**INTRODUCTION**

Crepidodera Chevrolat is a genus of small metallic-coloured flea beetles belonging to the family Chrysomelidae. Although these insects are quite common in the field and numerous in museum collections, the members of the genus in North America are, until now, poorly known. Heikertinger (1948-1950) recognized 4 taxa and recently, Lazurko (1974) described 3 additional species. These 7 species were recognized primarily on the basis of genital differences and were otherwise difficult to identify.

Examination of a large accumulation of museum material and investigations in the field have indicated the presence of several additional species in the North American fauna. A detailed study of external characters, male genitalia and female a spermathecae has revealed, in material previously referred to the Palaearctic species, C. fulvicornis (F.), a complex of closely related species.

Essentially nothing was known about the biology of the North American species. General information on host plants was available and the general seasonal occurrence and habits of adults were described by Luan (1967b). However, the immature stages and life histories of all members of the genus were unknown. This has now been remedied with the discovery, during the course of this study, of the larvae of two species.

The main purpose of this paper, therefore, is to consolidate the existing information on the genus in North America, describe 8 new species, redefine the previously described species, provide a key and illustrations to aid in their identification, and to describe the immature stages for 2 species. A discussion of the host plant relationships and the general life history of members of the genus is also presented.

**BIOLOGY**

Members of the genus Crepidodera in both North America and the Palaearctic Region have been well known to feed as adults on the leaves of various species of willow (Salix), poplar (Populus) and, in North America, on certain members of the Family Rosaceae such as hawthorn (Crataegus), wild cherry, wild plum (Prunus spp.) and apple (Pyrus). The most comprehensive source of information on the biology of the European species is Heikertinger (1925) who listed, for each of five species, the known food plants, the type of habitat in which it is found, the seasonal occurrence and, in a few cases, provided brief notes on adult feeding habits and time of oviposition. None of the species of Crepidodera are definitely known to be monophagous, i.e. restricted to one species of plant. Most appear to be oligophagous, feeding on a few species of a single genus or, in some cases, on plants of two or three genera.

Some of these species are further restricted within a host genus to a single host or a "compact group of host species" (Allen, 1972). For example, C. plutus is restricted to narrow-leaved tree willows such as Salix alba and S. fragilis. In contrast, C. fulvicornis, C. lamina Bedel and C. aurea (when it feeds on Salix) strongly favour low-growing shrubby broad-leaved willows (sallows) such as Salix caprea L. The main species of Populus reported to be hosts of Palaearctic Crepidodera are P. alba L., P. nigra L. and P. tremula L. Crepidodera aurata apparently occurs on all three of these (Heikertinger, 1925, 1948-1950) with no preference indicated. Crepidodera aurea, C. lamina and C. nitidula have been recorded from both P. tremula and P.
A similar situation seems to exist with regard to the host plant relationships of the North American species of Crepidodera. The known and probable host plants of the genus in North America are listed in Table 1.

At least one-half of the North American species appear to be restricted entirely to Salix spp. These include longula, spenceri, browni, opulenta, luminosa, bella, aerea and sculpturata. Three of these are recorded only from Salix and the remainder each have only a few other host records which are either so unlikely or so few as to be almost certainly adventitious.

Two species may be either restricted to or mainly confined to Populus spp. Crepidodera waga is known only from Populus deltoides. However, this record comes only from a single series of specimens taken in the same locality on the same date. The majority (76%) of the host plant records for C. populivora are Populus spp., but 18% of the records are from Salix spp. It is possible that C. populivora utilizes both Populus and Salix although strongly preferring Populus. In field studies, however, populivora was rarely found on Salix, even in habitats where it was abundant on Populus, and seemed to be restricted to the latter group of plants.

Five species (solita, decora, heikertingeri, digna and nana) have been taken in considerable numbers on both Salix and Populus, but in all of these, 90% or more of the host records are Salix spp. Therefore, if they do feed on both genera of plants, they all show a very strong preference for Salix spp. Only one of these species, solita, was actually observed to feed on leaves of Populus. This occurred in the laboratory.

LIFE HISTORY

Species of Crepidodera overwintering as adults, do so generally in the surface litter below their host plants (Loan, 1967b). North American specimens have been recorded during winter months in different parts of the range overwintering in leaves, grasses, rotting wood, and "trash". A number of adults of 3 different species have been found overwintering in the lichen, Usnea plicata (Old Man's Beard), growing on oak trees in Oregon.

Overwintered adults emerge early in the season and are found on their host plants soon after the leaves appear. At this time, if warm temperatures prevail, the flea beetles are quite active and abundant. They begin feeding on the leaves of the host and, shortly after, commence mating. Adults feed on either the upper or lower surfaces of leaves. Feeding damage is of a type typical of flea beetles in general. The beetles produce small holes or pits in the leaf by eating through the epidermis and underlying tissues, leaving the opposite epidermal layer intact. The tissue below the injury eventually dries up and falls out, giving a shot-hole appearance. The pits are irregular in outline and range from about 1 to 3 mm in diameter. Occasionally, larger pits run together to form larger areas of damage.

In the Ottawa area, mating occurs during a period of close to 2 months, from the latter half of May through the early part of July. Copulation takes place usually on the leaves or branches of the host shrubs or trees. The male mounts the female from the rear and, clinging to her posterior dorsum, extends the curved aedeagus down and forward into the female's vagina at the tip of the abdomen.

Loan (1967b) reported that females of Crepidodera collected on Salix near Belleville, Ontario were nongravid in early May and that nearly all females were gravid by mid-June. He also found that the proportion of gravid females decreased from early July to about mid-August as old females died from senescence or parasitism and new ones emerged from the soil. In the present study, eggs were produced in the laboratory by field-collected females of C. heikertingeri (Lazorko) from late May until August 25. Oviposition in the field has not been observed in Crepidodera but it seems probable that eggs are placed in the soil or litter beneath the host plant. Immature stages of Crepidodera are known only for 2 species, C. solita n. sp. and C. heikertingeri (Lazorko) and are described for the first time in the species descriptions.

Eggs of the two species observed had an incubation period ranging from 10 to 16 days in the laboratory at 22-24° C. The first instar larva emerges through a slit across the apex of the egg. The larvae resemble the root-feeding larvae of other genera such as Epitrix Foudras and Phyllotreta Stephens. They are long, slender and
subcylindrical in shape and whitish in colour except for the head, prothorax and 9th abdominal tergum (anal plate) which are brown. There are 3 larval instars, all of which occur below the soil surface.

At least the first and second instar larvae feed by mining inside the smallest tender roots of the host plant. Mines extend along the roots beneath the epidermis in Ontario. New-generation adults have been found near the beginning of August in both laboratory rearing (present study) and in the field (Loan, 1967b). The population of new adults increases during August and remains on the host plants until the onset of cold weather or until the leaves have fallen in late October.

SYSTEMATICS

Genus Crepidodera Chevrolat 1837


Foudrasia des Grozis 1882, p. 134 (new name for Chalcoides Foudras).

1. For additional references see Heikertinger and Casi, 1939.

Type Species: Chrysoæelus nitidula L., designated by Mauilik 1926, p. 234.

DIAGNOSIS: shape broadly oval and slightly elongate to elongate-oval, moderately convex; dorsum shining metallic with pronotum and elytra essentially unicolorous; pronotum generally strongly punctate and with a distinct prebasal transverse impression limited on each side by a sharp longitudinal impression extending from base, space between transverse groove and base not
TABLE 1. Known and probable host plants of North American Crepidodera spp.

(* indicates species records suspected to be adventitious)

<table>
<thead>
<tr>
<th>Host Plant</th>
<th>Habitat</th>
<th>Crepidodera spp. Recorded</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Family Rosaceae</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crataegus L.</td>
<td>disturbed sites, thickets along streams</td>
<td>*nana, *populivora, violacea</td>
</tr>
<tr>
<td><strong>Prunus americana</strong></td>
<td>moist woods, roadsides, fence-rows</td>
<td>*browni, *nana, violacea</td>
</tr>
<tr>
<td>Marsh.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P. angustifolia</td>
<td>sandy or sterile soil, open woods, thickets, fence-rows</td>
<td>violacea</td>
</tr>
<tr>
<td>Marsh.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P. pensylvanica L.</td>
<td>dry or moist woods and forest clearings</td>
<td>violacea</td>
</tr>
<tr>
<td>P. persica (L.)</td>
<td>introduced</td>
<td>*browni, *nana, violacea</td>
</tr>
<tr>
<td>Patsch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P. serotina Ehrh.</td>
<td>roadsides, waste land, forest margins</td>
<td>*browni, violacea</td>
</tr>
<tr>
<td>P. virginiana L.</td>
<td>rich moist soils, fence-rows, streams, forest margins</td>
<td>violacea</td>
</tr>
<tr>
<td>? Pyrus L.</td>
<td>in cultivation</td>
<td>violacea</td>
</tr>
<tr>
<td><strong>Family Salicaceae</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P. deltoides Marsh.</td>
<td>low woods and moist prairies</td>
<td>*nana, *solita, vaga</td>
</tr>
<tr>
<td>(=P. virginiana Four.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P. grandidentata Michx.</td>
<td>dry woods, slopes, recent burns</td>
<td>populivora, *solita</td>
</tr>
<tr>
<td>P. tremuloides Michx.</td>
<td>dry or moist soil, dry open woods, recent</td>
<td>*decora, *digna, *beikertingeri, populivora, *solita, *spenceri</td>
</tr>
<tr>
<td>P. trichocarpa Torr. &amp; Gray</td>
<td>low-lying damp areas, sandy or gravelly soils</td>
<td>*beikertingeri, populivora</td>
</tr>
<tr>
<td>Salix alba L.</td>
<td>introduced, escaped along rivers</td>
<td>solita</td>
</tr>
<tr>
<td>Host Plant</td>
<td>Habitat</td>
<td>Crepidodera spp. Recorded</td>
</tr>
<tr>
<td>------------</td>
<td>---------</td>
<td>--------------------------</td>
</tr>
<tr>
<td><em>S. alba x fragilis</em> (hybrid)</td>
<td>low areas, river banks</td>
<td>decoraria, helkertingeri, solita</td>
</tr>
<tr>
<td><em>S. bebbiana</em> Sarg.</td>
<td>moist or wet places</td>
<td>decoraria, helkertingeri</td>
</tr>
<tr>
<td><em>S. cordata</em> Michx.</td>
<td>sandy and alluvial shores</td>
<td>sculpturata, solita</td>
</tr>
<tr>
<td><em>S. discolor</em> Muhl.</td>
<td>swamps and wet ground</td>
<td>decoraria, helkertingeri, <em>populivora</em>, solita</td>
</tr>
<tr>
<td><em>S. exigua</em> Nutt.</td>
<td>sandbars, streambanks</td>
<td>nana, sculpturata</td>
</tr>
<tr>
<td><em>S. fragilis</em> L.</td>
<td>introduced, escaped in low areas, along river banks, lake shores</td>
<td>browni, decoraria, helkertingeri, nana, solita, <em>populivora</em></td>
</tr>
<tr>
<td><em>S. humilis</em> Marsh. (=<em>S. tristis</em> Ait.)</td>
<td>dry, often sandy uplands, roadsides</td>
<td>nana</td>
</tr>
<tr>
<td><em>S. interior</em> Rowlee</td>
<td>sandbars, mudbars, moist alluvial soil</td>
<td>nana, solita</td>
</tr>
<tr>
<td><em>S. lasiolepis</em> Benth.</td>
<td>along rocky streams at lower elevations (<em>S.</em> B.C. to Baja California) and arroyos</td>
<td>aereola</td>
</tr>
<tr>
<td><em>S. lucida</em> Muhl.</td>
<td>moist low ground, swamps, bogs, wet meadows</td>
<td>decoraria, digna, helkertingeri, nana, <em>populivora</em></td>
</tr>
<tr>
<td><em>S. melanopsis</em> Nutt.</td>
<td>stream banks</td>
<td>sculpturata</td>
</tr>
<tr>
<td><em>S. nigra</em> Marsh.</td>
<td>alluvial soils along streams, and in meadows</td>
<td>nana, solita</td>
</tr>
<tr>
<td><em>S. patula</em></td>
<td></td>
<td>nana</td>
</tr>
<tr>
<td><em>S. petiolaris</em> Smith (=<em>S. gracilis</em> Anderss.)</td>
<td>moist meadows, streambanks, lake shores, bogs</td>
<td>decoraria, digna, helkertingeri, nana, <em>populivora</em>, sculpturata, solita</td>
</tr>
</tbody>
</table>
Host Plant | Habitat | Crepidodera spp. Recorded
--- | --- | ---
*S. purpurea* L. | introduced, escaped along river banks, lake shores, roadides | *nana*
*S. pyrifolia* Anderss. | moist to wet or swampy ground, bogs | *digna*
*S. repeas* L. | introduced from Europe (arboretum) | *nana*
*S. sericea* Marsh. | moist rocky ground, often near running water | *nana*

