyllotreta Chevrolat, 1837:391.

Type-species: *Chrysomela brassicae* F. (Designated by Chevrolat, in d'Orbigny, 1845:6; clarification by White, 1970.)

Orchestris Crotch, 1873 (not Kirby, 1837):65.

Type-species: *Chrysomela nemorum nemorum* L. (Synonymy by LeConte, 1878:615.)

Tanygaster Blatchley, 1921:26–27.

Type-species: *Tanygaster ovalis* Blatchley (by original designation and monotypy). (Synonymy by Smith, 1979b:359.)

MAJOR REFERENCES—Crotch (1873), Horn (1889), Blatchley (1910), Duckett (1920), Chittenden (1927), Beller & Hatch (1932), Heikertinger & Csiki (1939), Wilcox (1954), Hatch (1971), and Balsbaugh & Hays (1972).

DIAGNOSIS—Small (less than 3.7 mm), shape elongate oblong, glabrous, completely dark or each elytron with a median pale stripe or 1 or 2 pale marks. In addition, antenna 11-segmented, slender (males of some species with segment 5 and often also 4 dilated); postantennal tubercles obsolete; pronotal width about 2 × length; elytra confusedly punctate; procoxal cavities open; metatibial apical spur short, simple; 1st metatarsal segment much less than ½ tibial length, 5th tarsal segment not swollen apically; claws simple.

DESCRIPTION—Small, 1.79–3.62 mm long, 0.88–1.85 mm wide; elongate oval to oblong oval; moderately convex to subdepressed; usually glabrous above but lightly pubescent ventrally with vestiture short, fine, and pale, antennal segments pubescent with vestiture sparse on basal segments to moderate on apical segments; dark, but legs, antennae, and/or elytra may have pale pattern.

Head—Dark; covered by prothorax to just behind eyes; eyes prominent, not emarginate; postantennal tubercles obsolete, reduced to flat spots without sharp superior delineation; frons usually evenly punctate; vertex punctation quite variable in size and spacing within a species so variation not given in species descriptions. Antennae 11-segmented, about ½ body length, slender with 1st and apical segments slightly wider (males of some species with 1 or more of segments 4–7 dilated, usually 5 and often also 4 dilated). Maxillary palpi with last segment about as long as preceding, elongate conical.

Prothorax—Width about 2 × length, somewhat narrower apically; moderately convex, without distinct antebasal or lateral impressions; basal margin adjacent to hind angles transverse, not oblique; punctures coarsest and closest on disc, usually less coarse and more widely spaced laterally (puncture size and spacing varies considerably within most species such that it is not diagnostic, so punctation variation is not included in species descriptions); procoxal cavities open.

Elytra—Oblong oval, moderately convex to subdepressed; entirely dark or each elytron with a median pale stripe or 1 or 2 pale marks; confusedly punctate with punctures coarsest and closest on disc, usually less coarse and more widely spaced laterally and in apical ½–⅓ (puncture size and spacing varies enough

within most species such that it is not diagnostic, so punctuation variation is not included in species descriptions); humeri never prominent.

Wings—Normally with metathoracic wings well developed, but both males and females of *P. arcuata* with wings vestigial (sometimes well developed) and *P. bisinuata* with wings reduced in males and well developed (sometimes vestigial) in females.

Legs—Metafemora greatly enlarged, saltatorial; tibiae normal, without a tooth above followed by a ciliate emargination; apical spurs inserted medially on apex, short, with a single point, 1st metatarsal segments much less than $\frac{1}{2}$ tibial length, 5th metatarsi simple, not swollen apically; claws simple with, at most, a very small basal swelling. Normal color sequence: trochanters pale, femora darkest, tibiae intermediate, tarsi pale (often with apical segments darker), all articulations paler than adjoining segments; rarely with a different sequence. When "normal color sequence" is used in a species description, it means the sequence described here.

Abdomen—Fifth sternum sexually dimorphic, simple in outline in females (fig. 1), but males (fig. 2) with an apical median lobe formed by median $\frac{1}{3}$ of apical margin set off by 2 narrow, moderately deep emarginations (pygidium fits this 3-part configuration), median lobe usually concave with concavity extending toward but ending before sternal base, male 5th sternum usually with a median linear impression extending part of or sometimes entire length; females sometimes with a median linear or oblong impression in apical $\frac{1}{3}$ of 5th sternum, or sometimes extending to base; both sexes usually with shallow lateral prebasal impressions. Dark, often with apical margins of sterna 1–4 paler or darker, male usually with apical $\frac{1}{2}$ – $\frac{1}{3}$ of 5th paler.

Male Genitalia—Figures 4, 5; terminology modified from that used by Sharp & Muir (1912) and Powell (1941). Aedeagus a single slender tube arched dorsoventrally; nearly uniform in width. Basal foramen narrower in basal half, almost entirely open ventrally. Tegmen ventral, attached medially at about midpoint of basal foramen; slender, usually about $\frac{1}{3}$ – $\frac{1}{4}$ total length of aedeagus and bifurcate at apical $\frac{1}{3}$ – $\frac{1}{2}$, the branches wrapped around median lobe but not meeting dorsally. Median lobe usually slightly tapering to apex which, in dorsal view, is usually rounded or acute, but may be emarginate or truncate; orifice dorsal, located preapically (in lateral view, on a plane oriented about 30° from longitudinal axis of median lobe), oblong in outline, occluded by a transparent area reinforced by 3 longitudinal sclerotized strips; sometimes, dorsally and/or ventrally with a "washboard" which consists of a median series of short transverse, parallel, heavily sclerotized, evenly

spaced ridges, which usually start postbasally to basal foramen and extend onto orifice base, a ventral washboard may be interrupted medially by a longitudinal concavity resulting in 2 parallel rows of "teeth"; usually with a ventral concavity or impression, at least in apical $\frac{1}{4}$.

Female Genitalia—Figure 6; terminology modified from that used by Samuelson (1966, 1973). Spermatheca, in lateral view, with pump of uniform width, about $\frac{1}{3}$ – $\frac{1}{2}$ length of receptacle, usually more heavily sclerotized in apical $\frac{1}{4}$, apex bluntly rounded. Receptacle (lateral view) usually cylindrical to elongate oval, slightly constricted premedially, but may be elongate pear-shaped or oblong; usually with a ring collar at junction with pump; uniformly sclerotized; in dorsal view, laterally compressed, shallowly C-shaped. Spermathecal duct (lateral view) usually attached to anterior end of receptacle premedially (in dorsal $\frac{1}{2}$), rarely on dorsum (figs. 157, 186), usually paralleling receptacle outline anteriorly and ventrally to just beyond gland valve attachment; usually constricted at anterior end of gland valve attachment, sometimes swollen just before constriction; usually gradually tapering posteriorly beyond gland valve attachment, uniformly sclerotized to where this tapering ceases, then not visibly sclerotized (most of unsclerotized portion of duct usually broken off during dissection). Gland valve (lateral view) globose, moderately developed, prominent; spermathecal gland attached on ventral posterior surface (often broken off during dissection or not visible except with phase-contrast or interference microscope).

Sexual Dimorphism—This is exhibited in overall size (females usually slightly larger), 5th abdominal sternum (see section on abdomen above), and in middle antennal segments of several species (see section on head above).

IMMATURE STAGES—The egg, larva, and pupa have been described for only 3 species included in this revision: *P. armoraciae* by Chittenden (1917), *P. striolata* by Shimer (1869) and Riley (1885a), and *P. zimmermanni* by Riley (1885b). All 3 species have the larva and pupa illustrated, but only *P. armoraciae* has the egg drawn. The descriptions of Riley and Chittenden are fairly detailed, but Shimer's is sketchy. Adults of other species have been reared from larvae, but no descriptions have been published of the immature stages. Both *P. armoraciae* and *P. striolata* are Eurasian introductions, and numerous European authors have treated their immature stages.

BIOLOGY—Most members of this genus are confined to the Cruciferae, but a few feed on the closely related Capparidaceae, Limnanthaceae, and Tropaeolaceae. It has been demonstrated that these beetles are attracted by the mustard oils and mustard

oil glucosides found in these plants (Gornitz, 1953; Feeny et al., 1970; Matsumoto, 1970).

In the temperate zone, a generalized life cycle would be as follows: adults overwinter; mating and egg-laying occur in early spring, the eggs are laid on or close to the part of the plant upon which the larvae feed (some are leaf miners, few are stem miners, and others are root feeders); the prepupal and pupal stages are spent in an earthen cell in the ground; and the adults emerge in late summer and are active until late fall.

The larvae are leaf miners (*P. constricta*, *P. liebecki*, *P. oregonensis*, and *P. zimmermanni*), stem miners (*P. armoraciae*, restricted to the petiole and midrib), or root feeders (*P. striolata*). The transition from leaf to stem feeding has been observed for *P. zimmermanni* (Chittenden, 1927, p. 21), and from stem to root feeding in *P. armoraciae* (Chittenden, 1917, p. 10). Contrary to the habits of North American species, worldwide, the majority of known larvae are stem and root borers or root feeders (Frost, 1924).

Among our North American species, *P. armoraciae*, *P. conjuncta* (recorded as *P. bipustulata*), *P. decipiens*, *P. oregonensis*, *P. ramosa*, *P. striolata*, and *P. zimmermanni* have been irregularly of economic importance.

Recently, several researchers at Cornell University have been working on such biological aspects as phenology and microhabitat selection (Tahvanainen, 1972), the influence of vegetation diversity on population ecology (Tahvanainen, 1972), host plant specificity (Feeny et al., 1970), and the role of temporal hosts on seasonal development of the crucifer fauna (Root & Tahvanainen, 1969).

In 1979, Wilcox published a list of host plants for the Chrysomelidae of northeastern North America in which he incorporated original data from my Ph.D. dissertation and the manuscript I sent him for inclusion in the North American Beetle Fauna Project; due to an oversight, my dissertation was not included in the bibliography. This involves six of my new host plant records recorded under four species (*P. bipustulata*, *P. liebecki*, *P. ramosa*, and *P. robusta*). In the interest of documenting these new records, I have left these entries in my New Collection Records sections, but have put them in brackets.

DISCUSSION—Characters and Previous Revisions—It should be pointed out that, with the exception of the antennal morphological characters, most of the external morphological and color characters used by previous workers are highly variable. In particular, this includes the texture, punctuation, and luster of the head, pronotum, and elytra, the color of the antennae and legs, and the elytral pattern for most species.

Contrary to Chittenden (1927), the sexes may be easily distinguished by the apical margin of the 5th abdominal sternum (see section on abdomen above). The aedeagi show the most reliable characters for separation of species, whereas the spermathecae are usually reliable only for separation to groups of closely related species because of their variability in shape. The male antennae provide very reliable characters for most of the species, particularly those which exhibit sexual dimorphism.

Several species exhibit reduction in the size of pale stripes or marks to the extent that they may be indistinct or completely absent. Therefore, it is possible that representatives of these maculate species may be found among the thousands of undetermined immaculate specimens, the subject of Part II of this revision.

It should be noted that I use the term "alutaceous" to mean "covered with minute cracks, like the human skin" as defined by Terep-Bueno (1962, p. 9). Many previous workers have used this term to describe the texture condition which I call granulate, meaning pebbly or like sandpaper.

Chittenden's 1927 revision of *Phyllotreta* deserves a cautionary comment concerning his treatment of the maculate species. Excluding *P. armoraciae*, his key to species is based almost completely on male characters, yet four of his new species (*P. alberta*, *P. oblonga*, *P. obtusa*, *P. perspicua*) which are separated by "male" characteristics were known to him only from females that he incorrectly sexed. Also, Hatch's 1971 review of *Phyllotreta* for the Pacific Northwest deserves a note of caution. A fair number of the specimens which I have examined that bear his determination label are misidentified. Therefore his listed localities should be accepted provisionally.

Nomenclature and Name—The authorship of the genus *Phyllotreta* has been credited to several people, but White (1970) has clarified this situation, Chevrolat (1837) being the correct author. Also, several species have been cited as the type-species, but Chevrolat (1845, in d'Orbigny) satisfactorily designated *Chrysomela brassicae* Fabricius (1787) as the type-species (White, 1970); it is now a synonym of *P. exclamatoris* (Thunberg, 1774). Crotch's unfortunate adoption of Kirby's name *Orchestris* for this genus has been adequately refuted by LeConte (1878, p. 615).

The name *Phyllotreta* comes from the Greek *phyllo-* meaning leaf, and *treta* meaning to perforate; leaf perforation is the characteristic flea beetle damage. The accent is on the penult syllable (based on the Greek vowel η, which is long): *Phyllotrēta*.

Relationships—The genus *Phyllotreta* is most closely related to *Longitarsus*, *Glyptina*, *Aphthona*,

and *Palaeothona*, the other members of the Aphthonini. This tribe is characterized by the following: small size, oval form, 11-segmented antennae, open procoxal cavities, pronotum without any antebasal impression, mesosternum always visible, metatibiae not sulcate or sinuate on outer edge, 1st metatarsal segments long and slender, 5th metatarsal segments slender, and claws simple. *Phyllotreta* can be separated from these four genera on the basis of the following: metatibiae not grooved on the outer edge, but slightly excavated near the tip and the spur inserted medially, the 1st metatarsal segments not much more than one-third tibial length at most, the elytra confusedly punctate, each often with a pale stripe or marks, and the postantennal tubercles obsolete.

Superficially, species of *Phyllotreta* might be confused with those of *Systema* (Chevrolat, 1837), *Epitrix* (Foudras, 1860), and *Chaetocnema* (Stephens, 1831), but in these three genera, the procoxal cavities are closed instead of open. In addition, species of *Epitrix* are usually pubescent instead of glabrous, those of *Chaetocnema* are more robust and their metatibiae have a preapical tooth followed by a ciliate emargination, and species of *Systema* are usually much longer (about twice as long), if they have pale stripes these are simple and straight, and the antennae are simple, with unmodified segments.

Phylogeny—It is difficult to propose phylogenetic relationships of this cosmopolitan genus after studying in detail only about half the nearctic species. However, one observation seems worthy of note: the

native nearctic maculate species form two distinct groups. These groups can be separated on the basis of antennal segment modifications and ratios and the dorsal washboard character of the aedeagus; for details, see Table 3. To be specific, in Group I, the male 5th antennal segment is enlarged (one species has segment 5 elongated only) and the aedeagus is without a dorsal washboard, whereas in Group II, the male 5th antennal segment is normal (one species has segment 5 slightly elongated only) and the aedeagus has a dorsal washboard. In addition, the length ratio of the 5th to 6th antennal segments in Group I averages 3.14 for males (lowest ratio is 2.0) and 1.57 for females (three ratios of 1.38), versus in Group II the ratio averages 1.07 for males (one ratio of 1.5) and 1.05 for females (one ratio of 1.22).

For both groups, as noted above, there is one species each which has antennal segment 5 elongated only. These two species exhibit distinctive extremes in ratios in their respective group; i.e., in Group I, this species represents the lowest ratio for males, and its female is one of three females with the lowest ratio, and in Group II, this species represents the largest ratio for both sexes. One might speculate that these species represent a transition between the two groups with respect to modification of the 5th antennal segment.

It should be pointed out that the maculate species do not constitute a natural group. This division of the genus is one of convenience.

Key to the Maculate Species of *Phyllotreta* of America North of Mexico

- 1 Elytra maculate, with pale marks or stripes 2
- 1' Elytra immaculate, entirely dark brown to black; may have metallic luster but no pale markings
..... Revision of these species to be published as Part II
- 2(1) Male, 5th abdominal sternum with an apical median lobe whose margin is surrounded by apical margin
of pygidium (fig. 2), median lobe concavity not attaining sternal base 3
- 2' Female, apex of 5th abdominal sternite evenly rounded or smooth (fig. 1), apical 1/3 sometimes with
a median linear or oblong impression 32
- 3(2) Each elytron pale yellow, outlined in brown or black with sutural margin slightly wider (fig. 8);
northern 1/2 U.S. and adjacent Canada east of Rocky Mts. and Pacific Northwest
..... *armoraciae* (Koch) p. 14
- 3' Elytra brown to black, with pale stripes or marks 4
- 4(3') Each elytron with 1 or 2 pale marks 5
- 4' Each elytron with a median pale stripe 12
- 5(4) Antennal segment 6 with a sharp anteroventrally directed process (fig. 66); each elytron with an
indistinct postbasal and/or preapical yellowish/reddish brown mark (fig. 20); Pacific Coast states.
..... (in part) *denticornis* Horn p. 24
- 5' Antennal segment 6 simple, with no process; each elytron with 1 indistinct small preapical yellowish/
reddish brown mark or with 2 yellowish marks 6

6(5')	Each elytron with 1 small preapical reddish brown to yellow mark (fig. 18); Rocky Mts. and westward, Texas	<i>decipiens</i> Horn p. 23
6'	Each elytron with 2 yellowish marks	7
7(6')	Antennal segment 5 about 2 × length of 6 and enlarged (fig. 89); elytral preapical mark incurved apically (figs. 40–42); widespread	(in part) <i>striolata</i> (F.) p. 38
7'	Antennal segments 5 and 6 subequal in length, 5th simple; elytral preapical mark with sutural margin straight, apex not incurved (figs. 10–11, 15–16); east of Rocky Mts.	8
8(7')	Each elytron with both pale marks tapering toward each other (fig. 15); east of Rocky Mts.	(in part) <i>conjuncta</i> Gent. p. 19
8'	Each elytron with only apical pale mark at most slightly tapered toward basal mark (figs. 10–11, 16)	9
9(8')	Less than 2.3 mm long or greater than 2.6 mm long	10
9'	Between 2.3 and 2.6 mm long	11
10(9)	Less than 2.3 mm long; east of Rocky Mts.	(in part) <i>conjuncta</i> Gent. p. 19
10'	Greater than 2.6 mm long; east of Great Plains	(in part) <i>bipustulata</i> (F.) p. 17
11(9')	Aedeagus with apex in lateral view at most gradually curved ventrad (fig. 115), lateral margin of apical orifice not reaching midlength of median lobe.	(in part) <i>conjuncta</i> Gent. p. 19
11'	Aedeagus with apex in lateral view curved at an angle ventrad (fig. 109), lateral margin of apical orifice extending at least to midpoint of median lobe.	(in part) <i>bipustulata</i> (F.) p. 17
12(4')	Elytral stripe of almost uniform width, without lateral or terminal dilations, slightly incurved apically (figs. 7, 12, 19, 35); 5th antennal segment expanded bilaterally, dorsoventrally flattened (fig. 49)	13
12'	Elytral stripe with 1 or 2 lateral dilations and/or terminal dilations (figs. 9, 24); 5th antennal segment may be enlarged or expanded	17
13(12)	Antennal segment 6 with a sharp anteroventrally directed process (fig. 66); Pacific Coast states	(in part) <i>denticornis</i> Horn. p. 24
13'	Antennal segment 6 simple, without a process	14
14(13')	Antennal segments 7–11 darkest, in contrast to paler basal segments; antennal segment 5 with venter longitudinally concave only on longitudinal ½ furthest from other antenna; southern California	<i>arcuata</i> n.sp. p. 13
14'	Antennal segments 5–11 darkest at least dorsally; antennal segment 5 with venter longitudinally concave medially or flat	15
15(14')	Antenna with at least segments 1–5 paler on venter, segment 2 often pale; antennal segment 5 with venter flat; northern California.	<i>spatulata</i> n.sp. p. 37
15'	Antennal segments 2–3 pale, others dark; antennal segment 5 with venter longitudinally concave medially	16
16(15')	Antennal segment 4 length about 2 × maximum width (fig. 72); metathoracic wings normal, well developed; aedeagus in lateral view slightly sigmoid (fig. 131); California, ?New York	<i>lepidula</i> (LeC.) p. 28
16'	Antennal segment 4 length and width subequal (fig. 57); metathoracic wings reduced to less than elytron length; aedeagus in lateral view with a very abrupt, strong bend premedially (fig. 112); California.	<i>bisinuata</i> n.sp. p. 18
17(12')	Elytral pale stripe greatly expanded over most of elytral width, at least in apical ½ (expanded portion rarely only slightly paler than background color) reaching lateral, posterior, and sutural margins apically (figs. 26, 33)	18
17'	Elytral pale stripe at most moderately expanded preapically, never covering most of preapical area, stripes never reaching apical margins	19
18(17)	Antennal segment 5 with a long pointed apical prolongation (fig. 85); northern ½ U.S. and adjacent Canada	<i>robusta</i> LeC. p. 36
18'	Antennal segment 5 with apical ½ at most moderately expanded laterally (fig. 75); Great Plains and eastward, ?California	<i>liebecki</i> Schffr. p. 29
19(17')	Antennal segment 4 moderately and 5 strongly expanded bilaterally, dorsoventrally flattened (figs. 94, 98)	20

19'	Antennal segment 4 and 5 simple, or if 5 enlarged it is essentially cylindrical (figs. 58, 81, 89)	25
20(19)	Antennal segments 2–5 pale, in distinct contrast to darker segments 7–11; segment 6 may be pale or dark.	21
20'	Antennal segments 2–4 pale and/or dark, segments 5–11 dark	22
21(20)	Length over 2.8 mm (about 3 mm); aedeagus in lateral view slightly sigmoid with apex almost straight dorsally, and strongly swollen medially on venter (fig. 160); California, Nevada, Oregon, Utah, Washington	<i>utana</i> Chttm. p. 42
21'	Length less than 2.8 mm (about 2.6 mm); aedeagus in lateral view with dorsum gradually arched, apex curving lightly ventrad, and venter only very slightly swollen medially (fig. 163); Pacific Northwest, Nevada, Utah.	<i>utanula</i> n.sp. p. 44
22(20')	Antennal segment 5 with a distinct concavity in basal ½ anteriorly or to outside, 5th much wider than 4th (fig. 98); apex of aedeagus with a narrow median emargination (fig. 165), moderately curved ventrad in lateral view (figs. 166–167); widespread	<i>zimmermanni</i> (Crotch) p. 46
22'	Antennal segment 5 evenly flattened ventrally although slightly concave, 5 subequal in width to 4 (figs. 61, 70, 79); apex of aedeagus entire (figs. 116, 139) or if emarginate, then ventrally straight or flat in lateral view (figs. 127–128)	23
23(22')	Elytral stripe width at middle distinctly less, usually much less, than distance from stripe to suture (fig. 24); apex of aedeagus with a narrow median emargination (fig. 127), straight or flat ventrally in lateral view (fig. 128); Oregon, northern California	<i>emarginata</i> n.sp. p. 26
23'	Elytral stripe width at middle about equal to or usually greater than distance from stripe to suture (figs. 17, 29), rarely less but if less, then apex of aedeagus entire, with no median emargination (figs. 116, 139)	24
24(23')	Pronotal disc punctures usually more widely separated than elytral disc punctures; aedeagus abruptly narrowed in apical ½ and apex in lateral view distinctly directed ventrad (fig. 118); east of Rocky Mts. and west of Mississippi River	<i>constricta</i> n.sp. p. 21
24'	Pronotal and elytral disc punctures usually separated by about same distance; aedeagus gradually narrowed toward apex which is essentially straight in lateral view (fig. 140); Rocky Mts. and westward.	<i>oregonensis</i> (Crotch) p. 31
25(19')	Elytral stripe apical dilation with inner margin straight, apex not incurved (figs. 13–14); east of Rocky Mts.	(in part) <i>conjuncta</i> Gent. p. 19
25'	Elytral stripe apex strongly incurved (figs. 23, 31)	26
26(25')	Antennal segments 4 and especially 5 slightly to moderately enlarged in diameter, essentially cylindrical, 5th subequal to or 2 × longer than 6th (figs. 89, 92)	27
26'	Antennal segments 4 and 5 simple; segments 4–6 usually subequal in length, or if 5th is longer than 4 or 6 it is not enlarged (figs. 77, 83)	28
27(26)	Antennal segment 5 at least 2 × length of 6th, 5th uniformly enlarged for most of its length (fig. 89); elytral stripe constricted in median ½, width medially usually much less than distance from stripe to suture (figs. 36–39); widespread	(in part) <i>striolata</i> (F.) p. 38
27'	Antennal segment 5 subequal to 6th, 5th distinctly enlarged in apical ½–⅔ and tapering to base (fig. 92); elytral stripe gradually somewhat narrower in median ½, width medially often almost equal to distance from stripe to suture (fig. 43); Maryland	<i>undulata</i> Kutsch p. 41
28(26')	Elytral stripe with median ⅓ very narrow, of uniform width, postbasal lateral dilations with posterior margin almost at 90° angle to stripe, apical ⅓ of stripe abruptly widened, appearing notched basally on outside (figs. 31–32)	29
28'	Elytral stripe with median ⅓ not of uniform width, gradually widening basally into postbasal lateral dilation and apically into wider apical ⅓, sometimes with a lateral notch ⅓ from apex (figs. 9, 23, 28)	30
29(28)	Antennal segment 5 longer than 4 or 6, 4 and 6 subequal in length (fig. 83); longer, about 2.5 mm; aedeagus in lateral view moderately and evenly arched dorsoventrally with apex gradually curved ventrad (fig. 146); Pacific Northwest, Northwest Territories	<i>ramosoides</i> n.sp. p. 35

29'	Antennal segments 4–6 subequal in length (fig. 81); shorter, about 2.2 mm; aedeagus in lateral view only very slightly arched dorsoventrally with apex bent ventrad at about 45° angle (fig. 143); Pacific Coast states, Nevada, ?New York	<i>ramosa</i> (Crotch) p. 33
30(28')	Elytral stripe with inner margin subparallel to suture except incurved apically, its width medially much less than distance from stripe to suture, and no basal dilation (fig. 28); antennal segment 5 about 1.25 × length of 6 (fig. 77); Canada, New Hampshire, Oregon, Wisconsin	<i>oblonga</i> Chttm. p. 30
30'	Elytral stripe with inner margin sinuous, stripe width medially almost equal to distance from stripe to suture, stripe with basal dilation (figs. 9, 23); antennal segments 4–6 subequal in length	31
31(30')	Elytral stripe with basal dilation small and not attaining midlength of postbasal lateral dilation; inner margin somewhat incurved (fig. 23); antennal segments 2–5 pale, 6–7 transitional, 8–11 dark; aedeagus longer, about 1.4 mm, in lateral view apex distinctly directed ventrad (fig. 126); California	<i>dolichophalla</i> n.sp. p. 25
31'	Elytral stripe with basal dilation large and extending beyond midlength of postbasal lateral dilation, inner margin subparallel to suture (fig. 9); antennal segments 2–4 pale, 5 transitional, 6–11 dark; aedeagus shorter, about 1.2 mm, in lateral view apex almost straight (fig. 107); Colorado, South Dakota.	<i>attenuata</i> n.sp. p. 15
32(2')	Each elytron pale yellow, outlined in brown or black with sutural margin slightly wider (fig. 8); northern ½ U.S. and adjacent Canada east of Rocky Mts. and Pacific Northwest	<i>armoraciae</i> (Koch) p. 14
32'	Elytra brown to black with pale stripes or marks	33
33(32')	Each elytron with 1 or 2 pale marks	34
33'	Each elytron with a median pale stripe	43
34(33)	Each elytron with 1 pale mark	35
34'	Each elytron with 2 pale marks	37
35(34)	Each elytron with a postbasal pale mark (fig. 21); Pacific Coast states	(in part) <i>denticornis</i> Horn p. 24
35'	Each elytron with a preapical pale mark	36
36(35')	Elytral mark usually incurved (fig. 18); shorter than 2.5 mm (about 2–2.4 mm); spermathecal receptacle shorter, distinctly tapered in apical ⅓ to a moderately developed apical ring collar (fig. 175); Rocky Mts. and westward, Texas	<i>decipiens</i> Horn p. 23
36'	Elytral mark not incurved (fig. 22); longer than 2.5 mm (about 2.6 mm); spermathecal receptacle longer, gradually tapering apically to a slightly developed ring collar, receptacle very slightly constricted medially on venter (fig. 176); Pacific Coast states . . . (in part) <i>denticornis</i> Horn p. 24	
37(34')	Antennal segments 5 and 6 subequal in length (figs. 56, 60); east of Rocky Mts.	38
37'	Antennal segment 5 about 1.5 × length of 6th (figs. 67, 90)	42
38(37)	Each elytron with both pale marks tapering toward each other (fig. 15); east of Rocky Mts.	(in part) <i>conjuncta</i> Gent. p. 19
38'	Each elytron with only apical pale mark at most slightly tapering toward basal mark (figs. 10–11, 16)	39
39(38')	Less than 2.4 mm long or greater than 2.7 mm long	40
39'	Between 2.4 and 2.7 mm long	41
40(39)	Less than 2.4 mm long; east of Rocky Mts. (in part) <i>conjuncta</i> Gent. p. 19	
40'	Greater than 2.7 mm long; east of Great Plains (in part) <i>bipustulata</i> (F). p. 17	
41(39')	Spermathecal duct attached dorsally, distance to gland valve attachment very short, gland valve located in anterior aspect (fig. 173); east of Rocky Mts. (in part) <i>conjuncta</i> Gent. p. 19	
41'	Spermathecal duct attached anteriorly, distance to gland valve attachment much greater, gland valve located in ventral aspect (fig. 171); east of Great Plains (in part) <i>bipustulata</i> (F). p. 17	
42(37')	Elytral marks much larger and wider, with dilations, incurved (figs. 40–42); shorter than 2.5 mm (about 2–2.3 mm); spermathecal receptacle shorter, distinctly tapered in apical ⅓ to a moderately developed apical ring collar, pump longer than ½ receptacle length (fig. 187); widespread.	(in part) <i>striolata</i> (F). p. 38

42'	Elytral marks small and narrow, without dilations, not incurved (fig. 20); longer than 2.5 mm (about 2.6 mm); spermathecal receptacle longer, slightly narrowed apically with a slightly developed ring collar, pump much shorter (fig. 177); Pacific Coast states (in part) <i>denticornis</i> Horn p. 24	
43(33')	Elytral stripe of almost uniform width, without lateral or terminal dilations, slightly incurved apically (figs. 7, 12, 19, 25, 35); antennal segment 5 about 1.5 × length of 6.	44
43'	Elytral stripe with 1 or 2 lateral dilations and/or terminal dilations; antennal segment 5 from subequal to 1.5 × length of 6th	48
44(43)	Elytral stripes usually indistinct with borders blending into background color, somewhat pale reddish brown; antennal segment 4 about 1.5 × length of 6th (fig. 67); Pacific Coast states (in part) <i>denticornis</i> Horn p. 24	
44'	Elytral stripes usually with borders clearly delimited, straw yellow; antennal segments 4 and 6 subequal in length	45
45(44')	IOD/MDE ratio greater than 1.75 (about 1.8); spermathecal receptacle unique (fig. 186), basal end tapering to a blunt predorsal point, rather abruptly and strongly swollen ventrally in basal ½ and elongate, almost parallel-sided in apical ½, ring collar moderately developed; northern California. <i>spatulata</i> n.sp. p. 37	
45'	IOD/MED ratio less than 1.70; spermathecal receptacle not as described above (figs. 168, 172, 179)	46
46(45')	IOD/MED ratio less than 1.45 (1.33–1.38); spermatheca more robust, receptacle length about 2.7 × width and basal and apical width subequal (fig. 179); California, ?New York. <i>lepidula</i> (LeC.) p. 28	
46'	IOD/MED ratio greater than 1.45 (1.50–1.63); spermatheca more elongate, receptacle length about 3.5 × width (fig. 172) or if length about 2.7 × width, then basal width greater than apical width (fig. 168)	47
47(46')	Spermathecal receptacle with dorsal indentation opposite midpoint of ventral basal swelling (fig. 172), receptacle length/width ratio about 3.5, basal and apical width subequal (fig. 172); California. <i>bisinuata</i> n.sp. p. 18	
47'	Spermathecal receptacle without such an indentation (fig. 168), receptacle length/width ratio about 2.8, basal width 1.25 × apical width (fig. 168); southern California. <i>arcuata</i> n.sp. p. 13	
48(43')	Elytral stripe greatly expanded over most of elytral width at least in apical ¼, reaching lateral, posterior, and sutural margins (figs. 26–27, 33–34)	49
48'	Elytral pale stripe at most moderately expanded preapically, never covering most of preapical area, stripes never reaching apical margins	50
49(48)	Elytral median pale stripe with a moderate postbasal lateral dilation and usually greatly expanded laterally only in apical ¼, leaving median ½ of stripe narrow (figs. 26–27); Great Plains and eastward, ?California. <i>liebecki</i> Schffr. p. 29	
49'	Elytral stripe with a strong postbasal lateral dilation and greatly expanded in apical ½–½, leaving usually much less than median ½ of stripe narrow (figs. 33–34); northern ½ of U.S. and adjacent Canada <i>robusta</i> LeC. p. 36	
50(48')	Elytral stripe with postbasal lateral dilation at most very small (fig. 43); Maryland <i>undulata</i> Kutsch p. 41	
50'	Elytral stripe with postbasal lateral dilation distinct and well developed (figs. 17, 23, 32, 47)	51
51(50')	Elytral stripe with median ½ very narrow, of uniform width, postbasal lateral dilations with posterior margin almost at 90° angle to stripe, apical ½ of stripe abruptly widened, appearing notched basally on outside (figs. 31–32)	52
51'	Elytral stripe with median ½ not of uniform width, gradually widening basally into postbasal lateral dilation and apically into wider apical ½, sometimes with a lateral notch ½ from apex (figs. 13, 28–29, 44, 47)	53
52(51)	Antennal segment 5 longer than 4 or 6 (rarely subequal), 4 and 6 subequal (fig. 84); longer, about 2.5 mm; spermathecal sclerotized duct between receptacle attachment and gland valve, with length about 1.5 × maximum width (fig. 184); Pacific Northwest, Northwest Territories. <i>ramosoides</i> n.sp. p. 35	

52'	Antennal segments 4–6 subequal in length (fig. 82); shorter, about 2.2 mm; spermathecal sclerotized duct between receptacle attachment and gland valve with length about $3.5 \times$ maximum width (fig. 183); Pacific Coast states, Nevada, ?New York	<i>ramosa</i> (Crotch) p. 33
53(51')	Elytral stripe width medially almost equal to or usually greater than distance from stripe to suture (figs. 9, 17, 29, 45)	54
53'	Elytral stripe width medially much less than distance from stripe to suture (figs. 13, 28, 30, 44)	57
54(53)	Antennal segments 5 and 6 subequal in length (fig. 54); Colorado, South Dakota	<i>attenuata</i> n.sp. p. 15
54'	Antennal segment 5 about $1.5 \times$ length of 6 (figs. 62, 80, 95)	55
55(54')	Antennal segments 2–5 pale, 6 pale/intermediate/dark, 7–11 dark; spermathecal receptacle almost parallel-sided, base not swollen (fig. 189); California, Nevada, Oregon, Utah	(in part) <i>utana</i> Chhtn. p. 42
55'	Antennal segment 2 pale, 3 pale/intermediate, 4 pale/intermediate/dark, 5–11 dark, segment 5 never pale; spermathecal receptacle with ventral constriction about midlength, base swollen (figs. 174, 182)	56
56(55')	IOD/MED ratio 1.25–1.44; spermathecal receptacle strongly constricted medially on venter (fig. 174); east of Rocky Mts. and west of Mississippi River	<i>constricta</i> n.sp. p. 21
56'	IOD/MED ratio 1.44–1.56; spermathecal receptacle only slightly constricted medially on venter (fig. 182); Rocky Mts. and westward	(in part) <i>oregonensis</i> (Crotch) p. 31
57(53')	Antennal segments 5 and 6 subequal in length (figs. 60, 69)	58
57'	Antennal segment 5 at least $1.4 \times$ length of 6, if 5 only $1.25 \times$ length of 6 then elytral stripe with no basal dilation and inner margin of stripe subparallel to suture except incurved at apex (fig. 28)	59
58(57)	Elytral stripe with apical inner margin straight, apex not incurved (figs. 13–14); smaller, less than 2.75 mm long (usually less than 2.4 mm); spermathecal receptacle oval, duct attached on dorsum of receptacle with distance to gland valve attachment very short (fig. 173); east of Rocky Mts.	(in part) <i>conjuncta</i> Gent. p. 19
58'	Elytral stripe incurved apically (fig. 23); larger, about 3 mm long; spermathecal receptacle unique (fig. 177), with normal duct and gland valve attachments; California, Oregon	<i>dolichophalla</i> n.sp. p. 25
59(57')	Elytral stripe with inner margin subparallel to suture except incurved at apex and stripe with no basal dilation (fig. 28); antennal segment 5 about $1.25 \times$ length of 6 (fig. 78); Canada, New Hampshire, Oregon, Wisconsin	<i>oblonga</i> Chhtn. p. 30
59'	Elytral stripe with inner margin sinuous, if subparallel to suture, then stripe moderately incurved basally (fig. 210); antennal segment 5 at least $1.4 \times$ length of 6	60
60(59')	Elytral stripe with basal terminal dilation strongly dilated and about same size as postbasal lateral dilation (figs. 24, 29–30, 36–39, 182)	61
60'	Elytral stripe with basal terminal dilation at most only slightly dilated in comparison to postbasal lateral dilation (figs. 44, 46–48, 208–210)	63
61(60)	IOD/MED ratio less than 1.30 (1.11–1.28); spermathecal pump longer than $\frac{1}{2}$ receptacle length (fig. 187); widespread	(in part) <i>striolata</i> (F.) p. 38
61'	IOD/MED ratio greater than 1.40 (1.44–1.76); spermathecal pump much less than $\frac{1}{2}$ receptacle length (figs. 178, 182)	62
62(61')	Spermathecal receptacle shorter (0.25 mm), more robust with maximum length about $2.6 \times$ width (fig. 178); Oregon, northern California	<i>emarginata</i> n.sp. p. 26
62'	Spermathecal receptacle longer (0.27 mm), more elongate with maximum length about $3.1 \times$ width (fig. 182); Rocky Mts. and westward	(in part) <i>oregonensis</i> (Crotch) p. 31
63(60')	Spermathecal receptacle with maximum width basally and apically subequal, ring collar indistinct to very slightly developed (figs. 189, 216)	64
63'	Spermathecal receptacle with maximum width greater basally (figs. 191, 214–215) or apically (fig. 190), ring collar slightly to strongly developed	65
64(63)	Elytral stripe sinuous, with basal dilation (figs. 44–45); Nevada, Oregon, Utah, Washington	(in part) <i>utana</i> Chhtn. p. 42

- 64' Elytral stripe almost parallel to suture except for apices, with no basal dilation (fig. 210); Oregon *perspicua* Chttm. p. 48
- 65(63') Spermathecal receptacle with basal ½ wider than apical ½ (figs. 191, 214–215), ring collar slightly or strongly developed 66
- 65' Spermathecal receptacle with basal ½ narrower than apical ½, ring collar moderately developed (fig. 190); Pacific Northwest, Nevada, Utah *utanula* n.sp. p. 44
- 66(65) Spermathecal receptacle with slightly developed ring collar (figs. 214–215) 67
- 66' Spermathecal receptacle with strongly developed ring collar (fig. 191); widespread *zimmermanni* (Crotch) p. 46
- 67(66) Beetle longer, about 2.8 mm; spermathecal receptacle longer (0.28 mm), basal ½ more strongly and abruptly swollen on venter (fig. 214); Alberta *alberta* Chttm. p. 48
- 67' Beetle shorter, about 2.2 mm; spermathecal receptacle shorter (0.24 mm), basal ½ less strongly and gradually swollen on venter (fig. 215); Colorado *obtusata* Chttm. p. 48

Phyllotreta arcuata Smith, NEW SPECIES. Figures 7, 49–50, 100–102, 168, 192.

Holotype: Male, deposited at Los Angeles County Museum of Natural History.

Type locality: Griffith Park, Los Angeles, California.

DIAGNOSIS—Each elytron with the median stripe simple, of uniform width and without lateral or terminal dilations, slightly incurved toward suture apically; male 4th and 5th antennal segments expanded bilaterally, dorsoventrally flattened, 5th with venter longitudinally concave on inner ½ only; antennal segments 2–6 pale, in contrast to darker segments 7–11; wings usually vestigial.

DESCRIPTION OF HOLOTYPE (species variation, excluding punctuation, in parentheses)—Figure 7; elongate oval, length 2.50 mm (♂ 2.28–2.50, ♀ 2.18–2.58), width 1.05 mm (♂ 1.05–1.12, ♀ 1.02–1.20); head and pronotum black with slight metallic luster, elytra brownish black, each with a median straw-yellow stripe. **Head:** Black; vertex finely granulate basally to slightly roughened anteriorly (entirely finely granulate), moderately punctate with punctures separated by less than to 2 × their diameter, mostly by about 1 diameter; interocular distance/maximum diameter of eye, 1.63 (♂ 1.50–1.63, ♀ 1.50–1.63). **Antennae:** Figures 49–50; segments 4 and 7 about 2 × length of 6, 5 about 2 × length of 4; segments 4 and 5 expanded bilaterally and dorsoventrally flattened; segment 5 distinctly longest, with venter longitudinally concave on inner ½ only; see Table 2 for segment length/width, length 1.50 mm (allotype: length 1.45 mm; simple); antennae various shades of brown, basal 6 (5) segments paler with dorsum of 1 darker, none (6) intermediate, 7–11 darkest. **Pronotum:** Length 0.45 mm (♂ 0.42–0.45, ♀ 0.38–0.48), width 0.75 mm (♂ 0.72–0.78, ♀ 0.72–0.78); black, texture slightly roughened (finely granulate); moderately to coarsely punctate, punctures separated

by less than to equal their diameter, mostly by about 1 diameter. **Elytra:** Length 1.80 mm (♂ 1.60–1.85, ♀ 1.62–1.88), width 1.05 mm (♂ 1.05–1.12, ♀ 1.02–1.20); brownish black (dark brown), median stripe as in Figure 7; texture slightly roughened (usually smooth); coarsely punctate in basal ½, moderately punctate in apical ½, punctures separated by less than ½ to equal their diameter, mostly by less than 1 diameter. **Legs** [metatarsi with left missing tarsomeres 2–5, right missing 5th]: Normal color sequence. **Abdomen:** 5th sternum with apical median lobe moderately concave, concavity oval in its extension to within ⅓ of sternal base, with a median linear impression extending from sternal base and ending preapically (♂: median linear impression ending ¼ from base; ♀: simple in outline, usually with apical ½ shallowly concave, usually with median linear impression in apical ½); black with apical ⅓ paler except along midline (dark brown to brownish black).

Male—Aedeagus (figs. 100–102); length approximately 0.80 mm; moderately arched dorsoventrally, of rather uniform width; apex in dorsal view very bluntly rounded with shallow, moderately wide median emargination, in lateral view gradually but strongly curved ventrad, end bluntly rounded; ventral view as in Figure 168.

Female—Spermatheca (fig. 168); length approximately 0.35 mm; receptacle elongate, ring collar slightly developed; pump long.

TYPE MATERIAL—The holotype, allotype, and 1 paratype (♀) are at the LACM; 2 paratypes (1♂, 1♀) are at the USNM; 2 paratypes (1♂, 1♀) are in my collection, EHSC; 4 paratypes (1♂, 3♀) are at the CAS; and 1 paratype (♂) is at the FMNH. The holotype is mounted on a point and the pin bears 2 labels (descending order): “Griffith Pk LA 4.4.25” and my holotype label. The allotype bears the same locality label and my allotype label. The paratype at the LACM and the 2 each at the EHSC and USNM have the same locality label as the holotype; all 4 paratypes

at the CASC have the same 2 labels (descending order): "Santa Marguerita [*sic*] Calif. IV-26-1933" and "R. HOPPING COLLECTION". The paratype at the FMNH has 3 labels (descending order): "Hullville, VI:9:31 Calif." "Col. by H. Dorn" and "Pres. by E. Liljebld".

BIOLOGY—Host plants and immature stages are unknown.

Habits—Adults have been collected in southern California during May and June.

DISTRIBUTION—Figure 192; *P. arcuata* has been found only in Hullville, Los Angeles, and Santa Marguerita, California.

SPECIMENS EXAMINED—Total 12, see Type Material above.

DISCUSSION—**Relationships**—*Phyllotreta arcuata* is most similar to *P. lepidula* and *P. bisinuata* and less similar to *P. utanula* and *P. utana*. *Phyllotreta arcuata* shares having a simple median elytral stripe with *P. lepidula*, *P. bisinuata*, *P. spatulata*, and the striped specimens of *P. denticornis*. The antennal character of the 5th segment dorsoventrally flattened is shared with *P. utana*, *P. utanula*, *P. oregonensis*, *P. emarginata*, *P. constricta*, and *P. zimmermanni*, but *P. arcuata* shares with *P. utana* and *P. utanula* the additional feature of having antennal segments 2 through 6 pale in contrast to 7 through 11 dark. The apex of the aedeagus in dorsal view is very similar in *P. arcuata*, *P. lepidula*, and *P. bisinuata*, but the lateral view will separate these since *P. arcuata* is evenly arched dorsoventrally, whereas *P. lepidula* is essentially straight, and *P. bisinuata* is strongly sigmoid.

Etymology—The specific name *arcuata* comes from the Latin *arcus*- meaning arch, and refers to the moderately and evenly arched aedeagus as seen in lateral view.

Phyllotreta armoraciae (Koch). Figures 8, 51–52, 103–105, 169, 192.

Haltica armoraciae Koch, 1803. Entomol. Hefte, 2:75–76; table 3, fig. 6.

Lectotype (here designated): Male, at Zoological Museum of Humboldt Univ., Berlin, DDR.

Type locality: ?; lectotype is from Hungary.

Phyllotreta armoraciae: Foudras, 1860. Ann. Soc. Linn. Lyon, 6(ser. 2):344.

Haltica vittata Stephens, 1831 (not Fabricius, 1801). Illus. British Entomol., Mandibulata, 4:297. (Synonymy by Weise, 1888:865.)

Phyllotreta armoraciae var. *biplagiata* Chittenden, 1927. Entomol. Amer., 8(n.s., no. 1):16. NEW SYNONYMY.

Holotype: Male, USNM type #28792, at United States National Museum.

Type locality: Green Bay, Wisconsin.

DIAGNOSIS—Each elytron pale, outlined in brown or black with sutural margin slightly wider; antennae simple.

DESCRIPTION OF LECTOTYPE (species variation, excluding punctuation, in parentheses)—Figure 8; elongate oval, length 2.82 mm (δ 2.48–3.38, f 3.08–3.62), width 1.35 mm (δ 1.30–1.62, f 1.60–1.85); head and pronotum black with slight metallic luster (no luster), elytra dark brown, each elytron with a very wide median straw-yellow stripe covering most of surface. **Head**: Black (brownish black); vertex finely granulate basally to roughened anteriorly (finely granulate, finely alutaceous basally to roughened anteriorly, finely alutaceous), moderately punctate with punctures separated by 1–2 \times their diameter, mostly by about 1 diameter; interocular distance/maximum diameter of eye, 1.30 (δ 1.30–1.50, f 1.36–1.67). **Antennae**: Figures 51–52; segments 4–6 subequal in length, simple; see Table 2 for segment length/width, length 1.76 mm (f paralectotype: length 1.95 mm; simple); antennae various shades of brown, basal 3 paler, 4–11 (4 intermediate, 5–11) darker. **Pronotum**: Length 0.50 mm (δ 0.42–0.60, f 0.55–0.62), width 0.92 mm (δ 0.85–1.05, f 1.05–1.15), black (brownish black); texture finely granulate to slightly roughened (finely granulate, slightly roughened); moderately punctate, punctures separated by less than $\frac{1}{2}$ to equal their diameter, mostly by about 1 diameter. **Elytra**: Length 2.10 mm (δ 1.90–2.50, f 2.38–2.78), width 0.92 mm (δ 1.30–1.62, f 1.60–1.85); dark brown (brown, usually brownish black), median stripe pattern as in Figure 8; texture slightly roughened (usually smooth); moderately to coarsely punctate, punctures separated by less than $\frac{1}{2}$ to equal their diameter, mostly by less than 1 diameter. **Legs**: Normal color sequence except tibiae and tarsi same color (normal color sequence). **Abdomen**: 5th sternum with a shallowly concave apical median lobe, concavity extending to within $\frac{1}{3}$ of base; a median linear impression extending postbasally to base of median lobe, impression somewhat indistinct or interrupted (concavity moderate, linear impression distinct, extending to sternal base; f : simple in outline, usually with a shallow narrow median elliptical impression extending from apex to within $\frac{1}{3}$ of base or to base); brownish black, median lobe area paler (5th sternum with apical $\frac{1}{2}$ paler).

Male—Aedeagus (figs. 103–105); length approximately 1.06 mm; slightly arched dorsoventrally, almost uniform in width, with a dorsal concavity extending from about midpoint and ending preapically; apex in dorsal view with a very wide, moderately deep median emargination, in lateral view with a preapical dorsal swelling and a rounded end; ventral view as in Figure 105.

Female—Spermatheca (fig. 169); length approximately 0.38 mm; receptacle oblong, ring collar wide and slightly developed; pump long.

TYPE MATERIAL—The lectotype and 7 apparent paralectotypes (1♂, 6♀) are in the Zoological Museum of Humboldt University, Berlin, DDR. This series is accepted as the type series on the authority of Dr. F. Hieke of this museum. It should be pointed out that, within this series, only 2 specimens bear labels and 5 different methods of mounting are used. The syntype selected as lectotype was chosen because it was the first in the series and has 2 more detailed labels associated with it, and its mount is unique in the series. The lectotype was pinned through the right elytron with a short (23–24 mm long) silvery pin of about #5 thickness (now remounted on a point), and the pin bears 3 labels (descending order): “55898” “*Armoracia* EH.* *Crioc. Nasturtii* Fab? Hung. Jr. Rhen. Koy Koch.” [see fig. 3] and my lectotype label. The paralectotypes are as follows: 2♀, each mounted on a short white point supported by a thin silvery pin; 1♂, pinned with a very thin silvery pin bearing a very small cream-colored to white square of paper below; 1♀, pinned with a thin silvery pin bearing a very small cream-colored to white square of paper below; 1♀, mounted on a short gray point supported by a moderate-size silvery pin and bearing the label “*Halae. Erichs.*” [this could be *Crisks*]; 2♀, each mounted identically to the previous female but without the label.

BIOLOGY—Host Plants, Adult—*Meerrettig (*Cochlearia Armoracia*) [*horseradish, *Armoracia rusticana* (Lam.) Gaertn., = *Armoracia Armoracia*] (Koch, 1803, p. 75); *marsh cress (*Nasturtium plaus-tre*) [*Rorippa islandica* (Oeder) Borbas, = *Radicula palustris*] (Chittenden, 1895, p. 405); *cabbage, not observed feeding (Chittenden, 1917, p. 8); *radish, *turnip (Beirne, 1971, p. 109); **Raphanus sativus* (Wilcox, 1979, p. 20). New Collection Records: alfalfa, from Sauk Co., Wis., 5 mi. N. LaValle, May 3, 1948, J.T. Medler Coll. (UWEM:1); DuPuits alfalfa, from Savage Farm, Ithaca, N.Y., 9 June 1967, C.U. Lot 946 (CUIC:1); **Raphanus*, from Ithaca, N.Y., 30 July '30 (CUIC:3).

Host Plants, Larva—Horse-radish (Chittenden, 1917, p. 2),

Immature Stages—Egg, larva, and pupa described by Chittenden (1917).

Habits—Larvae are stem miners on the basis of plant anatomy, being restricted to the petiole and midrib of horseradish leaves; rarely may they mine the roots (Chittenden, 1917). Adults cause either the typical shot-hole leaf damage or gouge pits in the midrib and petiole (Chittenden, 1917). Adults of *P. armoraciae* have been collected in the northern half of

the United States and adjacent Canada east of the Rocky Mountains from mid-April (as early as mid-February in the midwest) until mid-November and in Idaho in mid-August. The adults are long-lived, they overwinter, and then the females, with periodical mating, lay eggs until early August (Chittenden, 1917). In Wisconsin, larvae from eggs laid in late May emerge as adults in late July or early August (Chittenden, 1917). The most complete North American biological account of this species is by Chittenden (1917).

DISTRIBUTION—Figure 192; *P. armoraciae* has been collected mainly in the northern half of the United States and adjacent Canada east of the Rocky Mountains but also in southern Missouri and northern Idaho and Oregon. It is an introduced species and was first collected in 1893 at Chicago, Illinois, by Chittenden (Chittenden, 1895).

SPECIMENS EXAMINED—Total 1,121, see Type Material above and the Appendix.

DISCUSSION—Nomenclature—Koch (1803) described this species in *Haltica*, apparently from a series of eight specimens. Foudras (1860) transferred it to *Phyllotreta*. In 1831, Stephens described *Haltica vittata* which was synonymized by Weise (1888); this is not the Fabrician *vittata* described in *Crioceris* in 1801. Chittenden (1927) described the variety *P. a. biplagiata* which is to be treated as having subspecific rank according to the Rules of Zoological Nomenclature, article 45 (d)(i) and 45 (e)(i). However, this subspecies is based on a unique specimen which is merely one that has the median pale stripe somewhat irregularly interrupted by various shades of brown. This makes the overall color somewhat darker, but otherwise, it is a typical *P. armoraciae*. Therefore, I have synonymized this subspecies.

Relationships—*Phyllotreta armoraciae* shows no close similarities with any other species in this genus found north of Mexico.

***Phyllotreta attenuata* Smith, NEW SPECIES.** Figures 9, 53–54, 106–107, 170, 193.

Holotype: Male, deposited at United States National Museum.*

Type locality: Cottonwood, South Dakota.

DIAGNOSIS—Each elytron with a median pale stripe whose large basal dilation extends beyond midlength of postbasal lateral dilation, inner margin of basal dilation subparallel to suture, medially stripe usually wider than distance from stripe to suture; antennal segments 4–5 simple, male antennal segments 6–11

* USNM has discontinued their type numbering system.

darkest in contrast to paler basal segments; aedeagus in lateral view with apex very slender, almost straight.

DESCRIPTION OF HOLOTYPE (species variation, excluding punctuation, in parentheses)—Figure 9; elongate oblong, length 2.58 mm (δ 2.20–2.62, ♀ 2.30–2.65), width 1.18 mm (δ 1.05–1.20, ♀ 1.02–1.30); head and pronotum black with slight metallic luster, elytra brownish black (rarely with slight metallic luster), each with a median straw-yellow stripe. **Head:** Black (rarely dark reddish brown or brownish black); vertex finely granulate basally to smooth anteriorly (usually finely granulate basally to slightly roughened anteriorly), moderately punctate with punctures separated by less than to $2 \times$ their diameter, mostly by less than 1 diameter; interocular distance/maximum diameter of eye, 1.33 (δ 1.30–1.44, ♀ 1.33–1.56). **Antennae:** Figures 53–54; segments 5 and 6 equal in length, slightly longer than 4 and slightly shorter than segment 7; segments 4 and 5 simple, cylindrical; see Table 2 for segment length/width, length 1.46 mm (allotype: length 1.55 mm; simple); antennae various shades of brown, basal 4 (3) segments paler, 5 (4–5 or none) transitional, 6–11 (4–11 or 5–11) darkest. **Pronotum:** Length 0.50 mm (δ 0.40–0.50, ♀ 0.45–0.50), width 0.82 mm (δ 0.75–0.85, ♀ 0.75–0.85); black; texture finely granulate; coarsely punctate with moderate punctures interspersed, punctures separated by less than $\frac{1}{2}$ to equal their diameter, mostly by less than 1 diameter. **Elytra:** Length 1.88 mm (δ 1.60–1.95, ♀ 1.62–2.00), width 1.18 mm (δ 1.05–1.20, ♀ 1.02–1.30); brownish black (dark brown or black), median stripe as in Figure 9; texture smooth (usually smooth to slightly roughened or entirely slightly roughened); coarsely punctate with very coarse punctures interspersed in basal $\frac{1}{2}$, punctures separated by less than $\frac{1}{2}$ their diameter. **Legs:** Normal color sequence. **Abdomen:** 5th sternum with an apical median deeply concave lobe, concavity oblong and extending to within $\frac{1}{3}$ of sternal base, with a median linear impression extending from sternal base to base of concavity (usually extending to base of median lobe, sometimes interrupted; ♀ : simple in outline, usually with a shallow longitudinal median impression in apical $\frac{1}{3}$); black (brownish black) with median concavity paler (5th sternum unicolorous; ♀ : usually with apical $\frac{1}{3}$ paler).

Male—Aedeagus (figs. 106–107); length approximately 1.20 mm, moderately arched dorsoventrally, of rather uniform width except slightly narrower in apical $\frac{1}{3}$ in dorsal view and very slender in apical $\frac{1}{4}$ in lateral view; with a dorsal washboard; apex in dorsal view acute, gradually tapering to a blunt point, in lateral view very narrow, ending in a sharp point. No ventral impression observed.

Female—Spermatheca (fig. 170); length approximately 0.37 mm; receptacle elongate, moderately swollen basally and tapering posteriorly to a wide, moderately developed ring collar.

TYPE MATERIAL—The holotype, allotype, and 3 paratypes (2 δ , 1 ♀) are at the USNM, 7 paratypes (1 δ , 6 ♀) are at the SDSU, and 2 paratypes (1 δ , 1 ♀) are in my collection, EHSC. The holotype is mounted on a point and the pin bears 3 labels (descending order): “Cottonwood S.D. June 9, 1954 H.C. Severin Coll.” and my and the USNM’s type labels. The allotype bears the same locality-date label and my and the USNM’s type labels. The 7 paratypes at the SDSU have the following locality-date labels: same as holotype (2 ♀); same as holotype, but date is July 9, 1954 (1 δ); “Midland S.D. June 9, 1954 H.C. Severin Coll.” (1 ♀). The 3 paratypes at the USNM are labeled as follows (descending order): “Rocky Ford Col 26 August 15” “*Radicula palustris*” “H O Marsh Collector” “Chittenden No 1578” “*oregonensis* Phyllotreta Chtn. Ent Am 1927” (1 δ , 1 ♀); “Rocky Ford Col 29 Aug 11” “Sugar Beets” “H O Marsh Collector” and “*oregonensis* Phyllotreta Chtn. Ent Am 1927” (1 δ). The 2 paratypes (1 δ , 1 ♀) in my collection (EHSC) are labeled with the same locality-date label as the holotype.

BIOLOGY—**Host Plants, Adult**—*Marsh cress (*Radicula palustris*) (Chittenden, 1923, p. 135; recorded as *P. oregonensis*) (USNM: 2); sugar beets, from Rocky Ford, Col. 29 Aug 11, H O Marsh Collector, Phyllotreta oregonensis Chtn. Ent. Am. 1927 (USNM:1).

Immature Stages—Unknown.

Habits—Adults have been collected in South Dakota from late May until mid-August and in Colorado in late August.

DISTRIBUTION—Figure 193; *P. attenuata* has been collected in Colorado and South Dakota.

SPECIMENS EXAMINED—Total 14, see Type Material above.

DISCUSSION—**Relationships**—*Phyllotreta attenuata* is most similar to *P. dolichophalla* and the specimens of *P. conjuncta* which have the postbasal and preapical marks connected. These three species share the following: antennal segments 4 and 5 simple, segments 5 and 6 subequal in length, and the aedeagi very similar in form. The aedeagi differ mainly in length: that of *P. dolichophalla* is longest, that of *P. attenuata* is intermediate in length, and that of *P. conjuncta* is shortest; also, the apex in lateral view is almost straight in *P. attenuata*, whereas in *P. conjuncta* and *P. dolichophalla* it is distinctly directed ventrad. However, the spermathecae of these three species are very different: in *P. conjuncta*, the receptacle is oval

and robust, with the ring collar only slightly developed and the spermathecal duct attached dorsally; in *P. dolichophalla*, the receptacle is elongate, strongly swollen in the basal two-thirds, and rather uniformly narrow in the apical one-third, with the ring collar strongly developed and the spermathecal duct attached predorsally on the base; and in *P. attenuata*, the receptacle is moderately swollen basally and tapered posteriorly, with the ring collar moderately developed and the spermathecal duct attached predorsally on the base. *Phyllotreta attenuata* and *P. dolichophalla* share the additional character of having the elytral stripe very wide medially, whereas in *P. conjuncta* the stripe is narrow medially.

Phyllotreta attenuata might be confused with *P. oregonensis* because the elytral stripe of each is wide medially. However, *P. attenuata* has antennal segments 5 and 6 subequal in length, 5 simple and cylindrical, whereas *P. oregonensis* has antennal segment 5 about one and one-half times the length of 6, and in the male, segment 5 is dorsoventrally flattened.

Etymology—The specific name *attenuata* comes from the Latin *attenuat* meaning thin and refers to the apical one-fourth of the aedeagus which is very narrow in lateral view.

Phyllotreta bipustulata (Fabricius). Figures 10–11, 55–56, 108–110, 171, 193.

Crioceris bipustulata Fabricius, 1801. Systema Eleutheratorum, 1:464.

Neotype (here designated): Male, USNM type #100635, deposited at United States National Museum.

Type locality: "Carolinæ"; neotype is from Myrtle Beach, South Carolina.

Orchestris bipustulata: Crotch, 1873. Proc. Acad. Nat. Sci. Philadelphia, 25:66.

Phyllotreta bipustulata: Horn, 1889. Trans. Amer. Entomol. Soc., 16:300.

DIAGNOSIS—Each elytron with a postbasal and preapical pale mark, sutural margin of preapical mark straight, not incurved; antennal segments 4 and 5 simple and cylindrical, segments 5 and 6 subequal in length; aedeagus and spermatheca distinctive.

DESCRIPTION OF NEOTYPE (species variation, excluding punctation, in parentheses)—Figure 10; elongate oblong, length 2.68 mm (δ 2.38–3.00, ♀ 2.48–3.08), width 1.22 mm (δ 1.12–1.35, ♀ 1.10–1.45); head, pronotum, and elytra black with slight metallic luster, each elytron with a postbasal and preapical straw-yellow mark. **Head:** Black (often dark brown or brownish black); vertex finely granulate basally to slightly roughened anteriorly (entirely finely granulate), moderately punctate with punctures separated

by less than $\frac{1}{2}$ to equal their diameter, mostly by less than $\frac{1}{2}$ a diameter; interocular distance/maximum diameter of eye, 1.40 (δ 1.56–1.75, ♀ 1.56–1.60). **Antennae:** Figures 55–56; segment 4 shorter than 5, segments 5 and 6 subequal (equal) in length, segments 6 and 7 subequal (equal) in length; segments 4 and 5 simple and cylindrical; see Table 2 for segment length/width, length 1.49 mm (alloneotype: length 1.44 mm; simple); antennae various shades of brown, basal 4 (1–6, usually 1–4; 1st rarely darker) paler, 5 (sometimes 3–4, 5–7, or none) transitional, 6–11 (usually 4–11 or 8–11) darkest. **Pronotum:** Length 0.60 mm (δ 0.50–0.62, ♀ 0.52–0.68), width 0.85 mm (δ 0.82–0.95, ♀ 0.82–0.98); black (rarely dark brown or brownish black); texture finely granulate (rarely finely alutaceous or roughened); coarsely punctate, punctures separated by less than $\frac{1}{2}$ to equal their diameter, mostly by less than 1 diameter. **Elytra:** Length 1.88 mm (δ 1.78–2.02, ♀ 1.82–2.20), width 1.22 mm (δ 1.12–1.35, ♀ 1.10–1.45); black (often brownish black), color pattern as in Figure 10 (often as in fig. 11); texture slightly roughened (sometimes smooth to slightly roughened); coarsely punctate, punctures separated by less than $\frac{1}{2}$ to equal their diameter, mostly by less than 1 diameter. **Legs** [metatarsi with left and tarsomeres 3–5 of right missing]: Normal color sequence (often with tibiae and tarsi same color). **Abdomen:** 5th sternum with an apical median deeply concave lobe, concavity oblong and extending to within $\frac{1}{3}$ of sternal base (oval in its extension to midpoint), with a median linear impression (no impression) from sternal base to base of concavity (♀ : simple in outline, usually with a shallow median oblong impression in apical $\frac{1}{3}$); black (brownish black, rarely dark brown) with apical $\frac{1}{2}$ of 5th sternum paler (entirely dark or with median lobe to apical $\frac{1}{3}$ of 5th sternum paler).

Male—Aedeagus (figs. 108–110); length approximately 1.27 mm; moderately arched dorsoventrally, of rather uniform width except slightly narrowed preapically in dorsal view, slender and tapering toward apex in apical $\frac{1}{2}$ in lateral view; with a dorsal washboard; apex in dorsal view acute, bluntly rounded, in lateral view very narrow and distinctly directed ventrad, ending in a sharp point; ventral view as in Figure 110.

Female—Spermatheca (fig. 171); length approximately 0.37 mm; receptacle elongate, slightly swollen in basal half, with ring collar wide, strongly developed.

TYPE MATERIAL—The neotype and alloneotype are at the USNM. The neotype is mounted on a point and the pin bears 4 labels (descending order): "Myrtle Beach, S.C. 21 March 1963 V.M. Kirk" "Washed up on beach" and my and the USNM's type labels. The

alloneotype has the same 2 locality-date labels plus my and the USNM's type labels.

BIOLOGY—Host Plants, Adult—**Dentaria diphylla* Michx. (Tahvanainen, 1972, p. 125); **Cardamine douglassii* and **Dentaria laciniata* (Wilcox, 1979, p. 8, 11). New Collection Records: [**Cardamine douglassii* *sic*] (Torr.) Britton, from Cedar Springs Ont. May 2 1945 A.A. Wood (CNCI:2); [**Dentaria laciniata* Muhl. (feeding on), from OHIO: Franklin Co. Sharon Woods Metro. Park 29. V.75 E.H. Smith Lot No. 450 (EHSC:6)]; Mullien [*sic*] (*Verbascum* sp.; collected on), from College Park, Md. 4/29/19 W H White Coll (USNM:1).

Immature Stages—Undescribed.

Habits—The adults overwinter in the top soil close to the host plants (Hicks, 1972) and usually are active by April. Eggs are laid in the soil around the host plant (Hicks, 1972), and the adults decline in numbers thereafter and are rarely encountered after June. The larvae probably spend most of the summer feeding on the green rhizomes (Tahvanainen, 1972) and the adults appear again in the fall.

In the Ithaca, New York, area, *P. bipustulata* is restricted to woodland inhabiting *Dentaria diphylla*, with the adults common on it until the leaves die off in late June. I have collected it feeding on *Dentaria laciniata* in rich woodlands in Franklin County, Ohio, and Cook County, Illinois, and Marion County, Missouri.

Adults have been collected from early April to late June and again from mid-July until late August or September in northeastern United States (in early May in Iowa and in late August in Mississippi) and in Canada from early May until early July.

Many data in the literature about this species are erroneous; for example, being a pest in past years (Hicks, 1972) and feeding on a wide variety of crucifers (Chittenden 1902, 1923, 1927; Hicks, 1972). These data should probably be associated with *P. conjuncta*; see its Biology section.

DISTRIBUTION—Figure 193; *P. bipustulata* has been collected in northeastern United States with the addition of Iowa and Mississippi and in Ontario and Quebec in Canada.

SPECIMENS EXAMINED—Total 237, see Type Material above and the Appendix.

DISCUSSION—Nomenclature—Fabricius (1801) described *P. bipustulata* in the genus *Crioceris*. In 1873, Crotch in error placed *P. bipustulata* in *Orchestris* (see LeConte, 1878, p. 165) and Horn (1889) placed this species in *Phyllotreta*.

The Fabrician type is considered to be lost and, therefore, a neotype is designated here; for details see Smith, 1977.

Relationships—*Phyllotreta bipustulata* is most similar to *P. conjuncta* and less so to *P. dolichophalla* and *P. attenuata*; for a discussion of these relationships see this section under *P. conjuncta* and for the last two, see this section under *P. attenuata*.

Phyllotreta bipustulata has often been confused with specimens of *P. striolata* which have the elytral stripe reduced to a postbasal and preapical pale mark. However, in *P. bipustulata* the elytral preapical mark has the sutural margin straight, not incurved, whereas in *P. striolata* the preapical mark is incurved apically. Also, in *P. bipustulata*, antennal segment 5 is simple and segments 5 and 6 are subequal in length, whereas in *P. striolata* antennal segment 5 in the male is enlarged, and in both sexes segment 5 is about two times longer than segment 6.

Phyllotreta bisinuata Smith, NEW SPECIES. Figures 12, 57–58, 111–113, 172, 193.

Holotype: Male, CASC type #14211, deposited at California Academy of Sciences.

Type locality: Green Point, Humboldt Co., California.

DIAGNOSIS—Each elytron with the median pale stripe simple, of uniform width and without dilations; male antennal segments 4 and 5 moderately expanded bilaterally, dorsoventrally flattened, 5 moderately concave ventrally; antennal segments 5–11 darkest in contrast to paler basal segments; metathoracic wings reduced to less than elytron length; aedeagus in lateral view with a very abrupt, strong bend premedially.

DESCRIPTION OF HOLOTYPE (species variation, excluding punctuation, in parentheses)—Figure 12; elongate oblong, length 2.65 mm (δ 2.65–2.75, η 2.68), width 1.28 mm (δ 1.28–1.30, η 1.42); head and pronotum black with slight metallic luster, elytra dark brown, each with a median straw-yellow stripe. **Head:** Black; vertex finely granulate basally to slightly roughened anteriorly (finely alutaceous basally), moderately punctate with punctures separated by less than to equal their diameter, mostly by less than 1 diameter; interocular distance/maximum diameter of eye, 1.44 (δ 1.44–1.53, η 1.56). **Antennae** [left missing segments 9–11]: Figures 57–58; segment 4 longer than 6 and equal in length to 7, segment 5 more than $2 \times$ length of 6 and almost $2 \times$ length of 4; segments 4 and 5 moderately expanded bilaterally, dorsoventrally flattened, 5 with venter deeply concave in basal $\frac{1}{2}$ to outside; see Table 2 for segment length/width, length 1.59 mm (allotype: length 1.51 mm; simple); antennae various shades of brown, basal 4 (η : 5) segments paler, 5 (none) darkest, 6–11 darker

than basal segments. **Pronotum:** Length 0.50 mm (δ 0.50, ♀ 0.52), width 0.88 mm (δ 0.85–0.88, ♀ 0.88); black; texture finely granulate to slightly roughened (entirely slightly roughened); coarsely punctate, punctures separated by less than $\frac{1}{2}$ to equal their diameter, mostly by less than 1 diameter. **Elytra:** Length 1.95 mm (δ 1.95–2.00, ♀ 1.95), width 1.28 mm (δ 1.28–1.30, ♀ 1.42); dark brown, brownish black in basal $\frac{1}{8}$ (usually entirely brownish black), median stripe pattern as in Figure 12; texture smooth (smooth to slightly roughened); moderately punctate with coarse punctures interspersed basally, punctures separated by less than $\frac{1}{2}$ to equal their diameter, mostly by about 1 diameter. **Legs:** Normal color sequence. **Abdomen:** 5th sternum with an apical median deeply concave lobe, concavity tapering as it extends almost to midpoint, with a median linear impression extending postbasally to just inside concavity (extending from sternal base to base of median lobe, sometimes interrupted; ♀ : simple in outline, with a very shallow oval median impression in apical $\frac{1}{2}$); brownish black (black) with apical $\frac{1}{2}$ paler (with only median lobe paler; ♀ : entirely dark).

Male—Aedeagus (figs. 111–113); length approximately 1.37 mm; strongly sigmoid or twice bent, of rather uniform width except median lobe strongly constricted just anterior to junction with basal piece in dorsal view, swollen medially in lateral view; apex in dorsal view broadly rounded, with a moderately deep and moderately wide emargination, in lateral view gradually tapering to a wide bluntly rounded end which is directed ventrad, with a small preapical lobe on venter which is the ventral median emargination flange; ventral view as in Figure 113.

Female—Spermatheca (fig. 172); length approximately 0.39 mm; receptacle elongate, of rather uniform width, moderately arched dorsoventrally, ring collar moderately developed.

TYPE MATERIAL—The holotype, allotype, and 1 paratype (♀) are at the CASC, 2 paratypes (1 δ , 1 ♀) are in my collection (EHSC), and 3 paratypes (♀) are at the MCZC. The holotype is mounted on a point and the pin bears 5 labels (descending order): “Green Point Humboldt Co., Cal. VI-9-16” “F.E. Blaisdell Collector” “Blaisdell Collection” and my and the CASC’s type labels. The allotype bears the same first 3 labels and then my and the CASC’s type labels.

The paratype at the CASC is labeled: “Gustine Merced Co. IV · 14 · 45 Cal” “B.E. White Collector” “BURDETTE E. WHITE Collection Calif. Acad. Sci. Accession 1967”. The 2 paratypes at EHSC are labeled: δ , same first 3 labels of holotype; ♀ , “Rosarito Bch., L. Cal. IV-5-39” “Com-

positae” and “C.D. Michener”. The 3 paratypes at the MCZC are all labeled “Cal” and “Liebeck Collection”; 2 have an additional label, one is “P. _____ ulkei Horn” and the other is “Museum of Comparative Zoology”.

BIOLOGY—**Host Plants, Adult**—Compositae, see Type Material above.

Immature Stages—Unknown.

Habits—Adults have been collected in California from early April to mid-June.

DISTRIBUTION—Figure 193; *P. bisinuata* is known only from California.

SPECIMENS EXAMINED—Total 8, see Type Material above.

DISCUSSION—**Relationships**—*Phyllotreta bisinuata* is most similar to *P. lepidula* and less similar to *P. arcuata*, *P. spatulata*, and striped specimens of *P. denticornis*; for a discussion of these relationships see this section under *P. lepidula*.

Etymology—The specific name *bisinuata* comes from the Latin *bi-* meaning two and the Latin *sinua-* meaning bend. This refers to the sigmoid shape of the aedeagus as seen in lateral view.

Phyllotreta conjuncta Gentner. Figures 13–16, 59–60, 114–115A, 173, 194.

Phyllotreta conjuncta Gentner, 1924. Entomol. News, 35(5):168.

Holotype: Male, at Michigan State University.

Type locality: East Lansing, Michigan.

Phyllotreta bipustulata form *conjuncta*: Chittenden, 1927. Entomol. Amer., 8(n.s., no. 1):34.

Phyllotreta bipustulata var. *conjuncta*: Wilcox, 1954. Ohio Biol. Surv. Bull., 43:467.

Phyllotreta bipustulata var. *conjuncta*: Balsbaugh and Hays, 1972. Auburn Univ. Agr. Exp. Sta. Bull., 441:172.

Phyllotreta conjuncta: Wilcox, 1979. World Nat. Hist. Pub. New York. p. 7.

DIAGNOSIS—Each elytron with a postbasal and preapical pale mark or these marks connected, sutural margin of preapical mark or stripe apex straight, not incurved; antennal segments 4 and 5 simple and cylindrical, segments 5 and 6 subequal in length; aedeagus and spermatheca distinctive.

DESCRIPTION OF HOLOTYPE (species variation, excluding punctuation, in parentheses)—Figure 13; elongate oblong, length 2.22 mm (δ 1.95–2.52, ♀ 2.02–2.70), width 1.08 mm (δ 0.95–1.20, ♀ 0.95–1.22); head and pronotum black with slight metallic luster, elytra dark brown (usually brownish black with slight metallic luster), each elytron with a median straw-yellow stripe dilated basally and apically (usually reduced to a postbasal and preapical straw-yellow

mark). **Head:** Black (sometimes dark brown or brownish black); vertex finely granulate (usually finely granulate basally to slightly roughened anteriorly), moderately punctate with punctures separated by much less than to $2 \times$ their diameter, mostly by less than 1 diameter; interocular distance/maximum diameter of eye, 1.22 (δ 1.20–1.25, ♀ 1.25–1.44). **Antennae:** Figures 59–60; segment 4 shorter than 5, segments 5 and 6 equal (subequal) in length, segments 6 and 7 equal (subequal) in length; segments 4 and 5 simple and cylindrical; see Table 2 for segment length/width, length 1.41 mm (♀ : length 1.54 mm); antennae various shades of brown, basal 4 (3 or 5; 1 sometimes darker) paler, 5 (none, 4, 4–5, 5–6) transitional, 6–11 (4 or 7 through 11, usually 5 or 6 through 11) darkest. **Pronotum:** Length 0.42 mm (δ 0.40–0.50, ♀ 0.40–0.50), width 0.75 mm (δ 0.62–0.82, ♀ 0.65–0.85); black (rarely brownish black); texture finely granulate (rarely finely roughened to granulate or finely alutaceous to roughened); moderately punctate, punctures separated by much less than to equal their diameter, mostly by less than 1 diameter. **Elytra:** Length 1.65 mm (δ 1.35–1.88, ♀ 1.42–1.95), width 1.08 mm (δ 0.95–1.20, ♀ 0.95–1.22); dark brown (usually brownish black), color pattern as in Figure 13 (sometimes as in fig. 16, usually as in figs. 14–15); texture slightly roughened (sometimes smooth to slightly roughened); coarsely punctate, punctures separated by much less than to equal their diameter, mostly by less than 1 diameter. **Legs:** Normal color sequence except tarsi slightly darker than tibiae (often with tibiae and tarsi same color). **Abdomen:** 5th sternum with an apical median deeply concave lobe, concavity oblong and extending half way to sternal base (usually extending to within $\frac{1}{2}$ of sternal base, sometimes with base broadly rounded), with a faint median linear impression (no impression) from sternal base to base of concavity (♀ : simple in outline, usually with a shallow median oblong impression in apical $\frac{1}{2}$); brownish black (dark brown or black) with 5th sternum dark brown (basally usually same color as other sternites; concavity usually paler). **Male**—Aedeagus (figs. 114–115A); length approximately 1.02 mm; slightly arched dorsoventrally, of rather uniform width in dorsal view, slender and tapering toward apex in apical $\frac{1}{2}$ and with a smooth dorsally directed preapical arch in lateral view; with a dorsal washboard; apex in dorsal view acute, evenly tapered to rounded tip, in lateral view very narrow and distinctly directed ventrad, ending in a sharp point; ventral view (fig. 115A) from specimen of similar size. The tip was broken off on holotype but was added from specimen of similar size.

Female—Spermatheca (fig. 173); length approximately 0.26 mm; receptacle oval, very robust with ring collar slightly developed; spermathecal duct attached dorsally with distance to gland valve attachment very short.

TYPE MATERIAL—The holotype is at the MSUC. It is mounted on a point and the pin bears 8 labels (descending order): “AG. COLL. MICH. 12 July, 1921” “AG. COLLEGE LOT 1541 SUB. 52” “L.G. Gentner Collector” “AG. COLLEGE LOT 1541 SUB. 142” “ δ ” “TYPE conjuncta gentner [sic] L.G.G.” “Phyllotreta conjuncta Gentner” and “Abdomen lost E.H. Smith ‘80”.

BIOLOGY—Host Plants, Adult—The following represent those records verified by me via label data: **Arabis*, **Barbarea verna*, **Barbarea vul.*, **Brassica kaber*, clover (red), *cabbage, *cabbage (Chinese), *cress, *horseradish, **Lepidium* foliage, *mustard (feeding on), *peppergrass, *Prunus virginium* [sic] flowers, **Radicula palustris*, *radish foliage, and *turnip (foliage, matting). New Collection Records: Alfalfa, from Hagerstown, Md. 27 Apr. '15 W E Pennington Collector (USNM:1), **Brassica Pe-Tsai*, from Waupaca, Wis., 6-23-20 L.G. Gentner Collector (USNM:1); **Radicula Nasturtium-aquaticum* [= *Nasturtium officinale* R.Br.; water cress], from Utica, Ill., V-22-1946 F.G. Werner (INHS:4); smartweed, from Harrison Co., Ind. VI-23-1934 D W Lattue collector (PURC:1); sphagnum moss, from Volo, Ill., Oct. 27, 1943 Ross & Sanderson (INHS:1); 3-seeded Mercury, from Kokomo, Ind. June 27, 1922 G.M. Stirrett Collector (CNCI:1, PURC:1); *Trifolium pratense*, from Westville, Montcalm Co., Mich. 31 July 1959 H.D. Niemczyk (MSUC:1); wheat, from Urbana, Ill. May 21, 1885 (INHS:1); W. Clover, from Arlington, Va. 5-14-28 F W Poos Collector (USNM:1); willow, from Morgan Co., Ind. V-14 1932 Musgrave (PURC:1).

Immature Stages—Unknown.

Habits—Most data previously attributed to *P. bipustulata* should probably be associated with *P. conjuncta* for the following reasons: (1) *P. conjuncta* inhabits open sunny areas of disturbed vegetation, whereas *P. bipustulata* is restricted to moist woodlands; (2) most literature host records are for plants inhabiting open sunny areas of disturbed vegetation; (3) almost all of the literature host records for *P. bipustulata* are actually associated with *P. conjuncta* when the identification of the specimens is checked; and (4) specimens of *P. conjuncta* are much more numerous in collections than are those of *P. bipustulata* (1,024 vs. 237); also, see below under Nomenclature.

In central Ohio, I have collected *P. conjuncta* and a few *P. zimmermanni* along with more numerous *P. striolata* and *P. cruciferae* (Goeze) feeding on *Brassica kaber* along the roadside in midsummer. I have collected it along with more numerous *P. striolata* and *P. cruciferae*, both in northwestern Indiana in early August feeding on turnips and lettuce at the end of the turnip rows and in northeastern Illinois in mid-September feeding on Chinese cabbage.

Adults have been collected from late March to late June and again from early July until late August, occasionally as late as mid-November.

DISTRIBUTION—Figure 194; *P. conjuncta* has been collected east of the Rocky Mountains primarily north of 35° north latitude with the addition of southern Louisiana and Florida and in Manitoba, Ontario, Quebec, and Saskatchewan in Canada.

SPECIMENS EXAMINED—Total 1,024, see Type Material above and the Appendix.

DISCUSSION—Nomenclature—Gentner (1924) described this species from a single specimen. There are no synonyms, but I have listed for completeness the citations to this species when it was considered a form or variety of *P. bipustulata*. In 1979, Wilcox inadvertently published this change of status while incorporating original data from my Ph.D. dissertation and the manuscript I sent him for inclusion in the North American Beetle Fauna Project.

Several previous systematists probably based their published papers on *P. conjuncta* instead of the recorded *P. bipustulata*: Blatchley (1910) and Wilcox (1954), as indicated by the size range and abundance given; Duckett (1920), as indicated by the size range, abundance, and host plants listed; and Chittenden (1927), as indicated by the size range and host plants listed. Possibly, the record of Balsbaugh & Hays (1972) should also be for *P. conjuncta*.

Relationships—*Phyllostreta conjuncta* is most similar to *P. bipustulata*, with which it is often confused. Externally, only if both postbasal and preapical pale marks taper toward each other (= *P. conjuncta*), and otherwise, size (within limits) is distinctive. Males less than 2.3 mm and females less than 2.4 mm long are almost always *P. conjuncta*, whereas males greater than or equal to 2.5 mm and females greater than 2.5 mm are almost always *P. bipustulata*. This leaves males 2.3–2.4 mm and females 2.4–2.5 mm long which must be dissected for examination of their genitalia. The aedeagus of *P. conjuncta*, in lateral view, has the apex gradually curved ventrad and the lateral margin of the apical orifice not reaching mid-length of median lobe, whereas *P. bipustulata* has the apex curved ventrally at an angle and the lateral mar-

gin of the apical orifice extending at least to midpoint of median lobe. For the females, *P. conjuncta* has the spermathecal receptacle oval and very robust, with the duct attached dorsally and the distance to the gland valve attachment very short, whereas *P. bipustulata* has the spermathecal receptacle elongate, with the usual anterior duct and ventral gland valve attachments.

Phyllostreta conjuncta has frequently been confused with specimens of *P. striolata* which have the elytral stripe reduced to a postbasal and preapical pale mark. However, in *P. conjuncta*, the elytral preapical mark has the sutural margin straight, not incurved, whereas in *P. striolata*, the preapical mark is distinctly incurved apically. Also, in *P. conjuncta*, antennal segment 5 is simple and segments 5 and 6 are subequal in length, whereas in *P. striolata*, antennal segment 5 in the male is enlarged, and in both sexes segment 5 is about two times longer than segment 6.

Phyllostreta constricta Smith, NEW SPECIES. Figures 17, 61–62, 116–118, 174, 195.

Holotype: Male, deposited at United States National Museum.

Type locality: Rocky Ford, Colorado.

Phyllostreta constricta Smith, 1979. In Riley and Enns, Trans. Missouri Acad. Sci., 13:77. *Nomen nudum*.

DIAGNOSIS—Each elytron with a median pale stripe with dilations which never meet at suture, stripe medially equal to or usually wider than distance from stripe to suture; male antennal segment 5 dark, expanded bilaterally and dorsoventrally flattened, subequal to 4 in width, with venter flat; aedeagus in lateral view abruptly narrowed in apical ½ and apex distinctly directed ventrad.

DESCRIPTION OF HOLOTYPE (species variation, excluding punctuation, in parentheses)—Figure 17; elongate oblong, length 2.62 mm (♂ 2.55–2.85, ♀ 2.80–3.10), width 1.22 mm (♂ 1.15–1.30, ♀ 1.32–1.48); head and pronotum black with distinct metallic luster, elytra brownish black with slight metallic luster (no luster), each with a median straw-yellow stripe. **Head:** Black; vertex finely granulate basally to slightly roughened anteriorly (entirely finely granulate), moderately punctate with punctures separated by less than ½ to 2 × their diameter, mostly by less than 1 diameter; interocular distance/maximum diameter of eye, 1.56 (♂ 1.40–1.56, ♀ 1.25–1.44). **Antennae:** Figures 61–62; segment 4 longer than 3, 6, or 7, segment 5 about 1.4 × (usually 1.5 ×) length of 4 and more than 2 × length of 6, 6 distinctly shortest; segments 4 and 5 expanded bilaterally, dorsoventrally flattened; segment 5 dis-

tinctly longest, subequal to 4 in width, with venter flat; see Table 2 for segment length/width, length 1.56 mm (allotype: length 1.61 mm; simple); antennae various shades of brown, basal 3 segments pale with dorsum of 1 and 3 darker (3 usually entirely pale), 4–5 darkest (4 sometimes only dark), segments 6–11 dark (♀: 4–11 dark). **Pronotum:** Length 0.45 mm (♂0.42–0.50, ♀0.48–0.55), width 0.82 mm (♂0.78–0.90, ♀0.90–1.02); black; texture finely granulate to slightly roughened (usually entirely finely granulate); moderately punctate with fine and coarse punctures interspersed, punctures separated by less than ½ to 3 × their diameter, mostly by about 1 diameter. **Elytra:** Length 1.88 mm (♂1.80–2.02, ♀1.90–2.32), width 1.22 mm (♂1.15–1.30, ♀1.32–1.48); brownish black (dark brown laterally), median stripe pattern as in Figure 17; texture slightly roughened (smooth to slightly roughened, or smooth); coarsely punctate with several moderate punctures interspersed, punctures separated by less than ½ their diameter. **Legs** [right mesotarsus and metatarsi missing tarsomeres 4–5]: Normal color sequence. **Abdomen:** 5th sternum with an apical median moderately concave lobe, concavity tapering (moderately rounded) posteriorly and extending to midpoint, a median linear impression extending from sternal base to median lobe (ending postbasally and/or extending to preapex, sometimes interrupted; ♀: simple in outline, usually with a median longitudinal impression in apical ⅔); black (brownish black) with median lobe paler.

Male—Aedeagus (figs. 116–118); length approximately 0.94 mm; slightly arched dorsoventrally in dorsal view, of rather uniform width, in lateral view abruptly narrowed in apical ½; apex in dorsal view bluntly rounded, in lateral view abruptly tapered to a ventrally directed, rounded end; ventral view as in Figure 118.

Female—Spermatheca (fig. 174); length approximately 0.44 mm; receptacle elongate, strongly constricted medially on venter, ring collar indistinct.

TYPE MATERIAL—The holotype, allotype, and 16 paratypes (12♂, 4♀) are at the USNM; 1 paratype (♂) is at AMNH; 5 paratypes (♂) are at CASC; 3 paratypes (♂) are at CNCI; 7 paratypes (4♂, 3♀) are at EHSC; 4 paratypes (3♂, 1♀) are at MCZC; and 5 paratypes (4♂, 1♀) are at SDSU. The holotype is mounted on a point and the pin bears 6 labels (descending order): “Rocky Ford Col 26 Aug 15” “*Radicula palustris*” “H O Marsh Collector” “♂” “oregonensis Phyllotreta Chtt. Ent Am 1927” and my and the USNM’s type labels. The allotype bears the same labels as the holotype, except in the place of the

sex label is “Chittenden No 1578” and my and the USNM’s allotype labels.