Key to the United States and Canadian Species of *Crepidodera* Chevrolat

1. Colour entirely reddish-yellow to light reddish-brown except sutural region of elytra darker and with a faint greenish reflection as in head and pronotum; east-central United States; on *Salix* .................................................. 1 *longula* Horn
   Colour of dorsal surface metallic green, brassy-green, coppery, bronze, blue, violet, purplish, black or a combination of some of these colours; ventral surface black .................................................. 2
2. Dorsal surface violet or dark purple, dark blue, blue-green, greenish, all with violet reflections; pronotal ante-basal transverse impression shallow, feebly pronounced (Fig. 1); pronotal disc with major punctures fine to moderate in size (Fig. 1); eastern United States and Canada; on *Prunus* or *Crataegus* ........................................
   .......................................................................................................................... 2 *violacea* Melsheimer
   Dorsal surface not violet and without violet reflections; pronotal ante-basal transverse impression deeper, strongly pronounced (as in Figs. 2, 3, 4); pronotal disc with major punctures moderate to coarse in size .................................................. 3
3. Elytral disc strongly, distinctly depressed behind basal one-quarter (Figs. 5, 6); vertex of head along anterior edge of pronotum strongly, distinctly punctate (Fig. 2); southeastern United States; on *Salix* .................................................. 13 *bella* n. sp.
   Elytral disc at most only feebly depressed behind basal one-quarter (Fig. 7); vertex of head along anterior edge of pronotum smooth, occasionally with a few scattered fine punctures (as in Figs. 3, 4). .................................................. 4
4. Elytron at declivity bulging laterally, overhanging and hiding part of lateral margin (Fig. 8); dorsal surface metallic green, brassy-green, coppery-green, pure coppery, coppery-bronze or dark bronze; southern Ontario and eastern United States; on *Salix* .................................................. 6 *browni* n. sp.
   Elytron at declivity evenly rounded, not overhanging lateral margin (as in Fig. 9) or, if slightly bulging, dorsal surface not coloured as above or range differing from above .................................................. 5
5. Median setae of first abdominal sternum in both sexes short, sparse and inconspicuous (as in Fig. 16); major punctures of pronotum dense, very uniformly distributed, moderate to slightly coarse in size; elytral margins very narrow in dorsal view; dorsal surface black; California to British Columbia, Montana and Utah. .................................................. 3 *spenceri* (Laszko)
   Median setae of first abdominal sternum in males longer and more conspicuous than in females (as in Fig. 11) or, in females, usually moderately dense; major punctures of pronotum sparse to dense, irregularly distributed, moderate to very coarse in size; elytral margins narrow or relatively broad in dorsal view; colour of dorsal surface variable .................................................. 6
6. Major pronotal punctures very coarse, equal to or greater than size of basal serial punctures of elytra, closely placed (Fig. 3); anterior pronotal angles strongly,
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acutely produced laterally (Fig. 3); median setae of first abdominal sternum in males uniformly dense, not forming a brush; California to Washington, Wyoming and Utah ........................................... 14 aerea (LeConte)
Major pronotal punctures moderate to coarse, less or not greater than size of basal serial punctures of elytra, sparse to closely placed; anterior pronotal angles feebly produced; median setae of first abdominal sternum in males variable, uniformly dense or denser apically forming a brush ........................................... 7

7. Middle and hind trochanters each with a distinct posterior marginal brush of setae (as in Figs. 13, 15); metasternum medially almost entirely covered with setae almost as long and conspicuous as those of first abdominal sternum which is, especially in males, conspicuously hirsute from base to apex; dorsal surface dark bronze, dark greenish, purplish or black ........................................... 8
Middle and hind trochanters with a few inconspicuous setae as in adjacent parts of femora; metasternum inconspicuously to conspicuously setose medially but glabrous near midline in posterior two-thirds (as in Figs. 14, 16) .................... 9

8. Elytral margins strongly broadened in dorsal view (Fig. 9); male with median setae of first abdominal sternum slightly denser apically, forming a loose, poorly-defined brush (Fig. 15); major pronotal punctures coarse, in size; dorsal surface dark bronze, purplish or greenish ....... 10 heikertingi (Lazorko)
Elytral margins moderately broad in dorsal view; male with median setae of first abdominal sternum not forming a brush (Fig. 13); major pronotal punctures sparse, moderate in size; dorsal surface black............................................. 11. digna n. sp.

9. Apical margin of last abdominal sternum emarginate, with an inflected median lobe (Fig. 11) ............................................. (males) 10
Apical margin of last abdominal sternum rounded or almost truncate, without a median lobe (Fig. 12) ............................................. (females) 20

MALES
10. Median pubescence of first abdominal sternum not or barely denser apically, not forming a brush (Fig. 11) ............................................. 11
Median pubescence of first abdominal sternum denser apically forming a distinct brush near hind margin. (Fig. 14) ..................... 13

11. Shape oval, slightly elongate; dorsum dark purple to black, rarely blue or blue-green; on Populus ............................................. 12 populiwora n. sp.
Shape elongate; dorsum bright green, blue-green, brassy-green, coppery-green, pure coppery to dark bronze; on Salix ............................... 17

12. Pronotum appearing strongly convex or slightly swollen anteriorly (Fig. 4); elytral margins narrow in dorsal view; median lobe of genitalia evenly arcuate in lateral view (Fig. 31) ............................................. 15 sculpturata (Lazorko)
Pronotum moderately convex, not appearing swollen anteriorly (as in Figs. 1, 2, 3); elytral margins narrow to moderately broad in dorsal view; median lobe of genitalia in lateral view, bent at basal one-third, straight in apical two-thirds (Fig. 32) ............................................. 16 nana (Say) (in part)

13. Colour of dorsum dark bronze or coppery bronze to purplish ......................... 14
Colour of dorsum bright green, blue-green, brassy-green, bronze-green or coppery-green ................................. 17

14. Elytral margins moderately to strongly broadened in dorsal view (as in Fig. 9); brush of setae on first abdominal sternum very distinct, well-defined (Fig. 14) ............................................. 4 solita n. sp.
Elytral margins narrow in dorsal view (as in Fig. 10); brush of setae on first abdominal sternum distinct, well-defined or poorly developed to obsolete ........... 15

15. Median lobe of genitalia, in lateral view, bent at basal one-third, straight in apical two-thirds (Fig. 32) ............................................. 16 nana (Say) (in part)
Median lobe of genitalia, in lateral view, evenly arcuate ......................... 16

16. Median lobe of genitalia, in dorsal view, strongly narrowed in apical one-third (Fig. 25) ............................................. 9 vaga n. sp.
Median lobe of genitalia, in dorsal view, of almost even thickness or only slightly tapered in apical two-thirds (Fig. 23) ................................... 7 opulentia (LeConte) (in part)

17. Median lobe of genitalia, in lateral view, bent at basal one-third, straight in apical two-thirds (Fig. 37) ............................................. 16 nana (Say) (in part)
Median lobe of genitalia, in lateral view, evenly arcuate .............................. 18
19. Range in southwestern United States; elytral margins narrow in dorsal view (as in Fig. 10) ........................................ 7 opulenta (LeConte) (in part)  
Range in eastern United States and Canada; elytral margins narrow to moderately broad in dorsal view ........................................ 19
20. Elytral margins moderately broad in dorsal view; major pronotal punctures sparse to moderately dense; ventral side of median lobe of genitalia without distinct longitudinal impressions at middle (Fig. 71) ........................................ 5 decora n. sp.
21. Range in eastern United States and Canada; elytral margins narrow to moderately broad in dorsal view; major pronotal punctures dense; ventral side of median lobe of genitalia with a distinct longitudinal impression on each side at middle. (Fig. 24) ........................................ 8 luminosa n. sp.

FEMALES
20. Dorsal surface dark bronze, coppery-bronze, dark blue, dark purple to black ........................................ 21

21. Elytral margins moderately to strongly broadened in dorsal view (as in Fig. 9); first abdominal sternum with a median patch of very crowded setiferous punctures near hind margin (as in Fig. 16) ........................................ 4 solita n. sp.
Elytral margins narrow in dorsal view; first abdominal sternum with setiferous punctures uniformly placed or only slightly crowded medially near hind margin. ........................................ 22

22. First abdominal sternum with setiferous punctures uniformly distributed medially, not more crowded near hind margin; shape more broadly oval; dorsal surface dark purple to black; on Populus spp ........................................ 12 populivora n. sp.
First abdominal sternum with a median patch of slightly crowded punctures near hind margin; shape elongate-oval ........................................ 23

23. Range in Arizona, California and Utah ....................... 7 opulenta (LeConte) (in part)  
Range other than above ........................................ 24

24. Spermatheca with receptacle oval in shape (Fig. 45) ........................................ 9 vaga n. sp.
Spermatheca with receptacle globular (Fig. 52) ........................................ 16 nana (Say) (in part)  

25. Elytral margins moderately broad in dorsal view (as in Fig. 9) ........................................ 26
Elytral margins narrow in dorsal view (as in Fig. 10) ........................................ 28

26. Elytral margin at declivity strongly rounded to apex; dorsal surface green to blue-green ........................................ 5 decora n. sp.
Elytral margin at declivity more gradually rounded to apex ........................................ 27

27. Spermatheca (Fig. 44) with receptacle elongate-oval in shape. ........................................ 26
Spermatheca (Fig. 52) with receptacle globular in shape. ........................................ 8 luminosa n. sp. (in part)

28. Pronotum appearing slightly swollen or more convex anteriorly (as in Fig. 4); shape more elongate ........................................ 15 sculpturata (Lazorko)
Pronotum not swollen or more convex anteriorly (as in Figs. 1, 2, 3), shape elongate-oval ........................................ 29

29. Range east of Great Lakes and Mississippi River ........ 8 luminosa n. sp. (in part)
Range west of Great Lakes and Mississippi River ........................................ 30

30. Range in Arizona, California and Utah ....................... 7 opulenta (LeConte) (in part)
Range east and north of above ........................................ 16 nana (Say) (in part)

swollen, almost flat; elytra glabrous, regularly punctate-striate; procoxal cavities closed behind; hind tarsi with apical segment not globular; tarsal claws appendiculate; head with frontal tubercles elongate, oblique, convex, sharply delimited dorsally by distinct furrows; surface between frontal tubercle and margin of eye conspicuously, moderately punctate.