The paratypes all have a paratype label added. The 5 ♂ paratypes at CASC are as follows: 2, “Eldorado Springs, Colo VII-12-1939 J.W. Green”; 2, “Porvenir, N. Mex. Dr. A. Fenyes” “A. Fenyes Collection”; and 1, “Show Low, Ariz. IX.11.1941 O. Bryant”. The 3 ♂ paratypes at CNCI: 1, “Elbow, Sask. 24. VII 1954 Brooks-Wallis”; 1, “Ft. Collins Colo.” “TESTE 16067 Chittenden”; and 1, “Ft. Collins Colo 6.13.22” “Colo 28” “TESTE 16067 Chittenden”. The 7 paratypes in EHSC are: 2♂ and 1♀, “Childress Tex. July 8, 09” “On turnip” “H O Marsh Collector” and female has in addition “oregonensis Phyllotreta Chtt. Ent Am 1927”; 1♂ and 1♀, “Ft. Collins Colo. 7.11.22” correct sex symbol label, “oregonensis Phyllotreta Chtt. Ent Am 1927” and female has in addition “Colo 25”; and 1♂ and 1♀, same first 4 labels of holotype. The 5 paratypes at SDSU are as follows: 3♂ and 1♀, “Elk Point, S.D. June 27, 1946 J.A. Lofgren, Coll.”; and 1♂, “Freeman, S.D. June 27, 1946 J.A. Lofgren, Coll.”. The 16 paratypes at the USNM are as follows: 1♂ and 1♀, same 5 labels as allotype; 1♂, “Medicine Hat Alta 31.V.25 F.S. Carr” “♂” “oregonensis Phyllotreta Chtt. Ent Am 1927”; 1♂, “3 mi. N Tularosa N.M. 7/2/29 L. alyssoides” “from VE Romney”; 2♂, “Fowler Col 9 June 04” “ESG Titus Collector” “Cleome” 1 with “♂” and the other without; 1♂ and 1♀, “LARAMIE WYO. 6-14-93” “WICKHAM Collection 1933”; 1♂, “Ft. Collins Colo. 7.3.32” “Colo 26” “oregonensis Phyllotreta Chtt. Ent Am 1927”; 1♀, “Ft. Collins Colo. 7.11.22” “♀” “oregonensis Phyllotreta Chtt. Ent Am 1927”; 1♂, “Garden City Kans”; 2♂, 1♀, “Childress Tex. July 8, 09” “On turnip” “H O Marsh Collector” sex symbol label, “oregonensis Phyllotreta Chtt. Ent Am 1927”; 1♂, “Childress Tex. July 8, 09” “On turnip” “H O Marsh Collector”; 1♂, “Lincoln Neb June”.

BIOLOGY—**Host Plants, Adult**—**Cleome serrulatum* [sic], *marsh cress (*Radicula palustris*), and *turnip (Chittenden, 1923, p. 135; recorded as *P. oregonensis*); see Type Material for label and collection data.

Host Plants, Larva—*Cleome serrulata* (Chittenden, 1923, p. 135; recorded as *P. oregonensis*). These host records represent Chittenden’s Fowler, Colorado, record of *Cleome serrulata*, his Childress, Texas, and Garden City, Kansas, records of turnip, and part of his Rocky Ford, Colorado, record of *Radicula palustris*.

Immature Stages—Undescribed.

Habits—The larvae are leaf miners of *Cleome ser-*

rulata (Chittenden, 1923, p. 135). Adults have been collected in southern Saskatchewan and Alberta in late April and late May, in the central Great Plains from mid-June until late August, and in New Mexico and Texas in early July.

DISTRIBUTION—Figure 195; *P. constricta* has been collected in south central Canada, the central part of the Great Plains, southern New Mexico, and northern Texas.

SPECIMENS EXAMINED—Total 42, see Type Material above.

DISCUSSION—**Relationships**—*Phyllotreta constricta* is most similar to *P. oregonensis* and is less similar to *P. emarginata*, *P. zimmermanni*, *P. utanula*, and *P. utana*. For a discussion of these relationships, see this section under *P. oregonensis*.

Phyllotreta constricta might be confused with *P. attenuata* and *P. dolichophalla* on the basis of having the elytral stripe wide medially, but *P. constricta* has the male 5th antennal segment dorsoventrally flattened, whereas in *P. attenuata* and *P. dolichophalla* it is simple.

Etymology—The specific name *constricta* comes from the Latin *constrictus* meaning drawn together or contracted. This refers to the aedeagus in lateral view being abruptly narrowed in the apical one-half and to the deep premedian emargination on the venter of the spermathecal receptacle.

Phyllotreta decipiens Horn. Figures 18, 63–64, 119–121, 175, 196.

Phyllotreta decipiens Horn, 1889. Trans. Amer. Entomol. Soc., 16:298–299.

Lectotype (here designated): Male, MCZC type #32849, at Museum of Comparative Zoology, Harvard.

Type locality: Oregon and Washington Territory; lectotype is from Oregon.

Phyllotreta decipiens var. *ordinata* Chittenden, 1927. Entomol. Amer., 8(n.s., no. 1):38. NEW SYNONYMY.

Holotype: Male, USNM type #28814, at United States National Museum.

Type locality: Elko, Nevada.

DIAGNOSIS—Each elytron with 1 small preapical reddish brown to yellow mark or elytra entirely dark; male antennal segment 5 dark, simple but slightly enlarged, about $2 \times$ length of 6.

DESCRIPTION OF LECTOTYPE (species variation, excluding punctuation, in parentheses)—Figure 18; oblong, length 2.35 mm (δ 1.85–2.40, δ 2.38–2.55), width 1.15 mm (δ 0.92–1.15, δ 1.20–1.30); head and pronotum black with slight metallic luster (head no luster), elytra brownish black with slight metallic luster (no luster), each with a preapical yellowish (to

reddish) brown mark. **Head**: Black; vertex finely granulate (to slightly roughened anteriorly), moderately punctate with punctures separated by less than to equal their diameter, mostly by less than 1 diameter; interocular distance/maximum diameter of eye, 1.22 (δ 1.00–1.28; δ 1.22–1.38). **Antennae** [left missing segments 3–11]: Figures 63–64; segments 4 and 7 equal (subequal) in length, longer than 6, segment 5 about $2 \times$ length of 6; segment 5 simple, slightly enlarged in diameter; see Table 2 for segment length/width, length 1.49 mm (δ : length 1.32 mm; simple); antennae various shades of brown, basal 3 segments paler, 4–6 darkest (4 intermediate or usually 4–6 only dark), 7–11 dark (4–11 or usually 5–11 darkest) (δ : basal 2 or 3 segments paler, 3 or 4 intermediate, 4–11 or 5–11 darkest). **Pronotum**: Length 0.45 mm (δ 0.35–0.45, δ 0.42–0.48), width 0.75 mm (δ 0.60–0.75, δ 0.60–0.80); black; texture finely granulate to slightly roughened (usually entirely finely granulate); coarsely punctate, punctures separated by less than $\frac{1}{2}$ to equal their diameter, mostly by less than $\frac{1}{2}$ a diameter. **Elytra**: Length 1.68 mm (δ 1.40–1.80, δ 1.75–1.90), width 1.15 mm (δ 0.92–1.15, δ 1.20–1.30); brownish black (often black, rarely dark brown), color pattern as in Figure 18 (or elytra entirely dark); texture slightly roughened (often smooth); coarsely punctate, punctures separated by less than $\frac{1}{2}$ diameter, moderate (to slight) serial tendency. **Legs** [right metatarsus missing tarsomeres 4–5]: Normal color sequence. **Abdomen**: 5th sternum with an apical median shallowly concave lobe, concavity oval and extending to apical $\frac{1}{3}$ (oblong or tapering, extending to midpoint), with a median linear impression extending from midpoint to preapex (extending from sternal base to preapex, sometimes interrupted); δ : simple in outline, usually with a shallow median oval impression in apical $\frac{1}{4}$); black (often brownish black) with median lobe dark brown except median linear impression black (apical margin to apical $\frac{1}{3}$ paler or entirely dark).

Male—Aedeagus (figs. 119–121); length approximately 0.79 mm; moderately arched dorsoventrally, of rather uniform width except slightly narrowed preapically in dorsal view, with a dorsal washboard; apex in dorsal view broadly acute (about 45°), lateral margins almost straight, tip rounded, in lateral view gradually tapering in apical $\frac{1}{4}$ to very narrow apex, abruptly directed ventrad with tip pointed; ventral view as in Figure 121.

Female—Spermatheca (fig. 175); length approximately 0.32 mm; receptacle elongate oblong, wider basally and gradually tapering to posterior, moderately developed ring collar.

TYPE MATERIAL—The lectotype, allolectotype, and ♂ paralectotype are at the MCZC. The lectotype is mounted on a point, and the pin bears 4 labels (descending order): “Or.” “PARA-TYPE 3852.3” and my and the MCZC’s type labels. The allolectotype is labeled: “W.T.” “PARA TYPE 3852.2” and my and the MCZC’s type labels. The paralectotype is labeled: “W.T.” “LectoTYPE 3852”. This lectotype label on the male designated paralectotype by me was added by a subsequent curator and is not a valid designation. The male selected as lectotype was chosen because it has one complete antenna, whereas the other male lacks antennae.

BIOLOGY—**Host Plants, Adult**—*Radish, *turnip, sugar beet, and potato (Chittenden, 1927); the records for turnip and potato have been verified by me. New Collection Records: *Artemisia* [*sic*] sp., from Klamath Falls, Ore. (Algame) April 24, 1956 Joe Schuh, Coll. (AMNH:1); *Solidago* sp., from Creston, B.C. 2. VI. 1950 G. Stace Smith, C.A. Frost Collection 1962 (MCZC:1).

Immature Stages—Unknown.

Habits—Adults have been collected in the Pacific Northwest and Montana and Utah from late April until early August and again in late August and mid-October and in California in early July. No dates are associated with the other collection records.

DISTRIBUTION—Figure 196; *P. decipiens* has been collected mainly in the Pacific Northwest. The Texas record may be a case of mislabeling.

SPECIMENS EXAMINED—Total 214, see Type Material above and the Appendix.

DISCUSSION—**Nomenclature**—Horn (1889) described *P. decipiens* from at least three specimens and noted that two of them had a preapical pale mark on each elytron, whereas the third was entirely black (it actually has a slightly paler, indistinct preapical mark). Chittenden (1927) named the color variation with the preapical pale marks *P. decipiens* var. *ordinata*. According to the Rules of Zoological Nomenclature, article 45 (d)(i) and 45 (e)(i), this variety is to be treated as having subspecific rank. However, the aedeagi are the same, and the other characters all fall within the observed variation for this species. Therefore, I have synonymized this subspecies.

The vast majority of *P. decipiens* specimens are immaculate. Therefore, they will be treated/included in Part II to be published later.

Relationships—*Phyllotreta decipiens* is a rather distinctive species, except it is easily confused with those few specimens of *P. striolata* which have only a preapical pale elytral mark. Although *P. decipiens* often shows a tendency for serial elytral punctation, and the male 5th antennal segment of *P. striolata* is

usually distinctly enlarged (about two times width of 6th segment), the most reliable way to separate these species is by their genitalia. For *P. decipiens*, the aedeagus has the lateral margin of the apical orifice extending less than half the length of the median lobe, whereas *P. striolata* has the lateral margin extending about three-fourths the length of the median lobe. The spermatheca of *P. decipiens* is longer and has the pump measuring less than one-half the receptacle length, whereas *P. striolata* has the pump greater than one-half the receptacle length.

Phyllotreta denticornis Horn. Figures 19–22, 65–67, 122–124, 176, 197.

Phyllotreta denticornis Horn, 1889. Trans. Amer. Entomol. Soc., 16:297–298, fig. 19.

Lectotype (here designated): Male, MCZC type #32850, at Museum of Comparative Zoology, Harvard.

Type locality: California.

Phyllotreta amphicornis Chittenden, 1927. Entomol. Amer., 8(n.s., no. 1): 35–36. NEW SYNONYMY.

Holotype: Male, USNM type #28802, at United States National Museum.

Type locality: Wawawai, Washington.

Phyllotreta aequalis Hatch, 1971. The beetles of the Pacific Northwest. Part V:210. NEW SYNONYMY.

Holotype: Male, at United States National Museum.

Type locality: Bear Springs, Oregon.

DIAGNOSIS—Each elytron with the median pale stripe simple, of uniform width and without dilations, or reduced to a postbasal and/or preapical mark, or elytra entirely dark; male antennal segment 5 expanded bilaterally, dorsoventrally flattened, segment 6 with a sharp anteroventrally directed process.

DESCRIPTION OF LECTOTYPE (species variation, excluding punctuation, in parentheses)—Figure 19; elongate oblong, length 2.65 mm (♂2.45–2.80, ♀2.55–2.80), width 1.20 mm (♂1.00–1.20, ♀1.20–1.28); head and pronotum black with slight metallic luster, elytra black with slight metallic luster (no luster), each with a somewhat indistinct, slightly paler median stripe. **Head:** Black; vertex finely granulate basally to slightly roughened anteriorly (entirely slightly roughened), moderately punctate with punctures separated by less than ½ to equal their diameter, mostly by less than ½ a diameter; interocular distance/maximum diameter of eye, 1.62 (♂1.44–1.74, ♀1.56–1.75). **Antennae:** Figures 65–67; segment 4 longer than 3 or 7, shorter than 5, segment 5 more than 2 × length of 6; segment 5 bilaterally expanded, dorsoventrally flattened, venter concave in basal ⅓; segment 6 with a sharp anteroventral process, segments 7 and 8 with a short blunt apical process; see Table 2 for segment length/width, length 1.50 mm (♀: length 1.51 mm;

simple); antennae various shades of brown, basal 2 (3) segments paler with dorsum of segment 1 dark, 3–6 (4–5 or none) darkest, 7–11 (6–11 or 4–11) darker (♀: basal 3 or 4 segments paler, 4–11 or 5–11 darker). **Pronotum:** Length 0.45 mm (♂0.42–0.48, ♀0.42–0.48), width 0.82 mm (♂0.75–0.85, ♀0.80–0.82); black (rarely brownish black); texture finely granulate (finely granulate to slightly roughened, rarely finely alutaceous to finely granulate); coarsely punctate, punctures separated by less than ½ their diameter. **Elytra:** Length 1.92 mm (♂1.75–2.02, ♀1.88–2.02), width 1.20 mm (♂1.00–1.20, ♀1.20–1.28); black (dark brown, usually brownish black), median stripe indistinct, slightly paler than background color as in Figure 19 (or usually reduced to a postbasal and/or preapical mark as in Figures 20–22, or elytra entirely dark); texture smooth (smooth to slightly roughened); moderately and coarsely punctate, punctures separated by less than ½ to equal their diameter, mostly by less than ½ diameter. **Legs:** Normal color sequence. **Abdomen:** 5th sternum with an apical median moderately concave lobe, concavity tapering and extending to midpoint (extension ending postbasally, oblong and extending to midpoint), with a median linear impression extending postbasally to apex (♀: simple in outline, usually with a shallow to moderately deep oval impression in apical ⅓); black (usually brownish black) with concavity and apical margin paler (apical ⅓ paler or entirely dark).

Male—Aedeagus (figs. 122–124); length approximately 0.93 mm; essentially straight except for basal piece slightly and apex strongly curved ventrad, of rather uniform width except apical ¼ slightly wider; apex in dorsal view very bluntly rounded with a shallow, moderately wide median emargination, in lateral view strongly and rather abruptly curved ventrad with a small ventral median preapical lobe, of rather uniform width with end bluntly rounded; ventral view as in Figure 124.

Female—Spermatheca (fig. 176); length approximately 0.36 mm; receptacle elongate, slightly constricted medially on venter, gradually tapering to a slightly developed ring collar posteriorly.

TYPE MATERIAL—The lectotype and paralectotype (♂) are at the MCZC. The lectotype is mounted on a point and the pin bears 5 labels (descending order): “Cal” “LectoTYPE 3850” “*P. denticornis* Horn” and my and the MCZC’s type labels. The paralectotype pin bears 3 labels (descending order): “Cal” “PARA-TYPE 3850” and my type label. The curatorially added lectotype 3850 label is not a valid designation.

BIOLOGY—**Host Plants, Adult**—New Collection Records: *Medicago sativa* [sic], from Gregory Sta.,

Ore. VI-3-1932 Jones-Gammon Collector (CDAE:1); *mustard, from Hornbrook, Cal. IV-27-1949 Collector H T Osborn (CDAE:3) and from San Miguel, Cal. 5·5·49 Keifer (USNM:1).

Immature Stages—Unknown.

Habits—Adults have been collected in California, Oregon, and Washington, from late April until early July.

SPECIMENS EXAMINED—Total 48, see Type Material above and the Appendix.

DISTRIBUTION—Figure 197; *P. denticornis* is known only from California, Oregon, and Washington.

DISCUSSION—**Nomenclature**—Horn (1889) described *P. denticornis* from male specimens. In 1927, Chittenden described *P. ampicornis*, remarking that its antennae were similar to those of *P. denticornis*, but that the 6th antennal segment lacked the acute process; the acute process is present on the 6th antennal segment of his unique type, and the specimen is otherwise within the normal variation of *P. denticornis*. Hatch (1971) described *P. aequalis* from a striped specimen of *P. denticornis* and, not noting the acute process on the 6th antennal segment, placed it close to *P. lepidula*. The type of *P. aequalis* has a well-developed acute process on the 6th antennal segment and is a normal, striped *P. denticornis*. Therefore, I have synonymized these two species with *P. denticornis*.

Relationships—*Phyllotreta denticornis* is most similar to *P. spatulata* and less similar to *P. arcuata*, *P. bisinuata*, and *P. lepidula*, with which it shares having a simple elytral stripe and having the male 5th antennal segment dorsoventrally flattened. *Phyllotreta denticornis* and *P. spatulata* have very similar aedeagi, differing mainly in the overall shape in lateral view in which *P. denticornis* gradually and uniformly tapers toward the preapical ventral bend, whereas *P. spatulata* has a moderate dorsal swelling at approximately the base of the apical orifice. In dorsal view of the apex, *P. denticornis* is shallowly emarginate, whereas *P. spatulata* is faintly truncate. *Phyllotreta denticornis* has a sharp process on the male 6th antennal segment which is unique.

***Phyllotreta dolichophalla* Smith, NEW SPECIES.**
Figures 23, 68–69, 125–126, 177, 197.

Holotype: Male, CASC type #14212, deposited at California Academy of Sciences.

Type locality: Stinson Beach, Marin Co., California.

DIAGNOSIS—Each elytron with a median pale stripe with dilations basally somewhat and apically abruptly

incurved toward suture, but never meeting at suture; antennal segments 4–5 simple, male antennal segments 6–11 darkest in contrast to paler basal segments; aedeagus in lateral view with apex very narrow, directed ventrad.

DESCRIPTION OF HOLOTYPE (species variation, excluding punctuation, in parentheses)—Figure 23; oblong, length 2.78 mm (δ 2.66–3.16), width 1.30 mm (♀ 1.12–1.48); head and pronotum black with slight metallic luster, elytra brownish black, each with a median straw-yellow stripe. **Head:** Black; vertex finely granulate basally to slightly roughened anteriorly, finely to moderately punctate with punctures separated by less than $\frac{1}{2}$ to $1.5 \times$ their diameter, mostly by about 1 diameter; interocular distance/maximum diameter of eye, 1.67 (♀ 1.37–1.67). **Antennae** [left missing segments 4–11]: Figures 68–69; segments 4–6 equal (subequal) in length, segment 7 longer than (equal to) 6; segments 4 and 5 simple, cylindrical; see Table 2 for segment length/width, length 1.68 mm (allotype: length 1.90 mm; simple); antennae various shades of brown, basal 5 (4) segments paler, 6–7 (5–7) intermediate, 8–11 darkest. **Pronotum:** Length 0.58 mm (♀ 0.52–0.64), width 0.92 mm (♀ 0.85–1.04); black, texture slightly roughened to finely alutaceous (finely granulate to slightly roughened, smooth to slightly roughened); finely to moderately punctate, punctures separated by less than $\frac{1}{2}$ to $2 \times$ their diameter, mostly by about 2 diameters. **Elytra:** Length 1.98 mm (♀ 1.88–2.31), width 1.30 mm (♀ 1.12–1.48); brownish black, median stripe as in Figure 23; texture slightly roughened (smooth to slightly roughened); coarsely punctate, punctures separated by less than $\frac{1}{2}$ to equal their diameter, mostly by less than $\frac{1}{2}$ a diameter. **Legs** [left front leg missing tibia and tarsus, left middle leg and right hind leg missing tarsi]: Normal color sequence except tibiae and tarsi same color. **Abdomen:** 5th sternum with an apical median deeply concave lobe, concavity tapering and extending to within $\frac{1}{3}$ of sternal base, with a median linear impression extending postbasally to base of median lobe, interrupted at base of concavity (♀ : simple in outline, with a median longitudinal impression in apical $\frac{1}{3}$ to $\frac{1}{2}$); black (brownish black with apical $\frac{1}{3}$ of 5th sternum paler).

Male—Aedeagus (figs. 125–126); length approximately 1.31 mm; moderately arched dorsoventrally, of rather uniform width except gradually tapering toward apex in apical $\frac{1}{3}$ in lateral view; apex in dorsal view acute with tip bluntly rounded, in lateral view very narrow, directed ventrad, ending in a sharp point. No ventral impression observed.

Female—Spermatheca (fig. 177); length approximately 0.42 mm; receptacle unique, basal $\frac{1}{2}$ strongly

swollen ventrally, apical $\frac{1}{2}$ of rather uniform width, ring collar very wide, strongly developed.

TYPE MATERIAL—The holotype and allotype are at the CASC. All the paratypes are female, with 1 at CASC, 2 at CDAE, and 1 at EHSC. The holotype is mounted on a point and the pin bears 5 labels (descending order): “Stenson’s [sic] B Cal 4.11.33” “COL BY E J BLUM” “J.E. Blum Collection, gift of W.H. Nutting, Calif. Acad. Sci. Accession 1968” and my and the CASC’s type labels. The allotype bears the same first 3 labels and then my and the CASC’s type labels.

The paratype at the CASC is labeled: “Alpine Dam Cal 9-33” and “E.S. Ross Collection”. The 2 paratypes at CDAE are labeled: one, “CAL. Santa Cruz Co. 2 m E Scotts Valley 3-IV-1972 W.H. Tyson”, and the other, “Niles, Calif. Alameda Co. 14 · II · 1966” and “W.H. Tyson Collector”. The paratype at EHSC is labeled: “Cal. Marin, Co. L. Lagunitas V-10-59 D.C. Rencz”.

BIOLOGY—Host plants and immature stages are unknown.

Habits—Adults have been collected in California from mid-February until mid-May.

DISTRIBUTION—Figure 197; *P. dolichophalla* has been collected only in California.

SPECIMENS EXAMINED—Total 6, see Type Material above.

DISCUSSION—Relationships—*Phyllotreta dolichophalla* is most similar to *P. attenuata* and the specimens of *P. conjuncta* which have the postbasal and preapical marks connected; for a discussion of these relationships, see this section under *P. attenuata*.

Phyllotreta dolichophalla might be confused with *P. oregonensis* on the basis of having the elytral stripe wide medially, but *P. dolichophalla* has antennal segments 5 and 6 subequal in length, segment 5 simple and cylindrical, whereas *P. oregonensis* has antennal segment 5 about one and one-half times the length of segment 6, and in the male, segment 5 is dorsoventrally flattened.

Etymology—The specific name *dolichophalla* comes from the Greek *dolicho-* meaning long and the Greek *phallo* meaning penis, which refers to the aedeagus being much longer than the average length for the genus.

***Phyllotreta emarginata* Smith, NEW SPECIES.** Figures 24, 70–71, 127–129, 178, 198.

Holotype: Male, deposited at American Museum of Natural History.

Type locality: Mare’s Egg Spring, Klamath Co., Oregon.

DIAGNOSIS—Each elytron with a median pale stripe with dilations which never meet at suture, medially stripe width distinctly less than distance from stripe to suture; male antennal segment 5 dark, expanded bilaterally and dorsoventrally flattened, subequal to 4 in width, with venter flat; apex of aedeagus in dorsal view with a narrow deep median emargination, straight ventrally in lateral view.

DESCRIPTION OF HOLOTYPE (species variation, excluding punctuation, in parentheses)—Figure 24; elongate oblong, length 2.75 mm (δ 2.25–2.78, η 2.50–2.80), width 1.21 mm (δ 0.95–1.32, η 1.22–1.50); head and pronotum black with slight metallic luster, elytra brownish black, each with a median straw-yellow stripe. **Head:** Black; vertex finely granulate (finely granulate basally to slightly roughened anteriorly), moderately punctate with punctures separated by less than $\frac{1}{2}$ to equal their diameter, mostly by less than 1 diameter; interocular distance/maximum diameter of eye, 1.39 (δ 1.30–1.50, η 1.44–1.76). **Antennae:** Figures 70–71; segments 4 and 7 subequal (equal) in length, 6 about $\frac{1}{2}$ length of 4, segment 5 about $2 \times$ length of 4 and almost subequal to 4 in width; segments 4 and 5 expanded bilaterally, dorsoventrally flattened; segment 5 distinctly longest, with venter flat, not concave; see Table 2 for segment length/width, length 1.58 mm (allotype: length 1.40 mm; simple); antennae various shades of brown, basal 2 (η : 3) segments pale with dorsum of 1 dark, segments 3 and 7–11 (sometimes 8–11; η : 4–11) dark, 4–6 (sometimes 4–7) darkest. **Pronotum:** Length 0.52 mm (δ 0.40–0.52, η 0.48), width 0.85 mm (δ 0.72–0.92, η 0.82–0.92); black; texture finely granulate; coarsely punctate with moderate punctures interspersed, punctures separated by less than $\frac{1}{2}$ to equal their diameter, mostly by less than 1 diameter. **Elytra:** Length 1.90 mm (δ 1.42–2.02, η 1.80–2.05), width 1.21 mm (δ 0.95–1.32, η 1.22–1.50); brownish black, median stripe pattern as in Figure 24; texture slightly roughened (smooth); coarsely punctate with moderate punctures interspersed, punctures separated by less than $\frac{1}{2}$ to equal their diameter, mostly by less than $\frac{1}{2}$ a diameter. **Legs** [right metatarsus missing]: Normal color sequence. **Abdomen:** 5th sternum with an apical median lobe moderately concave, concavity tapering as it extends to within $\frac{1}{3}$ of sternal base, a median linear impression in middle $\frac{1}{3}$ only (η : simple in outline, no median impression); black.

Male—Aedeagus (figs. 127–129); length approximately 0.90 mm; slightly sigmoid, of rather uniform width; apex in dorsal view abruptly triangular with tip broadly rounded each side of a median narrow moderately deep emargination, in lateral view almost

straight ventrally, not directed ventrad, tip bluntly rounded; ventral view as in Figure 129.

Female—Spermatheca (fig. 178); length approximately 0.36 mm; receptacle elongate oblong with a slight dorsoventral arch, basal $\frac{1}{2}$ slightly swollen, tapering to a slightly developed ring collar.

TYPE MATERIAL—The holotype, allotype, and 9 paratypes (5 δ , 4 η) are at the AMNH. One paratype (δ) is at the CASC, 6 paratypes (3 δ , 3 η) are in my collection (EHSC), and 1 paratype (δ) is at OSUC. The holotype is mounted on a point and the pin bears 3 labels (descending order): ‘Mare’s Egg Spring, Ore.; Klamath County May 30, 1962 Joe Schuh, Collector’ ‘*Phyllotreta oregonensis* 16067 Cr. M.H. Hatch ‘67’ and my type label. The allotype bears the same first label and my type label.

The paratypes at the AMNH are as follows: 2 δ and 1 η , same as second pair cited for EHSC; 1 δ and 1 η , same as third pair cited for EHSC; 1 δ and 1 η , ‘Ore.; W. side of Upper Klamath Lk. July 30, 1969 Joe Schuh, Coll.’; 1 δ , ‘Sprague Riv., Ore. 5 mi. E. Bly June 16, 1957 Joe Schuh, Coll.’; and 1 η , ‘Klamath Falls, Oregon Geary Ranch 6-21 1961 Joe Schuh, Collector’. The paratype at the CASC is labeled: ‘Orinda, Cal Con Cos Co VI.10.1939’ ‘B.E. White Collector,’ and ‘BURDETTE E. WHITE Collection Calif. Acad. Sci. Accession 1967’. The 6 paratypes in my collection (EHSC) are labeled: 1 δ and 1 η , same as holotype; 1 δ and 1 η , ‘Ore.; Klamath Co. Williamson Riv. Rch.; alfalfa & cruciferous weeds; 5-28-70 Joe Schuh, Coll.’; and 1 δ and 1 η , ‘Crystal Cr., Ore. Upper Klamath Lk. May 30, 1960 Joe Schuh, Coll.’ The paratype at OSUC is labeled: ‘Chester Cal. VII-18-56’ and ‘D.J. & J.N. Knull Collrs.’.

BIOLOGY—**Host Plants, Adult**—Alfalfa and *cruciferous weeds, see Type Material above.

Immature Stages—Unknown.

Habits—Adults have been collected in California in mid-June and mid-July and in Oregon from late May until late July.

DISTRIBUTION—Figure 198; *P. emarginata* has been collected in California and Oregon.

SPECIMENS EXAMINED—Total 19, see Type Material above.

DISCUSSION—**Relationships**—*Phyllotreta emarginata* is most similar to *P. zimmermanni* and is less similar to *P. utana*, *P. utanula*, *P. oregonensis*, and *P. constricta*, with which it shares elytral color pattern and having the male 5th antennal segment dorsoventrally flattened. However, the elytral stripe of *P. oregonensis* and *P. constricta* is usually much wider than that of the other 4 species. The male 5th antennal segment of *P. zimmermanni* has a basal con-

cavity ventrally, whereas that of the other five species is evenly flattened ventrally; also antennal segments 2 through 5 are pale in *P. utana* and *P. utanula*, whereas in the other four species, antennal segments 2 and 3 are pale and/or dark and segments 5 through 11 are dark. *Phyllotreta emarginata* has the male 5th antennal segment subequal in width to the 4th, whereas *P. zimmermanni* has the 5th segment distinctly wider than the 4th. The aedeagi of these six species separate into three distinct groups (based on dorsal view of apex) as follows: *P. utana* and *P. utanula* have the apex very broad and its margin moderately and broadly emarginate; *P. constricta* and *P. oregonensis* have the apex not broadened and its margin entire; and *P. emarginata* and *P. zimmermanni* have the apex not broadened and its margin moderately but narrowly emarginate medially. However, *P. emarginata* has its apex in dorsal view abruptly triangular with its tip broadly rounded on each side of the median emargination and in lateral view almost straight, whereas *P. zimmermanni* has its apex in dorsal view bluntly rounded with short premedian extensions and in lateral view the apex is directed ventrad. The spermatheca of *P. emarginata* has the receptacle slightly arched dorsally and tapering in the apical one-half to a slightly developed ring collar, whereas *P. zimmermanni* has its receptacle almost straight dorsally, of rather uniform width in apical one-half, and with a strongly developed ring collar. Also see this section under *P. oregonensis* and *P. utana*.

Etymology—The specific name *emarginata* comes from the Latin *emarginatus* meaning notched at the apex, and refers to the apex of the aedeagus in dorsal view which has a narrow and moderately deep notch or emargination.

Phyllotreta lepidula (LeConte). Figures 25, 72–73, 130–132, 179, 198.

Haltica lepidula LeConte, 1857. Report of insects collected on the survey. Washington, p. 68.

Lectotype (here designated): Male, MCZC type #32851, at Museum of Comparative Zoology, Harvard.

Type locality: San Jose or San Diego, California.

Orchestris lepidula: Crotch, 1873. Proc. Acad. Nat. Sci. Philadelphia, 25:65–66.

Phyllotreta lepidula: Horn, 1889. Trans. Amer. Entomol. Soc., 19:294–295.

DIAGNOSIS—Each elytron with its median pale stripe simple, of uniform width and without dilations; male antennal segment 5 moderately expanded bilaterally, dorsoventrally flattened, moderately concave ventrally; antennal segments 2–3 pale in contrast to darker 5–11; aedeagus in lateral view slightly sigmoid.

DESCRIPTION OF LECTOTYPE species variation, excluding punctuation, in parentheses)—Figure 25; elongate oval, length 2.60 mm (δ 2.60–2.75, ♀ 2.55–2.72), width 1.22 mm (δ 1.18–1.28, ♀ 1.18–1.32); head and pronotum black with slight metallic luster, elytra brownish black (with slight metallic luster), each with a median straw-yellow stripe. **Head**: Black (brownish black); vertex finely roughened, alutaceous basally (finely granulate; smooth but finely granulate or roughened basally), moderately punctate with punctures separated by less than $\frac{1}{2}$ their diameter; interocular distance/maximum diameter of eye, 1.33 (δ 1.33–1.50, ♀ 1.33–1.38). **Antennae**: Figures 72–73; segment 4 slightly longer than (subequal to) 7, 5 almost $2 \times$ length of 4, 6 about $\frac{1}{2}$ length of 4; segment 5 moderately expanded bilaterally, dorsoventrally flattened, venter moderately concave entire length; see Table 2 for segment length/width, length 1.34 mm (♀ : length 1.30 mm; simple); antennae various shades of brown, basal 4 (3) segments paler, with segments 1 and 4 dorsally darker (4 sometimes completely darker), apical 7 (8) segments darker. **Pronotum**: Length 0.45 mm (δ 0.38–0.45, ♀ 0.42–0.48), width 0.79 mm (δ 0.75–0.85, ♀ 0.78–0.85); black; texture slightly roughened with wrinkles radiating from most punctures (smooth but with wrinkles); coarse to very coarsely punctate, punctures separated by less than $\frac{1}{2}$ their diameter. **Elytra**: Length 1.98 mm (δ 1.92–2.10, ♀ 1.90–2.08), width 1.22 mm (δ 1.18–1.28, ♀ 1.18–1.32); brownish black (dark brown), median stripe pattern as in Figure 25; texture slightly roughened (usually smooth); coarsely punctate, punctures separated by less than $\frac{1}{2}$ their diameter. **Legs**: Normal color sequence. **Abdomen**: 5th sternum with an apical median deeply concave lobe, its concavity extending and broadly tapering basad to within $\frac{1}{3}$ of base, transversed by a median linear impression extending postbasally to preapically (♀ : simple in outline, with a shallow lanceolate median impression starting at midpoint and ending preapically); sterna 1–4 black, 5 brownish black to dark brown in apical $\frac{1}{2}$ with median linear impression brownish black (entirely black).

Male—Aedeagus (figs. 130–132); length approximately 0.90 mm; slightly sigmoid dorsoventrally, rather uniform in width, but constricted just posterior to basal piece and preapically; apex in dorsal view shallowly and moderately emarginate, almost truncate, in lateral view abruptly tapering to a very blunt, somewhat ventrally directed apex, with a short preapical ventrally directed lobe which is the ventral median emargination flange; ventral view as in Figure 132.

Female—Spermatheca (fig. 179); length approximately 0.36 mm; receptacle elongate oblong, slightly arched, slightly wider apically and slightly taper-

ing anteriorly to basal swelling, ring collar slightly developed.

TYPE MATERIAL—The lectotype and 4 paralectotypes (2♂, 2♀) are at the MCZC. The lectotype is mounted on a point and the pin bears only a gold circle (= California) and my and the MCZC's type labels. The 4 paralectotypes have the same gold circle, but one female has the additional 2 labels (descending order): "Type 4428" and "Phyllotreta lepidula Lec. [sic] S. Jose, S.D.". The type label was added by a subsequent curator and is not a valid designation. The determination-locality label does not appear to be in LeConte's writing.

BIOLOGY—Host plants and immature stages are unknown.

Habits—Adults have been collected in California from mid-April until early September; no dates are associated with the questionable New York record, see below.

DISTRIBUTION—Figure 198; *P. lepidula* is known only from California, except for 2 specimens in the MSUC that are labeled "N.Y.", which may be a case of mislabeling.

SPECIMENS EXAMINED—Total 90, see Type Material above and the Appendix.

DISCUSSION—Nomenclature—LeConte (1857) apparently described *P. lepidula* from five specimens and placed it in *Haltica*. In 1873, Crotch in error placed *P. lepidula* in *Orchestrus* (see LeConte, 1878, p. 615), and Horn (1889) placed this species in *Phyllotreta*.

Relationships—*Phyllotreta lepidula* is most similar to *P. bisinuata* and less similar to *P. arcuata*, *P. spatulata*, and the striped specimens of *P. denticornis* with which it shares having a simple elytral stripe and having the male 5th antennal segment dorsoventrally flattened. *Phyllotreta denticornis* has a sharp process on the male 6th antennal segment which is absent in the other four species, *P. arcuata* has the male antennal segments 2 through 6 pale which separates it, *P. spatulata* has the male antennae dark but with the venter of segments 1 through 5 paler and has the venter of the male 5th antennal segment flat which separates it from the other four species, and *P. bisinuata* is unique in that it has no metathoracic wings. *Phyllotreta lepidula* and *P. bisinuata* are almost identical externally, and the aedeagi are more similar to each other than either is to those of the other three species. The aedeagal median lobe in lateral view of *P. lepidula* is essentially straight dorsally, whereas that of *P. bisinuata* is very abruptly and strongly bent premedially; the apices are almost identical in both species, and *P. lepidula* in dorsal view has the median lobe not as strongly constricted before the junction with the basal piece. The spermatheca of *P. lepidula*

is most similar to that of *P. arcuata* but is more robust, *P. spatulata* and *P. bisinuata* are very similar to each other and distinct from the other three species, and that of *P. denticornis* is distinct but is more similar to *P. lepidula* than to any of the others.

Phyllotreta liebecki Schaeffer. Figures 26–27, 74–76, 133–135, 180, 199.

Phyllotreta liebecki Schaeffer, 1919:339–340.

Lectotype (here designated): Male, USNM type #42423, at United States National Museum.

Type locality: Enterprise, Florida.

DIAGNOSIS—Each elytron with a median pale stripe greatly expanded in apical $\frac{1}{3}$, reaching margin and suture apically; male antennal segment 5 moderately enlarged in diameter, with apical $\frac{1}{2}$ at most moderately expanded ventrally, and venter deeply concave.

DESCRIPTION OF LECTOTYPE (species variation, excluding punctuation, in parentheses)—Figure 26; elongate oval, length 2.18 mm (♂ 2.02–2.28, ♀ 2.22–2.32), width 1.01 mm (♂ 0.95–1.15, ♀ 0.98–1.10); head and pronotum black with slight metallic luster, elytra dark brown, each with a median straw-yellow stripe. **Head:** Black; vertex finely granulate (also finely alutaceous basally), moderately punctate with punctures separated by less than their diameter; interocular distance/maximum diameter of eye 1.43 (♂ 1.38–1.43, ♀ 1.38–1.47). **Antennae:** Figures 74–76; segments 4 and 6 equal (subequal) in length, 5 more than $2 \times$ length of 4, 6 shorter than 7; segment 5 distinctly longest, moderately enlarged in diameter, with apical $\frac{1}{2}$ moderately (slightly) expanded ventrally, venter deeply concave entire length; see Table 2 for segment length/width, length 1.22 mm (all-lectotype: length 1.24 mm; simple); antennae various shades of brown, basal 2 (4) segments paler, 3–4 (4 or none) intermediate, 5–11 darkest. **Pronotum:** Length 0.40 mm (♂ 0.38–0.42, ♀ 0.40–0.42), width 0.68 mm (♂ 0.62–0.72, ♀ 0.70–0.75); black; texture finely granulate with fine wrinkles radiating from punctures (only finely granulate); coarsely punctate, punctures separated by less than to $2 \times$ their diameter, mostly by about 1 diameter. **Elytra:** Length 1.55 mm (♂ 1.50–1.68, ♀ 1.68–2.20), width 1.01 mm (♂ 0.95–1.15, ♀ 0.98–1.10); dark brown changing to brown at lateral margins, median stripe pattern as in Figure 26 (sometimes as in fig. 27); texture slightly roughened including extremely fine punctures (smooth, slightly roughened only); coarsely punctate, punctures separated by less than to $2 \times$ their diameter, mostly by about 1 diameter. **Legs** [right protarsus and left metatarsus missing tarsomeres 2–5]: Normal color sequence. **Abdomen:** 5th sternum with

an apical median lobe and a very shallow, narrow transverse median impression (♀: simple in outline, no median impression); dark brown (brown, brownish black; 5th often paler, especially apically).

Male—Aedeagus (figs. 133–135); length approximately 0.66 mm; moderately arched dorsoventrally, broadest preapically; apex in dorsal view very bluntly rounded with a median shallow notch, in lateral view somewhat abruptly tapering to a point; ventral view as in Figure 135.

Female—Spermatheca (fig. 180); length approximately 0.34 mm; receptacle elongate, slightly constricted medially, ring collar slightly developed.

TYPE MATERIAL—The lectotype, allolectotype, and 1 paralectotype (♀) are at the USNM and 1 paralectotype (♀) is at the MCZC. The lectotype is mounted on a point and the pin bears 6 labels (descending order): “Type ♂” “Enterprise Fla v.14” “BROOKLYN MUSEUM COLLN 1929” “U.S.N.M. Type No. 42423” “Phyllotreta liebecki Schffr.” and my lectotype label. The allolectotype has the 1st label “Alotype [*sic*] ♀”, the 2nd and 3rd labels the same, the 4th “liebecki U.S.N.M. Allotype No. 42423” and my allolectotype label. The USNM paralectotype is labeled: “Enterprise Fla V.14” “liebecki U.S.N.M. Paratype 42423” “Chittn. coll. from Schaeff” “Phyllotreta liebecki Schaeff. Sch.” and my paralectotype label. The MCZC paralectotype is labeled: “Enterprise Fla V-8” “Paratype” “Liebeck Collection” and my paralectotype label. No type designations were made in the original description.

BIOLOGY—Host Plants, Adults—*Mustard, *radish, *Chinese cabbage or pe-tsai (Chittenden, 1923, p. 135); *turnip (Wilcox, 1979, p. 8). New Collection Records: Brome grass, from Ninette, Man. 20·V·1958 R.B. Madge (CNCI:1); *Melilotus* [*sic*] *alba*, from Alachua Co., Fl. 13 IV 56 R.A. Morse coll. (FSCA:1); [*turnip, from Baton Rouge, La. 27-I-19, T.H. Jones (USNM:2)].

Host Plants, Larva—*Rorippa obtusa* (Nutt.), *Arabis virginica* (L.), *Radicula walteri* (Ell.) (Smith, 1921, p. 78); *Lepidium virginicum* L. (Chittenden, 1927, p. 28). New Collection Record: Larvae in mustard plants, from Brownsville, Tx. 3-29-'43 (USNM:1).

Immature Stages—Undescribed.

Habits—The larvae are leaf miners. Smith (1921) found *P. liebecki* breeding extensively as a miner in the foliage of the 3 host plants credited above. Chittenden (1923) reported that the larva had been reared from mines in the leaves of *L. virginicum*. Blatchley (1914) reported collecting this species (as *P. robusta*) in large numbers in the herbage along borders of cypress swamps at Sanford, Florida. Adults of *P. liebecki* have been collected in northeastern United

States in mid-May, in north central United States and Ontario in May and June, in the midwest during May, and in southeastern United States in January and from March until late June. The distribution (see below) falls within that of the known larval host plants and the collection dates within their growing season. Lawrence (1951) states that *Lepidium* is a weed of economic importance and that *Arabis* or Rock Cress is an ornamental. Thus, this species may be of beneficial as well as injurious potential.

SPECIMENS EXAMINED—Total 220, see Type Material above and the Appendix.

DISTRIBUTION—Figure 199; *P. liebecki* has been found mainly in the Gulf Coast states. Records not verified by me include Dundord and Sarasota, Florida, and Liberty, Texas (Gentner, 1926). The California record is probably a case of mislabeling.

DISCUSSION—Nomenclature—Schaeffer (1919) described this species from specimens sent to him by Charles Liebeck who mentioned to Schaeffer about the possible wrong identification of this species as *P. robusta* by Blatchley (1914, p. 142). Blatchley (1920, p. 263) corrected this error.

Relationships—*Phyllotreta liebecki* is very similar to *P. robusta* with which only it shares the distinctive elytral color pattern of the median pale stripe greatly expanded in the apical one-third, meeting the margin and suture apically; but in *P. liebecki* the stripe tends to be narrower and less expanded laterally. These species both have the male 5th antennal segment enlarged, in *P. liebecki* there is no prolongation and the segment is deeply concave on the venter, whereas in *P. robusta* there is a bluntly pointed apical prolongation with the segment otherwise simple. The aedeagi differ, in *P. liebecki* the apex is bluntly rounded and with a shallow median notch, whereas in *P. robusta* the apex is sharply tapered to a narrow point. The spermathecae are almost identical, but that of *P. liebecki* tends to be much less heavily sclerotized and has a narrower ring collar.

Phyllotreta oblonga Chittenden. Figures 28, 77–78, 136–138, 181, 200.

Phyllotreta oblonga Chittenden, 1927. Entomol. Amer., 8(n.s., no.1): 31–32.

Holotype: Female, USNM type #28840, at United States National Museum.

Type locality: Edmonton, Alberta, Canada.

DIAGNOSIS—Each elytron with a median pale stripe whose inner margin almost parallels the suture except strongly incurved apically but never meeting at suture; male antennal segment 5 simple, about 1.25 × length of 6, segments 4 and 6 subequal in length; aedeagus in lateral view with apex abruptly and strongly directed ventrad.

DESCRIPTION OF HOLOTYPE (species variation, excluding punctuation, in parentheses)—Figure 28; oblong, length 2.72 mm (δ 2.62–2.68, ♀ 2.58–2.82), width 1.35 mm (δ 1.22–1.25, ♀ 1.32–1.40); head and pronotum black with slight metallic luster (no luster), elytra black (with slight metallic luster), each with a median straw-yellow stripe. **Head:** Black, vertex finely granulate (to slightly roughened anteriorly; in addition also finely alutaceous basally), moderately punctate with punctures separated by less than to equal their diameter; interocular distance/maximum diameter of eye, 1.44 (δ 1.33–1.63, ♀ 1.33–1.53). **Antennae:** Figures 77–78; segments 4 and 6 equal (subequal) in length, segments 5 and 7 equal (subequal) in length, longer than 4 or 6 (δ : segment 5 about $1.25 \times$ length of 6), segments simple; see Table 2 for segment length/width, length 1.45 mm (δ : length 1.48 mm; simple); antennae various shades of brown, basal 3 (2) segments paler, segment 4 (3 or none) intermediate, segments 5–11 (4–11) darkest (δ : same sequence as female or segment 1 paler, 2–3 and 8–11 dark, 4–7 darkest). **Pronotum:** Length 0.52 mm (δ 0.50–0.52, ♀ 0.52–0.55), width 0.82 mm (δ 0.85, ♀ 0.82–0.88), black; texture finely granulate (slightly roughened or smooth to slightly roughened); moderately punctate, punctures separated by less than to equal their diameter, mostly by about 1 diameter. **Elytra:** Length 2.02 mm (δ 1.85–2.00, ♀ 1.85–2.08), width 1.35 mm (δ 1.22–1.25, ♀ 1.32–1.40); black (usually brownish black), median stripe pattern as in Figure 28; texture finely roughened (rarely smooth); coarsely punctate, punctures separated by less than to equal their diameter, mostly by about 1 diameter. **Legs:** Normal color sequence. **Abdomen:** 5th sternum simple in outline, with a shallow median oval impression in apical $\frac{1}{2}$ (δ : 5th sternum with an apical median deeply concave lobe, concavity tapering posteriorly and extending to apical $\frac{1}{2}$ or extending to within $\frac{1}{2}$ of sternal base, with a median linear impression extending from sternal base to base of concavity or ending preapically, sometimes interrupted); brownish black (black) with apex of 5th paler (apical margin to apical $\frac{1}{2}$ paler; median lobe paler but median linear impression dark; or entirely dark).

Male—Aedeagus (figs. 136–138); length approximately 1.00 mm; slightly arched dorsoventrally, of rather uniform width except slightly narrower preapically in dorsal view, in lateral view tapering on dorsum from base of median lobe to apex with venter essentially straight; with dorsal washboard; apex in dorsal view rounded with acute tip, in lateral view moderately narrow, rather abruptly and strongly directed ventrad, with a preapical notch on venter; ventral view as in Figure 138.

Female—Spermatheca (fig. 181); length approximately 0.40 mm; receptacle elongate, tapering in median $\frac{1}{3}$ to a narrow, almost parallel-sided apical $\frac{1}{3}$, ring collar slightly developed.

TYPE MATERIAL—The holotype and 5 paratypes (♀) are at the USNM and one paratype (♀) is at the UASM. The holotype is mounted on a point and the pin bears 4 labels (descending order): “Edmonton Alta 1.VI.18 F.S. Carr” “ ♀ ” “Type No. 28840 U.S.N.M.” and a determination label. The spermatheca is mounted on a plastic card immediately under the point. The paratypes are labeled as follows: 2, holotype 1st label, “ δ ” “Paratype No. 28840 U.S.N.M.” and “Phyllotreta oblonga Chttm. Par.”; 1, same as preceding except sex symbol “ ♀ ”; 1, holotype 1st label, “ ♀ ” “Paratype” and “Phyllotreta oblonga Chttm. Para.”; and 1, “Edmonston [sic] Alta. 1-VI.18” “F.S.Carr Coll.” “ ♀ ” “Paratype” and “Phyllotreta oblonga Chttm. Par.”.

BIOLOGY—**Host Plants, Adult**—**Lepidium virginicum* (Chittenden, 1927, p. 31). New Collection Record: *Horse-radish, from Madison, Wis. 5-12-19 R W Hartwell Collector (USNM:1).

Immature Stages—Unknown.

Habits—Adults have been collected in Canada during June, in New Hampshire in July, in Oregon in late May, and in Wisconsin in mid-June.

SPECIMENS EXAMINED—Total 24, see Type Material above and the Appendix.

DISTRIBUTION—Figure 200; *P. oblonga* has been collected in the Alberta, Manitoba, Northwest Territories, Quebec, and the Yukon Territory, and in New Hampshire, Oregon, and Wisconsin.

DISCUSSION—**Nomenclature**—Chittenden (1927) described this species from a series of females of which about half were erroneously sexed. The male is described here for the first time, from four specimens.

Relationships—*Phyllotreta oblonga* is a rather distinctive species: having the antennae simple with segment 5 longer than 6, and segments 4 and 6 subequal, along with the distinctive elytral stripe pattern of having the inner margin of the stripe essentially paralleling the suture except strongly incurved apically, easily separates this species.

Phyllotreta oregonensis (Crotch). Figures 29–30, 79–80, 139–141, 182, 200.

Orchestris oregonensis Crotch, 1873. Proc. Acad. Nat. Sci. Philadelphia, 25:66.

Lectotype (here designated): Male, MCZC type #32852, at Museum of Comparative Zoology, Harvard.

Type locality: Oregon.

Phyllotreta oregonensis: Horn, 1889. Trans. Amer. Entomol. Soc. 16:296–297.

DIAGNOSIS—Each elytron with a median pale stripe with dilations which never meet at suture, medially stripe usually wider than distance from stripe to suture; male antennal segment 5 dark, expanded bilaterally and dorsoventrally flattened, subequal to 4 in width, with venter flat; apex of aedeagus in dorsal view entire, in lateral view almost straight, not directed ventrad.

DESCRIPTION OF LECTOTYPE (species variation, excluding punctuation, in parentheses)—Figure 29; oblong oval, length 2.80 mm (δ 2.28–3.10, ♀ 2.28–3.35), width 1.38 mm (δ 1.22–1.55, ♀ 1.18–1.50); head and pronotum black with slight metallic luster, elytra dark brown (with slight metallic luster), each with a median straw-yellow stripe. **Head:** Black; vertex finely granulate (finely granulate basally to slightly roughened anteriorly), finely to moderately punctate with punctures separated by less than $\frac{1}{2}$ to equal their diameter, mostly by less than $\frac{1}{2}$ a diameter; interocular distance/maximum diameter of eye, 1.56 (δ 1.30–1.56, ♀ 1.44–1.56). **Antennae:** Figures 79–80; segment 4 longer than 3, 6, or 7, segment 5 about 1.5 \times length of 4, 6 distinctly shortest; segments 4 and 5 expanded bilaterally, dorsoventrally flattened; segment 5 distinctly longest, subequal to 4 in width, with venter flat; see Table 2 for segment length/width, length 1.52 mm (allolectotype: length 1.64 mm; simple); antennae various shades of brown, basal 2 (3) segments pale with dorsum of 1 dark, 3 (3–4 or none) intermediate, 4–11 (5–11) darkest. **Pronotum:** Length 0.50 mm (δ 0.48–0.55, ♀ 0.45–0.58), width 0.90 mm (δ 0.72–1.02, ♀ 0.82–1.02); black; texture slightly roughened (in addition with wrinkles radiating from some punctures; finely granulate); moderately to coarsely punctate, punctures separated by less than $\frac{1}{2}$ to equal their diameter, mostly coarsely punctate with punctures separated by less than $\frac{1}{2}$ a diameter. **Elytra:** Length 2.02 mm (δ 2.00–2.25, ♀ 1.55–2.42), width 1.38 mm (δ 1.22–1.55, ♀ 1.18–1.50); dark brown (usually brownish black, sometimes black) median stripe pattern as in Figure 29 (sometimes as in fig. 30); texture smooth (to slightly roughened or entirely slightly roughened); coarsely punctate with moderate punctures interspersed, punctures separated by less than $\frac{1}{2}$ to equal their diameter, mostly by less than $\frac{1}{2}$ a diameter. **Legs:** Normal color sequence. **Abdomen:** 5th sternum with an apical median moderately concave lobe, concavity tapering posteriorly and extending to midpoint (extending to within $\frac{1}{3}$ of sternal base), a median linear impression extending postbasally to preapically (extending from sternal base to base of concavity; ♀ : simple in outline, sometimes with a median linear impression in apical $\frac{1}{3}$ to $\frac{1}{2}$);

brownish black (usually black) with median lobe paler except median linear impression black.

Male—Aedeagus (figs. 139–141); length approximately 1.01 mm; slightly arched dorsoventrally, of rather uniform width except median lobe slightly narrowed premedially; apex in dorsal view narrowly truncate, in lateral view tapering to a moderately wide, rounded tip, venter almost straight; ventral view as in Figure 141.

Female—Spermatheca (fig. 182); length approximately 0.37 mm; receptacle elongate, basal $\frac{1}{3}$ swollen, ventrally slightly constricted medially, ring collar moderately developed.

TYPE MATERIAL—The lectotype, allolectotype, and 4 paralectotypes (1 δ , 3 ♀) are at the MCZC (recently transferred from the ANSP), and 1 other possible paralectotype (♀) is at the MCZC. The lectotype is mounted on a point and the pin bears 5 labels (descending order): “Or.” “ δ ” “Horn Coll H 7025” and my and the MCZC’s type labels. The allolectotype and 3 of the MCZC paralectotypes are labeled: “Or. [1 δ has label with period partially cut off, 1 ♀ has the period completely cut off]” and “Horn Coll H 7025”; and the 4th (♀) is labeled as follows: “Or.” “TYPE No. 2711” and “P. oregonensis Crotch”. The questionable specimen at MCZC is labeled: “Or.” “J.L. LeConte Coll.” “Type 5015” and “oregonensis Cr.”.

The series from the ANSP is accepted as Crotch’s type series based on his statement (1873, p. 19) that “all the species described are from the cabinets of Drs. Leconte [*sic*] and Horn,” the type locality is given as “Oregon (Horn),” and the sexually dimorphic male antennae are mentioned in the description. Crotch did not designate a type as was the custom of the day. The type label on the one specimen was added by a subsequent curator and is not a valid designation; the Horn collection label was either never added to this specimen or was accidentally not returned to the specimen, possibly at this time. Dr. Rentz, Curator of the Entomology Collection, could add nothing to my conclusions. A male was selected because of the diagnostic male genitalia and antennae.

The specimen labeled as type at the MCZC may have been examined by Crotch because he studied LeConte’s collection and it was customary for Horn and LeConte to exchange material. However, it is possible that it was added after Crotch’s study (1873) because LeConte was still active and Crotch specifically indicated that the specimens were from Horn’s collection. Therefore, it was not labeled a paralectotype. The type label was added by a subsequent curator and is not a valid designation.

BIOLOGY—**Host Plants, Adult**—Leaves, seed-heads, and flowers of sugar beet (Chittenden, 1923, p.

135). New Collection Records: *Mixed mustards, from Hollister, Id. 6/11/27 (USNM:1); on potatoes, from Tulelake Cal. July 20, 1946 (AMNH:2); and **Brassica* sp., from Tulelake, Siskiyou Co., Cal., Joe Schuh Coll. (AMNH:2). The other host records cited by Chittenden (1923, p. 135) belong to other species (see *P. attenuata* and *P. constricta*), except the following which have not been verified by me because of lack of specimens: Fowler and Paonia, Colorado, by Titus, on foliage and flowers of peppergrass, *Lepidium (Sopulorus) spathalatum*, and Rocky Ford, Colorado, by Marsh, on radish and turnip. The peppergrass citation also represents the larval leaf mining record.

Immature Stages—Undescribed or unknown (see above).

Habits—The larvae may be leaf miners (see above). Adults have been collected in Colorado from mid-June until mid-August, in Idaho in mid-June, in Oregon in May, and in California from late May to late July; no date is associated with the Utah specimen.

SPECIMENS EXAMINED—Total 35, see Type Material above and the Appendix.

DISTRIBUTION—Figure 200; *P. oregonensis* has been collected in the Rocky Mountains and westward, specifically in Colorado, Idaho, Utah, Oregon, California, and New Mexico.

DISCUSSION—**Nomenclature**—Crotch (1873) described *P. oregonensis* from six or seven specimens (see above under Type Material) and placed it in the genus *Orchestris* (Crotch, not Kirby, 1837). LeConte (1878, p. 615) pointed out Crotch's error in using this generic name, and Horn (1889) transferred this species to *Phyllotreta*.

Relationships—*Phyllotreta oregonensis* is most similar to *P. constricta* and is less similar to *P. emarginata*, *P. zimmermanni*, *P. utanula*, and *P. utana* with which it shares elytral color pattern and having the male 5th antennal segment dorsoventrally flattened. However, the elytral stripe of *P. oregonensis* and *P. constricta* is usually much wider medially than that of the other four species. The male 5th antennal segment of *P. zimmermanni* has a basal concavity ventrally, whereas that of the other five species is evenly flattened ventrally; also antennal segments 2 through 5 are pale in *P. utana* and *P. utanula*, whereas in the other four species, antennal segments 2 and 3 are pale and/or dark, and segments 5 through 11 are dark. The aedeagi of these six species separate into three distinct groups (based on dorsal view of apex) as follows: *P. utana* and *P. utanula* which have the apex very broad and its margin moderately and broadly emarginate; *P. zimmermanni* and *P. emarginata* with the apex not broadened and with its mar-

gin moderately but narrowly emarginate medially; and *P. oregonensis* and *P. constricta* with the apex not broadened and with its margin entire. However, *P. oregonensis* has its apex in dorsal view narrowly truncate and in lateral view almost straight, whereas *P. constricta* has its apex evenly rounded and directed ventrally. The spermathecae of these six species are fairly distinct, with those of *P. oregonensis* and *P. constricta* most similar. *Phyllotreta utana* has the receptacle oblong, almost parallel-sided, and with a very slight posterior collar, whereas *P. emarginata* has the receptacle elongate oblong with the base swollen and gradually tapering to a slightly developed ring collar. Those of *P. oregonensis*, *P. constricta*, and *P. zimmermanni* have the receptacle elongate, but *P. oregonensis* and *P. constricta* have the receptacle slightly arched dorsally, ventrally constricted medially, and with a moderately developed ring collar or no collar, whereas *P. zimmermanni* has the receptacle swollen basally, almost parallel-sided apically, and with a prominent collar. The spermatheca of *P. oregonensis* tends to have the receptacle less strongly swollen in the basal one-half and has a moderate collar, whereas that of *P. constricta* is more strongly swollen and has no collar. The spermatheca of *P. utanula* is unique to this entire group in that its receptacle tapers anteriorly in the basal one-half ventrally. Also see this section under *P. emarginata* and *P. utana*.

Phyllotreta oregonensis might be confused with *P. attenuata* and *P. dolichophalla* on the basis of the medially wide elytral stripe, but *P. oregonensis* has the male 5th antennal segment dorsoventrally flattened, whereas in *P. attenuata* and *P. dolichophalla*, it is simple.

Phyllotreta ramosa (Crotch). Figures 31, 81–82, 142–144, 183, 201.

Orchestris ramosa Crotch, 1874. Trans. Amer. Entomol. Soc., 5:80.

Holotype: Female, MCZC type #5022, at Museum of Comparative Zoology, Harvard.

Type locality: Lake Port, North California (= Lakeport in Lake County).

Phyllotreta ramosa: Horn, 1889. Trans. Amer. Entomol. Soc., 16:299.

DIAGNOSIS—Each elytron with a median pale stripe with abrupt lateral dilations, apically curved toward but never meeting suture, median $\frac{1}{2}$ uniformly very narrow; antennal segment 5 simple, almost same length as 4 or 6, 4 and 6 subequal.

DESCRIPTION OF HOLOTYPE (species variation, excluding punctuation, in parentheses)—Figure 31; oblong oval, length 2.20 mm (δ 1.92–2.35, η 1.98–

2.25), width 1.05 mm (δ 0.88–1.12, ♀ 0.92–1.08); head and pronotum black with a slight metallic luster, elytra dark brown with a slight metallic luster (no luster), each elytron with a median straw-yellow stripe. **Head:** Black (brownish black); vertex finely granulate (in addition finely alutaceous basally or slightly roughened anteriorly), moderately punctate with punctures separated by less than $\frac{1}{2}$ to equal their diameter, mostly by less than $\frac{1}{2}$ a diameter; interocular distance/maximum diameter of eye, 1.31 (δ 1.25–1.33, ♀ 1.25–1.38). **Antennae** [left missing]: Figures 81–82; segments 4 and 6 subequal (equal) in length; segment 5 simple, slightly longer than (subequal to) 4, 6 or 7, 7 slightly longer than (subequal to) 6; see Table 2 for segment length/width, length 1.16 mm (δ : length 1.08 mm; simple); antennae various shades of brown, basal 2 (3) segments paler with segment 1 darker medially (not darker to basal $\frac{1}{2}$ darker), 3 (4 or none) intermediate, 4–11 (5–11) darkest. **Pronotum:** Length 0.40 mm (δ 0.35–0.42, ♀ 0.35–0.42), width 0.70 mm (δ 0.60–0.78, ♀ 0.65–0.72); black (rarely brownish black); texture finely granulate; very coarsely punctate, coarsely punctate medially in apical $\frac{1}{2}$, punctures separated by less than $\frac{1}{2}$ their diameter. **Elytra:** Length 1.65 mm (δ 1.40–1.72, ♀ 1.45–1.75), width 1.05 mm (δ 0.88–1.12, ♀ 0.92–1.08); dark brown but basally brownish black between stripes (entirely dark brown; with suture and margins darker), median stripe pattern as in Figure 31; texture smooth; very coarsely punctate in basal $\frac{1}{2}$, coarsely punctate in apical $\frac{1}{2}$, punctures separated by less than $\frac{1}{2}$ their diameter. **Legs:** Normal color sequence. **Abdomen:** 5th sternum with outline simple, with a shallow median impression in apical $\frac{1}{3}$ (♀ : in addition apical $\frac{1}{2}$ shallowly concave; impression in apical $\frac{2}{3}$ but very narrow or no median impression but this area flat; δ : 5th sternum with an apical median, moderately to deeply concave lobe and a shallow median linear impression; median concavity sometimes extended and tapering toward base but ending before reaching basal $\frac{1}{3}$, median linear impression can extend complete length of sternum, but usually ends $\frac{1}{3}$ of way into median concavity, or rarely is expanded in basal $\frac{1}{3}$); dark brown (to black; δ : usually with apical $\frac{1}{3}$ of 5th paler).

Male—Aedeagus (figs. 142–144); length approximately 0.91 mm; very slightly arched dorsoventrally, width rather uniform but slightly tapering toward base in basal $\frac{1}{3}$; with dorsal washboard; apex in dorsal view moderately acute, tip slightly rounded, in lateral view extreme apex very slender, abruptly bent ventrally at about 45°, tip pointed; ventral view as in Figure 144.

Female—Spermatheca (fig. 183); length approximately 0.32 mm; receptacle elongate pear-shaped, tapering toward pump, with a slightly developed ring collar.

TYPE MATERIAL—The holotype is at the MCZC. It is mounted on a point and the pin bears 5 labels (descending order): “Cala.r” “J.L. Lecont [sic] Coll.” “Type 5022” “ramosa sp.n.” and “Abdomen lost E.H. Smith '80”.

BIOLOGY—**Host Plants, Adult**—*Cabbage, *cauliflower, *brussels sprouts, *mustard, *radish, *rape, *stocks, *turnips, *wallflower, *water cress (Essig, 1926, p. 481); **Erysimum asperum* (Nutt.), **Brassica nigra* (Wilcox, 1979, pp. 11, 8). New Collection Records: [**Brassica nigra* (L.), from Guadalupe, Cal., July 29, 1908, ILJL Condit Collector (USNM:4)]; *Asclepias* sp., from mouth Williams R., Klamath County, Ore. June 17, 1958, Joe Schuh Coll. (AMNH:1); *Cupressus macrocarpa*, from San Carlos, Cal. 4-12-18 F.B. Herbert colr. (USNM:1); Strawberry plants, from Santa Cruz, Cal. 1-22-34 Cal. Dept. Agr. No. 3446 (CDAE:1).

Immature Stages—Unknown.

Habits—Essig (1926, pp. 280–281) remarked that this species is often very abundant and destructive to the above-recorded host plants. Adults have been collected in the Pacific Northwest from mid-March until mid-June and in late January (perhaps overwintering), in California from March until early August and in early December, and in mid-August in Nevada. The questionable New York record was collected in mid-June (see below).

SPECIMENS EXAMINED—Total 157, see Type Material above and the Appendix.

DISTRIBUTION—Figure 201; *P. ramosa* has been collected in the Pacific Coast states, 3 specimens are recorded from Nevada, and 1 specimen is recorded from New York which is either mislabeled or is an important new record for this western economic species.

DISCUSSION—**Nomenclature**—There are no synonyms, and Crotch (1874) described *P. ramosa* from a single specimen.

Relationships—*Phyllotreta ramosa* is most similar to *P. ramosoides* and less similar to *P. bipustulata*, *P. striolata*, and *P. decipiens*. Of the maculate species, these five have the aedeagus of the same general shape, have the dorsal washboard, and an acute apex which in lateral view is angled ventrally. Only *P. ramosa* and *P. ramosoides* share the distinctive elytral color pattern, having the stripe with abrupt lateral dilations apically curved toward but never reaching the suture, and with the median one-half uniformly very narrow; but occasionally, these two might be confused with a *P. striolata*, having the median part

of the stripe narrow, but the antennae will easily separate the three species. *Phyllotreta ramosa* and *P. bipustulata* share the additional character of having the 5th antennal segment in both sexes simple and not elongate, whereas in *P. ramosoides* and *P. decipiens*, it is simple but elongate in both sexes, and in *P. striolata*, it is simple and elongate in the female and enlarged and elongate in the male. The spermathecae of these five species are each distinctive, but those of *P. ramosa* and *P. ramosoides* are somewhat similar. However, the spermatheca of *P. ramosa* is less robust with a longer pump and has the spermathecal sclerotized duct between the receptacle and gland valve attachment narrower (its length about three and three-fourths its maximum width) than in *P. ramosoides* (duct length about one and one-half times its maximum width).

***Phyllotreta ramosoides* Smith, NEW SPECIES.** Figures 32, 83–84, 145–146, 184, 202.

Holotype: Male, CNCI type #17804, deposited at Canadian National Collection of Insects.
Type locality: Pender Harbor, British Columbia, Canada.

DIAGNOSIS—Each elytron with a median pale stripe with abrupt lateral dilations, apically curved toward but never meeting suture, median $\frac{1}{2}$ uniformly very narrow; antennal segment 5 simple, longer than 6, segments 4 and 6 subequal; male genitalia in lateral view moderately and evenly arched dorsoventrally.

DESCRIPTION OF HOLOTYPE: (species variation, excluding punctuation, in parentheses)—Figure 32; oblong, length 2.45 mm (δ 2.38–2.65, η 2.48–2.78), width 1.20 mm (δ 1.18–1.25, η 1.22–1.30); head brownish black (with slight metallic luster), pronotum black with slight metallic luster (no luster), elytra dark brown (with slight metallic luster), each with a median straw-yellow stripe. **Head:** Brownish black (usually black); vertex finely granulate basally to smooth anteriorly (basally, finely alutaceous or alutaceous and granulate; anteriorly, slightly roughened or smooth to roughened; entirely slightly roughened), moderately punctate with coarse and very fine punctures interspersed, punctures separated by less than $\frac{1}{2}$ to equal their diameter but mostly by less than $\frac{1}{2}$ a diameter; interocular distance/maximum diameter of eye, 1.33 (δ 1.33–1.39, η 1.26–1.39). **Antennae:** Figures 83–84; segments 4 and 6 subequal, shorter than segment 7, segment 5 about $1.5 \times$ length of 6; segment 5 slightly enlarged in diameter; see Table 2 for segment length/width, length 1.46 mm (allotype: length 1.39 mm; simple); antennae various shades of

brown, basal 3 segments paler with dorsum of 1 darker (η : 1 entirely paler), segment 4 intermediate, 5–11 darkest. **Pronotum:** Length 0.48 mm (δ 0.45–0.50, η 0.45–0.52), width 0.80 (δ 0.80–0.88, η 0.80–0.90); black; texture smooth (slightly roughened, finely granulate, smooth to roughened, alutaceous to roughened); coarsely punctate, punctures separated by less than $\frac{1}{2}$ to equal their diameter, mostly by less than $\frac{1}{2}$ a diameter. **Elytra:** Length 1.80 mm (δ 1.78–1.92, η 1.80–2.08), width 1.20 mm (δ 1.18–1.25, η 1.22–1.30); dark brown (black, sometimes brownish black between stripes basally), median stripe pattern as in Figure 32; texture smooth (slightly roughened or smooth to slightly roughened); coarsely punctate, punctures separated by less than $\frac{1}{2}$ their diameter. **Legs:** Normal color sequence. **Abdomen:** 5th sternum with an apical median moderately (deeply) concave lobe, concavity oval and extending to apical $\frac{1}{3}$ (oblong or tapering, extending to within $\frac{1}{3}$ of sternal base), with a median linear impression extending from sternal base to apex (ending at base of median lobe; η : simple in outline; with no impression, with a median short narrow shallow transverse preapical impression, or with a median shallow oval impression in apical $\frac{1}{3}$); brownish black (black or dark brown) with median lobe paler (entirely dark).

Male—Aedeagus (figs. 145–146); length approximately 1.06 mm; moderately and evenly arched dorsoventrally, of rather uniform width, with a dorsal washboard; apex in dorsal view roundly acute with tip rounded, in lateral view narrow, gradually curved ventrad with tip pointed. No ventral impression observed.

Female—Spermatheca (fig. 184); length approximately 0.33 mm; receptacle elongate pear-shaped, tapering toward pump, ring collar very slightly developed.

TYPE MATERIAL—The holotype, allotype, and 7 paratypes (3 δ , 4 η) are at the CNCI; 23 paratypes (14 δ , 9 η) are at AMNH; 16 paratypes (8 δ , 8 η) are at CASC; 12 paratypes (7 δ , 5 η) are in my collection (EHSC); 2 paratypes (1 δ , 1 η) are at MCZC; 1 paratype (δ) is at NMDC; 1 paratype (η) is at OSUO; and 2 paratypes (1 δ , 1 η) are at the USNM. The holotype is mounted on a point and the pin bears 3 labels (descending order): “Pender Harbor B.C. V-27-28 G.R. Hopping” and my and the CNCI’s type labels. The allotype has the same locality-date label as the holotype and my and the CNCI’s type labels.

The 23 paratypes at the AMNH are as follows: 1 η , “Astoria, Ore. May 10, 1936 Coll. K. Gray”; 1 δ , “Corvallis, 14-1. Or.”; 1 η , “Corvallis, 11-12. Or.”; 1 η , “Goble, Oregon May 22, 1938 Coll. K. Gray J. Schuh”; 4 δ and 1 η , “22 Mi. N of Prospect, Ore. 6-8-41 col: Schuh & Gray”; 2 η , “Scappoose, Ore.

April 16, 1938 (Emergence Cages) Coll. K. Gray J. Schuh"; 1♂, "Scappoose, Ore. May 1, 1937 (on turnips) Coll. J. Schuh"; 1♂, "Scappoose, Ore. VI-8-1937 R.E. Reider, col."; 1♂, "Scappoose, Ore. VI-12-1937 R.E. Reider, col."; 1♂, "Scappoose, Ore. VI-25-1937 R.E. Reider, col."; 1♀, "Sprague, Riv., Ore. 5 mi. E Bly June 16, 1957 Joe Schuh, Coll."; 4♂ and 1♀, "Summit, Ore. 5-25-41 col: Schuh & Gray"; 1♂, "Vernonia, Ore April 21, 1936 Coll. K. Gray"; and 1♂, "Vernonia, Ore. May 9, 1936 Coll. K. Gray J. Schuh". The 7 paratypes at CNCI are as follows: 3♂ and 2♀, same as holotype; 1♀, "Aklavik, N.W.T. 25-VI-1956 E.F. Cashman"; and 1♀, "Mission City, B.C. VI·29·53 S.D. Hicks". The 16 paratypes at the CASC all have the holotype locality-date label and the additional label: "R. HOPPING COLLECTION". The 12 paratypes at EHSC are as follows: 3♂ and 3♀, same as those at CASC; 2♂ and 1♀, "Summit, Ore. 5-25-41 col: Schuh & Gray"; and 2♂ and 1♀, "22 Mi. N of Prospect, Ore. 6-8-41 col: Schuh & Gray". The paratype at NMDC is labeled "Sandpoint, Ida VI-11 1951 N.M. Downie" "may be oblonga ♂ Chtt" and "also as 16073 as Det. L.G.G. but too large". The paratype at OSUO is labeled "McMinnville Ore 10/11/1941 KM DM Fender". The 2 pairs of paratypes at the MCZC and USNM are labeled identically to those of CASC.

BIOLOGY—Host Plants, Adult—*Turnips, from Scappoose, Ore. May 1, 1937 Coll. J. Schuh (AMNH:1).

Immature Stages—Unknown.

Habits—Adults have been collected in the Pacific Northwest from mid-April until late June, and in the Northwest Territories in late June.

SPECIMENS EXAMINED—Total 66, see Type Material above.

DISTRIBUTION—Figure 202; *P. ramosoides* has been collected in the Pacific Northwest, specifically southern British Columbia, northern Idaho, and Oregon, and in the Northwest Territories.

DISCUSSION—Relationships—*Phyllotreta ramosoides* is most similar to *P. ramosa* and less similar to *P. bipustulata*, *P. striolata*, and *P. decipiens*; for a discussion of these relationships, see this section under *P. ramosa*.

Etymology—The specific name *ramosoides* comes from a combination of the specific name of *P. ramosa* (Latin *ramosa*- meaning branch) and the Latin suffix *-oides* meaning like. This refers to the elytral stripe pattern which this species shares with *P. ramosa*.

Phyllotreta robusta LeConte. Figures 33–34, 85–86, 147–149, 185, 203.

Phyllotreta robusta LeConte, 1878. Proc. Amer. Phil. Soc., 17:614–615.

Holotype: Female, MCZC type #4429, at Museum of Comparative Zoology, Harvard.

Type locality: Detroit, Michigan.

DIAGNOSIS—Each elytron with a median pale stripe greatly expanded in apical $\frac{1}{2}$, reaching margin and suture apically, and usually laterally expanded basally; male antennal segment 5 moderately expanded, with a ventrally directed bluntly pointed apical prolongation.

DESCRIPTION OF HOLOTYPE (species variation, excluding punctuation, in parentheses)—Figure 33; elongate oval, length 2.38 mm (δ 1.98–2.30, η 2.08–2.38), width 1.25 mm (δ 1.00–1.12, η 1.10–1.18); head and pronotum black with slight metallic luster (no luster), elytra brownish black (rarely with faint metallic luster), each with a median straw-yellow stripe. **Head:** Black; vertex finely granulate (sometimes in addition, finely alutaceous basally), moderately punctate with punctures separated by less than $\frac{1}{2}$ to equal their diameter, mostly by less than $\frac{1}{2}$ a diameter, many punctures confluent; interocular distance/maximum diameter of eye, 1.22 (δ 1.22–1.38, η 1.22–1.38). **Antennae:** Figures 85–86; segments 4 and 6 subequal in length, 6 shorter than 7, 5 distinctly longer than 4, 6, or 7 and simple (δ : segment 5 moderately expanded, with a long ventrally directed bluntly pointed apical prolongation, flat ventrally but slightly concave; segment 6 shorter than 4 or 7); see Table 2 for segment length/width, length 1.36 mm (δ : length 1.25 mm); antennae various shades of brown, basal 4 (3) segments paler, 5 (4–7) intermediate, 6–11 darkest (5–11 or 8–11) (dorsum of 1–5 sometimes darker in any combination, usually 1 and 4–5). **Pronotum:** Length 0.45 mm (δ 0.38–0.42, η 0.40–0.45), width 0.75 mm (δ 0.65–0.75, η 0.72–0.78); black; texture finely granulate; coarsely punctate, punctures separated by less than $\frac{1}{2}$ to equal their diameter, mostly by less than $\frac{1}{2}$ a diameter. **Elytra:** Length 1.75 mm (δ 1.48–1.75, η 1.52–1.75), width 1.25 mm (δ 1.00–1.12, η 1.10–1.18); brownish black between stripes to dark brown (brown) laterally, median stripe pattern as in Figure 33 (sometimes as in fig. 34); texture slightly roughened (sometimes smooth); coarsely punctate in basal $\frac{1}{2}$ with punctures separated by less than $\frac{1}{2}$ to less than their diameter, mostly by less than 1 diameter, moderately punctate in apical $\frac{1}{2}$ with punctures separated by less than to equal their diameter, mostly by about 1 diameter. **Legs:** Normal color sequence. **Abdomen:** 5th sternum simple in outline (η : rarely with median shallow linear impression in apical $\frac{1}{2}$; δ : with an apical median deeply concave lobe, a deep, troughlike

wide median impression extending postbasally to base of median lobe concavity); brownish black (black; ♂: median lobe usually paler).

Male—Aedeagus (fig. 147–149); length approximately 0.76 mm; slightly arched dorsoventrally, rather uniform in width but slightly wider just basad of orifice in dorsal view and strongly tapered dorsally from midpoint of median lobe to apex in lateral view; apex in dorsal view strongly, somewhat abruptly acute, in lateral view tapering to a narrow rounded tip except for a small postorifice flange on dorsum; ventral view as in Figure 149.

Female—Spermatheca (fig. 185); length approximately 0.33 mm; receptacle elongate, ventrally slightly constricted premedially, ring collar slightly developed.

TYPE MATERIAL—The holotype is at the MCZC. It is mounted on a point and the pin bears 5 labels (descending order): “Detroit Mic 26/5” “34” “Type 4429” “*O. robusta* Lec. [*sic*]” and “Abdomen lost E.H. Smith '80”.

BIOLOGY—**Host Plants, Adult**—*Radish and *turnip (Chittenden, 1927, p. 19); *cabbage (Beirne, 1971, p. 109); **Brassica napus* L. and **B. campestris* L. (Burgess, 1977, p. 31); **Brassica* sp., **B. arvensis*, and **Lepidium* sp. (Wilcox, 1979, pp. 7, 14). New Collection Records: [**Brassica arvensis* (= *Sinapis arvensis* L.), from Waupaca, Wis., 6-21-20 L.G. Gentner Collector (CNZI:1, UWEM:1)]; [**Lepidium* sp., from Madison, Wis. 6-3-19, L.G. Gentner Collector (UWEM:1)]; *Chinese cabbage, from Portland, Maine 14·9·43 (USNM:1); **Eleagnus* [*sic*] *commutata*, from Ninette, Manitoba 15-V·1958 J. F. McAlpine, Aspen Bluff Community (CNCI:1); **Poa pratensis* L., from White-water L. 4 mi. N. Whitewater, Man. 22.VI.1958, R.D. Bird (CNCI:1); *water cress, from Framingham, Mass., VI·6·41 J.W. Green (CASC:1).

Immature Stages—Unknown.

Habits—Adults have been collected in north-eastern United States and adjacent Canada from mid-April until late June and in mid-January (probably overwintering), in the midwest and adjacent Canada from early May until late September, and in western United States and adjacent Canada from late April until early October.

SPECIMENS EXAMINED—Total 211, see Type Material above and the Appendix.

DISTRIBUTION—Figure 203; *P. robusta* has been collected east of the Rocky Mountains in the northern half of the United States and adjacent Canada and in southern Colorado.

DISCUSSION—**Nomenclature**—In 1878, LeConte described *P. robusta* from a single specimen. There are no synonyms.

Relationships—*Phyllotreta robusta* is most similar to *P. liebecki*; see this section under *P. liebecki*.

Phyllotreta spatulata Smith, NEW SPECIES. Figures 35, 87–88, 150–152, 186, 203.

Holotype: Male, CASC type #14213, deposited at California Academy of Sciences.

Type locality: Humboldt Co., California.

DIAGNOSIS—Each elytron with the median stripe simple, of uniform width and without dilations, slightly incurved toward suture apically; male 5th antennal segment expanded bilaterally, dorsoventrally flattened, with venter flat, not concave; antennal segments dark, except at least 1–5 paler on venter.

DESCRIPTION OF HOLOTYPE (species variation, excluding punctuation, in parentheses)—Figure 35; elongate, length 2.52 mm (♂2.45–2.52, ♀2.55–2.62), width 1.15 mm (♂1.12–1.15, ♀1.25–1.28); head and pronotum black with slight metallic luster, elytra brownish black with slight metallic luster (no luster), each with a median straw-yellow stripe. **Head:** Black; vertex finely granulate basally to slightly roughened anteriorly (entirely finely granulate), moderately punctate with punctures separated by less than to 2 × their diameter, mostly by about 1 diameter; interocular distance/maximum diameter of eye, 1.88 (♂1.88, ♀1.81). **Antennae:** Figures 87–88; segments 3–5 progressively longer, 6 less than ½ length of 4, segment 7 slightly longer than 6; segments 4 and 5 expanded bilaterally, dorsoventrally flattened; segment 5 distinctly longest, with venter flat, not concave; see Table 2 for segment length/width, length 1.50 mm (allotype: length 1.48 mm; simple); antennae dark brown with segments 1–7 (at least 1–5) paler ventrally (♀: with basal 2 or 3 segments or with 2 or 2–3 paler, ventrally segments 3–5 or 4–5 somewhat darker than basal segments but paler than dorsum). **Pronotum:** Length 0.45 mm (♂0.42–0.45, ♀0.45), width 0.80 mm (♂0.80, ♀0.82); black; texture finely granulate; moderately punctate, punctures separated by less than ½ to equal their diameter, mostly by about 1 diameter. **Elytra:** Length 1.82 mm (♂1.75–1.82, ♀1.90–1.92), width 1.15 mm (♂1.12–1.15, ♀1.25–1.28); brownish black (dark brown), median stripe as in Figure 35; texture smooth (slightly roughened); coarsely punctate with moderate punctures interspersed, punctures separated by less than ½ their diameter. **Legs:** Normal color sequence. **Abdomen:** 5th sternum with an apical median lobe moderately concave, concavity tapering (oval) in its extension to midpoint, with a median

linear impression from sternal base to preapex, frequently interrupted (♀: simple in outline, with an oblong median impression in apical ½ or with apical ½ flat medially); brownish black (dark brown) with median lobe paler (♀: entirely dark).

Male—Aedeagus (figs. 150–152); length approximately 0.88 mm; essentially straight except for a dorsal preapical-orifice swelling and for basal piece slightly and apex strongly curved ventrad, of rather uniform width except gradually broadening in apical ½, broadest preapically; apex in dorsal view broadly rounded, faintly truncate medially, in lateral view strongly but gradually curved ventrad, of rather uniform width with tip bluntly rounded and tip with a median ventral swelling or blunt tooth; ventral view as in Figure 152.

Female—Spermatheca (fig. 186); length approximately 0.37 mm; receptacle elongate, with basal margin tapering to a blunt preapical point, rather abruptly and strongly swollen ventrally in basal ½ and elongate, almost parallel-sided in apical ½, with a moderately developed ring collar; spermathecal duct attached on dorsum of receptacle.

TYPE MATERIAL—The holotype and allotype are at the CASC, 1 paratype (♀) is in my collection (EHSC), and 1 paratype (♂) is at the USNM. The holotype is mounted on a point and the pin bears 4 labels (descending order): “Humboldt Co. Cal.” “Van Dyke Collection” and my and the CASC’s type labels. The allotype bears the same first 2 labels and my and the CASC’s type labels.

The paratype at EHSC also bears the same first 2 labels as the holotype. The paratype at the USNM bears the following 3 labels: “Humboldt Co. Cal.” “WICKHAM Collection 1933” and “Phyllotreta lepidula Lec. [sic]”.

BIOLOGY—Host plants, immature stages, and habits are unknown.

DISTRIBUTION—Figure 203; *P. spatulata* has been collected only in Humboldt Co., California.

SPECIMENS EXAMINED—Total 4, see Type Material above.

DISCUSSION—Relationships—*Phyllotreta spatulata* is most similar to the striped specimens of *P. denticornis*, and is less similar to *P. lepidula*, *P. arcuata*, and *P. constricta* with which it shares having a simple elytral stripe and the male 5th antennal segment dorsoventrally flattened. *Phyllotreta spatulata* also shares the flattened male 5th antennal segment with *P. utana*, *P. utanula*, *P. oregonensis*, *P. emarginata*, and *P. zimmermanni*, but these six species have the elytral stripe dilated, not simple. *Phyllotreta denticornis* is unique in having the male 6th antennal segment with a sharp process. The aedeagi of *P. spat-*

ulata and *P. denticornis* are very similar and distinct as a group, based particularly on the lateral view. However, in dorsal view, *P. spatulata* is more abruptly broader preapically, and the apex is broadly rounded and faintly truncate medially, whereas in *P. denticornis*, the median lobe is somewhat broadened in the apical one-fourth and the apex is broadly rounded but moderately and shallowly emarginate; in lateral view on the dorsum *P. spatulata* has a moderate preapical-orifice swelling, whereas *P. denticornis* is evenly tapered toward the apex. The spermatheca of *P. spatulata* is unique, but is most similar to those of *P. dolichophalla*. The spermatheca of *P. spatulata* has the dorsum straight, and the ring collar is not as wide or strongly developed, whereas in *P. dolichophalla*, the receptacle dorsum is slightly swollen in the basal one-half and the ring collar is much more strongly developed.

Etymology—The specific name *spatulata* comes from the Latin *spatul-* meaning a spoon and refers to the aedeagus in lateral view resembling a scoop or spoon.

Phyllotreta striolata (Fabricius). Figures 36–42, 89–90, 153–155, 187, 204, 217.

Crioceris vittata Fabricius, 1801. Systema Eleutheratorum, 1:469. (Not *C. vittata* Fabricius, 1775:122.)

Neotype (here designated): Male, USNM type #100636, deposited at United States National Museum.

Type locality: “Carolinae”; neotype is from near Charleston, South Carolina.

Crioceris striolata Fabricius, 1803. Index alphabeticus, in J. C. Fabricii Systema Eleutheratorum, genera et species continens, p. 38. (Substitute name for *C. vittata* F., 1801.)

Haltica striolata: Illiger, 1807. Mag. Insektenk., 6:148.

Phyllotreta striolata: Barber, 1947. Proc. Entomol. Soc. Washington, 49(6): 156–157.

Haltica sinuata Redtenbacher, 1849. Fauna Austriaca, p. 532. (Not Stephens, 1831: not Horn, 1889.) (Synonymy by Heikertinger, 1913:175.)

Phyllotreta sinuata: Foudras, 1860. Ann. Soc. Linn. Lyon, 6(ser. 2):345.

Orchestris vittata: Crotch, 1873. Proc. Acad. Nat. Sci. Philadelphia, 25:66.

Phyllotreta vittata: Horn, 1889. Trans. Amer. Entomol. Soc., 16:294.

Phyllotreta sinuata var. *discedens* Weise, 1888. Naturgeschichte der Insecten Deutschlands . . . , Abt. 1, Coleoptera, 6(Lief. 5):871. NEW SYNONYMY.

Type: ?, not examined.

Type locality: “Nordafrika”, Syria, Siberia to Wladivostok.

Phyllotreta vittata var. *discedens*: Chittenden, 1927. Entomol. Amer., 8(n.s., no. 1):25.

Phyllotreta vittata fa. *maculipennis* ab. *discedens*: Heikertinger and Csiki, 1939. Coleopterorum catalogus, pars 166, p. 55.

Phyllotreta maculipennis abber. *discedens*: Balsbaugh and Hays, 1972. Auburn Univ. Agr. Exp. Sta. Bull., 441:172.

Phyllotreta sinuata var. *monticola* Weise, 1888. Naturgeschichte der Insecten Deutschlands . . . , Abt. 1, Coleoptera, 6(Lief. 5):871. NEW SYNONYMY.

Type: ?, not examined.

Type locality: "Kärnten" and "Krain."

Phyllotreta vittata var. *monticola*: Chittenden, 1927. Entomol. Amer., 8(n.s., no. 1):24.

Phyllotreta vittata fa. *tenuelimbata* ab. *monticola*: Heikertinger and Csiki, 1939. Coleopterorum catalogus, pars 166, p. 55.

Phyllotreta tenuelimbata abber. *monticola*: Balsbaugh and Hays, 1972. Auburn Univ. Agr. Exp. Sta. Bull., 441:172.

Phyllotreta vittata var. *artivitta* Chittenden, 1927. Entomol. Amer., 8(n.s., no. 1):26. NEW SYNONYMY. Holotype: Male, USNM type #28803, at United States National Museum.

Type locality: Muscatine, Iowa.

Phyllotreta vittata ab. *artivitta*: Heikertinger and Csiki, 1939. Coleopterorum catalogus, pars 166, p. 56.