1. Crepidodera longula Horn  
Figs. 17, 37; Map 1.

Crepidotera longula Horn 1889, p. 240, 316  
(type locality, near McPherson, Kansas);  
Henshaw 1895, p. 28; Blatchley 1910, p. 1213; Leng 1920, p. 300; Heke 1924-1925, p. 65; Douglass 1929, p. 31;  
Balsbaugh and Hays 1972, p. 156.

**TYPE MATERIAL.** Lectotype, here designated: male, with labels "Ke"/"Lectotype 3836"/"Lectotype, Crepidodera longula Horn, φ, R.H. Parry, 1976". This specimen is in the Horn Collection, Museum of Comparative Zoology, Harvard University. The lectotype is the tenth in a series of 12 specimens. The first specimen in the series, a female, has a piece of red paper on the pin but bears only the label "Melsh". Therefore, it seems appropriate to select as lectotype the above male with a label denoting the type locality. The lectotype fits Melshemer's description except that the antennae, palpi and tarsi are rufotestaceous rather than yellow-testaceous, the sides of the pronotum are moderately rounded rather than feebly rounded, and the length is 2.6 mm rather than 1.1 mm. Another female specimen, besides the female mentioned above, bears only the label "Melsh". Four specimens besides the lectotype bear the label "Pennsylvania, Melshemer". A single male is labelled "Pa, Ziegler" and 4 specimens on one pin are labelled only "Ziegler".

In addition to the type series, 6 specimens of violacea labelled only "Melsh." occur in the Melshemer-Ziegler Collection but do not seem to be placed under any name. A single female specimen of violacea labelled "Melsh." is found under the name Caeporis nana and 2 specimens, a male labelled "Pennsylvania, Melshemer" and a specimen (sex undetermined) labelled "Pennsylvania, Ziegler" occur under the name Crepidodera helxines.

**DIAGNOSIS.** Dorsal surface violet to dark blue; pronotum with generally fine punctuation; pronotal transverse groove feebly impressed (less strongly pronounced than in other species); setae of the first abdominal sternum in the male short, inconspicuous (both sexes).

**MATERIAL EXAMINED:** 1100 specimens. CANADA: Ontario, Québec. UNITED STATES: Colorado, Connecticut, District of Columbia, Florida, Illinois, Indiana, Iowa, Kansas, Maine, Maryland, Massachusetts, Michigan, Missouri, Nebraska, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Vermont, Virginia, West Virginia. (see Map 2).

**REMARKS.** Variation in C. violacea was pointed out by Melshemer (1847) in the original description. He described, in addition to his "type", 3 varieties of which 2 are based on slight colour differences and...
differences in the punctation and smoothness of the pronotum. His third variety (Var c) differs mainly in being "brilliant brassy" and in having the elytra "indented behind the base towards the suture". These characters lead me to suspect that this "variety" is probably a different species, although I found no examples of it with the type material in the Melsheimer-Ziegler Collection.

The specimens examined show some variation in colour. The majority have the dorsal surface either entirely violaceous or dark blue to blue-green with violet reflections. Others have the pronotum and elytra differing in shade, the elytra violaceous or blue to blue-green with violet reflections and the pronotum more greenish, or vice versa. A few specimens are blue-green, dark green or slightly brassy-green above with no trace of violet. Variation in the median lobe is slight. Some specimens are not as strongly broadened apically as in Fig. 18 and have the tip slightly more narrowly rounded.

3. Crepidodera spenceri (Lazorko)
   new combination
   Figs. 19, 39; Map 3.

Chalcoides spenceri Lazorko 1974, P. 147, 148 (fig.), 150, 151, 153 (type locality, Vancouver, British Columbia).


No type material was seen. The name is applied on the basis of the original description and a single female topotype bearing Lazorko's determination label.

DIAGNOSIS: anterior pronotal angles very prominent; disc with dense, rather uniform punctuation; dorsal surface black; pronotal transverse groove strongly impressed; the elytral disc with dense, rather uniform punctuation; first abdominal sternum with setae short, sparse and inconspicuous (in both sexes).

MATERIAL EXAMINED: 329 specimens. CANADA: British Columbia. UNITED STATES - California, Montana, Nevada, Oregon, Utah, Washington. (see Map 3).

REMARKS. There is some variation in the colour pattern of the antennae and legs in this species. The antennae typically have the distal one-half to two-thirds darker than the basal segments, becoming piceous or almost black apically. A number of specimens, however, have the more distal segments scarcely or no darker than the basal ones. Rarely, the antenna is entirely dark except for the basal two or three segments. The hind femora are typically entirely piceous but in some specimens, especially many from California, they are partially light to dark reddish-brown or entirely the same colour as the remainder of the legs.

In the majority of specimens, the pronotal punctuation is (as described by Lazorko, 1974) moderately strong, dense and quite uniform. Very few specimens have the pronotum more finely and sparsely punctate giving the disc a smoother appearance while a number of specimens have coarser, virtually contiguous punctures making the disc appear somewhat rugose.

4. Crepidodera solita n. sp.
   Figs. 14, 20, 40; Map 4.

DIAGNOSIS: dorsal surface dark bronze to coppery-bronze with margins greenish; shape elongate-oval; major pronotal punctures moderate to coarse in size; elytral declivity evenly rounded; elytral disc at most only very feebly depressed behind basal one-quarter; lateral margins of elytra moderately to strongly broadened in dorsal view, visible for their entire length; metasternum glabrous near midline in posterior two-thirds; males with pubescence of first abdominal sternum longer and more conspicuous than in females, denser apically forming a distinct, sharply-defined median brush near hind margin (Fig. 14); middle and hind trochanters without a distinct brush of setae.

MALE. Holotype: length 2.4 mm, greatest width 1.2 mm. Shape elongate-oval; length equal to twice the width. Dorsum shining, metallic; vertex of head dark bronze-green; pronotum and elytra dark bronze with green reflections at margins; head below vertex dark green to blue-green; scutellum piceous. Antennae and legs testaceous. Ventral surface shining black.

Vertex of head along anterior edge of pronotum smooth, very finely punctate. Pronotum with sides slightly sinuous with apical two-thirds moderately arcuate and basal one-third subparallel; anterior angles feebly produced, truncation slightly less than length of second antennal segment. Ante-basal transverse groove deep, strongly pronounced. Major punctures of pronotal disc dense, irregularly distirted; size moderately coarse, close or equal to size of
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nasal serial punctures of elytra; punctures in interspaces minute, much smaller than major punctures. Elytron at declivity evenly rounded; disc in basal one-half almost evenly convex. Lateral margins of elytra moderately broad in dorsal view, visible for entire length. Elytral striae strongly, distinctly punctate from base to apex. Metasternum medially somewhat sparsely, conspicuously setose except glabrous near midline in posterior two-thirds. First abdominal sternum (Fig. 1) medially with a very dense patch of long, erect setae near apical margin forming a conspicuous well-defined brush; area anterior to brush sparsely setose. Middle and hind trochanters with a few inconspicuous setae as in adjacent parts of femora.

Median lobe of genitalia (Fig. 20) 0.8 mm long, evenly arcuate except slightly recurved at apex; in dorsal view, of even thickness in apical two-thirds except slightly tapered near tip; tip rounded, appearing subtruncate. Ventral side smooth except for a short, shallow median furrow at apex.

FEMALE. Allotype: length 2.8 mm, greatest width 1.4 mm. Similar to male except for sexual differences at apex of abdomen; setae of metasternum and first abdominal sternum shorter and less conspicuous; first abdominal sternum lacking a brush of setae but with a median patch of very crowded setiferous punctures near hind margin; and the following non-sexual difference: antennae and legs rufotestaceous.

TYPE MATERIAL. Holotype: Male, Port Rowan, Ontario, June 23, 1944, W.J. Brown on Salix (CNC No. 15394). Allotype: Female, same data as holotype (CNC No. 15394). Both holotype and allotype are in the Canadian National Collection, Ottawa.


VARIATION. Males range from 2.1 to 2.9 mm in length and from 1.0 to 1.4 mm in greatest width. Females range from 2.3 to 3.4 mm in length and from 1.2 to 1.7 mm in greatest width. In both sexes, the length is equal to or slightly greater than twice the width. Variation in color is slight. The pronotum and elytra are typically dark bronze to coppery-bronze with the margins greenish. A few specimens, mostly from British Columbia, have the dorsum bronze-green to coppery-green. Antennae and legs range from light testaceous to rufotestaceous with the hind femora occasionally slightly darker or partially piceous. The metasternum and first abdominal sternum occasionally show a greenish reflection. The sides of the pronotum range from evenly arcuate in very few specimens to slightly sinuous with the apical two-thirds feebly to strongly arcuate. Major pronotal punctuation varies among specimens from moderately sparse to very dense. Size of the punctures ranges from moderate to coarse, about equal to the
size of the basal serial punctures of the elytra. The punctures of the interspaces range from very fine to about one-half the diameter of the major punctures. Unlike the holotype, some specimens have the elytral disc slightly depressed behind the basal one-quarter. The lateral margins of the elytra range from moderately broad to more conspicuously broad as in *heikertingeri* (Fig. 9). Male genitalia range in length from 0.7 to 0.8 mm. In dorsal view, the median lobe varies from slightly tapered at the aperture to slightly broadened. In females, spermathecae range in length from 0.17 to 0.21 mm and are similar to Fig. 40.

**FIRST INSTAR LARVA:** Length about 1.0 mm, greatest width about 0.2 mm. Maximum length of head capsule 0.18 to 0.22 mm, maximum width 0.16 to 0.18 mm. Colour pale light yellowish-white (when alive) except head and terga of prothorax and 9th abdominal segment light brown. Body orthosomatic, subcylindrical, slightly flattened ventrally, widest at thorax and slightly narrowed posteriorly.

Head nutant, prognathous, notched posteriorly; labrum short, transverse, slightly rounded anteriorly, with a lateral pair of long setae placed medially, a central pair of moderately long setae placed basally and 2 central pairs of short setae at anterior margin; clypeus short, transverse, with a lateral pair of short setae placed medially, and 2 central pairs of very short setae placed basally; frons triangular, distinctly separated from epicranium by V-shaped frontal suture, with 4 pairs of long setae -- a lateral pair at anterior margin and 3 central pairs located anteriorly, medially and posteriorly; epicranium divided posteriorly by a short coronal suture, with 10 pairs of setae -- 5 dorsal pairs, 2 lateral pairs and 3 ventral pairs; ocelli absent. Antenna short, 2-segmented, attached to head by a broad membrane, first segment with several sensilla. Mandible palmate, 5-toothed, the 3rd tooth the most elongate. Maxillary palps prominent, conical, 3-segmented, with apical segment as long as the other 2 combined. Labium with mentum subquadrate and submentum rectangular; labial palps short, 2-segmented, apical segment elongate-conical; submentum with 1 anterior pair and 1 posterior pair of setae.