Phyllotreta vittata var. *lineolata* Chittenden, 1927. Entomol. Amer., 8(n.s., no. 1):25. NEW SYNONYMY.

Holotype: Male, USNM type #28805, at United States National Museum.

Type locality: Corvallis, Texas.

Phyllotreta vittata ab. *lineolata*: Heikertinger and Csiki, 1939. Coleopterorum catalogus, pars 166, p. 56.

Phyllotreta vittata var. *vernica* Chittenden, 1927. Entomol. Amer., 8(n.s., no. 1):25. NEW SYNONYMY.

Holotype: Male, USNM type #28809, at United States National Museum.

Type locality: Fieldbrook, California.

Phyllotreta vittata ab. *vernica*: Heikertinger and Csiki, 1939. Coleopterorum catalogus, pars 166, p. 56.

DIAGNOSIS—Each elytron with a median pale stripe with dilations, which may be reduced to a postbasal and preapical pale mark, preapical part of stripe or mark incurved apically but never meeting suture; male antennal segment 5 enlarged, essentially cylindrical, about $2 \times$ length of segment 6.

DESCRIPTION OF NEOTYPE (species variation, excluding punctuation, in parentheses)—Figure 36; elongate oblong, length 2.25 mm (δ 1.79–2.42, η 1.82–2.60), width 1.08 mm (δ 0.90–1.22, η 1.02–1.35); head and pronotum black with slight metallic luster, elytra brownish black (often with slight metallic luster), each with a median straw-yellow stripe. **Head**: Black (rarely brownish black); vertex finely granulate (rarely finely granulate to finely alutaceous or slightly roughened), finely punctate with punctures separated by less than $\frac{1}{2}$ to equal their diameter, mostly by less than $\frac{1}{2}$ a diameter; interocular distance/maximum diameter of eye, 1.25 (δ 1.11–1.28, η 1.11–1.28). **Antennae**: Figures 89–90; segment 4 longer than 6, subequal to 7, segment 5 about $2 \times$ length of 6; segment 5 moderately

(often only slightly) enlarged, essentially cylindrical but slightly flattened ventrally (shape, degree of ventral flattening, and amount of enlargement varies); see Table 2 for segment length/width, length 1.31 mm (alloneotype: length 1.35 mm; simple); antennae various shades of brown, basal 2 segments paler (dorsum of 1 often darker), 3–4 (or none) intermediate, 5–11 (3 or 4–11) darkest (η : basal 3 segments paler, dorsum of 1 may be darker, segment 4 or 4–5 intermediate, segments 5–11 or 6–11 darkest). **Pronotum**: Length 0.44 mm (δ 0.32–0.48, η 0.40–0.48), width 0.68 mm (δ 0.60–0.78, η 0.65–0.90); black; texture finely granulate (rarely finely alutaceous, or finely alutaceous to slightly roughened, or smooth to slightly roughened to finely granulate); coarsely punctate, punctures separated by less than $\frac{1}{2}$ to equal their diameter, mostly by less than $\frac{1}{2}$ a diameter. **Elytra**: Length 1.62 mm (δ 1.38–1.80, η 1.25–2.60), width 1.08 mm (δ 0.90–1.22, η 1.02–1.35); black (usually brownish black), median stripe pattern as in Figure 36 (pattern varies as in figs. 37–42); texture smooth to slightly roughened (often entirely slightly roughened); coarsely punctate, punctures separated by less than $\frac{1}{2}$ to equal their diameter, mostly by less than $\frac{1}{2}$ a diameter. **Legs**: Normal color sequence. **Abdomen**: 5th sternum with an apical median shallowly (to deeply) concave lobe, concavity tapering (often oblong), extending to midpoint of sternum (extending to within $\frac{1}{3}$ of sternal base), with no median linear impression (usually with a somewhat indistinct or distinct median linear impression extending from sternal base to base of concavity or extending from sternal base or postbasally to preapex, sometimes interrupted; η : simple in outline, often with a median longitudinal to oval shallow impression in apical $\frac{1}{3}$); black (dark brown, usually brownish black; usually with apical $\frac{1}{3}$ to $\frac{1}{4}$ paler).

Male—Aedeagus (figs. 153–155); length approximately 0.81 mm; moderately arched dorsoventrally, of rather uniform width except slightly narrowed then swollen preapically in dorsal view, with a dorsal washboard; apex in dorsal view broadly rounded with an acute blunt tip, in lateral view gradually tapering in apical $\frac{1}{4}$ to a very narrow, ventrally directed apex, tip pointed; ventral view as in Figure 155.

Female—Spermatheca (fig. 187); length approximately 0.27 mm: receptacle elongate, wider basally and gradually tapering to posterior moderately developed ring collar; pump long, more than $\frac{1}{2}$ receptacle length.

TYPE MATERIAL—The neotype and alloneotype are at the USNM. The neotype is mounted on a point and the pin bears 4 labels (descending order):

"S. CAROLINA: Charleston Co., U.S.D.A. Exp. Sta. 7 mi. W. of Ashley River on U.S. 17; 9:IX:1976" "Lot No. 463 Eric H. Smith feeding on mustard" and my and the USNM's type labels. The alloneotype bears the same first 2 labels and my and the USNM's type labels. All the paraneotypes (35♂, 7♀) bear the same first 2 neotype labels and a paraneotype label. A pair have been deposited at BMNH, CASC, CNCI, MCZC, and UZMC. The remainder (30♂, 2♀) are at EHSC, but some will be deposited at other institutions.

BIOLOGY—Host Plants, Adult—The following represent those records verified by me via label data: Alfalfa (DuPuits, Kansas, Vernal), **Arabis* sp., banana, **Barbarea verna*, bean, beet, bluegrass, **Brassica* sp., **Brassica arvensis* [= *Sinapis arvensis* L.], **Brassia Pe-Tsai*, *broccoli, *cabbage, *cabbage (Chinese), cabbage (swamp), **Cakile edentula*, *cauliflower, cherry (wild), clover, clover (red), *collards, corn, corn (sweet), cottonwood, *Erysimum cheiranthoides* L., grass (Brome, Pelfer), *horse-radish, *kale, **Lepidium* sp., **Lepidium virginicum*, *Melilotus* sp., muskmelon, *mustard, *mustard (Texas green), **Nasturtium palustre*, nettle, *peppergrass, *Polygonum* sp., potato vines, **Radicula palustris* and **Rorippa palustris* [= *Rorippa islandica* (Oeder) Borbas], *radish, *rape, *rutabaga, strawberry, sycamore, timothy, *Trifolium pratense*, *turnip, *turnip (Chinese, Japanese, white), *water cress (*Nasturtium* sp.), wheat, and willow. Riley (1885a) records in addition: *charlock (*Sinapis* sp.), *shepherd's purse (*Capsella* sp.), *stock (*Matthiola* sp.), and *rocket (*Hesperis* sp.). Additional literature records are: *wall flower (Gibson, 1913); *brussel sprouts, gallberry (*Ilex glabra*), and sugar and garden beets (Duckett, 1920); *mustard (*Brassica nigra*), *stock (*Matthiola incana* et al.), *hoary alyssum (*Berteroa incana*), *sweet alyssum (*Alyssum maritimum* [sic] (L.)), *Virginia stock (*Cakile maritima*), *rocket (*Hesperis matronalis*), *wallflower (*Chieranthus* [sic] *cheiri*), *candy tuft (*Iberis* sp.), *yellow cress (*Radicula silvestris* [sic], sea lavender (*Statice sinuata*), **Erysimum* spp., peas, celery, and tomato (Chittenden, 1927); *broccoli (*Brassica oleracea botrytis* L.) and *spider plant (*Cleome pungens* Willd.) (Fenny et al., 1970; probable hosts from list of 22 plants); **Brassica napobrassica* Mill. (Balsbaugh & Hays, 1972); and *flixweed (*Descurainia sophia* (L.) Webb) and *lamb's-quarters (*Chenopodium album* L.) (Burgess, 1977).

Host Plants, Larva—Cabbage (Shimer, 1869), horseradish (*Armoracia rusticana*) (Burgess & Wiens, 1976). New Host Record: Radish (bred from),

no locality, June 21st · 76 (USNM:1); turnip (larvae in galleries throughout root), from Ft. Lauderdale, FL. 23 · V · 45 G Hsmold (USNM:1).

Immature Stages—Descriptions include egg by Riley (1885a), larvae by Shimer (1869) and Riley (1885a), and pupa by Shimer (1869).

Habits—The larvae are root feeders (Shimer, 1869). The adults feed mainly on the Cruciferae, including most of the genera (Tahvanainen, 1972). However, they probably feed on some members of the closely related plant families Capparidaceae, Tropaeolaceae, and Limnathaceae (Feeny et al., 1970). If populations become particularly large, they will feed on plants of other families; e.g., I have collected them feeding on lettuce (*Lactuca sativa* L.) belonging to the Compositae which was located at the end of turnip rows. This species is an important economic pest, and insecticide treatment is usually required if cruciferous vegetables are grown.

In the midwest and northeastern United States, the adults overwinter (in the top soil in New York; Hicks, 1972) and become active in early spring. Eggs are laid on or near the host (Riley, 1885a; Hicks, 1972). A few adults are present throughout the summer, but beginning in late July, the populations start to rapidly increase in size due to the emergence of the new adults from the spring-deposited eggs.

This species was introduced from Eurasia sometime before 1801 and is now widespread. Adults have been collected starting in mid-June in the Northwest Territory, in early April in Iowa and Wisconsin, in late March in North Carolina, and in early March in Louisiana. They have been collected as late as mid-September in Canada to late October in Louisiana; occasionally, they have been collected in December and January, probably representing overwintering adults.

An analysis of elytral color pattern variation was done for the available material. Seven categories of patterns were selected and are represented in Figures 36–42; these are in order of category 1 (very wide stripe) to category 7 (stripe represented by 2 marks) with the exception that Figure 36 fits between Figure 37 and Figure 38, representing category 2. For the population samples, the individuals were placed in 1 of these 7 categories, and the results are represented by the histograms of Figure 217, which are arranged (left to right, top to bottom) geographically north to south with the disjunct California population represented last. In general, the sample size was relatively small for variation analysis work, and only a coefficient of variance has been run on the data. However, a general trend can be seen in that, progressing north to south, there is an increase in dark

versus light area, or the elytral stripe tends to be more interrupted (represented by 2 marks). Until more and larger samples from a wider geographical range can be obtained, little more can be said.

SPECIMENS EXAMINED—Total 5,327, see Type Material above and the Appendix.

DISTRIBUTION—Figure 204; *P. striolata* is widespread but has been more frequently collected in northeastern and midwestern United States and central Canada.

DISCUSSION—**Nomenclature**—Fabricius (1801) described this species in the genus *Crioceris* using the already occupied specific name, *vittata*. In 1803, Fabricius published an index to his 1801 work and proposed the specific name *striolata* to replace this 1801 *vittata*. Illiger (1807) transferred *C. striolata* to *Haltica*. The Fabrician replacement name and Illiger's transfer were ignored until Barber (1947) made the transfer from *Haltica* to *Phyllotreta* and clarified the previous confusion. In 1849, Redtenbacher described this species as *Haltica sinuata* (not Stephens, 1831; not Horn, 1889, as *Phyllotreta sinuata*) which was synonymized by Foudras (1860). Crotch (1873) in error placed *P. vittata* in *Orchestris* (see LeConte, 1878, p. 165), and Horn (1889) transferred it to *Phyllotreta*.

Weise (1888) described two varieties of *P. striolata* as *P. sinuata discedens* and *P. sinuata monticola*; Chittenden (1927) transferred them to *P. vittata* and retained their varietal status. Heikertinger & Csiki (1939) listed these as aberrations of two "fa." (form ?), *maculipennis* and *tenuelimbata*; i.e., *P. vittata maculipennis discedens* and *P. vittata tenuelimbata monticola*. Balsbaugh & Hays (1972) forgot to include the specific name *vittata* in their citation of the Heikertinger & Csiki (1939) listing and mis-cited the year and page references. Chittenden (1927) described three color varieties of *P. vittata* (*artivitta*, *lineolata*, and *vernica*) which were listed by Heikertinger & Csiki (1939) as aberrations. According to article 1 and article 45(d)(i) and 45(e)(i) of the Rules of Zoological Nomenclature, these five varieties or aberrations are to be treated as having subspecific rank. In each of several long series of more than 100 to 150 specimens which I have collected, all three of Chittenden's varieties are present. Also, the European varieties *discedens* and *monticola* of Weise, which Chittenden recognized as being present in the United States, are both represented in the same long series as Chittenden's three varieties (see figs. 36–42 and 217). Therefore, I have synonymized these subspecies.

According to the Rules of Zoological Nomenclature, the type specimen of *Crioceris vittata* F. is

also the type specimen of the replacement name *Crioceris striolata* F.; for additional discussion, see Barber (1947, pp. 156–157).

The "type" of *Crioceris vittata* Fabricius, given as coleopteran number 1618 by Zimsen (1964, p. 105), was borrowed from the University Zoological Museum, Copenhagen. However, the "type" sent is not a *Phyllotreta* but, based on my experience (Smith, 1970), is probably *Systema elongata* (F.).

The Fabrician type is considered to be lost; for details see Smith (1977). Therefore, a neotype is designated here which was collected as near to the type locality as available and which agrees with Fabricius' original description.

Relationships—*Phyllotreta striolata* is a rather distinctive species. Specimens with the typical elytral stripe pattern have been confused with *P. zimmermanni* which are much longer and more robust and have the male 5th antennal segment dorsoventrally flattened instead of cylindrical. Specimens of *P. striolata* which have the elytral stripe reduced to a postbasal and preapical pale mark have often been confused with *P. bipustulata* and *P. conjuncta*, but in *P. striolata*, the preapical mark is incurved toward the suture instead of having its sutural margin straight; also male antennal segment 5 is about two times the length of segment 6 and enlarged in the male in *P. striolata*, whereas in *P. bipustulata* and *P. conjuncta* segment 5 is simple and segments 5 and 6 are subequal. The aedeagus of *P. striolata* is most similar to that of *P. decipiens*, *P. bipustulata*, *P. conjuncta*, *P. dolichophalla*, *P. ramosa*, and *P. ramosoides* with which it shares general shape and having a dorsal washboard, but differs in the shape of the apex. The spermatheca of *P. striolata* is most similar to that of *P. decipiens*, but that of *P. striolata* is shorter and has the pump proportionally much longer.

The few specimens of *P. striolata* which have only a preapical pale mark are easily confused with *P. decipiens*; for a discussion of this relationship, see this section under *P. decipiens*.

Phyllotreta undulata Kutschera. Figures 43, 91–93, 156–158, 188, 205.

Phyllotreta undulata Kutschera, 1860. Wiener Entomol. Monatschr., 4(10): 301.

Type: ?, not located.

Type locality: Europe.

Altica nemorum Panzer, 1794. Fn. Germ., XXI nr. 19. (Not Fabricius, 1775; not Linnaeus, 1758; not von Paykull, 1799.) (Synonymy by Heikertinger and Csiki, 1939:49.)

Phyllotreta flexuosa Gyllenhal, 1813. Fn. Suec. III, p. 531, var. a. (Not Baly, 1865; not Illiger, 1794; not

von Harold, 1875.) (Synonymy by Heikertinger and Csiki, 1939:49.)

DIAGNOSIS—Each elytron with the median stripe with postbasal lateral dilation at most a very small bump, stripe moderately expanded preapically, and strongly incurved apically; male antennal segment 5 subequal to 6 in length, 5th distinctly enlarged in apical $\frac{1}{2}$ to $\frac{2}{3}$ and tapering to base.

DESCRIPTION OF MALE SPECIMEN FROM YUGOSLAVIA (variation, excluding punctuation in parentheses)—Figure 43; elongate oval, length 2.20 mm (δ 2.18–3.05, η 2.41–2.59), width 1.06 mm (δ 0.90–1.10, η 1.14–1.22); head and pronotum black with slight metallic luster (no luster), elytra black (sometimes brownish black and/or with slight luster), each with a median straw-yellow stripe. **Head:** Black; vertex finely granulate (basally sometimes roughened instead), finely to moderately punctate with punctures separated by less than $\frac{1}{2}$ a diameter, mostly fine punctures, few contiguous; interocular distance/maximum diameter of eye, 1.30 (δ 1.28–1.42, η 1.33–1.47). **Antennae:** Figures 91–93; segments 4 and 6 subequal in length, 5th slightly longer than 4 or 6, 5th semiconical, distinctly enlarged in apical $\frac{1}{2}$ ($\frac{2}{3}$) and tapering to base [most distinct in posterior-dorsal view]; see Table 2 for segment length/width, length 1.39 mm (η : length 1.42; simple); antennae various shades of brown, basal 3 (2) segments paler with dorsum of 1 darker, segment 4 (3) transitional, segments 5–11 (4–11) darkest. **Pronotum:** Length 0.44 mm (δ 0.44–0.48, η 0.48–0.50), width 0.69 mm (δ 0.65–0.69, η 0.71–0.78); black, texture finely granulate (sometimes roughened, often with fine wrinkles radiating from punctures); moderately punctate with punctures separated by less than $\frac{1}{2}$ a diameter. **Elytra:** Length 1.68 mm (δ 1.54–2.34, η 1.71–1.88), width 1.06 mm (δ 0.90–1.10, η 1.14–1.22); black (sometimes brownish black), median stripe as in Figure 43; texture smooth (sometimes a few punctures with fine radiating wrinkles); coarsely punctate with punctures separated by less than $\frac{1}{2}$ a diameter. **Legs:** Normal color sequence. **Abdomen:** 5th sternum with an apical median lobe moderately concave, concavity tapered and very shallow in its extension to within $\frac{1}{3}$ of sternal base, with a median linear impression extending from sternal base and ending preapically (η : simple in outline, with no median linear impression); black.

Male—Aedeagus (figs. 156–158); length approximately 0.93 mm; moderately arched dorsoventrally, of rather uniform width except slightly tapering toward extremities in dorsal view, in lateral view ta-

pering in apical $\frac{1}{3}$ toward apex; with dorsal washboard; apex hidden in dorsal view and appearing truncated but actually acute, in lateral view with a preapical, abrupt, approximately 90° bend ventrad, apex acute; ventral view as in Figure 158.

Female—Spermatheca (fig. 188); length approximately 0.31 mm; receptacle elongate pear-shaped, tapering toward pump, with a neck before a moderately developed ring collar.

TYPE MATERIAL—Not examined.

BIOLOGY—**Host Plants, Adult**—Many cruciferous plants, see European literature. New Collection Records: feeding on Hickory, from Bladensburg, Md. 8-15-13 ABDuckett Coll (USNM:1).

Immature Stages—See European literature.

Habits—See European literature. The single specimen collected in the United States was taken in mid-August.

SPECIMENS EXAMINED—Total 33, see the Appendix.

DISTRIBUTION—Figure 205; *P. undulata* has been collected only once in the United States, near Bladensburg, Maryland. This is an introduced species of primarily European distribution where it is a common pest of crucifers. Its establishment in the United States is questionable.

DISCUSSION—**Nomenclature**—Kutschera (1860) described this species. Heikertinger & Csiki (1939) list the two synonyms given.

Relationships—*Phyllotreta undulata* shows no close similarities with any other species in this genus found north of Mexico.

Phyllotreta utana Chittenden. Figures 44–45, 94–95, 159–161, 189, 205.

Phyllotreta utana Chittenden, 1920. J. Washington Acad. Sci., 10:389–390, fig. 1.

Holotype: Male, USNM type #23114, at United States National Museum.

Type locality: Logan, Utah.

DIAGNOSIS—Each elytron with a median pale stripe with dilations which never meet at suture; male antennal segment 5 expanded bilaterally, dorsoventrally flattened; antennal segments 2–5 pale, in distinct contrast to darker segments 7–11; greater than 2.8 mm long (about 3 mm); aedeagus in lateral view slightly sigmoid with apex almost straight dorsally, and strongly swollen medially on venter.

DESCRIPTION OF HOLOTYPE (species variation, excluding punctuation, in parentheses)—Figure 44; elongate oval, length 3.25 mm (δ 2.85–3.25, η 2.85–3.02), width 1.20 mm (δ 1.20–1.50, η 1.42–1.52); head and pronotum black with a slight metallic luster

(no luster), elytra brownish black with a slight metallic luster (no luster), each elytron with a median straw-yellow stripe. **Head:** Black; vertex finely granulate (finely alutaceous basally to slightly roughened anteriorly), moderately punctate with punctures separated by less than to equal their diameter; interocular distance/maximum diameter of eye, 1.55 (δ 1.47–1.70, ♀ 1.50–1.78). **Antennae:** Figures 94–95; segments 4 and 6 equal (subequal) in length, 5 about 1.5 \times longer than 4 (almost 2 \times 4), 6 shorter than 7; segments 4 and 5 strongly expanded bilaterally, dorsoventrally flattened; segment 5 distinctly longest, venter essentially flat; see Table 2 for segment length/width, length 1.76 mm (♀ paratype: length 1.60 mm; simple); antennae various shades of brown, basal 5 (6) segments paler with dorsum of 1 dark, 6 (none) intermediate, 7–11 (6–11) darkest. **Pronotum:** Length 0.58 mm (δ 0.50–0.58, ♀ 0.52), width 1.05 mm (δ 0.95–1.05, ♀ 0.92–1.02); black; texture finely granulate and alutaceous (slightly roughened, finely granulate only or with wrinkles radiating from punctures); coarsely punctate, punctures separated by less than to equal their diameter. **Elytra:** Length 2.42 mm (δ 2.10–2.42, ♀ 2.12–2.30), width 1.20 mm (δ 1.20–1.50, ♀ 1.42–1.52); brownish black (black), median stripe pattern as in Figure 44 (sometimes as in fig. 45); texture smooth; coarsely punctate, punctures separated by less than to equal their diameter, with several moderate punctures irregularly interspersed. **Legs** [right mesotarsus and left metatarsus missing tarsomeres 4–5]; Normal color sequence except tibiae and tarsi same color. **Abdomen:** 5th sternum with an apical median moderately concave lobe, concavity tapering posteriorly and restricted to apical $\frac{1}{2}$, a shallow linear impression from base of segment to edge of median concavity (median linear impression sometimes extending $\frac{1}{3}$ into median concavity or in basal $\frac{1}{3}$; ♀ : apical area broadly and shallowly concave, a narrow median longitudinal impression in apical $\frac{1}{3}$); brownish black (dark brown, black).

Male—Aedeagus (figs. 159–161); length approximately 1.12 mm; slightly sigmoid dorsoventrally, broadest apically in dorsal view, strongly swollen medially on venter in lateral view; apex in dorsal view moderately deep and broadly emarginate, in lateral view tapering to a blunt posteriorly directed point with a short preapical, ventrally directed lobe which is the ventral median emargination flange; ventral view as in Figure 161.

Female—Spermatheca (fig. 189); length approximately 0.44 mm; receptacle oblong, almost parallel-sided, with a very slight ring collar at junction with pump.

TYPE MATERIAL—The holotype and 12 paratypes

are at the USNM. The holotype is mounted on a hair which is glued to a male sex label, and the pin bears 4 labels (descending order): “Logan UT” “ δ ” “U.S.N.M. Type No. 23114” and a determination label “Phyllotreta utana Chtt. Type [not in Chittenden’s writing]” with “Holotype fell off point 10. Apr. 39-remtd. HSB” written on the other/bottom side.

There are 12 (4δ , 8♀) paratypes at the USNM, of which 3 (2δ , 1♀) represent the new species *P. utanula*. The 12 paratypes are labeled as follows: 1δ , “Logan UT” “ δ ” and “U.S.N.M. Paratype No. 23114”; 1δ , “Logan UT Jul. 9, '06” “ δ ” “Type No. 23114 U.S.N.M.” “Phyllotreta utana Chtt. Type”; 1♀ , “Logan UT Jul. 9, '06” “ ♀ ” and “U.S.N.M. Paratype No. 23114”; 1♀ , “Logan UT Jul. 12, '06” “ ♀ ” and “U.S.N.M. Paratype No. 23114”; 1♀ , “Logan UT 20 Jne. 04” “ESG Titus Collector” “Sugar beets” and “U.S.N.M. Paratype 23114”; 1♀ , same first 4 labels as preceding and “ ♀ ” “Paratype 23114 U.S.N.M.” and “Phyllotreta utana Chtt. Par.”; 1δ , same first 3 labels as preceding, except beets has the “t” not printed, and “ δ ” “Paratype No 23114 U.S.N.M.” and the same determination label; 1♀ , “Logan UT 20 Jne. 04” “ESG Titus Collector” “Sugar beets” and “ ♀ ”; 1♀ , same 4 labels as preceding and “Paratype No.”. The 3 paratypes which are *P. utanula* are labeled: 1δ , “Elko Nev.” “ δ ” and “Phyllotreta utana Chtt. Par.”; 1δ , “Park City UT 6 17” “Coll Hubbard & Schwarz” and “ δ ”; 1♀ , “Logan UT Jul. 12, '06” “ ♀ ” and “Phyllotreta Chtt. Par.”. There are 2 (δ) additional specimens which have a paratype label but are not valid paratypes because they are not cited in the original description and which are labeled: “Logan UT. 6-21-04” “ δ ” “Paratype” and “Phyllotreta utana Chtt.”; “Portland Or” “ δ ” “Collection Wickham” and “Paratype No. 23114 U.S.N.M.”. The Oregon specimen is a specimen of *P. utanula*.

There is 1 (δ) probable paratype at AMNH which came from the Joe Schuh collection and is actually a specimen of *P. utanula*. It is labeled “Corvallis Ore.” “G.F. Mozzette Collector” “ δ ” and “Phyllotreta Chtt. Det. L.G. Gentner '39”. This does represent the locality, no date, and collector cited in the original description, but the determination label is of Gentner and 19 years later. Probably it was exchanged before the type series was labeled.

There are 2 (δ , ♀) probable paratypes at the Frey Museum in West Germany. The δ is labeled “Logan Ut. 7-9-06” “donv. Chittenden” and “utana cotype Chtt.”, and the other, “Logan Ut. 7-12-06” “donav. Chittenden” and “utana cotype Chtt.” which is dermestid-eaten but probably a ♀ .

There is 1 (δ) specimen at UASM which has a paratype label but is not a valid paratype because it is not cited in the original description. It is labeled "LOGAN UT 6-21-04" " δ " "Paratype No." and "Phyllotreta utana Chtt. Par.". This is a specimen of *P. utana*.

It should be noted that all of the "Phyllotreta utana Chtt. Par." labels are not in Chittenden's writing. It appears as though the type series of *P. utana* was not carefully designated and that, after some exchanges, someone at the USNM attempted to put type labels on the "remaining part of the type series."

BIOLOGY—Host Plants, Adult—Sugar beet, *hedge mustard (Chittenden, 1920, p. 390). The hedge mustard record has not been verified by me because of lack of specimens. New Collection Record: Alfalfa, from Franklin, Cal. VII-1-1932 Backman Collector Cal. Dept. Agr. No. 32876 (CDAE:1).

Immature Stages—Unknown.

Habits—Adults of *P. utana* have been collected in California in early July, in Oregon from mid-May until late July, in Utah from mid-May until mid-July, and in Washington in mid-May; no date is associated with the Nevada specimen.

DISTRIBUTION—Figure 205; *P. utana* has been collected in California, Nevada, Oregon, Utah, and Washington.

SPECIMENS EXAMINED—Total 59, see Type Material above and the Appendix.

DISCUSSION—Nomenclature—In 1920, Chittenden described *P. utana* from apparently 17 specimens; see Type Material above. There are no synonyms.

Relationships—*Phyllotreta utana* is most similar to *P. utanula* and less similar to *P. emarginata*, *P. zimmermanni*, *P. constricta*, and *P. oregonensis* which all share the elytral color pattern and having the male 5th antennal segment dorsoventrally flattened. However, the elytral stripe of *P. oregonensis* and *P. constricta* is usually much wider medially than that of the other four species. The male 5th antennal segment of *P. zimmermanni* has a basal concavity ventrally, whereas that of the other five is evenly flattened ventrally; also antennal segments 2 through 5 are pale in *P. utana* and *P. utanula*, whereas in the other four species, antennal segments 2 and 3 are pale and/or dark and segments 5 through 11 are dark. The aedeagi of these six species separate into three distinct groups (based on dorsal view of apex) as follows: *P. zimmermanni* and *P. emarginata* have the apex not broadened and its margin moderately but narrowly emarginate medially; *P. oregonensis* and *P. constricta* have the apex not broadened and its margin entire; and *P. utana* and *P. utanula* have the apex

very broad and its margin moderately and broadly emarginate. However, the aedeagus in lateral view of *P. utana* is almost straight dorsally including the apex, and medially strongly swollen on the venter, whereas in *P. utanula* the dorsum is gradually arched, the apex curving slightly to the venter, and the venter is only very slightly swollen medially. The spermatheca of *P. utana* has the receptacle oblong or much more robust than those of the other five species which are more elongate. Four of these five species also have the receptacle ventrally somewhat constricted medially, with *P. utanula* the exception, but the receptacle of *P. utanula* is unique to this entire group by tapering anteriorly in the anterior one-half ventrally. Also see this section under *P. emarginata* and *P. oregonensis*.

Phyllotreta utana might be confused with *P. arcuata* on the basis of antennal structure and color, but *P. arcuata* has the male 5th antennal segment venter concave on the inner one-half instead of entirely flat and the elytral stripe is simple, without lateral dilations.

Phyllotreta utanula Smith, NEW SPECIES. Figures 46, 96–97, 162–164, 190, 206.

Holotype: Male, deposited at United States National Museum.

Type locality: Portland, Oregon.

DIAGNOSIS—Each elytron with a median pale stripe, with dilations, which never meet at suture; male antennal segment 5 expanded bilaterally, dorsoventrally flattened; antennal segments 2–5 pale, in distinct contrast to darker segments 7–11; less than 2.9 mm long (about 2.6 mm); aedeagus in lateral view with dorsum gradually arched, apex curving slightly ventrad, and venter only very slightly swollen medially.

DESCRIPTION OF HOLOTYPE (species variation, excluding punctuation, in parentheses): Figure 46; elongate oblong, length 2.71 mm (δ 2.48–2.75, η 2.58–2.93), width 1.11 mm (δ 1.11–1.35, η 1.24–1.49); head and pronotum black with slight metallic luster (luster pronounced), elytra dark brown (brownish black basally between stripes) with slight metallic luster (sometimes without luster), each elytron with a median straw-yellow stripe. **Head:** Black; vertex slightly roughened anteriorly to finely granulate basally (finely alutaceous and roughened or granulate, finely granulate to roughened), moderately punctate with punctures separated by less than to equal their diameter, mostly by less than 1 diameter; interocular distance/maximum diameter of eye, 1.45 (δ 1.44–1.67, η 1.44–1.56). **Antennae:** Figures 96–97; seg-

ment 4 about $2 \times$ length of 6, subequal to 7, segment 5 about $2 \times$ length of 4; segments 4 and 5 strongly expanded bilaterally, dorsoventrally flattened; segment 5 distinctly longest, venter essentially flat; see Table 2 for segment length/width, length 1.64 mm (allotype: length 1.52 mm; simple); antennae various shades of brown, basal 6 (4, 5, or 7) segments pale with dorsum of 1 darker, 7 (6 or none) transitional, segments 8–11 (7–11) darkest. **Pronotum:** Length 0.62 mm (δ 0.42–0.62, ♀ 0.49–0.64), width 0.98 mm (δ 0.78–0.98, ♀ 0.86–0.94); black; texture slightly roughened (smooth, slightly roughened and/or finely granulate, wrinkles radiating from punctures); coarsely punctate, punctures separated by less than $\frac{1}{2}$ to equal their diameter, mostly by less than 1 diameter. **Elytra:** Length 1.95 mm (δ 1.82–2.02, ♀ 1.91–2.16), width 1.11 mm (δ 1.11–1.35, ♀ 1.24–1.49); dark brown (brownish black basally between stripes, brownish black, black), median stripe pattern as in Figure 46; texture smooth to slightly roughened (smooth or slightly roughened); coarsely punctate, punctures separated by less than $\frac{1}{2}$ a diameter. **Legs:** Normal color sequence except tibiae about as pale as tarsi (usually normal color sequence). **Abdomen:** 5th sternum with an apical median moderately concave lobe, concavity oval and extending to apical $\frac{2}{5}$ (usually extending to midpoint), with a median linear impression extending from sternal base to apex (interrupted; ♀ : simple in outline, with a shallow median linear impression in apical $\frac{1}{3}$); brownish black (sometimes black).

Male—Aedeagus (figs. 162–164); length approximately 0.88 mm; slightly arched dorsoventrally, gradually widening from midpoint to apex with apex broadest in dorsal view, widest medially in lateral view, not swollen on venter; apex in dorsal view moderately deep and broadly emarginate, in lateral view curving slightly ventrad, tapering to a blunt tip, with a short preapical median, ventrally directed lobe which is the ventral median emargination flange; ventral view as in Figure 164.

Female—Spermatheca (fig. 190); length approximately 0.36 mm; receptacle elongate, dorsum almost straight, distinctly tapering anteriorly in basal $\frac{1}{2}$ ventrally, ring collar moderately developed.

TYPE MATERIAL—The holotype and allotype are at the USNM. The 25 paratypes (17 δ , 8 ♀) are distributed as follows: 4 δ and 1 ♀ at AMNH, 2 δ at CASC, 1 δ at CNCI, 1 δ and 1 ♀ at EHSC, 1 δ and 1 ♀ at MCZC, 2 δ at NMDC, 1 δ and 3 ♀ at ODAC, 1 δ at OSUO, 1 δ and 2 ♀ at UAIC, and 3 δ at the USNM. The holotype is mounted on a point and the pin bears 6 labels (descending order): “Portland Or” “ δ ” “Coll Hubbard & Schwarz” “utana Chhtn. Gentner

1926” and my and the USNM’s type labels. The allotype bears the same 1st, 3rd, and 4th holotype labels and my and the USNM’s type labels.

The paratypes at AMNH are labeled: 1 δ , “Clatskanie, Ore. Aug. 4, 1956 [line of printing marked out with pencil] Coll. J. Schuh”; 1 δ , “Corvallis Ore.” “G.F. Moznette Collector” and “ δ ”; 1 δ , “Crystal Cr., Ore. Upper Klamath Lk. May 30, 1960 Joe Schuh, Coll.”; 1 δ , “Kelsey Valley, Ore. Douglas County June 26, 1962 J.D. Vertress, Coll.”; 1 ♀ , “Upper Klamath Marsh, Klamath Co., Oregon under board; 9-25-65 Joe Schuh, Coll.”. Those at CASC are, 1 labeled “Fort Lewis, Wn. VI.12.1945 P.H. Arnaud” and the other, “Corvallis Or.” “VanDyke” and “Van Dyke Collection”; the paratype at CNCI is labeled “B.C., 12 mi. E. Hope, VI.2.1969 Campbell & Smetana” and “ex river debris”; the ♀ at EHSC is labeled “Hiens, Oregon Harney County June 6, 1963 Kenneth Goeden” and “margins of warm springs” and the δ is labeled “Kelsey Valley Ore. Douglas County June 26, 1962 J.D. Vertress, Coll.”; the δ at MCZC is labeled “Portland Ore.” “268” and “Horn Coll H 7025” and the ♀ , “Corvallis Ore.” “ ♀ ” and “Liebeck Collection”; 1 paratype at NMDC is labeled “Montesano, Wn. 14 June 1928 Wm. W. Baker” and the other, “Puyallyp, Wn. 10 Oct. 1927 Wm. W. Baker”; those at ODAC are 1 δ and 1 ♀ , “Hiens, Oregon, Harney Co nty Aug. 30, 1961 Spring Kenneth Goeden”, 1 ♀ same as ♀ cited for EHSC, the other ♀ “Ore., Wasco Co. Jct of Hwy 216 and Hwy 26 June 10, 1963 Kenneth Goeden” and “sweeping plant margin of stream”; the paratype at OSUO is labeled “Salem Ore. 5-15-25.”; the δ at UAIC is labeled “7024 Elko” and “C.W. LENG COLLECTION #16073”, 1 ♀ is labeled “Portland Or” and “C.W. LENG COLLECTION #16067”, and the other ♀ , “Portland Or 7025” and “C.W. LENG COLLECTION #16067”; 1 paratype at USNM is labeled “Portland Or” “ δ ” “Collection Wickham” “Paratype No. 23114 U.S.N.M.” and “Phyllotreta utana Chhtn. Par.”; the 2nd is labeled “Elko Nev.” “ δ ” and “Phyllotreta utana Chhtn. Par.”, and the 3rd is labeled “Park City Ut 6 17” “Coll Hubbard & Schwarz” and “ δ ”.

BIOLOGY—Host plants and immature stages are unknown.

Habits—Adults of *P. utanula* have been collected in the Pacific Northwest from late May until early June and in early August and mid-October and in Utah in June.

SPECIMENS EXAMINED—Total 27, see Type Material above.

DISTRIBUTION—Figure 206; *P. utanula* has been collected west of the Rocky Mountains in the Pacific

Northwest and in Nevada and Utah, specifically in southern British Columbia, western Washington, Oregon, eastern Nevada, and north central Utah.

DISCUSSION—Relationships—*Phyllotreta utanula* is most similar to *P. utana* and less similar to *P. emarginata*, *P. zimmermanni*, *P. constricta*, and *P. oregonensis*; for a discussion of these relationships, see this section under *P. utana*.

Phyllotreta utanula might be confused with *P. arcuata* on the basis of antennal structure and color, but *P. arcuata* has the male 5th antennal segment venter concave on the inner one-half instead of entirely flat, and the elytral stripe is simple, without lateral dilations.

Etymology—The specific name *utanula* comes from a combination of the specific name of *P. utana* and the Latin diminutive suffix *-ula*, referring to the fact that this species is very similar to *P. utana* but smaller.

Phyllotreta zimmermanni (Crotch). Figures 47–48, 98–99, 165–167, 191, 207.

Orchestris zimmermanni Crotch, 1873. Proc. Acad. Nat. Sci. Philadelphia, 25:66.

Neotype (here designated): Male, USNM type #100637, deposited at United States National Museum.

Type locality: Missouri; neotype is from near Moberly, Randolph Co., Missouri.

Phyllotreta zimmermanni: Riley, 1885. Ann. Rep. Dept. Agr. for 1884, Rep. Entomol., p. 304.

Phyllotreta sibirica Weise, 1887. Arch. Naturgesch., 53:200. (Synonymy by Heikertinger and Csiki, 1939:59.)

Phyllotreta sinuata Horn, 1889. Trans. Amer. Entomol. Soc., 16:295, table VI, fig. 15. (Not Stephens, 1831; not Redtenbacher, 1849.) (Synonymy by Heikertinger and Csiki, 1939:12.)

DIAGNOSIS—Each elytron with a median pale stripe with dilations which never meet at suture; male antennal segment 5 dark, expanded bilaterally and dorsoventrally flattened, much wider than 4, with a distinct concavity in basal ½ anteriorly; apex of aedeagus in dorsal view with a narrow deep median emargination, moderately curved ventrad in lateral view.

DESCRIPTION OF NEOTYPE (species variation, excluding punctuation, in parentheses)—Figure 47; elongate oval, length 2.71 mm (♂ 2.18–2.78, ♀ 2.52–3.10), width 1.25 mm (♂ 1.00–1.30, ♀ 1.18–1.50); head and pronotum black with slight metallic luster, elytra black (brownish black) with slight metallic luster, each with a median straw-yellow stripe. **Head:** Black; vertex finely granulate (sometimes finely granulate basally to slightly roughened anteriorly), mod-

erately punctate with punctures separated by less than ½ to equal their diameter, mostly by less than 1 diameter; interocular distance/maximum diameter of eye, 1.33 (♂ 1.33–2.00, ♀ 1.50–1.62). **Antennae:** Figures 98–99; segments 4 and 7 subequal in length, 4 longer than 6, segment 5 more than 3 × length of 6 and more than 2 × length of 4, 5 distinctly wider than 4; segments 4 and 5 strongly expanded bilaterally, dorsoventrally flattened; segment 5 distinctly longest, venter with a distinct moderately deep concavity in basal ½ anteriorly or to outside; see Table 2 for segment length/width, length 1.56 mm (alloneotype: length 1.49 mm; simple); antennae various shades of brown, 1 and 4 dark with venter pale, 2–3 paler (basal 3 paler with dorsum of 1 dark, 4 pale, intermediate, or dark), 5–11 (4–11) darkest. **Pronotum:** Length 0.50 mm (♂ 0.40–0.50, ♀ 0.40–0.58), width 0.85 mm (♂ 0.70–0.90, ♀ 0.80–0.95); black; texture finely granulate; moderately punctate, punctures separated by less than ½ to equal their diameter, mostly by about 1 diameter. **Elytra:** Length 1.96 mm (♂ 1.55–2.05, ♀ 1.85–2.22), width 1.25 mm (♂ 1.00–1.30, ♀ 1.18–1.50); black (brownish black to black, rarely dark brown), median stripe pattern as in Figure 47 (sometimes as in fig. 48); texture slightly roughened (often smooth); coarsely punctate with very coarse punctures basally between stripes, punctures separated by less than ½ a diameter to 1 diameter, mostly by less than 1 diameter. **Legs:** Normal color sequence. **Abdomen:** 5th sternum with an apical median moderately concave lobe, concavity tapering in its extension to midpoint (extending to within ½ of sternal base), with a median linear impression extending from sternal base to base of median lobe (extending to apex, sometimes interrupted; ♀: simple in outline, sometimes with a shallow oblong preapical impression); black (brownish black with median lobe paler or apical ½ of 5th paler).

Male—Aedeagus (figs. 165–167); length approximately 0.88 mm; moderately arched dorsoventrally with a slight premedian ventrally directed bend in lateral view, of rather uniform width except slightly narrower in apical ¼; apex in dorsal view bluntly rounded with short premedian extensions, with a median narrow moderately deep emargination, in lateral view broadly tapering to an abruptly narrower, rounded tip which is directed ventrad; ventral view as in Figure 167.

Female—Spermatheca (fig. 191); length approximately 0.45 mm; receptacle elongate, basal ½ swollen, apical ½ almost parallel-sided [often slightly arched dorsally]; ring collar wide, strongly developed.

TYPE MATERIAL—The neotype and alloneotype are at the USNM. The neotype is mounted on a point and

the pin bears 4 labels (descending order): "MISSOURI: Randolph Co. 1 mi. E. of Moberly on US 24; 14:VI:1980 Smith & Riley collrs." "Lot No. 591 Eric H. Smith on turnip" and my and the USNM's type labels. The alloneotype bears the same first 2 labels and my and the USNM's alloneotype labels. All paraneotypes bear the same first 2 neotype labels and a paraneotype label. A pair have been deposited at AMNH, CASC, CNCI, EGRC, MCZC, OSUC, UMRM, and USNM. The remainder (about 550) are at EHSC, but some will be deposited at additional institutions.

BIOLOGY—Host Plants, Adult—The following represent those records verified by me via label data: alfalfa, *Ambrosia psilostachya*, apple, apple (Scap-tah), **Arabis*, **Barbarea* sp., **Barbarea verna*, beech, **Brassica* sp., **B. oleracea* (collards), *broccoli, *cabbage, clover, clover (red, w.), **Dentaria laciniata* Muhl., *Desmodium* sp., dewberry, *Erigeron* sp., *Fragaria* sp., grass, hickory (feeding on), *horse-radish (feeding on), *Juglans* sp., **Lepidium* sp., **L. virginicum*, locust, locust (black), moss (sphagnum), *mustard, *Narcissus* sp., oak (red), peach, pepper (feeding on), *pepper grass, *Pinus ponderosa*, plum (wild), potato vine, **Radicula* sp., *radish (feeding on), **Rorippa palustris*, *Shephards [*sic*] purse, strawberry, sunflower, tobacco, *Trifolium pratense*, *turnip, *turnip (white), *Urtica holcserices*, *water-cress (feeding on), and wheat. Tahavanainen (1972) records in addition, **Barbarea vulgaris*, **Brassica oleracea acephala*, and **Dentaria diphylla*; Hicks (1972) adds **Brassica nigra* and **Lepidium campestre*; Balsbaugh & Hays (1972) record *Trifolium incarnatum*; and Wilcox (1979) adds *cress.

Host Plants, Larva—Wild pepper-grass (*Lepidium virginicum*) and *Arabis ludoviciana* (Riley, 1885b, pp. 304–305); cress (Duporte, 1914, p. 433; as *P. sinuata*). New Host Record: *Radicula* (reared from), from Hammond, La., Mar. 21, 1922 C E Smith Issued May 21 '22 (USNM:1); turnip (ex larva on), from Natches, Miss., 3/30/27 W.I. Gray Collector (USNM:1).

Immature Stages—Egg, larva, and pupa are described by Riley (1885b, pp. 305–306; pl. IV, fig 1) with the larva and pupa illustrated; Duporte (1914, p. 433; as *P. sinuata*) also illustrates the larva.

Habits—The larvae are leaf miners, preferring *Lepidium virginicum* and sparingly attacking *Arabis ludoviciana*, and are not confined to a single mine or even one leaf (Riley, 1885b, pp. 304–305). The adults overwinter (Hicks, 1972) and become active in early spring. Eggs are laid on the upper leaf surface along the midvein (Riley, 1885b); however, Hicks

(1972) says that "*P. zimmermanni* lay their eggs in the leaf tissues." Pupation takes place in an earthen cell just beneath the soil surface (Riley, 1885b). According to Riley (1885b), in May and June, the entire life cycle may be completed in 20–23 days in Missouri.

This species has been a pest in the past years, but it has apparently been largely displaced by the more competitive introduced species *P. crucifera* (Goeze) (Hicks, 1972) and *P. striolata*. The former was apparently introduced from Europe in the early 1920s on the East Coast (Milliron, 1953) and the latter was introduced before 1801. However, *P. zimmermanni* still remains a major pest of garden crucifers in Missouri.

Adults have been collected starting in mid-June in the Northwest Territory, in early April in Ontario and Alberta, and in early to mid-March in Iowa, the Midwest, and Louisiana. They have been collected as late as mid-August in the Northwest Territory, mid-October in Ontario, late September in the Midwest, early November in Iowa, and mid-May in Georgia and Mississippi.

DISTRIBUTION—Figure 207; *P. zimmermanni* is widespread but has been more frequently collected in the northeastern and midwestern United States.

SPECIMENS EXAMINED—Total 4,104, see Type Material above and the Appendix.

DISCUSSION—Nomenclature—Crotch (1873) described *P. zimmermanni* in the genus *Orchestris*; this unfortunate choice of generic name was corrected by LeConte (1878, p. 615). In 1885, Riley transferred this species to *Phyllotreta*. Heikertinger & Csiki (1939) listed *P. sibirica* Weise as a synonym, but I haven't seen the type to verify this. Horn (1889) thought that Crotch had failed to realize that his new species was the common European *P. sinuata* Stephens, but Heikertinger (1911) recognized that *P. zimmermanni* was native to North America and a distinct species, whereas Stephens' *Haltica sinuata* was native to Europe and Asia.

A search for the type of *P. zimmermanni* has proven unsuccessful. Crotch gives the type locality and collector as "Missouri (Riley)", and it was apparently a male because the diagnostic male antennal character is given. The specimen labeled as the type at the MCZC is a female labeled "N.C." and there is no indication that Riley was the collector; also a search turned up no other *P. zimmermanni* material. Since it is well known that Crotch and Horn freely exchanged material, a search was requested at the ANSP; no such specimen was found. Finally, since the Riley Collection is at the USNM, a search was also requested there; again, no such specimen was found. These unsuccessful investigations lead to the conclusion that

the type of *P. zimmermanni* is most probably lost. Therefore, a neotype has been designated from a long series which Ed Riley and I collected at 1 mile east of Moberly, Missouri, a site which is part of the original type locality. This specimen also agrees with Crotch's original description and is a male.

Relationships—*Phyllotreta zimmermanni* is most similar to *P. emarginata* and is less similar to *P. utana*, *P. utanula*, *P. oregonensis*, and *P. constricta* with which it shares elytral color pattern and having the male 5th antennal segment dorsoventrally flattened. For a discussion of these relationships, see this section under *P. emarginata*.

Specimens of *P. zimmermanni* have been confused with *P. striolata* having the typical elytral color pattern, but *P. striolata* is much smaller and the male has the 5th antennal segment enlarged but essentially cylindrical, not dorsoventrally flattened. With regard to color pattern, *P. zimmermanni* has a preapical lateral dilation or none, whereas *P. striolata* has in addition a terminal dilation which is fused with its lateral preapical dilation.

Species Considered Incertae Sedis

Phyllotreta alberta Chittenden. Figures 208, 211, 214.

Phyllotreta alberta Chittenden, 1927. Entomol. Amer., 8(n.s., no. 1): 28.

Holotype: Female, USNM type #28791, at United States National Museum.

Type locality: Edmonton, Alberta, Canada.

Contrary to Chittenden (1927), this species is known only from a series of females. The elytral color pattern is most similar to that of *P. zimmermanni*, the spermatheca is most similar to that of *P. constricta* (larger species), and the antenna is similar to that of all of the 14 species having the 5th segment elongate. The following are illustrated: beetle (fig. 208), antenna (fig. 211), and spermatheca (fig. 214).

Phyllotreta obtusa Chittenden. Figures 209, 212, 215.

Phyllotreta obtusa Chittenden, 1927. Entomol. Amer., 8(n.s., no. 1): 30.

Holotype: Female, USNM type #28793, at United States National Museum.

Type locality: Breckenridge, Colorado.

Contrary to Chittenden (1927), the unique type is a female. The elytral color pattern is unique, the spermatheca is most similar to that of *P. decipiens* and *P. striolata* (spermathecae of both smaller, both larger

species), and the antenna is similar to all of the 14 species having the 5th segment elongate. The following are illustrated: beetle (fig. 209), antenna (fig. 212), and spermatheca (fig. 215).

Phyllotreta perspicua Chittenden. Figures 210, 213, 216.

Phyllotreta perspicua Chittenden, 1927. Entomol. Amer., 8(n.s., no. 1): 29.

Holotype: Female, USNM type #28812, at United States National Museum.

Type locality: Klamath Lake, Oregon.

Contrary to Chittenden (1927), the unique type is a female. The elytral color pattern is unique, the spermatheca is most similar to *P. bisinuata* (larger species), and the antenna is similar to all of the 14 species having the 5th segment elongate. The following are illustrated: beetle (fig. 210), antenna (fig. 213), and spermatheca (fig. 216).

DISCUSSION—It is possible that all three of these species are good. However, at the present time no males with similar color patterns nor such males with associated females whose spermathecae are also similar have been found within the group having the 5th antennal segment elongate. In addition, when the color pattern or the spermatheca is somewhat similar, these species are much smaller.

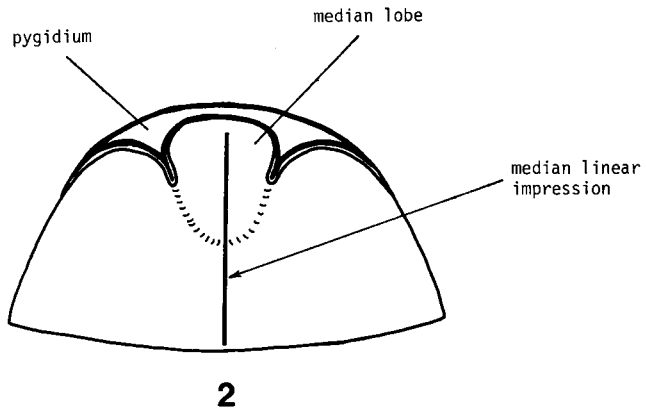
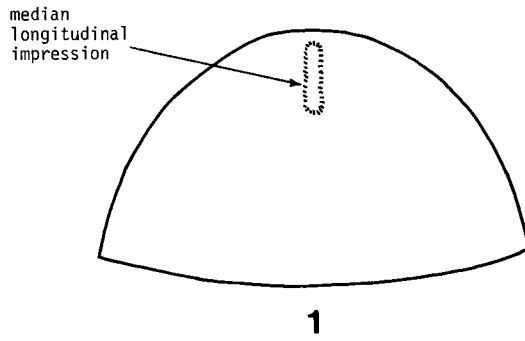
The remote possibility exists that they represent maculate forms of the species which are now known as being immaculates. However, the spermathecae of the immaculate species have not yet been studied so this judgment is postponed until these studies are made.

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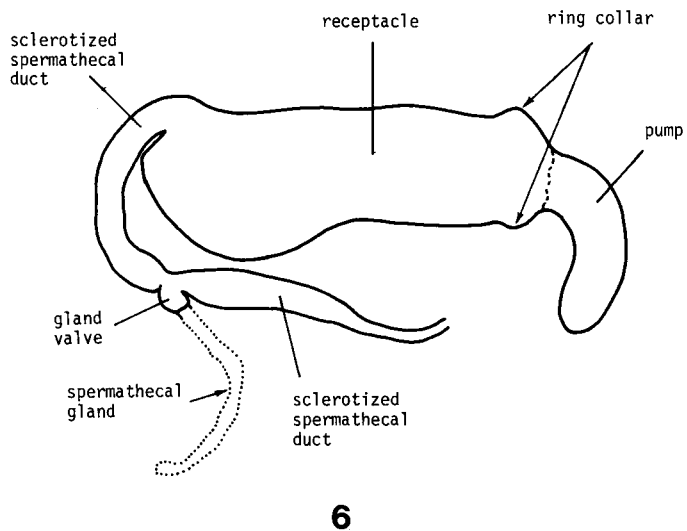
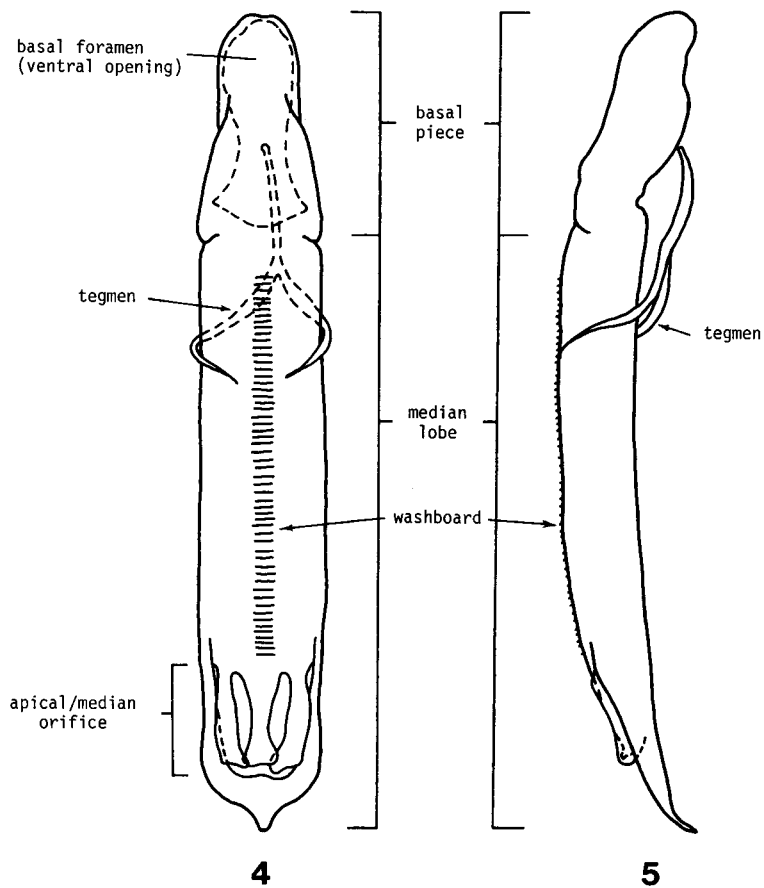
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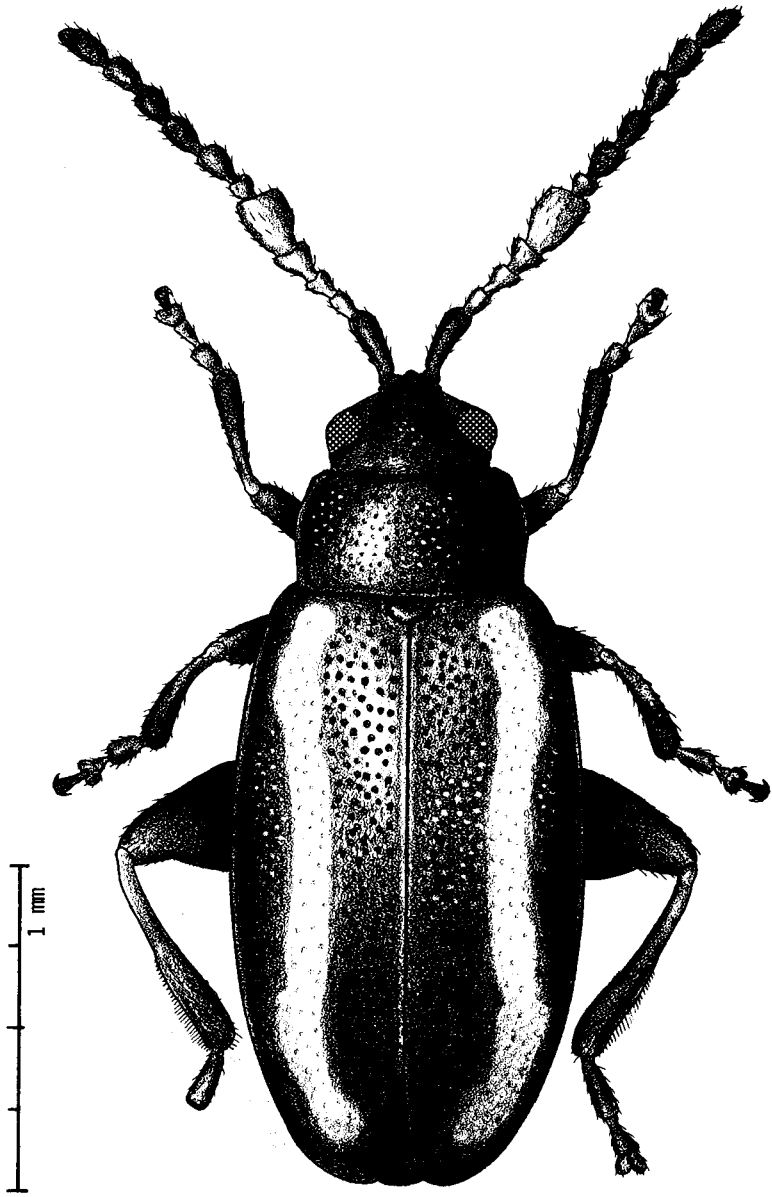
Armoracia
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 Hung. Roy.
 Tr. Rhen. Koch.

3

FIGS. 1-3. 1, Female 5th abdominal sternum, ventral view. 2, Male 5th abdominal sternum and pygidium, ventral view. 3, Label of lectotype of *Phyllotreta armoraciae*.



FIGS. 4-6. Aedeagus with structures labeled: 4, dorsal view; 5, lateral view. 6, Spermatheca with structures labeled, lateral view.



7

FIG. 7. *Phyllotreta arcuata*, holotype, dorsal view.

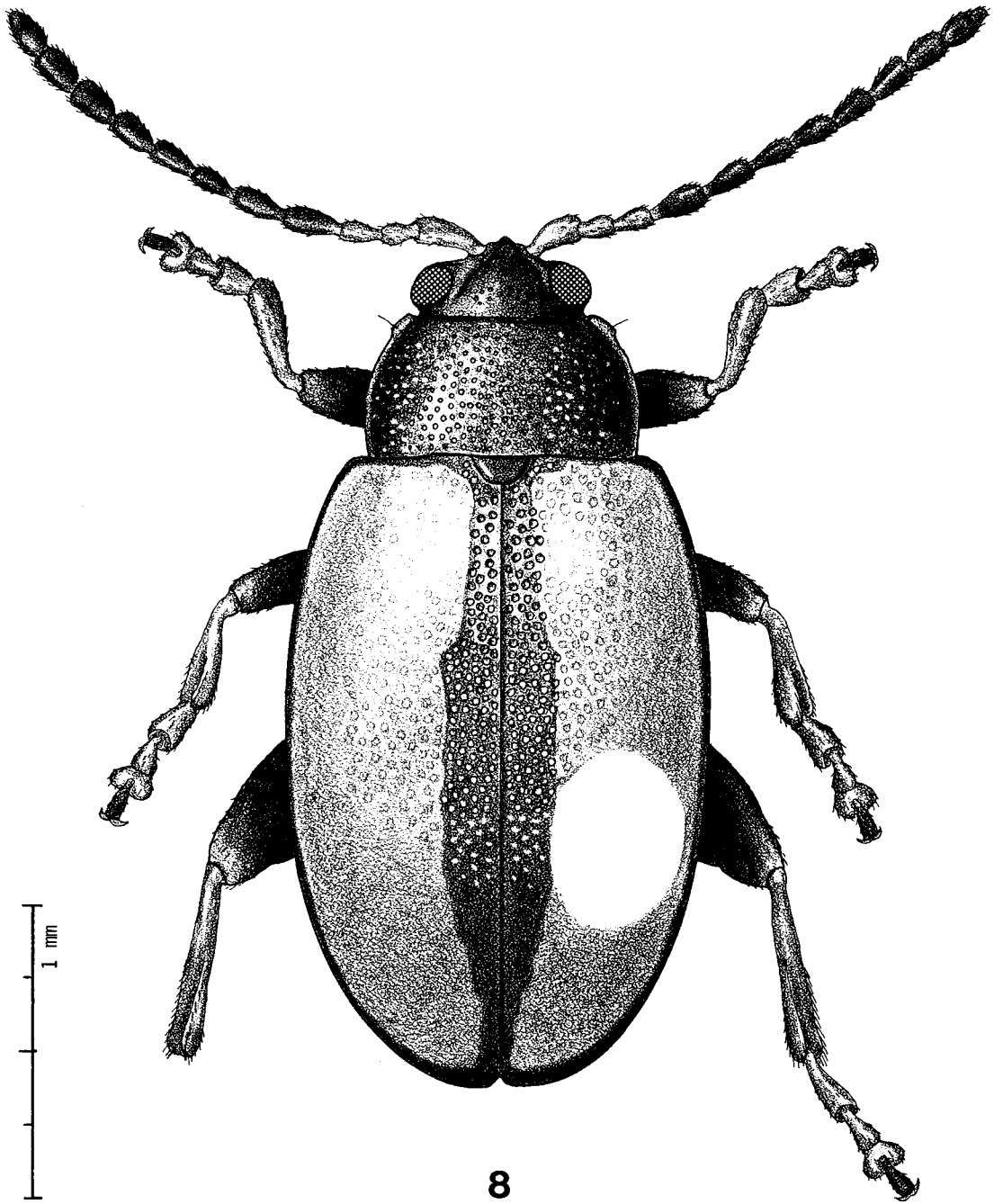


FIG. 8. *Phyllotreta armoraciae*, lectotype, dorsal view.

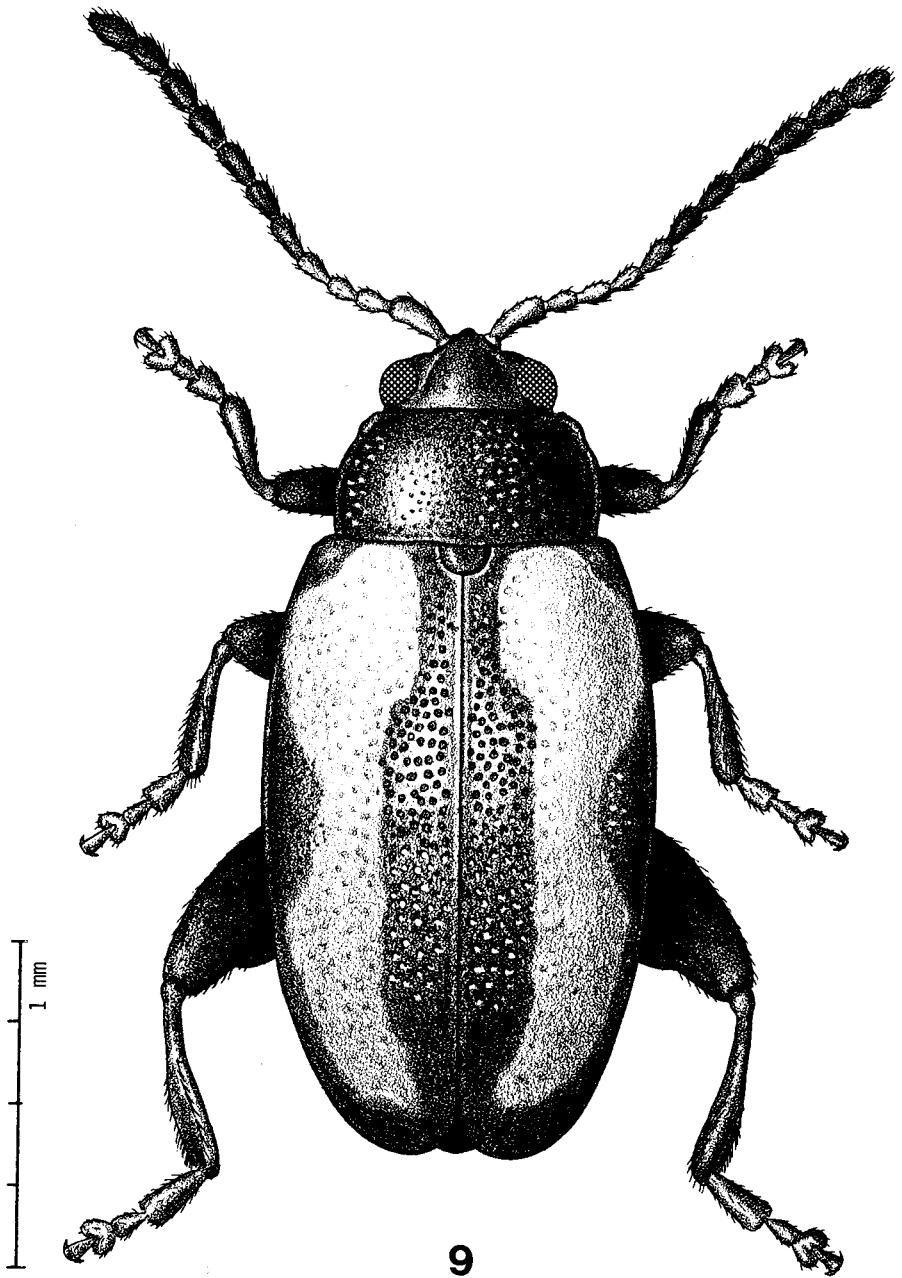
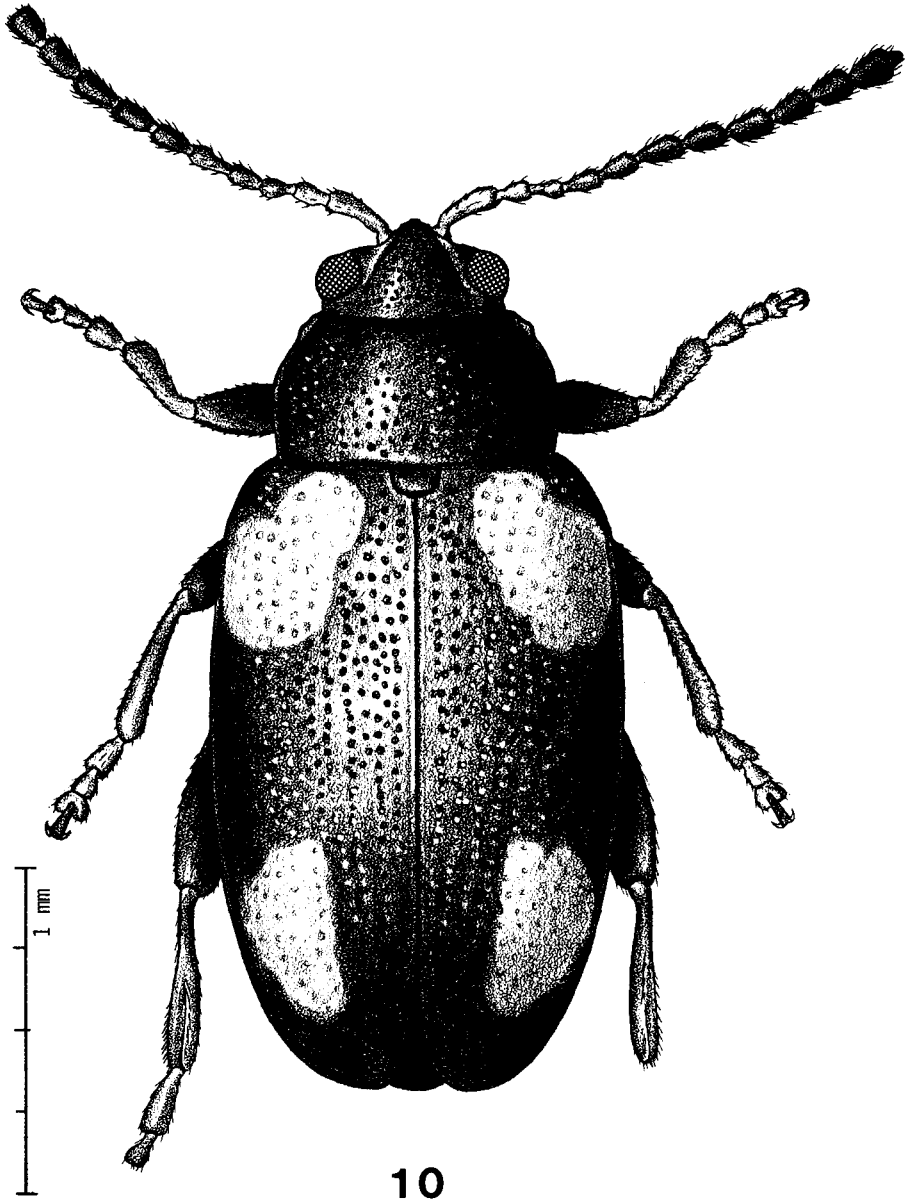
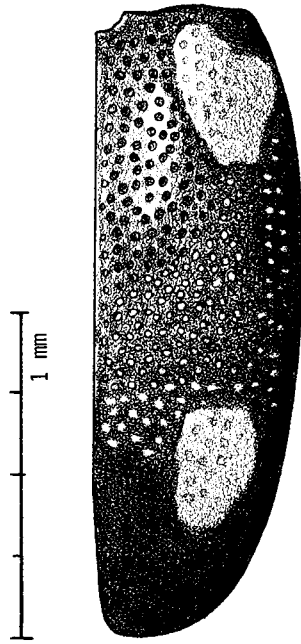


FIG. 9. *Phyllotreta attenuata*, holotype, dorsal view.



10

FIG. 10. *Phyllotreta bipustulata*, neotype, dorsal view.



11

FIG. 11. *Phyllotreta bipustulata*, right elytron showing color pattern variation, dorsal view.

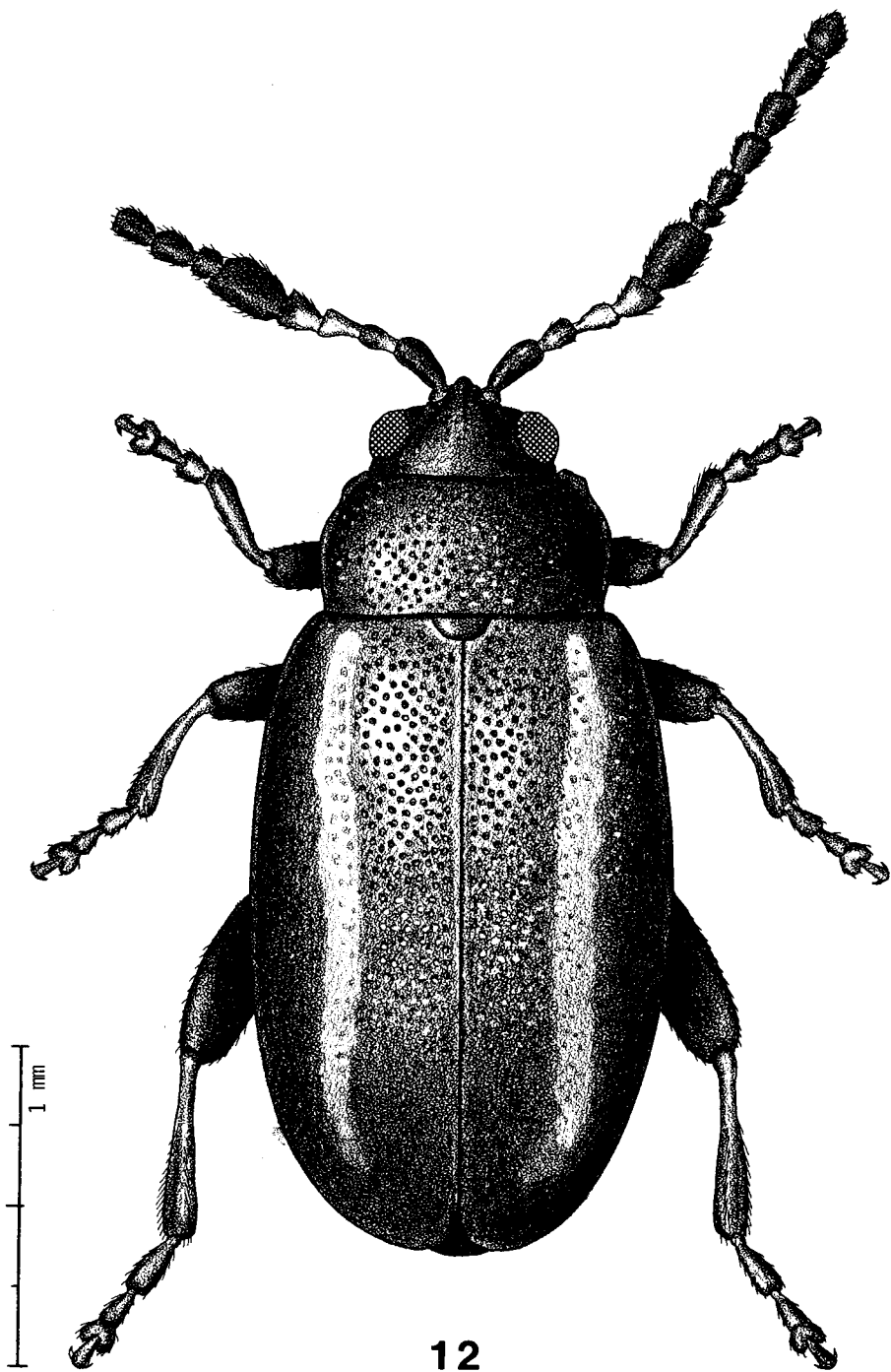


FIG. 12. *Phyllotreta bisinuata*, holotype, dorsal view.

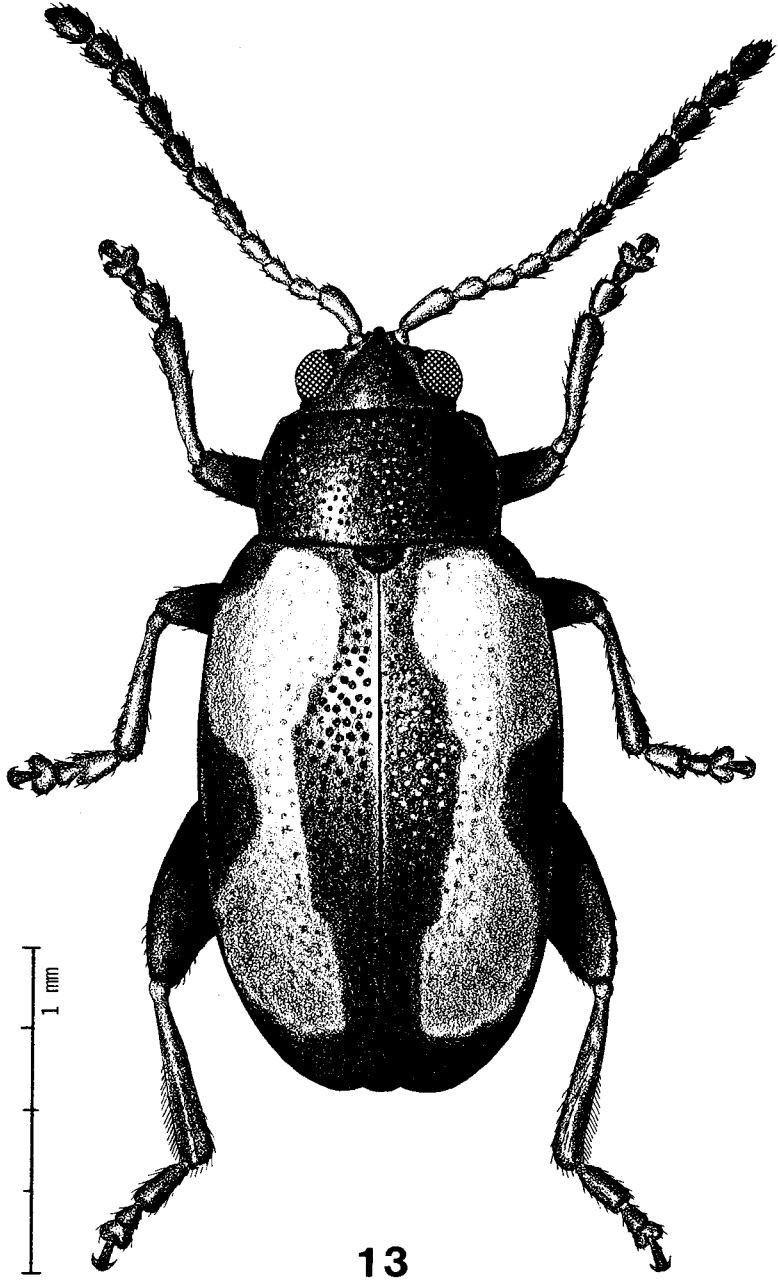
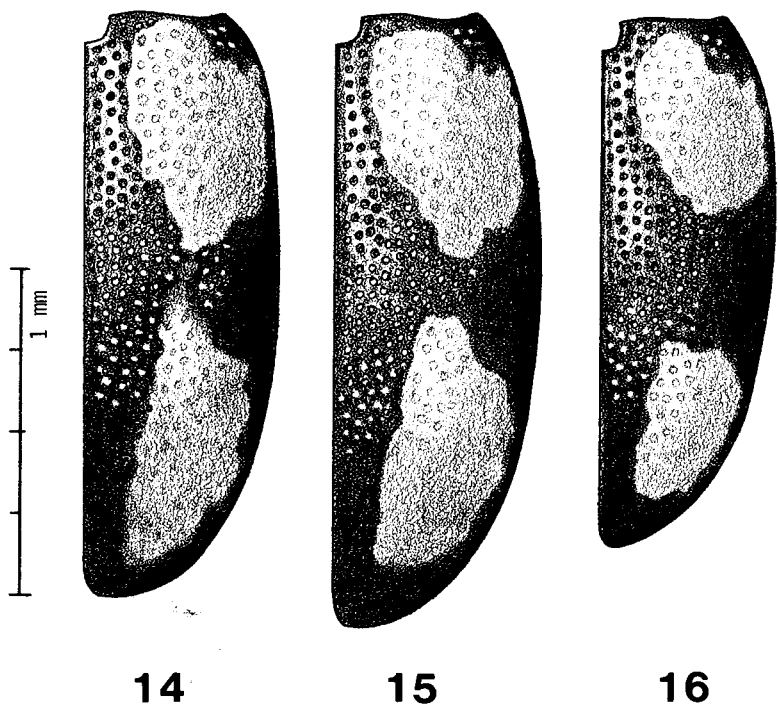


FIG. 13. *Phyllotreta conjuncta*, holotype, dorsal view.



FIGS. 14-16. *Phylloreta conjuncta*, right elytra showing color pattern variations, dorsal view.

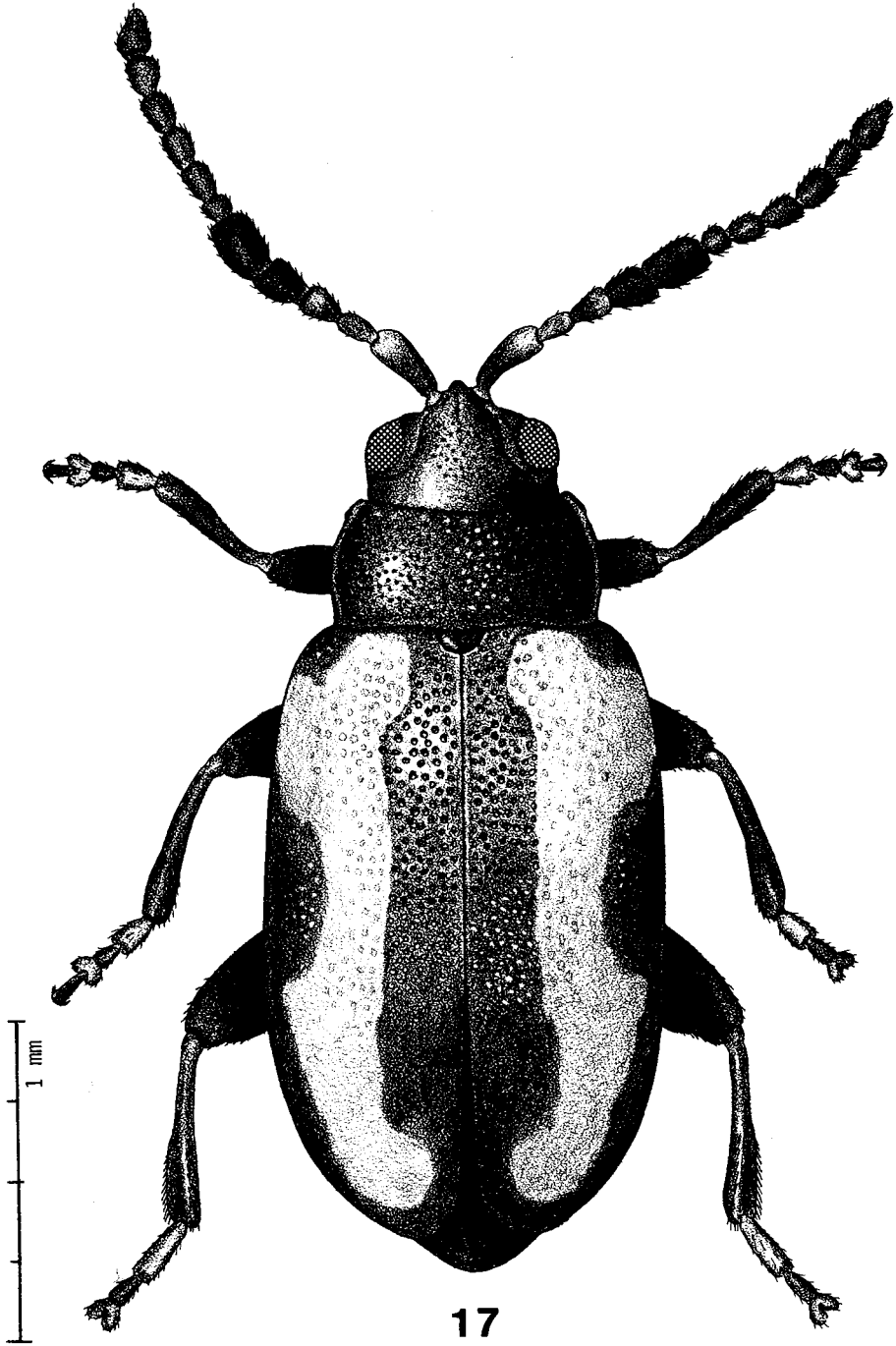


FIG. 17. *Phyllotreta constricta*, holotype, dorsal view.

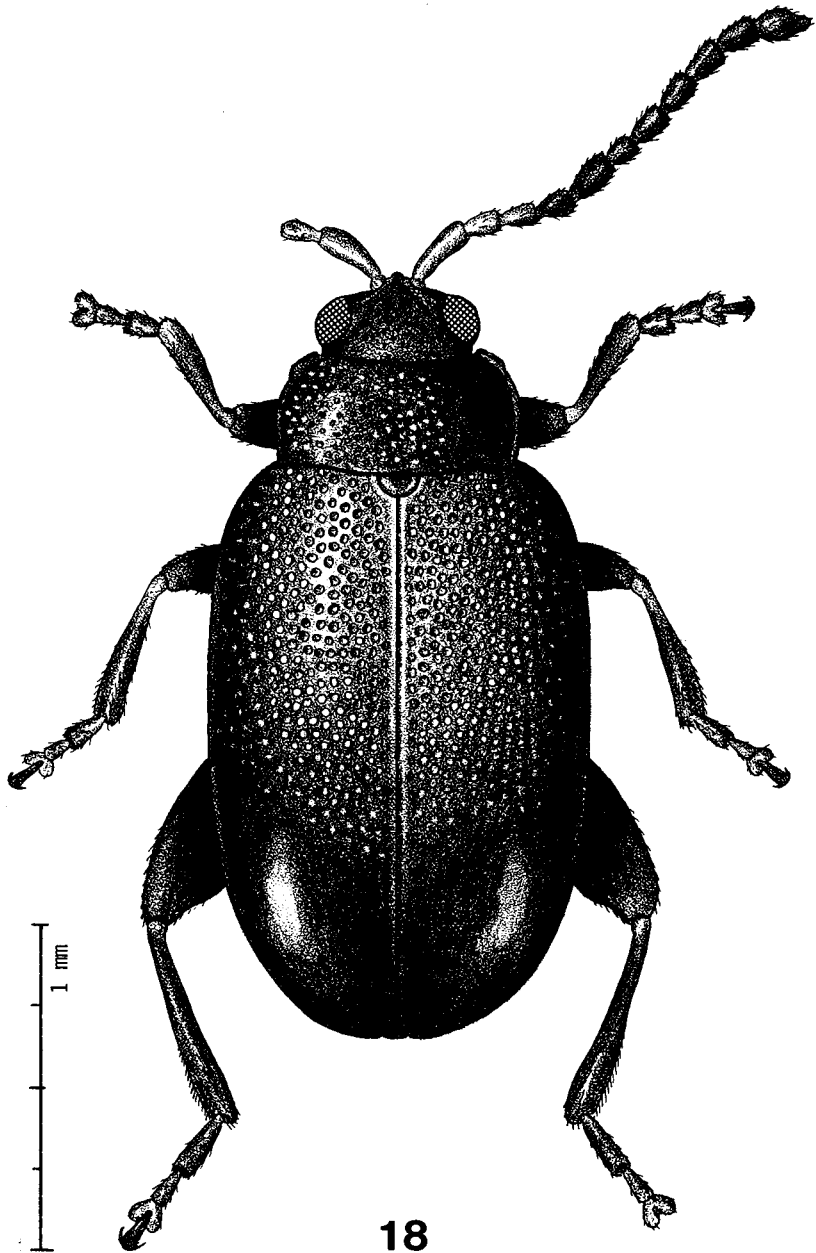


FIG. 18. *Phyllotreta decipiens*, lectotype, dorsal view.

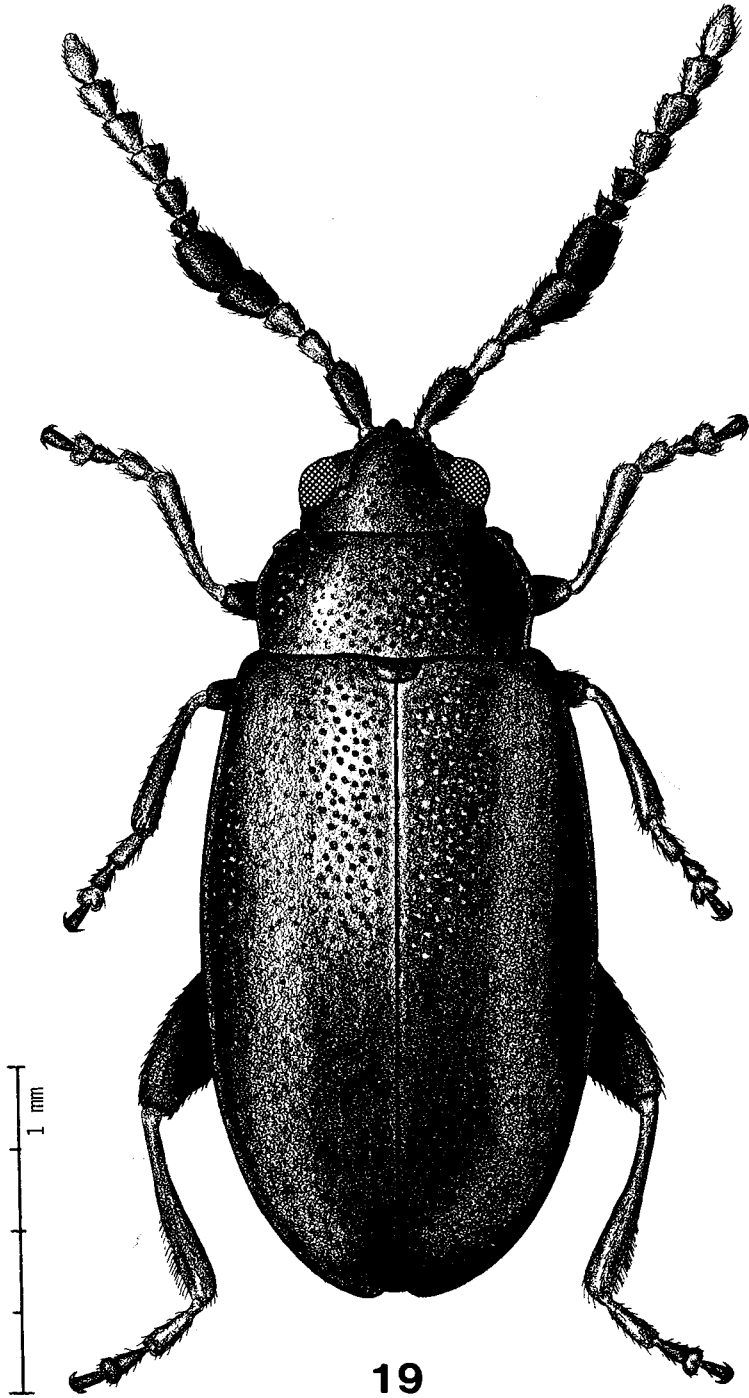
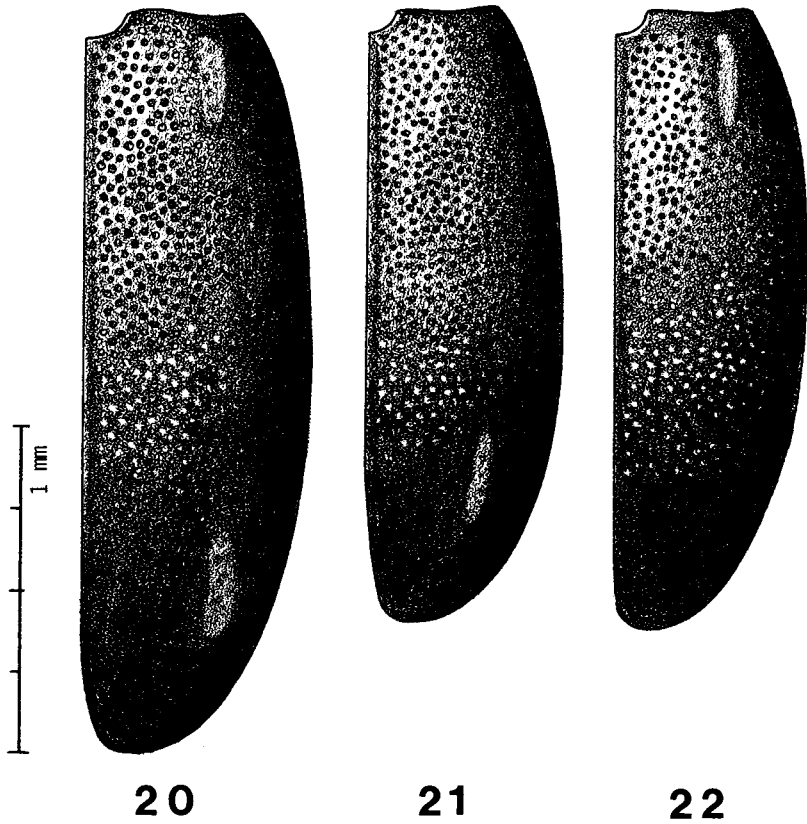
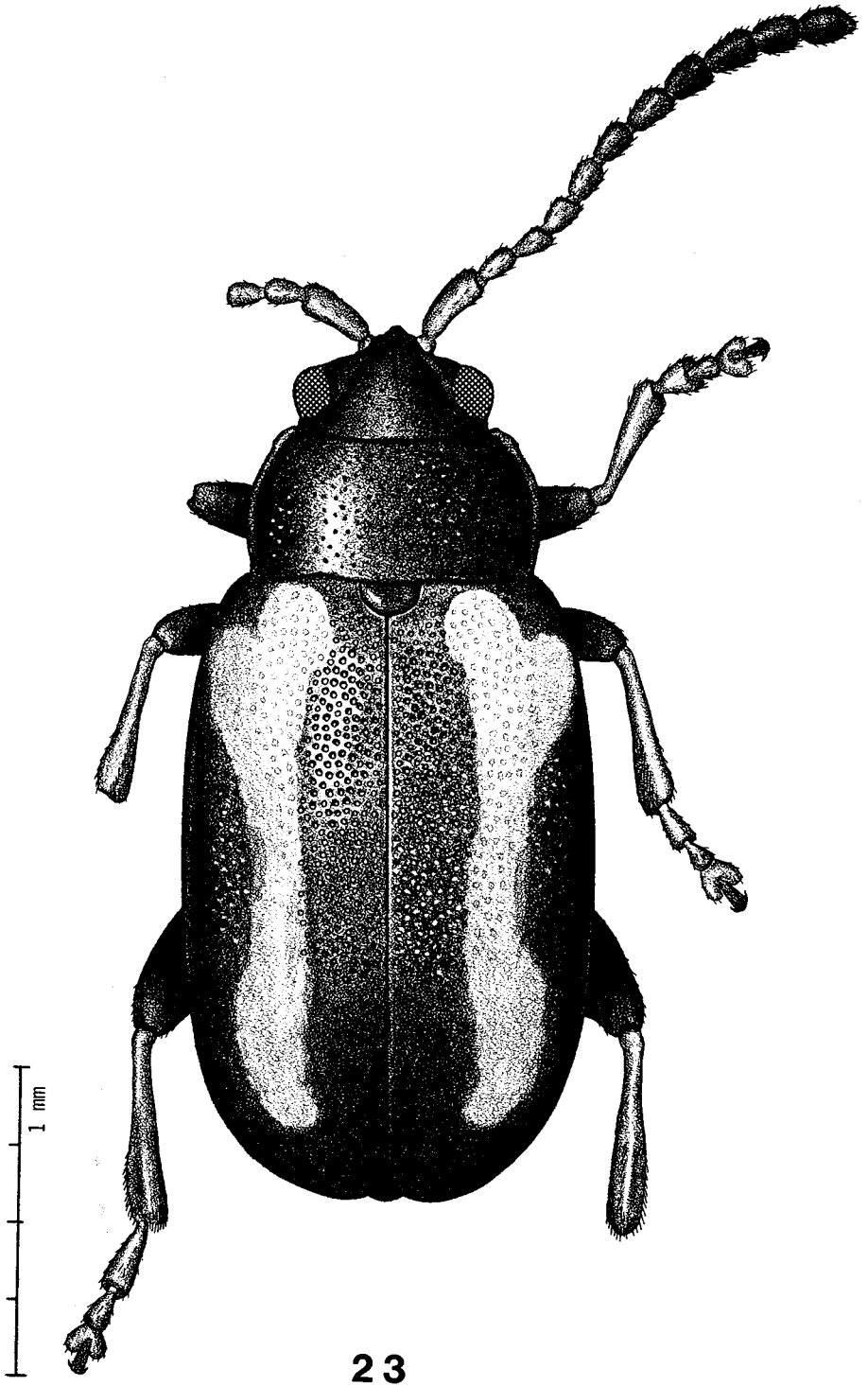


FIG. 19. *Phyllotreta denticornis*, lectotype, dorsal view.



FIGS. 20-22. *Phyllotreta denticornis*, right elytra showing color pattern variations, dorsal view.



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FIG. 23. *Phyllotreta dolichophalla*, holotype, dorsal view.

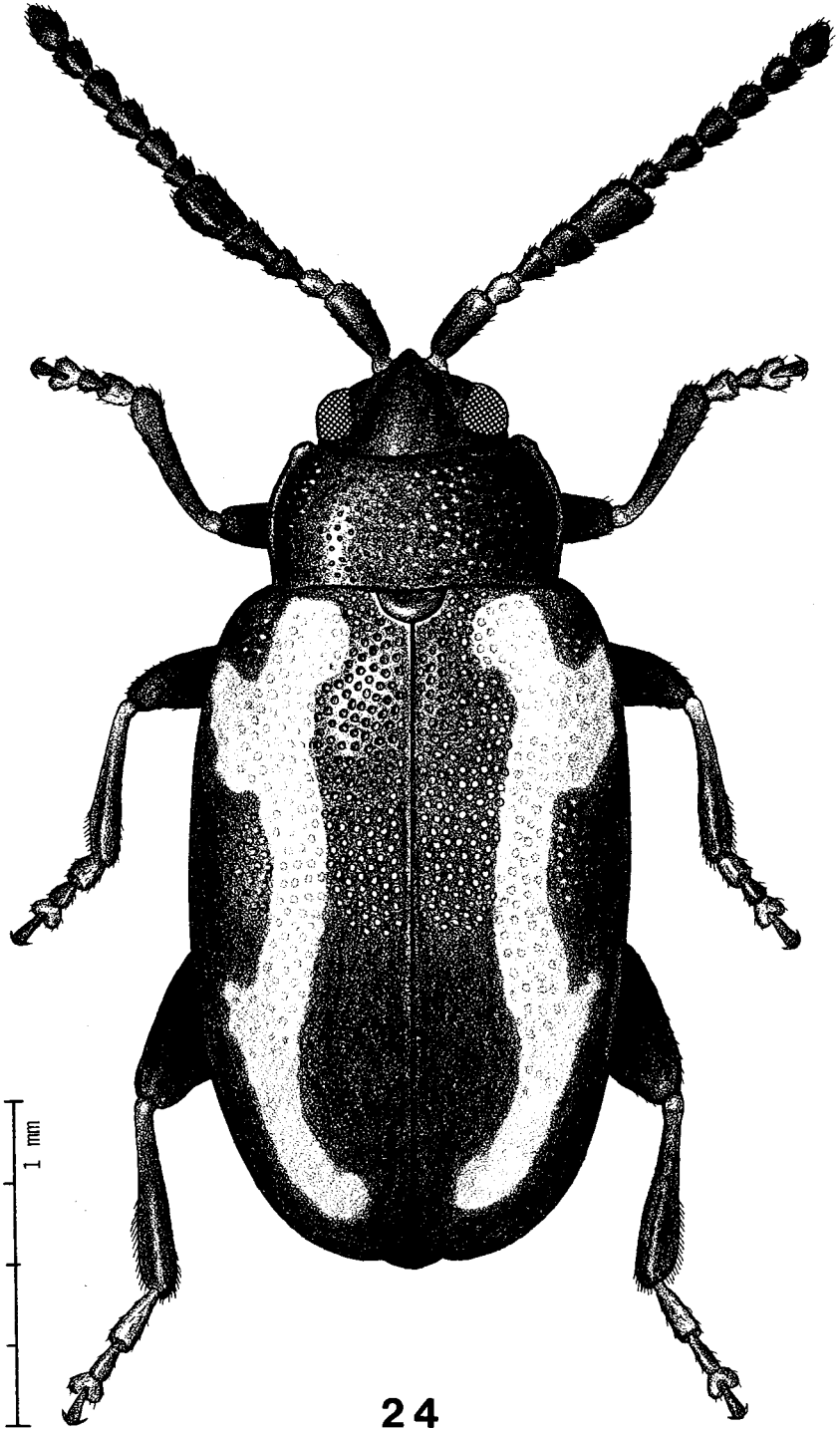


FIG. 24. *Phyllotreta emarginata*, holotype, dorsal view.

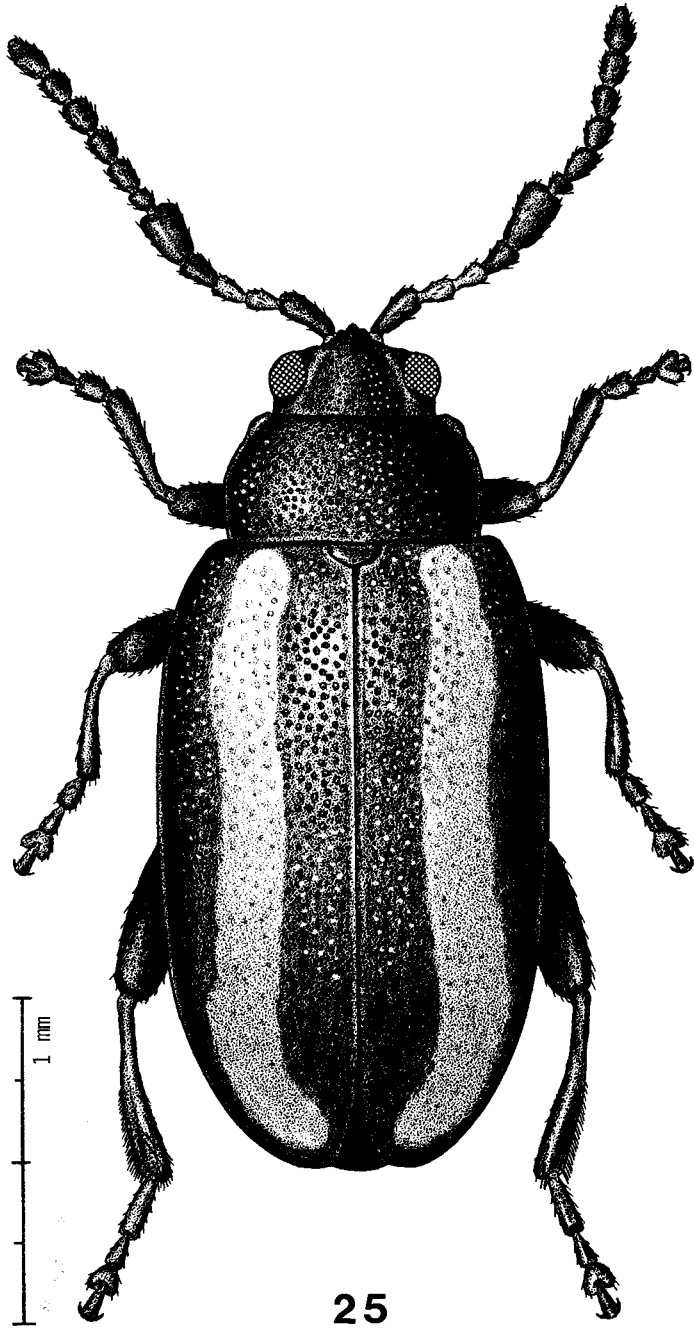


FIG. 25. *Phyllotreta lepidula*, lectotype, dorsal view.

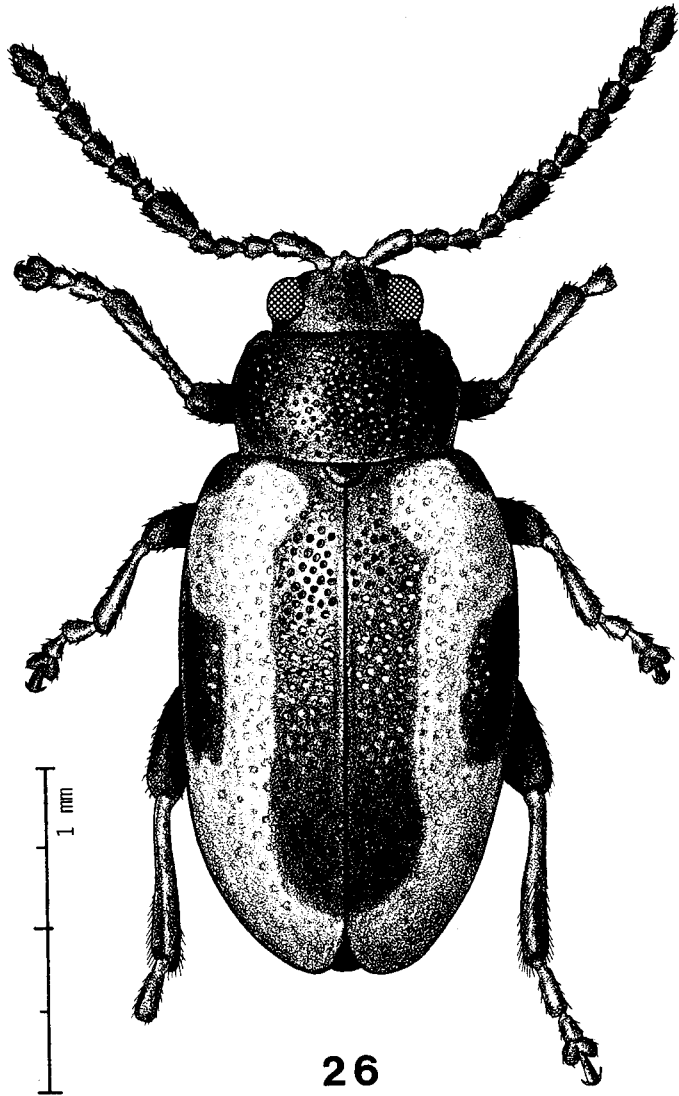
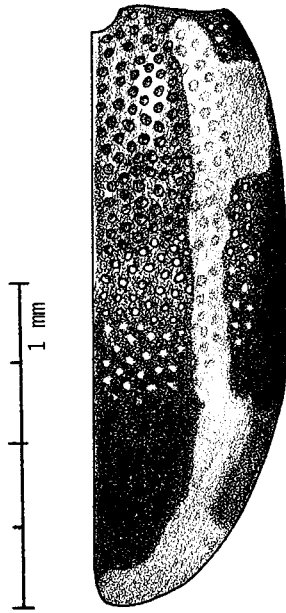
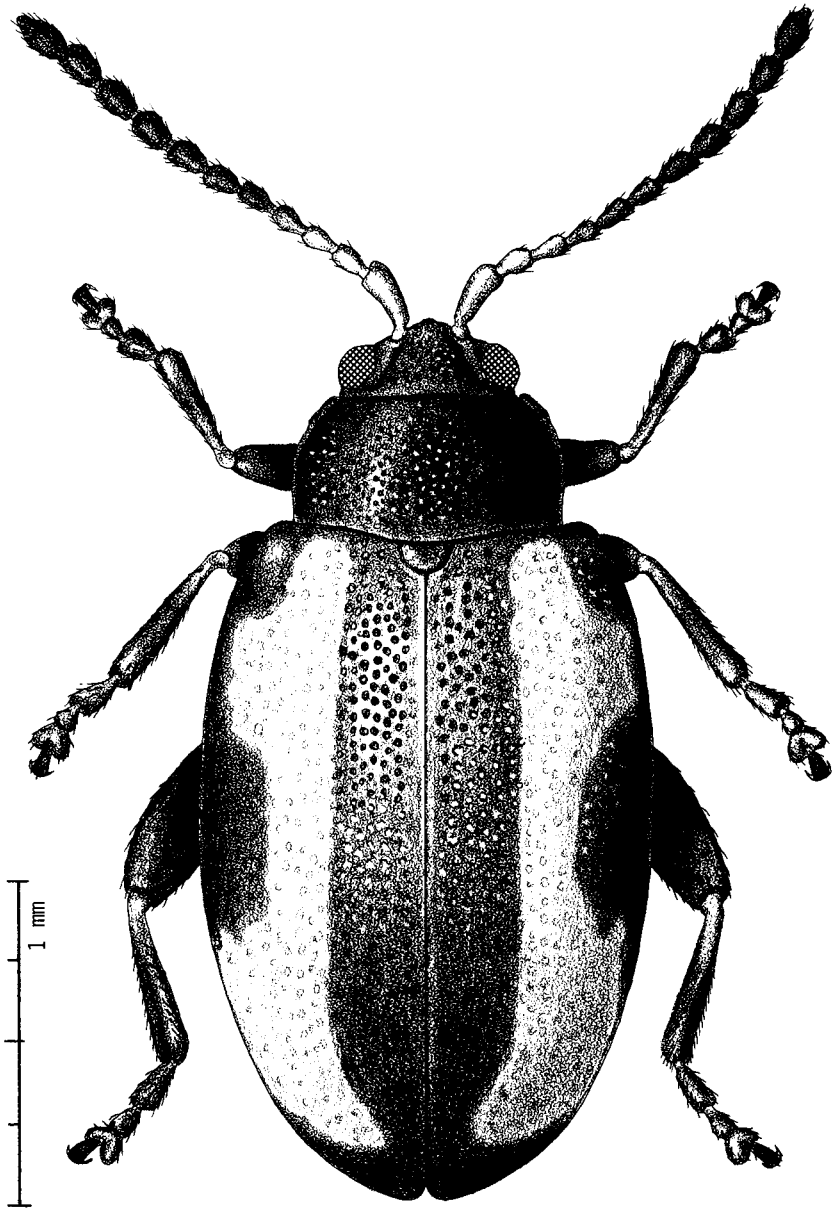


FIG. 26. *Phyllotreta liebecki*, lectotype, dorsal view.



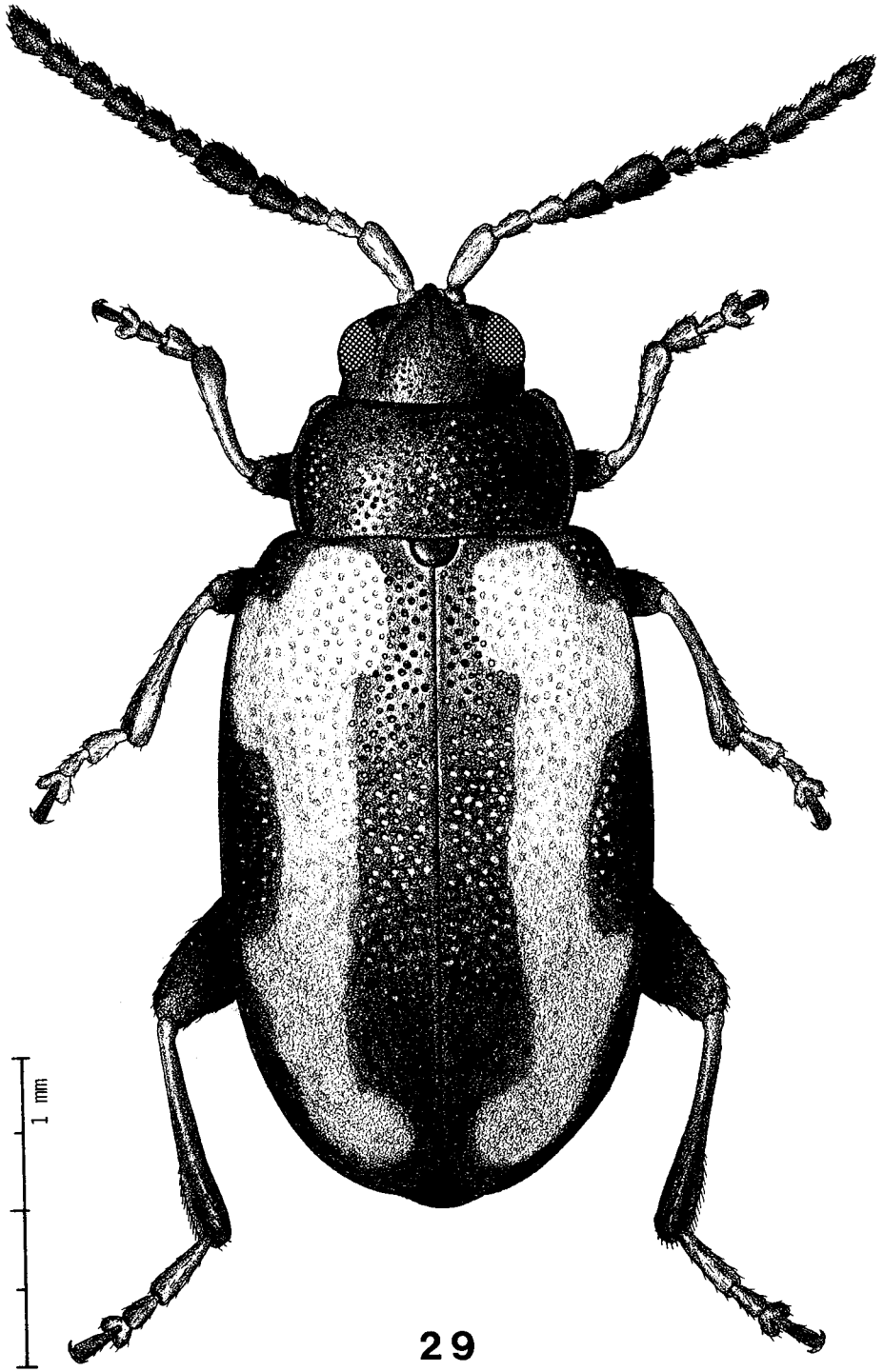
27

FIG. 27. *Phyllostreta liebecki*, right elytron showing color pattern variation, dorsal view.



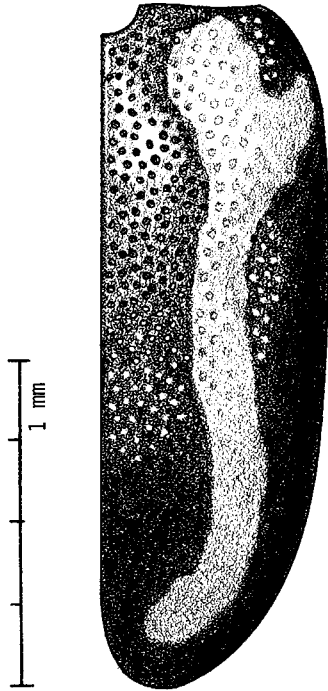
28

FIG. 28. *Phyllotreta oblonga*, holotype, dorsal view.



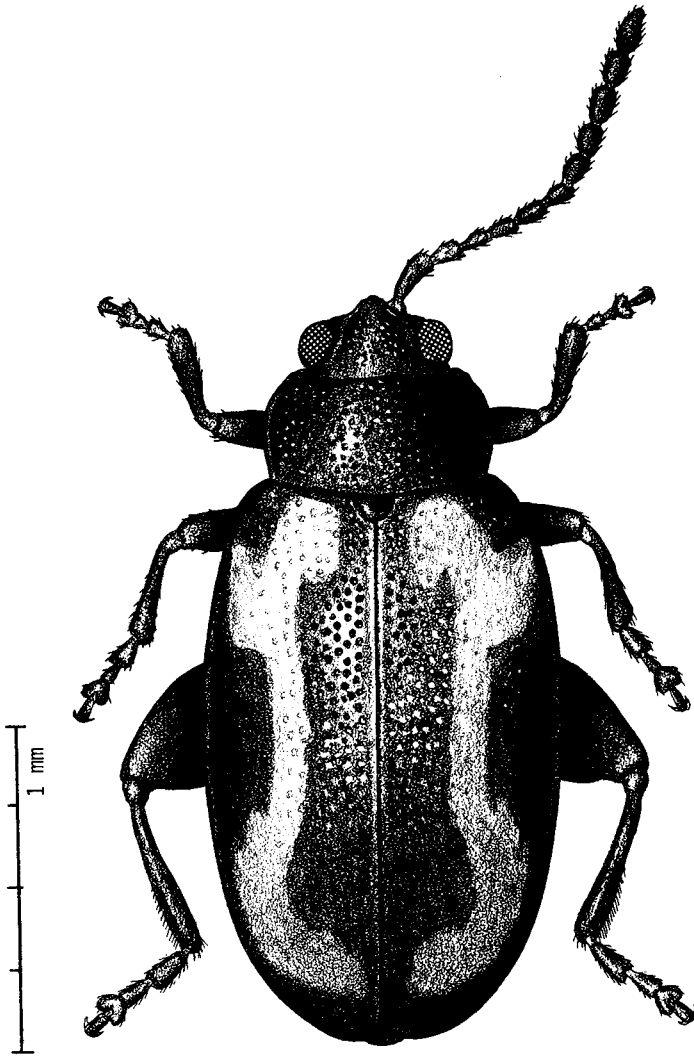
29

FIG. 29. *Phyllotreta oregonensis*, lectotype, dorsal view.



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FIG. 30. *Phyllotreta oregonensis*, right elytron showing color pattern variation, dorsal view.



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FIG. 31. *Phyllotreta ramosa*, holotype, dorsal view.

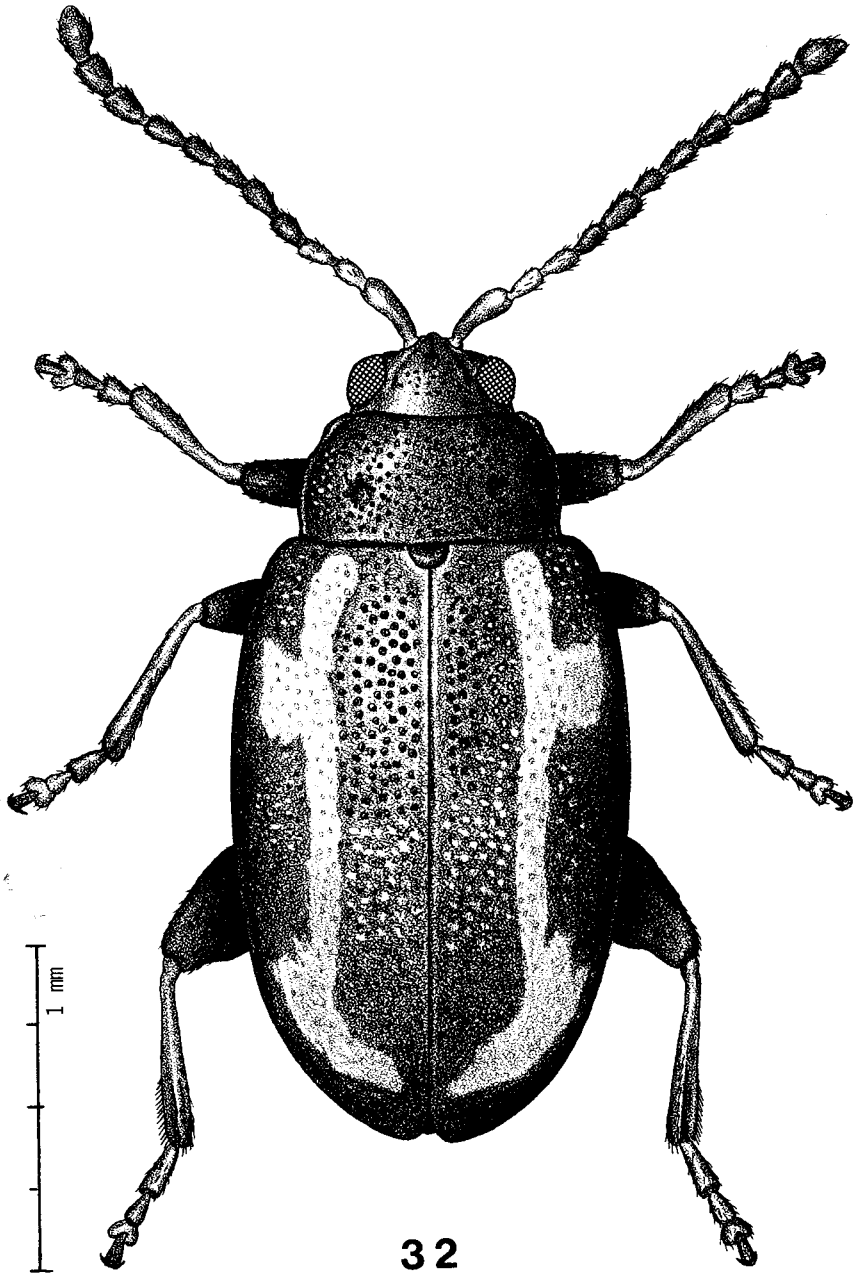


FIG. 32. *Phyllotreta ramosoides*, holotype, dorsal view.

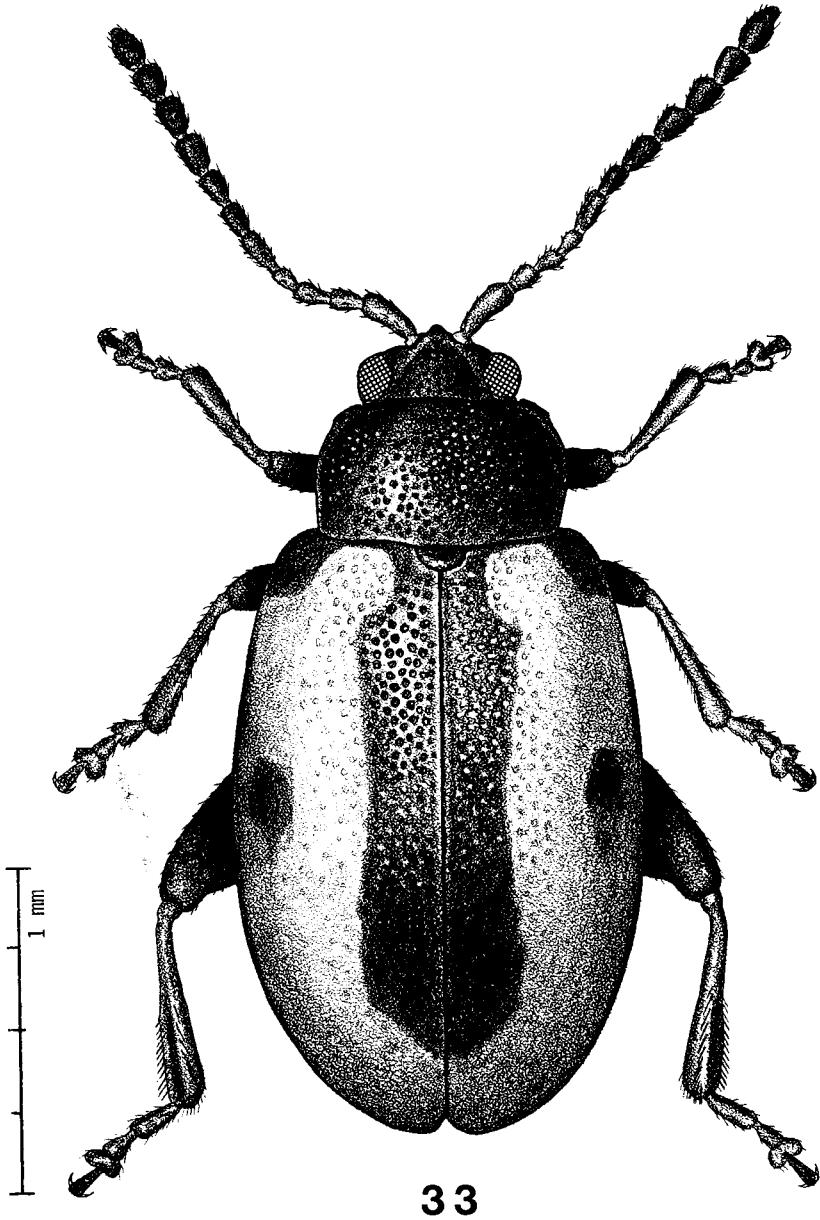
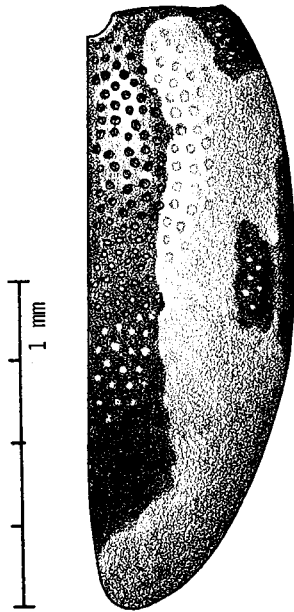


FIG. 33. *Phyllotreta robusta*, lectotype, dorsal view.



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FIG. 34. *Phyllotreta robusta*, right elytron showing color pattern variation, dorsal view.

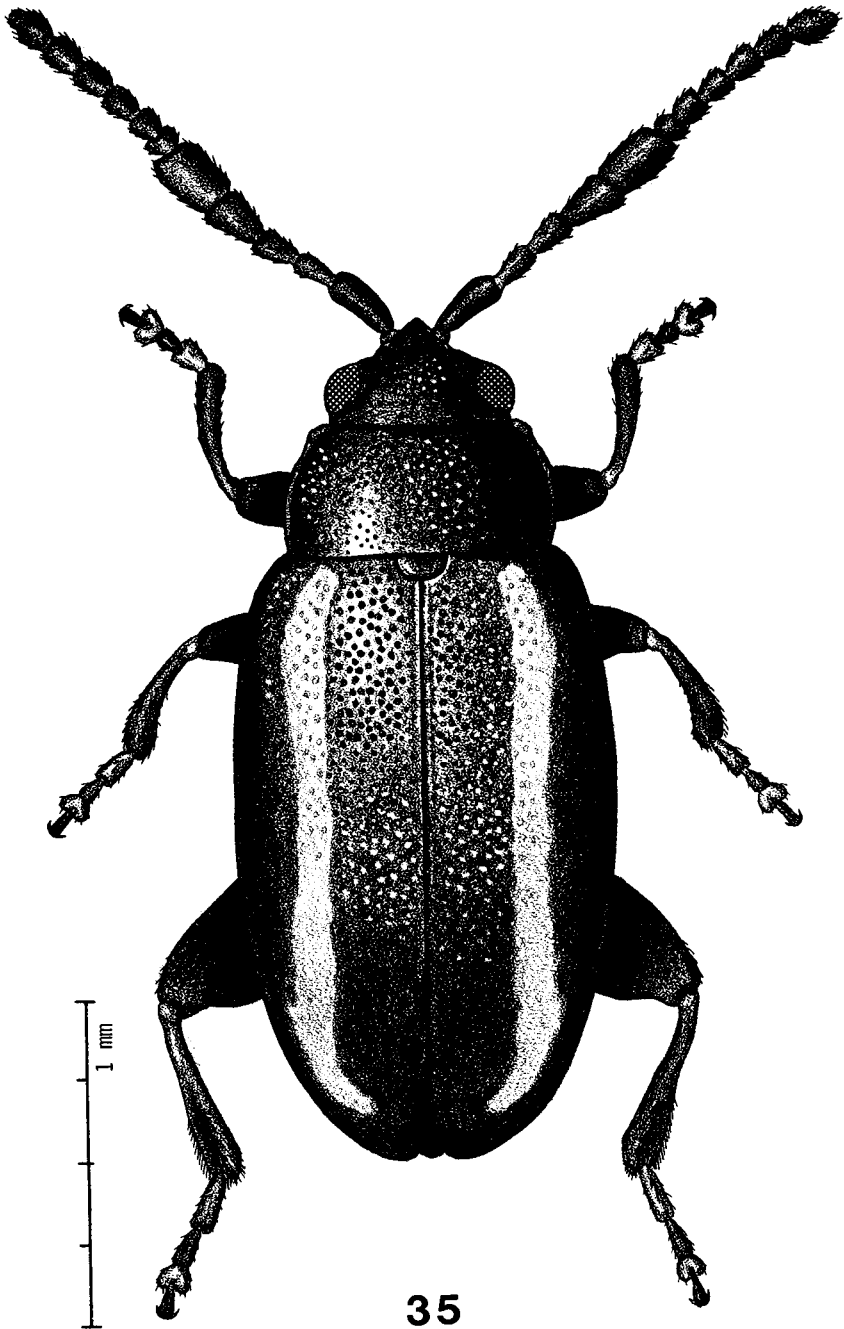


FIG. 35. *Phyllotreta spatulata*, holotype, dorsal view.

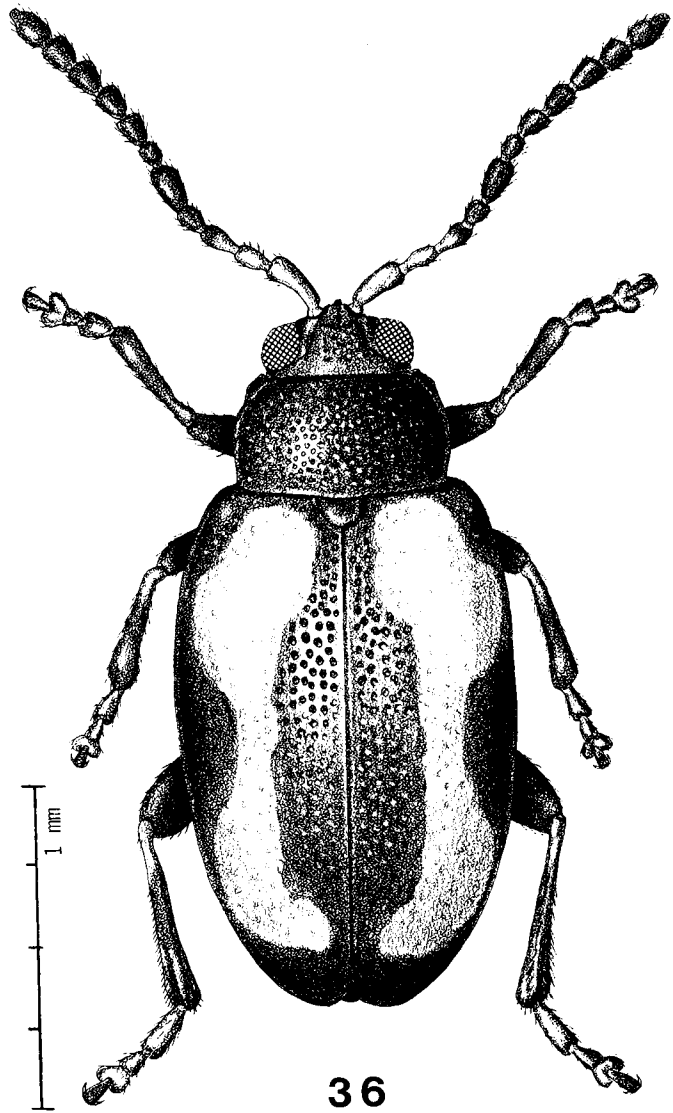
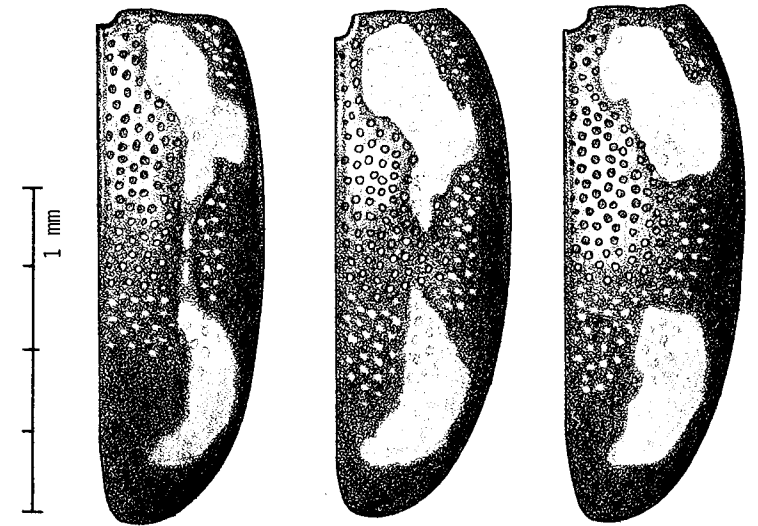
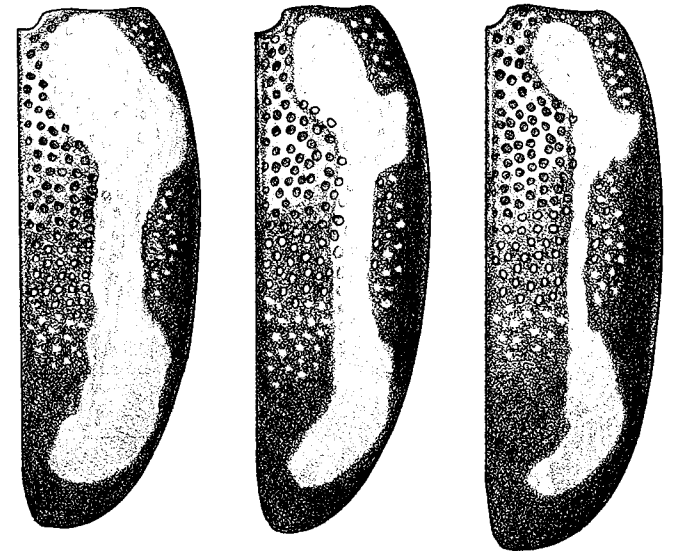


FIG. 36. *Phyllotreta striolata*, neotype, dorsal view.



FIGS. 37-42. *Phyllotreta striolata*, right elytra showing color pattern variations, dorsal view.

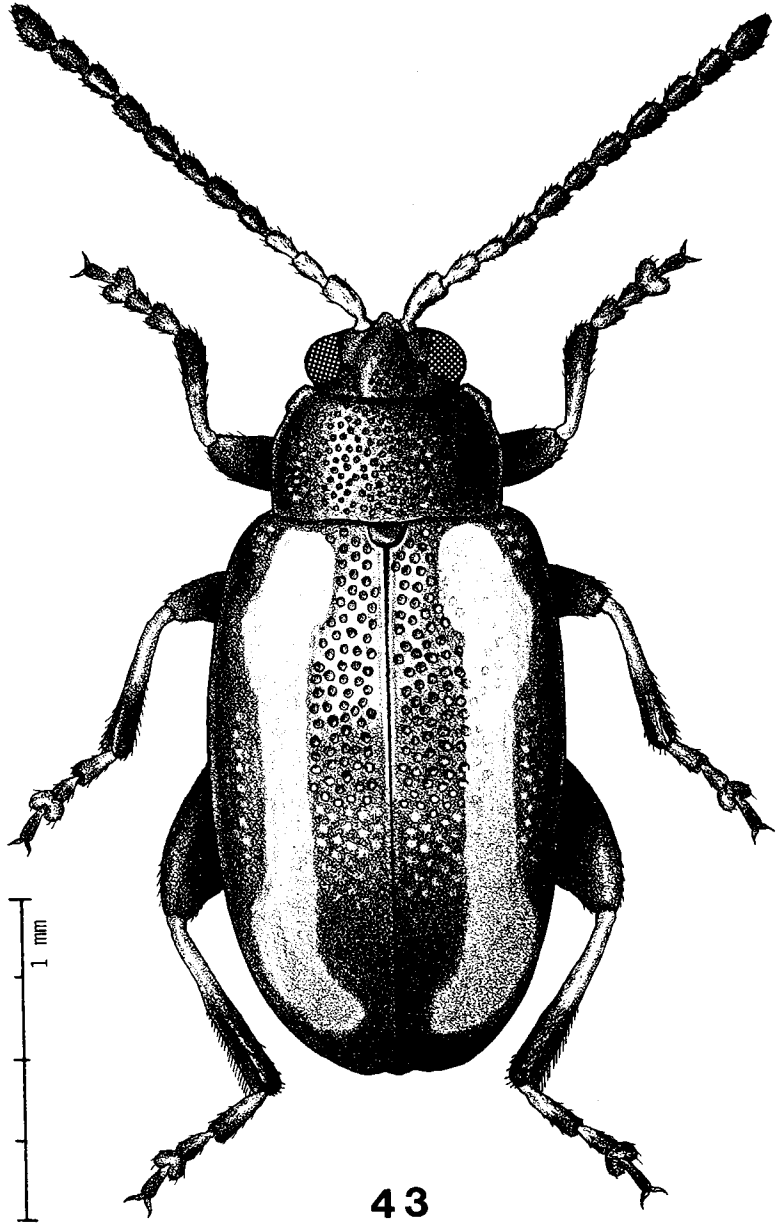


FIG. 43. *Phyllotreta undulata*, dorsal view.

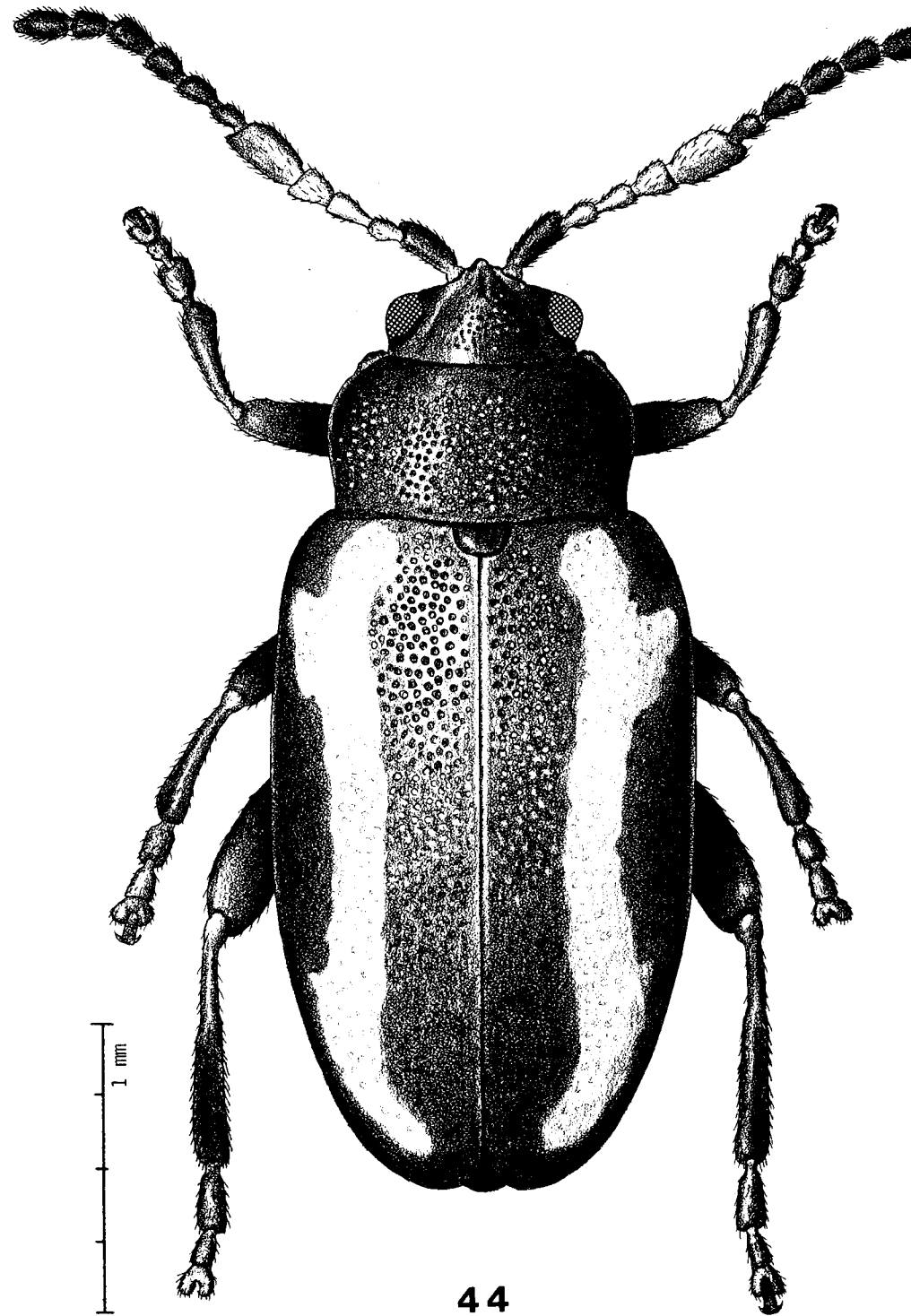
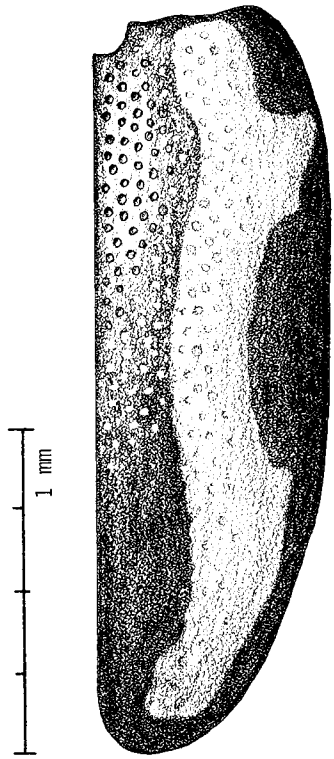
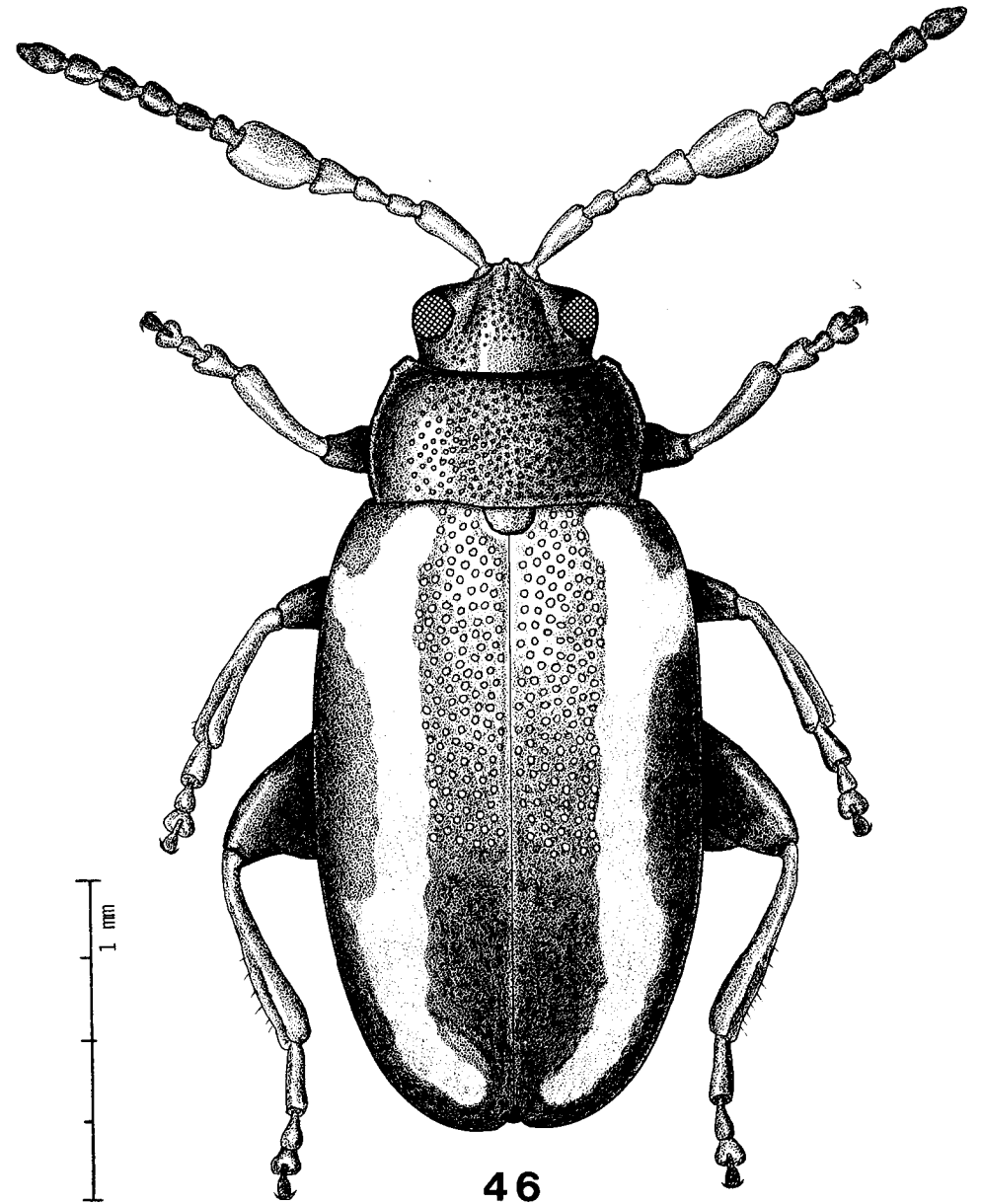


FIG. 44. *Phyllotreta utana*, holotype, dorsal view.



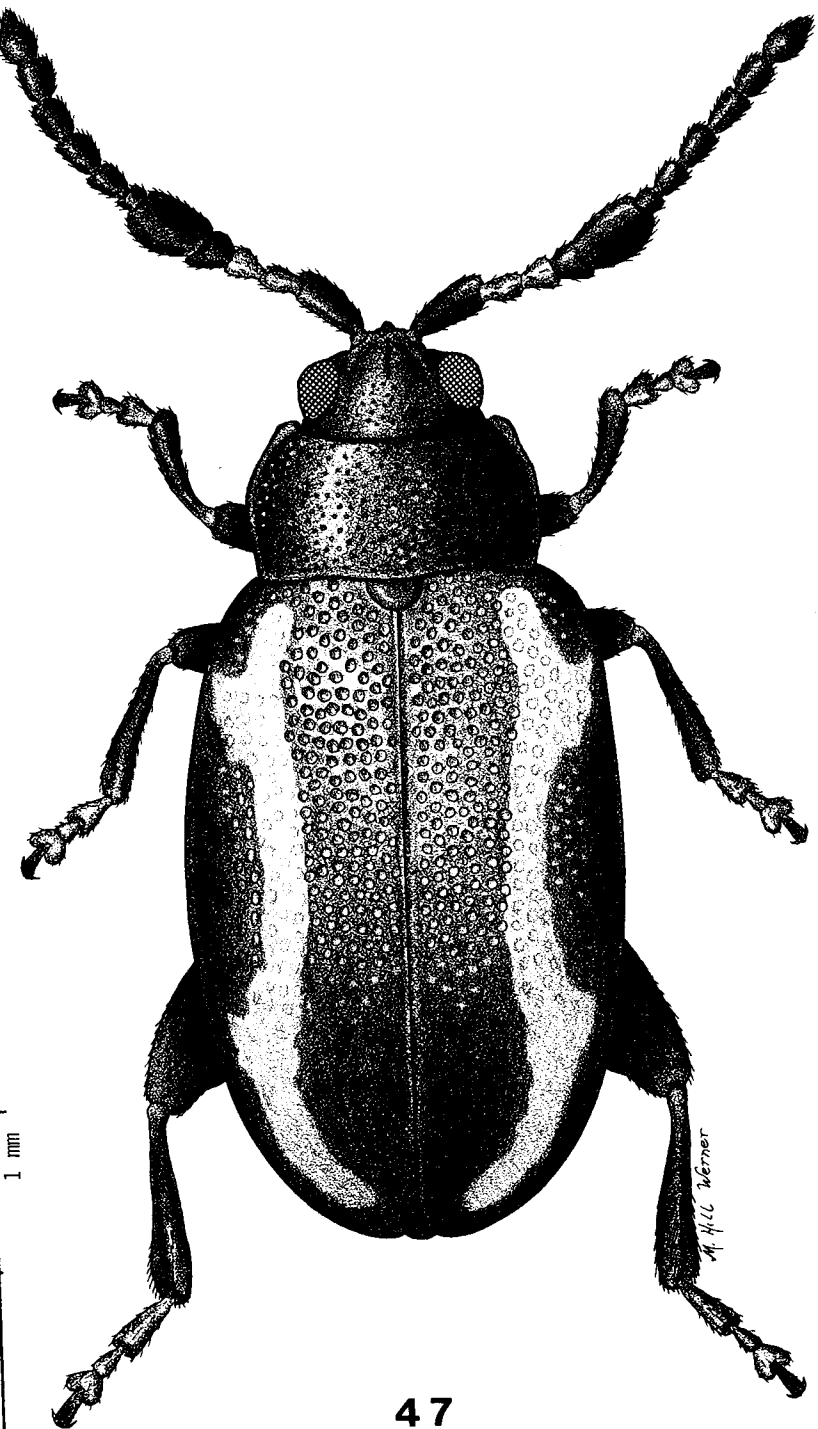
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45. *Phyllotreta utana*, right elytron showing color pattern variation, dorsal view.



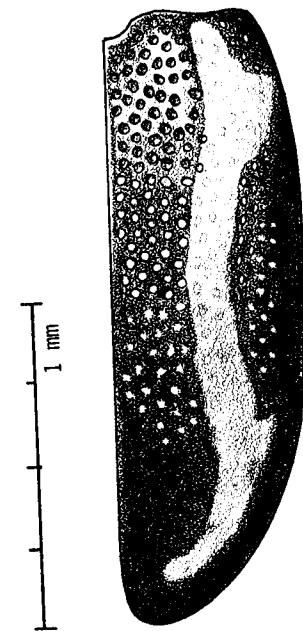
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FIG. 46. *Phyllotreta utanula*, holotype, dorsal view.



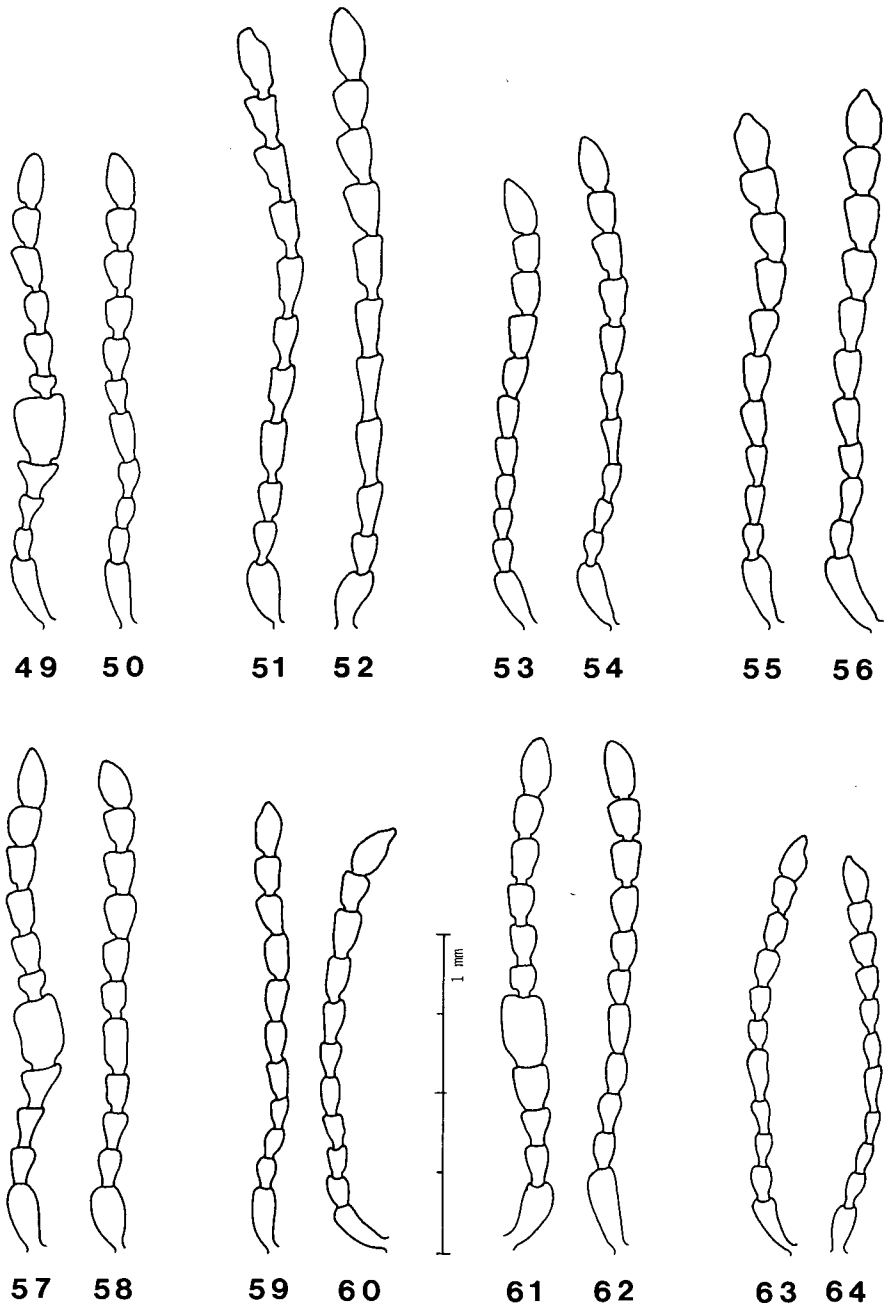
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FIG. 47. *Phyllotreta zimmermanni*, neotype, dorsal view.

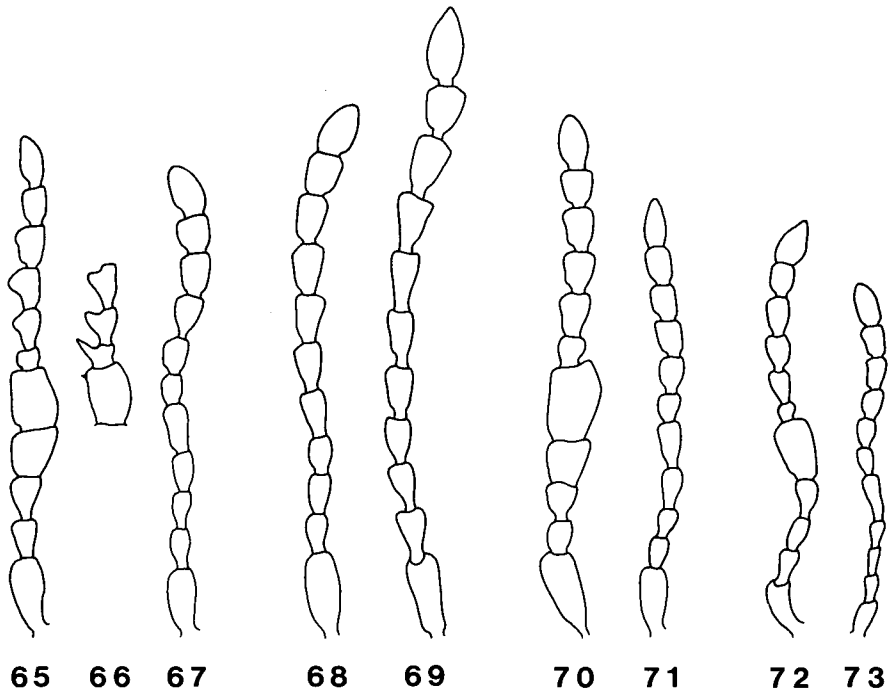


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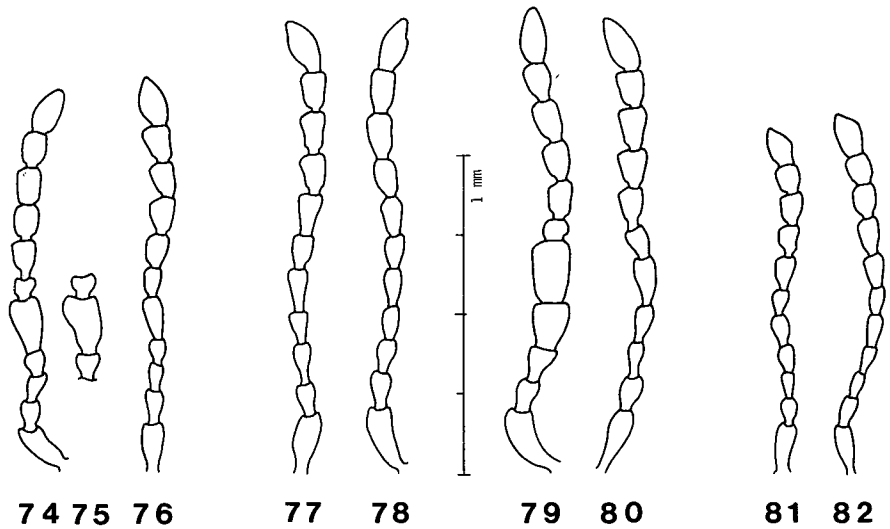
FIG. 48. *Phyllotreta zimmermanni*, paraneotype, right elytron showing color pattern variation, dorsal view.



FIGS. 49–64. Anterodorsal views of right antennae of *Phyllotreta arcuata*: **49**, male, holotype; **50**, female, allotype. Anterodorsal views of right antennae of *Phyllotreta armoraciae*: **51**, male, lectotype; **52**, female, allotype. Anterodorsal views of right antennae of *Phyllotreta attenuata*: **53**, male, holotype; **54**, female, allotype. Anterodorsal views of right antennae of *Phyllotreta bipustulata*: **55**, male, neotype; **56**, female, alloneotype. Anterodorsal views of right antennae of *Phyllotreta bisinuata*: **57**, male, holotype; **58**, female, allotype. Anterodorsal views of right antennae of *Phyllotreta conjuncta*: **59**, male, holotype; **60**, female. Anterodorsal views of antennae of *Phyllotreta constricta*: **61**, male, holotype, left antenna; **62**, female, allotype, right antenna. Anterodorsal views of right antennae of *Phyllotreta decipiens*: **63**, male, lectotype; **64**, female, allotype.

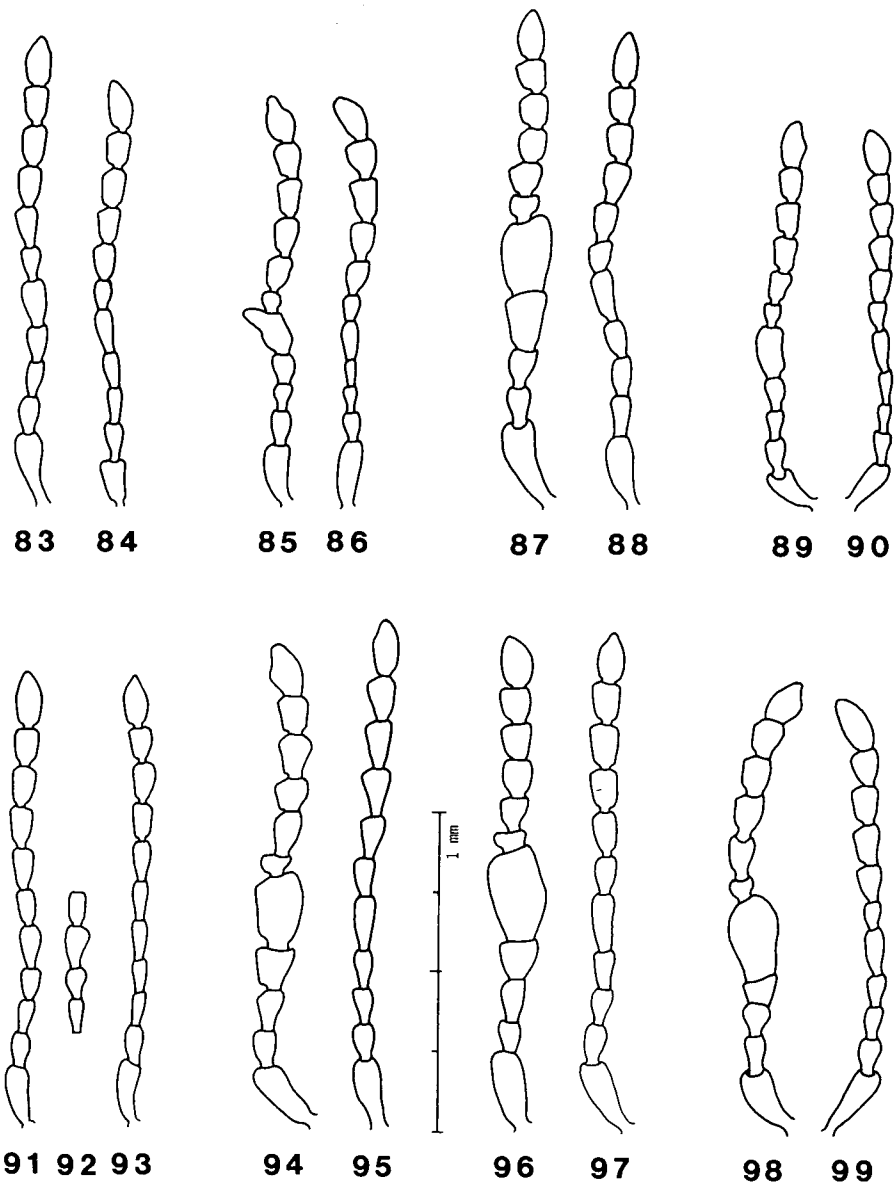


65 66 67 68 69 70 71 72 73

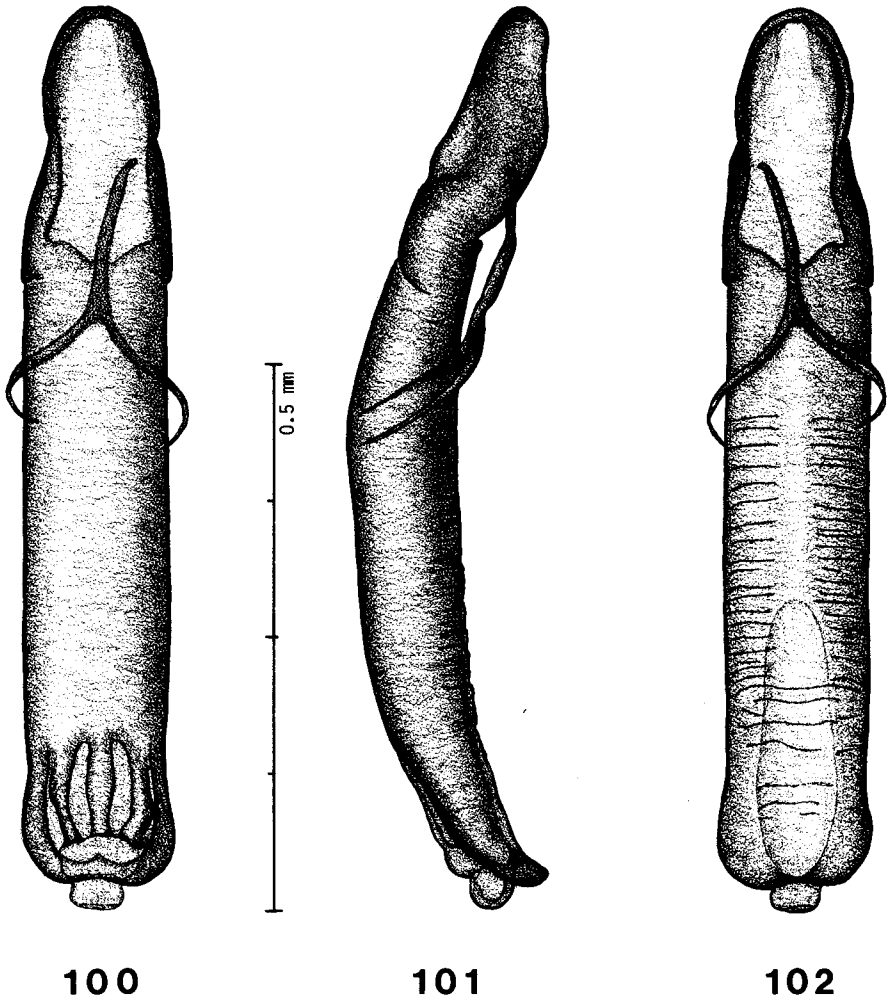


74 75 76 77 78 79 80 81 82

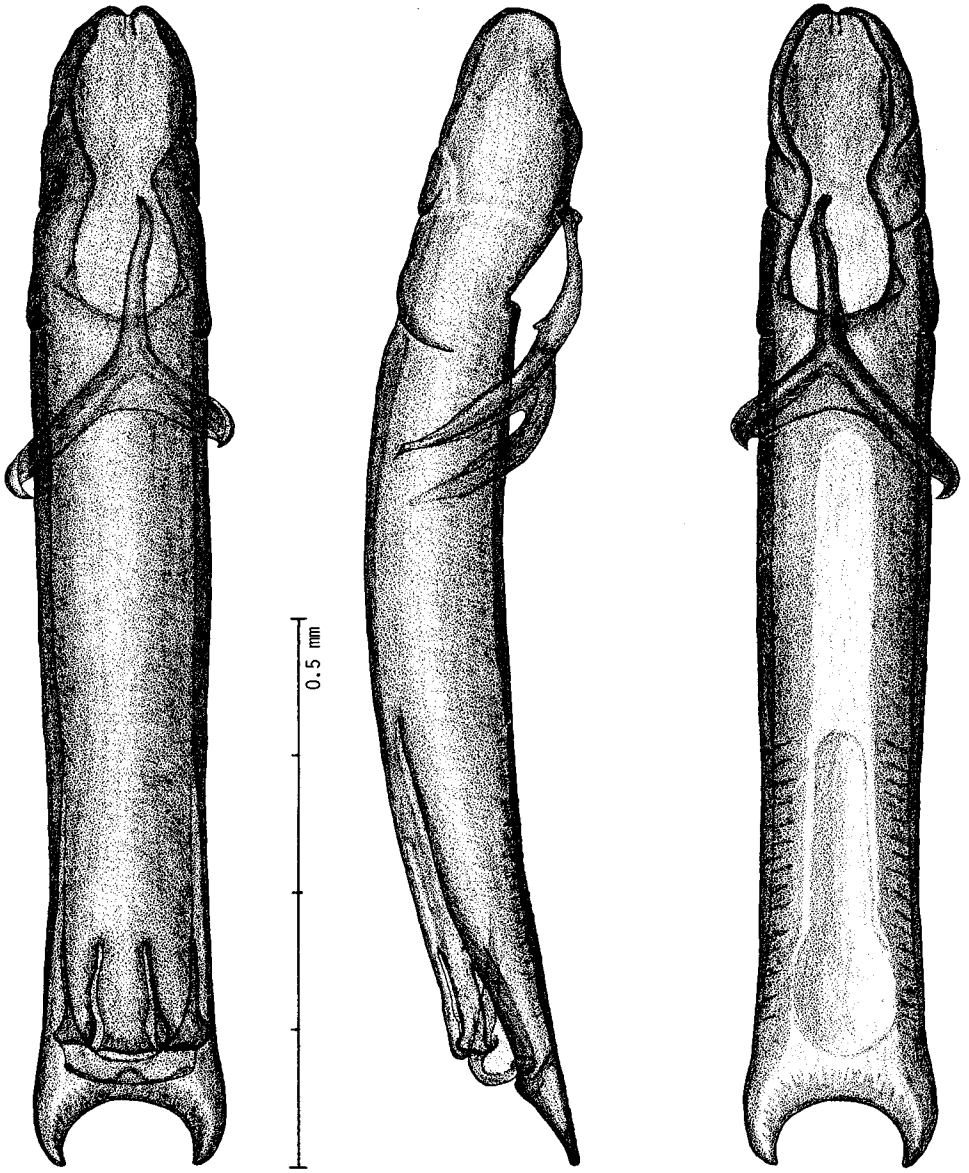
FIGS. 65-82. Right antennae of *Phyllotreta denticornis*: 65, male, lectotype, anterodorsal view; 66, male, antennal segments 5-8, lectotype, anterior view; 67, female, anterodorsal view. Anterodorsal views of antennae of *Phyllotreta dolichophalla*: 68, male, holotype, right antenna; 69, female, allotype, left antenna. Anterodorsal views of right antenna of *Phyllotreta emarginata*: 70, male holotype; 71, female, allotype. Anterodorsal views of right antennae of *Phyllotreta lepidula*: 72, male, lectotype; 73, female, allolectotype. Right antennae of *Phyllotreta liebecki*: 74, male, lectotype, anterodorsal view; 75, male antennal segments 4-6, lectotype, anterior view; 76, female, allolectotype, anterodorsal view. Anterodorsal views of right antennae of *Phyllotreta oblonga*: 77, male; 78, female, holotype. Anterodorsal views of right antennae of *Phyllotreta oregonensis*: 79, male, lectotype; 80, female, allolectotype. Anterodorsal views of right antennae of *Phyllotreta ramosa*: 81, male; 82, female, holotype.



FIGS. 83-99. Anterodorsal views of right antennae of *Phyllotreta ramosoides*: 83, male, holotype; 84, female, allotype. Anterodorsal views of right antennae of *Phyllotreta robusta*: 85, male; 86, female, holotype. Anterodorsal views of right antennae of *Phyllotreta spatulata*: 87, male, holotype; 88, female, allotype. Anterodorsal views of right antennae of *Phyllotreta striolata*: 89, male, neotype; 90, female, alloneotype. Right antennae of *Phyllotreta undulata*: 91, male, anterodorsal view; 92, male, antennal segments 3-6, posterodorsal view; 93, female, anterodorsal view. Anterodorsal views of right antennae of *Phyllotreta utana*: 94, male, holotype; 95, female, paratype. Anterodorsal views of right antennae of *Phyllotreta utanula*: 96, male, holotype; 97, female, allotype. Anterodorsal views of right antennae of *Phyllotreta zimmermanni*: 98, male, neotype; 99, female, alloneotype.



FIGS. 100-102. Aedeagus of *Phyllotreta arcuata*, holotype: **100**, dorsal view; **101**, lateral view; **102**, ventral view.

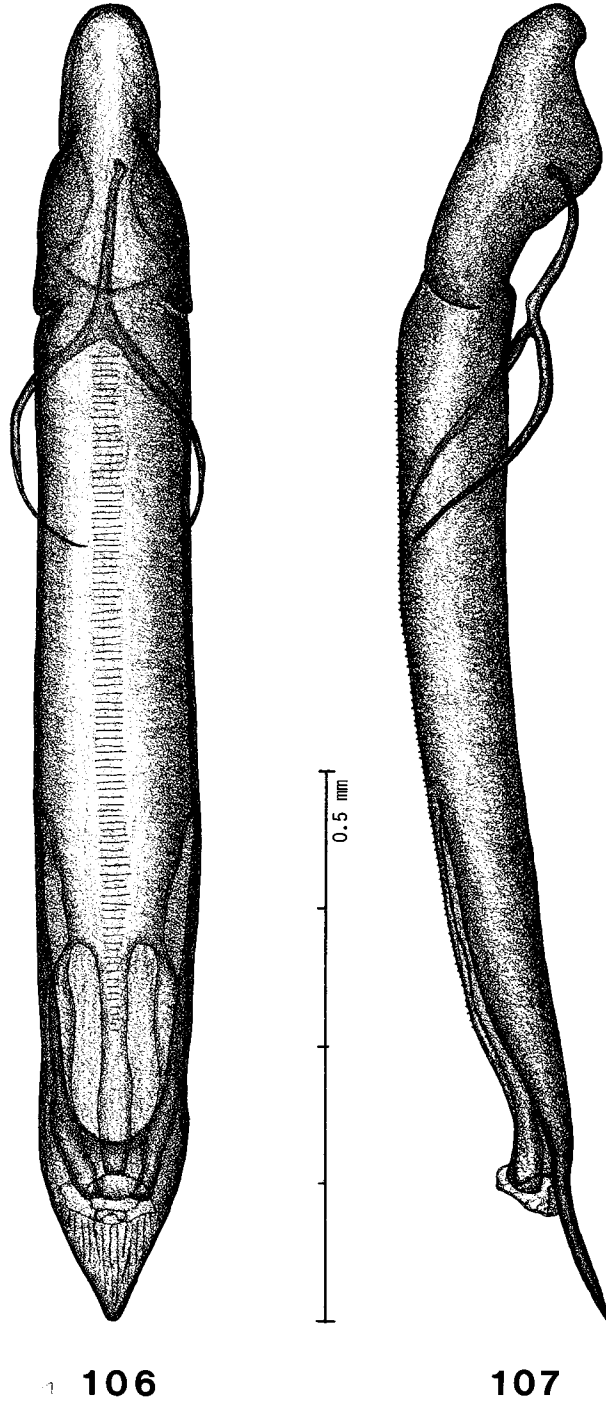


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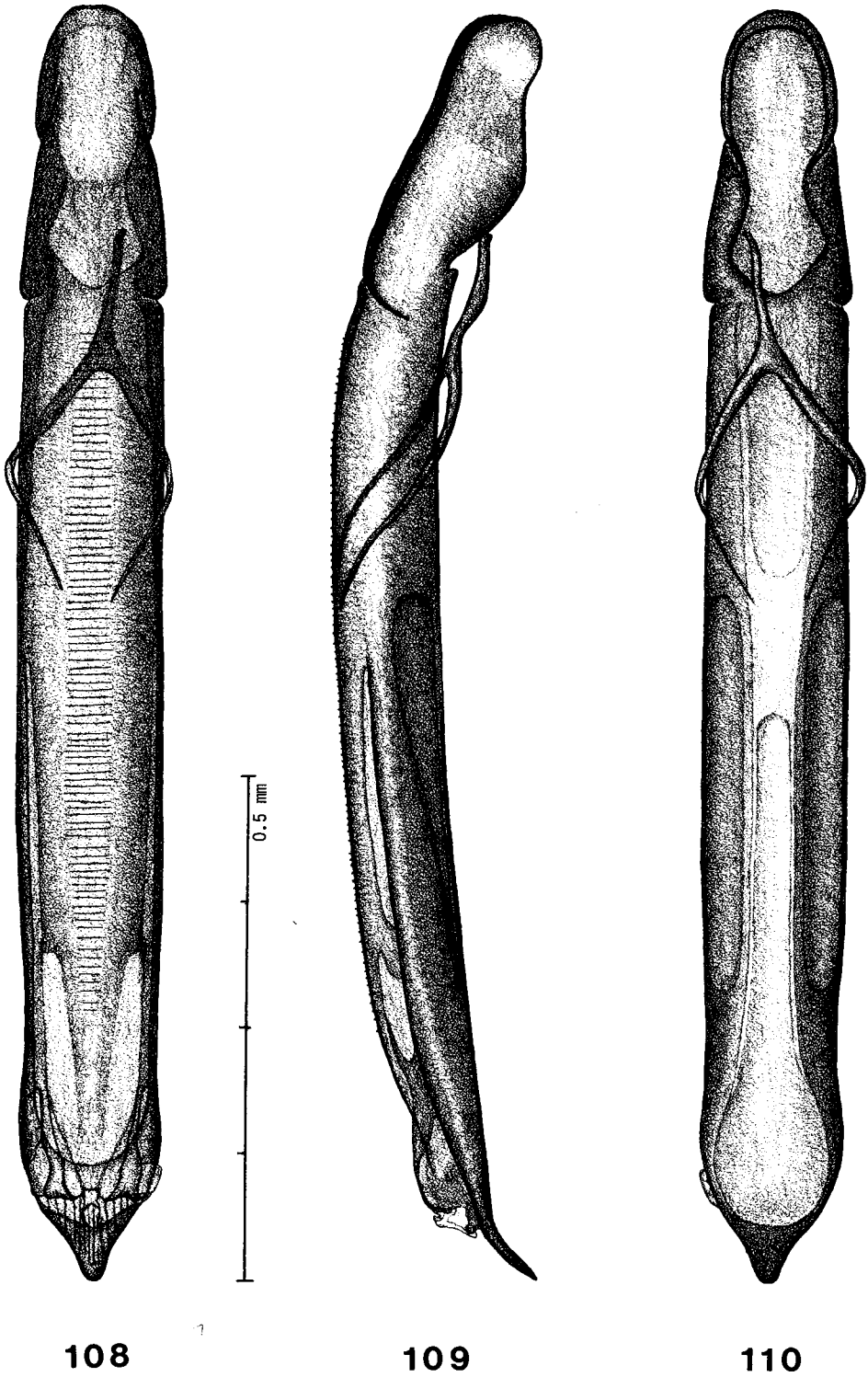
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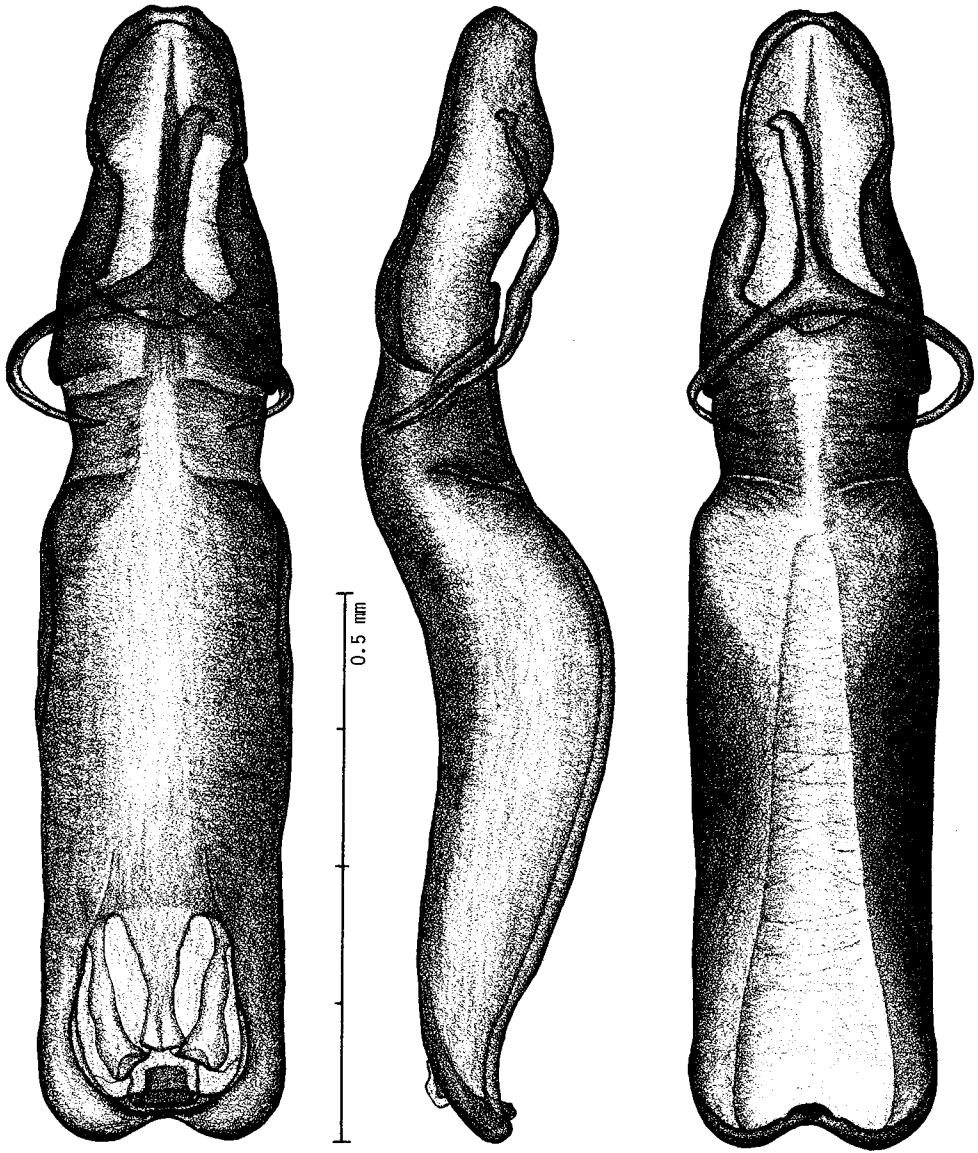
FIGS. 103–105. Aedeagus of *Phyllotreta armoraciae*, lectotype: **103**, dorsal view; **104**, lateral view; **105**, ventral view.