Thorax distinctly 3-segmented; prothorax with a slightly sclerotized, longitudinally divided, transverse tegular shield bearing anteriorly a row of 5 pairs of setae and posteriorly a row of 3 pairs of setae; mesothorax and metathorax dorsally each with a central pair of dark hatching spines located medially and with 7 rows of setae -- anterior row with 1 short lateral pair and 1 long central pair, posterior row with 4 long pairs located 1 pair centrally, 1 pair posterior to hatching spines and 1 pair laterally; lateral margins of mesonotum and metanotum each with a long, strong, laterally-projecting medial seta and 2 short setae -- 1 located anterodorsal and 1 located posteroventral to median seta; thoracic sterna each with 2 central pairs of setae -- a long anterior pair and a shorter posterior pair; prothoracic sternum also with a lateral pair of setae located anterior to legs. Legs short, 4-segmented with 4th segment terminated by a moderately curved claw and a membranous empodium; segments 1 to 4 each with several short to moderately long setae.

Abdomen 10-segmented; segments 1 to 8 each divided dorsally into 3 transverse folds -- anterior fold with 3 pairs of long setae, medial fold with 1 short pair and posterior fold with 3 long pairs plus a very short pair ventral to lateral-most pair of long setae; pleural area of segments 1 to 8 with a long, strong medial seta and a shorter seta anterodorsal to medial seta; venter of segments 1 to 8 with 2 transverse rows of setae -- anterior row with 2 pairs and posterior row with 3 pairs; 9th segment with a sclerotized, spatulate, posteriorly rounded dorsal plate (anal plate); anal plate flat, with 1 anterior pair and 1 medial pair of moderately long setae located centrally and with 4 pairs of long setae and 1 pair of very short setae located anteriorly and posteriorly; venter of 9th segment with a transverse row of 2 pairs of long setae; 10th segment reduced, hidden from above by 9th segment, disc-like with a single median anal proleg.

Spiracles small, annular; 1 pair on mesothorax and 1 pair on each of abdominal segments 1 to 8.

The above description is based on 12 specimens reared from adults collected in Ottawa, Ontario.

The second instar larva, third instar larva and pupa of this species are unknown.

A single first instar larva was found in the roots of a potted willow (*Salix alba* x *fragilis*) removed from a rearing cage (No. 3) on July 11, 28 days after adults had been placed in the cage. The larva was mining below the epidermis of a small root about 0.5 mm in diameter. When the mine was dissected, the larva emerged and crawled around the dish containing the washed roots but did not resume feeding. When placed on
a fresh new root of S. alba x fragilis and left overnight, the larva chewed at several places on a small lateral root but did not mine. It became inactive and died several hours later. Some of the other small, tender roots on the same plant contained vacant larval mines. Some mines ran for a short distance along a root and out into smaller lateral roots. Entrance or exit holes were apparent in each mine. Larvae had fed on the tissues of the cortex and on the tender tissues, probably endodermis and pericycle, surrounding the central vascular bundle. Reddish-brown frass occurred throughout the mines.

REMARKS. The characters given in the diagnosis will separate solita from all the other species. However, solita may be confused with vaga, similarly coloured specimens of nana and, possibly, opulenta. The lateral elytral margins in solita are distinctly broader than in opulenta and slightly broader than in vaga and nana. Males can usually be separated from those of opulenta and nana by the more sharply-defined apical brush of setae on the first abdominal sternum. Males of solita can easily be distinguished from those of nana and vaga by the shape of the genitalia (Fig. 20). The shape of the spermatheca (Fig. 40) in females will also readily separate solita from the other three species.

5. Crepidodera decorata new species
   Figs. 21, 41; Map 5.

DIAGNOSIS: dorsal surface bright green to blue-green; elytral declivity evenly rounded; lateral margins of elytra moderately broad in dorsal view, visible for their entire length; males with pubescence of first abdominal sternum longer and more conspicuous than in females, denser apically forming a distinct, sharply-defined median brush near hind margin; median lobe of male genitalia evenly arcuate in lateral view, without conspicuous ventral sculpture except for a shallow median furrow at apex.

MALE. Holotype: length 2.4 mm, greatest width 1.1 mm. Shape elongate-oval; length slightly greater than twice the width. Dorsum shining, metallic; vertex of head, pronotum and elytra green; head below vertex blue-green; scutellum piceous. Antennae and legs rufotestaceous. Ventral surface shining black.

Vertex of head along anterior edge of pronotum smooth, very finely punctulate. Pronotum with sides slightly sinuous with apical two-thirds feebly arcuate and basal one-third subparallel; anterior angles feebly produced, truncation slightly less than length of second antennal segment. Antennal transverse groove deep, strongly pronounced. Major punctures of pronotal disc moderately dense, irregularly distributed; size moderate to slightly coarse, the latter close or equal to size of basal serial punctures of elytra; punctures in interspaces minute, much smaller than major punctures. Elytron at declivity evenly rounded; disc in basal one-half almost evenly convex. Lateral margins of elytra moderately broad in dorsal view, visible for entire length. Elytral striae strongly, distinctly punctate from base to apex. Metasternum medially somewhat sparsely, inconspicuously setose except glabrous near midline in posterior two-thirds. First abdominal sternum medially with a very dense patch of long, erect setae near apical margin forming a conspicuous well-defined brush; area anterior to brush sparsely setose. Middle and hind trochanters with a few inconspicuous setae as in adjacent parts of femora.

Median lobe of genitalia (Fig. 21) 0.8 mm long, evenly arcuate except slightly recurved at apex; in dorsal view, of even thickness in apical two-thirds except slightly narrowed at tip; tip rounded. Ventral side smooth except for a short, shallow median furrow at apex.

FEMALE. Allotype: length 2.9 mm, greatest width 1.4 mm. Similar to male except for sexual differences at apex of abdomen; setae of first abdominal sternum shorter and less conspicuous; first abdominal sternum lacking a brush of setae but with a median patch of crowded setiferous punctures near hind margin; and the following non-sexual differences: anterior pronotal angles with truncation equal to length of first antennal segment; major pronotal punctures slightly more dense.

TYPE MATERIAL. Holotype: Male, Ottawa, Ontario, May 31, 1962, W.J. Brown, on Salix discolor (CNC No. 15395). Allotype: Female, same data as holotype (CNC No. 15395). Both holotype and allotype are in the Canadian National Collection, Ottawa. Paratypes: 360 specimens, CANADA.

Ontario: Arnprior, Bell's Corners, Blackburn, Britania Hts., Constance Bay, Delhi, Georgetown, Hazeldean, Kinburn, Marmora, Merivale, Orawa, Ramsayville Marsh, Simcoe, Quebec: Carman Lake, Farm Point, Gatineau Pk., Hull, Knowlton,Knowlton's Landing, UNITED STATES.


VARIATION. Males range from 2.0 to 2.8 mm in length and from 0.9 to 1.3 mm in greatest width. Females range from 2.3 to 3.2 mm in length and from 1.1 to 1.6 mm in greatest width. In both sexes, the length ranges from equal to twice the width to slightly greater than twice the width. Variation in color is slight. The head, pronotum and elytra range from green to blue-green. Antennae are typically entirely rufotestaceous but occasionally have the apical one-half darker to dark reddish-brown. Hind femora range from entirely rufotestaceous to partially or entirely dark reddish-brown to piceous. The metasternum and first abdominal sternum occasionally show a greenish reflection. The sides of the pronotum range from evenly, feebly to moderately arcuate in a few specimens to slightly sinuous with the apical two-thirds feebly to moderately arcuate and the basal one-third subparallel. The anterior pronotal angles have the truncation equal to or slightly less than the length of the second antennal segment. The major punctuation of the pronotal disc varies from sparse to very dense, the size of the punctures ranging from fine to moderate in some specimens and from moderate to coarse in others. The small punctures of the pronotal interspaces range from very fine to about one-half the diameter of the major punctures. Male genitalia range in length from 0.8 to 0.9 mm. In dorsal view, the median lobe varies from slightly tapered at the aperture to slightly broadened and the tip ranges from narrowly to broadly rounded. In females, spermathecae range from 0.20 to 0.25 mm in length and are similar to Fig. 41.

REMARKS. The characters given in the diagnosis and its eastern range should separate decora from all the other species. On the basis of external characters, decora will easily be confused with luminosa, nana, and possibly sculpturata. In colour and shape, decora is similar to some sculpturata but can be distinguished from this species by the distinctly broader elytral margins and, in males, by the pubescence of the first abdominal sternum forming a distinct median brush near the hind margin. The elytral margins in decora are generally only slightly broader than in luminosa. In luminosa, the major punctuation of the pronotum is generally denser and slightly coarser than in decora. Male genitalia in decora differ slightly from those in luminosa in lacking distinct longitudinal impressions on the ventral side. In shape, decora usually differs from both luminosa and nana in having the sides of the elytra at the declivities more strongly rounded to the apex. In luminosa and nana, the sides of the elytra are generally slightly more gradually rounded at the declivities. It is, however, very difficult to separate decora from eastern specimens of nana except by the distinct difference in the shape of the male genitalia (Fig. 21) and females spermatheca (Fig. 41). The shape of the spermatheca will also separate females of decora and luminosa.

6. Crepidodera browni new species Figs. 8, 22, 42, Map 6.

DIAGNOSIS: Dorsal surface bright green, brassy-green, coppery-green, pure coppery, coppery-bronze or dark bronze colour; elytra in both sexes bulging laterally at the declivities to overhang and hide part of the lateral margins (Fig. 8); males with the pubescence of the first abdominal sternum longer and more conspicuous than in females, pubescence denser apically forming a distinct, feebly to strongly-defined median brush near the hind margin.

MALE. Holotype: length 2.7 mm, greatest width 1.35 mm. Shape elongate-oval; length equal to twice the width. Dorsum shining, metallic; head, pronotum and elytra brassy-green; scutellum black. Antennae and legs rufotestaceous. Ventral surface shining black.

Vertex of head along anterior edge of pronotum smooth, very finely punctulate. Pronotum with sides slightly sinuous with apical two-thirds moderately arcuate and basal one-third subparallel; anterior angles feebly produced, truncation slightly less than length of second antennal segment. Ante-basal transverse groove deep, strongly pronounced. Major punctures of pronotal disc dense, irregularly distributed; size moderate, smaller than basal serial punctures of elytra; punctures in interspaces minute to about one-half diameter of major punctures. Elytron (Fig. 8) at declivity slightly bulging laterally to overhang margin; disc gently depressed behind basal one-quarter. Lateral margins of elytra narrow in dorsal view, hidden at declivity by hinge. Elytral striae strongly, distinctly punctate from base to apex. Metasternum medially somewhat
sparsely, inconspicuously setose except glabrous near midline in posterior two-thirds. First abdominal sternum medially with a dense patch of long, erect setae near midline in posterior sparsely, inconspicuously setose except anterior to brush moderately densely setose. Middle and hind trochanters with a few inconspicuous setae as in adjacent parts of femora.