Figs. 106–107. Aedeagus of *Phyllotreta attenuata*, holotype: 106, dorsal view; 107, lateral view.



Figs. 108–110. Aedeagus of *Phyllotreta bipustulata*, neotype: 108, dorsal view; 109, lateral view; 110, ventral view.

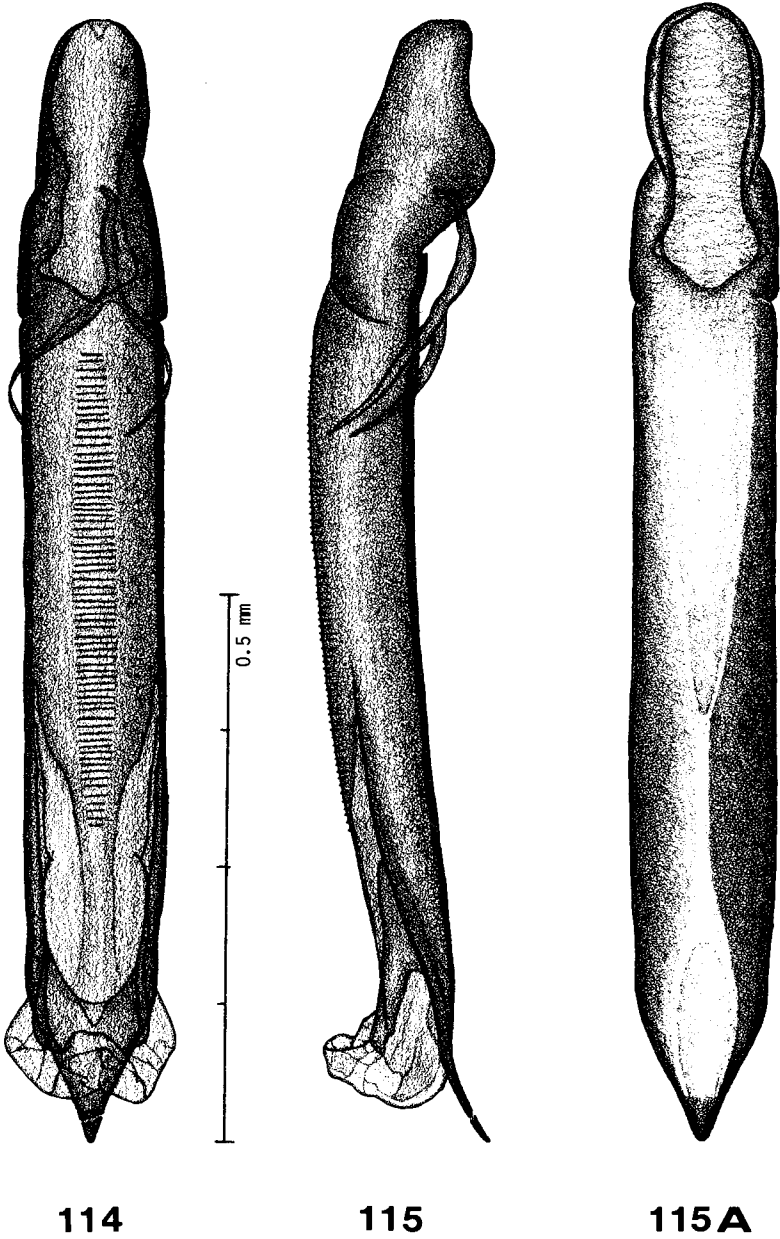


111

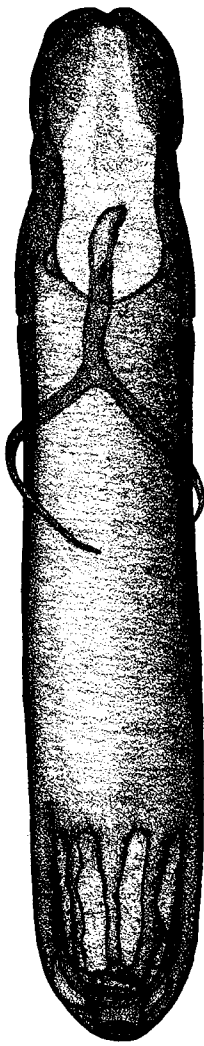
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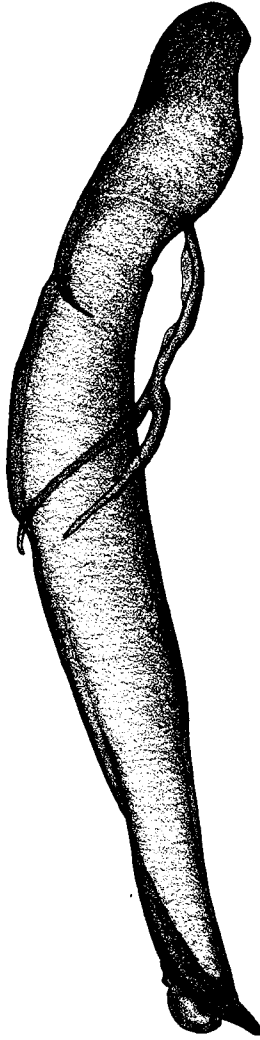
FIGS. 111-113. Aedeagus of *Phyllotreta bisinuata*, holotype: 111, dorsal view; 112, lateral view; 113, ventral view.



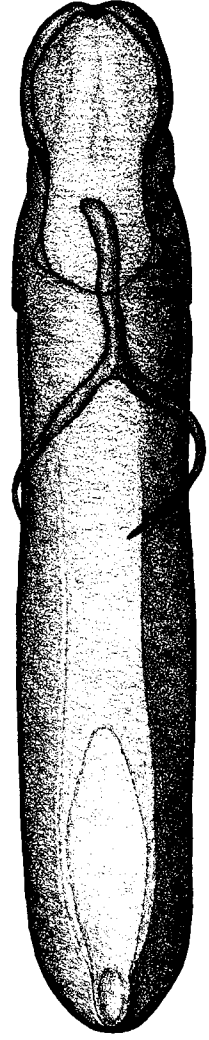
FIGS. 114–115A. Aedeagus of *Phyllotreta conjuncta*: 114, dorsal view, holotype, missing apex indicated; 115, lateral view, holotype, missing apex indicated; 115A, ventral view, specimen.



116

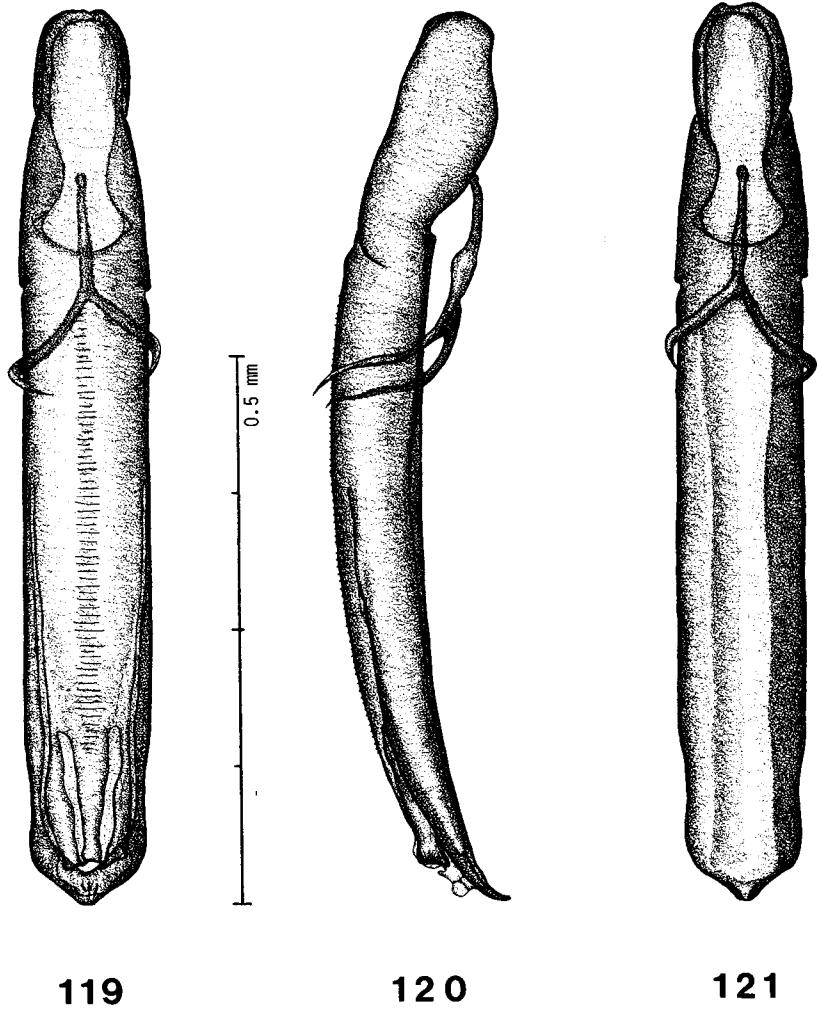


117

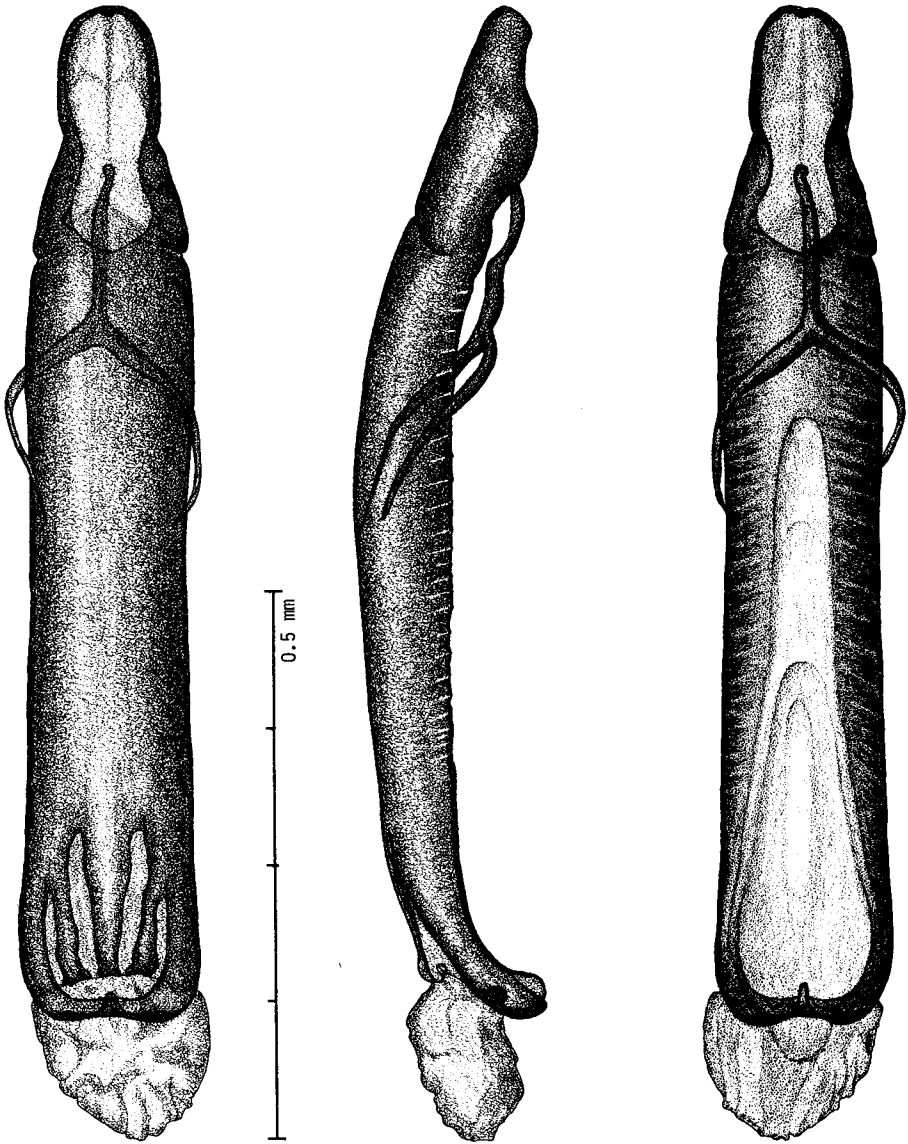


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Figs. 116–118. Aedeagus of *Phyllostreta constricta*, holotype: 116, dorsal view; 117, lateral view; 118, ventral view.



FIGS. 119–121. Aedeagus of *Phyllotreta decipiens*, lectotype: **119**, dorsal view; **120**, lateral view; **121**, ventral view.

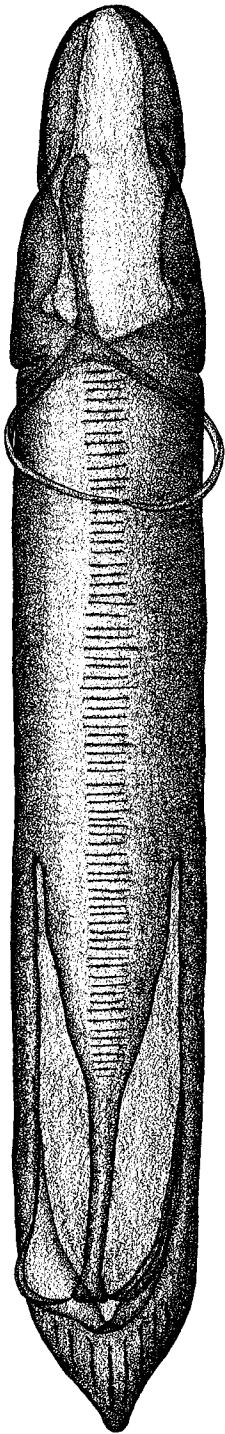


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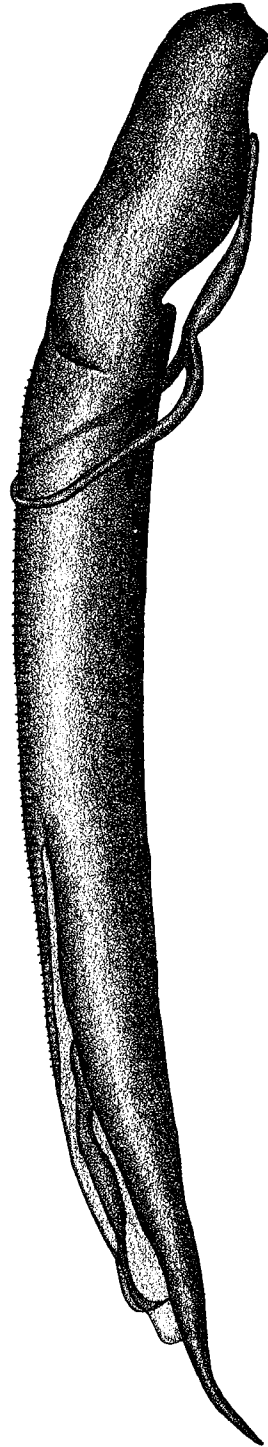
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FIGS. 122-124. Aedeagus of *Phyllostreta denticornis*, lectotype: 122, dorsal view; 123, lateral view; 124, ventral view.



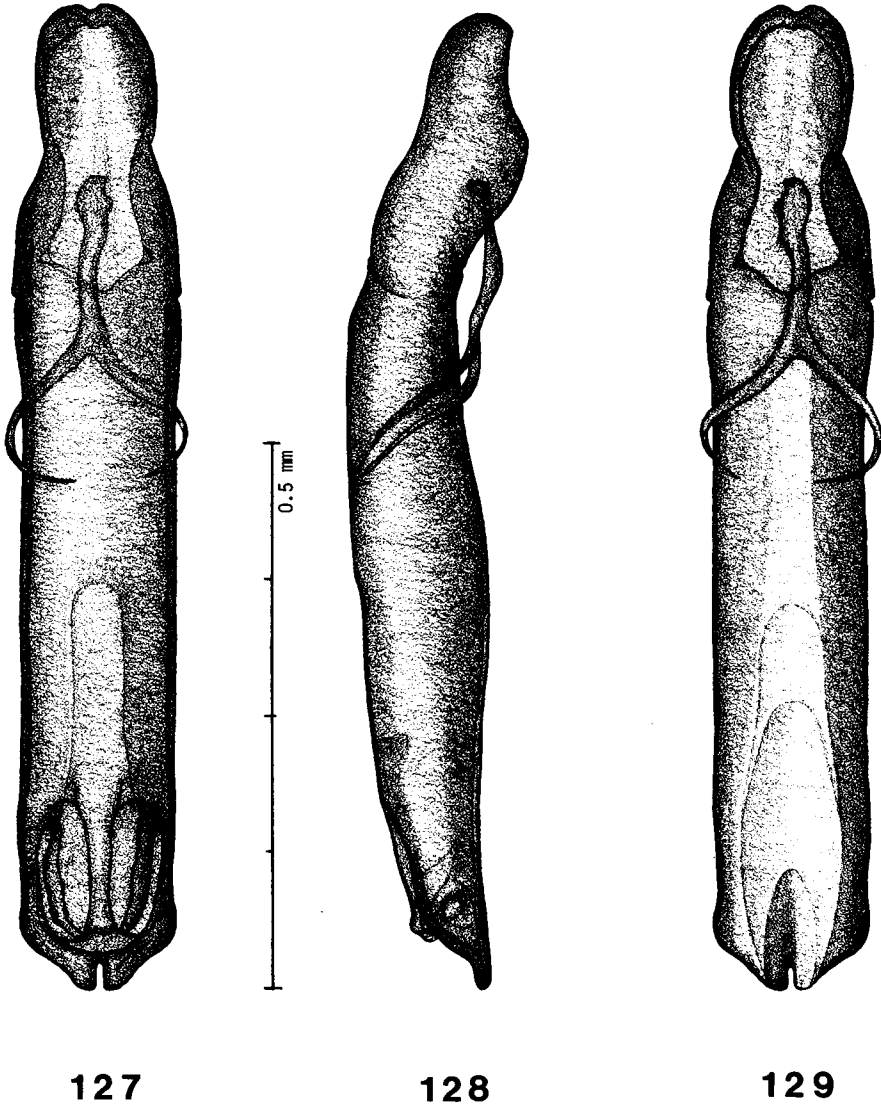
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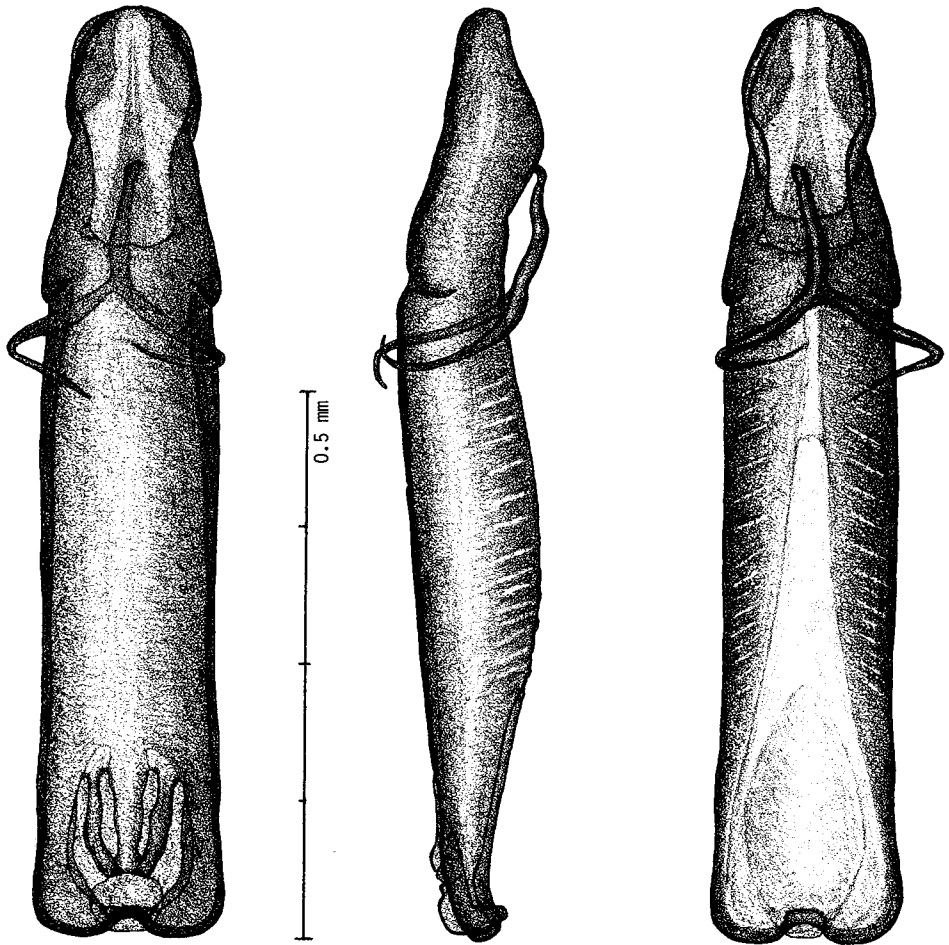
126



FIGS. 125–126. Aedeagus of *Phyllotreta dolichophalla*, holotype: 125, dorsal view; 126, lateral view.



FIGS. 127-129. Aedeagus of *Phyllostreta emarginata*, holotype: 127, dorsal view; 128, lateral view; 129, ventral view.

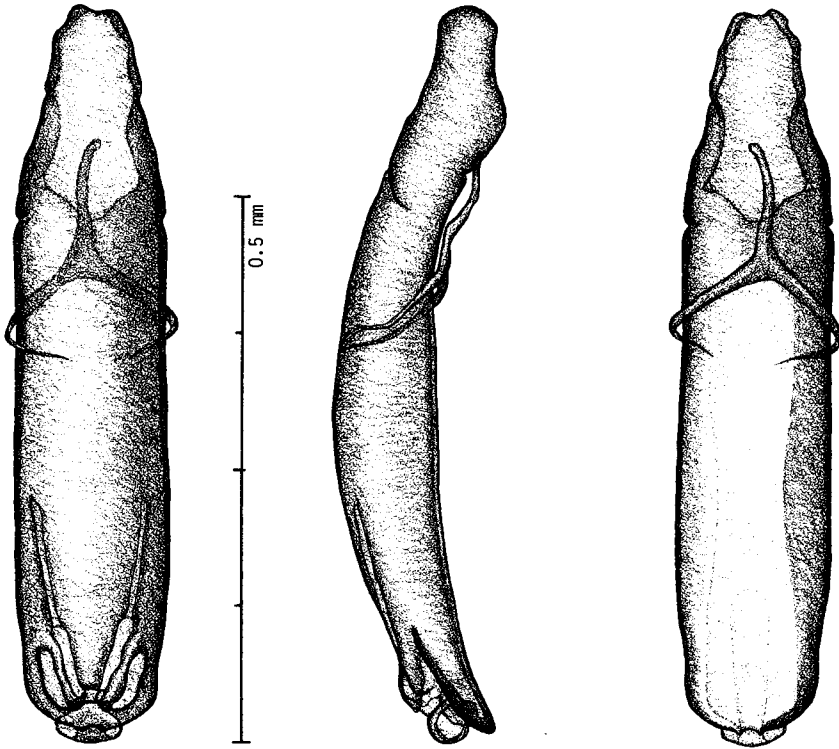


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Figs. 130–132. Aedeagus of *Phyllotreta lepidula*, lectotype: 130, dorsal view; 131, lateral view; 132, ventral view.

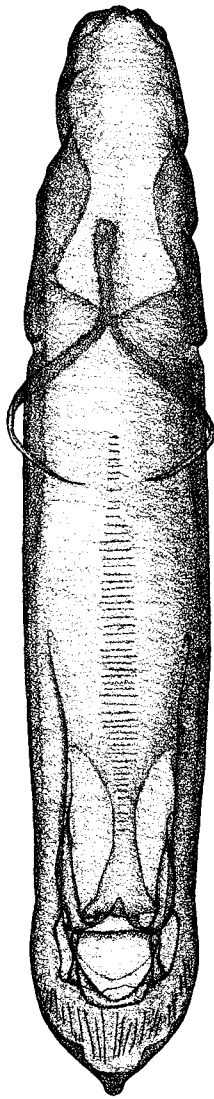


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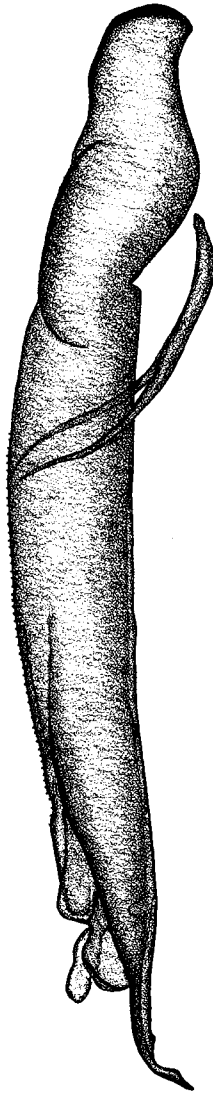
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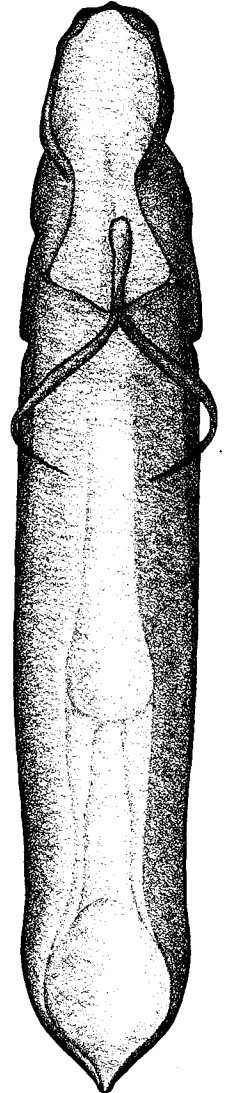
FIGS. 133–135. Aedeagus of *Phylloreta liebecki*, lectotype: **133**, dorsal view; **134**, lateral view; **135**, ventral view.



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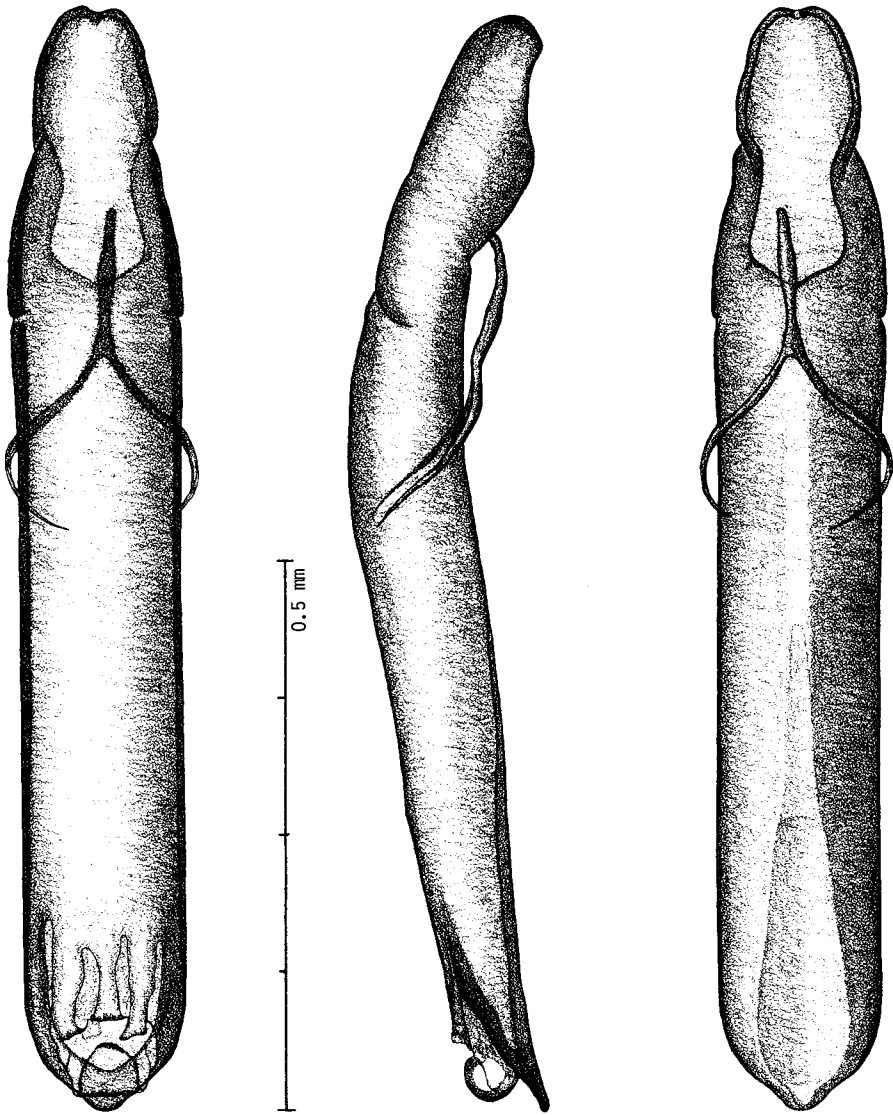
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FIGS. 136-138. Aedeagus of *Phyllotreta oblonga*: 136, dorsal view; 137, lateral view; 138, ventral view.

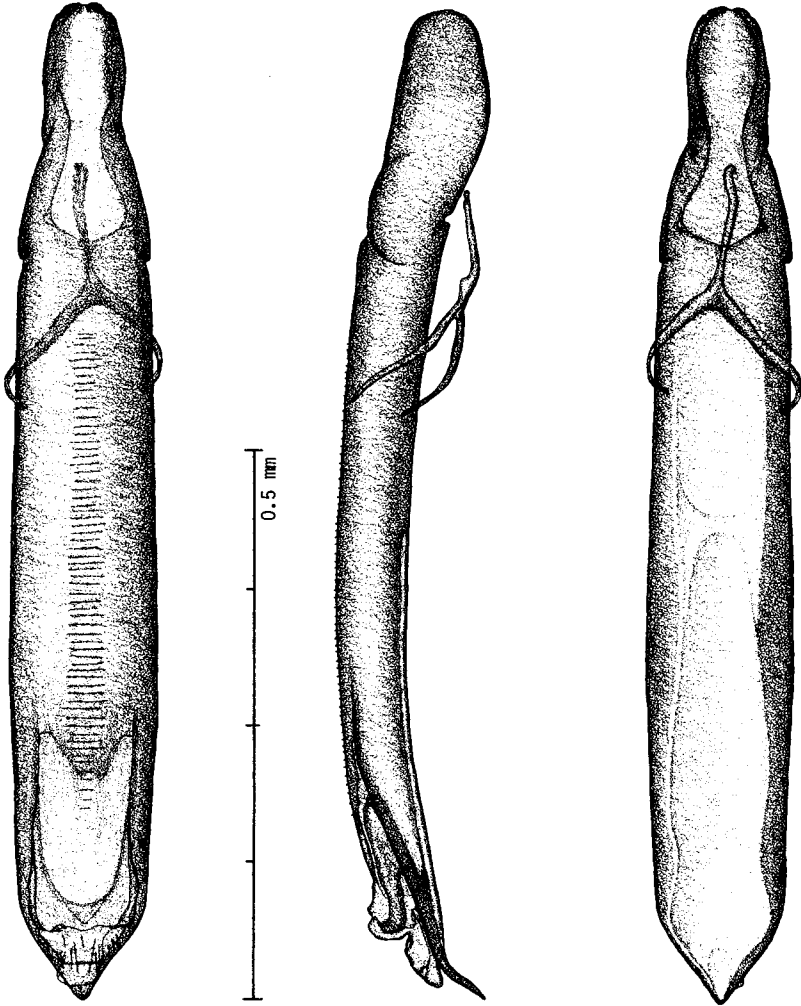


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FIGS. 139–141. Aedeagus of *Phyllostreta oregonensis*, lectotype: **139**, dorsal view; **140**, lateral view; **141**, ventral view.

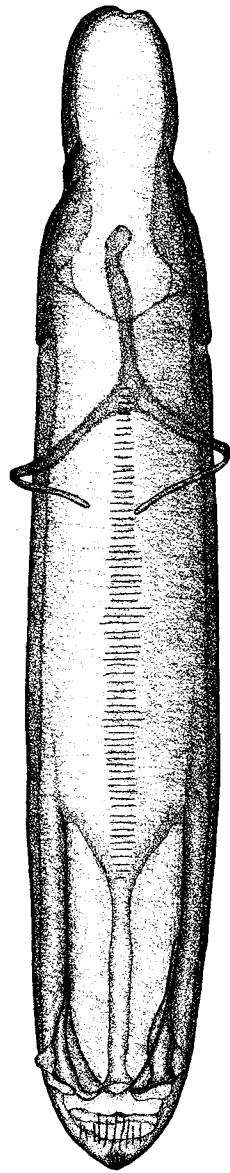


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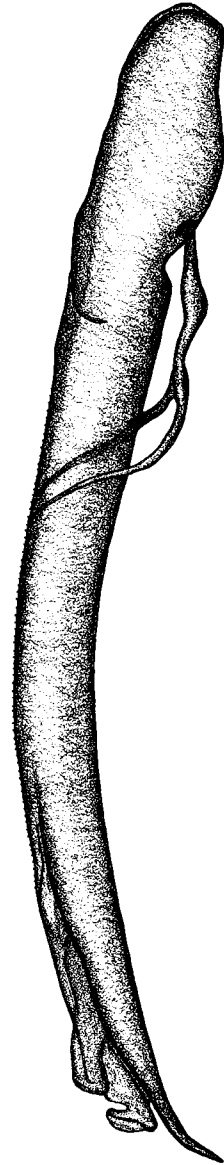
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Figs. 142–144. Aedeagus of *Phylloreta ramosa*: **142**, dorsal view; **143**, lateral view; **144**, ventral view.



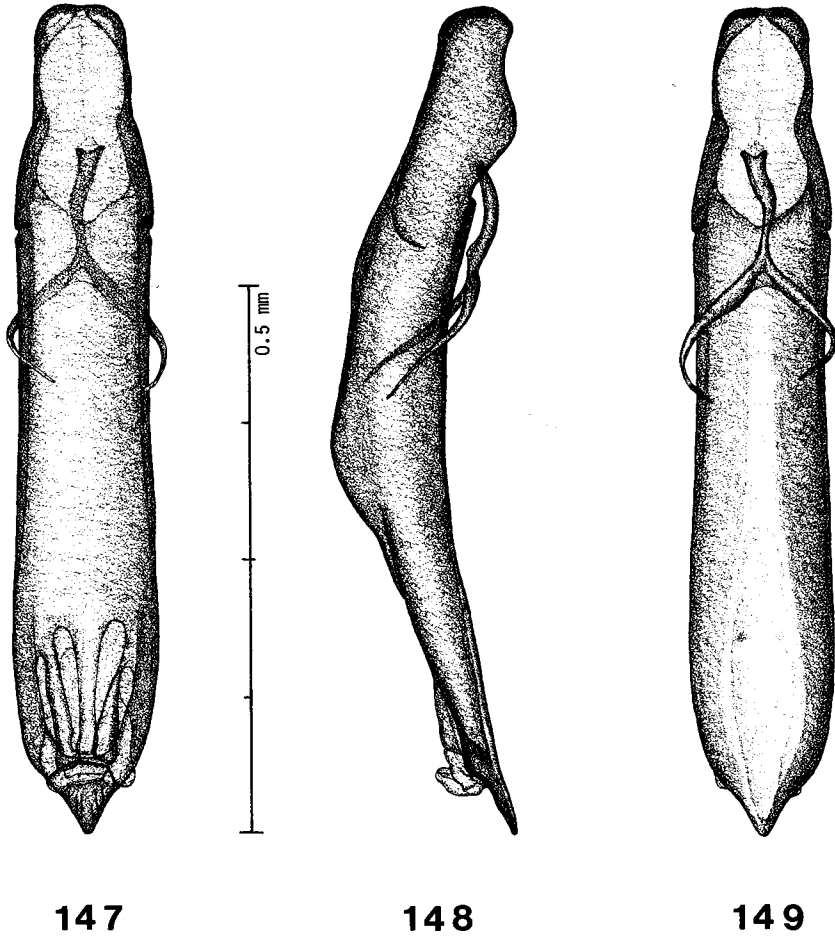
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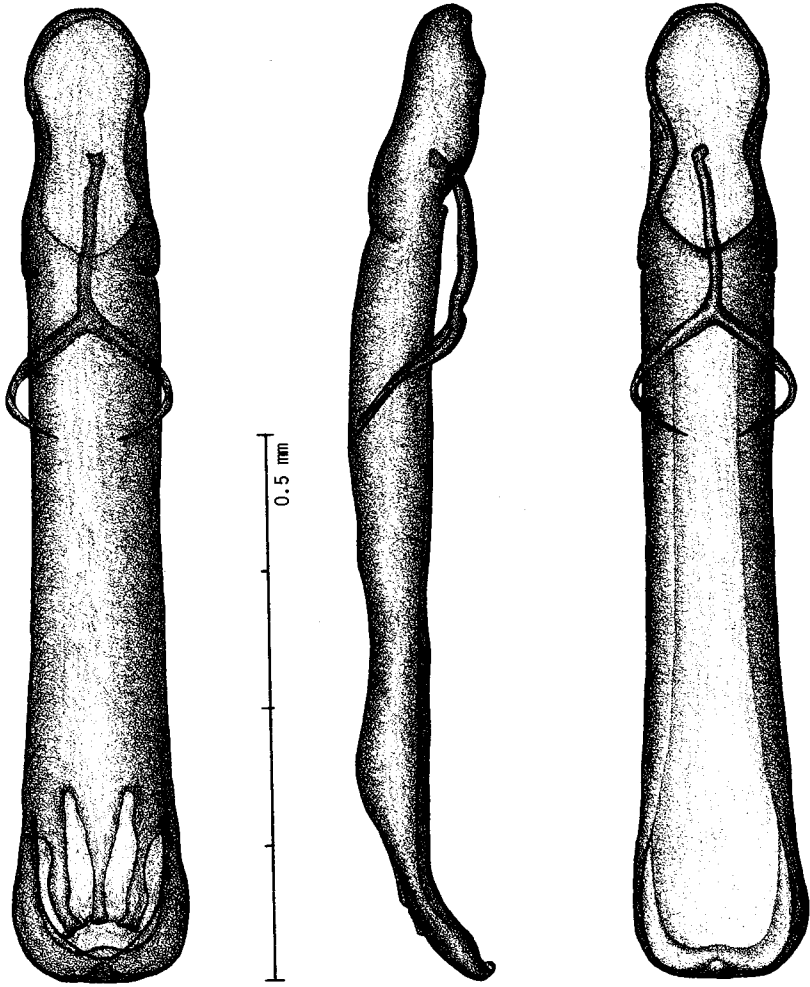
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FIGS. 145-146. Aedeagus of *Phyllotreta ramosoides*, holotype: 145, dorsal view; 146, lateral view.



FIGS. 147–149. Aedeagus of *Phyllotreta robusta*: 147, dorsal view; 148, lateral view; 149, ventral view.

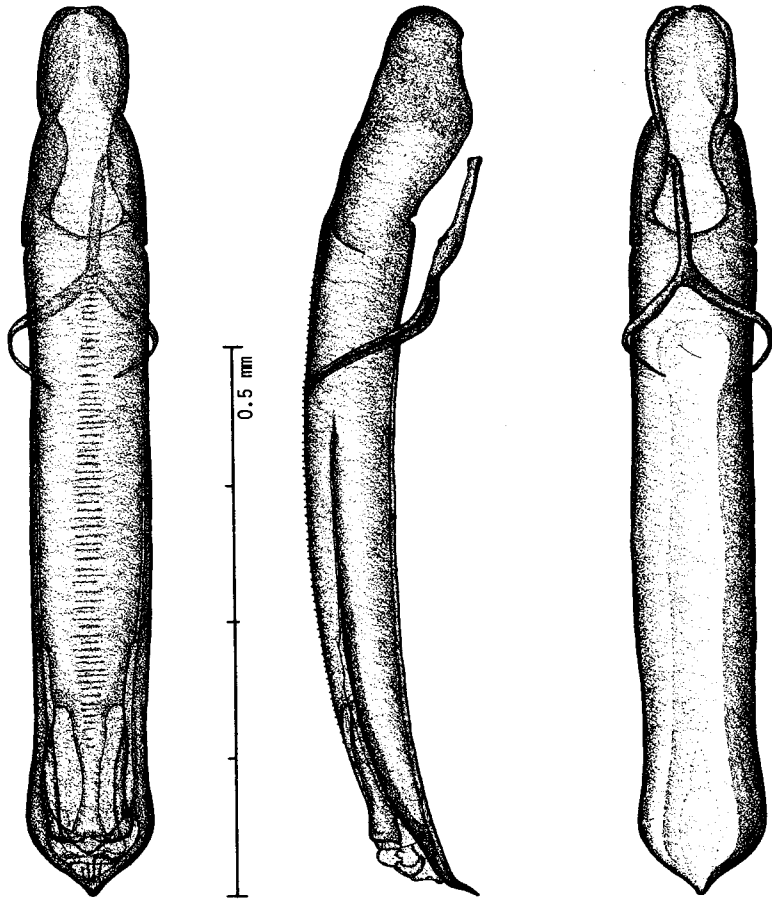


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Figs. 150-152. Aedeagus of *Phyllotreta spatulata*, holotype: 150, dorsal view; 151, lateral view; 152, ventral view.

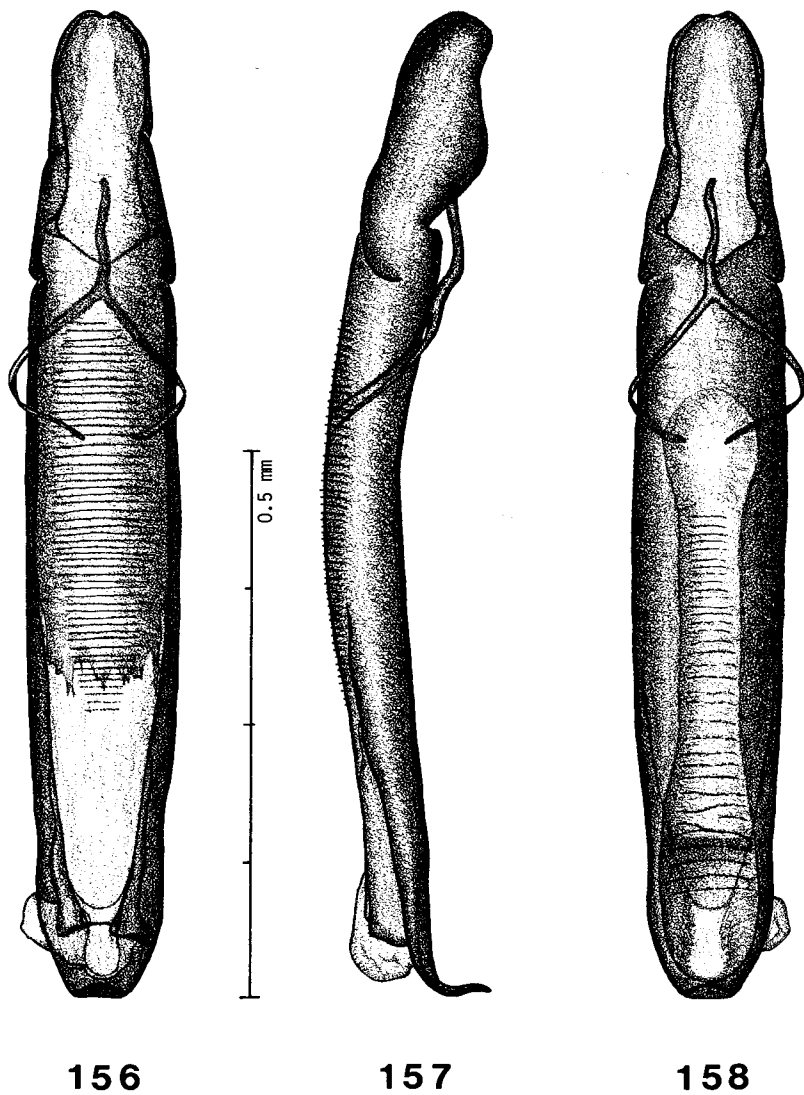


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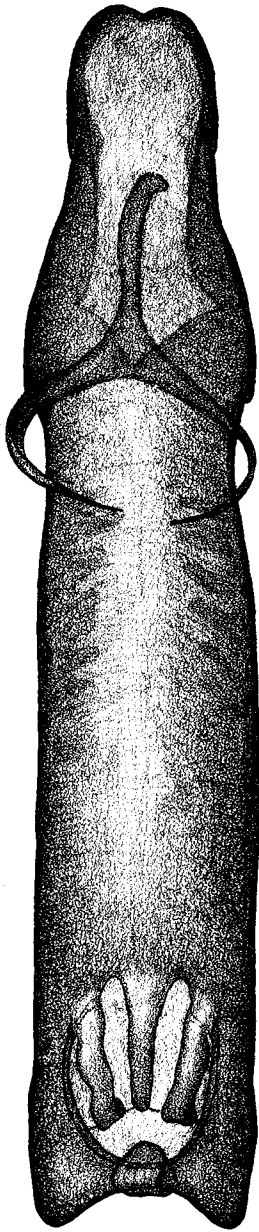
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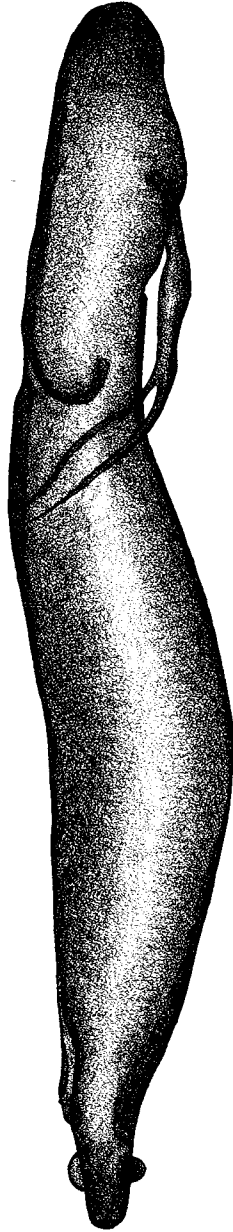
FIGS. 153–155. Aedeagus of *Phyllotreta striolata*, neotype: 153, dorsal view; 154, lateral view; 155, ventral view.



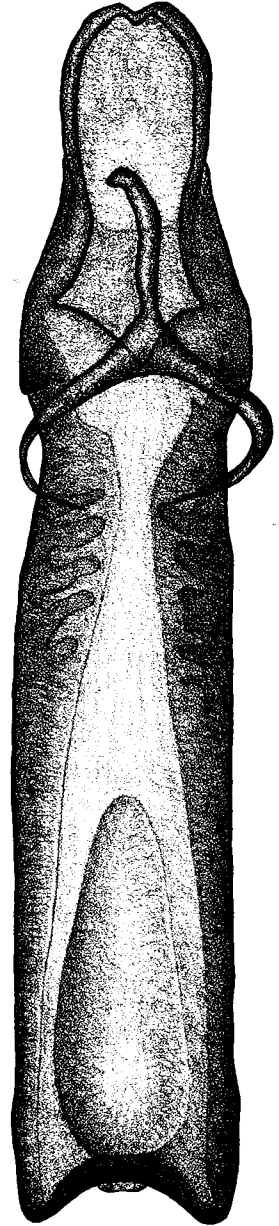
Figs. 156–158. Aedeagus of *Phyllotreta undulata*: 156, dorsal view; 157, lateral view; 158, ventral view.



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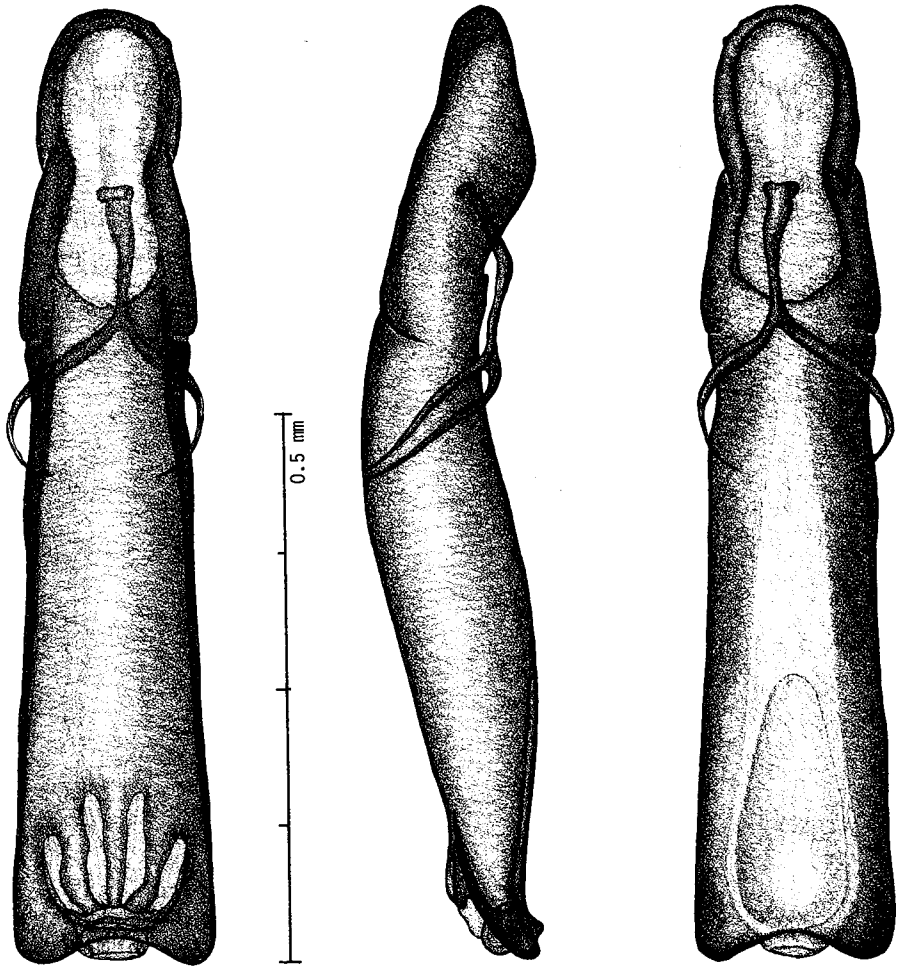


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FIGS. 159–161. Aedeagus of *Phyllotreta utana*, holotype: 159, dorsal view; 160, lateral view; 161, ventral view.

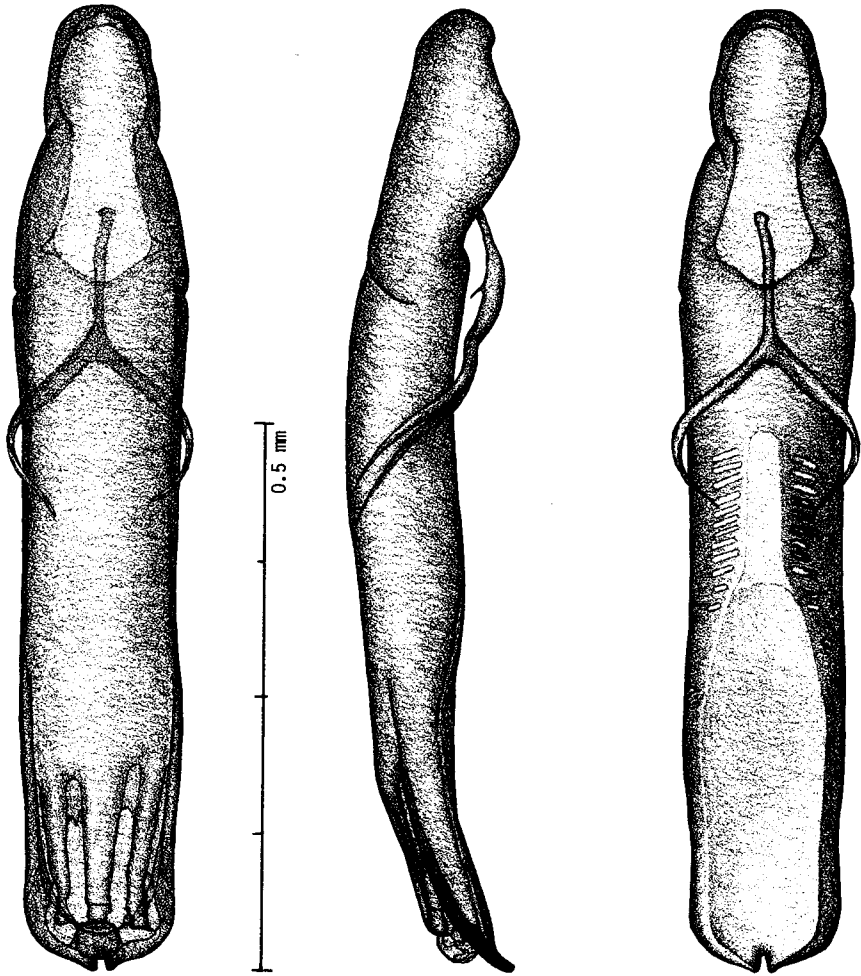


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164

Figs. 162-164. Aedeagus of *Phyllostreta utanula*, holotype: **162**, dorsal view; **163**, lateral view; **164**, ventral view.



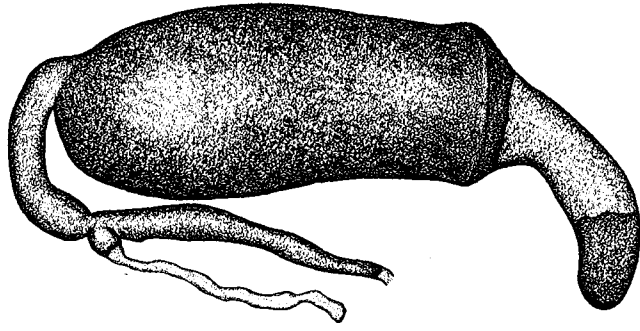
165

166

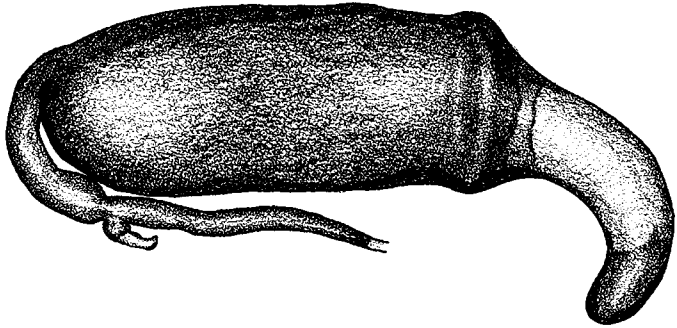
167

Figs. 165–167. Aedeagus of *Phyllotreta zimmermanni*, neotype: **165**, dorsal view; **166**, lateral view; **167**, ventral view.

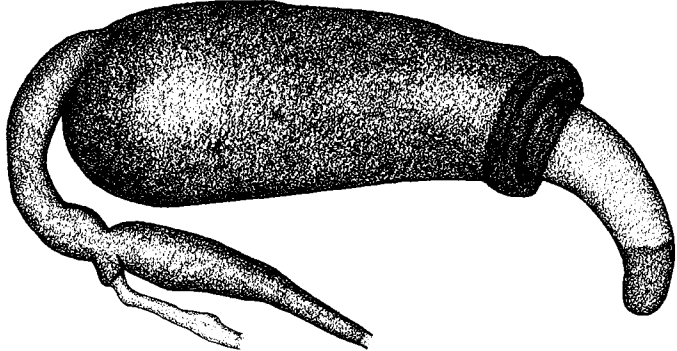
168



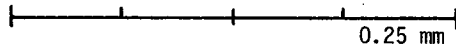
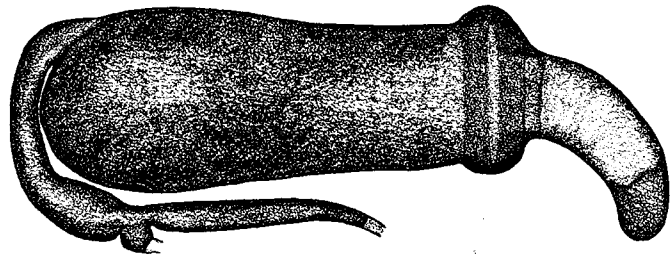
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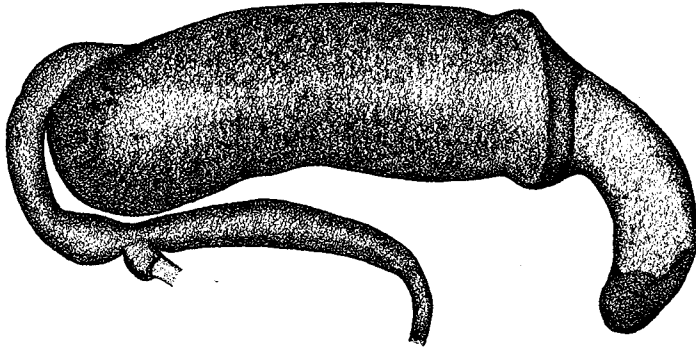


171

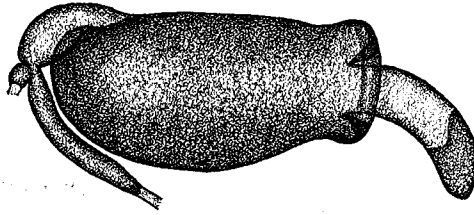


FIGS. 168–171. Spermathecae, lateral views: 168, *Phyllostreta arcuata*, paratype; 169, *Phyllostreta armoraciae*, allotype; 170, *Phyllostreta attenuata*, allotype; 171, *Phyllostreta bipustulata*, alloneotype.

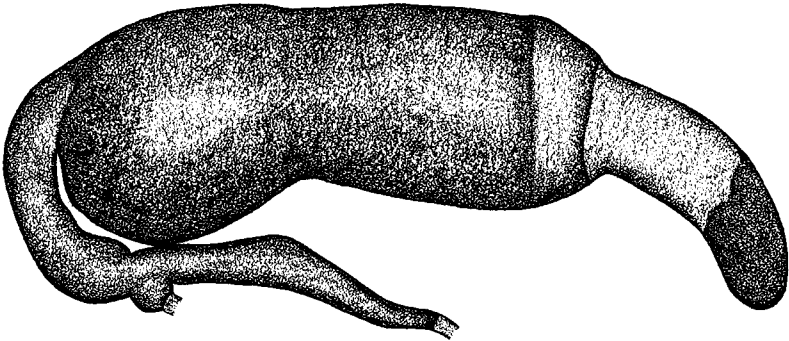
172



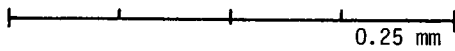
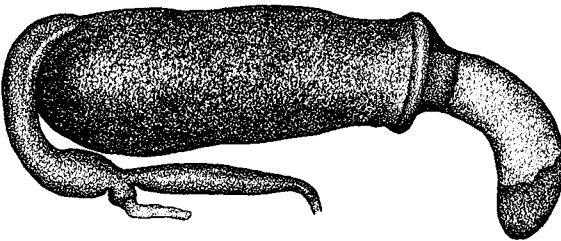
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174

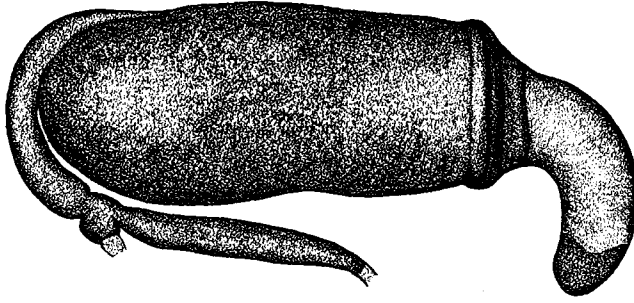


175

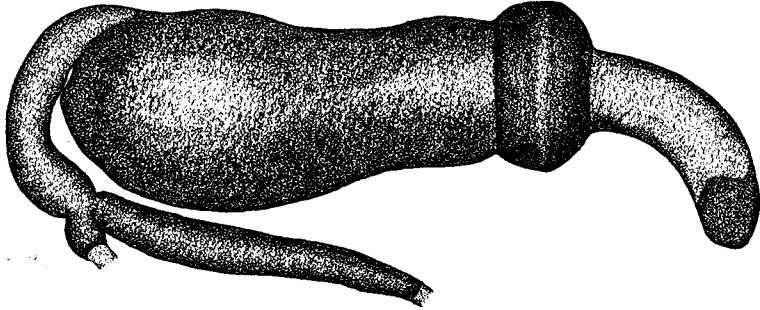


Figs. 172–175. Spermathecae, lateral views: 172, *Phyllotreta bisinuata*, allotype; 173, *Phyllotreta conjuncta*; 174, *Phyllotreta constricta*, paratype; 175, *Phyllotreta decipiens*, allolectotype.

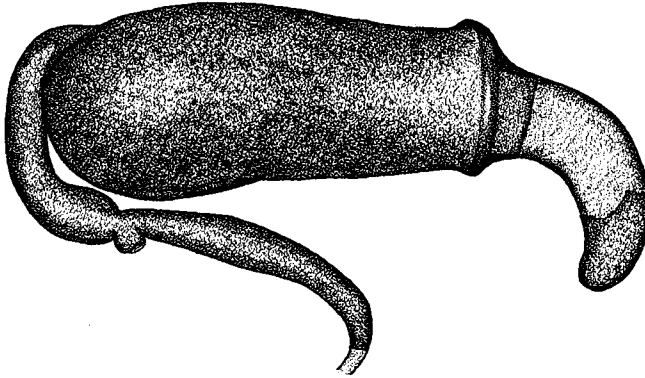
176



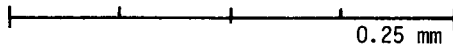
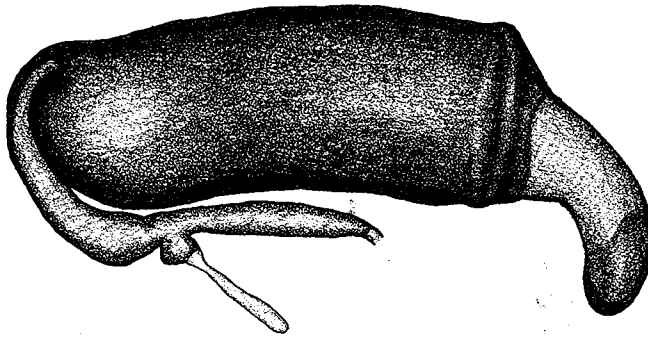
177



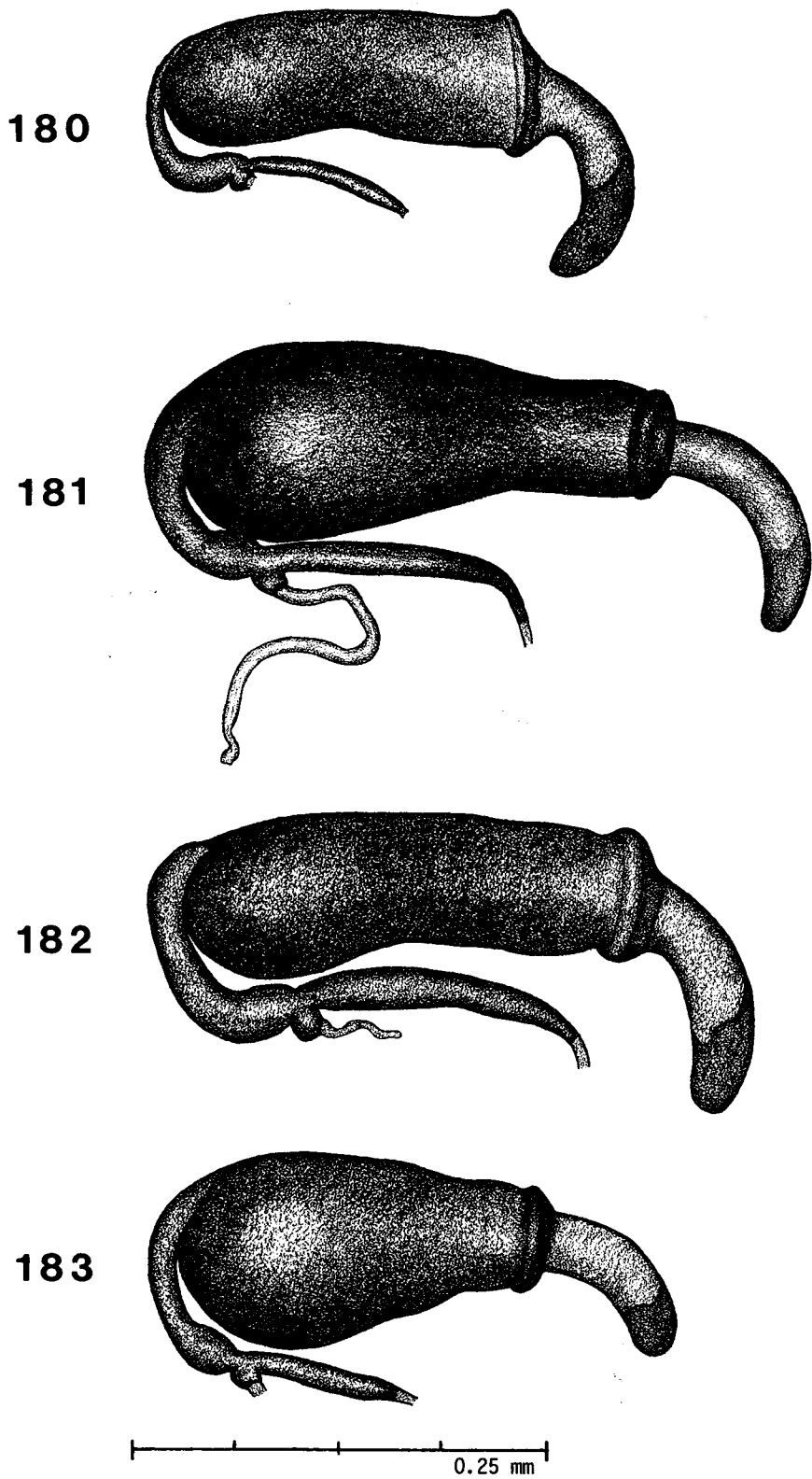
178



179

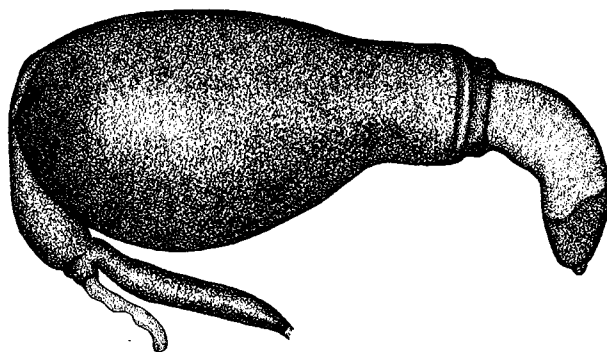


FIGS. 176-179. Spermathecae, lateral views: 176, *Phyllotreta denticornis*; 177, *Phyllotreta dolichophalla*, allotype; 178, *Phyllotreta emarginata*, allotype; 179, *Phyllotreta lepidula*, allotype.

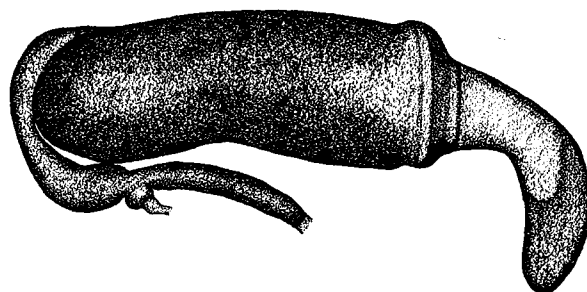


FIGS. 180-183. Spermathecae, lateral views: **180**, *Phyllotreta liebecki*, allolectotype; **181**, *Phyllotreta oblonga*, holotype; **182**, *Phyllotreta oregonensis*, allolectotype; **183**, *Phyllotreta ramosa*.

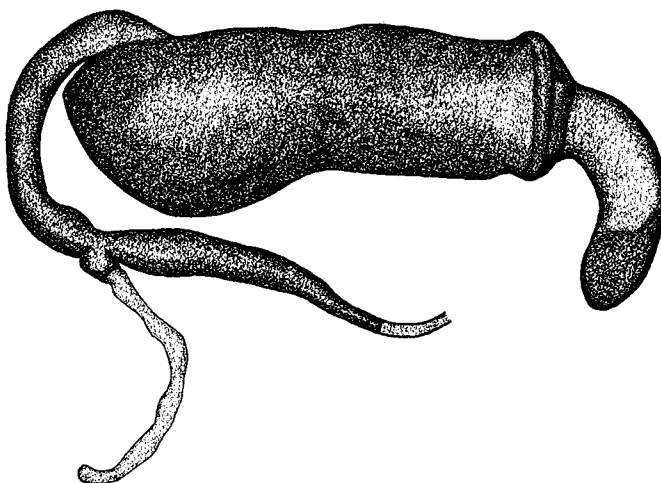
184



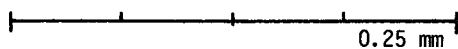
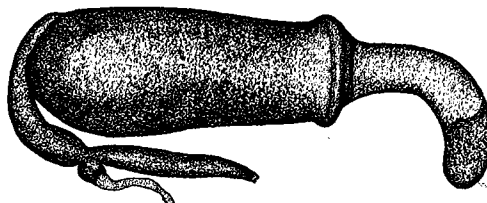
185



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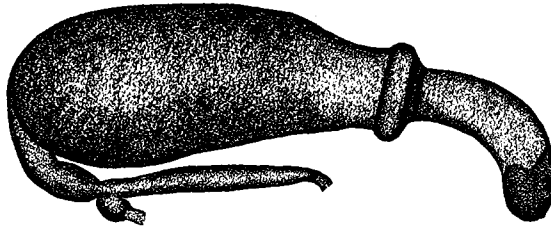


187

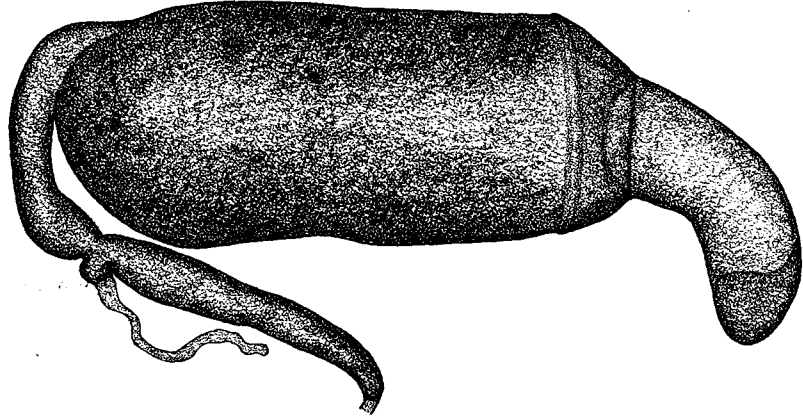


FIGS. 184–187. Spermathecae, lateral views: **184**, *Phyllotreta ramosoides*, allotype; **185**, *Phyllotreta robusta*; **186**, *Phyllotreta spatulata*, paratype; **187**, *Phyllotreta striolata*, alloneotype.

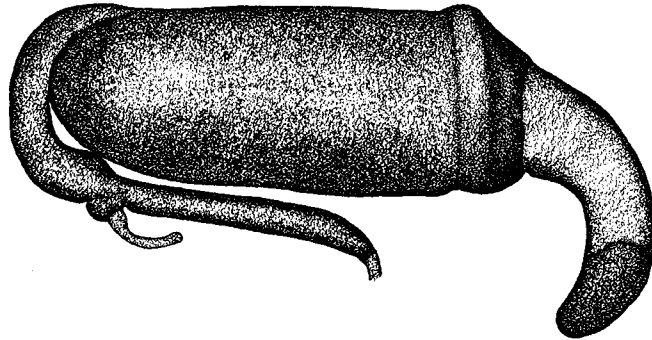
188



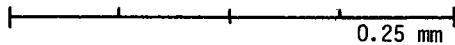
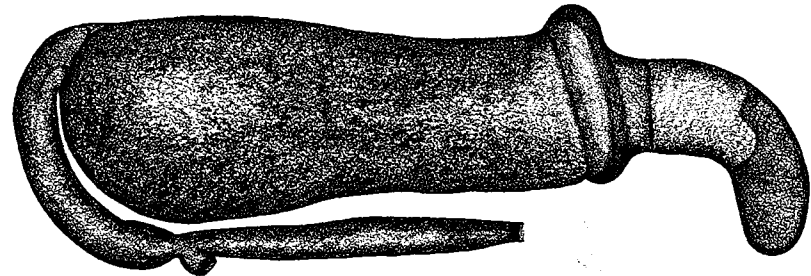
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FIGS. 188–191. Spermathecae, lateral views: **188**, *Phyllotreta undulata*; **189**, *Phyllotreta utana*, allotype; **190**, *Phyllotreta utanula*, allotype; **191**, *Phyllotreta zimmermanni*, alloneotype.

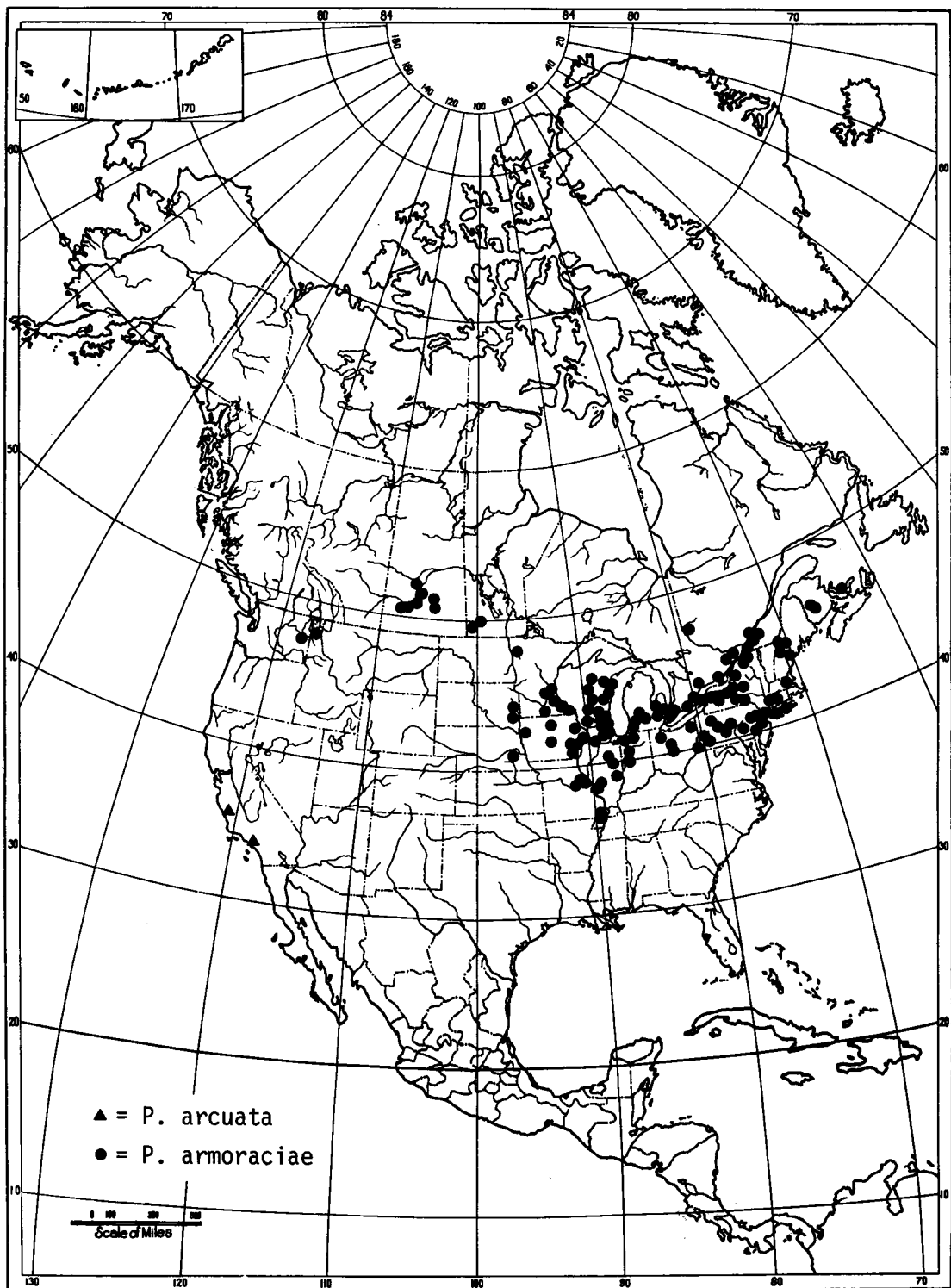


FIG. 192. Distribution of *Phyllotreta arcuata* and *Phyllotreta armoraciae*.

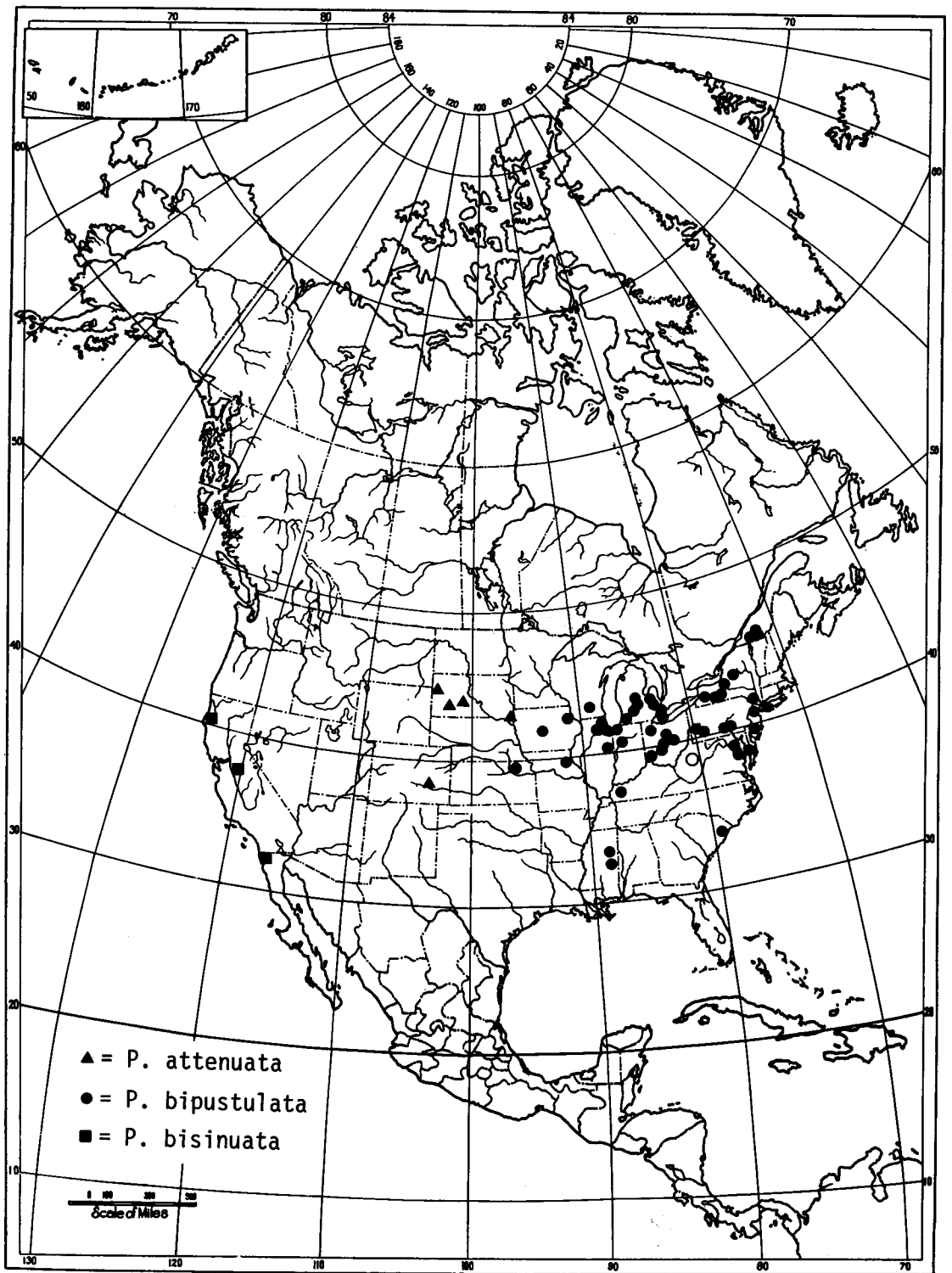


FIG. 193. Distribution of *Phyllotreta attenuata*, *Phyllotreta bipustulata*, and *Phyllotreta bisinuata*.

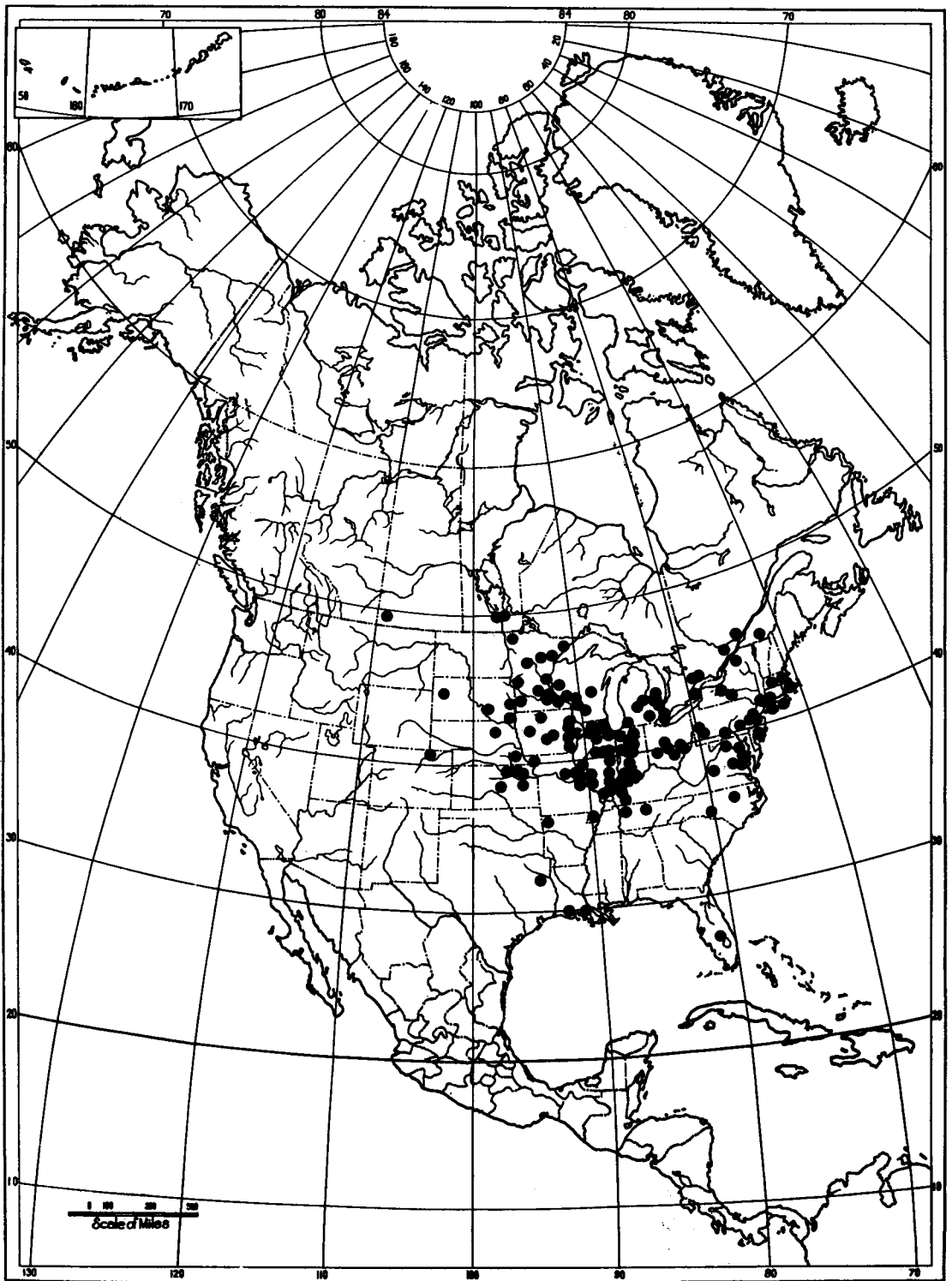


FIG. 194. Distribution of *Phyllotreta conjuncta*.

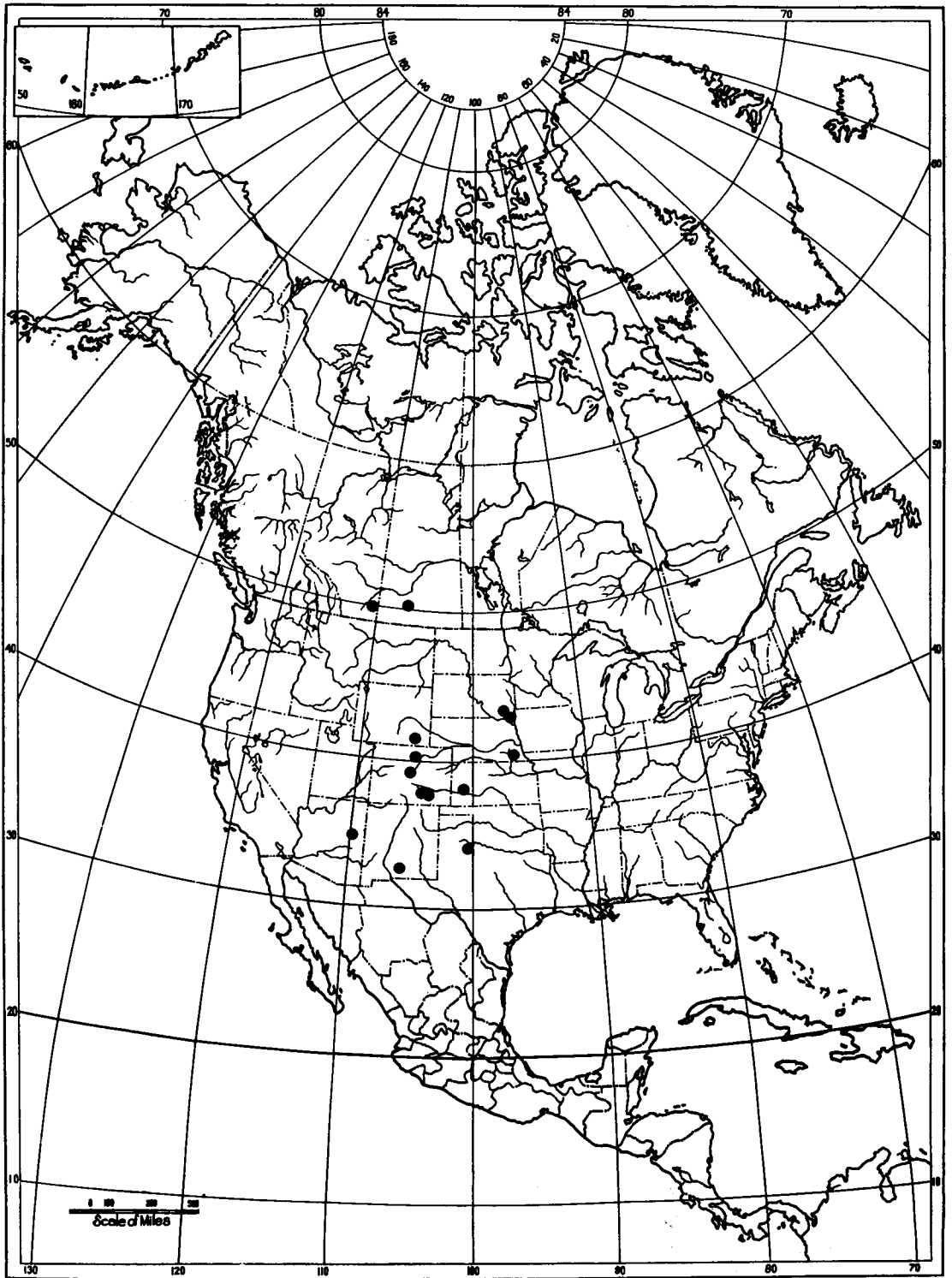


FIG. 195. Distribution of *Phyllotreta constricta*.

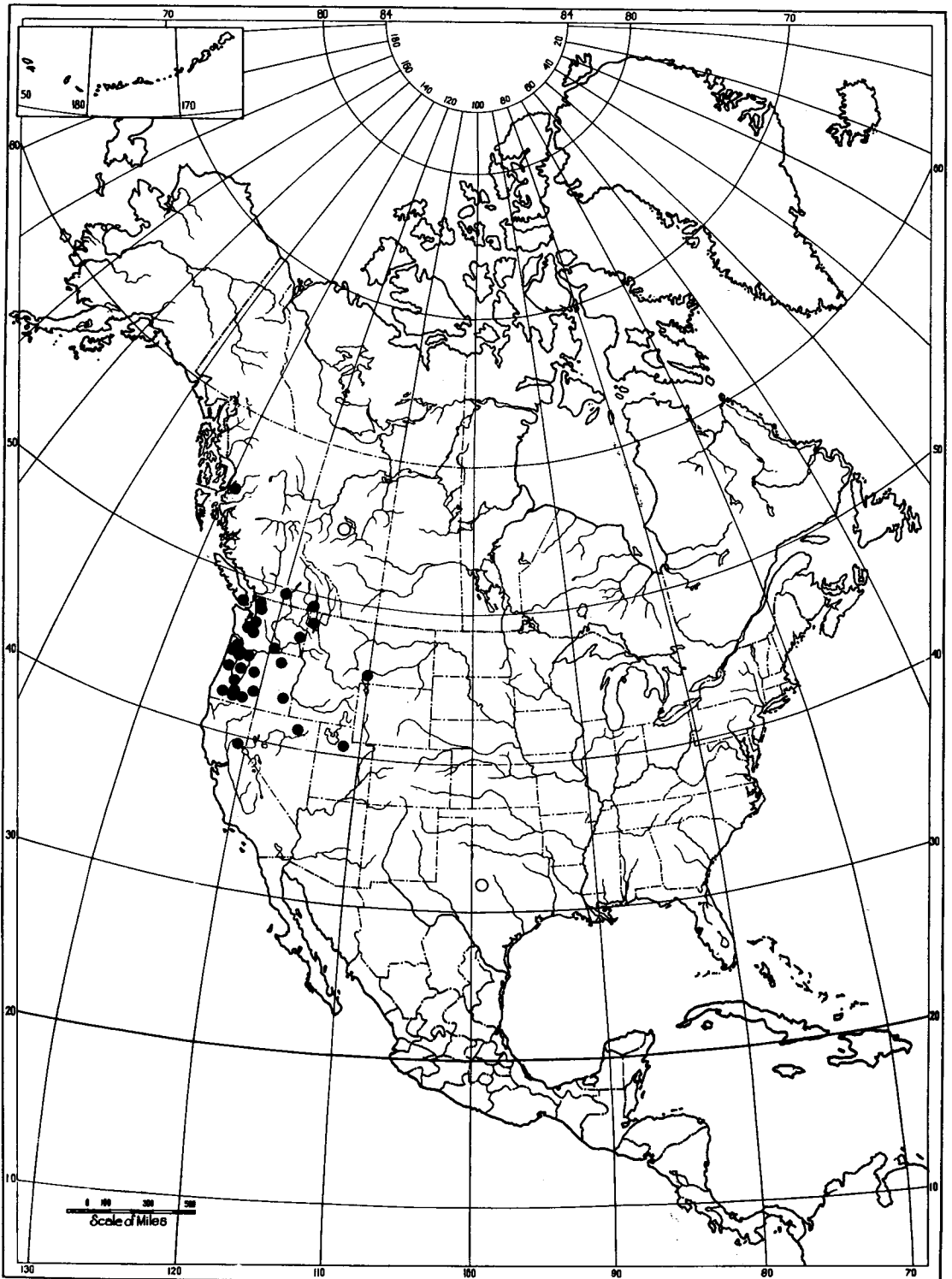


FIG. 196. Distribution of *Phyllotreta decipiens*.

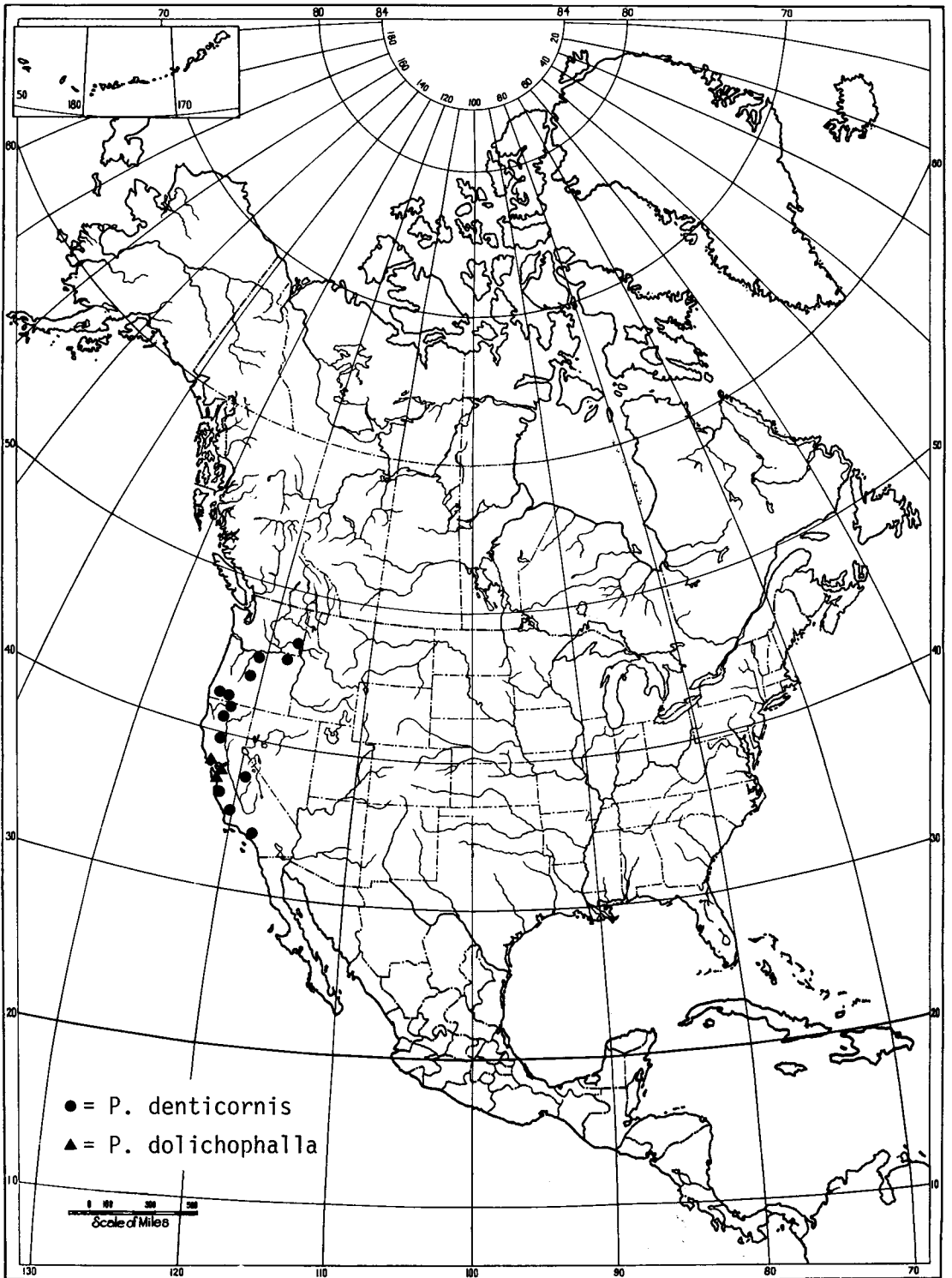


FIG. 197. Distribution of *Phyllotreta denticornis* and *Phyllotreta dolichophalla*.

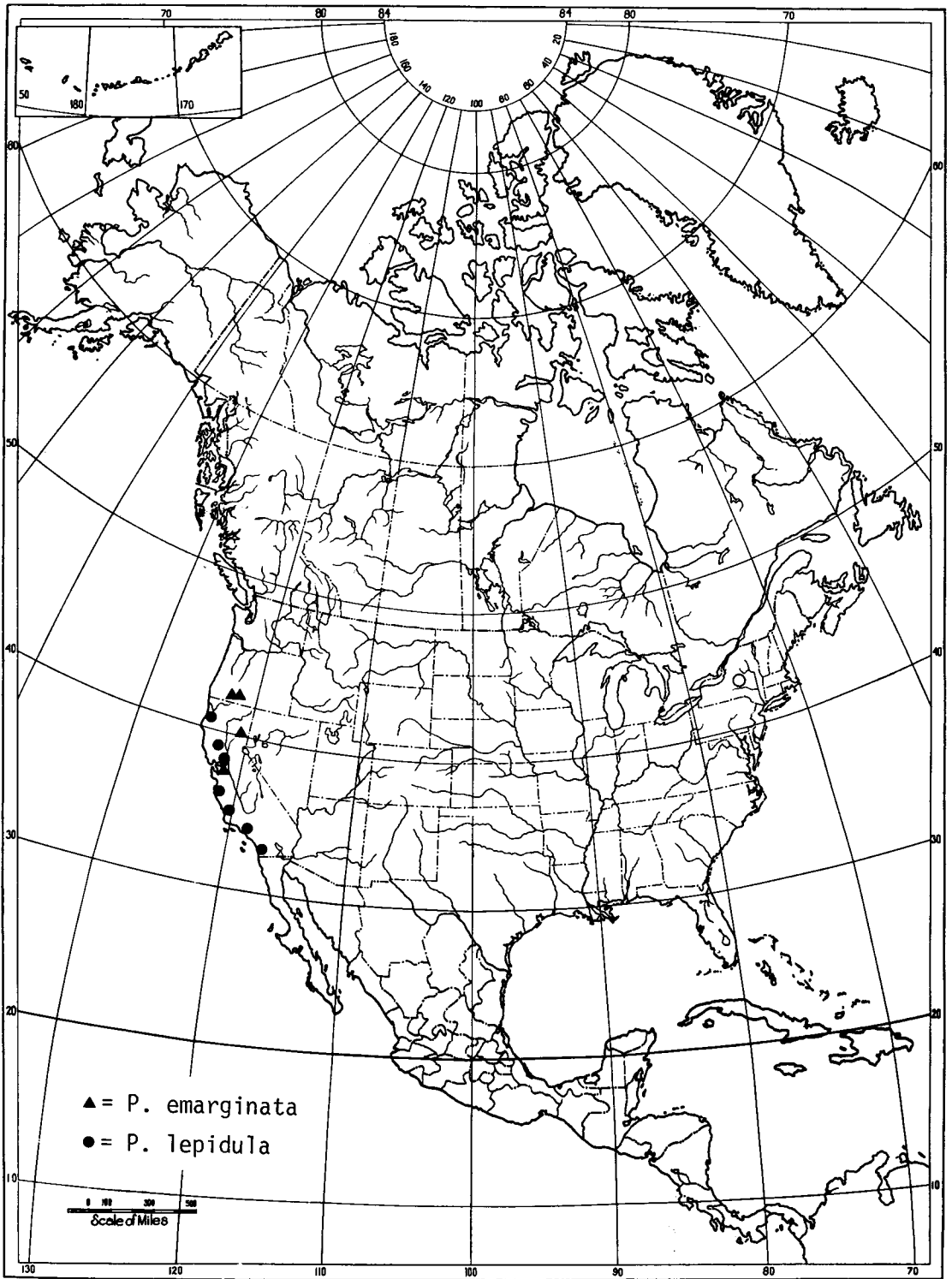


FIG. 198. Distribution of *Phyllotreta emarginata* and *Phyllotreta lepidula*.

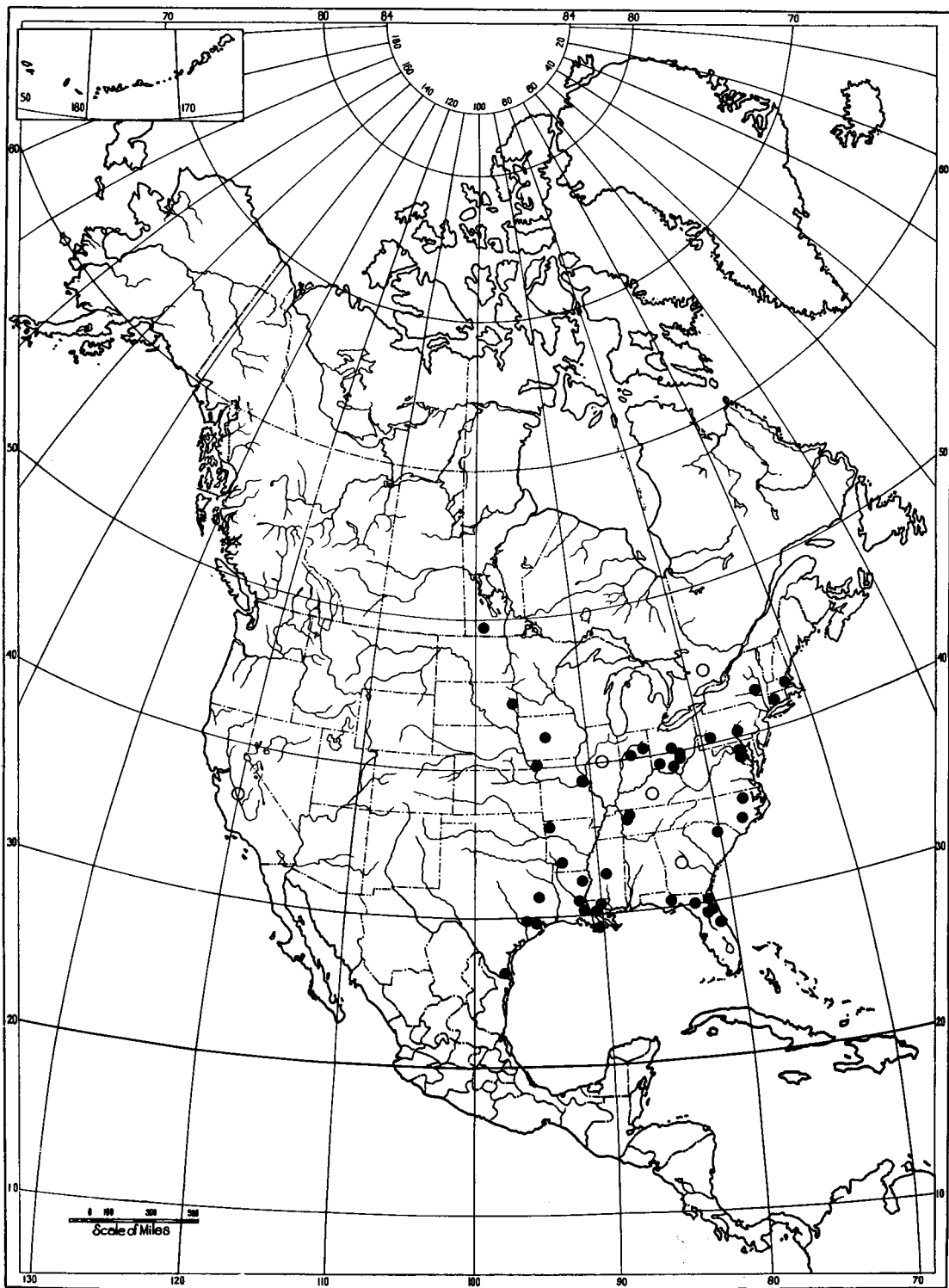


FIG. 199. Distribution of *Phyllotreta liebecki*.

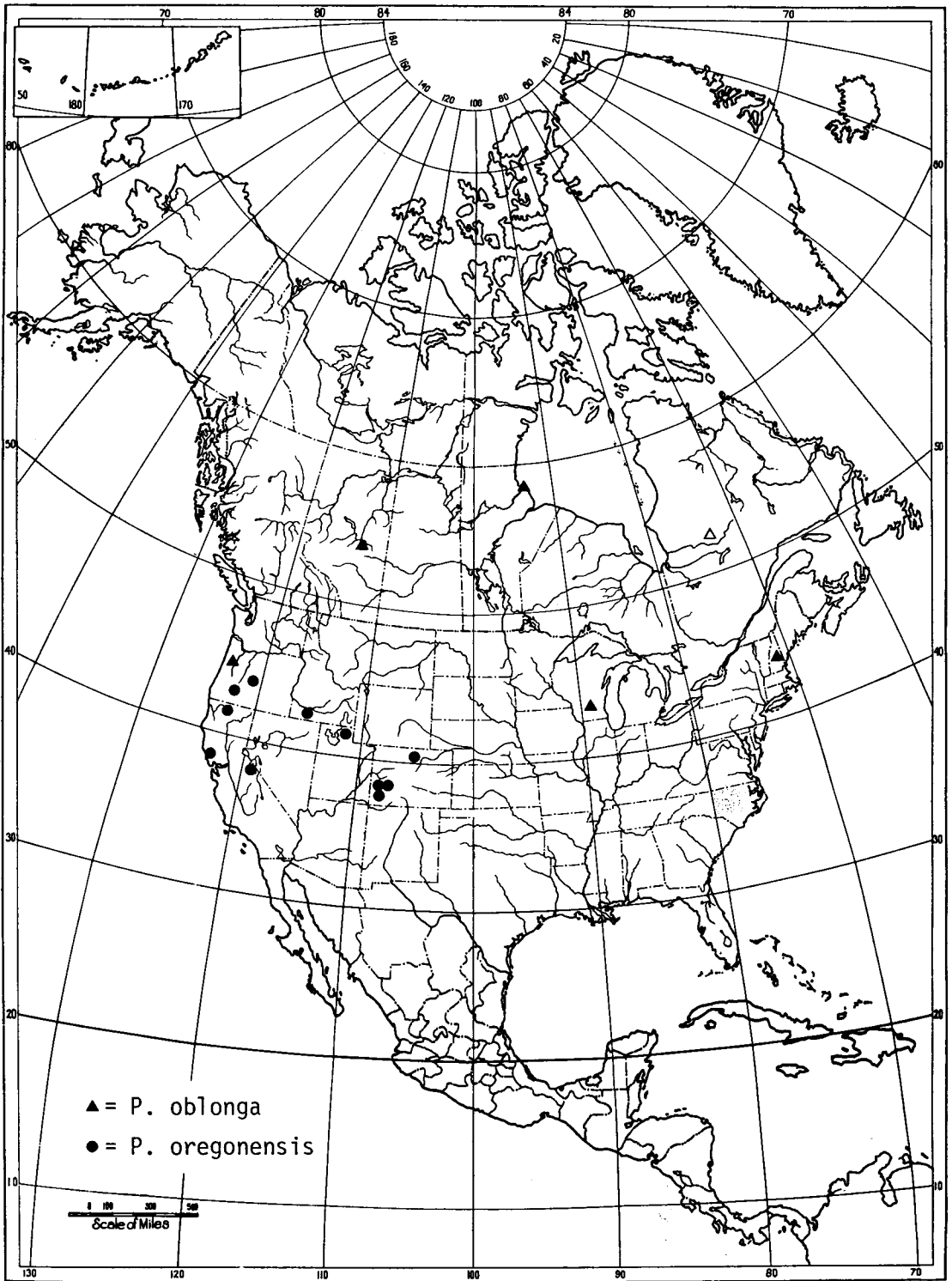


FIG. 200. Distribution of *Phyllotreta oblonga* and *Phyllotreta oregonensis*.

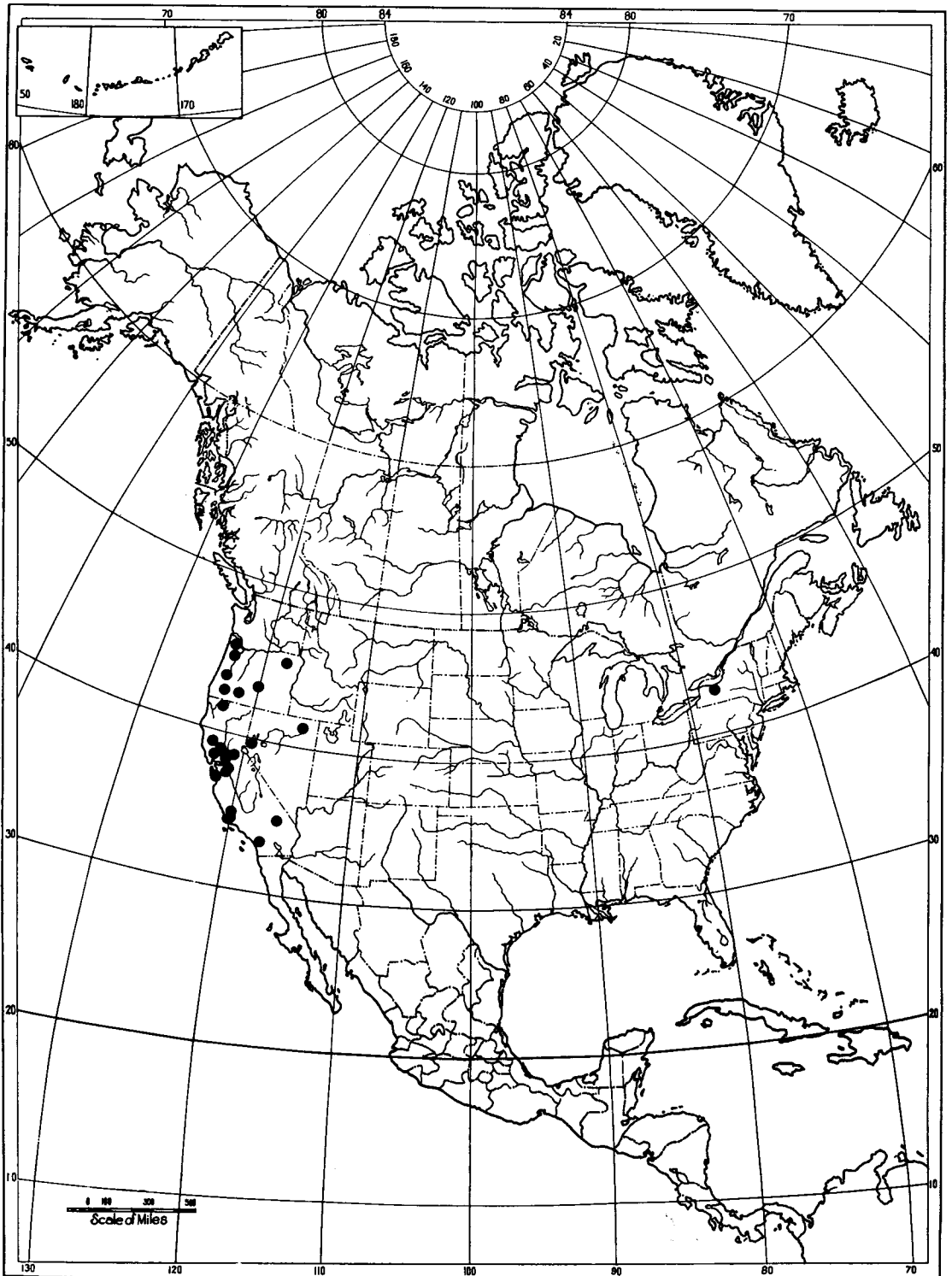


FIG. 201. Distribution of *Phyllotreta ramosa*.



FIG. 202. Distribution of *Phyllotreta ramosoides*.

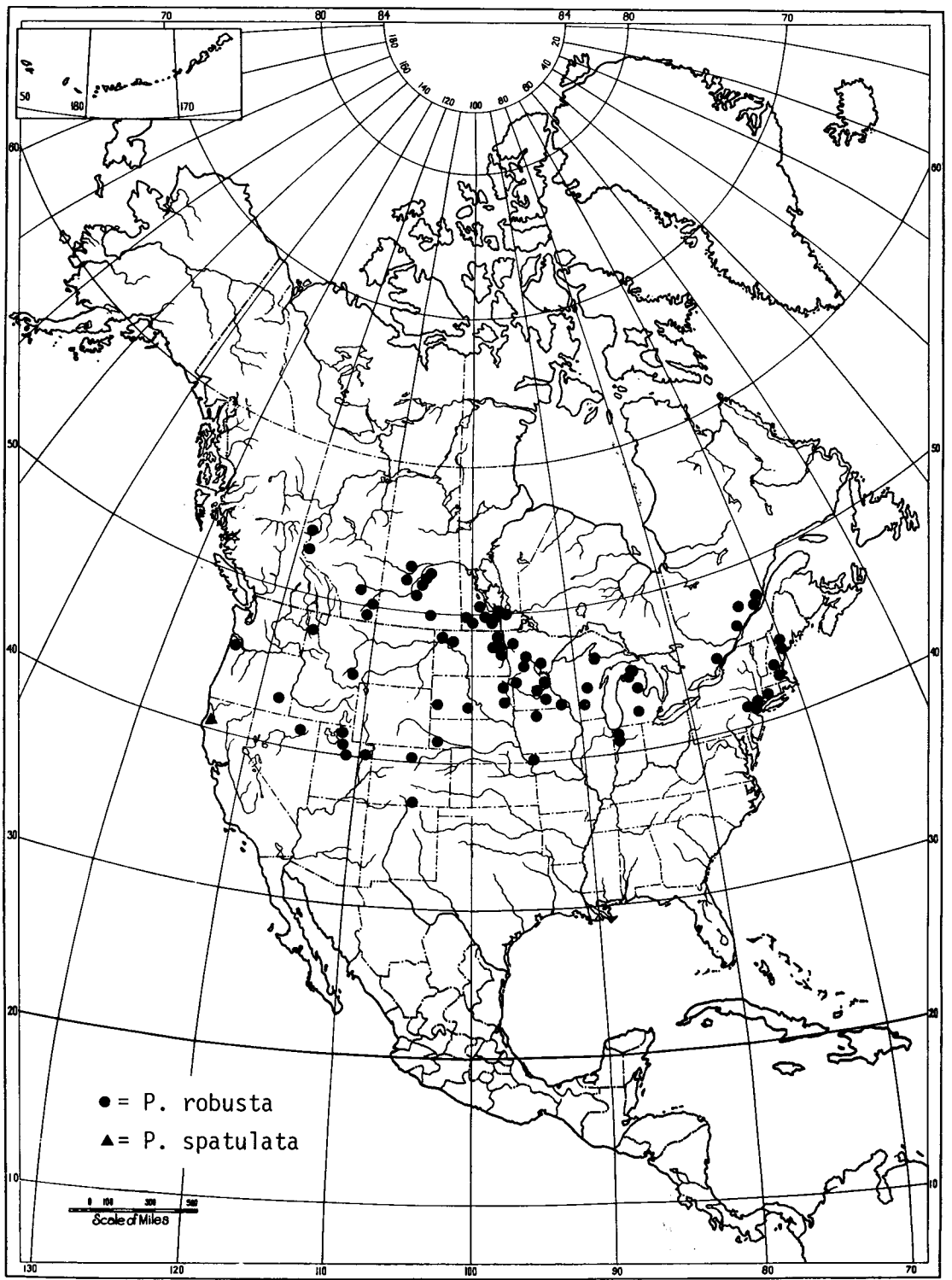


FIG. 203. Distribution of *Phyllotreta robusta* and *Phyllotreta spatulata*.

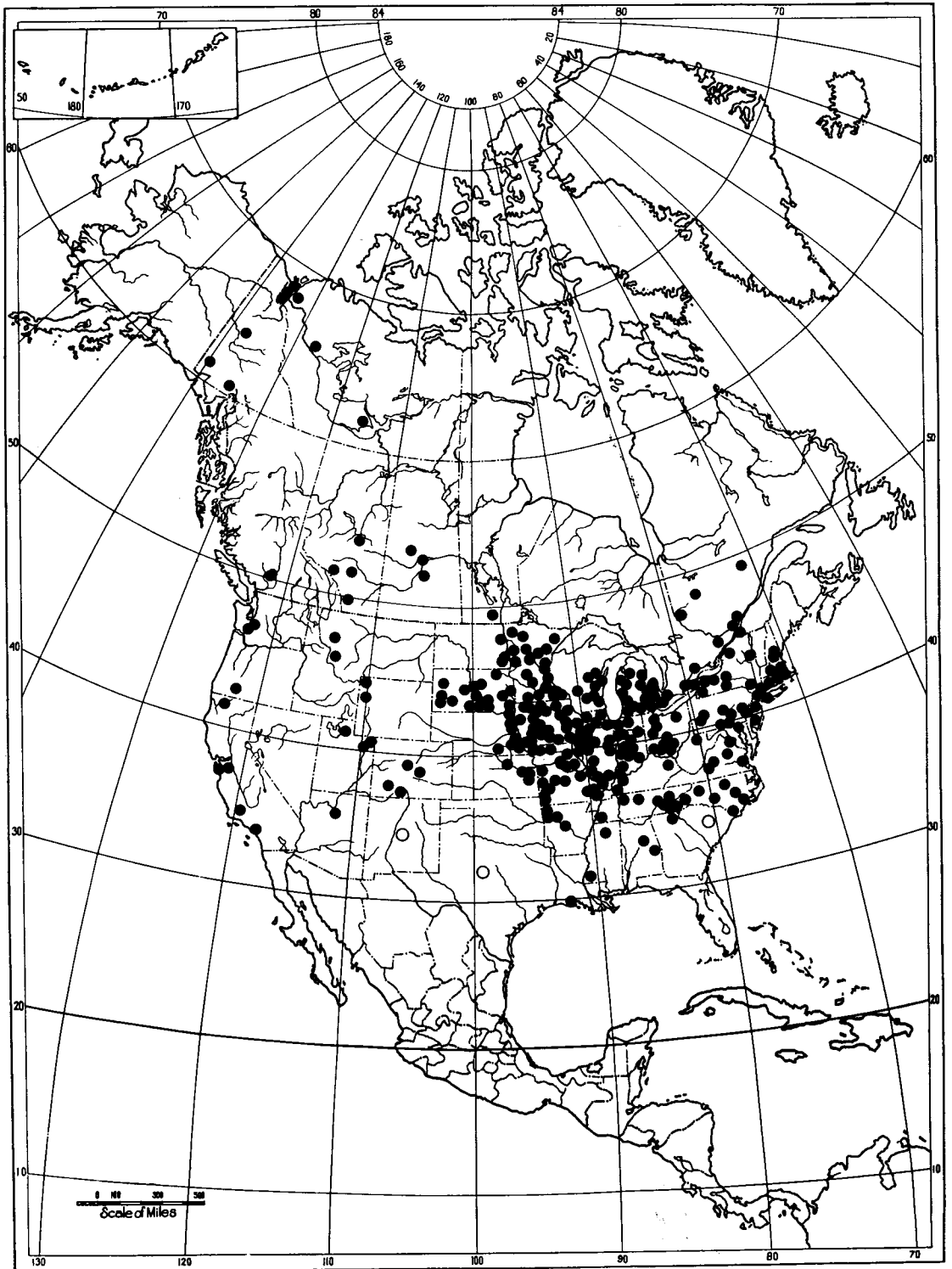


FIG. 204. Distribution of *Phyllotreta striolata*.

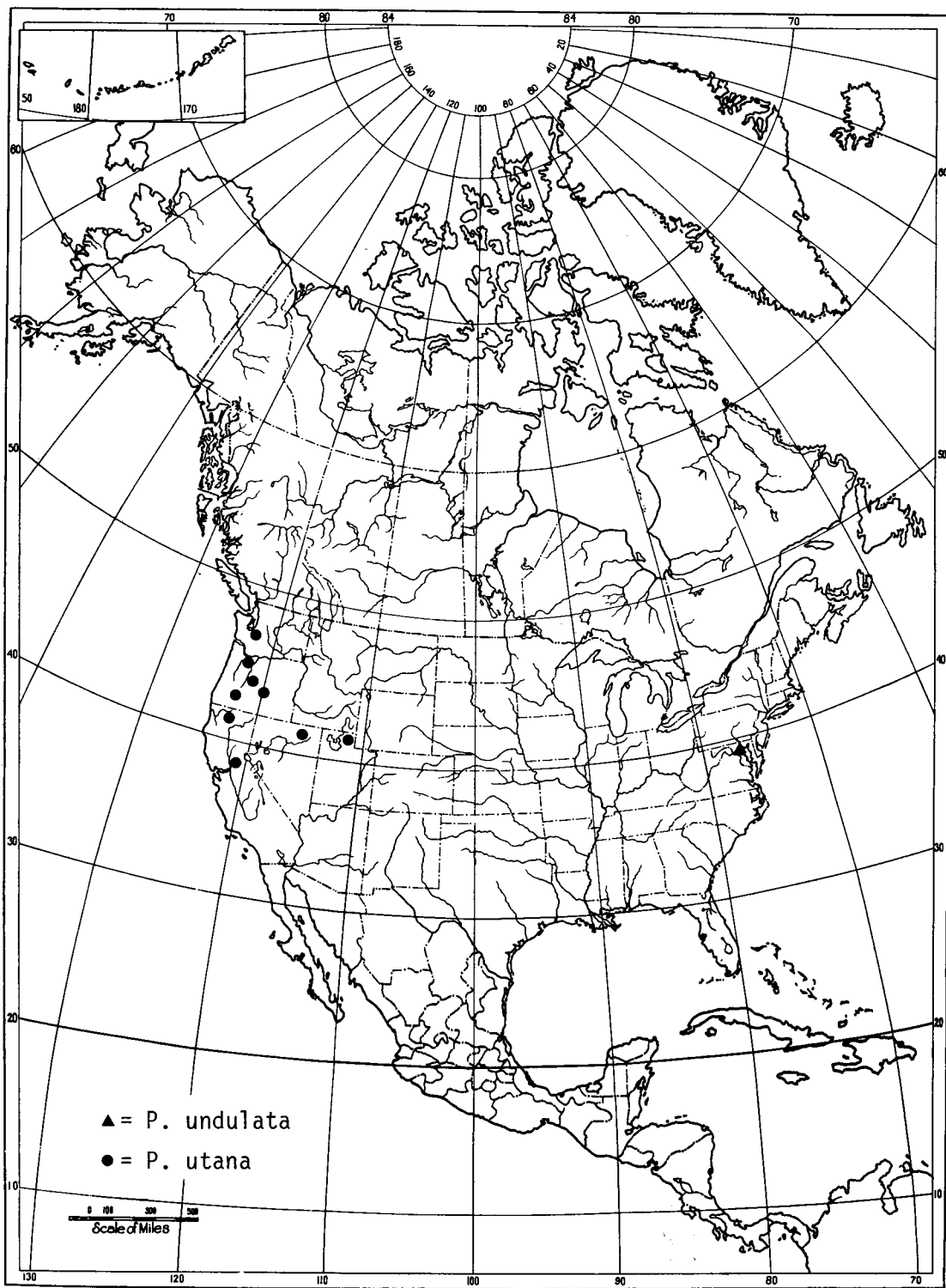


FIG. 205. Distribution of *Phyllotreta undulata* and *Phyllotreta utana*.



FIG. 206. Distribution of *Phyllotreta utanula*.

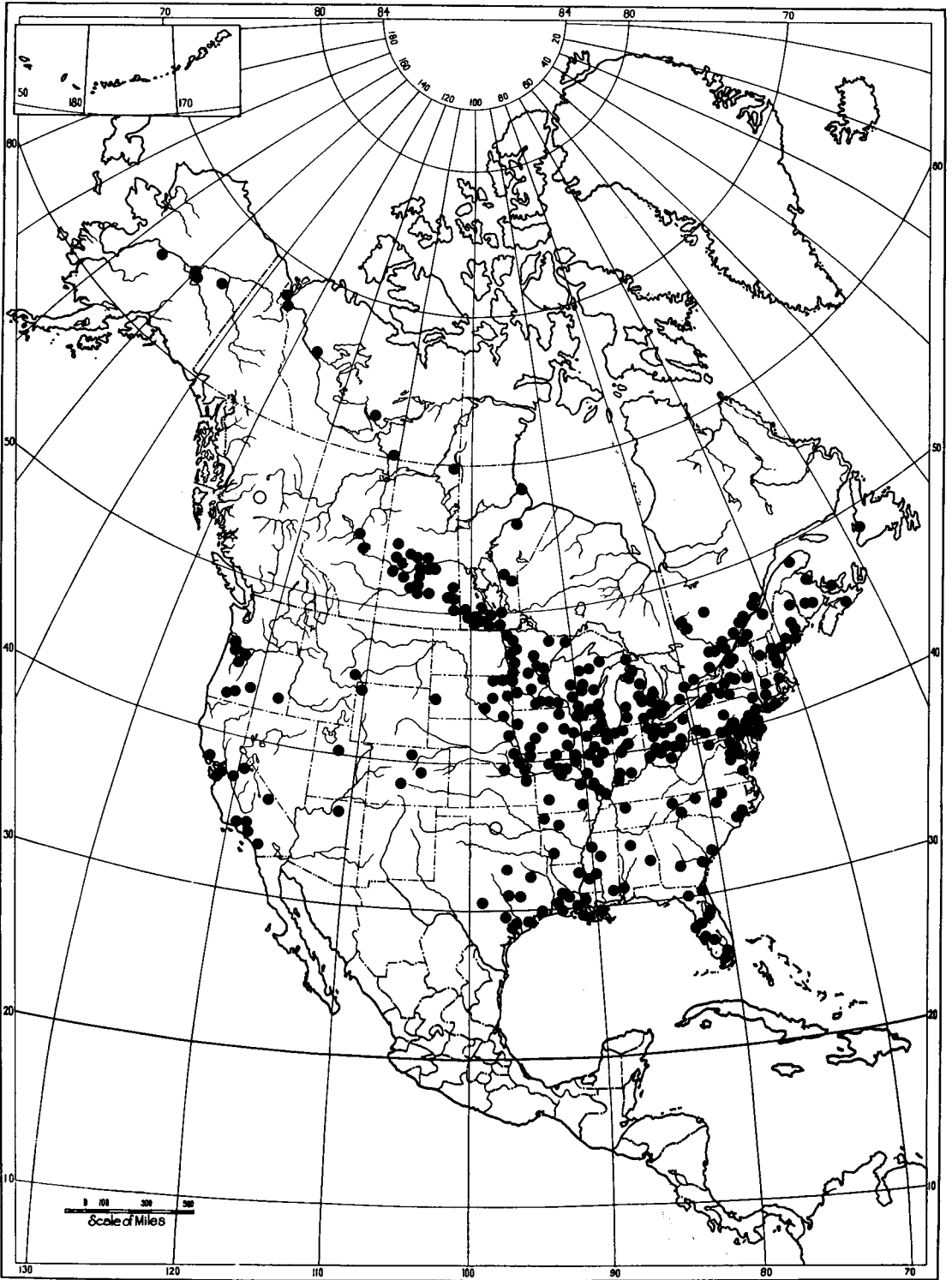
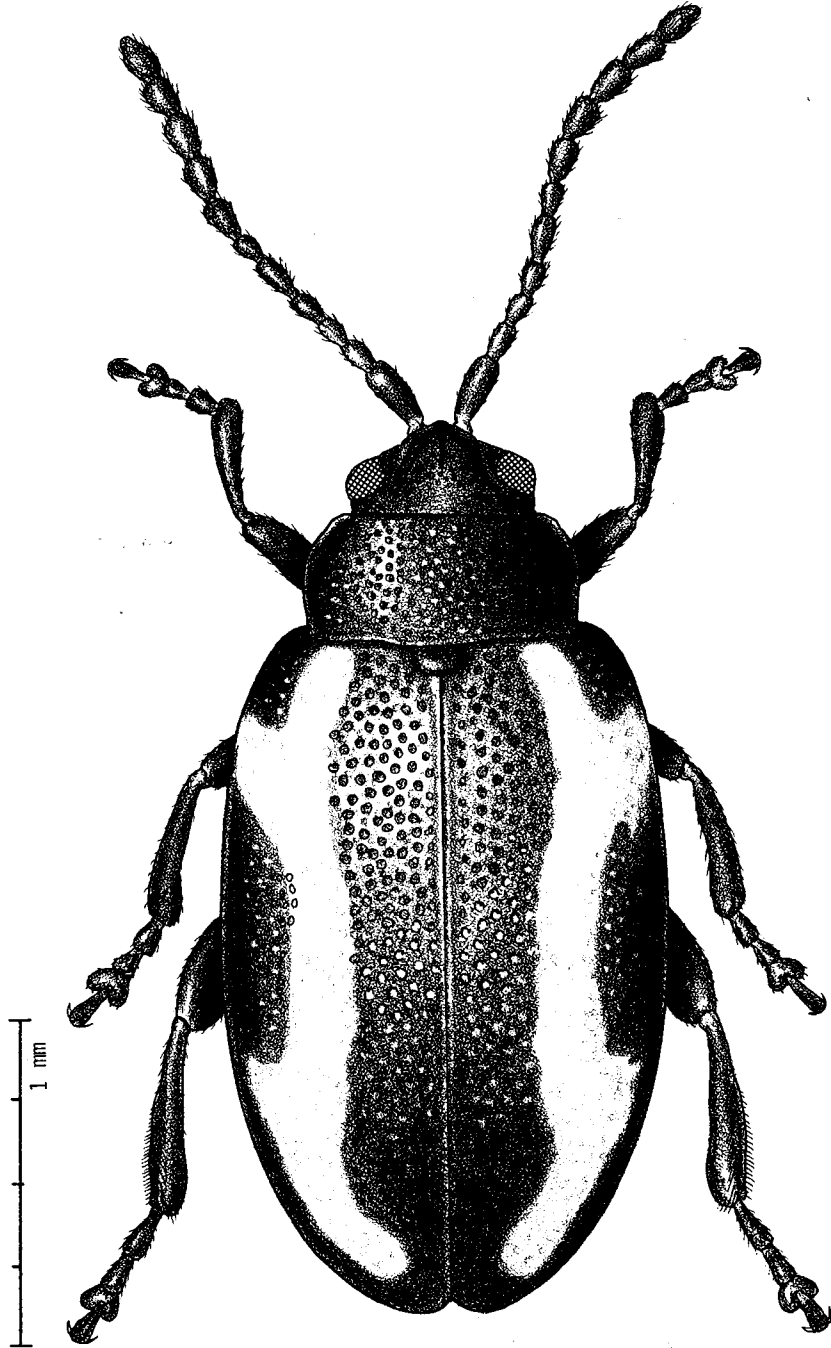


FIG. 207. Distribution of *Phyllotreta zimmermanni*.



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FIG. 208. *Phyllotreta albata*, holotype, dorsal view.

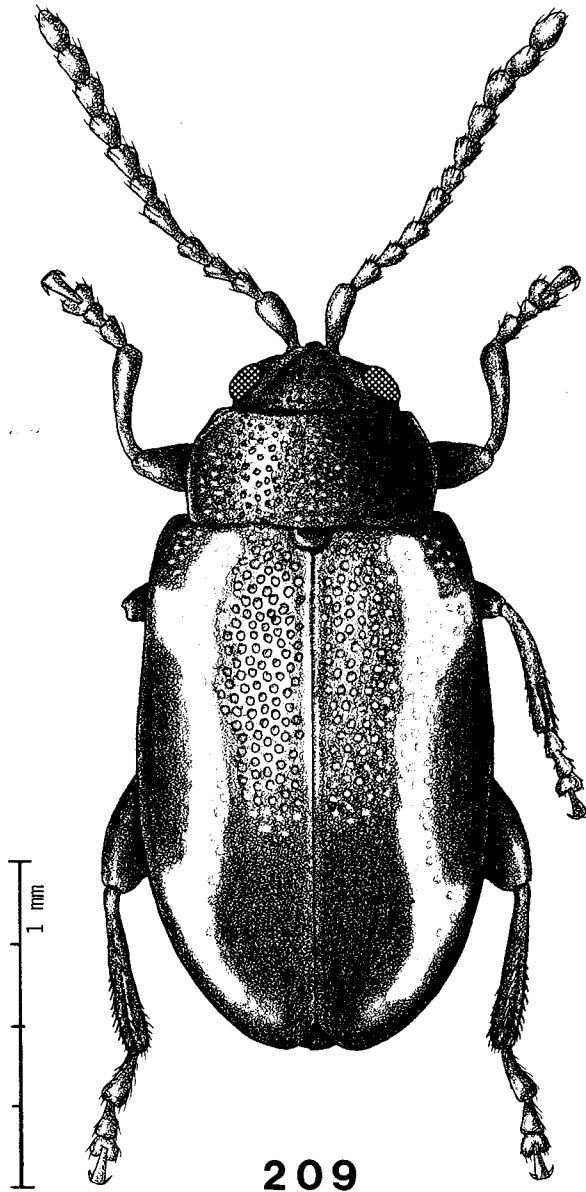
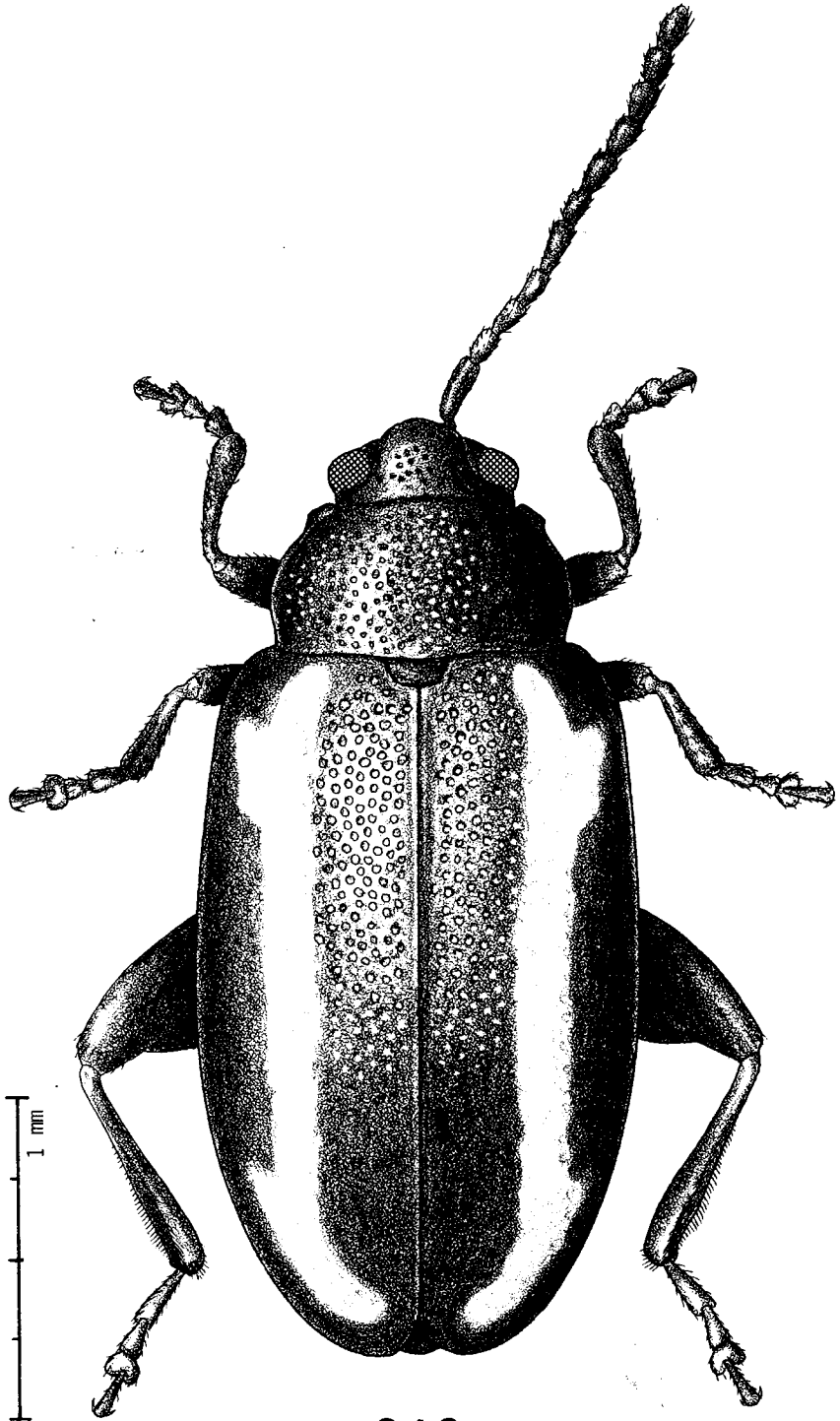
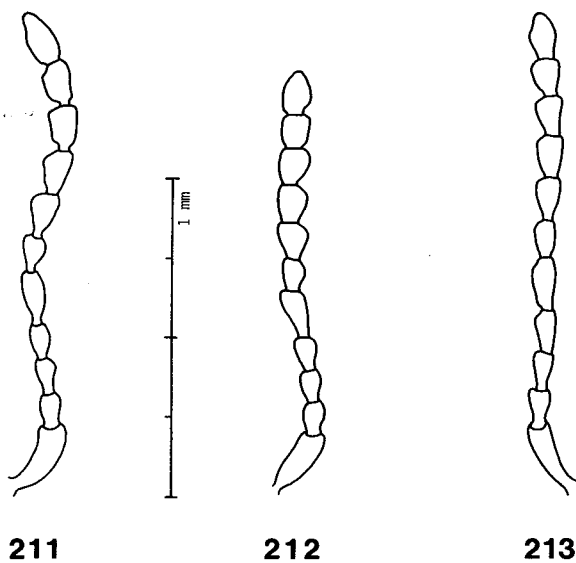


FIG. 209. *Phyllotreta obtusa*, holotype, dorsal view.



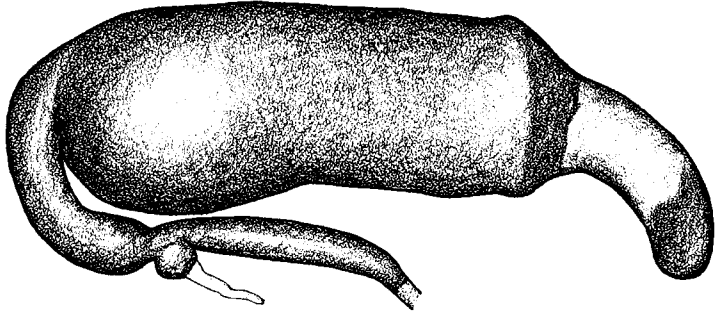
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FIG. 210. *Phyllotreta perspicua*, holotype, dorsal view.

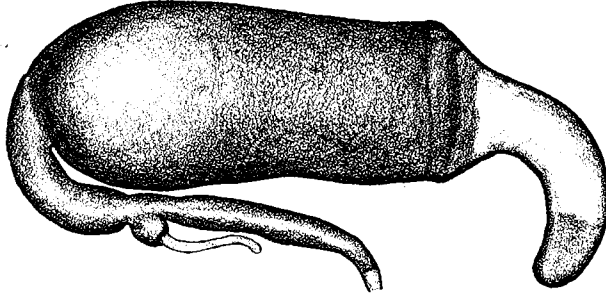


FIGS. 211–213. Female antennae, anterodorsal views: **211**, *Phyllotreta albata*, holotype, left antenna; **212**, *Phyllotreta obtusa*, holotype, left antenna; **213**, *Phyllotreta perspicua*, holotype, right antenna.

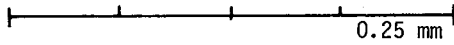
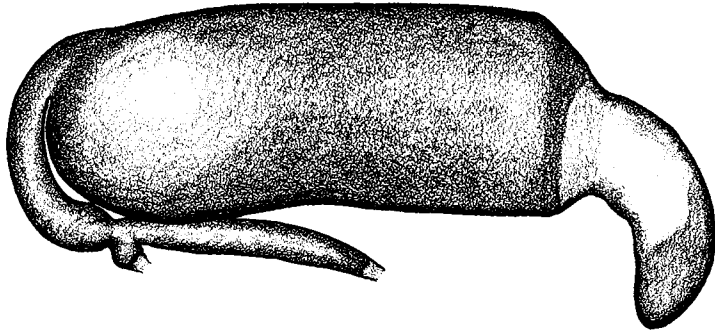
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FIGS. 214–216. Spermathecae, lateral views: **214**, *Phyllotreta alberta*, holotype; **215**, *Phyllotreta obtusa*, holotype; **216**, *Phyllotreta perspicua*, holotype.

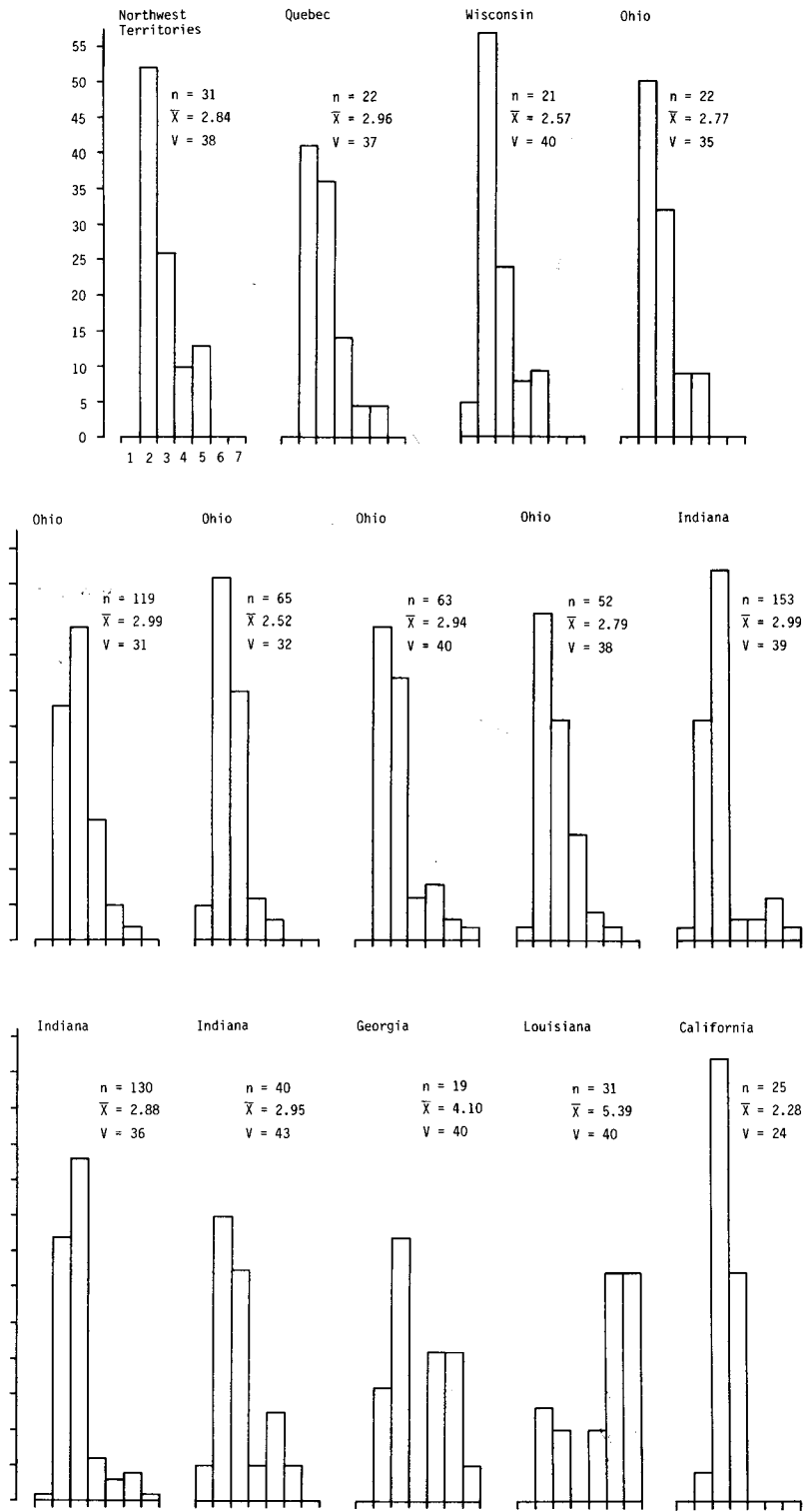


FIG. 217. Histograms representing color pattern variation of 14 samples of *Phyllotreta striolata*. Information given: state or province, n = sample size, \bar{X} = mean, V = coefficient of variation.

TABLE 1. Measurement ranges: Head ratios (using ocular grid units), pronotum, elytra, and entire beetle (in millimeters).

Species	Sex	Head IOD/MDE	Pronotal length	Pronotal width	Elytral length	Elytral width	Beetle length	Beetle width
<i>P. arcuata</i>	♂	1.50–1.63	0.42–0.45	0.72–0.78	1.60–1.85	1.05–1.12	2.28–2.50	1.05–1.12
	♀	1.50–1.63	0.38–0.48	0.72–0.78	1.62–1.88	1.02–1.20	2.18–2.58	1.02–1.20
<i>P. armoraciae</i>	♂	1.30–1.50	0.42–0.60	0.85–1.05	1.90–2.50	1.30–1.62	2.48–3.38	1.30–1.62
	♀	1.36–1.67	0.55–0.62	1.05–1.15	2.38–2.78	1.60–1.85	3.08–3.62	1.60–1.85
<i>P. attenuata</i>	♂	1.30–1.44	0.40–0.50	0.75–0.85	1.60–1.95	1.05–1.20	2.20–2.62	1.05–1.20
	♀	1.33–1.56	0.45–0.50	0.75–0.85	1.62–2.00	1.02–1.30	2.30–2.65	1.02–1.30
<i>P. bipustulata</i>	♂	1.42–1.75	0.50–0.62	0.82–0.95	1.78–2.02	1.12–1.35	2.38–3.00	1.12–1.35
	♀	1.56–1.60	0.52–0.68	0.82–0.98	1.82–2.20	1.10–1.45	2.48–3.08	1.10–1.45
<i>P. bisinuata</i>	♂	1.44–1.53	0.50–0.50	0.85–0.88	1.95–2.00	1.28–1.30	2.65–2.75	1.28–1.30
	♀	1.56	0.52	0.88	1.95	1.42	2.68	1.42
<i>P. conjuncta</i>	♂	1.20–1.25	0.40–0.50	0.62–0.82	1.35–1.88	0.95–1.20	1.95–2.52	0.95–1.20
	♀	1.25–1.44	0.40–0.50	0.65–0.85	1.42–1.95	0.95–1.22	2.02–2.70	0.95–1.22
<i>P. constricta</i>	♂	1.40–1.56	0.42–0.50	0.78–0.90	1.80–2.02	1.15–1.30	2.55–2.85	1.15–1.30
	♀	1.25–1.44	0.48–0.55	0.90–1.02	1.90–2.32	1.32–1.48	2.80–3.10	1.32–1.48
<i>P. decipiens</i>	♂	1.00–1.28	0.35–0.45	0.60–0.75	1.40–1.80	0.92–1.15	1.85–2.40	0.92–1.15
	♀	1.22–1.38	0.42–0.48	0.60–0.80	1.75–1.90	1.20–1.30	2.38–2.55	1.20–1.30
<i>P. denticornis</i>	♂	1.44–1.74	0.42–0.48	0.75–0.85	1.75–2.02	1.00–1.20	2.45–2.80	1.00–1.20
	♀	1.56–1.75	0.42–0.48	0.80–0.82	1.88–2.02	1.20–1.28	2.55–2.80	1.20–1.28
<i>P. dolichophalla</i>	♂	1.67	0.58	0.92	1.98	1.30	2.78	1.30
	♀	1.37–1.66	0.52–0.64	0.85–1.04	1.88–2.31	1.12–1.48	2.66–3.16	1.12–1.48
<i>P. emarginata</i>	♂	1.30–1.50	0.40–0.52	0.72–0.92	1.42–2.02	0.95–1.32	2.25–2.78	0.95–1.32
	♀	1.44–1.76	0.48–0.48	0.82–0.92	1.80–2.05	1.22–1.50	2.50–2.80	1.22–1.50
<i>P. lepidula</i>	♂	1.33–1.50	0.38–0.45	0.75–0.85	1.92–2.10	1.18–1.28	2.60–2.75	1.18–1.28
	♀	1.33–1.38	0.42–0.48	0.78–0.85	1.90–2.08	1.18–1.32	2.55–2.72	1.18–1.32
<i>P. liebecki</i>	♂	1.38–1.43	0.38–0.42	0.62–0.72	1.50–1.68	0.95–1.15	2.02–2.28	0.95–1.15
	♀	1.38–1.47	0.40–0.42	0.70–0.75	1.68–2.20	0.98–1.10	2.22–2.32	0.98–1.10
<i>P. oblonga</i>	♂	1.33–1.63	0.50–0.52	0.85–0.85	1.85–2.00	1.22–1.25	2.62–2.68	1.22–1.25
	♀	1.33–1.53	0.52–0.55	0.82–0.88	1.85–2.08	1.32–1.40	2.58–2.82	1.32–1.40
<i>P. oregonensis</i>	♂	1.30–1.56	0.48–0.55	0.72–1.02	2.00–2.25	1.22–1.55	2.28–3.10	1.22–1.55
	♀	1.44–1.56	0.45–0.58	0.82–1.02	1.55–2.42	1.18–1.50	2.28–3.35	1.18–1.50
<i>P. ramosa</i>	♂	1.25–1.33	0.35–0.42	0.60–0.78	1.40–1.72	0.88–1.12	1.92–2.35	0.88–1.12
	♀	1.25–1.38	0.35–0.42	0.65–0.72	1.45–1.75	0.92–1.08	1.98–2.25	0.92–1.08
<i>P. ramosoides</i>	♂	1.33–1.39	0.45–0.50	0.80–0.88	1.78–1.92	1.18–1.25	2.38–2.65	1.18–1.25
	♀	1.26–1.39	0.45–0.52	0.80–0.90	1.80–2.08	1.22–1.30	2.48–2.78	1.22–1.30
<i>P. robusta</i>	♂	1.22–1.38	0.38–0.42	0.65–0.75	1.48–1.75	1.00–1.12	1.98–2.30	1.00–1.12
	♀	1.22–1.38	0.40–0.45	0.72–0.78	1.52–1.75	1.10–1.18	2.08–2.38	1.10–1.18
<i>P. spatulata</i>	♂	1.88–1.88	0.42–0.45	0.80–0.80	1.75–1.82	1.12–1.15	2.45–2.52	1.12–1.15
	♀	1.81–1.81	0.45–0.45	0.82–0.82	1.90–1.92	1.25–1.28	2.55–2.62	1.25–1.28
<i>P. striolata</i>	♂	1.11–1.28	0.32–0.48	0.60–0.78	1.38–1.80	0.90–1.22	1.79–2.42	0.90–1.22
	♀	1.11–1.28	0.40–0.48	0.65–0.90	1.25–2.60	1.02–1.35	1.82–2.60	1.02–1.35
<i>P. undulata</i>	♂	1.28–1.42	0.44–0.48	0.65–0.69	1.54–2.34	0.90–1.10	2.18–3.05	0.90–1.10
	♀	1.33–1.47	0.48–0.50	0.71–0.78	1.71–1.88	1.14–1.22	2.41–2.59	1.14–1.22
<i>P. utana</i>	♂	1.47–1.70	0.50–0.58	0.95–1.05	2.10–2.42	1.20–1.50	2.85–3.25	1.20–1.50
	♀	1.50–1.78	0.52–0.52	0.92–1.02	2.12–2.30	1.42–1.52	2.85–3.02	1.42–1.52
<i>P. utanula</i>	♂	1.44–1.67	0.42–0.62	0.78–0.98	1.82–2.02	1.11–1.35	2.48–2.75	1.11–1.35
	♀	1.44–1.56	0.49–0.64	0.86–0.94	1.91–2.16	1.24–1.49	2.58–2.93	1.24–1.49
<i>P. zimmermanni</i>	♂	1.33–2.00	0.40–0.50	0.70–0.90	1.55–2.05	1.00–1.30	2.18–2.78	1.00–1.30
	♀	1.50–1.62	0.40–0.58	0.80–0.95	1.85–2.22	1.18–1.50	2.52–3.10	1.18–1.50

TABLE 2. Antennal segment measurements: Length/width (in ocular grid units) and total length of antenna (in millimeters).

Species	Sex	1	2	3	4	5	6	7	8	9	10	11	Length
<i>P. arcuata</i>	♂	9.5/3	4/2+	4.5/3	4.5/5	8.5/6	2+/3	5/3.5	5/3	5/3.5	5/3.5	7/3	1.50
	♀	8.5/3	4/2+	4/2	4.5/2.5	6/2.5	4/2.5	5/3	5/3.5	5/3.5	5/3.5	7/3+	1.45
<i>P. armoraciae</i>	♂	9/3.5	4.5/3-	5/2.5	7-/3+	7-/3	6/3-	6+/3	6+/3+	6+/3+	6/3.5	8/3.5	1.76
	♀	11/4-	5/3	5+/3-	8/3-	8-/3-	6.5/3-	7-/3+	7/3.5	7/4-	6.5/4-	8/4-	1.98
<i>P. attenuata</i>	♂	8.5/3	4/2+	4/2	4+/2	5/2	5/2.5	5+/3-	5.5/3	5.5/3+	5/3+	7/4-	1.46
	♀	8.5/3	4+/2+	4/2	4.5/2	5.5/2.5	5.5/3-	6/3	6/3+	6-/3+	5/3+	7/3+	1.55
<i>P. bipustulata</i>	♂	8.5/3	4-/2.5	4/2	4.5/2.5	5.5/2+	5+/2+	5.5/3-	6-/3+	5.5/3.5	5+/4-	6.5/4	1.50
	♀	8.5/3	4.5/2.5	4.5/2+	4.5/2.5	5+/2.5	5+/2.5	5+/3+	6-/3+	5+/3.5	5+/3.5	7.5/3.5	1.51
<i>P. bispinuada</i>	♂	8.5/4-	5-/3-	5/3	5/4.5	9/5.5	3.5/3+	5/3.5	5.5/3.5	5/3.5	5/4-	7/3+	1.59
	♀	8.5/4	4.5/3	4+/3	5-/3	7/3+	4.5/3	5+/3+	5.5/4	5.5/4	5+/4	6/4	1.51
<i>P. conjuncta</i>	♂	8/3	3.5/2+	4-/2	3.5/2	5/2+	5/2.5	5/3-	6/3	5/3	5-/3+	7/3+	1.42
	♀	7.5/2.5	3.5/2+	3.5/2	4-/2	5-/2+	5/2.5	5/2.5	5+/3-	5/3	5-/3	6/3+	1.36
<i>P. constricta</i>	♂	10/4	4.5/2.5	5/3+	6/5	8/5+	3+/3	4.5/3	5/3	5.5/3+	5/3+	7/3+	1.59
	♀	10/4-	4.5/2.5	5/3-	5/2.5	7-/3	4.5/2.5	4.5/3.5	5.5/3.5	6-/3.5	5+/3.5	7/3.5	1.60
<i>P. decipiens</i>	♂	9/3	5-/2.5	4+/2+	4.5/2.5	6.5/3	3.5/2+	4.5/2.5	5-/3-	5/3	5/3	7/3	1.45
	♀	9/3	4.5/2+	4/2	3.5/2	5.5/2	4-/2	5-/2+	5-/2.5	5-/3-	5-/3	6.5/3+	1.41
<i>P. denticornis</i>	♂	8+/4-	5/2.5	5/3.5	6/5.5	7.5/6-	2.5/4.5	5-/4	5/4+	5/4-	5/3	6.5/3	1.51
	♀	8/3+	5-/3-	5-/2.5	5.5/3-	6-/3-	3.5/2.5	5/3	6-/3.5	4.5/4-	5-/4-	6.5/3.5	1.50
<i>P. dolichophalla</i>	♂	10/4	5-/3	5-/3-	5-/3	5.5/3	6/3.5	6/4-	6/4-	6/4-	5.5/4	7/4	1.68
	♀	10/4	5+/3+	6/3	6/3	6/3	6/3	7.5/4-	7+/4	7+/4.5	6/4.5	9.5/4+	1.90
<i>P. emarginata</i>	♂	10.5/4+	5/3	4.5/4-	5+/4	9/5	3.5/3	5/3.5	4.5/3.5	5/3.5	5/3.5	6/3.5	1.58
	♀	9/3.5	3.5/2.5	3.5/2.5	5/2.5	6/3	3.5/2.5	4.5/3-	5-/3-	5/3-	4.5/3-	6/3	1.40
<i>P. lepidula</i>	♂	8/3	4.5/2	4/2+	4.5/3	8/4.5	2.5/2+	4/3-	4.5/2.5	4/3-	4/3-	6/3-	1.34
	♀	10/3-	4/2	4/2	4/2+	6-/2+	3/2	4/2.5	4/3-	4+/3-	4/3-	5.5/3-	1.30

TABLE 2. Continued.

Species	Sex	1	2	3	4	5	6	7	8	9	10	11	Length
<i>P. liebecki</i>	♂	7/3	4/2	3/2	2.5/2.5	7/4	2.5/2	4/3	4/3	4.5/3	4.5/3	6/3	1.22
	♀	7/3	4/2+	3.5/2	3/2	5+/2+	4/2+	4.5/3-	4+/3	4+/3-	4+/3	6/3	1.24
<i>P. oblonga</i>	♂	8.5/3	4.5/2+	5-/2+	4+/2+	4.5/2.5	4.5/2.5	5.5/3	5/3	5/3	5/3+	7/3.5	1.48
	♀	9/3+	4.5/2.5	4/2	4/2	5/2	4/2.5	5/3	5/3	5.5/3+	5/3	7/3+	1.45
<i>P. oregonensis</i>	♂	10/4-	4.5/2.5	4/3	5/4	8-/4.5	3+/3	4.5/3	5/3+	5/3.5	4.5/3.5	7.5/3+	1.52
	♀	10-/3.5	5/2.5	4.5/2+	6.5/2.5	8/2.5	5/2.5	6-/3+	5.5/3+	5.5/3+	5.5/3+	7/3	1.64
<i>P. ramosa</i>	♂	7/2.5	3+/2	3/1.5	3/2	3.5/2+	3/2	4/2.5	4/2.5	4/2.5	3.5/2.5	5/3	1.08
	♀	7/2.5	4/2	3.5/2-	3.5/2-	4/2	4-/2	4/2.5	4/2.5	4.5/2.5	4.5/2.5	5+/2.5	1.16
<i>P. ramosoides</i>	♂	9/3+	4.5/2.5	4.5/2+	4+/2+	6-/3	4/2.5	5/2.5	5/3	5/3	5-/3	6.5/3	1.46
	♀	8/3	5/2+	4/2	4.5/2	5.5/2+	4.5/2+	4.5/3-	4.5/3-	5+/3+	4.5/3-	7/3+	1.39
<i>P. robusta</i>	♂	8/3	4/2+	3.5/2	3.5/2.5	6/5.5	2.5/2+	4/3-	4.5/3	4.5/3	4.5/3	5/3	1.25
	♀	8/3-	4/2+	4/2	3.5/2	5.5/2+	4-/2	5/3-	5+/3+	5/3+	5/3	6+/3	1.36
<i>P. spatulata</i>	♂	9/4-	5.5/2.5	5.5/3.5	7/4.5	8.5/5.5	2.5/3	4/3	4+/3+	4/3	4+/3	6/3	1.50
	♀	8.5/3+	5/2+	4.5/2	5-/2.5	6.5/3-	4+/3	5-/3	5/3+	5/3+	4.5/3+	6+/3	1.48
<i>P. striolata</i>	♂	8/3-	4.5/2+	4/2	4/2.5	5.5/3	3/2	4+/2.5	4.5/3-	5/3	4.5/3	5.5/2.5	1.31
	♀	8/3	4+/2+	4-/2	4/2	6-/2	4-/2	4.5/2.5	4.5/3-	4.5/3-	4.5/3	6+/3	1.35
<i>P. undulata</i>	♂	7+/3-	4.5/2+	4/2	4+/2+	5+/2.5	4.5/2	5+/2.5	5+/3-	5+/3-	4.5/3-	7/3	1.39
	♀	10-/3-	5-/2	4-/1.5	4/2-	5/2-	4+/2	5/2	5/2.5	5/3-	4+/3-	6+/3-	1.42
<i>P. utana</i>	♂	9/4-	4.5/3	6/3+	6/5-	10.5/6-	4.5/3+	6/3.5	6/3.5	6.5/3.5	5.5/3.5	7.5/4-	1.76
	♀	9/3+	4.5/3-	4.5/2.5	5/2.5	7+/2.5	4.5/3-	5.5/3+	6/4-	6/3.5	5.5/3-	7/3	1.60
<i>P. utanula</i>	♂	11/3.5	4+/2.5	5-/3-	5/4.5	11.5/6	3/3	5-/3	5-/3+	5-/3+	4.5/3+	6.5/3+	1.64
	♀	9.5/3.5	4.5/3-	4/2.5	4.5/2.5	7/2.5	4.5/2.5	5.5/3	5+/3.5	5+/3.5	5-/3+	6.5/3+	1.52
<i>P. zimmermanni</i>	♂	10+/4	4.5/3-	4.5/3.5	4/5-	9/6.5	2+/3-	4.5/3+	5/3.5	5.5/3.5	5/3.5	7/3+	1.56
	♀	9+/3.5	5-/2.5	4/2.5	4/2.5	6/2.5	4/2.5	5-/3+	6-/3+	5.5/3+	5-/3+	6+/3+	1.49

TABLE 3. Comparative morphological data for native maculate nearctic species of *Phyllotreta* with respect to antennal 5th segment and aedeagal dorsal washboard.

Group I (male antennal segment 5 modified, aedeagus without dorsal washboard)			Group II (male antennal segment 5 normal, aedeagus with dorsal washboard)		
Species	Antennal segment 5 ÷ 6*		Species	Antennal segment 5 ÷ 6*	
	♂	♀		♂	♀
<i>P. arcuata</i>	4.25	1.50	<i>P. attenuata</i>	1.00	1.00
<i>P. bisinuata</i>	2.57	1.56	<i>P. bipustulata</i>	1.10	1.00
<i>P. constricta</i>	2.67	1.56	<i>P. conjuncta</i>	1.00	1.00
<i>P. decipiens**</i>	2.00	1.38	<i>P. dolichophalla</i>	0.92	1.00
<i>P. denticornis</i>	3.00	1.71	<i>P. oblonga</i>	1.11	1.12
<i>P. emarginata</i>	2.57	1.71	<i>P. ramosa</i>	0.88	1.00
<i>P. lepidula</i>	3.20	2.00	<i>P. ramosoides**</i>	1.50	1.22
<i>P. liebecki</i>	2.80	1.38	Average	1.07	1.05
<i>P. oregonensis</i>	2.67	1.60			
<i>P. robusta</i>	2.60	1.38			
<i>P. spatulata</i>	3.40	1.62			
<i>P. utana</i>	3.83	1.56			
<i>P. utanula</i>	3.83	1.56			
<i>P. zimmermanni</i>	4.50	1.50			
Average	3.14	1.57			

*Length of 5th segment ÷ length of 6th segment, in ocular grid units. **Fifth antennal segment elongated only.

Appendix

List of Abbreviations

Abbreviations are from Arnett & Samuelson (1969), except ACSS, ACUM, AJGC, CLCC, EGRC, EUBC, UZMC, and ZSBS which were coined for collections not listed.

ACSS	Agriculture Canada, Saskatoon, Saskatchewan	NMDC	N. M. Downie Collection
ACWM	Agriculture Canada, Winnipeg, Manitoba	ODAC	Oregon Department of Agriculture
AJGC	Arthur J. Gilbert Collection	OSUC	Ohio State University
AMNH	American Museum of Natural History	OSUO	Oregon State University
ANSP	Academy of Natural Sciences at Philadelphia	PADA	Pennsylvania Department of Agriculture
BWUM	University of Washington	PIME	P.I.M.E. Entomological Museum
CASC	California Academy of Sciences	PSUC	Pennsylvania State University
CDAE	California Department of Agriculture	PURC	Purdue University
CISC	California Insect Survey	SDSU	South Dakota State University
CLCC	Claude Chantal Collection	TAMU	Texas A & M University
CNCI	Canadian National Collection of Insects	UADE	University of Arkansas
CSUC	Colorado State University	UAIC	University of Arizona
CUIC	Cornell University	UASM	University of Alberta
DBUM	University of Montreal	UCRC	University of California, Riverside
DCMC	David C. Miller Collection	UMDC	University of Maryland
DEFW	University of Minnesota	UMDE	University of Maine
DEUN	University of Nebraska	UMMZ	University of Michigan
EGRC	Edward G. Riley Collection	UMRM	University of Missouri
EHSC	Eric H. Smith Collection	USNM	United States National Museum
EMUS	Utah State University	UWEM	University of Wisconsin
EUBC	Edward U. Balsbaugh, Jr., Collection	UZMC	University Zoological Museum, Copenhagen
FMNH	Field Museum of Natural History	VMKC	Vernon M. Kirk Collection
FSCA	Florida State Collection of Arthropods	VPIC	Virginia Polytechnic Institute
GHNC	G. H. Nelson Collection	WRSC	Walter R. Suter Collection
HAHC	Henry and Anne Howden Collection	WSUC	Washington State University
ICCM	Carnegie Museum	ZSBS	Zoologische Sammlung de Bayerischen Staates, München
INHS	Illinois Natural History Survey		
ISUI	Iowa State University		
LACM	Los Angeles County Museum of Natural History		
MCZC	Museum of Comparative Zoology, Harvard University		
MSUC	Michigan State University		
NCSU	North Carolina State University		
NDSU	North Dakota State University		

Specimens Examined

This section is organized in the following manner: state (in boldface capitals, listed alphabetically; Canada last with provinces in capitals, listed alphabetically), county or parish (boldface, arranged alphabetically), other locality details; date of collection (as on label, except Roman numerals substituted for month if written out, an apostrophe before year digits is recorded as "19," and entries now separated by colons; questionables are quoted); location of specimens, colon, number of specimens (if in capsule, estimated number enclosed in quotation marks) (all in parentheses). If only a county record is given, the location and number of specimens are recorded in brackets after all other listings for that particular county. If only a state record is given or the county could not be determined, the location and number of specimens appear in brackets after all listings for counties or parishes of that particular state. For specimens with no country/state indicated, these are

recorded in brackets after all other listings for that particular species.

The four-letter abbreviations denoting the location of the specimens are given above under List of Abbreviations. The complete label data were recorded and remain in my files. They are available upon request.

Each specimen (except types) examined during this study is labeled with a determination label of consistent format: first line, "Phyllotreta"; second line, species and author; and third line, "Det. Eric H. Smith 1985."

See the Type Material section under each species for additional data.

Phyllotreta arcuata: See species description under Type Material.

Phyllotreta armoraciae: CONNECTICUT: Litchfield Co., Cornwall, 6:16:20 (CUIC:1), Litchfield, VIII:25:1924 (AMNH:5), VIII:27:24 (AMNH:2), New Haven Co., So. Meriden, 5:17:1914 (USNM:8); IDAHO: Booner Co., Sandpoint, VII:17:1954 (HAHC:5), VII:19:1954 (HAHC:1), VIII:11:1954 (NMDC:4), VIII:17:1960 (AMNH:1, NMDC:1); ILLINOIS: Champaign Co., Champaign, VI:30:1911 (INHS:1), V:6:1921 (INHS:1), Urbana, 26:VI:1926 (INHS:4), 4:18:27 (WSUC:1), 4:11:1928 (DEFW:1), Cook Co., Chicago, VI:2:04 (USNM:1), IV:28:1906 (INHS:4), IV:20:1907 (INHS:1), 8:9:10 (CUIC:1), V (UWEM:3), VI (UWEM:1), No Date (CASC:5, DEFW:1, MCZC:3, OSUC:1, UMRM:2, USNM:3), Eggers, VI:20:26 (FMNH:1), Edgebrook (UMMZ:4), Glencoe, 2:VII:08 (USNM:4), Willow Springs, VI:12:10 (FMNH:2), VII:17:10 (FMNH:4), 9:VI:13 (USNM:4), 8:26:13 (CUIC:2), 9:24:13 (USNM:8), 9:25:15 (CASC:2), VII:27 (USNM:4), [County Only: V:10:50 (INHS:1), VI (USNM:2), No Date (MCZC:2, USNM:2)], Jasper Co., Newton, 6:28:26 (INHS:1), LaSalle Co., [County Only: IX:6:1938 (UAIC:1)], Madison Co., Collinsville, VII:19:1947 (INHS:4), McHenry Co., Algonquin, 10:5:95 (INHS:1), 5:5:96 (INHS:1), 5:21:96 (INHS:1), Piatt Co., Monticello, V:24:1929 (INHS:1), Putnam Co., [County Only: V:14:1932 (INHS:4)], Saint Clair Co., Belleville, IV:21:1925 (INHS:4), [County Only: VI:24:1946 (INHS:2)], [State Record: Shermerville, IV:25:17 (USNM:2); State Only (AMNH:2, CASC:4, INHS:14)]; INDIANA: Kosciuski Co., [County Only: IV:20:1933 (PURC:2), V:21:1933 (PURC:2)], Marshall Co., Plymouth, 6:7:19 (USNM:2), Saint Joseph Co., Mishawaka, VII:8:1931 (PURC:2), VI:14:1932 (PURC:1), VII:25:1932 (PURC:5), Tippecanoe Co., Lafayette, 9:15:23 (CNCI:1), [State Record: Pine, V:28:05 (FMNH:1, PURC:1), 7:27:15 (CASC:2, EHSC:2)]; IOWA: Buchanan Co., Independence, V:15 (USNM:1), Clayton Co., Guttenberg, 9:15:94 (USNM:4), 15:9 (USNM:2), No Date (MCZC:1, USNM:2), Franklin Co., Hampton, VII:25:1955 (NDSU:1), Henry Co., 4 mi. N Rome, 5:20:63 (ISUI:1), Johnson Co., Iowa City, 4:27:11 (USNM:1), 6:4:14 (USNM:1), IV:26 (USNM:4), 9:26 (LACM:1), Muscatine Co., Muscatine, 6:28:17 (USNM:1), 7:18:17 (USNM:2), 6:17 (OSUO:1), VIII:6:17 (OSUO:1, USNM:2), 5:1:19 (OSUO:2, USNM:1), [County Only: 7:18:17 (USNM:5), VII:27:17 (USNM:2)], Scott Co., Pleasant Valley, 9:14:31 (ISUI:5), 7:1:32 (ISUI:1), Story Co., Ames, 5:5:16 (ISUI:7), Woodbury Co., Sioux City, No Date (DEFW:1), [State Record: (USNM:3)]; MASSACHUSETTS: Middlesex Co., Stoneham, 6:6:17 (CUIC:3), 6:9:17 (CUIC:4), 6:15:17 (CUIC:3), VIII:1 (UAIC:4), No Date (CASC:13), Norfolk Co., Framingham, 5:21:19 (MCZC:1), VI:1:48 (GHNC:4); MAINE: Oxford Co., Paris, 6:28:32 (MCZC:2); MICHIGAN: Allegan Co., Fennville, 5:19:26 (CASC:1), LACM:2, MSUC:4, UMDC:1), VIII:6:1926 (CASC:4), Berrien Co., Paw Paw Lake, VII:16:09 (UMMZ:1), Ingham Co., Ag. Coll. Mich., 5:6:21 (MSUC:14), 5:23:22 (MSUC:9), V:23:1923 (CASC:5), 30:VI:1928 (MSUC:1), Ionia Co., Belding, 6:2:25 (MSUC:1, USNM:2), Lapeer Co., [County Only: 5:30:37 (MSUC:1)], Oakland Co., Pontiac, 6:17:07 (MSUC:2), [County Only: 6:20:26 (MSUC:1), VIII:10:29 (UMDC:3)], St. Clair Co., Port Huron, 7:16:20 (MSUC:2), [State Record: 7:VII:02 (USNM:2)]; MINNESOTA: Dodge Co., Dodge Center, 10:IX:07 (USNM:1), Faribault Co., Winnebago, 7:11:23 (CNCI:2, DEFW:7), Hennepin Co., Minneapolis, 11:12:25 (DEFW:22), 6:27:35 (DEFW:15), Houston Co., [County Only: 5:21:38 (DEFW:2)], Olmstead Co., [County Only: 6:08 (DEFW:1), No Date (DEFW:3)], Polk Co., E. Grand Forks, 10:3:41 (UCRC:2), Ramsey Co., St. Paul (Univ. Farm), 5:23:35 (DEFW:1), 7:9:41 (DEFW:19), Rice Co., Faribault, 7:28:21 (CNCI:1), Wabasha Co., Lake City, 7:6:21 (CNCI:3, DEFW:6), Winona Co., Dresbach, 7:13:20 (DEFW:15), [State Record: St. Anthony Pk., 15:VII:07 (USNM:1)]; MISSISSIPPI: [State Record: Okatchee, 16:II:1897 (AMNH:2)]; MISSOURI: Pike Co., Louisiana, IV:28:1949 (CSUC:1), V:2:1949 (ISUI:4, NDSU:1), Mississippi Co., Charleston, 4:20:15 (USNM:1), Montgomery Co., Montgomery City, 6:15:30 (CNCI:3); NEBRASKA: Butler Co., Bellwood, 5:1:45 (DEUN:6); NEW HAMPSHIRE: Coos Co., Mt. Washington (5700' Toll Rd. cow pasture), 8:2:54 (CNCI:1); NEW JERSEY: Bergen Co., Alpine, V:30:1946 (AMNH:1), Fort Lee, V:25:1912 (USNM:1), Hillsdale, 3:VI:1928 (CASC:1, NMDC:1), Morris Co., Chester, 6:5:13 (USNM:13); NEW YORK: Brooklyn Co., Rockaway, L.I., V:19:1917 (AMNH:7), V:20:1917 (AMNH:3), Broome Co., Binghamton, 6:17:17 (CUIC:1), Erie Co., Buffalo, V:26 (USNM:1), E. Aurora, V:21:10 (CASC:2), Genesee Co., Batavia, 6:5:15 (ISUI:2), Madison Co., Bridgeport, V:20:14 (AMNH:1, OSUO:3, USNM:12), Niagara Co., Olcott, 14:V:1922 (CUIC:16), 6:20:25 (CUIC:1), 7:26:25 (CUIC:1), 8:13:27 (CUIC:1), Onondaga Co., Elbridge, IX:15:41 (UAIC:3), [County Only: 9:13:41 (NMDC:4)], Orange Co., Tuxedo, 26:V:40 (FMNH:10), Putnam Co., West Point, 5:5:09 (USNM:1), Saint Lawrence Co., Potsdam, 7:27:5 (MCZC:3), 8:1:5 (MCZC:1), 1906 (CASC:1), No Date (UMMZ:1), Suffolk Co., Orient Point, L.I., 2:VIII:43 (USNM:9), Tompkins Co., Ithaca (Cornell U.), No Date (CUIC:1), Ithaca (Savage Farm), 6:9:67 (CUIC:1), Ithaca, 5:1:13 (CUIC:1), 4:28:13 (CUIC:1), 5:2:16 (CUIC:1), 30:VII:1930 (CUIC:3), [County Only: 6:22:69 (NMDC:2)], Wayne Co., [County Only: VII:6:1950 (USNM:1)], [State Record: Newtown, L.I., 4:19:19 (CUIC:21), Rikers Island, 31:VIII:44 (USNM:4), Rock Beh., L.I., V:27:1916 (USNM:3); State Only (CUIC:1)]; OHIO: Ashtabula Co., Jefferson, 8:08 (OSUC:5), Crawford Co., Plankton, III:21:18 (CASC:1), 11:15:18 (CASC:1), Franklin Co., Columbus, 4:26:25 (WSUC:1), Wood Co., Bowling Green, 6:12:20 (OSUC:2), 8:27:20 (OSUC:4), [State Record: 5:27:27 (CNCI:4)]; PENNSYLVANIA: Allegheny Co., Aspinwall, 5:16:26 (ICCM:1), 5:23:25 (ICCM:1), 5:27:26 (ICCM:2), 7:4:27 (MCZC:2), Pittsburgh, 5:21:26 (ICCM:1), 5:23:26

(ICCM:1), 7:9 (ICCM:1), 6:19 (ICCM:1), 6:26 (ICCM:1), Wilmerding, 9:3:16 (ICCM:1), 6:11:17 (ICCM:3), **Centre Co.**, State College, 4:19:15 (PSUC:1), 5:18:38 (EHSC:1, PSUC:1), 5:7:48 (PSUC:2), **Dauphin Co.**, Hummelstown, 8:9:17 (PADA:1), **Forest Co.**, [County Only: 8:5:38 (EHSC:1, PSUC:2)], **Monroe Co.**, Tobyhanna, 8:14:20 (PADA:19), **Northampton Co.**, Easton, VII:28:18 (CASC:2), **Philadelphia Co.**, Bustleton (Sta. Col. Lab.), 3:15:22 (PSUC:2), Germantown, 5:23:25 (ANSP:4, CASC:4), Philadelphia, 8:31:43 (USNM:5); **SOUTH DAKOTA: Brookings Co.**, Brookings, 5:8:19 (SDSU:1), 6:6:19 (SDSU:1), 7:15:19 (MSUC:2, SDSU:8), 5:12:21 (SDSU:1), 7:16:24 (SDSU:2), 7:17:24 (SDSU:3), **Minnehaha Co.**, Colton, 8:1:23 (SDSU:2); **WASHINGTON: Lincoln Co.**, Govan, III:29:11 (USNM:1); **WEST VIRGINIA: Marion Co.**, Fairmont, VIII:31:1926 (UMRM:1), [State Record: VIII (DBUM:3)]; **WISCONSIN: Adams Co.**, Big Flats, 9:9:20 (UWEM:2), **Brown Co.**, Green Bay, 7:21:14 (FMNH:1), MCZC:7, OSUC:1, UMRM:1, UWEM:10, WSUC:4), 4:29:15 (DEFW:2), V:4:1915 (CNCI:1, USNM:6), V:5:1915 (USNM:1), 5:27:15 (MCZC:1, OSUC:3, UMRM:1, UWEM:1, WSUC:1), 9:3:15 (EHSC:1, PUSC:2), 5:25:16 (OSUC:3), 5:24:20 (EHSC:3, UWEM:3), **Dane Co.**, 7:22:14 (UWEM:1), 8:22:16 (USNM:6), 11:5:17 (WSUC:1), 11:17 (UWEM:1), 5:17:18 (CNCI:1, USNM:2), 3:19:19 (USNM:4), 3:25:19 (USNM:6, UWEM:4), 5:8:19 (EHSC:4, PURC:1, USNM:9, UWEM:2), 5:26:19 (USNM:2, UWEM:2, WSUC:1), 7:28:19 (CSUC:1, EHSC:2, USNM:2), 11:17:19 (USNM:1, UWEM:1), 5:7:20 (PURC:1, USNM:2, UWEM:1), 5:15:20 (UWEM:1), 5:16:20 (UWEM:1), 5:20:20 (UWEM:1), 5:21:20 (WSUC:1), V:25:20 (UWEM:1), 6:1:20 (UWEM:1), No Date (USNM:6, WSUC:1), [County Only: 5:22:1900 (UWEM:38), No Date (USNM:1)], **Dodge Co.**, V:5:1904 (UMMZ:2), No Date (USNM:4), **Door Co.**, Sturgeon Bay, 5:28:54 (UWEM:1), 6:16:19 (AMNH:1, OSUO:1, TAMU:1, USNM:4, UWEM:3), **Fond du Lac Co.**, Ripon, 7:16:17 (OSUC:1), **Oneida Co.**, Minocqua, 5:21:22 (UWEM:2), **Sauk Co.**, LaValle (5 mi. N), 5:3:48 (UWEM:1), **Walworth Co.**, Lake Geneva, 6:23:17 (CUIC:1, TAMU:1, USNM:2, UWEM:9, WSUC:2), **Waukesha Co.**, Oconomowoc, VII:96 (USNM:2), Okauchee, VII:96 (CASC:3, CUIC:4, MCZC:7), 2:16:97 (AMNH:2), VII (AMNH:1), No Date (OSUC:7), **Waupaca Co.**, Clintonville, V:6:34 (WSUC:1), Waupaca, 7:22:20 (UWEM:1), 3:2:21 (UWEM:4), [State Record: 7:96 (AMNH:4), No Date (USNM:2)]. **CANADA: MANITOBA: Brandon**, 6:23:38 (CNCI:4), Rock Lake, 6:29:29 (CNCI:7); **NEW BRUNSWICK: Fredrickton**, 5:13:30 (CNCI:1), Millville, 7:9:42 (CNCI:9); **ONTARIO: Britannia**, 5:31:49 (CNCI:1), Burlington, No Date (CNCI:1), Chatham, 5:28:27 (CNCI:1), 6:8:27 (CNCI:1), Dresden, 6:24:27 (CNCI:1), Leamington, 6:15:40 (CNCI:1), Manotick, 6:9:68 (CNCI:1), Port Roman, 5:31:44 (CNCI:4), Prince Edward Co., 5:7:15 (CUIC:3), 5:29:19 (CUIC:1), 6:3:19 (CUIC:1), 6:22:21 (CNCI:1), VI:22:1925 (UAIC:4), 4:IX:1952 (EUBC:4), Tilbury, 6:20:28 (CNCI:23), Toronto, VI:6 (USNM:1), Welland, 6:10:13 (PSUC:1); **QUEBEC: Berthierville**, 11:VI:19 (DBUM:1), 31:V:21 (DBUM:14), Duparquet, 5:VI:1942 (CASC:1), Laprairie, 6:14:27 (CNCI:1), Montreal, 6:20:10 (CNCI:1), 15:V:17 (DBUM:1), 6:26:17 (CNCI:1), 29:VII:17 (DBUM:1), 24:X:17 (DBUM:2), 21:VI:21 (DBUM:1), 4:V:24 (DBUM:2), 2:VI:24 (DBUM:1), 4:VI:24 (DBUM:7), 16:V:25 (DBUM:2), 19:V:25 (DBUM:1), 22:IX:32 (DBUM:1), 25:VII (DBUM:1), Outremont, 27:III:1917 (CASC:4), 6:18:17

(CADE:4, MCZC:1, UCRC:4), 8:27:17 (CNCI:8), 9:2:17 (LACM:10); **SASKATCHEWAN: Blaine Lake**, 8:29:1972 (ACSS:1, EHSC:1), Donovan, 9:7:1971 (EHSC:1, ACSS:2), 8:14:1972 (ACSS:1), Duck Lake, 9:22:1971 (ACSS:1), Dundurn, V:30:1971 (ACSS:1), Forestry Farm, 5:16:1972 (ACSS:1), Moose Jaw, 6:6:44 (CNCI:1), Saskatoon, 6:21:51 (CNCI:2), Strassbourg, 9:8:44 (CNCI:2). [NO COUNTRY/STATE: St. Joseph Co., VI:14:1932 (UMMZ:1), St. Louis Co., 2:VI:1931 (UMRM:4), Bloomfield, 7:9:1948 (USNM:4), Jarepla, No Date (USNM:1), Saxonia, No Date (UAIC:1); No Data (DEFW:2, MCZC:1, UAIC:4, USNM:1, UWEM:1, WSUC:1).]