Median lobe of genitalia (Fig. 22) 0.8 mm long, evenly arcuate from base to apex; in dorsal view, of even thickness in apical two-thirds except slightly narrowed at tip; tip rounded. Ventral side with a shallow longitudinal impression on each side at middle and a short, shallow longitudinal median furrow at apex.

FEMALE. Allotype: length 2.8 mm, greatest width 1.4 mm. Similar to male except for sexual differences at apex of abdomen; setae of metasternum and first abdominal sternum shorter and less conspicuous; first abdominal sternum lacking a brush of setae but with a median patch of slightly crowded setiferous punctures near hind margin; and the following non-sexual differences: major punctures of pronotal disc slightly coarser, punctures of interspaces minute.

TYPE MATERIAL. Holotype: Same data as allotype (CNC No. 15396). Allotype: Female, same data as holotype (CNC No. 15396). Both holotype and allotype are in the Canadian National Collection, Ottawa.

Paratypes: 444 specimens. CANADA.


District of Columbia: Rock Creek pk.


Illinois: Cairo, Champaign, Grand Tower.

Indiana: Elkhart, Lafayette.


Kansas: Topeka.

Kentucky: Louisville, Morehead.

Louisiana: Covington, Logansport, Morgan City, Mound.


Massachusetts: Chicopee, Sherborn.

Michigan: Mapley (7 Rapids).


Missouri: (state record only).

New Jersey: Bound Brook, Phillipsburg.

New York: West Point.


Vermont: Brattleboro. Virginia: Alex. Co., Fredericksburg, Great Falls, Nelson Co., Kasslyn. West Virginia: Fairmont. (see Map 6). Paratypes are deposited in the following collections: CAS, CNC, CSCA, FMNH, HAC, OSU, RBP, SDSU, UA, USNM.

VARIATION. Males range from 2.1 to 2.8 mm in length and from 1.0 to 1.4 mm in greatest width. Females range from 2.4 to 3.3 mm in length and from 1.2 to 1.7 mm in greatest width. In both sexes, the length ranges from equal to twice the width to slightly greater than twice the width. There is considerable variation in the colour of the dorsal surface. Specimens vary in colour from green, brassy-green or coppery-green to pure coppery, coppery-bronze or dark bronze. This variation appears to be clinal. Specimens from the northeastern part of the range, from Massachusetts and Ontario to Georgia, are generally green or greenish while specimens from Florida to Texas and from Iowa, Kansas and southern Illinois are darker, from pure coppery to coppery-bronze or dark bronze. Material from Tennessee, Alabama and Mississippi includes both greenish and coppery to dark bronze specimens.

Greenish specimens exhibit some variation in shade. They range from unicolorous, with the head, pronotum and elytra green or brassy-green, to slightly bicolorous with head and pronotum green, blue-green or brassy-green and the elytra more brassy or coppery. Also, the head may be green to blue-green with the pronotum and elytra ranging from brassy-green or coppery-green to pure coppery. Antennae occasionally have the apical four or five segments slightly darker than the remainder to medium reddish-brown. Hind femora range from entirely to partially rufotestaceous or entirely medium to dark reddish-brown.

The sides of the pronotum vary from evenly, moderately arcuate to slightly sinuous with the apical two-thirds feebly to strongly arcuate and the basal one-third subparallel. The truncation of the anterior pronotal angle ranges from slightly less than to equal the length of the second antennal segment. There is considerable variation in the punctation of the pronotal disc. The major punctuation ranges from sparse to very dense. Size of the major
punctuation ranges from moderate to coarse, the latter equal in size to the basal serial punctures of the elytra. The size in individual specimens varies among moderate, moderate to slightly coarse, moderate to coarse, and coarse. The lateral elytral margins range from narrow to moderately broad in dorsal view. In males, the metasternal setae range from somewhat sparse and inconspicuous as in the holotype to more closely placed and more conspicuous. The setal brush on the first abdominal sternum in males varies from slightly loose as in the holotype to more strongly defined. Male genitalia range in length from 0.7 to 0.8 mm. In dorsal view, the median lobe varies from slightly more strongly narrowed apically than in Figs. 22 to narrowly narrowed apically with the tip appearing subtruncate. In females, spermathecae (Fig. 42) range from 0.13 mm to 0.16 mm in length.

REMARKS. In most external characters and in male genitalia, Crepidodera browni is similar to solita, decuria, luminosa and opulenta. It can easily be separated from these and most other species by the elytron bulging laterally at the declivity to overhang and hide part of the lateral margin in dorsal view. This condition is also present to some extent in a few other species, namely violacea, spenceri (more commonly in females) and populivora (some females only). However, browni can readily be distinguished from these species by the slightly more elongate shape, the different colour of the dorsal surface and by the pubescence of the first abdominal sternum in males. Males of browni differ from those of violacea and spenceri in having the setae of the first abdominal sternum longer and more conspicuous than in females and from males of populivora in having a conspicuous brush of setae near the hind margin of the sternum.

This species is named in memory of the late Mr. W.J. Brown who collected a good part of the type series of this species and much of the material used in this revision.

7. Crepidodera opulenta (LeConte) new combination
Figs. 23, 43; Map 7.

Halicta opulenta LeConte 1858, p. 86 (type locality, Fort Yuma, California).
Crepodera helixines (L.); Crotch (misidentification) 1873, p. 71 (in part); Hamilton 1889, p. 149; Horn 1889, p. 316; Hamilton 1894, p. 399; Duckett 1920, p. 149. Chalcides helixines (L.); Lang (misidentification) 1920, p. 300 (in part); Beiler and Hatch 1932, p. 128, 129.

Chalcides fulvicornis (Fabr.); Heikertinger and Csiki (misidentification) 1959, p. 320 (in part).

Crepodera fulvicornis manicata (Say); Heikertinger 1948-1950, p. 110 (fig.), 115, 136-137 (in part); Lazorko 1974, p. 148 (fig.), 152.

Crepodera manicata (Say); Balsbaugh and Hays 1972, p. 156 (in part).

DIAGNOSIS: dorsal surface dark green, bronze-green, brassy-green, coppery-green, coppery-bronze to dark bronze; shape elongate-oval; anterior pronotal angles feebly produced; major pronotal punctures moderate to slightly coarse in size; elytral declivity evenly rounded; lateral margins of elytra narrow in dorsal view, visible for their entire length; males with pubescence of first abdominal sternum longer and more conspicuous than in females, denser apically forming a distinct but poorly developed median brush near hind margin; median lobe of male genitalia evenly arcuate in lateral view; range in southwestern United States.

TYPE MATERIAL. Lectotype, here designated: male, with a circular gold label which represents California, a red label "type 4437" and the following labels. "A. (C.)" opulenta Lect. Cal."/"Lectotype of Crepidodera opulenta (Lec.), R.H. Parry, 1976". This specimen is in the LeConte Collection, Museum of Comparative Zoology, Harvard University. The lectotype is accompanied by two female specimens. These each bear a circular gold label and are probably syntypes.

MATERIAL EXAMINED: 253 specimens. UNITED STATES. Arizona, California, Colorado, Utah. (see Map 7).

REMARKS. In the original description, LeConte (1858) described the colour of this species as "laete viridiaurea" or bright green-gold. 'the lectotype differs from this of first abdominal sternum longer and more conspicuous than in females, denser apically forming a distinct but poorly developed median brush near hind margin; median lobe of male genitalia evenly arcuate in lateral view; range in southwestern United States.

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Chalcides fulvicornis (Fabr.); Heikertinger and Csiki (misidentification) 1959, p. 320 (in part).

Crepodera fulvicornis manicata (Say); Heikertinger 1948-1950, p. 110 (fig.), 115, 136-137 (in part); Lazorko 1974, p. 148 (fig.), 152.

Crepodera manicata (Say); Balsbaugh and Hays 1972, p. 156 (in part).

DIAGNOSIS: dorsal surface dark green, bronze-green, brassy-green, coppery-green, coppery-bronze to dark bronze; shape elongate-oval; anterior pronotal angles feebly produced; major pronotal punctures moderate to slightly coarse in size; elytral declivity evenly rounded; lateral margins of elytra narrow in dorsal view, visible for their entire length; males with pubescence of first abdominal sternum longer and more conspicuous than in females, denser apically forming a distinct but poorly developed median brush near hind margin; median lobe of male genitalia evenly arcuate in lateral view; range in southwestern United States.

TYPE MATERIAL. Lectotype, here designated: male, with a circular gold label which represents California, a red label "type 4437" and the following labels: "A. (C.)" opulenta Lect. Cal."/"Lectotype of Crepidodera opulenta (Lec.), R.H. Parry, 1976". This specimen is in the LeConte Collection, Museum of Comparative Zoology, Harvard University. The lectotype is accompanied by two female specimens. These each bear a circular gold label and are probably syntypes.

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REMARKS. In the original description, LeConte (1858) described the colour of this species as "laete viridiaurea" or bright green-gold. 'the lectotype differs from this of first abdominal sternum longer and more conspicuous than in females, denser apically forming a distinct but poorly developed median brush near hind margin; median lobe of male genitalia evenly arcuate in lateral view; range in southwestern United States.

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easily separate *opulenta* from otherwise similar males of *nana*. This character, along with the shape of the spermatheca (Fig. 43) in females, will also readily distinguish *opulenta* from *sculpturata* and *vaga*. The spermatheca in *opulenta* is slightly smaller than in *nana*. This character, along with the shape of the spermatheca and vagina, also readily separate *opulenta* from otherwise similar males of *nana*. This character, along with the shape of the spermatheca and vagina, also readily separate *opulenta* from *sculpturata* and *vaga*. The spermatheca in *opulenta* is slightly smaller than in *nana*.

3. Crepidodera luminosa new species

Figs. 10, 24, 44; Map 8.

**DIAGNOSIS:** Dorsal surface bright green, blue-green, brassy-green or bronze-green; elytral declivity evenly rounded; lateral margins of elytra narrow to moderately broad in dorsal view, visible for their entire length; males with pubescence of first abdominal sternum longer and more conspicuous than in females, denser apically forming a distinct, well-defined median brush near hind margin; median lobe of male genitalia evenly arcuate in lateral view, with distinct longitudinal impressions on ventral side.

**MALE.** Holotype: length 2.4 mm, greatest width 1.1 mm. Shape elongate-oval; length slightly greater than twice the width. Dorsum shining, metallic; vertex of head and pronotum green; elytra brassy-green; head below vertex green to blue-green; scutellum black. Antenna and legs, except hind femora, rufotestaceous; hind femora dark reddish-brown. Ventral surface shining black.

Vertex of head along anterior edge of pronotum smooth, very finely punctate. Pronotum with sides even, feebly arcuate; anterior angles feebly pronounced, truncation slightly less than length of second antennal segment. Ante-basal transverse groove deep, strongly pronounced. Major punctures of pronotal disc moderately dense, irregularly distributed; size moderately coarse, close or equal to size of basal serial punctures of elytra; punctures in interspaces fine, much smaller than major punctures. Elytron (Fig. 10) at declivity evenly rounded; disc in basal one-half almost evenly convex. Lateral margins of elytra narrow in dorsal view, visible for entire length. Elytral striae strongly, distinctly punctate from base to apex. Mesosternum medially sparsely, inconspicuously setose except glabrous near midline in posterior two-thirds. First abdominal sternum medially with a very dense patch of long, erect setae near apical margin forming a conspicuous well-defined brush; area anterior to brush moderately densely setose. Middle and hind trochanters with a few inconspicuous setae as in adjacent parts of femora.

Median lobe of genitalia (Fig. 24) 0.7 mm long, evenly arcuate except slightly recurved at apex; in dorsal view, of even thickness in apical two-thirds except slightly narrowed at tip; tip rounded. Ventral side sculptured with a distinct longitudinal impression on each side at middle and a short, shallow median furrow or apex.

**FEMALE.** Allotype: length 2.8 mm, greatest width 1.4 mm. Similar to male except for sexual differences at apex of abdomen; setae of first abdominal sternum shorter and less conspicuous, the sternum lacking a brush of setae but with a patch of slightly crowded setiferous punctures near hind margin; and the following non-sexual differences: sides of pronotum slightly sinuous with apical two-thirds evenly arcuate and basal one-third subparallel; major punctures of pronotal disc dense; lateral margins of elytra moderately broad in dorsal view.

**TYPE MATERIAL.** Holotype: Male, Hartland, New Brunswick, July 8, 1942, G.M. Stirrett, small willows on beach (CNC No. 15397). Allotype: Female, same data as holotype (CNC No. 15397). Both holotype and allotype are in the Canadian National Collection, Ottawa.


**VARIATION.** Males range in length from 2.2 to 2.8 mm and in greatest width from 1.1 to 1.4 mm. Females range in length from 2.3 to 3.1 mm and in greatest width from 1.1 to 1.5 mm. In both sexes, length ranges from equal to twice the width to slightly greater than twice the width. Variation in colour is light. The head, pronotum and elytra range from pure green to blue-green, brassy-green or bronze-green. The head and pronotum occasionally differ in shade from the elytra, the latter appearing slightly more brassy or bronze. Antennae, typically entirely rufotestaceous, occasionally have the apical one-third to one-half darker to dark reddish-brown. Hind femora range from entirely rufotestaceous to partially or
entirely dark reddish-brown. The sides of the pronotum range from evenly, feebly or moderately arcuate to slightly sinuous with the apical two-thirds feebly to moderately arcuate and the basal one-third subparallel. The major punctuation of the pronotal disc generally ranges from moderately dense to very dense and is rarely sparse. The lateral elytral margins range in width from somewhat narrow as in the holotype to moderately broad as in the allotype. Male genitalia range in length from 0.7 to 0.8 mm. In dorsal view, the median lobe varies from slightly tapered at the aperture to slightly broadened. In females, spermathecae range from 0.16 to 0.19 mm in length and are similar to Fig. 44.

REMARKS. The holotype and allotype are slightly damaged. The holotype is missing the last three segments of the left front tarsus and the last segment of the right hind tarsus. Part of the left antenna is broken off but this was salvaged and is glued to the point with the specimen. The allotype is missing the last three segments of the left middle and hind tarsus. The tarsi of the right middle and hind legs are broken off but these were salvaged and are glued to the point with the specimen. Both specimens were originally mounted with the antennae and legs held in an excessive amount of an acetate glue. The damage was discovered when the glue was dissolved in anyl acetate in order to remove the specimens from their original mounting for examination of the ventral surface and for dissection of the male specimen.

The characters given in the diagnosis and its eastern range should separate luminosa from all the other species. On the basis of external characters, luminosa will be easily confused with decora, nana and possibly, sculpturata. It can usually be distinguished from decora by the generally denser and slightly coarser punctuation of the pronotum, the generally slightly narrower elytral margins and the sides of the elytra at the declivities more gradually rounded to the apex. Male genitalia in luminosa differ from those in decora in having distinct lateral longitudinal impressions on the ventral side. In luminosa, the pronotum is not as convex or swollen anteriorly as in sculpturata. Also, males of luminosa differ from those of sculpturata in having a distinct median brush in the peneumence of the first abdominal sternum. The only sure way of separating luminosa from nana is by the shape of the male genitalia (Fig. 24) and female spermatheca (Fig. 44). These will also distinguish luminosa from decora and sculpturata.

9. Crepidodera vaga new species
Figs. 25, 45; Map 9.

DIAGNOSIS: dorsal surface dark coppery-bronze to dark purplish; shape elongate-oval; major pronotal punctures moderately coarse in size; elytral declivity evenly rounded; elytral disc at most only very feebly depressed behind basal one-quarter; lateral margins of elytra narrow in dorsal view, visible for their entire length; males with pubescence of first abdominal sternum longer and more conspicuous than in females, denser apically forming a distinct, sharply-defined median brush near hind margin; median lobe of male genitalia evenly arcuate in lateral view; range east of Rocky Mountains.

MALE. Holotype: length 7.7 mm, greatest width 1.3 mm. Shape elongate-oval; length slightly greater than width. Dorsum shining, metallic; pronotum and elytra dark coppery-bronze with margins greenish; head dark green; scutellum piceous. Antennae and legs yellowish-brown. Ventral surface shining black.

Vertex of head along anterior edge of pronotum smooth, very finely punctulate. Pronotum with sides slightly sinuous with apical two-thirds moderately arcuate and basal one-third subparallel; anterior angles feebly produced, truncation slightly less than length of second antennal segment. Ante-basal transverse groove deep, strongly pronounced. Major punctures of pronotal disc dense, irregularly distributed; size moderately coarse, close or equal to size of basal serial punctures of elytra; punctures in interspaces fine, much smaller than major punctures. Elytron at declivity evenly rounded; disc very gently depressed behind basal one-quarter. Lateral margins of elytra narrow in dorsal view, visible for entire length. Elytral striae strongly, distinctly punctate from base to apex. Metasternum medially somewhat closely, conspicuously sebaceous except glabrous near midline in posterior two-thirds. First abdominal sternum medially with dense patch of long erect setae near apical margin forming a conspicuous, well-defined brush; area anterior to brush sparsely sebaceous. Middle and hind trochanters with a few inconspicuous setae as in adjacent parts of femora.
Median lobe of genitalia (Fig. 25) about 0.8 mm long, evenly arcuate from base to apex; in dorsal view, broadened just posterior to middle, strongly narrowed in apical one-third; tip rounded. Ventral side with a distinct impression on each side near middle converging in apical one-third into a single median longitudinal furrow extending to apex.

FEMALE. Allotype: length 3.1 mm, greatest width 1.5 mm. Similar to male except for sexual differences at apex of abdomen; setae of metasternum and first abdominal sternum shorter and less conspicuous; first abdominal sternum lacking a brush of setae but with a median patch of crowded setiferous punctures near hind margin.


VARIATION. Males range from 2.4 to 2.9 mm in length and from 1.2 to 1.4 mm in greatest width. Females range from 2.7 to 3.3 mm in length and from 1.3 to 1.6 mm in greatest width. In both sexes, length ranges from equal to twice the width to slightly greater than twice the width. Colour of the dorsal surface ranges from dark coppery-bronze to piceous with purplish reflections. The colour of the head below the vertex ranges from green to blue-green and the vertex varies from dark green to dark bronze-green or purplish. In some specimens, the last abdominal sternum has the medial and apical portion paler than the remainder to medium reddish-brown. The sides of the pronotum range from evenly, moderately arcuate to slightly sinuous with the apical two-thirds feebly to moderately arcuate. The major punctuation of the pronotal disc ranges from slightly sparse to dense and the punctures of the interspaces vary from minute to about one-half the diameter of the major punctures. The elytral disc varies from very gently depressed behind the basal one-quarter as in the holotype to almost entirely convex. Male genitalia range in length from 0.8 to 0.9 mm. In females, spermathecae (Fig. 45) range from 0.15 to 0.16 mm in length.

REMARKS. The characters given in the diagnosis and its range east of the Rocky Mountains should separate *vaga* from all the other species. In external characters, *vaga* is similar to *solita*, *opulenta* and mid-western or western specimens of *nana* and will likely be confused with these. Females may also be confused with those of *populivora*. The lateral elytral margins in *vaga* are narrower than in *solita* and generally scarcely broader than in *opulenta* and *populivora*. Males of *vaga* can usually be separated from similar males of *nana* by the more strongly defined median brush of setae near the hind margin of the first abdominal sternum. The different range of *vaga* will distinguish it from *opulenta*. The shape of the male genitalia (Fig. 25) and female spermatheca (Fig. 45) will readily separate *vaga* from all of these species.

10. *Crepidodera heikertingeri* (Lazorko) new combination

Figs. 9, 15, 26, 33-36, 46; Map 10.

Chalcidodes heikertingeri Lazorko 1974, p. 147, 148 fig., 149, 152 (type locality, Essondale, British Columbia).

DIAGNOSIS: Dorsal surface dark metallic bronze, purplish or dark greenish; shape broadly oval; lateral margins of elytra conspicuously broad, relatively wider than in other North American species except for some specimens of *solita*; males with middle of metasternum covered throughout with setae almost as long and conspicuous as those of first abdominal sternum which is conspicuously hirsute from base to apex, the hairs forming a loose, poorly defined brush; middle and hind trochanters each with a distinct brush of setae on posterior margin. The distinctive male genitalia (Fig. 26) will also separate *vaga* from all other species.


No type material was seen. The name is applied on the basis of the original description plus two specimens from Vancouver, B.C., and three specimens from Vernon, B.C., all bearing Lazorko's determination labels.
Heikertinger (1948-1950) who, in a footnote, medially on lateral margins and 2 pairs on margins of eyes and 1 pair medially at bases will separate helkertingerl from all of the wider elytral margins and the generally -- 2 pairs centrally near anterior margin, 2 other species except, possibly, females of dlgoa and solita. It can be distinguished from dlgoa by the slightly more robust shape, slightly wider elytral margins and the dense, uniform pubescence of the first abdominal sternum.

**11. Crepidodera digna new species**

**Figs. 13, 16, 27, 47; Map 11.**

**DIAGNOSIS:** Dorsal surface shining black; lateral margins of elytra moderately broad, slightly narrower than in heikertingeri; males similar to those of heikertingeri with metasternum conspicuously setose throughout median region, first abdominal sternum conspicuously hirsute from base to apex; males differing from heikertingeri in having setae of first abdominal sternum slightly shorter and less dense, not forming a brush; middle and hind trochanters, as in heikertingeri, each with a distinct brush of setae on hind margin. The distinctive male genitalia (Fig. 27) will also separate digna from all other species. In addition, digna can usually be distinguished from helkertingeri by the generally finer, sparser pronotal punctuation and, often, by the outer corners of the anterior pronotal angles being more strongly acute.

**MALE. Holotype:** Length 2.4 mm, greatest width 1.3 mm. Shape broadly oval, slightly elongate; length less than twice the width. Dorsum shining, metallic; vertex of head, pronotum and elytra black with a purplish reflection on pronotal disc and with pronotal margins and sutural margins of elytra green; head below vertex green to blue-green; scutellum piceous. Antennae light testaceous in basal one-half, darker in apical one-half to medium reddish-brown. Legs, except hind femora, rufotestaceous; hind femora piceous. Ventral surface shining black.