Phyllotreta attenuata: See species description under Type Material.

Phyllotreta bipustulata: **DISTRICT OF COLUMBIA**: Washington, No Date (MCZC:1); **ILLINOIS: Champaign Co.**, Urbana, XI:9:1949 (INHS:1), **Cook Co.**, Elk Grove Forest Pres., V:17:1942 (FMNH:1), Palos Hills Forest Preserve, Burr Oak Woods, 17:IV:77 (EHSC:13), 25:V:78 (EHSC:17), 20:IV:80 (EHSC:1), 20:IV:81 (EHSC:10), Palos Hills Forest Preserve, Cap Sauers Holdings, 23:IV:77 (EHSC:2), 29:V:79 (EHSC:6), 2:IV:81 (EHSC:2), Palos Park, VII:4:07 (FMNH:1), Riverside, VI:29:35 (FMNH:3), **LaSalle Co.**, [County Only: 5:1:1937 (UAIC:1)], **Will Co.**, Racoon Grove (Monce), 5:VI:1975 (WRSC:1), [State Record: No Date (DEFW:1, ICCM:1, INHS:16)]; **INDIANA: Lake Co.**, [County Only: 5:21:05 (PURC:1)], **Tippecanoe Co.**, Lafayette, V:2:23 (CNCI:1), Wabash Twp. South Sec. 22, Pur. Ent. Res. Area, IV:24:1971 (PURC:3), [County Only: V:24:1952 (NMDC:1), 21:V:1967 (NMDC:1)]; **IOWA: Clayton Co.**, Guttenberg, 4:4:97 (UMRM:1), **Story Co.**, Ames, IV:25:1935 (ISUI:1), V:7:1949 (ISUI:1), V:13:1951 (ISUI:1), 18:V:1956 (AMNH:1); **KANSAS: Pottawatomie Co.**, Onaga, 5:IV:07 (UMRM:1); **KENTUCKY: Christian Co.**, Hopkinsville (5 mi. W), 22:IX:1967 (CNCI:1); **MARYLAND: Montgomery Co.**, Plimmers Island, 3:V:12 (USNM:1), IV:12:17 (USNM:1), **Prince Georges Co.**, College Park, 4:29:19 (USNM:1), [State Record: No Date (DEFW:1, FMNH:1)]; **MICHIGAN: Berrien Co.**, Gallien, 12:VI:1974 (MSUC:1), **Eaton Co.**, Gd. Ledge, No Date (USNM:1), **Gratiot Co.**, [County Only VI:13:39 (MSUC:1)], **Ingham Co.**, Ag. Coll., V:13:1922 (CASC:1), 5:25:23 (UDMC:1), **Lapeer Co.**, [County Only: 5:30:39 (MSUC:2)], **Macomb Co.**, E. of Memphis, 1:VI:1963 (PIME:1), 2:V:1969 (PIME:1), 1:V:1972 (PIME:1), 17:V:1972 (PIME:2); **MISSISSIPPI: Lauderdale Co.**, Meridia, IV:17:1952 (INHS:1), **Oktibbeha Co.**, Agr. Col. IV:25:1922 (CUIC:1); **MISSOURI: Marion Co.**, 4 mi. E Palmyra, 26:V:1978 (EGRC:6), bluff S jct. St. Rt. 168 & JJ, 18:V:80 (EHSC:21); **NEW JERSEY: Camden Co.**, Camden, 12:12 (OSUC:1), **Union Co.**, Summit, VI:8:1913 (USNM:1), [State Record: No Date (SDSU:1)]; **NEW YORK: Brooklyn Co.**, Rockaway Beach, L.I., V:13:1911 (USNM:1), V:24:14 (USNM:1), **Erie Co.**, Lancaster, I:89 (USNM:1), **Herkimer Co.**, Newport, No Date (MCZC:2), **Nassau Co.**, Flushing, L.I., No Date (CNCI:1), **Onondaga Co.**, Elbridge, V:21:1940 (NMDC:1), V:19:41 (UCRC:1), V:26:41 (UCRC:1), [County Only: IV:25:1942 (NMDC:1)], **Orange Co.**, West Point, V:3:1913 (USNM:1), **Tompkins Co.**, Brooktondale (Besemer Rd.), 4:30:1967 (CUIC:2), 5:17:1967 (CUIC:2), Brooktondale, IV:27:1969 (CUIC:8), Caroline, 6:6:1971 (CUIC:2), [State Record: No Date

(CASC:2); **OHIO: Delaware Co.**, [County Only: IV:2 (OSUC:1)], **Fairfield Co.**, Neotoma, 13:IV:1979 (EHSC:1), 14:IV:1979 (EHSC:1), **Franklin Co.**, Sharon Woods Metro. Park, 17-24:IV:1973 (EHSC:7), 24:IV-1:V:1973 (EHSC:2, UZMC:1), 1-8:V:1973 (EHSC:3), 8-15:V:1973 (EHSC:2), 22-29:V:1973 (EHSC:5), 29:V-5:VI:1973 (EHSC:1), 10-17:VII:1973 (EHSC:2), 8:V:1975 (EHSC:1), 15:V:1975 (EHSC:2), 29:V:1975 (EHSC:6), [County Only: VI:2 (OSUC:1)], **Hamilton Co.**, Cincinnati, No Date (MCZC:1), **Pickaway Co.**, [County Only: IV:24:35 (OSUC:1)], **Wood Co.**, Bowling Green, 5:27:20 (OSUC:1), [State Record: No Date (MCZC:1)]; **PENNSYLVANIA: Allegheny Co.**, Pittsburgh, VI:24 (ICCM:1), **Dauphin Co.**, Hummelstn, V:1 (OSUC:1), V:18 (ANSP:1), **Perry Co.**, Blain, 5:4:55 (PADA:1), **Westmoreland Co.**, St. Vinc., No Date (EHSC:1, ICCM:3), [State Record: No Date (MCZC:2)]; **WEST VIRGINIA:** [State Record: No Date (CASC:1)]; **WISCONSIN: Dane Co.**, Madison, IV-V:1934 (UWEM:1). **CANADA: ONTARIO:** Cedar Springs, V:2:1945 (CNCI:6), Leamington, VII:2:31 (CNCI:1), Pelee Island, VI:26:40 (CNCI:1); **QUEBEC:** Brome, 4:VI:36 (CNCI:1), Knowlton, VI:3:36 (CNCI:1), Montreal, 25:V:35 (DBUM:1). [NO COUNTRY/STATE: No Data (CUIC:1, INHS:2, WSUC:1).]

Phyllotreta bisinuata: See species description under Type Material.

Phyllotreta conjuncta: **ARKANSAS: Benton Co.**, Rogers, VI:6:1945 (INHS:2), **Washington Co.**, [County Only: 31:VII:1907 (UADE:1)]; **COLORADO: Weld Co.**, Ault, 19:9:44 (USNM:1); **CONNECTICUT: Litchfield Co.**, Cornwall, V:23:1925 (CUIC:1), **New Haven Co.**, West Haven, 16:IX:44 (USNM:2); **DISTRICT OF COLUMBIA:** Washington, VIII:14:1906 (CASC:1), VIII:12:07 (USNM:1), 9:8:09 (USNM:1), 6:22:19 (USNM:1), VI:8:22 (USNM:1), VI:19:22 (USNM:1), 29:V:32 (USNM:1), IV (USNM:1), VII (USNM:1), 10:10 (USNM:1), No Date (ANSP:2, DEFW:3, MCZC:2, USNM:3); **ILLINOIS: Bureau Co.**, Bureau, VII:25:1947 (INHS:1), **Calhoun Co.**, Kampsville, VI:10:1932 (INHS:2), **Carroll Co.**, Savanna, VII:9:1917 (INHS:1), **Champaign Co.**, Homer, IV:25:1909 (INHS:1), Mahomet [sic], IV:23:1904 (INHS:1), 1.5 mi. NE Mohemet [sic; Mahomet], VII:10:1943 (INHS:6), Telona, V:31:1955 (INHS:1), Urbana, V:21:1885 (INHS:1), VI:1:1889 (INHS:4), VII:4:1914 (INHS:1), XI:13:1933 (INHS:1), VII:22:1948 (INHS:1), No Date (MCZC:1), [County Only: V:1:1959 (CNCI:1)], **Clay Co.**, Clay City, VI:24:1909 (INHS:1), **Cook Co.**, Chicago, VI:2:04 (FMNH:1), VIII:16:04 (FMNH:1), IV:28:1906 (INHS:1), V (UWEM:1), Edgebrook, V:6:1911 (AMNH:2, GHNC:3, UMMZ:4), Lemont, VII:1:06 (FMNH:1), Palos Park, VIII:3-4:1937 (INHS:1), West Chicago, 16:X:1978 (EHSC:1), Willow Springs, VI:7:03 (FMNH:1), VI:13:09 (FMNH:1), VI:6:16 (FMNH:1), [County Only: IX (USNM:1)], **DeKalb Co.**, DeKalb, 8:1:19 (USNM:2, UWEM:1), **Ford Co.**, Paxton, VII:30:1916 (INHS:1), **Hardin Co.**, Elizabethtown, VII:14:1948 (INHS:1), **Jackson Co.**, Grand Tower, VI:24:1905 (INHS:2), IV:22:1944 (INHS:1), Lake Murphysboro St. Pk., VI:17:1967 (FMNH:1), **Lake Co.**, Antioch, VIII:1:1930 (INHS:1), Fox Lake, V:29:1938 (INHS:1), Volo, X:27:1943 (INHS:1), **LaSalle Co.**, Ottawa, VII:20:1939 (UAIC:1), Utica (Split Rock), VII:11:1941 (INHS:2), Utica, V:22:1946 (INHS:4), [County Only: 4:30:1936 (UAIC:1)], **Madison Co.**, [County Only: 10:1:77

(INHS:1), 7:20:78 (INHS:1), 9:12:78 (INHS:1)], **Mason Co.**, Havana, VIII:18:1907 (INHS:1), **McHenry Co.**, Algonquin, No Date (INHS:5), **McLean Co.**, Bloomington, V:24:1883 (INHS:7), IV:24 (USNM:1), Heyworth, V:10:96 (USNM:1), No Date (CASC:8, CNCI:1, USNM:1), **Piatt Co.**, Monticello, VI:30:1914 (INHS:1), White Heath, III:20:1938 (AMNH:1), IV:25:1939 (AMNH:1), **Putnam Co.**, [County Only: V:24:1932 (INHS:1), V:27:1932 (INHS:1), VI:26:1932 (INHS:1)], **St. Clair Co.**, Mascoutah, XI:16:1946 (INHS:2), [County Only: V:25:1900 (MCZC:2), VII:1976 (INHS:1), 8:22:78 (INHS:1), 9:7:78 (INHS:1)], **Stephenson Co.**, Freeport, VII:2:1917 (INHS:2), VIII:13:1946 (INHS:1), **Union Co.**, Pine Hills Field Station nr. Wolf Lake, VII-VIII:1963 (FMNH:1), **Wayne Co.**, Geff, I:25:1947 (INHS:1), **Will Co.**, Joliet, 6:5:26 (FMNH:1), [State Record: Duncan's Mills, IX:2:1910 (INHS:1), Garryville, VI:25:1932 (INHS:1), LaRue, VIII:7:1946 (INHS:1), Rago, V:7:1932 (INHS:1); State Only: (CUIC:4, DEFW:12, FMNH:1, ICCM:1, INHS:8, MCZC:2, MSUC:1, UMRM:1, USNM:1, WSUC:3)]; **INDIANA: Boone Co.**, Ogdon Dunes, 10:22:27 (FMNH:1), **Crawford Co.**, [County Only: 6:24:03 (UWEM:1), No Date (UWEM:2)], **Dubois Co.**, [County Only: 5:12:08 (PURC:1)], **Floyd Co.**, [County Only: 6:23:03 (PURC:2)], **Harrison Co.**, [County Only: VI:23:1934 (PURC:2)], **Howard Co.**, Kokomo, VI:27:1922 (CNCI:1), VI:27:1927 (PURC:1), **Knox Co.**, [County Only: VII:18:1929 (UMMZ:1), No Date (CUIC:1)], **Kosciusko Co.**, [County Only: VII:4:1933 (PURC:1)], **Lake Co.**, Long Lake 5:11:26 (FMNH:2), [County Only: 5:21:05 (PURC:1), 23:V:1926 (INHS:1)], **Marion Co.**, [County Only: 4:14:08 (TAMU:2), 6:12:10 (UWEM:1), 5:5:18 (UWEM:1), 7:16:20 (PURC:1)], **Martin Co.**, [County Only: 7:13:03 (PURC:2)], **Monroe Co.**, [County Only: IV:27:1961 (ISUI:1)], **Morgan Co.**, [County Only: V:14:1932 (PURC:1)], **Perry Co.**, [County Only: 5:23:08 (UWEM:1)], **Porter Co.**, Indiana Dunes State Park, 29:V:1969 (EHSC:1), **Posey Co.**, [County Only: 4:18:07 (TAMU:1)], **Starke Co.**, Knox, 6:27:11 (USNM:4), 7:27:11 (USNM:3), 7:30:13 (USNM:3), [County Only: 5:18:09 (PURC:1)], **Tippecanoe Co.**, Lafayette, VIII:5:1916 (USNM:1), VI:29:1922 (PURC:1), VIII:3:1922 (CNCI:1, PURC:1), VII:10:1923 (CNCI:1), VI:19:1925 (CNCI:1), VI:22:1925 (CNCI:4), Wabash Twp. South Sec. 22 Pur. Ent. Res. Area, IV:24:1971 (PURC:1), West Lafayette, 5:VIII:1971 (EHSC:6), [County Only: XI:11-14:1930 (PURC:1), IV:22:1932 (PURC:1), VII:20:1932 (PURC:1), 11:6:1935 (PURC:1), VII:4:1952 (NMDC:2), 6:6:1959 (NMDC:1), VIII:5:1959 (NMDC:1), 7:29:1961 (NMDC:1), VII:2:1966 (NMDC:1), 11:V:1975 (FSCA:1)], **Warren Co.**, 7:26:1950 (INHS:1), [State Record: Hovey Lake, VIII:14:1965 (FSCA:1), Mineral Springs, 7:31:04 (FMNH:2), 7:4:11 (FMNH:1)]; **IOWA: Boone Co.**, Ledges State Park, V:26:1946 (ISUI:1), VI:1:1953 (ISUI:1), V:7:1956 (EHSC:1, ISUI:1), V:8:1956 (ISUI:1), 9:VI:1956 (AMNH:1), **Buchanan Co.**, Independence, V:15 (USNM:2), **Clayton Co.**, Backbone St. Pk., 4:VIII:1973 (UMRM:1), Guttenburg, 9:15 (USNM:4), **Iowa Co.**, Williamsburgh [sic], 27:V:1913 (ISUI:1, UCRC:1), **Johnson Co.**, Iowa City, V:2:1896 (MCZC:1, USNM:1), 7:1900 (LACM:1), V:1917 (USNM:3), VII (DBUM:2), No Date (AMNH:2, UAIC:1, USNM:1), **Kossuth Co.**, 2 mi. S Ledyard, V:9:1926 (ISUI:1), **Lee Co.**, Keokuk, No Date (MCZC:1), **Muscatine Co.**, Muscatine, V:10:1917 (USNM:3), 6:VIII:17 (USNM:1), **Sac Co.**, Little Wall Lake, 2 mi. S Jewell, IV:24:1960 (ISUI:1), **Scott Co.**, Davenport, 19:VIII:17 (ISUI:1), Pleasant Valley, VII:5:1928 (CNCI:1), **Story**

Co., Ames, 5:4:96 (ISUI:1), 10:VII:1917 (ISUI:1), IV:30:1926 (ISUI:1), IV:22:1928 (ISUI:1), V:19:1928 (ISUI:1), VI:1:1928 (EHSC:1, ISUI:1), IV:13:1929 (ISUI:1), V:15:1929 (ISUI:1), V:21:1932 (ISUI:1), IV:28:1942 (ISUI:1), IV:19:1943 (ISUI:1), IV:28:1947 (AMNH:1), V:11:1947 (ISUI:1), V:19:1947 (ISUI:1), V:3:1948 (ISUI:1), V:28:1948 (ISUI:2), V:6:1953 (ISUI:1), VII:1955 (LACM:3), [State Only: No Date (ISUI:1, UCRC:3)], [State Record: Davis' Gardens, VII:27:17 (USNM:2), Lake Amana, VIII:31:1927 (ISUI:2); State Only (CASC:1, DEFW:2, INHS:1, USNM:63)]; **KANSAS: Douglas Co.**, Lawrence, 4:1930 (CNCI:12, EHSC:8), [County Only: No Date (ICCM:1)], **Pottawatomie Co.**, Onago, V:15:03 (MSUC:1), 22:VI:03 (UMRM:1), 17:VIII:03 (UMRM:3), No Date (CASC:2), **Riley Co.**, [County Only: VI (USNM:1), VII:5 (USNM:1), VII:26 (USNM:1)], **Saline Co.**, Salina, No Date (USNM:1), **Shawnee Co.**, Topeka, V:29 (USNM:3), No Date (USNM:3), [State Record: State Only: No Date (USNM:1)]; **KENTUCKY: Henderson Co.**, Henderson, IV:4:22 (UMDC:1), 6:17:23 (LACM:1), **Todd Co.**, Trenton, 9:8:26 (LACM:1), [State Record: State Only: No Date (USNM:2)]; **LOUISIANA: Lafayette Par.**, Lafayette, 5:11:40 (SDSU:1), **MARYLAND: Baltimore Co.**, Baltimore, VII:24:09 (CASC:1), **Montgomery Co.**, Glen Echo, Summer: 1922 (USNM:3), Plummers Island, 5:6:05 (USNM:1), 17:6:06 (INHS:1), 5:30:07 (USNM:1), 5:9:13 (USNM:1), **Prince Georges Co.**, Bladensburg, 8:4:12 (UMDC:1), 8:12:12 (UMDC:4), 8:17:12 (UCRC:1), College Park, 7:9:11 (UMDC:1), 5:17:17 (UMDC:1), 5:19:20 (USNM:6), 10:20 (UMDC:1), Marlboro, V:13 (USNM:1), **Washington Co.**, Hagerstown, 27:IV:1915 (USNM:1), V:8:16 (USNM:1), [State Record: "C Ba Pr'bo4", V:6:1929 (USNM:1); State Only (DEFW:3)]; **MASSACHUSETTS: Bristol Co.**, Fall River, IV:12:1911 (MCZC:1), **Hampshire Co.**, Amherst, IV:25:1938 (UCRC:1), **Hampden Co.**, Chicopee, VII:16:99 (USNM:3), No Date (UMRM:5), **Middlesex Co.**, Framingham, VIII:8:06 (MCZC:2), V:18:07 (MCZC:1), V:30:1908 (MCZC:2), VI:13:47 (UCRC:1), Sherborn, V:29:21 (MCZC:1), "30-38" (MCZC:1), VII:18:41 (UAIC:3), V:13:49 (AMNH:1); **MICHIGAN: Berrien Co.**, Galien, 29:V:1974 (MSUC:1), 7:VI:1974 (MSUC:1), 13:VI:1974 (MSUC:1), **Huron Co.**, Harbor Beach, 12:VI:1967 (PIME:1), **Ingham Co.**, Ag. Coll., 8:12:90 (MSUC:1), 3:23:91 (MSUC:1), 7:5:92 (MSUC:1), V:13:1922 (CASC:2), 4:III:1923 (UAIC:3), V:4:1923 (MSUC:5), 5:25:23 (UMDC:2), [County Only: VIII:17:1932 (UMMZ:4)], **Lapeer Co.**, 1 mi. S of Lum., 16:VI:1964 (PIME:1), 30:VI:1964 (PIME:3), **Macomb Co.**, E. of Memphis, 7:V:1963 (PIME:2), 27:VI:1963 (PIME:1), 21:VII:1963 (PIME:4), 27:VII:1963 (PIME:7), IX:7:1963 (PIME:3), 7:V:1964 (PIME:1), 17:V:1964 (PIME:1), Mt. Clenens (Selfridge field), V:10-20:44 (FMNH:1), V:30:44 (FMNH:2), **Midland Co.**, [County Only: 4:29:25 (MSUC:1), 5:20:44 (MSUC:1), 6:10-14:51 (MSUC:1)], **Montcalm Co.**, Westville, 31:VII:1959 (MSUC:1); **MINNESOTA: Crow Wing Co.**, Mille Lacs, V:18:1940 (DEFW:1), **Goodhue Co.**, [County Only: V:23:1937 (DEFW:1)], **Kittson Co.**, [County Only: VI:19:1936 (DEFW:1)], **Lake Co.**, Two Harbors (Beach-36), VI:28:1927 (DEFW:1), **LeSueur Co.**, Minnesota River, VII:17:1922 (DEFW:1), [County Only: VII:1922 (DEFW:3)], **Lincoln Co.**, Hendricks, 9:VI:1966 (VMKC:1), **Olmsted Co.**, [County Only: No Date (DEFW:3)], **Ramsey Co.**, near Gray Cloud Is., VII:12:1921 (CNCI:2, DEFW:1), **Scott Co.**, Blakely, Summer: 1922 (DEFW:1), Dunes at Jordan, VIII:1:1922 (DEFW:1), **Sibley Co.**, River near Blakeley [sic], VII:17:1922 (DEFW:8, EHSC:5), **Traverse Co.**,

[County Only: No Date (DEFW:1)], **Wabasha Co.**, Lake City, VII:6:1921 (DEFW:1), [State Record: Frontenac, V:29:1930 (DEFW:2, EHSC:2), New Canada, VII:21:1941 (DEFW:1), Wyoming, V:25:1935 (DEFW:1); State Only: No Date (WSUC:1)]; **MISSOURI: Boone Co.**, Columbia, VII:4:1930 (UMRM:1), VI:15:1939 (UMRM:1), 3:28:1946 (UMRM:1), 4:6:1946 (UMRM:1), VI:24:1946 (LACM:48), McBain, VI:7:1949 (UMRM:3), **Holt Co.**, Mound City, VII:3:1968 (UMRM:1), VII:4:1968 (UMRM:1), VII:9:1968 (UMRM:1), VII:10:1968 (UMRM:1), VII:11:1968 (UMRM:1), VII:13:1968 (UMRM:1), VII:14:1968 (UMRM:1), VII:20:1968 (UMRM:1), **New Madrid Co.**, Portageville, VII:12:1968 (UMRM:1), **Pike Co.**, New Hartford, VI:28:1946 (UMRM:1), **Randolph Co.**, 1 mi. E. Moberly, 5:IX:1972 (UMRM:5), **St. Charles Co.**, Weldon Spr., III:8:1968 (UMRM:1), VIII:5:1968 (UMRM:1), **St. Louis Co.**, St. Louis, 5:7:94 (UMRM:1), 30:VIII:1894 (UMRM:1), 24:5:95 (UMRM:1), 22:5:96 (UMRM:1), No Date (CNCI:3), [State Record: State Only: No Date (DEFW:1)]; **NEBRASKA: Antelope Co.**, Neligh, VI:18:1909 (DEUN:1), VI:19:1909 (DEUN:1), VI:20:1909 (DEUN:1), **Lancaster Co.**, Lincoln, V:4:1915 (DEUN:1), VII (DEUN:3); **NEW JERSEY: Burlington Co.**, Columbus, V:27 (MCZC:20), N. Lisbon, 6:28:30 (AMNH:1), Riverton, VII:6 (MCZC:2), [County Only: VI:4 (USNM:2), 5:27 (USNM:4)], **Camden Co.**, Camden, VI:13 (MCZC:1), V:27 (OSUC:4), 12:12 (OSUC:1), **Gloucester Co.**, New Field [sic], 6:IX:43 (USNM:2), **Morris Co.**, Boonton, VI:14:01 (USNM:1), **Ocean Co.**, Lakehurst, VII:7 (AMNH:3), **Warren Co.**, Phillipsburg, V:25:13 (CASC:2), VI:24:17 (CASC:1), [State Record: State Only: No Date (CASC:1, SDSU:3)]; **NEW YORK: Monroe Co.**, Rochester, VI:7:52 (LACM:3), VII:1921 (USNM:1), VI (LACM:3), 52 (LACM:1), **Orange Co.**, Tuxedo, X:26:40 (FMNH:1), West Point, V:14:1909 (USNM:8), V:7:1909 (USNM:1), 5:24:09 (USNM:8), **Queens Co.**, Long Beach, L.I., 4:26:25 (CUIC:1), **Saint Lawrence Co.**, Canton, VII:12:1941 (NMDC:1), **Suffolk Co.**, Riverhead, L.I., 5:28:1948 (VMKC:1), **Tompkins Co.**, Ithaca, No Date (USNM:1), **Westchester Co.**, Yonkers, VII:3:40 (FMNH:1), [State Record: Long I., 8:9:08 (USNM:1); State Only: No Date (DEFW:1, USNM:2)]; **NORTH CAROLINA: Union Co.**, [County Only: 18:III:1964 (VMKC:1)], **Wake Co.**, Raleigh, V:13:1951 (NCSU:1), **OHIO: Delaware Co.**, [County Only: 13:VIII:72 (EHSC:1), IV:2 (OSUC:1), V:21 (OSUC:1)], **Fairfield Co.**, [County Only: 5-6:VI:71 (EHSC:1)], **Franklin Co.**, Columbus, 2:IX:44 (USNM:2), No Date (OSUC:1, PADA:1), [County Only: 23:VIII:71 (EHSC:1)], **Greene Co.**, [County Only: VI:2 (OSUC:1)], **Guernsey Co.**, [County Only: 22-23:V:71 (EHSC:1)], **Hocking Co.**, [County Only: 16:V:71 (EHSC:1), VI:2 (OSUC:1)], **Washington Co.**, Marietta, 10:11 (USNM:1), [State Record: State Only: No Date (ANSP:1, USNM:1)]; **PENNSYLVANIA: Allegheny Co.**, Pittsburgh, VI:24 (ICCM:2), **Berks Co.**, Reading, 7:23:95 (FMNH:1), **Cumberland Co.**, New Cumberland, V:11:08 (PADA:1), V:17:08 (PADA:1), 7:16:1938 (VMKC:1), **Delaware Co.**, Glenolden, VII:4 (OSUC:4), **Lancaster Co.**, 22:IX:1937 (PSUC:1), 5:26:47 (PSUC:1), **Monroe Co.**, Water Gab, No Date (MCZC:1), **Northampton Co.**, Easton, V:9:09 (CASC:1), V:31:14 (CASC:1), VII:28:18 (CASC:1), VII:4:26 (CASC:1), **Philadelphia Co.**, Angora, 6:30 (MCZC:2), Frankford, 5:20 (USNM:1), Germantown, V:22 (ANSP:1), Philadelphia, 8:2:89 (USNM:2), 8:28:97 (CASC:2, USNM:5), IV:24:99 (USNM:2), 5:30:00 (FMNH:1), X:1:03 (USNM:1), **Westmoreland Co.**, Jeanette, VIII:21 (ICCM:

1), VI (EHSC:3, ICCM:3), VII (ICCM:1, PADA:2), VIII (PADA:1), [State Record: Phila. Neck, No Date (OSUC:2), 7:18-19:40 (USNM:1); State Only: No Date (ANSP:1, MCZC:2)]; **SOUTH DAKOTA: Brookings Co.**, Brookings, 6:11:91 (SDSU:1), X:23:1929 (SDSU:1), IX:30:1947 (SDSU:1), IX:13:49 (SDSU:8), 10:V:1967 (VMKC:1), 12:VII:1968 (VMKC:1), Oak Lake, 15:VI:1966 (VMKC:1), Volga, 23:V:1967 (VMKC:2), **Brule Co.**, Chamberlain, VI:5:1947 (SDSU:2), **Butte Co.**, Newell, VI:26:1950 (SDSU:1), **Union Co.**, Canton, VI:3:1953 (SDSU:1), VIII:1:1946 (SDSU:1), VI:3:1953 (SDSU:1), V:27:1954 (SDSU:14), 18:V:1970 (VMKC:1), **Yankton Co.**, Yankton, 5:23:19 (SDSU:1), 17:V:1967 (VMKC:1); **TENNESSEE: Montgomery Co.**, Clarksville, 3:11:09 (USNM:1), 4:12:09 (USNM:1), **Smith Co.**, Elmwood, No Date (CASC:1), [State Record: White Oak Lake, Oak Ridge AEC area, V:4:1957 (HAHC:1), Oak Ridge AEC area, V:17:1957 (HAHC:1); State Only: No Date (AMNH:1)]; **TEXAS: Anderson Co.**, 10 mi. S.W. Elkhart, VII:7:1963 (TAMU:2); **VIRGINIA: Arlington Co.**, Arlington, 5:20:20 (USNM:1), VI:22:20 (USNM:1), 5:14:28 (USNM:1), 1932 (USNM:1), **Augusta Co.**, Staunton, 6:26:1928 (VPIC:1), **Fairfax Co.**, Vienna, VII:20:12 (USNM:10), IV:22:13 (USNM:1), **Fauquier Co.**, Belvoir, VII:6:1940 (USNM:1), **Spotsylvania Co.**, Fredericksburg, 5:19:91 (USNM:1), V:16:1900 (USNM:1), [State Record: Rosslyn, 6:1 (USNM:1)]; **WEST VIRGINIA: Berkley Co.**, Berkley, No Date (USNM:1); **WISCONSIN: Dane Co.**, Madison, 8:1:12 (UWEM:1), 8:24:14 (UWEM:1), 5:17:18 (USNM:2, UWEM:1), 5:8:19 (USNM:2), 5:12:19 (USNM:1), 5:22:19 (UWEM:1), 5:26:19 (TAMU:1), 5:28:19 (USNM:1), 5:29:19 (AMNH:1, OSUO:1, USNM:3, UWEM:3), 6:3:19 (USNM:2), 7:19:19 (OSUO:1, USNM:1, UWEM:2), 7:24:19 (CASC:1), 7:19 (UWEM:1), 8:4:19 (CUIC:1, PADA:1, USNM:2), 8:6:19 (UWEM:1), 8:11:19 (OSUO:1), 8:14:19 (CASC:1, UWEM:1), 3:31:20 (UWEM:1), [County Only: V:13:1956 (UWEM:1)]; **Jackson Co.**, N. Bend, V:3:1948 (UWEM:1), **Monroe Co.**, Sparta, 4:10:10 (UWEM:1), **St. Croix Co.**, St. Croix FL, 6:11:16 (UWEM:1), **Sauk Co.**, 1958 (AMNH:1), **Waupaca Co.**, Waupaca, 6:23:20 (USNM:1), [State Record: State Only: No Date (ANSP:1)]. **CANADA: MANITOBA: Aweme**, V:19:1904 (CNCI:1), 5:23:1905 (CNCI:1), 9:VI:06 (USNM:2), Glenlea, 4:06:79 (ACWM:1), 12:06:79 (ACWM:1), 18:04:80 (ACWM:1), 24:04:80 (ACWM:1), LaSalle, 20:05:75 (ACWM:1), Strathern, VI:11:24 (CNCI:3), Winnipeg, 15:05:79 (ACWM:1), 17:05:79 (ACWM:1, EHSC:1), 18:05:79 (ACWM:1), 24:05:79 (ACWM:1), 25:05:79 (ACWM:2), 29:05:79 (ACWM:1), 31:05:79 (ACWM:1, EHSC:1), 4:06:79 (ACWM:2); **ONTARIO: Blackburn**, VI:2:1932 (CNCI:1), Chatham, VI:20:1928 (CNCI:1), Leamington, 6:15:40 (CNCI:1), Ottawa, V:7:1941 (CNCI:1), Port Credit, 10:7:96 (CUIC:3), Ridgeway, VI:25:1885 (CASC:1), Toronto, 5:16:96 (CUIC:1); **QUEBEC: LaTrappe**, 26:VII:33 (DBUM:1), 1:VII:43 (DBUM:8), 2:VII:43 (DBUM:3), 4:VI:45 (DBUM:1), Rigaud, 26:V:38 (DBUM:1); **SASKATCHEWAN:** Cypress Hills, 10:VI:1980 (ACSS:6); [NO PROVINCE: Pte-du-Lac, 24:VIII:26 (DBUM:1)]. [NO COUNTRY/STATE: Del. Water Gap, No Date (AMNH:2), Iowa City, No Date (AMNH:2, USNM:1), Van Cortland Pk., 27:VI:40 (FMNH:1); No Data (CUIC:4, DEFW:2, ICCM:1, INHS:23, OSUC:1, UCRC:1, USNM:8, WSUC:1).]

Phyllotreta constricta: See species description under Type Material.

Phyllotreta decipiens: **CALIFORNIA: Plumas Co.**, Chester, VII:7:48 (OSUC:1), [State Record: State Only: No Date (MCZC:1, USNM:1)]; **IDAHO: Bonner Co.**, Sandpoint, 2:VII:1949 (NMDC:4); **MONTANA: Gallatin Co.**, Mont. Exp. Sta., LoLo, VI:8:1912 (USNM:2); **NEVADA: Elko Co.**, Elko, No Date (ANSP:1, CNCI:1, USNM:1); **OREGON: Clatsop Co.**, Astoria, 24:5 (USNM:1), **Columbia Co.**, Scappoose, 6:13:1934 (NMDC:1, OSUO:1), VII:10:1935 (UAIC:1), V:7:1936 (AMNH:3, GHNC:3), V:1:1937 (AMNH:8, GHNC:1, NMDC:2), VI:1:1937 (AMNH:2), VI:6:1937 (AMNH:3), VI:9:1937 (AMNH:1), VI:25:1937 (AMNH:3), X:20:1937 (AMNH:3), V:18:1938 (AMNH:1), St. Helens, IV:28:1938 (AMNH:1), Vernonia, IV:23:1938 (AMNH:1), **Crook Co.**, 10 mi SE of Prineville (Crooked River), VII:22:1939 (AMNH:1), **Deschutes Co.**, Redmond, VIII:17:1939 (AMNH:1), **Douglas Co.**, 22 mi. N of Prospect, 6:8:41 (AMNH:2), **Harney Co.**, Voltage, 17:V:1956 (OSUO:1), **Jackson Co.**, Butte Falls, V:22:1941 (NMDC:4, PURC:3), 6:7:41 (AMNH:4, EHSC:4), Talent, V:8:1936 (AMNH:2), **Klamath Co.**, 9-12 mi. N.E. Bly, VII:1:1964 (AMNH:1), 2.5 mi. N. Hwy 66, Buck Lake Road, VI:22:1964 (AMNH:1), Crescent Lake, VII:20:1962 (AMNH:2, NMDC:1), Crooked Cr. Sprg., Hwy. 62 Bridge, 6:12:64 (AMNH:2), Crystal Cr., Upper Klamath Lk., V:30:1960 (AMNH:1), Deming Cr. Reserv., NE of Bly, IX:1:1959 (AMNH:1), Ft. Klamath, Crooked Creek, VIII:4:1963 (AMNH:1), Klamath Falls, X:12:1939 (GHNC:4, PURC:3), VII:5:1953 (AMNH:1), IV:24:1956 (AMNH:1), Klamath Falls (Geary Ranch), VII:11:1954 (AMNH:1), Klamath Falls above Geary Ranch, VI:5:1961 (AMNH:1), Klamath Falls, Poe Valley, V:27:1955 (AMNH:1, NMDC:1), Lake of the Woods, VII:5:1941 (CUIC:4, MCZC:4, UAIC:7), Odessa Cr., VI:15:1962 (AMNH:2, NMDC:1), Spregus Riv., 5 mi. E. Bly, VI:16:1957 (AMNH:4), Upper Klamath Lk., 3 mi. Creek, VIII:4:1963 (AMNH:1), Upper Klamath Marsh, Military Crossing, V:11:1956 (AMNH:1, NMDC:1), Williamson R., VI:1953 (AMNH:1), Williamson Riv., VII:1961 (AMNH:1), **Lake Co.**, Chewaucan R. (near Paisley), VI:16:1938 (AMNH:2), Chewaucan River Near Valley Falls, VIII:16:1939 (AMNH:1), **Lane Co.**, Beaver Marsh, VII:19:1961 (AMNH:1), **Multnomah Co.**, Portland, 1889 (UAIC:1), No Date (AMNH:2, MCZC:2, UAIC:2, USNM:6), **Tillamook Co.**, Tillamook Naval Base, IV:8:1962 (AMNH:1), **Umatilla Co.**, Weston, IV:28:1939 (AMNH:1), **Yamhill Co.**, McMinnville, 5:2:1936 (UCRC:1), [State Record: Koebele, No Date (USNM:1); State Only: No Date (ANSP:1, DEFW:1, OSUO:1, UAIC:6, USNM:1)]; **TEXAS:** [State Record: State Only: No Date (MCZC:1)]; **UTAH: Wasatch Co.**, Heber, 7:27:53 (MSUC:1); **WASHINGTON: Benton Co.**, Kennewick, IV:28:1938 (AMNH:1), **King Co.**, Auburn, VIII:1919 (USNM:1), Bothell, IV:24:1958 (DCMC:1), **Skagit Co.**, Mt. Vernon, V:5:38 (WSUC:3), **Thurston Co.**, Olympia, No Date (MCZC:2), Tenino, No Date (USNM:4), **Whatcom Co.**, Ferndale, VII:21:1927 (WSUC:6), **Whitman Co.**, Pullman, No Date (WSUC:2), [State Record: San Juan Island, VI:10:41 (WSUC:6)]. **CANADA: ALBERTA:** Watertown, VIII:30 (CNCI:1); **BRITISH COLUMBIA:** Creston, 2:VI:1950 (MCZC:1), Salmon Arm, 6:16:1930 (NMDC:2), Terrace, VI (CUIC:4), No Date (AMNH:6, CUIC:9, MCZC:4, UAIC:1), Victoria (Vancouver), No Date (USNM:1). [NO COUNTRY/STATE: Washington Territory, No Date (ANSP:2, OSUC:1).]

Phyllotreta denticornis: **CALIFORNIA: Butte Co.**, 5 mi NE Butte Meadows Cherry Hill Cpgd., V:24-27:1974

(CDAE:5, EHSC:4), **Los Angeles Co.**, Los Angeles, V:7:1934 (CASC:1), **Mariposa Co.**, Midpines, V:15:1975 (AJGC:5), **Monterey Co.**, 17 mi SE Carmel Val., V:5:1973 (CDAE:1), **San Luis Obispo Co.**, San Miguel, 5:5:49 (USNM:1), Santa Marguerita [sic], IV:26:1933 (CASC:1), **Shasta Co.**, Castle Crag., VII:5:1904 (CASC:2), **Siskiyou Co.**, Hornbrook, IV:27:1949 (CDAE:3); **OREGON: Deschutes Co.**, Redmond, V:11:1939 (AMNH:2), **Hood River Co.**, Hood River, 20:5 (USNM:2), **Jackson Co.**, Butte Falls, 6:7:41 (AMNH:1, EHSC:1), Gregory Sta., VI:3:1932 (CDAE:1), **Josephine Co.**, Cave Junction, V:28:1956 (AMNH:1), **Umatilla Co.**, Milton, VI:22:1938 (AMNH:1), **Wasco Co.**, Bear Springs, V:18:1940 (BMUW:1), Dalles, 19:5:93 (USNM:1), 18:5 (USNM:1), 19:5 (USNM:6), The Dalles, 8:V:1947 (AMNH:1), 5 mi. S. The Dalles, 8 Mile Creek, V:22:1959 (AMNH:2), Rowena Loops Viewpoint, V:23:1959 (AMNH:1); **WASHINGTON: Whitman Co.**, Wawawai, V:31:1921 (USNM:1).

Phyllotreta dolichophalla: See species description under Type Material.

Phyllotreta emarginata: See species description under Type Material.

Phyllotreta lepidula: **CALIFORNIA: Humboldt Co.**, [County Only: VI:47 (CASC:3, EHSC:2)], **Los Angeles Co.**, Los Angeles, No Date (CASC:4, USNM:1), [County Only: III (USNM:3), IV (USNM:1), No Date (UAIC:1)], **Monterey Co.**, 17 mi SE Carmel Val., V:5:1973 (CDAE:10, EHSC:8), Paloma Crk., V:6:1973 (CDAE:6), **San Diego Co.**, Poway, No Date (CASC:1), [County Only: No Date (CASC:1)], **San Luis Obispo Co.**, Cholame, IV:10:1940 (CASC:2), San Marguerita [sic], IV:26:1933 (CASC:3), **Solano Co.**, Birds Landing, V:7:1922 (USNM:5), **Yolo Co.**, Rumsey, V:3:1936 (CASC:14), [State Record: State Only: No Date (CNCI:2, DEFW:3, MCZC:8, MSUC:2, USNM:1, UWEM:1)]; **NEW YORK**: [State Record: State Only: No Date (MSUC:2)]. [**NO COUNTRY/STATE**: No Date (MCZC:1).]

Phyllotreta liebecki: **ARKANSAS: Hempstead Co.**, Hope, 6:VI:23 (DBUM:1), **Washington Co.**, 2.5 mi. N of Springdale, 3:24:1938 (USNM:1); **CALIFORNIA**: [State Record: State Only: No Date (MCZC:1)]; **CONNECTICUT: Litchfield Co.**, Cornwall, 1:VI:1920 (CUIC:2), 13:V:1925 (CUIC:1), Kent, VII:4:25 (MCZC:1); **DISTRICT OF COLUMBIA**: Washington, 28 mi NW Genaca Va, V:6:39 (USNM:1); **FLORIDA: Alachua Co.**, [County Only: 13:IV:56 (FSCA:1)], **Duval Co.**, Jacksonv [sic], No Date (AMNH:1), Jacksonville [sic], No Date (USNM:1), **Liberty Co.**, Rockbluff [sic], 4:IV:1927 (USNM:1), **Seminole Co.**, Sanford, 3:28:1911 (PURC:1), 4:1:1913 (CNCI:1), 4:5:1913 (AMNH:3), IV:7:1913 (UWEM:4), 4:7:13 TAMU:3), 4:9:1913 (PURC:2), 4:9:13 (AMNH:1), 11:IV:1913 (CUIC:2), 4:11:13 (CUIC:1), **Volusia Co.**, Enterprise, V:5 (MCZC:17), V:11 (CASC:4), V:12 (CASC:7), V:16 (CASC:1), V:17 (CASC:1), IV:19 (MCZC:1), No Date (USNM:1), [State Record: Bamford, No Date (CNCI:1)]; **GEORGIA**: [State Record: State Only: 5:27:97 (MCZC:1), No Date (MSUC:4)]; **ILLINOIS**: [State Record: Bowmanville, IV:3:04 (FMNH:1)]; **INDIANA: Putnam Co.**, [County Only: 25:VII:1909 (CUIC:1)], **Wayne Co.**, [County Only: 5:26:09 (TAMU:1)], [State Record: Lake Station, VI:31:1911 (UMMZ:1)]; No Date (CUIC:1)]; **IOWA: Story Co.**, Ames, V:5:20 (ISUI:2);

KENTUCKY: [State Record: State Only: No Date (AMNH:2)]; **LOUISIANA: East Baton Rouge Par.**, Baton Rouge, I:18:19 (USNM:1), I:27:19 (CASC:1, MCZC:1, USNM:7), V:2:19 (CASC:1), V:10:19 (USNM:1), VI:18:19 (AMNH:1, CASC:1), III:17:22 (USNM:1), III:18:22 (USNM:2), III:27:22 (USNM:5), 4:25:1923 (UDMC:3), X:1923 (USNM:2), 4:25:1927 (CASC:1), Bayd [sic], I:23:79 (USNM:1), **Madison Par.**, Tallulah, No Date (USNM:3), **Saint Landry Par.**, Opelousas, No Date (USNM:1); **Tangipahoa Par.**, Hammond, III:21:1922 (USNM:1), Ponchatoula, III:29:1922 (CSUC:1, USNM:2), **Terrebonne Par.**, Houma, 1:1:44 (USNM:1); **MARYLAND: Montgomery Co.**, Glen Echo, Summer:1922 (USNM:1), Plummery I, 17:6:06 (USNM:3), VI:8:13 (USNM:1); **MASSACHUSETTS: Middlesex Co.**, Framingham, IX:9:07 (MCZC:1), Tyngs [sic], 4:29:94 (MCZC:1), VII:71 (MCZC:1), [State Record: State Only: No Date (MCZC:2)]; **MISSISSIPPI: Hinds Co.**, Jackson, 16:V:14 (USNM:1); **MISSOURI: Holt Co.**, Mound City, VII:2:1968 (UMRM:1), VII:3:1968 (UMRM:1), **St. Charles Co.**, Weldon Spr., IV:29:1968 (UMRM:1); **NEW YORK: Chenango Co.**, [County Only: VII:10:1925 (USNM:1)]; **NORTH CAROLINA: Granville Co.**, Stem, mid-IV:1910 (NCSU:1), **Sampson Co.**, [County Only: V:24:1957 (NCSU:2)]; **OHIO: Fairfield Co.**, Neotoma, 5-6:VI:71 (EHSC:17), 13:IV:1979 (EHSC:24), **Hamilton Co.**, 5 mi. NW Montgomery 11316 Gideon Lane, 4:VII:73 (EHSC:1), **Hocking Co.**, [County Only: 5:V:72 (EHSC:1)], [State Record: Sugar Grove, 5:17:02 (OSUC:1)]; **PENNSYLVANIA: Allegheny Co.**, Pittsburg [sic], VII:1905 (ICCM:1), **Dauphin Co.**, Hummelston, V:18 (ANSP:1), **Westmoreland Co.**, Jeanette, VI:3 (ICCM:1); **SOUTH CAROLINA: Kershaw Co.**, Camden, III:1905 (MCZC:1); **SOUTH DAKOTA: Deuel Co.**, Gary, 21:V:1967 (SDSU:1); **TENNESSEE: Montgomery Co.**, Clarksville, 3:25:06 (USNM:1), 3:11:09 (USNM:1), **Stewart Co.**, Land Between the Lakes, nr. Model, 9-10:VI:1971 (MSUC:1); **TEXAS: Brazos Co.**, College Station, 2:27:31 (TAMU:1), **Cameron Co.**, Brownsville, 3:29:1943 (USNM:1), 3:29:43 (USNM:1), No Date (USNM:1), **Colorado Co.**, Columbus, 20:5 (USNM:1), 2:6 (CNCI:1), 3:6 (USNM:1), 5:6 (USNM:1), 11:6 (USNM:1), 25:6 (USNM:1), **Harris Co.**, Houston, 16:4:48 (USNM:2). **CANADA: MANITOBA**: Ninette, 20:V:1958 (CNCI:1); **ONTARIO**: Normandale, 5:VI:1931 (CNCI:1). [**NO COUNTRY/STATE**: 4:15:97 (MCZC:5); No Date: (ANSP:2, MCZC:1, USNM:9).]

Phyllotreta oblonga: **NEW HAMPSHIRE: Grafton Co.**, Franconia, No Date (AMNH:1), [State Record: Mt. Plst. Hse., VII (CASC:1)]; **OREGON: Benton Co.**, Mary S Pk near Corvallis, No Date (CASC:1), Summit, 5:25:41 (AMNH:1); **WISCONSIN: Dane Co.**, Madison, 5:12:19 (USNM:1). **CANADA: ALBERTA**: Edmonton, VI:15:18 (CASC:3, EHSC:1); **MANITOBA**: Churchill, 9:VII:1937 (CNCI:1); **QUEBEC**: Brodore Bay, 5:VII:1930 (CNCI:1); **NORTHWEST TERRITORIES**: Aklavik, VIII:20:1930 (CASC:1), VII:29:1932 (CASC:1), 16:VI:1956 (CNCI:1), 30:VI:1956 (CNCI:1); **YUKON TERRITORY**: Swim Lakes, 133°, 62°13' 3200', 17:VI:60 (CNCI:1, EHSC:1).

Phyllotreta oregonensis: **CALIFORNIA: Inyo Co.**, Lone Pine, V:29:1937 (UAIC:1), **Siskiyou Co.**, Tulelake, VII:20:1946 (AMNH:1, EHSC:1), VII:12:1968 (AMNH:1), **Sonoma Co.**, S. Rosa, 6:25:96 (OSUC:2); **COLORADO: Delta Co.**, Paonia, 14:VI:1904 (CASC:3, USNM:9), 14:VI

(CASC:1), **Larimer Co.**, Ft. Collins, 7:11:22 (UAIC:1), **Montezuma Co.**, Mesa Verde Nat'l Pk., 8:14:25 (USNM:1), **Montrose Co.**, Montrose, No Date (USNM:2); **IDAHO: Falls Co.**, Hollister, 6:11:27 (USNM:1); **NEW MEXICO:** [State Record: Collidge, No Date (UAIC:1)]; **OREGON: Klamath Co.**, Williamson Riv. Rch., 5:28:70 (AMNH:1), **Crook Co.**, Pineville, V:20:1940 (AMNH:1), [State Record: State Only: No Date (MCZC:1)]; **UTAH: Cache Co.**, Logan, No Date (USNM:1).

Phyllotreta ramosa: **CALIFORNIA: Alameda Co.**, Berkeley, IX:1914 (CASC:5), 6:1:1930 (USNM:1), XI (USNM:1), Niles, XII:7:1965 (CDAE:1), Oakland, 3:25:33 (CASC:1), 6:35 (CASC:1), [County Only: X (CASC:1), XI (USNM:1), No Date (CASC:4)], **Contra Costa Co.**, Antioch, XII:5:37 (CASC:1), Brentwood, 12:VIII:36 (CNCI:1), Lafayette, VI:2:60 (MCZC:1), **Lake Co.**, Lucerne, 28:V:49 (CASC:1), **Los Angeles Co.**, Los Angeles, No Date (CASC:2), Pasadena, VI (CASC:1), **Orange Co.**, Los Alamitos, VII:22:1908 (USNM:1), **Sacramento Co.**, Sacramento, VII:8:1932 (CDAE:1), V:27:1936 (UAIC:1), IX: 8:44 (NMDC:1, UCRC:3), [County Only: VII (USNM:1), No Date (AMNH:1)], **San Bernardino Co.**, Chino, VII:16:1908 (USNM:3), **San Francisco Co.**, [County Only: No Date (MCZC:1)], **San Mateo Co.**, Crystal Lakes, V:26:1921 (CASC:5), E. Palo Alto, 8:9:57 (CASC:1), San Carlos, 4:12:18 (USNM:1), San Mateo, V:1:1944 (CDAE:2), **Santa Barbara Co.**, Guadalupe, VII:29:1908 (USNM:4), **Santa Clara Co.**, Alviso, XI:6:31 (GHNC:1, UAIC:3), Gilroy, VIII:4:1908 (USNM:2), Milpites, 4:20:22 (USNM:1), San Jose, VIII:27:38 (CASC:1), No Date (USNM:1), Santa Clara, X:1:1937 (CASC:1), Searsville L. Stanford U., 7:31:55 (CASC:1), Stan. U., III:1902 (LACM:1), **Santa Cruz Co.**, Santa Cruz, 1:22:34 (CDAE:1), **Siskiyou Co.**, Grass Lake, VI:11:1941 (CASC:4, CDAE:4, NMDC:2), 6:28:41 (AMNH:1), Tulelake, V:12:1959 (AMNH:1), Tule Lake [sic], VI:18:1946 (AMNH:2, EHSC:1), VI:27:1946 (AMNH:1), **Solano Co.**, Vacaville, VII:14:48 (GHNC:2), **Sonoma Co.**, Forestville, V:19:1938 (UAIC:1), Guerneville, VIII:13:1908 (USNM:1), VIII:18:08 (USNM:1), Rio Nido, 6:24:47 (CASC:1), [County Only: 6:25:93 (LACM:3)], **Tuolumne Co.**, Buck Meadows 1.8 mi W, V:21:1973 (CDAE:7), **Yolo Co.**, Clarksburg, V:1:31 (UAIC:1), X:28:1931 (CDAE:1), V:1:37 (CASC:2), V:5:1974 (CDAE:2), Davis, VI:23:12 (USNM:1), 1931 (CASC:1), III:22:36 (CASC:1), [State Record: Cryst Springs, No Date (USNM:1), Mohawk, VI:5:20 (CASC:1), S. Gregoria, V:20:1949 (CASC:1), S. Ross, (CASC:1), Tilden Park, XII:1:56 (CASC:1); State Only: No Date (AMNH:4, ICCM:1, MCZC:3, PURC:1, USNM:4)]; **NEVADA: Elko Co.**, Elko, No Date (ANSP:1, USNM:1), **Washoe Co.**, Reno Hot Spgs., VIII:15:36 (CASC:1); **NEW YORK: Monroe Co.**, Rochester, VI:21 (USNM:1); **OREGON: Benton Co.**, Corvallis, No Date (MCZC:1), **Columbia Co.**, Scappoose, VI:1:1937 (AMNH:1), **Crook Co.**, 7 Mi. E. of Terrebone, V:9:1956 (ODAC:1), **Jackson Co.**, Butte Falls, 6:7:41 (AMNH:4, EHSC:4), Phoenix, 14:III:1931 (AMNH:1), Talent, 26:1:1931 (AMNH:1, MCZC:1), 10:IV:1931 (MCZC:1), 24:IV:1931 (MCZC:1), **Klamath Co.**, Bly Mt., VI:14:1958 (AMNH:1), Klamath Falls, X:12:1939 (GHNC:1), VI:1943 (OSUO:3), VII:19:1946 (AMNH:1), Lower Klamath Lk., III:27:1962 (AMNH:1), Mouth Williamson R., VI:17:1958 (AMNH:1), Worden, V:31:1961 (AMNH:1), **Union Co.**, 4 mi. S. LaGrande, VII:18:36 (CDAE:1), Union, IV:17:1937 (AMNH:1), **Yamhill Co.**, McMinnville, 5:2:1936 (UCRC:1), [State Record: Cornelius,

V:6:1938 (AMNH:1)]. [NO COUNTRY/STATE: S.R., 6:25:93 (AMNH:2).]

Phyllotreta ramosoides: See species description under Type Material.

Phyllotreta robusta: **COLORADO: Costilla Co.**, Garland, 22:6 (MCZC:1), 22:8 (USNM:1), **Larimer Co.**, Ft. Collins, 7:11:22 (CSUC:1); **CONNECTICUT: Litchfield Co.**, Cornwall, 23:V:1925 (CUIC:1); **IDAHO: Bonner Co.**, Sagle, VII:16:1950 (NMDC:1); **INDIANA: Lake Co.**, Long Lake, 5:11:26 (FMNH:1), [County Only: 5:30:00 (PURC:1)], [State Record: Lake Station, VI:30:1911 (UMMZ:1), Pine, V:12:07 (FMNH:1)]; **IOWA: Dickinson Co.**, Lake Okoboji, VII:22:1916 (USNM:1); **MAINE: Cumberland Co.**, Portland, 14:9:43 (USNM:1), **Oxford Co.**, Paris, VI:26:44 (MCZC:1); **MASSACHUSETTS: Hampden Co.**, Chicopee, IV:16:99 (USNM:1), **Middlesex Co.**, Framingham, V:24:08 (MCZC:1), VI:6:41 (CASC:2), Natick, V:26:1929 (CASC:1, MCZC:1), VI:22:41 (FMNH:2), Natick [sic], V:26:1929 (MCZC:1), Sherborn, V:30:38 (MCZC:1), VI:7:41 (UAIC:1), V:11:49 (GHNC:1), 5:17:1949 (NMDC:1), **Suffolk Co.**, N. Camb., I:12:1974 (MCZC:1), W. Roxbury, VI:14:1908 (MCZC:1); **MICHIGAN: Charlevoix Co.**, Whiskey Is, VI:9:1923 (UMMZ:1), **Cheboygan Co.**, Cheboygan, V:12:1921 (UMMZ:1), **Gladwin Co.**, [County Only: 6:3:49 (MSUC:1)], **Ingham Co.**, Ag. College, 5:9:89 (MSUC:1), 4:V:1923 (MSUC:1), 25:V:1923 (MSUC:1, UMMZ:2), 1:VI:1923 (UDMC:1), 6:1:23 (UDMC:1), **Marquette Co.**, Marquette, 27:7 (USNM:1); **MINNESOTA: Anoka Co.**, Bunker Pr. Dunes, IV:19:141 (DEFW:1), **Big Stone Co.**, [County Only: No Date (DEFW:1)], **Crow Wing Co.**, Mille Lacs, V:18:1940 (DEFW:1), **Hennepin Co.**, [County Only: VII:13-14:1922 (DEFW:1)], **Houston Co.**, [County Only: V:22:1937 (DEFW:1)], **LeSueur Co.**, Fish hatcheries, VII:25:1922 (DEFW:1), **Mille Lacs Co.**, Mille Lacs, VI:2:1937 (DEFW:1), V:18:1940 (DEFW:1), Mille Lacs Lake, VI:2:1937 (DEFW:1), **Nicollet Co.**, St. Peter Fish Hatch. pond, VII:21:1922 (CNCI:1, DEFW:1), **Ramsey Co.**, near Gray Cloud Is., VII:12:1921 (CNCI:1), [County Only: No Date (DEFW:2)], **Red Lake Co.**, Plummer, V:31:1933 (DEFW:1), **Sibley Co.**, Riv. near Blakeley, VII:17:1922 (DEFW:2), **Todd Co.**, [County Only: VIII:3:1938 (DEFW:1)], **Washington Co.**, [County Only: 7:8:11 (DEFW:1)]; **MISSOURI: Holt Co.**, Mound City, V:29:1968 (UMRM:1), **Gallatin Co.**, Bozeman Gallatin Valley, VIII:4:1949 (SDSU:1); **NEBRASKA: Scotts Bluff Co.**, Scottsbluff, 7:VI:40 (USNM:1); **NEVADA: Elko Co.**, Elko, No Date (MSUC:1, USNM:3); **NEW HAMPSHIRE: Hillsborough Co.**, Antrim, VI:21:33 (MCZC:1); **NEW JERSEY: Morris Co.**, Mountain Lakes, 23:VI:40 (FMNH:3); **NEW YORK: Rockland Co.**, Ramapo Mts., No Date (AMNH:1), [State Record: Rosedale L.I., 5:V:26 (MCZC:2)]; **NORTH DAKOTA: Grand Forks Co.**, Goose River, 14:VI:1966 (NDSU:1), **Mount-rail Co.**, [County Only: 7:6:1967 (NDSU:1)], **Nelson Co.**, [County Only: 8:6:1967 (NDSU:1)], **Pembina Co.**, [County Only: 29:VI:1967 (NDSU:1)], **Richland Co.**, [County Only: VII:22:1966 (NDSU:1)], **Williams Co.**, Epping Dam, 8:6:1967 (NDSU:1); **OREGON: Columbia Co.**, Goble, V:22:1938 (AMNH:1), **Harney Co.**, Hines, VI:14:1963 (ODAC:1), Malheur Lake, VI:20-21:1951 (FMNH:1); **PENNSYLVANIA: Pike Co.**, Milford, 30:V-1:VI:1941 (FMNH:1); **SOUTH DAKOTA: Brookings Co.**, Brookings, VI:6:19 (SDSU:1), IX:30:47 (SDSU:1), Volga, No Date (SDSU:1), **Jackson Co.**, Cottonwood, VI:24:1950

(SDSU:1), **Lawrence Co.**, Spearfish Creek 3 mi. N. Spearfish, 9:VI:1971 (SDSU:2), **Roberts Co.**, Sisseton, IX:7:1948 (SDSU:1); **UTAH: Cache Co.**, Logan, V:1952 (EMUS:1), Paradise, 5:4:37 (EMUS:1), Providence, IV:24:1949 (EMUS:1), **Salt Lake Co.**, Salt Lake, 5:15:12 (USNM:1), **Uintah Co.**, [County Only: No Date (ICCM:2)], **Utah Co.**, Provo, VI (CASC:3, EHSC:4, MCZC:8, USNM:4), No Date (FMNH:2, USNM:7); **WISCONSIN: Dane Co.**, Madison, 6:3:19 (UWEM:1), 6:12:19 (PADA:1, TAMU:1), **Waupaca Co.**, Waupaca, 6:21:20 (CNCI:1, UWEM:1). **CANADA: ALBERTA:** Bilby, VI:20:1924 (CASC:1), Hussar, V:20:1928 (CASC:1), Lethbridge, 19:VI:1930 (CNCI:1), Medicine Hat, 1:VI:1952 (CNCI:1), No Date (MCZC:1), Southern, VI-VIII:1956 (CNCI:1); **MANITOBA:** Aweme, 12:V:1903 (CNCI:2), 15:VII:1915 (CNCI:1), 9:VI:1916 (CNCI:1), 14:V:1917 (CNCI:1), 3:VII:1917 (CNCI:1), 15:VII:1918 (USNM:1), 15:VII:18 (UAIC:1), 6:VI:1923 (CNCI:1), 7:VI:1923 (CASC:1, CNCI:3), 9:VI:1923 (CNCI:3), V:30 (USNM:1), Dugald, 31:7:79 (ACWM:1), Morgate, 6:6:1972 (ACSS:1), Ninette, 15:V:1958 (CNCI:1), Onah, 15:VI:20 (CNCI:1), 16:VI:1916 (CNCI:1), Rosebark, 13:VIII:17 (CUIC:1), 5 mi. SW. Shilo, 28:V:1958 (CNCI:1), Tevlon, No Date (USNM:1), Virden, VII:8:1953 (CNCI:1), VII:9:1953 (CNCI:1), Whitewater L. 4 mi. N. Whitewater, 22:VI:1958 (CNCI:1), Winnipeg, VI:6:1953 (CNCI:1); **ONTARIO:** Green's Creek, VI:5:1928 (CNCI:1), Pr. Edw. Co., 16:VI:1954 (EUBC:4), Toronto, No Date (CUIC:3, SDSU:1); **QUEBEC:** Berthierville, 3:VII:48 (DBUM:2), Ila Jesus, V:34 (DBUM:1), LaTrappe, 26:V:48 (DBUM:1), Ste-Foy C. Queb. P., 16:VI:72 (NMDC:1); **SASKATCHEWAN:** Alvena, 6:1:1971 (ACSS:2), Blain Lake, 6:29:1972 (ACSS:1), Beaver Ck, 7:IX:1956 (CNCI:1), Buffer Lake, 6:17:1971 (ACSS:1), C.B.C. Tower, 6:5:1972 (ACSS:1), Elbow, 22:VI:1954 (CNCI:1), 23:VI:1954 (CNCI:1), Forestry Farm, 5:2:1972 (ACSS:1), 5:29:1972 (ACSS:1), Ogema, 16:VI:1916 (CNCI:1), Perdue, 5:31:1972 (ACSS:1), Saskatoon, V:22:1923 (CNCI:1), 3:X:1923 (CNCI:1, USNM:1), 5:VII:1957 (CNCI:7, EHSC:5), Sask., 7:VI:1949 (CNCI:2). [NO COUNTRY/STATE: Colville Lk, 20:VI:1920 (WSUC:1), Elko, No Date (UAIC:1), ½ Mi. South Meford, VII:17:1946 (DEFW:1); No Data: (MCZC:2).]

Phyllotreta spatulata: See species description under Type Material.

Phyllotreta striolata: **ALABAMA:** Jefferson Co., Birmingham, 6:20:22 (USNM:1), No Date (USNM:45), Lee Co., Auburn, 1963 (UMDE:1), Mobile Co., Mobile, 6:1927 (MCZC:1), [State Record: Barachias, VI:11:1924 (USNM:1)]; **ALASKA:** Bodenbug Butte, 6:19:1945 (USNM:1), Circle Hot Springs, VI:21:1945 (USNM:12), VI:20:45 (USNM:4), College, VI:22:1945 (USNM:6), VI:17:1945 (USNM:14), VI:26:1945 (USNM:1), Matanuska, V:17:1945 (USNM:1), 5:VII:45 (USNM:2), Rampart, VII:1945 (CASC:1, USNM:1), 1920 (USNM:2), Ruby, 6:19:17 (USNM:2); **ARIZONA:** Coconino Co., 7 mi. S. Flagstaff, roadside ponds, 26:VIII:52 (CASC:1); **AR-KANSAS:** Crawford Co., [County Only: 10:17:68 (UADE:5)], Hempstead Co., Hope, VI:3:1923 (CUIC:5, UMMZ:4), 6:VI:23 (DBUM:5), 10:VI:24 (DBUM:1), 6:6:30 (CUIC:3), VI:6:1930 (MCZC:2), 6:2:32 (LACM:1), 6:7:32 (LACM:13), 6:8:32 (LACM:8), VI:8:32 (CASC:4), **Pulaski Co.**, Little Rk., 13:7:09 (USNM:1), **Washington Co.**, Fayetteville, VII:30:1942 (INHS:4), [County Only:

V:23:1942 (INHS:1), 29:VII:1968 (UADE:1)], [State Record: South West, No Date (UAIC:1)]; **CALIFORNIA:** Alameda Co., Hills back of Oakland, No Date (CASC:2), [County Only: No Date (CASC:16, DEFW:1, FMNH:1)], **Fresno Co.**, Fresno, 4:4 (USNM:1), 27:5 (USNM:1), Friant, VI:27:1972 (CDAE:1), **Inyo Co.**, Bishop, 7:28:21 (LACM:1), **Lake Co.**, [County Only: No Date (USNM:1)], **Los Angeles Co.**, Baldwin Pk., II:12:1944 (CDAE:4), Burbank, 7:15:32 (INHS:1), El Monte, I:29:44 (CDAE:2), X:16:1952 (CDAE:1), Los Angeles, No Date (CASC:2), N. Long Beach, 7:2:58 (UCRC:6), IX:15:58 (UCRC:25), San Marino, 8:16:41 (UCRC:2), 8:3:43 (UCRC:1), 9:7:44 (LACM:1), 7:22:45 (LACM:2), 7:27:47 (LACM:1), San Pedro, 13:III:47 (USNM:1), Santa Monica, 7:17:32 (INHS:1), 9:20:43 (UCRC:1), Sunland, 2:X:45 (USNM:16), Wilmington, IV:4:1944 (CDAE:2), [County Only: No Date (USNM:2)], **Orange Co.**, Huntington Beach, VII:25:08 (USNM:6), Santa Ana, 4:6:35 (LACM:1), VI:6:38 (CDAE:1), VI:7:38 (CDAE:1), 6:7:38 (LACM:3), **San Diego Co.**, Chula Vista 10 mi. E., VII:19:1971 (AJGC:6), Descanso, 9:23:52 (FMNH:1), E. Chula Vista, VII:10:1971 (CDAE:12), Lakeside, IX:12:1973 (CDAE:1), San Ysidro, 24:V:49 (USNM:2, "90"), **San Francisco Co.**, S. Francisco, 16:6:85 (USNM:1), [County Only: IV:19:08 (CASC:1), No Date (MCZC:1)], **San Joaquin Co.**, Stockton, X:16:1943 (CDAE:2), **San Mateo Co.**, [County Only: VIII (USNM:2)], **Santa Clara Co.**, Los Gatos, 6:2:57 (CASC:1), No Date (USNM:1), **Sonoma Co.**, St. Rosa, 25:6:93 (UMRM:5), 6:25:96 (OSUC:1), 28:96 (OSUC:2), X (CASC:1), **Tuolumne Co.**, Buck Meadows 1.8 mi W, V:21:1973 (CDAE:3), Lyons Dam, V:28:1955 (CASC:1), **Ventura Co.**, Santa Paula, VII:11:1952 (CDAE:1), [State Record: Rickjaker, No Date (USNM:1), Tilden Park, XII:1:56 (CASC:1); State Only: No Date (ANSP:6, EHSC:1, FMNH:1, ICCM:2, INHS:3, MCZC:9, UAIC:5, UMMZ:1, USNM:8)]; **COLORADO:** Arapahoe Co., Denver, No Date (ICCM:1), **Larimer Co.**, Ft. Collins, 6:13:22 (CSUC:2, USNM:1), 6:15:22 (CSUC:1), 6:27:22 (CSUC:1), 7:11:22 (CSUC:2, USNM:1), 6:22:23 (CSUC:5), 7:2:23 (CSUC:1), 7:11:23 (USNM:1), 6:16:24 (CSUC:4), 6:24:24 (CSUC:8), **Saguache Co.**, Saguache, 18:VIII:1952 (FMNH:1), [State Record: Skyway, VII:4:37 (FMNH:11)]; **CONNECTICUT:** Litchfield Co., Litchfield, VIII:27:1924 (AMNH:6), New Haven Co., Milford, 15:VIII:1900 (USNM:4), [State Record: State Only: No Date (AMNH:1)]; **DELAWARE:** New Castle Co., Newark, IX:13:1905 (CDAE:2); **DISTRICT OF COLUMBIA:** Patomc [sic] Flts, 13:VIII:03 (USNM:1), Washington, 9:4:81 (USNM:1), 6:25:97 (OSUC:1), VI:29:1900 (CASC:1, USNM:3), 24:4:04 (USNM:1), 25:VII:05 (USNM:1), VIII:14:06 (AMNH:1, USNM:1), VIII:12:07 (USNM:5), 25:VII:15 (USNM:1), 4:22:19 (USNM:3), V:20:1919 (USNM:1), VII:31:1919 (USNM:7), VIII:1:1919 (USNM:8), IV:22:1920 (USNM:4), VI:8:22 (USNM:2), 24:3 (USNM:2), No Date (DEFW:1, MCZC:1, USNM:1); **FLORIDA:** Alachua Co., Gainesville, VI:23:59 (AMNH:1), [County Only: 27:VIII:54 (FSCA:2), 19:IV:55 (FSCA:1)], **Broward Co.**, Ft. Lauderdale, 23:V:45 (USNM:6), **Dade Co.**, Homestead, 10:II:44 (USNM:"40"), Miami, IV:13:1944 (DEFW:1), **Duval Co.**, Jacksonville, 13:IV:1963 (UAIC:1), **Hillsborough Co.**, Dover, 17:1:44 (USNM:1), Plant City, II:4:44 (USNM:3), Ruskin, 13:1:45 (USNM:1), **Highlands Co.**, Archbold Bio. Sta., 3:4:64 (PSUC:1), 4:8:64 (PSUC:1), 4:9:64 (PSUC:1), 2:18:65 (PSUC:1), 4:5:65 (PSUC:1), 3:29:67 (PSUC:1), 5:7:67 (PSUC:2), **Mantee Co.**, Oneco, 9:II:44

(USNM:"35"), **Orange Co.**, Orlando, 5:15:07 (CNCI:1, USNM:1), No Date (USNM:9), **Pinellas Co.**, Dunedin, 4:26:20 (PURC:1), 4:26:25 (PURC:2), **Saint Johns Co.**, Hastings, VII:1927 (CUIC:1, USNM:2), **Sarasota Co.**, Sarasota, 18:I:44 (USNM:9), **Seminole Co.**, Sanford, 4:9:1913 (PURC:1), **Volusia Co.**, Enterprise, V:14 (MCZC:1), [State Record: State Only: No Date (ICCM:1)]; **GEORGIA: Bryan Co.**, Richmond Hill, 12:1:43 (EHSC:7, USNM:28), **Chatham Co.**, Savannah, 3:XI:43 (USNM:1), 9:VIII:44 (USNM:1), **Tift Co.**, Tifton, No Date (MCZC:1); **ILLINOIS: Adams Co.**, Quincy, VI:11-30:1883 (INHS:1), **Alexander Co.**, Cairo, VII:15:1937 (INHS:1), **Champaign Co.**, Bondville, X:1:1909 (INHS:4), 1.5 mi NE Mahomet, VII:10:1943 (INHS:1), Urbana, V:21:1885 (INHS:1), X:16:1885 (INHS:1), VIII:3:1909 (INHS:4), VIII:20:1947 (INHS:6), **Cook Co.**, Chicago, VII (UWEM:1), Des Plaines, VII:22-24:1937 (EHSC:4, INHS:10), VIII:11:1937 (INHS:2), Edgebrook, VIII:23:10 (UMMZ:3), VII:24:1919 (UMMZ:1), Oak Park, 7:VIII:1979 (EHSC:1), Palos Hills Forest Pres., Teason Woods, 29:V:1979 (EHSC:7), Palos Park, 7:26:24 (FMNH:2), **DeKalb Co.**, [County Only: 8:1:19 (USNM:9, UWEM:4)], **DuPage Co.**, Waterfall Glen For. Preserve, 7:V:77 (EHSC:5), 17:VI:1978 (EHSC:18), West Chicago, 20:VIII:1977 (EHSC:30), **Jackson Co.**, Carbondale, IV:29:1878 (INHS:2), VII:19:1909 (INHS:1), Grand Tower, VI:24:1905 (INHS:1), **Lake Co.**, Antioch, X:27:1943 (INHS:2), **LaSalle Co.**, Utica, V:15:1938 (UAIC:1), V:22:1940 (INHS:1), **Logan Co.**, Lincoln, X:17:1933 (INHS:1), **Macon Co.**, Decatur, V:23:1883 (INHS:1), **Madison Co.**, Collinsville, II:9:1944 (INHS:6), VII:19:1947 (INHS:3), Troy, XI:16:1944 (EHSC:3, INHS:6), [County Only: 8:3:71 (INHS:4), VI:1976 (INHS:1), VII:1976 (INHS:2), VIII:1976 (INHS:4), X:1976 (INHS:3), 5:30:77 (INHS:2), 6:8:77 (INHS:3), 6:30:77 (INHS:2), 7:10:77 (INHS:9), 7:20:77 (INHS:18), 8:3:77 (INHS:9), 8:17:77 (INHS:8), 8:24:77 (INHS:10), 8:30:77 (INHS:3), 9:8:77 (INHS:4), 9:12:77 (INHS:12), 9:15:77 (INHS:9), 9:22:77 (INHS:14), 10:1:77 (INHS:7), 10:19:77 (INHS:9), 10:26:77 (INHS:5), 11:2:77 (INHS:8), 11:23:77 (INHS:1), 6:13:78 (INHS:1), 6:21:78 (INHS:1), 6:28:78 (INHS:4), 7:6:78 (INHS:8), 7:26:78 (INHS:4), 7:27:78 (INHS:1), 8:2:78 (INHS:6), 8:9:78 (INHS:10), 8:18:78 (INHS:2), 8:22:78 (INHS:5), 9:7:78 (INHS:12), 9:30:78 (INHS:1), 10:1:78 (INHS:5), 10:10:78 (INHS:3), 10:18:78 (INHS:13), 10:25:78 (INHS:6), 7:27-28 (INHS:7)], **Madison & St. Clair Cos.**, [County Only: 6:13:78 (INHS:2), 6:21:78 (INHS:3)], **Mason Co.**, Mason State Forest, 19:VII:1969 (MSUC:1), **Massac Co.**, Metroplis [sic], VIII:25:1905 (INHS:2), **McHenry Co.**, Algonquin, 6:22:96 (INHS:1), **McLean Co.**, Bloomington, V:7:1883 (INHS:1), V:31:1883 (INHS:3), Normal, 3:29-31:1883 (INHS:1), V:31:1883 (INHS:2), V:10:1884 (INHS:2), **Pike Co.**, Pittsfield, IX:3:49 (GHNC:1), **Saint Clair Co.**, Mascoutah, XI:16:1946 (INHS:2), [County Only: VII:1976 (INHS:8), IX:1976 (INHS:4), 8:3:77 (INHS:4), 7:26:78 (INHS:4), 8:22:78 (INHS:13), 9:7:78 (INHS:2), 9:12:78 (INHS:1), 10:1:78 (INHS:4), 10:10:78 (INHS:4)], **Stephenson Co.**, Freeport, 12:VIII:1946 (INHS:2), **Union Co.**, Anna, VI:22:1884 (INHS:1), Grand Tower, V:16:1971 (FMNH:1), [State Record: Mt. Forest, VIII:28:1904 (FMNH:2); State Only: IV (INHS:4), No Date (CUIC:1, DEFW:22, INHS:12, MCZC:1, UAIC:1, WSUC:6)]; **INDIANA: Dubois Co.**, [County Only: 5:12:04 (PURC:1)], **Floyd Co.**, [County Only: 6:23:03 (PURC:2)], **Howard Co.**, Kokomo, VI:27:1922 (CNCI:1), **Kosciusko Co.**,

[County Only: VII:7:1932 (PURC:1), V:13:1933 (PURC:1), V:21:1933 (PURC:1)], **LaPorte Co.**, LaPorte, No Date (ICCM:1), **Marion Co.**, Indianapolis, VIII:8:1964 (FSCA:1), VII:10:1966 (FSCA:1), [County Only: 18:12 (PURC:1)], **Porter Co.**, Ind. Dunes St. Pk., VI:26:1971 (FMNH:1), **Posey Co.**, [County Only: 6:27:08 (PURC:1)], **Putnam Co.**, [County Only: 7:25:09 (CUIC:1), 9:25:09 (PURC:1)], **Starke Co.**, Knox, 6:27:11 (USNM:6), 7:27:11 (CASC:1, USNM:12), 8:12:12 (USNM:13), 7:30:13 (USNM:17), No Date (USNM:3), **Tippecanoe Co.**, Lafayette, VIII:16:1922 (CNCI:1), 9:5:23 (CNCI:2), 1923 (CNCI:1), 5:25:24 (CNCI:6), III:25:1925 (UMMZ:2), 8:3:27 (CNCI:1), 7:21:32 (USNM:1), VII:23:1961 (DCMC:1), W. Lafayette, 5:VIII:1971 (EHSC:323), [County Only: VII:20:1932 (PURC:2), IX:28:1932 (PURC:3), III:1:1933 (PURC:1), VI:11:1935 (NMDC:1), 20:VI:71 (EHSC:1)], [State Record: Hovey Lake, VII:13:1965 (FSCA:1), VII:16:1965 (FSCA:1), VII:22:1965 (FSCA:1), VII:23:1965 (FSCA:1), Pine, VII:16:05 (FMNH:1); State Only: No Date (MSUC:1)]; **IOWA: Adair Co.**, [County Only: 3:1955 (USNM:1)], **Boone Co.**, Ledges St. Pk., IV:22:1950 (ISUI:1), **Dallas Co.**, [County Only: 29:VIII:1894 (CUIC:1)], **Johnson Co.**, Iowa City, 10:22:15 (USNM:4), 10:23:15 (USNM:1), 10:22:16 (USNM:1), No Date (USNM:1), **Lee Co.**, Ft. Madison, No Date (ICCM:4), **Muscatine Co.**, Muscatine, V:10:17 (USNM:3), V:21:17 (USNM:1), VIII:16:17 (CSUC:1, USNM:4), 5:1:19 (USNM:9), **Page Co.**, Clarinda, IV:21:1953 (ISUI:1), **Scott Co.**, Pleasant Valley, 7:5:28 (CUIC:2), **Story Co.**, Ames, 6:30:90 (ISUI:1), 7:5:90 (ISUI:2), 8:25:10 (ISUI:1), 3:IV:18 (AMNH:2), 4:4:18 (OSUO:5), 4:7:24 (ISUI:1), VII:10:1925 (ISUI:1), 8:7:25 (ISUI:1), 6:14:26 (ISUI:1), 6:23:26 (ISUI:1), 4:15:28 (ISUI:1), 4:4:30 (ISUI:1), V:3:1930 (ISUI:1), 7:29:38 (ISUI:1), IV:1939 (ISUI:1), IV:4:1941 (ISUI:1), IV:30:1942 (ISUI:1), 4:23:46 (ISUI:1), IV:18:1947 (ISUI:1), VI:3:1947 (ISUI:2), 8:8:49 (ISUI:2), VI:20:1950 (CSUC:3), V:5:1960 (ISUI:1), IV:18:1961 (ISUI:1), No Date (CSUC:1, ISUI:7), Ames Exp. Sta., No Date (ISUI:1), **Taylor Co.**, [County Only: I:1956 (USNM:1)], **Winneshick Co.**, Decorah, 9:2:1935 (ISUI:1), **Woodbury Co.**, Sioux City, 6:23:21 (DEFW:1), [State Record: Davis Gardens, 7:27:17 (USNM:1), Devil's Gardens, VII:27:17 (USNM:5), Moran, 5:5:40 (CSUC:1); State Only: No Date (DEFW:1, USNM:1)]; **KANSAS: Douglas Co.**, Lawrence, 4:1930 (CUIC:3), **Riley Co.**, [County Only: IV (USNM:1), VII (USNM:1)], **Shawnee Co.**, Topeka, V:29 (USNM:3), No Date (USNM:2), [State Record: State Only: No Date (CNCI:1, MSUC:4, PURC:4)]; **LOUISIANA: East Baton Rouge Par.**, Baton Rouge, VI:1905 (USNM:1), X:20:1914 (CASC:1, MCZC:1, OSUC:1, USNM:1), V:25:16 (USNM:1), 1:27:19 (USNM:2), V:2:1919 (CASC:1, USNM:19), IX:10:19 (CNCI:2, USNM:10), XII:1:21 (MCZC:1, USNM:1), 5:8:1923 (UDMC:1), 5:17:1923 (UDMC:2), X:1923 (USNM:175), X:8:37 (EHSC:9, USNM:22, "500"), **Evangeline Par.**, Manou, 5:4:41 (SDSU:2), **Lafayette Par.**, SW Lafayette, 3:1:4 (SDSU:1), **Madison Par.**, Tallulah, No Date (USNM:1), **Orleans Par.**, New Orleans, 22:6:43 (USNM:20), VI:3:45 (USNM:3), **Rapides Par.**, Ball, 3:16:06 (USNM:1), 3:23:1906 (USNM:10), **Richland Par.**, Delhi, IV:1:1957 (INHS:1), **St. Bernard Par.**, Harahan, 5:15:44 (MCZC:1), **Terrebonne Par.**, Houma, 1:1:44 (USNM:2), 5:1:44 (USNM:1), 23:XII:43 (USNM:2), [State Record: Camp Plauche, 5:3:44 (MCZC:2), Will's Point, 21:3:45 (USNM:4); State Only: No Date (ANSP:4, FMNH:1)];