Vertex of head along anterior edge of pronotum smooth except for a few scattered fine punctures. Pronotum with sides evenly, moderately arcuate; anterior angles feebly produced, truncation slightly less than length of second antennal segment. Ante-basal transverse groove moderately deep, moderately pronounced. Major punctures of pronotal disc somewhat sparse, irregularly distributed; size moderate to coarse, the latter close or equal to size of basal serial punctures of elytra; punctures in interspaces very minute, much smaller than major punctures. Elytron at declivity evenly rounded; disc in basal one-half evenly convex. Lateral margins of elytra moderately broad in dorsal view, visible for entire length. Elytral striae
strongly, distinctly punctate from base to apex. Metasternum medially closely, conspicuously setose. First abdominal sternum (Fig. 13) medially with conspicuous, long, semi-erect to erect setae closely placed from base to apex of sternum but not forming a brush. Middle and hind trochanters each with a distinct posterior marginal brush of setae (Fig. 13).

Median lobe of genitalia (Fig. 27) 0.7 mm long, evenly arcuate; in dorsal view, gradually tapered apically except slightly broadened near tip; tip rounded with a deep notch at middle. Ventral side smooth except for a short, shallow median furrow at apex.

FEMALE. Allotype: Length 2.8 mm, greatest width 1.5 mm. Similar to male except for sexual differences at apex of abdomen; setae of metasternum and first abdominal sternum (Fig. 16) much shorter, less conspicuous and slightly sparser; brush of setae on middle and hind trochanters less distinct; and the following non-sexual differences: pronotal disc without a purplish reflection; antennae entirely rufotestaceous; pronotum with sides slightly sinuous with apical two-thirds moderately arcuate and basal one-third subparallel.

TYPE MATERIAL. Holotype: Male, Gillam, Manitoba, June 30, 1950, W.J. Brown, on Salix (CNC No. 15399). Allotype: Female, same data as holotype (CNC No. 15399). Both holotype and allotype are in the Canadian National Collection, Ottawa.


Paratypes are deposited in the following collections: CAS, CNC, CSCA, CU, FMNH, HAHC, MCZ, OSU, RHP, SDSU, UA, USNM.

VARIATION. Size of the males ranges from 2.1 to 2.7 mm in length and from 1.1 to 1.4 mm in greatest width. Females range from 2.3 to 3.0 mm in length and from 1.2 to 1.6 mm in greatest width. The colour of the dorsal surface is shining black, occasionally with purplish or greenish reflections and often with greenish reflections at the margins. Antennae vary from entirely rufotestaceous to testaceous in the basal one-half with the apical one-half darker as in the holotype.

The hind femora range in color from entirely rufotestaceous to testaceous from sparse to moderately dense. Most specimens have the major punctures of moderate size while others have them slightly coarser as in most heidertingeri. A few have these punctures relatively fine and sparse. The elytral disc ranges from almost evenly convex in the basal one-half as in the holotype to slightly sinusous as in the allotype. The anterior pronotal angles range from feebly to somewhat strongly produced and the truncation ranges from slightly less to slightly greater than the length of the second antennal segment. The major punctuation of the pronotal disc ranges from sparse to moderately dense. Most specimens have the major punctures of moderate size while others have them slightly coarser as in most heidertingeri. Male genitalia range in length from 0.6 to 0.8 mm. In dorsal view, the median lobe is either continuously tapered apically or has the tip slightly broadened. The notch at the tip ranges from somewhat shallow to deep. In females, spermathecae are about 0.20 mm long and are similar to Fig. 47.

REMARKS. Crepidodera digna and the closely related heidertingeri overlap in their ranges and both species seem to live in similar habitats. In at least three localities, Lake Mijinemungshing, in Lake Superior Provincial Park, Ontario, Black Sturgeon Lake, Ontario, and near Golden, British Columbia, both species were collected in the same habitat from the same species of Salix.

12. Crepidodera populivora new species Figs. 28, 48; Map 12.

DIAGNOSIS: Dorsal surface dark purple to
black, rarely blue, blue-green or dark green; anterior pronotal angles feebly produced; pronotal ante-basal transverse groove strongly pronounced; major pronotal punctures sparse to dense, moderate to coarse in size, irregularly distributed; elytral declivity evenly rounded except in some females which have elytra slightly bulging laterally to overhang lateral margins; elytral disc at most only very gently depressed behind basal one-quarter; lateral margins of elytra narrow, visible for their entire length except when partially hidden by a bulge at the declivity in some females; males with pubescence of first abdominal sternum longer and more conspicuous than in females and uniformly dense, not forming a brush.

MALE. Holotype: Length 3.0 mm, greatest width 1.5 mm. Shape oval, slightly elongate; length equal to twice the width. Dorsum shining, metallic; vertex of head dark green, pronotum and elytra dark purple, margins of pronotum greenish; head below vertex blue-green; scutellum black. Antennae and legs rufotestaceous. Ventral surface shining black.

Vertex of head along anterior edge of pronotum smooth, very finely punctulate. Pronotum with sides slightly sinuous with apical two-thirds moderately arcuate and basal one-third subparallel; anterior angles feebly produced, truncation slightly less than length of second antennal segment. Ante-basal transverse groove deep, strongly pronounced. Major punctures of pronotal disc moderately dense, irregularly distributed; size moderate to coarse, the latter close or equal to size of basal serial punctures of elytra; punctures in interspaces minute, much smaller than major punctures. Elytron at declivity evenly rounded; disc in basal one-half almost evenly convex. Lateral margins of elytra narrow in dorsal view, visible for entire length. Elytral striae strongly, distinctly punctate from base to apex. Metasternum medially sparsely, inconspicuously setose except glabrous near midline in posterior two-thirds. First abdominal sternum medially with conspicuous sculpture except for a shallow longitudinal median furrow at apex.

FEMALE. Holotype: Length 3.2 mm, greatest width 1.6 mm. Similar to male except for sexual differences at apex of abdomen, setae of metasternum and first abdominal sternum shorter and less conspicuous, elytron at declivity very slightly bulging laterally to overhang and hide part of lateral margin.


New Brunswick: Bathurst, Boiestown, Fredericton, Royalty, Dieppe, Moncton, Mount Carleton, Chatham, Lindsay, Perth, Tabusintac.


VARIATION. Males range from 2.2 to 3.3 mm in length and from 1.1 to 1.7 mm in greatest width. Females range from 2.4 to 3.5 mm in length and from 1.2 to 1.8 mm in greatest width. In both sexes, length ranges from slightly less than twice the width to equal twice the width, rarely slightly greater. There is very little variation in colour in most of the type series. The colour of the pronotum and elytra normally varies from dark purple with greenish margins to black, occasionally with greenish reflections. The head has the vertex similar in colour to the pronotum and elytra or dark green. Geographical variation in colour is exhibited by 12 paratypes from the Lower Fraser Valley of British Columbia. These have the head, pronotum and elytra dark blue to blue-green or dark green. In the whole series, hind femora range from entirely rufotestaceous to partially or entirely piceous. The sides of the pronotum are generally slightly sinuous as in the holotype and allotype with the apical two-thirds ranging from feebly to moderately arcuate. A few specimens have the sides evenly, moderately arcuate. The truncation of the anterior pronotal angles ranges from slightly less than to equal the length of the second antennal segment. The major punctuation of the pronotal disc ranges from sparse to dense. Size of the major punctures varies among specimens, some having them all of moderate size, others with them moderate to coarse or all somewhat coarse, and rarely with them fine to moderate. The punctures of the interspaces of the pronotal disc range in size from minute to about one-half the diameter of the smaller major punctures. In females, the declivity of the elytron ranges from arcuate and basal one-third subparallel, almost evenly convex in the basal one-half as in the holotype to very gently depressed behind the basal one-quarter. Male genitalia range from 0.7 to 0.9 mm in length. In dorsal view, the median lobe varies from slightly broadened apically to slightly narrowly rounded. In females, spermathecae range from 0.17 to 0.22 mm in length and are similar to Fig. 48.

REMARKS. The characters given in the diagnosis should separate this species from all other North American species. Females of *populivora* may be confused with similarly-coloured females of *vaga*. They can usually be separated from this species by the slightly broader and more convex body, the elytra occasionally slightly bulging at the declivities and the generally slightly narrower elytral margins. The shape of the spermatheca (Fig. 48) will easily separate *populivora* from *vaga*. Although differing in some important characters given in the diagnosis, *populivora* seems to be most closely related to *bella* and *aerea*. All three species have a similar pattern of pubescence on the first abdominal sternum in males, similarly shaped male genitalia and generally similar spermathecae.

13. *Crepidodera bella* new species

Figs. 2, 5, 6, 29, 49; Map 13.

**DIAGNOSIS:** Dorsal surface coppery-bronze, dark bronze or black; shape elongate-oval; vertex of head strongly, distinctly punctate at anterior edge of pronotum; elytral declivity evenly rounded; elytral disc with a distinct depression behind basal one-quarter; lateral margins of elytra moderately broad, visible for their entire length; males with pubescence of first abdominal sternum longer and more conspicuous than in females and uniformly dense, not forming a brush.

**MALE.** Holotype: Length 2.5 mm, greatest width 1.2 mm. Shape (Fig. 5) elongate-oval; length slightly greater than twice the width. Dorsum shining, metallic; head, pronotum and elytra dark coppery-bronze; scutellum black. Antennae and legs rufotestaceous. Ventral surface shining black with greenish reflections in post sternum, metasternum and first abdominal sternum.

Vertex of head along anterior edge of pronotum closely, moderately punctate (Fig. 2). Pronotum (Fig. 2) with sides slightly sinusous with apical two-thirds moderately arcuate and basal one-third subparallel;
anterior angles feebly produced, truncation
slightly less than length of second antennal
segment. Ante-basal transverse groove deep,
strongly pronounced. Major punctures of
pronotal disc dense, irregularly
distributed; size moderately coarse, close
eq or equal to size of basal serial punctures
of elytra; punctures in interspaces fine,
much smaller than major punctures. Elytron
distinctly depressed behind basal
one-quarter. Lateral margins of elytra
moderately broad in dorsal view, visible for
entire length. Elytral striae strongly,
distinctly punctate from base to apex.
Metasternum medially somewhat closely,
conspicuously setose except glabrous near
midline in posterior two-thirds. First
abdominal sternum medially with conspicuous,
moderately-long, erect setae very closely,
uniformly placed, not forming a brush.
Middle and hindtrochanters each with a
rather loose, inconspicuous posterior
marginal brush of setae.
Median lobe of genitalia (Fig. 29) 0.7
mm long, evenly arcuate from base to apex;
in dorsal view, slightly broadened apically
in apical two-thirds; tip
rounded. Ventral side smooth, without
sculpture.
FEMALE. Allotype: Length 7.8 mm, greatest
width 1.4 mm. Similar to male except for
sexual differences at apex of abdomen setae
of metasternum and first abdominal sternum
shorter, slightly sparser, and less
conspicuous; and the following non-sexual
difference: anterior pronotal angles with
truncation equal to length of second
antennal segment.
TYPE MATERIAL. Holotype: Male, Copeland,
Florida, June 28, 1963, D.G. Kissinger, on
Salix (CNC No. 15401). Allotype: Female,
same data as holotype (CNC No. 15401). Both
holotype and allotype are in the Canadian
National Collection, Ottawa.
Paratypes: 39 specimens. UNITED
STATES: Alabama: Spring Hill, Florida:
Arcadia, Copeland, Elfers, Pt. Ogden,
Homestead, Royal Palm Park, Oviedo, Paradise
Key, Starke. Louisiana: Mansura,
Tallulah. South Carolina: Yemassee. (see
Map 13). Paratypes are deposited in the
following collections: CNC, CU, HAHC, MZ, RHP, USNM.
VARIATION. Size of the males ranges from
2.2 to 2.5 mm in length and from 1.1 to 1.2
mm in greatest width. Females range from
2.3 to 2.9 mm in length and from 1.1 to 1.4
mm in greatest width. In both sexes, length
ranges from equal to twice the width to
slightly greater than twice the width. The
colour of the head, pronotum and elytra
ranges from coppery-bronze to dark bronze or
black. In the head, the clypeus and genae
are occasionally greenish. The sides of the
pronotum are generally slightly sinuous with
the apical two-thirds ranging from feebly to
moderately arcuate. In a few specimens, the
sides are evenly, moderately arcuate. The
anterior pronotal angles have the truncation
slightly less than to equal to the length of the
second antennal segment. The major
punctuation of the pronotal disc is generally
somewhat coarse, the size of the major
punctures ranging from moderate to coarse
with the latter about equal to the size of the
basal serial punctures of the elytra.
Punctures in the pronotal interspaces range
in size from minute to about one-half the
diameter of the major punctures.
In females, spermathecae range from
0.15 to 0.16 mm in length and are similar to
Fig. 49.
REMARKS. Although distinctly different in
some characters, bella appears to be most
closely related to aereola and populivora.
All three species are very similar in the
pattern of pubescence on the first abdominal
sternum in males, the shape of the male
genitalia, and in the general shape of the
spermatheca.