MAINE: Aroostock Co., Saddleback Mts., No Date (OSUC:1), **Cumberland Co.**, Portland, IX:14:43 (USNM:2), 14:9:43 (USNM:4), **Handcock Co.**, Isle-au-Haut, 8:1905 (MCZC:3), **Kennebec Co.**, Monmouth, VII:14:14 (MCZC:1), **Penobscot Co.**, Orno, 7:VI:1905 (CNCI:1, UMDE:2), 7:11:11 (UMDE:4); **MARYLAND:** Baltimore Co., Baltimore, 23:9:43 (USNM:3), No Date (MCZC:6), **Calvert Co.**, Chesapeake Bch., VII:28 (USNM:2), Plum Point, VI:24:1950 (GHNC:1), **Dorchester Co.**, nr. Lloyds, VII:10:07 (USNM:1), **Frederick Co.**, [County Only: No Date (MCZC:1)], **Garrett Co.**, Oakland, 6:2:22 (UMDC:2), **Howard Co.**, Jessup [*sic*], 8:11:12 (UCRC:1, USNM:1), **Montgomery Co.**, Plummers I, 28:4:05 (USNM:1), 17:6:06 (USNM:4), 17:6:07 (INHS:1), 21:VII:07 (USNM:2), Takoma Park, 23:VI:1971 (CDAE:1), **Prince Georges Co.**, Beltsville, 3:IV:45 (USNM:4), Bladensburg, 5:7:12 (UMDC:1), 6:12:12 (UMDC:1), 7:4:12 (UMDC:1), 8:1:12 (UMDC:1), 8:4:12 (UMDC:1), 8:7:12 (USNM:9), 8:17:12 (USNM:1), College, 10:4:10 (UMDC:1), 10:4:15 (UMDC:5), 10:11:15 (UMDC:1), College Park, 5:3:12 (UMDC:1), 5:20:12 (UMDC:1), 6:2:12 (UMDC:2), 6:29:15 (USNM:2), 8:8:16 (UMDC:1), 8:4:19 (USNM:9), VIII:4:1919 (USNM:15), 10:20:19 (UMDC:2), V:19:1920 (USNM:2), V:29 (UMDC:3), 4:5:1948 (HAHC:1), Laurel, VII:29:12 (USNM:1), Riverdale, 7:4:12 (USNM:1), 8:4:12 (UMDC:2), 8:9:12 (UMDC:1), **Somerset Co.**, Westover, 6:18:25 (CUIC:2), [State Record: Ba. Co., V:6:1939 (USNM:2), Marshall Hall, IX:99 (USNM:1); State Only: No Date (MCZC:3)]; **MASSACHUSETTS:** Berkshire Co., Hinsdale, VIII:21:98 (USNM:1), Essex Co., Lynn, 19:3:74 (MCZC:1), **Hampden Co.**, Springfield, No Date (MCZC:1), **Middlesex Co.**, Arlington, No Date (MSUC:1), Framingham, V:24:08 (INHS:1), Lowell, No Date (MCZC:7), N. Camb. 1:12:74 (MCZC:1), Sherborn, 7:8:06 (MCZC:1), 5:25:29 (MCZC:1), **Nantucket Co.**, Nantucket Isl., No Date (INHS:1), **Suffolk Co.**, Cambridge, 4:12:73 (MCZC:1), No Date (MCZC:1, MSUC:1), Chelsea Slit Marsh, No Date (MSUC:1), [State Record: Tyngs, No Date (MCZC:2); State Only: No Date (AMNH:3, MCZC:8, MSUC:1)]; **MICHIGAN:** Allegan Co., Allegan St. Forest, 25:VII:1963 (MSUC:3), Fennville, 7:2:26 (MSUC:3), **Berrien Co.**, Galien, 27:V:1974 (MSUC:3), 28:V:1974 (MSUC:1), 30:V:1974 (MSUC:2), 2:VI:1974 (MSUC:1), 9:VI:1974 (MSUC:2), 10:VI:1974 (MSUC:1), 19:VI:1974 (MSUC:2), 21:VI:1974 (MSUC:1), 22:VI:1974 (MSUC:1), 2:VII:1974 (EHSC:4, MSUC:5), **Charlevoix Co.**, Whiskey Is, VI:9:1923 (UMMZ:1), **Cheboygan Co.**, Cheboygan, V:12:1921 (UMMZ:1), 4 mi. N of Topinabee, 9:VIII:1962 (PIME:1), 10:VIII:1962 (PIME:7), [County Only: 7:29:1937 (FMNH:1)], **Gladwin Co.**, [County Only: 6:10:49 (MSUC:1)], **Huron Co.**, Harbor Beach, 12:VI:1967 (PIME:1), **Ingham Co.**, Ag College, 6:1:89 (MSUC:1), 6:3:89 (MSUC:3), 6:13:89 (MSUC:3, UAIC:1), 6:3:12 (MSUC:5), 10:24:21 (MSUC:1), 13:V:1922 (MSUC:1), VI:21:1922 (CASC:2), 6:21:22 (MSUC:2), 5:VII:1922 (MSUC:1), 6:VII:1922 (MSUC:1), 28:IV:1923 (MSUC:1), 5:16:24 (UDMC:2), V:7:1926 (CASC:2), 7:V:1926 (CASC:1), No Date (AMNH:1), E. Lansing, 7:VIII:1947 (MSUC:1), 24:V:1957 (MSUC:1), 13:VIII:1959 (MSUC:3), Lansing, 11:V:1881 (MSUC:1), [County Only: VIII:17:1932 (UMMZ:2), No Date (MSUC:1)], **Kalamazoo Co.**, Gull Lake Biol. Sta., 12:VII:1963 (MSUC:3), 9:VIII:1970 (MSUC:1), 21:VIII:1970 (MSUC:1), **Lapeer Co.**, 1 mi. S. of Lum, 16:VI:1964 (PIME:1), 30:VI:1964 (PIME:3), **Lenawee Co.**, Cadmus, 25:VII:1959 (MSUC:1), Clayton, 11:VII:1959 (MSUC:2), **Mackinac Co.**, St. Ignace, VIII:8:1921 (UMMZ:1), **Macomb Co.**, E. of Memphis, 21:V:1963 (PIME:1), 16:VI:1963 (PIME:1), 25:VI:1963 (PIME:3), 27:VI:1963 (PIME:1), VIII:27:1963 (PIME:1), IX:7:1963 (PIME:5), 4:V:1964 (PIME:1), 7:V:1964 (PIME:11), 17:V:1964 (PIME:1), 21:VII:1964 (PIME:1), 24:VIII:1964 (PIME:8), 30:VIII:1964 (PIME:3), 27:VI:1966 (PIME:1), VIII:67 (PIME:1), 7:V:1969 (PIME:1), Richmond, 8:VII:1969 (PIME:1), **Marquette Co.**, Marquette, 30:6 (USNM:1), **Midland Co.**, [County Only: 3:24:45 (MSUC:1)], **Saginaw Co.**, E. Sag., VI:1878 (MCZC:2), **Sanilac Co.**, Port Sanilac, 23:VII:1965 (PIME:1), **Wayne Co.**, Detroit, 28:V (USNM:2), No Date (USNM:3), [State Record: State Only: No Date (CSUC:1, UDMC:2, USNM:2)]; **MINNESOTA:** Anoka Co., [County Only: 4:20:40 (DEFW:1)], **Big Stone Co.**, [County Only: 45 (DEFW:1)], **Clay Co.**, Mooreland, 31:7:43 (USNM:1), **Cook Co.**, Grand Marais, 8:13:23 (DEFW:2), 8:10:29 (DEFW:7), X:4:1940 (DEFW:1), Poplar Lake, 8:10:29 (DEFW:1), **Crow Wing Co.**, Mille-Lacs, V:18:1940 (DEFW:1), **Dodge Co.**, Mantorville, VII:10:1923 (CNCI:1, DEFW:3, FMNH:2), **Faribault Co.**, Winnebago, VII:11:1923 (CNCI:4, DEFW:2), **Hennepin Co.**, Crystal Lake, VII:30:1921 (DEFW:1), **Kittson Co.**, Robbin, VIII:9:1941 (DEFW:1), **Mille Lacs Co.**, [County Only: 6:2:37 (DEFW:2), V:14:1938 (DEFW:1), 5:18:38 (DEFW:1)], **Olmsted Co.**, [County Only: 05 (DEFW:4), No Date (DEFW:6)], **Otter Tail Co.**, Pelican Lake, VII:21-22:1958 (DEFW:1), **Polk Co.**, Crookston (Red Lake River), 7:18:35 (DEFW:5), Crookston, 7:17:35 (DEFW:5), VII:25-26:1959 (DEFW:2), 15:VIII:1965 (DEFW:1), **Ramsey Co.**, near Gray Cloud Is., 7:12:21 (DEFW:1), St. Anthony Pk., 2:VII:1921 (DEFW:1), No Date (DEFW:4), St. Paul (Univ. Farm), 7:7:1924 (DEFW:3), VI:26:1936 (DEFW:1), 7:4:41 (DEFW:7), St. Paul, 8:31:25 (DEFW:2), VII:16:1936 (DEFW:2), No Date (USNM:1), U. Farm, 7:8:21 (DEFW:1), 7:9:21 (DEFW:1), VII:11:1923 (FMNH:1), [County Only: No Date (DEFW:4)], **St. Louis Co.**, Duluth, No Date (LACM:1), **Sibley Co.**, Blakely (Near River), 7:17:22 (DEFW:11, EHSC:6), **Steele Co.**, Medford, VI:20:1922 (DEFW:1), Owatonna, 6:25:23 (CUIC:2), **Wabasha Co.**, Lake City, VII:6:1921 (CNCI:2, DEFW:1), VII:6:1923 (FMNH:1), **Winona Co.**, Dresbach, 7:13:20 (DEFW:6), **Wright Co.**, Buffalo, VII:30:1947 (USNM:1), **Yellow Medicine Co.**, Canby, VI:24:1921 (DEFW:1), [State Record: Donaldson, 8:9:41 (DEFW:1), Frontenac, 5:29:30 (DEFW:1), Ft. Snelling, 5:6:22 (CNCI:1), Kawishiwi Riv., 30:VIII:1919 (CNCI:1, DEFW:1), Waltham, VII:10:1923 (DEFW:1); State Only: No Date (MCZC:1)]; **MISSISSIPPI:** Copiah Co., Crystal Spgs., 9:24:09 (USNM:1), Hazlehurst, 4:22:29 (USNM:1), **George Co.**, Lucedale, 8:8:29 (CNCI:6), X:8:1931 (CUIC:5), 2:12:32 (CUIC:8), **Lafayette Co.**, Belmont, 10:12:68 (MSUC:1), [State Record: Solfport, VIII:38 (FMNH:2), Starkville [*?sp.*], XI:2:1909, (USNM:1)]; **MISSOURI:** Adair Co., [County Only: 3-6:VII:1971 (MSUC:1)], **Barry Co.**, Roaring Riv. St. Pk., 11:VI:1977 (EGRC:6), **Boone Co.**, Columbia, IV:29:1947 (CSUC:1, UMRM:2), 6:24:46 (LACM:24), **Callaway Co.**, Fulton, V:8:1949 (UMRM:1), **Holt Co.**, Mound City, IX:25:1968 (UMRM:1), **Jefferson Co.**, Arnold-Bay Shore subdivision, 16:VII:1965 (UMRM:3), **Linn Co.**, Bucklin, 20:V:1977 (EGRC:4), **Putnam Co.**, 2 mi. W Unionville, VI:12:1974 (UMRM:1), **Randolph Co.**, 1 mi. E Moberly, 4:IX:1972 (EHSC:4, UMRM:7), 5:IX:1972 (UMRM:1), 1:X:1973 (UMRM:1), 10:VIII:1974 (UMRM:2), 13:V:1975

(UMRM:1), 4:IX:1979 (UMRM:1), **St. Louis Co.**, Black-jack [*sic*], 12:1:32 (USNM:2), St. Louis, No Date (USNM:4), **Stoddard Co.**, 2.8 mi. NE of Dexter Holly Preserve, VI:12:1975 (UMRM:1), [State Record: Crasskeyz [*?sp.*], 12:1:32 (USNM:2), Lay, No Date (USNM:1); State Only; No Date (DEFW:2, USNM:1)]. **MONTANA: Gallatin Co.**, Bozeman, VII:21:1949 (SDSU:2); **NEBRASKA: Cuming Co.**, West Pt., 4:88 (DEUN:1), **Lancaster Co.**, Lincoln (Salt Basin), VI:26:1904 (CASC:4), Lincoln, V:4:05 (USNM:1), 8:20:08 (DEUN:1), 4:1915 (DEUN:4), VII (USNM:1), No Date (USNM:1), **Otoe Co.**, Nebraska City, VI (USNM:1); **NEW HAMPSHIRE: Coos Co.**, Mt. Washington 6000', VIII:6:1939 (MCZC:1), **Grafton Co.**, Franconia, No Date (AMNH:2), **Strafford Co.**, Durham, VI:22:1907 (USNM:1), [State Record: Wt. Mts., No Date (MSUC:1); State Only: No Date (MCZC:5)]; **NEW JERSEY: Camden Co.**, Camden, VII:4 (MCZC:1), **Essex Co.**, Cedar Grove, V:30:1923 (USNM:2), **Gloucester Co.**, Paulsboro, 28:8:43 (USNM:6), **Hunterdon Co.**, Lambertville, VI:24:74 (CDAE:5), **Middlesex Co.**, N. Bruns., IX:1:1943 (INHS:1), **Monmouth Co.**, farm in Monmouth Co., 6:22:43 (USNM:5), **Morris Co.**, Chester, VIII:16:1917 (CSUC:1, USNM:16), **Ocean Co.**, Barnegat Bay, VIII:4:28 (CASC:2), L. Beach Is., 7:16:32 (AMNH:1), Seaside Park, 8:20 (FMNH:4), **Union Co.**, Elizabeth, X:29 (USNM:1), [State Record: Hoboktn, 26:2:48 (USNM:1); State Only: No Date (CASC:1, MCZC:8, UAIC:6, USNM:5)]; **NEW YORK: Allegany Co.**, Cuba, 3:19:40 (USNM:1), IV:9:1940 (USNM:7), **Brooklyn Co.**, Flatbush, L.I., VI:1887 (AMNH:11), X:1887 (AMNH:1), **Chautauqua Co.**, Westfield, No Date (MCZC:9), **Erie Co.**, Lancaster, 5:6:89 (CASC:1), 5:30:89 (CASC:1), No Date (CASC:1), **Genesee Co.**, Alexander, VII:20:1915 (CUIC:1), **Monroe Co.**, Honeoye Falls, Chase Nurs., VII:1913 (CUIC:1), Rochester, 10:10:32 (LACM:1), 6:7:52 (LACM:1), 6:10:52 (LACM:1), 6:20-22:1952 (LACM:3), 8:30:52 (LACM:1), **Madison Co.**, Hubbardsville, 6:7:17 (CUIC:2), **Nassau Co.**, [County Only: 5:18:32 (CUIC:4)], **Onondaga Co.**, Elbridge, IX:13:41 (UAIC:5), IX:15:41 (UAIC:9), [County Only: 9:13:41 (NMDC:2)], **Orange Co.**, Tuxedo, 26:V:40 (FMNH:3), **Orleans Co.**, Albion, 21:7:1939 (USNM:1), **Putnam Co.**, Brewster, V:11:1936 (CUIC:1), **Queens Co.**, Flushing L.I., No Date (CNCI:2), **St. Lawrence Co.**, Canton, 5:1:36 (NMDC:1), V:2:1936 (NMDC:1), VII:23:1941 (NMDC:1), Rossie, 8:24:1967 (NMDC:1), **Schenectady Co.**, Schenectady, 7:15:1941 (NMDC:1), **Schuylkill Co.**, North of Watkins Glen, 8:18:37 (USNM:1), **Tompkins Co.**, Ithaca, 15:VII:1907 (CUIC:1), VII:27:1915 (CUIC:1), 11:26:16 (CUIC:2), 6:14:17 (CUIC:23), 1:VIII:1917 (CUIC:1), 5:31:18 (CUIC:1), 5:IX:22 (CUIC:1), 26:VI:1925 (CUIC:1), 7:24:28 (CUIC:1), 26:VI:29 (CUIC:1), 4:4:69 (CUIC:1), 4:12:70 (CUIC:1), 5:VI (CUIC:1), No Date (USNM:6), Ithaca Hurlbett Farm, 6:28:1966 (CUIC:1), Ithaca Savage Farm, 6:VII:1966 (CUIC:1), 5:18:67 (CUIC:1), 5:27:67 (CUIC:1), 7:VII:1967 (CUIC:1), [County Only: 8:15:1959 (NMDC:1), 6:22:69 (NMDC:4), No Date (GHNC:4)], **Ulster Co.**, [County Only: 17:7:1919 (USNM:8)], **Wyoming Co.**, Pike, VII (MCZC:2), [State Record: Cld Spg. Harbor L.I., VIII:2:1900 (AMNH:1), Inlet Brook, McLean Res, No Date (CUIC:5), Newtown L I, 4:29:19 (CUIC:7), Ridif. Spr., VI:87 (USNM:1), top of Mt. Whiteface, 7:7:1922 (USNM:3); State Only: 10:17:35 (USNM:1), No Date (AMNH:1, CASC:2, CNCI:5, DEFW:1, MSUC:2, UMRM:8, USNM:21)]; **NORTH CAROLINA: Ashe Co.**, Jefferson,

4:3:46 (NCSU:2), **Granville Co.**, Stem, mid-IV:1910 (NCSU:1), **Henderson Co.**, Mills River, VI:25:1951 (HAHC:1), **New Hanover Co.**, Castle Hayne, 27:11:43 (USNM:1), **Pender Co.**, St. Helena, III:23:1951 (NCSU:4), 3:23:51 (NCSU:7), **Wake Co.**, late V:07 (UCRC:2), V:17:1930 (NCSU:2), [State Record: Pisgah Forest, Looking Glass Pk, 19:VII:1957 (CNCI:1), Upper Mountain Res Sta. Laurel Springs, 5:IV:1907 (NCSU:1); State Only: No Date (MCZC:3, UAIC:5)]; **NORTH DAKOTA: Grand Forks Co.**, Grand Forks, 30:8:45 (USNM:1); **OHIO: Ash-tabula Co.**, Rock Creek, VI:25:1934 (CASC:2), **Belmont Co.**, [County Only: 6:V:72 (EHSC:1)], **Crawford Co.**, Plankton, No Date (CASC:3), [County Only: 11:VII:72 (EHSC:3)], **Delaware Co.**, [County Only: 17:VII:71 (EHSC:65), 13:VIII:72 (EHSC:63), 27:VIII:72 (EHSC:119), 27:VII:73 (EHSC:21)], **Fairfield Co.**, [County Only: 11:V:73 (EHSC:24), 10:V:74 (EHSC:7)], **Franklin Co.**, Columbus, V:22:99 (SDSU:1), V:18:09 (SDSU:1), V:19:09 (SDSU:1), 1915 (OSUC:1), VI:15:31 (LACM:1), 8:3:33 (OSUC:1), 10:8:42 (OSUC:4), 2:IX:44 (USNM:4), 11:VIII:73 (EHSC:1), [County Only: 26:VII:71 (EHSC:8)], **Greene Co.**, [County Only: V:12 (OSUC:2)], **Guernsey Co.**, [County Only: 22-23:V:71 (EHSC:9)], **Hamilton Co.**, 5 mi. NW Montgomery 11316 Gideon Lane, 24:V:1977 (EHSC:1), [County Only: 4:VII:73 (EHSC:19)], **Hocking Co.**, [County Only: 8:3:69 (EHSC:1), 16:V:71 (EHSC:1)], **Knox Co.**, [County Only: 1:VIII:72 (EHSC:5)], **Lawrence Co.**, Ironton, 5:29 (OSUC:1), South Point, 11:VI:48 (USNM:2), **Licking Co.**, [County Only: 14:VIII:74 (EHSC:6)], **Logan Co.**, [County Only: 7:1932 (DEFW:5)], **Lorain Co.**, Amherst, VI:1934 (TAMU:3), **Lucas Co.**, Adams Twp. Sec. 23, VII:9:1935 (USNM:1), **Muskingum Co.**, [County Only: 26:VII:71 (EHSC:1)], **Pickaway Co.**, [County Only: 20:IV:74 (EHSC:1)], **Ross Co.**, [County Only: 7:V:72 (EHSC:4)], **Trumbull Co.**, [County Only: 2:VIII:71 (EHSC:6)], **Vinton Co.**, [County Only: 17:VI:72 (EHSC:10)], **Warren Co.**, [County Only: 28:VII:72 (EHSC:3)], **Washington Co.**, [County Only: 10:V:72 (EHSC:2), 13:V:74 (EHSC:4)], **Wayne Co.**, [County Only: 12:VII:74 (EHSC:2)], **Wyandot Co.**, [County Only: 14:VIII:71 (EHSC:52)], [State Record: State Only: No Date (CSUC:2, USMC:1)]; **OKLAHOMA:** [State Record: Oa. L Vyoming, V:22:99 (USNM:1)]; **OREGON: Columbia Co.**, Scappoose, VII:10:1935 (USIC:1), **Harney Co.**, Volgate, V:19:1956 (MSUC:1, ODAC:25), **Jackson Co.**, [County Only: No Date (ICCM:2)], **Klamath Co.**, Klamath Falls, VI:9:1960 (ODAC:2), Lake of the Woods, VII:5:1941 (UAIC:1), **Lake Co.**, Paisley, VII:24:1956 (ODAC:1), **Marion Co.**, Salem, IX:31:1959 (ODAC:1), **Multnomah Co.**, Portland, No Date (UAIC:1, USNM:1), **Wasco Co.**, Mosier, V:9:1952 (ODAC:1), [State Record: Or. Ex Sta., No Date (OSUO:1)]; **PENNSYLVANIA: Adams Co.**, Arendtsville, 8:23:1927 (PSUC:1), **Allegheny Co.**, Aspinwall, V:16:26 (ICCM:1), Harmarville, 6:24:07 (ICCM:1), Pittsburgh [*sic*], VII:1902 (ICCM:1), VI:10 (ICCM:1), VI:21 (ICCM:4), IX:4 (ICCM:5), V (ICCM:1), No Date (ICCM:3), [County Only: VII:31:86 (CUIC:3), No Date (ICCM:15)], **Bucks Co.**, Bristol, 18:9:43 (USNM:12), **Centre Co.**, Pine Grove Mills, 7:27:47 (PSUC:1), State College, 10:9:46 (PSUC:1), 5:1:47 (PSUC:1), **Dauphin Co.**, Harrisburg, V:10:07 (PADA:1), III:31:10 (PADA:1), V:6 (PADA:3), Hummelstown, 5:30:17 (PADA:3), 6:2:17 (PADA:6), **Delaware Co.**, Glenolden [*sic*], VI:14 (OSUC:2), **Lancaster Co.**, Lancaster, 9:22:37 (PSUC:7), 8:28:41 (PSUC:1), **Lebanon Co.**, 5 mi. N. of Palmyra, 21:VIII:1975 (EUBC:1), Swatara Gap, 16:VI:1965

(UMDE:1), **Northampton Co.**, Bangor, 7:9:8 (PADA:5), Bethl-m., No Date (USNM:2), Easton, VII:9:09 (CASC:2), Wind Gap [*sic*], VII:9:1954 (CASC:1), **Philadelphia Co.**, Philadelphia, IV:8:08 (USNM:1), 31:VIII:43 (USNM:3), 22:IX:43 (USNM:1), 21:VII:62 (UMDE:1), Phila Intl. Airt. 6:13:65 (PADA:1), **Westmoreland Co.**, Jeannette, V:23 (ICCM:1), V:26 (ICCM:1), VI:2 (ICCM:1), VI:3 (ICCM:2), VI:19 (ICCM:1), VI:22 (ICCM:1), VI:24 (ICCM:2), VI:26 (ICCM:3), VI:27 (ICCM:2), VII:4 (ICCM:1), VII:14 (ICCM:1), VII:21 (ICCM:1), VII (ICCM:1, PADA:3), VIII:4 (ICCM:1), VIII:10 (ICCM:1), No Date (PADA:1), [State Record: Allegheney, No Date (ICCM:2), Frankford, 5:20 (USNM:1), Lehigh Gap, 7:13:1900 (USNM:1), PA Stat. Col. Lab Bustleton, 4:26:22 (PSUC:1), Penllyn, 6:10:36 (PADA:1), Phila Neck, 4:10 (MCZC:1), 7:15 (MCZC:3), 3:20 (MCZC:1), No Date (OSUC:6); State Only: 7:18-19:40 (USNM:1), No Date (ANSP:3, MCZC:2, UAIC:6, USNM:2)]; **RHODE ISLAND**: [State Record: Conanicut, VIII:29:1912 (UMMZ:2)]; **SOUTH CAROLINA**: **Charleston Co.**, Charleston, VIII:24:1936 (USNM:2), 4:IX:1968 (USNM:5), U.S.A.D. Exp. Sta. 7 mi. W. of Ashley River on U.S. 17, 9:IX:1976 (EHSC:15), [State Record: State Only: No Date (ANSP:1, MCZC:2)]; **SOUTH DAKOTA**: **Beadle Co.**, Huron, 5:18:44 (SDSU:1), **Brookings Co.**, Brookings, 7:17:24 (SDSU:1), 10:9:29 (SDSU:1), VI:28:1943 (SDSU:1), 7:4:43 (SDSU:1), 7:23:43 (SDSU:5), VII:25:1943 (SDSU:1), 7:27:43 (SDSU:5), 8:5:43 (SDSU:3), VIII:20:1944 (SDSU:1), VII:18:1946 (SDSU:1), IX:12:49 (SDSU:1), 9:13:49 (SDSU:18), 2 mi. N. of Brookings, 17:V:1966 (SDSU:1), 27:VI:1966 (SDSU:1), 7:5:66 (SDSU:1), 7:VII:1966 (SDSU:1), Volga, No Date (SDSU:1), **Brown Co.**, Aberdeen, VII:7:1944 (SDSU:1), Itecla, 7:4:44 (SDSU:3), **Buffalo Co.**, Ft. Thompson, IX:1:1943 (SDSU:2), **Clay Co.**, Vermilion, 7:24:45 (SDSU:1), VIII:29:1945 (SDSU:1), **Lawrence Co.**, Spearfish, VI:28:1947 (SDSU:1), **Roberts Co.**, Seehie Hollow, VI:10:1954 (SDSU:1), **Union Co.**, Canton, VI:3:1953 (SDSU:3), Elk Point, V:27:1954 (SDSU:1), [State Record: Frankfort, 7:13:31 (SDSU:1), Grand Forks, Fall:1890 (INHS:1), Mt. McKinley Nat. Park, VII:27:1951 (SDSU:1); State Only: No Date (CSUC:1, SDSU:3)]; **TENNESSEE**: **Knox Co.**, Knoxville, V:28:1957 (HAHC:1), VII:29:1955 (HAHC:1), **Montgomery Co.**, Clarksville, 3:5:09 (USNM:1), 3:11:09 (USNM:2), 3:26:09 (USNM:1), 3:31:09 (USNM:1), 7:15:15 (OSUC:2), [State Record: State Only: No Date (AMNH:1)]; **TEXAS**: **Bexar Co.**, San Antonio, 31:X:05 (USNM:5), I:2:10 (USNM:5), I:12:10 (MCZC:1, OSUC:2), I:14:10 (UCRC:1), **Brazoria Co.**, Angleton, V:15:44 (USNM:17), **Brazos Co.**, College Station, V:24:1933 (TAMU:1), **Colorado Co.**, Columbus, 21:6 (USNM:2), 28:7 (USNM:1), **Dallas Co.**, [County Only: V:18:1938 (EHSC:2, INHS:8)], **DeWitt Co.**, Cuero, 6:28:10 (USNM:4), **Galveston Co.**, Alta Loma, VI:22:1940 (TAMU:14), Dickinson, IV:19:1937 (USNM:13), 6:16:1930 (TAMU:8), Galveston, 7:15:1935 (TAMU:6), **Jefferson Co.**, Beaumont, 4:20:32 (TAMU:4), **Smith Co.**, [County Only: 10:3:30 (TAMU:5)], [State Record: State Only: No Date (USNM:5)]; **UTAH**: **Utah Co.**, Benjamin, 8:6:62 (AMNH:1), Provo, VI (CASC:4, MCZC:2, USNM:1), [State Record: State Only: No Date (UAIC:1, USNM:1)]; **VIRGINIA**: **Arlington Co.**, Arlington, VI:21:1912 (USNM:1), 8:2:12 (USNM:1), 8:1:16 (USNM:18), X:22:17 (USNM:1), 8:2:18 (USNM:2), V:22:1919 (USNM:1), X:22:1919 (USNM:14), V:17:20 (USNM:1), V:29:20 (USNM:1), VI:22:1920 (USNM:12),

VI:30:20 (USNM:5), X:1920 (USNM:1), IX:1923 (USNM:27), **Fairfax Co.**, Fairfax, 4:2:34 (USNM:1), Falls Church, 9:28 (MCZC:4), No Date (MCZC:2), Vienna, VI:22:12 (USNM:2), VII:20:12 (USNM:6), VII:27:12 (USNM:1), VII:29:12 (USNM:1), **Loudoun Co.**, Leesburg, 4:23:1919 (VPIC:1), **Montgomery Co.**, Blacksburg, 17:VII:197 (CADE:1), **Northampton Co.**, Cp. Charles, VII:31:10 (PADA:1), **York Co.**, Hempton, VII:1943 (NMDC:1), Norfolk, 6:15:20 (CUIC:12), 3:30:32 (UCRC:2), [State Record: Acquia, V:22 (MCZC:1), Steeles Tavern, sum.:58 (VPIC:1); State Only: V (USNM:1), No Date (CASC:1, MCZC:1, USNM:11)]; **VERMONT**: **Washington Co.**, Mt. Wash'n., No Date (AMNH:1); **WEST VIRGINIA**: [State Record: Ft. Pendtln, 8:7 (USNM:1)]; **WISCONSIN**: **Brown Co.**, Green Bay, 6:1:15 (UWEM:1), **Dane Co.**, Madison, 8:24:14 (UWEM:1), 8:18:16 (UWEM:1), 5:28:17 (AMNH:2, CUIC:1, USNM:1, UWEM:4), 6:9:17 (AMNH:1, UWEM:1), 7:25:17 (UWEM:1), 5:13:18 (UWEM:1), 5:25:18 (OSUO:1, USNM:4, UWEM:2), 4:6:19 (UWEM:4), 4:8:19 (USNM:1, UWEM:11), 4:26:19 (UWEM:1), 5:2:19 (UWEM:1), 5:8:19 (OSUO:2, USNM:18, UWEM:5), 5:12:19 (USNM:9, UWEM:1), 5:22:19 (USNM:1), 5:31:19 (UWEM:1), 5:1919 (UWEM:1), 7:19:19 (USNM:2), 7:28:19 (USNM:3, UWEM:2), 7:29:19 (CUIC:1, USNM:3), 8:4:19 (AMNH:2, USNM:21), 8:6:19 (USNM:3), 8:11:19 (UWEM:4), 8:14:19 (USNM:5, UWEM:1), 9:18:19 (USNM:12, UWEM:8), 10:8:19 (UWEM:1), 10:10:19 (USNM:5, UWEM:21), 10:31:19 (OSUO:1, USNM:6, UWEM:2), 4:21:20 (USNM:1, UWEM:2), 5:7:20 (USNM:1), VI:28:21 (UWEM:2), [County Only: 5:8:19 (USNM:1), No Date (USNM:7)], **Grant Co.**, Boscobel, VII:1:1952 (AMNH:1), **Kenosha Co.**, Kenosha, 4:28:15 (UWEM:3), **Milwaukee Co.**, Milwaukee, 7:18:14 (MSUC:1, SDSU:7), **Monroe Co.**, Sparta, 4:10:10 (UWEM:1), **Oneida Co.**, Minoqua, 5:21:22 (UWEM:2), **Racine Co.**, Racine, 5:24:18 (AMNH:1, USNM:1, UWEM:2), 5:14:20 (UWEM:3), **Waupaca Co.**, Waupaca, 6:23:20 (USNM:1), **Winnebago Co.**, Oshkosh, 5:15:14 (UWEM:1), **Wood Co.**, Griffith St. Nursery, 7:28:48 (UWEM:1), Nekoosa, VII:7:1949 (UWEM:1), [State Record: Nakoma, 8:11:20 (UWEM:1); State Only: No Date (CUIC:3, FMNH:1, USNM:2)]; **WYOMING**: **Yellowstone National Park Co.**, Yellowstone Pk., VII:20-25:1920 (CNCI:1). **CANADA**: **ALBERTA**: Edmonton, VII:8:17 (CASC:6), 8:5:17 (CUIC:3), VIII:8:17 (CASC:7), VIII:17 (CASC:4), 1:IV:18 (DBUM:1), 21:V:18 (MCZC:4, USNM:1), 6:1:18 (USNM:1), 6:12:18 (OSUC:2), VI:15:18 (CASC:14, EHSC:6), 24:VIII:1918 (INHS:1), VI:1:192 (INHS:4), V:21 (ANSP:2), V:25 (ANSP:2), No Date (CNCI:1), McMurray, 6:24:53 (CNCI:1); **BRITISH COLUMBIA**: Middy Val. Merritt, 15:VI:1924 (INHS:1), Stanley, VII:21:31 (CASC:6); **MANITOBA**: Arnaud, 4:VIII:53 (CNCI:1), Aweme, 6:1:1908 (CNCI:2), VI:2:09 (CNCI:1), 9:3:14 (CNCI:1), 4:VIII:1917 (CNCI:1), 8:4:17 (CNCI:2), 8:19:30 (CNCI:2), 9:16:69 (CNCI:7), V:2 (MCZC:1), V:23 (MCZC:5), Berens River, 7:9:38 (CNCI:2), Brandon, 6:7:72 (ACSS:1), Churchill, 28:VI:1937 (CNCI:1), Gillam, 17:VI:1950 (CNCI:1), 11:VII:1950 (CNCI:1), VI:26:1978 (ACWM:1), 28:4:78 (ACWM:12), 14:4:80 (ACWM:1), Grandview, 6:5:72 (ACSS:2), Int. Peace Gardens, Turtle Mtn. For. Res., 17:VII:1958 (CNCI:2), Lena, 4:21:72 (ACSS:1), Mile, 6:VII:17 (MCZC:2), Morris, V:23:1953 (CNCI:2), Ninette, 5:20:58 (CNCI:1), Shoal Lake, 6:7:72 (ACSS:2), Thornhill, 19:VIII:17 (UAIC:8), Westbaerne, 6:6:72 (ACSS:1), Win-

nipeg, V:26:15 (MCZC:1), 22:V:22 (UAIC:2), 6:7:72 (ACSS:1), 25:5:79 (ACWM:1); **NEW BRUNSWICK:** Fredericton, 5:31:29 (CNCI:4), Millville, 7:9:43 (CNCI:1), Tabusintac, 22:VI:1939 (CNCI:1); **NEWFOUNDLAND:** Harmonfield, 6:17:49 (CNCI:4), Stephenville Cross, 5-6:VII:49 (CNCI:12, EHSC:4); **NOVA SCOTIA:** Truro, 8:26:13 (CUIC:1), 30:VI:21 (CNCI:1); **NORTHWEST TERRITORIES:** Aklavik, 6:22:56 (CNCI:2), 29:VI:1956 (CNCI:1), Fort Smith, VI:15:1930 (CNCI:20, EHSC:12), Norman Wells, VI:15:1949 (CNCI:11, EHSC:4), VI:20:1949 (CNCI:5), VI:29:1949 (CNCI:3), VII:4:1949 (CNCI:2), VII:11:1949 (CNCI:1), V:17:1953 (CNCI:2), V:26:1953 (CNCI:1), Reindeer Depot. Mackenzie Delta, VIII:10:1948 (CNCI:1), Yellow Knife, VII:18:1949 (CNCI:1); **ONTARIO:** Aldershot, 7:7:55 (CNCI:3), Burlington, No Date (CNCI:1, PURC:1), Chatham, V:30:1944 (CNCI:1), Constance Bay, VIII:6:1959 (CNCI:1), Eberts, IV:5:1927 (CNCI:1), Erican, VI:26:1932 (CNCI:2), Gainston [?sp.], V:15:1919 (CNCI:1), Leamington, VI:15:1940 (CNCI:3), Manotick, VI:9:1964 (CNCI:1), Mer Bleue, VI:1:1921 (CNCI:1), 28:V:1927 (CNCI:1), V:29:1931 (CNCI:1), Ottawa, 17:VII:1905 (CNCI:9), 20:VII:05 (USNM:5), 8:17:05 (CNCI:1), V:7:1941 (CNCI:8, EHSC:4), No Date (CASC:2, USNM:1), Pelee Island, VI:26:1940 (CNCI:1), Tilbury, V:6:1927 (CNCI:1), Toronto, XI:23 (USNM:1), VII:40 (CASC:1), 60 (SDSU:1), No Date (CUIC:17, MCZC:1, UMMZ:1); **PRINCE EDWARD ISLAND:** Green Gables, Cavendish Beach, VII:22:1967 (CNCI:1); **QUEBEC:** Aylmer, VII:19:1956 (CNCI:1), 31:V:21 (DBUM:3), 22:VI:21 (DBUM:1), 2:VII:50 (DBUM:1), Cap-Rouge, 19:VI:65 (CLCC:1), 10:VII:65 (CLCC:1), Hemmingford, 7:24:25 (CNCI:1), Ile Grosbois, 14:7:34 (DBUM:2), Ile Jesus, 12:VII:33 (DBUM:1), V:35 (DBUM:1), Joliette, 11:VII:29 (DBUM:1), 8:VII:32 (DBUM:4), 12:VII:32 (DBUM:1), Lac Abitibi, 28:VIII:43 (DBUM:1), Laprairie, 14:VI:1927 (CNCI:1), Laniel, VIII:22:1932 (CNCI:1), LaTrappe, 24:VI:23 (DBUM:1), 8:VIII:32 (DBUM:1), 25:VI:33 (DBUM:1), 19:VII:33 (DBUM:4, LACM:1, MSUC:4), 17:VI:44 (DBUM:1), 26:V:46 (DBUM:1), Longueuil, 29:IV:35 (DBUM:1), Montreal, V:99 (FMNH:1), 10:VI:00 (DBUM:1), 12:VI:09 (DBUM:1), 12:V:15 (DBUM:2), 11:VI:19 (DBUM:1), 12:IX:21 (DBUM:1), 3:VIII:22 (DBUM:1), 23:V:23 (DBUM:2), 15:VI:27 (DBUM:1), 11:V:32 (DBUM:1), 2:VI:32 (DBUM:1), 10:IV:35 (DBUM:1), 7:IV:36 (DBUM:1), 17:X:47 (DBUM:1), 17:V (DBUM:1), 5:24 (MCZC:1), No Date (USNM:1), Mt. Albert, VI:30:1954 (CNCI:14, EHSC:8), New Richmond, VIII:6:54 (CNCI:1), Outremont, VII:28:1917 (CDAE:3), 1:6:19 (LACM:3), Paradis, 21:VIII:43 (DBUM:1), Rigaud, 4:V:27 (DBUM:1), 9:V:37 (DBUM:1), 19:IV:38 (DBUM:1), 3:V:38 (DBUM:1), 28:V:38 (DBUM:1), 20:V:39 (DBUM:2), Ste. Anne, I:VIII:1943 (DBUM:1), 2:VIII:1943 (DBUM:1), Ste. Augustin, 5:VI:65 (CLCC:1), Ste. Croix, 2:VI:73 (CLCC:2), St. Eustache, 18:VIII (DBUM:1), Ste. Foy, 29:VII:69 (CLCC:1), 20:VI:72 (CLCC:3), St. Jean, 4:VII:1944 (DBUM:2), St. Placide, 2:VII:31 (DBUM:1), 10:VII:31 (DBUM:1), 14:VII:31 (DBUM:1), St. Remi, 3:IX:14 (DBUM:2), 5:VIII:17 (DBUM:1), 1:IX:19 (DBUM:1), 23:X:19 (DBUM:1), 5:V:20 (DBUM:2), 29:VIII (DBUM:1); **SASKATCHEWAN:** Aberdeen, 6:1:71 (ACSS:1), Alvena, 6:1:71 (ACSS:1), 9:8:71 (ACSS:1), Aylsham, 5:5:71 (ACSS:1), Broadview, 13:VIII:1954 (CNCI:1), Buffer Lake, 6:17:71 (ACSS:1, EHSC:1), Canora, 22:VIII:1954 (CNCI:1), Cochin, 4:27:72 (ACSS:2), Duck Lake, 5:8:71 (ACSS:1),

Edam, 4:1:72 (EHSC:1), Flin Flan, 8:13:49 (SDSU:1), Forestry Farm, 4:28:72 (ACSS:2), 5:2:72 (ACSS:1), Goodsoil, 5:12:71 (ACSS:1), Grand Greve, VII:15:81 (MCZC:1), MacDowall, 5:4:71 (ACSS:1), Marcellin, 6:24:71 (ACSS:1, EHSC:1), Meskanaw, 6:3:71 (ACSS:1), Saskatoon, 12:01:1926 (CUIC:1), 5:VII:1957 (CNCI:2), Shell Lake, 5:11:71 (ACSS:1), Smeaton, 5:4:71 (ACSS:2), Strasbourg, 9:8:44 (CNCI:2), Sutherland, 4:3:71 (ACSS:1, EHSC:1), Yorkton, 16:VI:1954 (CNCI:1), Zenon Pk., 5:5:72 (ACSS:1); **[NO PROVINCE:]** St. Hilane, 5:26:99 (UWEM:1), St. Joachim Mey., 4:V:63 (CLCC:1); No Date (MCZC:2)]. **[NO COUNTRY/STATE:]** Biewertrick, 8:1:79 (MCZC:1), Buffo., No Date (MSUC:1), Cambr., No Date (CASC:1, MCZC:3, USNM:1), Hayward, 3:26:23 (CASC:1), Hillsborg, IV:2:44 (USNM:1), Holyoethe, VII:43 (MCZC:1), Ithaca, IV (UAIC:1), K. Madison, No Date (CASC:1), Lear Mt. Lake, 5:VI:09 (USNM:1), L.I., (AMNH:1, USNM:1), Lud, VI (UAIC:1), Pad Stoy, 4:26:15 (USNM:1), Riley Co., No Date (USNM:1), S.I., No Date (UAIC:1, USNM:1), S. Ross Col., 6:25:96 (OSUC:1), S.R., 6:25:93 (AMNH:2), Westbyad [?sp.], 14:IX:43 (USNM:3), W.T., No Date (INHS:2, OSUC:1); Date Only: V:15:70 (USNM:11), VI:21:75 (USNM:2), VI:21:76 (USNM:1), VI:25:76 (USNM:1), 7:28:79 (MCZC:5), 3:18:86 (USNM:1), 6:25:97 (OSUC:1), 10:4:15 (UMDC:1), V (WSUC:15), X:7 (INHS:4), X (WSUC:7); No Data: (AMNH:2, DEFW:5, ICCM:4, INHS:35, MCZC:3, NCSU:1, UMDC:4, UMMZ:3, USNM:24).]

Phyllotreta undulata: **MARYLAND:** Prince Georges Co., Bladensburg, 8:15:13 (USNM:1). **YUGOSLAVIA:** Postojna, 7:V:1965 (EHSC:2, ZSBS:6).

Phyllotreta utana: **CALIFORNIA:** Sacramento Co., Franklin, VII:1:1932 (CDAE:1); **OREGON:** Crook Co., 7 Mi. E. of Terrebone, V:9:1956 (EHSC:3, ODAC:3), **Harney Co.,** Malheur Lake, VI:20-21:1951 (FMNH:1), **Klamath Co.,** Crooked Cr. Sprng., Hwy. 62 Bridge, V:31:1960 (AMNH:2), Crystal Cr. Upper Klamath Lk., V:31:1960 (AMNH:5, EHSC:3), 5 mi. E. Kirk 4200', 22:VII:1957 (OSUC:1), Klamath Falls, V:17:1956 (AMNH:1), 7:25:1957 (AMNH:1), Klamath Falls (Geary Ranch), VII:11:1954 (AMNH:1), Klamath Lake, 1917 (CASC:2), W. side of Upper Klamath Lk., VII:30:1969 (AMNH:1), 3 mi. S. Saddle Mt., VI:7:1962 (AMNH:1), Williamson Riv. Rch., 5:28:70 (AMNH:7, EHSC:5), Wood River Valley, VII:15:1956 (AMNH:1), **Multnomah Co.,** Portland, No Date (UAIC:1); **NEVADA:** Elko Co., Elko, No Date (UMRM:1); **UTAH:** Cache Co., Logan, V:28:1944 (EMUS:1), Logan Canon, 5:16:1934 (EMUS:1); **WASHINGTON:** Pierce Co., Puyallup, 10:V:1928 (CNCI:1).

Phyllotreta utanula: See species description under Type Material.

Phyllotreta zimmermanni: **ALABAMA:** Lee Co., N. Auburn Dairy Farm, 10:IV:1964 (EUBC:2), 3 mi N of Auburn, 24:III:1963 (EUBC:1), 3 mi SW Auburn, II:1965 (PADA:1), 3:24:1965 (PADA:1), **Shelby Co.,** Alabaster, 15:V:1955 (FMNH:1), Helena, V:15:55 (FMNH:2), [State Record: Lengoton, 19:5:48 (USNM:3)]; **ALASKA:** Circle, VI:10:1946 (CASC:1), Cooper Landing, Kenai Peninsula, VI:7:1951 (CNCI:1), Matanuska, VII:9:1945 (USNM:3), VII:19:1945 (USNM:1), Mutanuska, 5:VII:45 (USNM:1), V:14:1945 (USNM:1), V:18:1945 (USNM:7), V:29:1945 (USNM:1), VI:2:1945 (USNM:1), Ruby, 6:19:17

(USNM:1), 6:19:1919 (USNM:1); **ARKANSAS:** **Benton Co.**, Garfield, 10:VI:1975 (EHSC:1, UADE:3), Rogers, VI:6:1946 (EHSC:4, INHS:112), Siloam Springs, 5:18:07 (USNM:2), **Crawford Co.**, [County Only: 14:V:1970 (UADE:3), 6-22:V:1970 (UADE:1)], **Jackson Co.**, Ozone, 11:III:1972 (UMRM:3), **Pulaski Co.**, Little Rock, No Date (USNM:1), **Washington Co.**, Elkins, V:23:99 (USNM:1), 2.5 mi. N of Springdale, 3:24:1938 (USNM:2), [County Only: 3:23:38 (INHS:1), 6:8:39 (INHS:2), 2:III:1955 (UADE:1)]; **ARIZONA:** **Coconino Co.**, Grand Canyon North Rim 8000-9000 ft, VIII:18:34 (AMNH:1), VII:19:34 (AMNH:2), 7 mi. S. Flagstaff, 26:VII:52 (CASC:1), [State Record: State Only: No Date (DEFW:1)]; **CALIFORNIA:** **Los Angeles Co.**, Los Angeles, No Date (LACM:1), **San Mateo Co.**, [County Only: No Date (LACM:2)], **Siskiyou Co.**, Lower Klamath Lk., VI:9:1956 (AMNH:1), **Stanislaus Co.**, Modesto, VI-VII:1934 (DEFW:1), [State Record: State Only: No Date (SDSU:1)]; **COLORADO:** **Douglas Co.**, Larkspur, VIII:3:1932 (LACM:2), **Mineral Co.**, Creede, VI:26:1936 (ISUI:1), VII:2:1936 (ISUI:1), VII:7:1936 (ISUI:1), [State Record: Crocho Lake, X:1:1941 (CASC:1)]; **CONNECTICUT:** **Fairfield Co.**, Norwalk, VII:1:1916 (USNM:2), **Litchfield Co.**, Cornwall, 13:V:1925 (CUIC:1), Kent, VII:4:25 (MCZC:4), **New Haven Co.**, New Haven, VII:7:11 (PADA:1), **Windham Co.**, Nth Windham, VII:14:1894 (MCZC:1); **DISTRICT OF COLUMBIA:** Washington, VII:25:1919 (USNM:11), IV:22:1920 (OSUC:2), 29:V:32 (USNM:1), VI:18:93 (USNM:1), VI:19:22 (CASC:1), CNCI:1, MCZC:2, USNM:40, VI:11 (USNM:1), 1:III (USNM:1), 8:4 (USNM:1), 18:6 (USNM:1), 27:6 (USNM:1), 29:5 (USNM:2), 29:6 (USNM:3), No Date (DEFW:1, USNM:2), Piney Br., 11:4:04 (USNM:1), 16:5:05 (USNM:1); **GEORGIA:** **Clarke Co.**, Athens, 12:V:1963 (UWEM:2), **Rabun Co.**, Pine Mountain 1400', V:14:57 (CNCI:1), [State Record: State Only: No Date (MCZC:1, MSUC:2)]; **ILLINOIS:** **Adams Co.**, Quincy, III:12:1885 (INHS:1), **Calhoun Co.**, Kampsville, VI:10:1932 (INHS:1), **Carroll Co.**, Smith Park, Mt. Carroll, XII:6:1945 (INHS:3), **Champaign Co.**, Champaign, I:21:1945 (INHS:2), V:30:192- (INHS:1), Homer, IV:25:1909 (INHS:1), 1.5 mi. N.E. Mahomet, VII:10:1943 (INHS:2), Pesotum, VI:5:1908 (INHS:1), Trelease Woods, 15:II:1964 (INHS:1), Urbana, V:21:1885 (INHS:1), VII:16:1885 (INHS:1), IV:3:1888 (EHSC:2, INHS:3), VI:1:1889 (INHS:2), V:31:1920 (FMNH:6), XII:8:1925 (INHS:2), 4:10:1929 (ISUI:1), VI:20:1932 (INHS:2), 10:1:32 (FMNH:1), IX:16:1933 (INHS:1), X:3:1933 (INHS:2), X:15:1933 (INHS:1), X:24:1933 (INHS:4), XI:13:1933 (INHS:1), No Date (INHS:1), 1 mi. e. Urbana, VI:7:1957 (INHS:1), South Urbana, X:12:1933 (INHS:4), **Coles Co.**, Mattoon, VI:10:1928 (INHS:3), **Cook Co.**, Chicago, 1893 (USNM:1), VII:4 (ANSP:6), IV:28:1906 (INHS:1), IV:20:1907 (INHS:1), III (UWEM:1), IV (UWEM:1), No Date (CASC:3, USNM:3), Downers Grove, VI:25:1933 (FMNH:1), Elgin Bot. Gardens, VI:20:1946 (INHS:4), Evanston, Lake Michigan Beach, NU, 28:IV:1957 (WRSC:1), Homewood, 6:26:26 (FMNH:5), Palos Hills Forest Preserve, Burr Oak Woods, 17:IV:77 (EHSC:1), Palos Park, VII:24:04 (UMMZ:1), VI:22:11 (UMMZ:1), Summit, IV:11:41 (FMNH:1), Wolf Lake, V:5:1932 (INHS:1), **Douglas Co.**, Arcole, X:12:1949 (INHS:3), **DuPage Co.**, Hinsdale, X:25:29 (USNM:1), West Chicago, 20:VIII:1977 (EHSC:1), **Edgar Co.**, Chrisman, XII:9:1934 (INHS:1), **Effingham Co.**, Edgewood, VI:5:1951 (INHS:1), **Fayette Co.**, 5 mi. s. Brownstown, VI:9:1956

(INHS:1), 8 mi. s. Brownstown, VI:10:1956 (INHS:1), Farina, VI:14:1947 (INHS:1), **Franklin Co.**, Ziegler, VI:21:1950 (INHS:5), **Gallatin Co.**, Bowmanville, IV:3:04 (FMNH:3), **Greene Co.**, Eldred, VI:7:1949 (INHS:5), Hillview, VI:10:1927 (UAIC:1), **Hancock Co.**, Warsaw, VI:9:1932 (EHSC:2, INHS:6), **Henderson Co.**, Oquawka, VI:8:1949 (INHS:1), **Iroquois Co.**, Iroquois [sic], VI:5:1932 (INHS:1), **Jackson Co.**, Carbondale, V:21:1908 (USNM:1), VI:6:1910 (INHS:1), III:4:1928 (INHS:1), Cora, V:3:1946 (INHS:1), Murphysboro, XI:5:1942 (INHS:1), **Jo Daviess Co.**, Apple R. Can. S. P., VII:3:1946 (INHS:1), **Johnston Co.**, Cypress, V:17:1932 (INHS:1), Ferne Clyffe St. Pk., nr. Goreville, 23:VI:58 (FMNH:1), 5:VI:1971 (EHSC:9, MSUC:17), 5-6:VI:1971 (MSUC:8), Tunnel Hill, V:24:1961 (INHS:2), **Kane Co.**, Aurora, X:6:1933 (INHS:1), Elgin, VII:7:1947 (INHS:4), Elgin Prairie Hill, VIII:1:1944 (INHS:1), **Kankakee Co.**, Arome Pk., VIII:6:1947 (INHS:1), Kankakee River State Pk., V:17:1970 (FMNH:1), **Lake Co.**, Antioch, X:27:1943 (EHSC:2, INHS:5), Antioch Tamarack bog, X:15:1942 (INHS:1), Ft. Sheridan, V:7:05 (FMNH:2), Fox Lake, VIII:2:1924, Illinois Beach State Pk., 21:VI:52 (FMNH:1), Volo, X:7:1933 (INHS:1), X:27:1943 (INHS:1), Waukegan, X:27:1943 (INHS:1), [County Only: VI:21:1952 (INHS:2)], **LaSalle Co.**, Farm Ridge Township, XI:28:46 (FMNH:1), Ottawa, IV:18:1946 (INHS:1), Starved Rock State Park, XI:8:1943 (INHS:2), Utica, VI:20:1940 (UAIC:1), [County Only: 4:19:1937 (UAIC:1), VII:3:1937 (UAIC:1), III:20:1938 (CSUC:4, UAIC:4), III:27:1938 (UAIC:1)], **Logan Co.**, Elkhart, II:1:1944 (INHS:1), Lincoln, X:17:1933 (INHS:4), New Holland, X:21:1941 (INHS:1), **Madison Co.**, Edwardsville, VI:4:1941 (INHS:1), [County Only: V:1976 (INHS:4), VI:1976 (INHS:2), 6:21:78 (INHS:1), 7:20:78 (INHS:1)], **Madison & St. Clair Cos.**, [County Only: 6:13:78 (INHS:3), 6:21:78 (INHS:1)], **Marion Co.**, Kimmundy nr. Rt. 57, V:16:1971 (FMNH:2), Odin, V:28:1910 (INHS:7), **Mason Co.**, Havana, VIII:18:1907 (INHS:1), V:2:1912 (INHS:3), XI:9:1943 (INHS:4), Mason City, VI:21:1926 (INHS:2), Mason State Forest 5 mi. W. Manito, 9:VI:1960 (AMNH:1), **McHenry Co.**, Algonquin, 4:11:96 (INHS:1), 6:1:96 (INHS:1), 6:26:96 (INHS:1), McHenry, 6:25:98 (WSUC:2), **McLean Co.**, Bloomington, V:24:1883 (INHS:1), 2 mi. se. Carlock, VI:18:1953 (INHS:3), Normal, VI:27:1883 (INHS:18), **Mercer Co.**, Keithsburg, VI:8:1932 (INHS:1), **Peoria Co.**, Peoria, VI:23:1938 (INHS:4), VI:9:1942 (INHS:1), **Perry Co.**, DuQuoin, VII:5:1883 (INHS:1), Tamaroa, V:25:1954 (INHS:1), **Piatt Co.**, Monticello, X:3:1933 (INHS:2), VI:11:1934 (INHS:1), White Heath, 10:9:1924 (INHS:1), 7:9:1929 (INHS:2), 9:15:1929 (INHS:1), II:20:1938 (INHS:2), X:29:1939 (INHS:1), [County Only: I:2:1938 (INHS:1)], **Pulaski Co.**, Mound City, V:24:1932 (INHS:1), Pulaski, V:26:1907 (INHS:4), VI:28:1909 (INHS:2), **Putnam Co.**, [County Only: III:18:1913 (INHS:1), IV:20:1932 (INHS:1), V:28:1933 (INHS:1), VI:24:1932 (INHS:2)], **Randolph Co.**, Coulterville, VI:7:1910 (INHS:4), **Sangamon Co.**, Sherman, IV:3:1930 (INHS:3), Springfield, VI:27:85 (INHS:7), **St. Clair Co.**, Mascoutah, XI:16:1946 (INHS:1), [County Only: 8:6:02 (UMRM:1), 4:V:03 (UMRM:1)], **Union Co.**, Anna, VI:27:1909 (INHS:2), Cobden, IV:28:1884 (INHS:1), Grand Tower, V:6:1971 (FMNH:1), Pine Hills area nr. Wolf L., V:16:1971 (FMNH:1), Pine Hills Field Sta., V:15:1967 (CNCI:1), State Park Jonesboro, V:19:1932 (INHS:2), [County Only: VI:3:1937 (USNM:4)], **Vermilion Co.**, Catlin, III:18:1939 (INHS:1, ISUI:2), Oak-

wood, X:6:1933 (INHS:1), [County Only: 20:V:1926 (INHS:1), 6:VI:1926 (INHS:1), 27:VI:1926 (INHS:12)], **Wabash Co.**, Belmont, V:23:1961 (INHS:2), Mt. Carmel, VI:6:1941 (INHS:3), **Warren Co.**, Monmouth, IV:2:1928 (INHS:3), **Washington Co.**, DuBois, VII:2:1909 (INHS:1), VII:3:1909 (INHS:4), **Will Co.**, Lockport, VI:18:1960 (MSUC:1), **Woodford Co.**, Metamora, XII:27:1948 (INHS:1), [State Record: Beverly H's, V:17:03 (FMNH:1), Cory, VII:8:1947 (INHS:1), Funkhouser, III:27:1949 (INHS:1), Palisades S.P., VII:4:1946 (INHS:1), Roundhouse, VI:7:1949 (INHS:2), Salts, 18:IV:1926 (INHS:2), 10:VII:1926 (INHS:1), Spring Bay, VI:21:1942 (INHS:2), Tonti, V:24:1902 (INHS:1), White Pines S.P., VII:2:1946 (INHS:2); State Only: No Date (AMNH:1, ANSP:1, CNCI:1, DEFW:3, ICCM:1, INHS:9, UAIC:1, USNM:2, WSUC:3)]; **INDIANA: Benton Co.**, Talbot, VII:3:1972 (PURC:1), **Clark Co.**, State Forest, VI:22:1937 (PURC:1), **Daviess Co.**, [County Only: VIII:8:1938 (PURC:1)], **Gibson Co.**, [County Only: VI:13:1933 (UMMZ:1)], **Knox Co.**, Vincennes, V:30:24 (CNCI:1), [County Only: 7:2:03 (PURC:2), VI:16:1924 (PURC:4), XI:1:1937 (USNM:1), IV:6:1938 (USNM:1), 4:VI:1958 (PURC:1)], **Kosciusko Co.**, [County Only: 6:3:02 (PURC:2), 6:5:03 (PURC:2, TAMU:1), V:21:1933 (PURC:1), VI:8:1933 (PURC:1)], **Lake Co.**, Indiana Harbor, IV:23:05 (FMNH:3), Long Lake 5:7:26 (FMNH:1), 5:11:26 (FMNH:10), [County Only: 5:15:00 (TAMU:2), 1:5:04 (PURC:2), 5:5:07 (PURC:2)], **LaPorte Co.**, Michigan City, 15:IV:1973 (CDAE:5), **Lawrence Co.**, 3 mi W Bono, VI:20:1972 (PURC:2), **Marion Co.**, Indianapolis, VI:8:1961 (FSCA:1), [County Only: 5:31:96 (TAMU:1), 11:1:04 (PURC:2), 10:6:12 (PURC:2), 6:27:20 (PURC:1), 8:6:20 (PURC:1), 6:IV:21 (CUIC:2), 6:4:21 (CUIC:1), 6:5:23 (PURC:2), 6:11:29 (PURC:1), No Date (CNCI:2, PURC:1)], **Morgan Co.**, [County Only: VI:18:1933 (PURC:1)], **Porter Co.**, Bev. Shores, 10:IV:36 (FMNH:1), Dune Park, V:1:27 (FMNH:1), Dunes State Park, 17:V:72 (CDAE:2), 14:IV:1973 (CDAE:13), Ind. Dunes State Park, 29:V:1969 (EHSC:11), VI:4:1972 (FMNH:1), **Posey Co.**, [County Only: 4:22:04 (PURC:2), VII:11:1929 (UMMZ:1)], **Pulaski Co.**, [County Only: VII:2:1968 (NMDC:1)], **Putnam Co.**, [County Only: 7:2:04 (PURC:2)], **Saint Joseph Co.**, Mishawaka, VI:15:1932 (PURC:2), VII:8:1932 (PURC:1), **Tippecanoe Co.**, VI:29:1922 (PURC:1), III:18:1923 (CNCI:7, PURC:1), V:2:1923 (CNCI:1), V:6:1923 (PURC:1), II:15:1923 (UMMZ:1), V:25:1924 (CNCI:5), IX:25:1936 (PURC:1), 5:4:50 (INHS:1), 5:13:1950 (INHS:1), No Date (USNM:1), [County Only: XI:11:14 (PURC:1), XII:3:1930 (PURC:1), XI:21:1932 (PURC:1), XI:28:1932 (PURC:1), 6:10:1966 (NMDC:1), 6:18:1968 (NMDC:1), 19:VI:71 (EHSC:1)], **Vigo Co.**, [County Only: 3:19:93 (PURC:2), 8:19:93 (PURC:1)], **Wells Co.**, 3 mi WNW Bluffton, XI:27:1971 (CDAE:2), [State Record: Clarke, VII:4:04 (FMNH:4), Hovey, V:23:1964 (FMNH:4), Pine, VII:16:05 (FMNH:1), Winona L, No Date (USNM:1); State Only: No Date (MSUC:13)]; **IOWA: Appanoose Co.**, [County Only: I:1936 (USNM:1)], **Boone Co.**, Ledges State Park, V:16:1947 (ISUI:1), V:15:1956 (ISUI:1), **Buchanan Co.**, Independence, V:15 (USNM:1), No Date (USNM:1), **Cedar Co.**, [County Only: V:31 (USNM:1)], **Clayton Co.**, Backbone St. Pk., 4:VIII:1973 (UMRM:1), **Davis Co.**, [County Only: I:1936 (USNM:1)], **Dickinson Co.**, Lake Okoboji, 6:22:16 (USNM:1), VII:26:16 (USNM:1), [County Only: VI:1916 (USNM:1)], **Emmet Co.**, Estherville, V:20:1949 (ISUI:1), **Hamilton Co.**, Stratford, VI:30:1950 (ISUI:1), **Hancock Co.**, 8 mi. SE Britt, V:19:1928 (ISUI:1), **Howard Co.**, Cresco, 9:VI:1949 (ISUI:1), Elma, IV:6:04 (UMMZ:4), **Jasper Co.**, Colfax, V:29:1963 (ISUI:1), **Johnson Co.**, Iowa City, VI:5 (USNM:1), VI:08 (USNM:1), 1908 (USNM:1), VI:09 (USNM:1), VI:4:14 (USNM:1), 4:2:16 (USNM:1), 5:30:16 (USNM:3), 6:3:16 (USNM:1), VI:10:1919 (LACM:1), No Date (CASC:4, MCZC:2, USNM:2), **Lee Co.**, Montrose, VI:21:1927 (ISUI:2), VI:26:1927 (ISUI:4), VI:27:1927 (ISUI:5), VII:6:1927 (ISUI:1), VII:20:1927 (ISUI:1), **Linn Co.**, Palisades-Kepler St. Pk., VII:8:1950 (ISUI:1), **Madison Co.**, Pammel State Park, VII:4:1950 (ISUI:1), **Marshall Co.**, Marshalltown, VI:15:1949 (ISUI:2), **Page Co.**, Clarinda, IV:21:1953 (ISUI:2), Shenandoah, 6:11:1942 (ISUI:1), 6:11:46 (ISUI:2), VI:7:1952 (ISUI:1), VI:16:1952 (ISUI:1), **Polk Co.**, 4 mi. NE of Alleman, IV:26:1947 (ISUI:1), **Scott Co.**, Pleasant Val., 4:VII:1928 (CNCI:1), 5:VII:1928 (CNCI:1), **Story Co.**, Ames, 7:10:90 (ISUI:1), 4:15:92 (ISUI:1), 6:23:92 (ISUI:3), 7:19:95 (ISUI:1), 7:30:95 (ISUI:1), 5:4:96 (ISUI:2), 7:1:98 (ISUI:1), 6:14:1924 (ISUI:2), IV:12:1925 (ISUI:1), IV:23:1925 (ISUI:1), VI:4:1927 (ISUI:1), V:7:1928 (ISUI:1), V:17:1928 (ISUI:1), V:22:1928 (ISUI:2), V:30:1928 (ISUI:1), V:12:1929 (ISUI:2), V:14:1929 (ISUI:1), IV:12:1930 (ISUI:2), VI:20:1930 (ISUI:1), V:25:1931 (ISUI:1), VI:1:1931 (ISUI:1), IV:25:1932 (USNM:1), IV:30:1932 (USNM:1), V:21:1932 (TAMU:1), VI:26:1935 (ISUI:1), IV:5:1937 (ISUI:2), IV:30:1938 (ISUI:1), V:16:1938 (ISUI:1), V:12:1939 (ISUI:1), V:17:1939 (ISUI:1), IV:24:1942 (ISUI:1), 6:23:42 (ISUI:1), V:24:1943 (ISUI:1), VI:14:1943 (ISUI:1), VIII:5:1945 (ISUI:1), XI:5:1945 (ISUI:1), IV:12:1948 (ISUI:2), V:24:1948 (ISUI:1), XI:5:1948 (CSUC:2), IV:8:1950 (ISUI:1), IV:14:1950 (ISUI:1), IV:18:1950 (ISUI:1), IV:29:1950 (ISUI:1), V:1:1950 (ISUI:1), VI:15:1950 (ISUI:1), 5:6:1951 (ISUI:1), V:7:1951 (ISUI:2), 7:9:1951 (ISUI:1), VI:11:1952 (CSUC:3), IV:20:1953 (ISUI:1), IV:23:1953 (ISUI:1), VI:1953 (LACM:2), 5:25:56 (NDSU:1), IV:2:1959 (ISUI:1), IV:12:1961 (ISUI:1), V:28:1961 (ISUI:1), IV:27:1965 (ISUI:1), No Date (ISUI:22, UCRC:3), **Webster Co.**, Dolliver Mem. St. Pk., VI:30:1950 (ISUI:1), **Winnebago Co.**, Forest City, IV:4:1953 (ISUI:2), Thompson, V:9:1940 (ISUI:1), **Woodbury Co.**, Soo City [*sic*], No Date (DEFW:1), [State Record: Fraser, IV:13:1946 (ISUI:1), Lake Amana, VI:23:1928 (ISUI:1), Long Grove, 8:VI:1949 (ISUI:2), Spirit Lake, VI:1896 (UWEM:1); State Only: 7:93 (ISUI:2), No Date (ANSP:1, DEFW:2, ISUI:16, MCZC:2, MSUC:1)]; **KANSAS: Douglas Co.**, Baldwin, VI:190- (AMNH:2), Lawrence, IV:1928 (CNCI:16, EHSC:10), IV:1930 (CNCI:9), 6:VI:1901 (EMUS:1), [County Only: IV (LACM:1)], **Franklin Co.**, Ottawa, 8:VI:1901 (EMUS:1), 10:VI:1901 (EMUS:1), **Pottawatomie Co.**, Onaga, 27:III:03 (UMRM:1), **Riley Co.**, [County Only: IV:21 (USNM:1), IV:25 (USNM:1), V:24 (USNM:1)], **Shawnee Co.**, Topeka, No Date (USNM:2), 10 mi. W of Topeka, VI:10:1941 (FMNH:1), [State Record: State Only: No Date (CNCI:1, CSUC:2, PURC:9)]; **KENTUCKY: Christian Co.**, 5 mi. W Hopkinsville, 22:IX:1967 (CNCI:1), **Henderson Co.**, Henderson, 5:7:22 (LACM:1), V:7:22 (UDMC:1), **Rowan Co.**, Morehead, VI:11 (OSUC:2); **LOUISIANA: Tangipahoa Par.**, Hammond, III:21:1922 (USNM:2); **MASSACHUSETTS: Bristol Co.**, Fall River, IV:29:08 (MCZC:1), VII:27:08 (MCZC:1), **Hampden Co.**, Chicopee, No Date (CASC:2, UMRM:4), Springfield, No Date (MCZC:1), **Hampshire Co.**, Amherst, V:4:1939 (VPIC:1), **Middlesex Co.**, Arlington, V:14:1924

(MCZC:2), Camb.[ridge], No Date (MSUC:1), Framingham, V:5:07 (MCZC:1), V:24:08 (MCZC:1), No Date (MCZC:2), Lincoln, 27:VI:37 (MCZC:2), Natick, 5:26:29 (UDMC:1), Sherborn, 7:8:06 (TAMU:1), 30:IV:11 (CUIC:1), 6:21 (USNM:4), X:30:1927 (MCZC:1), X:24:41 (FMNH:1), V:13:49 (GHNC:2), Stoneham, VI:9:17 (CUIC:5), VI:15:17 (CUIC:5), Tyngs [Tyngsboro] Mer'ck River, 4:25:01 (CASC:1), **Norfolk Co.**, Wellesley, VI:27:1894 (MCZC:1), **Suffolk Co.**, Boston, 7:7:95 (MCZC:14), VIII:1 (USNM:1), Dorchester, 21:VI:08 (MSUC:2), Roxbury, VII:4:1905 (MCZC:3), [State Record: State Only: No Date (CASC:1, CUIC:1, MCZC:1)]; **MARYLAND: Baltimore Co.**, Baltimore, VI:13:09 (CASC:1), VI:14 (CASC:1), VI:30 (CASC:1), **Calvert Co.**, Chesapeake Beach, IV:20:1930 (USNM:4), Plum Point, III:30:52 (GHNC:1), **Montgomery Co.**, Glen Echo, VI:1922 (USNM:1), Summer: 1922 (USNM:39), [County Only: VI:25:11 (USNM:3), VI:17:16 (USNM:3)], **Prince Georges Co.**, Beltsville, VI:15:13 (INHS:1), 23:V:43 (USNM:10), 3:IV:45 (USNM:10), Beltsville, Nat'l. Agr. Res. Cen., 12:IV:1969 (CDAE:3), Berwyn, IV (USNM:1), Bladensburg, 5:7:12 (UMDC:1, USNM:1), 7:10:12 (USNM:1), 8:4:12 (UMDC:1, USNM:1), 8:15:13 (UMDC:3, USNM:1), College Park, 5:18:12 (UMDC:1, USNM:1), 5:20:12 (USNM:1), V:19:1920 (USNM:1), 6:14:25 (UMDC:1), V:11:48 (UMDC:2), Riverdale, 7:14:12 (UMDC:1), **Washington Co.**, Hagerstown, IV:22:14 (USNM:2), 1:IV:15 (USNM:1), V:6:15 (USNM:1), V:13:16 (USNM:2), 27:IV:1975 (USNM:2), [State Record: Arundel, VI:19:1898 (UMDC:1), F Pawpaw, VI:14:1942 (USNM:1), Mayarsville [?sp.], III:26:15 (USNM:1); State Only: No Date (DEFW:1, UMDC:18)]; **MICHIGAN: Alcona Co.**, [County Only: VI:2:51 (UMMZ:1)], **Allegan Co.**, Fennville, 2:VII:1926 (MSUC:1), 14:VII:1926 (MSUC:4), Saugatuck, Lake Mich. Beach, V:20:1967 (AMNH:2), **Bay Co.**, [County Only: V:7:33 (DBUM:2, MSUC:1), 5:7:33 (MSUC:1)], **Berrien Co.**, Galien, 13:IV:1968 (EHSC:7, MSUC:10), 27:IV:1968 (MSUC:1), 22:VI:1968 (MSUC:5), 6:V:1969 (MSUC:1), 30:V:1974 (MSUC:1), 3:VI:1974 (MSUC:1), 15:VI:1974 (MSUC:3), 28:VI:1974 (MSUC:1), 2:VII:1974 (MSUC:1), St. Joseph, 29:VI:1968 (MSUC:1), nr. Stevensville, IV:27:1968 (MSUC:3), **Branch Co.**, near Tekonsha, 6:VII:1973 (MSUC:1), **Cheboygan Co.**, Cheboygan, V:12:1921 (UMMZ:2), **Genesee Co.**, Argentine, V:30:1932 (UMMZ:1), VI:13:1932 (UMMZ:17), Flint, V:25:1932 (UMMZ:9), **Huron Co.**, [County Only: VI:9:51 (UMMZ:1)], **Ingham Co.**, Ag. Coll., 5:13:91 (MSUC:1), 6:9:1892 (CUIC:1), III:19:1921 (MSUC:5), III:23:1921 (MSUC:2), III:26:1921 (MSUC:2), IV:2:1921 (MSUC:1), IV:4:1921 (MSUC:1), 6:V:1921 (MSUC:1), 28:X:1921 (MSUC:1), 8:IV:1922 (MSUC:2), 21:IV:1922 (MSUC:1), VI:20:1923 (CASC:4), 27:IV:1923 (MSUC:1), 19:XII:1923 (MSUC:1), 4:9:25 (UMDC:5), 8:V:1932 (MSUC:1, NDSU:1), Agric. College, V:10:1922 (CASC:5), Bear Lake Bog, 19:III:1969 (MSUC:1), East Lansing, 23:IV:1939 (UAIC:1), 3:V:1939 (UAIC:10), 3:VI:1939 (UAIC:1), VIII:8:1947 (MSUC:2), 19:V:1959 (MSUC:2), E. Lansing Toumey Woodlot, 12:IV:1968 (MSUC:1), M.S.U., 23:V:1971 (MSUC:1), Okemos, 13:VII:1968 (MSUC:13), Williamston, 16:VII:1944 (FMNH:1), **Iosco Co.**, [County Only: 6:20:48 (UMMZ:1)], **Kalamazoo Co.**, Gull Lake, 6:V:1968 (MSUC:1), 12:V:1968 (MSUC:1), 23:V:1968 (MSUC:1), 9:VII:1968 (MSUC:3), 31:VII:1970 (MSUC:1), Gull Lake Biol. Sta., 12:VII:1963 (MSUC:2), 11-18:VIII:1965 (MSUC:1), 12:V:1968 (MSUC:1),

16:VII:1972 (MSUC:1), **Lapeer Co.**, Deerfield twp, VII:5:1942 (UCRC:1), 1 mi. S. of Lum, 16:VI:1964 (PIME:3), 30:VI:1964 (PIME:4), **Macomb Co.**, E. of Memphis, 16:VI:1963 (PIME:1), 25:VI:1963 (PIME:11), 27:V:1963 (PIME:2), VII:9:1963 (PIME:1), 17:VII:1963 (PIME:2), 21:VII:1963 (PIME:9), 27:VII:1963 (PIME:1), 7:V:1964 (PIME:1), 17:VII:1965 (PIME:1), 27:VII:1967 (PIME:2), 7:V:1960 (PIME:3), 14:V:1969 (PIME:1), 15:VII:1969 (PIME:1), Richmond, 25:VI:1969 (PIME:4), 2:VII:1969 (PIME:4), 8:VII:1969 (PIME:1), **Manistee Co.**, [County Only: 7:5:52 (UMMZ:1)], **Midland Co.**, [County Only: 6:24 (MSUC:2), V:3:37 (MSUC:1), 6:6:37 (MSUC:1), No Date (DBUM:1)], **Missaukee Co.**, [County Only: 5:29:39 (MSUC:1)], **Monroe Co.**, Monroe, 8:VI:1921 (MSUC:1), **Muskegon Co.**, [County Only: 6:30:51 (UMMZ:1)], **Oakland Co.**, Orion Lake, 17:VI:1944 (FMNH:3), [County Only: VI:10:1924 (MSUC:1)], **Osceola Co.**, [County Only: 7:18:42 (MSUC:1)], **Saginaw Co.**, St. Charles, 11:VI:1969 (MSUC:1),⁴[County Only: VII:8:43 (MSUC:1), 7:16:50 (MSUC:1)], **Van Buren Co.**, Lawton, VII:17:24 (CASC:1), 17:VII:1924 (CASC:1), **Washtenaw Co.**, Ann Arbor, VII:6:1916 (UMMZ:1), VII:8:1916 (UMMZ:1), **Wayne Co.**, Detroit, VI:10:09 (UMMZ:1), No Date (USNM:1), [State Record: E.-Unis, 28:VI (DBUM:2), E.-U, 28:VI:08 (DBUM:1), 28:VI (DBUM:2)]; State Only: 13:V:1922 (MSUC:1), 6:VII:1922 (MSUC:1)]; **MINNESOTA: Aitkin Co.**, Tamarack, VII:3:1936 (DEFW:4), **Anoka Co.**, Friday sand dunes, VIII:8:1922 (CNCL:1), [County Only: IV:20:1940 (DEFW:12, EHSC:3)], **Beltrami Co.**, Blackduck, VII:8:1942 (DEFW:1), **Benton Co.**, [County Only: VIII:26:1924 (DEFW:1)], **Crow Wing Co.**, Mille Lacs, V:18:1940 (DEFW:17, EHSC:10), [County Only: V:14:1938 (DEFW:5)], **Dakota Co.**, [County Only: IV:22:1939 (DEFW:1)], **Goodhue Co.**, Red Wing, Summer:1938 (DEFW:2), **Hennepin Co.**, Nine Mile Creek, VI:19:1932 (DEFW:1), [County Only: VI:30:1938 (DEFW:1), IV:29:1939 (DEFW:1)], **Houston Co.**, La-Crescent, VI:16:1925 (DEFW:1), Mississippi Bluff 1-2 mi. N. State Line, V:30:1941 (DEFW:15, EHSC:6), Winnebago Creek, V:22:1937 (DEFW:1), V:30:1941 (DEFW:4, EHSC:2), V:30:1941 (DEFW:5, EHSC:2), **Jackson Co.**, [County Only: VI:18:96 (UWEM:1)], **Kandiyohi Co.**, [County Only: VI:26:1938 (DEFW:4, EHSC:3)], **LeSueur Co.**, LeSueur, Minnesota River, VII:17:1922 (DEFW:1), **Marshall Co.**, Alma twp. E. of Argyle, VII:6:1935 (DEFW:4, EHSC:2), V:18:1938 (DEFW:6), V:18:1940 (DEFW:14, EHSC:8), Mille Lacs Lake, VI:2:1937 (DEFW:1), [County Only: VI:2:1937 (DEFW:4)], **Mower Co.**, Austin, V:24:1957 (DEFW:2), **Norman Co.**, [County Only: VI:23:1937 (DEFW:1)], **Otter Tail Co.**, [County Only: VI:15:1936 (DEFW:2)], **Pine Co.**, Mine Dump, N bank Snake River, 4 mi E Pine City, V:1941 (DEFW:1), [County Only: V:27:1939 (DEFW:1)], **Polk Co.**, Crookston, VI:21:1932 (DEFW:1), VII:7:1935 (DEFW:2), Euclid, VI:13:96 (USNM:1), [County Only: VI:18:1936 (DEFW:1)], **Ramsey Co.**, St. Paul, IV:29:1939 (DEFW:1), 18:IV:1940 (DEFW:1), 2:VII:1940 (DEFW:1), VII:12:1940 (DEFW:1), St. Paul, University Farm, VII:27:1940 (DEFW:1), VII:6:1947 (DEFW:1), [County Only: No Date (DEFW:1)], **Rice Co.**, Fairbault, VI:20:1922 (CNCL:2), **St. Louis Co.**, Duluth, No Date (INHS:4, LACM:1), **Sibley Co.**, Riv. near Blakely, VII:17:1922 (DEFW:1), **Steele Co.**, Medford, VI:20:1922 (DEFW:1), Owatonna, VI:23:1923 (USNM:1), VI:25:1923 (CNCL:3, DEFW:1),

VI:25:1926 (CNCI:1), **Wabasha Co.**, Lake City, VI:23:1920 (CNCI:1, DEFW:4), VI:22:1921 (DEFW:2), **Washington Co.**, Hudson Br., St. Croix R. near Lakeland, V:1941 (DEFW:1), [County Only: V:7:1938 (DEFW:3), IV:23:1939 (DEFW:5)], [State Record: Frontenac, V:29:1930 (DEFW:4), Mallory, 7:2:1935 (UCRC:1), 7:16:1935 (UCRC:1), 9 Mile Creek, 4:30:38 (DEFW:1), Plummer, V:16:1933 (DEFW:1), VII:13:1935 (DEFW:1); State Only: No Date (USNM:4)]; **MISSISSIPPI: Adams Co.**, Natchez, V:14:09 (USNM:2), V:22:09 (USNM:1), V:25:09 (USNM:1), V:27:09 (USNM:1), V:28:09 (USNM:1), 3:30:27 (USNM:1), **Lafayette Co.**, Belmont, 10:12:68 (MSUC:1), **Oktibeha Co.**, Ag Coll, No Date (AMNH:1); **MISSOURI: Barry Co.**, Roaring River St. Park, VI:15:54 (CASC:4), **Boone Co.**, Columbia, 11:VI:1904 (DEUN:2), 12:VI:1907 (UMRM:1), 4:V:1930 (UMRM:1), VI:4:1930 (UMRM:10), V:12:1937 (UMRM:1), IV:10:1938 (UMRM:2), 4:25:40 (UMRM:1), V:11:1940 (UMRM:1), V:22:40 (UMRM:2), 3:12:1946 (UMRM:1), 3:28:1946 (UMRM:2), IV:14:1947 (UMRM:5), IX:26:1955 (UMRM:1), V:29:1969 (UMRM:1), VI:7:1969 (UMRM:1), 22:IV:76 (UMRM:6), Easley, 5:24:1939 (UMRM:10), McBaine, VI:7:1949 (UMRM:2), **Calloway Co.**, Fulton, V:17:1947 (UMRM:1), V:8:1949 (UMRM:8), V:29:1949 (UMRM:2), Reform, 2:VI:1975 (UMRM:3), Tucker Prairie, IV:16:1968 (UMRM:1), IV:19:1968 (UMRM:2), VI:20:1968 (UMRM:1), VI:23:1968 (UMRM:1), VIII:18:1968 (UMRM:1), **Cape Girardeau Co.**, Cape Girardeau, V:19:1930 (UMRM:1), V:13:1931 (UMRM:1), **Franklin Co.**, Pacific, V:7:23 (USNM:1), **Gentry Co.**, 6 mi. SE Albany, 12:VI:74 (UMRM:1), 13:VI:74 (UMRM:1), **Greene Co.**, Willard, VI:8:1920 (ANSP:3), **Holt Co.**, Mound City, VI:21:1968 (UMRM:1), **Jackson Co.**, Kansas, VI:6 (MCZC:1), **Lawrence Co.**, Mt. Vernon, IX:29:1963 (UMRM:1), V:27:1968 (UMRM:1), VI:3:1968 (UMRM:1), VI:5:1968 (UMRM:1), VI:6:1968 (UMRM:2), VI:10:1968 (UMRM:1), VI:12:1968 (UMRM:1), VI:13:1968 (UMRM:1), VI:17:1968 (UMRM:1), VI:19:1968 (UMRM:1), V:22:1969 (UMRM:1), V:23:1969 (UMRM:2), V:30:1969 (UMRM:1), VI:9:1969 (UMRM:1), **Marion Co.**, bluff S. jct. St. Rt. 168 & JJ, 18:V:1980 (EHSC:3), **Mississippi Co.**, Charleston, 4:20:15 (USNM:2), 2:17:17 (USNM:1), 2:26:17 (USNM:1), IV:16:17 (USNM:1), **Montgomery Co.**, Montgomery City, VI:15:1930 (CNCI:2), **Phelps Co.**, Rosati, V:20:1949 (UMRM:1), **Pike Co.**, New Hartford, IV:8:1941 (UMRM:1), **Polk Co.**, Bolivar, No Date (CASC:1), **Pulaski Co.**, Devil's Elbow 0.5 mi. SE jct. US 66 & St. Rt. 28, 27:V:1972 (EHSC:40), **Putnam Co.**, 2 mi. W Unionville, VI:12:1974 (UMRM:1), **Randolph Co.**, Randolph Bennett Wildlife Area, 25:V:1975 (UMRM:1), **St. Charles Co.**, Weldon Spr., VI:3:1968 (UMRM:1), **St. Louis Co.**, Baden, IV:12:76 (USNM:7), Blackjack, 12:1:32 (USNM:1), Kirkwood, IV:14:76[1876] (USNM:20), Meramec, 4:19:20 (USNM:1), Ranken, V:23:1934 (UMRM:2, USNM:1), V:29:38 (UMRM:4), V:30:46 (AMNH:3, GHNC:1), St. Louis, No Date (AMNH:2, USNM:1), Valley Park, 10:30:19 (USNM:3), 4:20:20 (USNM:2), Webster Groves, VI:9:29 (USNM:1), 3:26:1921 (USNM:1), **Stoddard Co.**, 2.8 mi NE of Dexter Holly Preserve, VI:12:1975 (UMRM:3), Mingo Wildlife Refuge, VI:12:1975 (UMRM:1), **Vernon Co.**, Nevada, 23:III:1963 (UMRM:1), In Nevada area, 8:VI:1964 (FSCA:1), [State Record: Lay, No Date (USNM:17), Spanish Lake, IV:18:24 (USNM:2); State Only: June (USNM:3), No Date (ANSP:8, CASC:1,

CSUC:2, DEFW:13, IHNS:2, USNM:20)]; **MONTANA: Lewis and Clark Co.**, Helena, VIII:9:09 (USNM:1), **Ravalli Co.**, Florence Mont. Expr. Station, VI:24:1912 (USNM:1); **NEBRASKA: Cuming Co.**, West Pt., 4:88 (DEUN:1), 6:88 (DEUN:2), 6:18 (DEUN:1, USNM:1), **Douglas Co.**, Omaha, 27:VI:1904 (USNM:3), 28:VI:04 (USNM:1), VI:23:1907 (CASC:4), IV:22:1915 (DEUN:3), IV:30:1915 (DEUN:1), **Lancaster Co.**, Lincoln, 5:10:1913 (DEUN:2), IV:27:1915 (DEUN:3), IV:29:1915 (DEUN:1), IV:1915 (DEUN:4), V:2:1915 (DEUN:1), V:4:1915 (DEUN:1), V (DEUN:1), VI (DEUN:11), VII (DEUN:2), No Date (DEUN:6), **Nuckolls Co.**, Superior, 25:5:01 (UMRM:2), **Otoe Co.**, Nebraska City, VI (DEUN:6), [State Record: State Only: No Date (DEFW:1)]; **NEW HAMPSHIRE: Hillsborough Co.**, Manchester, 7:5 (USNM:1), **Strafford Co.**, Durham, VI:22:1907 (USNM:3), VII:5:1907 (USNM:7); **NEW JERSEY: Bergen Co.**, Palisades, 22:VI:39 (FMNH:1), Ridgewood, VI:30:1911 (CUIC:7), **Burlington Co.**, N. Lisbon, 6:28:30 (AMNH:7), [County Only: VI:4 (USNM:2)], **Camden Co.**, Camden, 1:19 (USNM:4), Collingswood, III (CASC:4), Haddon Hts., 6:8:34 (CNCI:1), 5:13:36 (CNCI:1, USNM:1), 6:5:36 (CNCI:1), [County Only: IX (CASC:2)], **Cumberland Co.**, Vineland, 11:17:11 (AMNH:1), 11:17 (AMNH:1), **Gloucester Co.**, Wenonah, VII:4 (MCZC:1), Westville, 1:28:99 (USNM:2), Woodbury, VI:13:01 (USNM:14), 6:22 (MCZC:1), **Hunterdon Co.**, Lambertville, VI:24:74 (CDAE:3), **Mercer Co.**, Trenton, VI:16:74 (CDAE:1), VI:17:74 (CDAE:1), **Middlesex Co.**, Avenel, VI (ICCM:1), **Morris Co.**, Boonton, V:15:01 (USNM:1), VI:14:01 (USNM:2), VIII:23:01 (USNM:1), Mountain Lakes, 23:VI:40 (FMNH:1), Troy Hills, VI:28:02 (USNM:1), **Ocean Co.**, Lakehurst, VII:3:12 (AMNH:8), **Somerset Co.**, East Millstone, 21:VI:1968 (USNM:4), **Sussex Co.**, Hopatcong, No Date (AMNH:2), [State Record: VanCortland Pk., 13:VI:39 (FMNH:1), 15:VI:39 (FMNH:2), 21:VI:39 (FMNH:24), 27:VI:40 (FMNH:4); State Only: No Date (SDSU:7, USNM:2)]; **NEW MEXICO: [State Record: State Only: No Date (ICCM:1)]; NEW YORK: Brooklyn Co.**, Rockaway, 5:11:04 (AMNH:1), **Cattaraugus Co.**, Eden, V:4:1955 (CUIC:1), **Eric Co.**, Buffalo, 6:9:88 (CASC:1), Lancaster, 9:27:10 (CASC:1), **Essex Co.**, Whiteface Mt. trail, VII:12:1914 (USNM:1), **Madison Co.**, Bridgeport, V:20:14 (USNM:4), **Monroe Co.**, Rochester, 24:VI:1914 (CUIC:1), 25:VI:1914 (CUIC:1), 8:VIII:32 (LACM:3), VI:19:1952 (LACM:1), VIII (LACM:2), **Nassau Co.**, Baldwin, L.I., VI:30:45 (INHS:10), Flushing, L.I., No Date (CNCI:6), Hicksville, L.I., No Date (INHS:4), Long Bch, L.I., 4:26:1925 (CUIC:1), Roslyn, L.I., VI:20:1930 (FSCA:1), VII:4:1930 (FSCA:1), **New York Co.**, City & vcty., No Date (USNM:1), **Niagara Co.**, Olcott, 7:19:1925 (CUIC:1), **Onondaga Co.**, Elbridge, V:13:1940 (NMDC:2), Westrale, W of Syracuse, 3:VIII:1969 (CUIC:1), [County Only: IV:14:1952 (NMDC:1)], **Orange Co.**, Ft. Montgomery, 6:15:1913 (CUIC:1), Tuxedo, 26:V:40 (FMNH:1), West Point, IV:7:1906 (USNM:2), IV:9:1919 (USNM:1), IV:19:1909 (USNM:2), IV:7:1909 (USNM:2), IV:9:1909 (USNM:1), V:4:1909 (USNM:1), V:6:1909 (USNM:2), V:14:1909 (USNM:10), V:18:1909 (USNM:2), **Orleans Co.**, Albion, 21:7:19 (USNM:1), **Queens Co.**, Sea Cliff, L.I., 17:V:71 (FMNH:1), **Saint Lawrence Co.**, Potsdam, VIII:1:1905 (UMMZ:1), **Tompkins Co.**, Freeville, 5:VI:1917 (CUIC:1), Ithaca, Van Natta's Dam, 8:V:1936 (CUIC:1), Ithaca, 9:V:95 (CUIC:1), 8:VII:98 (CUIC:2), 2:V:09

(CUIC:1), 10:V:15 (CUIC:1), 13:XI:16 (CUIC:1), 21:V:1916 (CUIC:1), 27:V:16 (CUIC:1), 28:V:16 (CUIC:5), 12:VI:16 (CUIC:2), 17:VII:16 (CUIC:5), 31:V:18 (CUIC:5), 8:VI:1919 (CUIC:1), 31:VI:25 (CUIC:4), 23:VI:28 (CUIC:1), 17:VII:28 (CUIC:1), 24:VII:28 (CUIC:1), 9:VI:1935 (CUIC:1), 20:VII:1935 (CUIC:1), 11:V:1936 (CUIC:1), 24:VI:36 (CUIC:1), 13:VI:66 (CUIC:1), 14:VII:1967 (CUIC:1), 29:VII:1979 (CUIC:2), **Westchester Co.**, Peekskill 6:83 (PSUC:3), No Date (AMNH:1, UAIC:1), [State Record: Bear Mt., 11:V:41 (FMNH:1), Hubbardville, VI:7:17 (CUIC:1), top of Mt. Whiteface, 7:7:1922 (USNM:1), U. Seaica, (CASC:3); State Only: No Date (AMNH:1, MCZC:1, USNM:2)]; **NORTH CAROLINA: Buncombe Co.**, Asheville, No Date (MCZC:2), **Cherokee Co.**, Murphy, V (CASC:1), **Columbus Co.**, Chadbourn, V:1:20 (USNM:21), V:1922 (USNM:2), No Date (USNM:8), **Macon Co.**, Highlands, V:8:57 (CNCI:2), V:12:57 (CNCI:1), **McDowell Co.**, 20 mi E. 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Index to Plant Names

The following is an index to the names of plants as they appear in the text. Where an obvious misspelling is involved, the correct spelling has been indicated. Since there is no single general authority for current botanical names, I have chosen to follow Britton and Brown's *An Illustrated Flora of the Northern United States and Canada* which was first published in 1913 and reprinted by Dover in 1970. However, I have not followed Britton and Brown for *Armoracia* and *Prunus*.

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