14. Crepidodera aereola (LeConte) new
combination
Figs. 3, 7, 30, 50; Map 14.

Haltica aereola LeConte 1857, p. 68 (type
locality, San Francisco, California).
Crepododera helixinis (L.); Crotch
(misidentification) 1873, p. 71 (in part);
Hamilton 1889, p. 149; Horn 1889, p. 316;
Hamilton 1894, p. 399; Duckett 1920, p. 149.
Chalcolodes helixinis (L.); Kaller and March
1932, p. 128, 129 (in part).
Chalcolodes fulvicornis (Fabr.); Heikertinger
and Csiki (misidentification) 1939, p. 320
(in part).
?Chalcolodes fulvicornis nana (Say);
Heikertinger 1948-1950, p. 110 (fig.), 115,
136-137 (in part); Lazorko 1974, p. 148
(fig.), 152.
DIAGNOSIS. Anterior pronotal angles
strongly produced, outer corners acutely
pointed; pronotum with dense, irregularly
distributed, very coarse punctuation (Figs.
7, 3); males with the median pubescence of
the first abdominal sternum longer and more
conspicuous than in females, pubescence
uniformly dense, not forming a brush.
TYPE MATERIAL. Lectotype, designated here:
Female, with a circular gold label which
denotes California, a red label "type 8258"
and the following labels: "A. (C.) aereola Lec. S. Fr./"Lectotype g. Crepidodera aereola (Lec.), R.H. Parry, 1976". This specimen is in the LeConte Collection, Museum of Comparative Zoology, Harvard University. The lectotype is accompanied by a male and a female specimen, each with a circular gold label. These are evidently synonyms. In addition, the LeConte Collection contains two females labelled "Cal." and a male with no label. These are similar to the lectotype but are probably not part of the type series.

MATERIAL EXAMINED: 474 specimens. UNITED STATES: California: Nevada, Oregon, Utah, Washington, Wyoming. (see Map 14). Specimens are deposited in the following collections: CAS, CSCA, CU, FMNH, MCZ, OSU, USNM.

REMARKS. Although easily distinguished by some of the characters given in the diagnosis, aereola appears to be most closely related to bella and populivora in having a similar pattern of pubescence on the first abdominal sternum in males, similar male genitalia, and a generally similar spermatheca.

15. Crepidodera sculpturata (Lazorno)
new combination
Figs. 4, 11, 12, 31, 51; Map 15.

Chalcoides sculpturata Lazorno 1974, p. 148 (fig.), 149, 150, 152 (type locality, Creston, British Columbia).

DIAGNOSIS: Dorsal surface bright green, blue-green, brassy-green or coppery-green; shape elongate; major pronotal punctures moderate to coarse in size; elytral declivity evenly rounded; lateral margins of elytra narrow in dorsal view, visible for their entire length; males with median pubescence of first abdominal sternum longer, denser and more conspicuous than in females, not forming a brush; median lobe of male genitalia evenly arcuate in lateral view.

TYPE MATERIAL. Holotype: Male, Creston, British Columbia, May 29, 1949, host Salix exigua, G. Stace Smith (University of British Columbia Coll.). Allotype: Female, Creston, British Columbia, June 13, 1952, ex Salix exigua, C. Stace Smith (University of British Columbia Coll.). Paratypes, 6 males, 8 females, Creston, British Columbia, G. Stace Smith (University of British Columbia Coll.).

Only the holotype and allotype were examined. Lazorno (1974) gives the date of collection of the holotype as "29 May 1959". This is slightly in error as the year given on the specimen label of the holotype is 1949.


REMARKS. The variation in the colour of the dorsal surface in this species is evident within series of specimens from single localities as well as among specimens from different localities. The majority of specimens are bright green with those from British Columbia, Washington and Oregon tending to be blue-green.

There is some variation in the punctation of the pronotum. The size of the major pronotal punctures ranges among localities as well as among specimens from the same locality. The size also ranges from moderate to coarse within individual specimens. In some males, the tip of the median lobe is not as strongly broadened as in Fig. 31.

The external characters given in the diagnosis will separate sculpturata from all the other North American species except, possibly, nana and opulenta. It can usually be distinguished from nana by the slightly narrower elytral margins and from both species by the pronotum appearing slightly more convex or swollen anteriorly. Males can usually be separated from those of opulenta by the lack of a distinct brush in the pubescence of the first abdominal sternum. Western specimens of nana and some specimens of opulenta are very similar in appearance to sculpturata and it is often difficult to separate them. However, the shape of the male genitalia (Fig. 31) and female spermatheca (Fig. 51) will readily distinguish sculpturata from these and all other species.

16. Crepidodera nana (Say)
Figs. 32, 52; Map 16.

Altica nana Say 1824, p. 86 (type locality, United States).

Haltica nana (Say); Melsheimer 1847, p. 165.

Haltica helvina (L.); LeConte (misidentification) 1858, p. 87 (var. nana Say).

Crepidodera helvina (L.); Crotch (misidentification) 1873, p. 71 (in part);
Crepoides fulvicornis nana (Say); Heikertinger 1911, p. 9 (fig.), 10, 19; 1924-1925, p. 67; Heikertinger and Csiki 1939, p. 320.

Chalcoides helix (L.); Leng (misidentification) 1920, p. 300 (in part); Beller and Hatch 1932, p. 128, 129.

Chalcoides chittendeni Heikertinger 1948-1950, p. 110 (fig.), 116, 136 (type locality, "Kahokia", Illinois); Lazarko 1974, p. 146, 148 (fig.), 151, 153. NEW SYNONMY.

Chalcoides nana (Say); Wilcox 1954, p. 455; Dillon and Dillon 1961, p. 712.

Crepidodera nana (Say); Hatch 1971, p. 219; Kalsbeek and Hays 1977, p. 156.

DIAGNOSIS: Dorsal surface generally green or greenish with brassy, bronze, copper, or blue tones, occasionally coppery-red; shape elongate-oval; anterior pronotal angles feebly produced; major pronotal punctures moderate to coarse in size; elytral declivity evenly rounded; elytral disc at most only very feebly depressed behind basal one-quarter; lateral margins of elytra, in dorsal view, moderately broad in eastern specimens, generally narrower in western specimens; males with median punctures of first abdominal sternum longer and more conspicuous than in females, denser apically forming a distinct, well-defined brush in eastern specimens, a poorly-developed or obsolete brush in western specimens; median lobe of male genitalia not arcuate but straight in apical view.

Abbotsburg, Anson Co., Franklin 2000 ft.,
Highlands 3800 ft., Raleigh, Richmond Co.,
Southern Pines, Wayah Gap. North Dakota:
13 mi. W. Medora, Heart Butte Dam Grant Co.
Ohio: Ashthabula, Ashville Pickaway Co.,
Buckeye Lake Licking Co., Cedar Swp.,
Clinton Co., Columbus, Delaware Co.,
Ironton, Marion Co. Oklahoma: Norman,
Oklahoma Co. Oregon: Corvallis, Hood
River. Pennsylvania: Allegheny Co., Castle
Rock, Easton, Glenolden, Harrisburg, Kennett
Sq., Lancaster, Philadelphia, Phila. Neck,
Reading, W. Park, Wissinoming, Wyoming
Philadelphia. South Carolina: Aiken,
Callahatt Falls, Clemson Honeycut Creek Seneca
River, Greenwood Co., Newy Oconee Co. 900
ft. Yemassee Rt. 17 bridge. South Dakota:
Badlands Interior, Beresford, Cedar Canyon,
Chamberlain, Elk Point, Port Pierre, Ft.
Thompson, Highmore, Newell, Philip, Pierre,
Spearfish, Springfield, Tabor Craimer,
Union Co. State Park, Veraillon, Yankton.
Tennessee: Knoxville, Oak Ridge A.E.C.
Area, Rhea Co. Texas: Austin, Brownsville,
Burnet Co., Cameron Co., Dallas, Devi
Riv., El Paso, Gillespie Co., Kerrville,
Presidio, Val Verde Co., Victoria, Walder
Wildlife Ref. nr. Sinton San Patricio Co.
Virginia: Alex. Co., Arlington, Bull Run,
Fairfax Co., Fredericksburg, Glencarlyn,
Pennington Gap, Potmac Cr., Rosslyn, Stone
Cr. Lee Co. West Virginia: East Panhandle,
Fairmont, W. Sulphur. Wyoming: Pine
Bluff. (see Map 10).

REMARKS. This species exhibits considerable
variation. The colour of the dorsum varies
greatly, both geographically and within many
local populations. In eastern populations
ranging from New Brunswick, southern Quebec
and southern Ontario to Georgia, Indiana and
Mississippi, the head, pronotum and elytra
are generally pure green to blue green and
occasionally brassy-green or pure blue. In
greenish specimens, the pronotal and elytral
margins are often bluish. A series of
specimens from Caspe, Quebec ranges from
coppery-green or cupreo-aeneous to
coppery-red with greenish margins.
Similarly, specimens from northern Ontario,
Manitoba, Saskatchewan and Alberta are
brassy-green, cupperly-green or
cupreo-aeneous to pure coppery or
coppery-red in colour, rarely pure green.
This range of colour variation also occurs
southward in Montana, Wyoming, South Dakota
and Colorado. Specimens from western
Northwest Territories, British Columbia and
Oregon have the dorsum generally
brassy-green, cupperly-green or
cupreo-aeneous, occasionally pure green but
rarely pure coppery. In populations from
the central United States, from Illinois to
Nebraska and south to Louisiana, Texas and
New Mexico, specimens are generally dark
coppery or coppery-bronze to dark bronze or
dark purple, occasionally bronze-green and
rarely cupreo-aeneous. Specimens from
southwestern Texas (El Paso, Presidio) and a
few from New Mexico tend to be more
greenish, ranging from cupreo-aeneous to
pure green. A large species from
south-central Texas (Kerrville) containing
mainly coppery-bronze to dark bronzespecimens, includes also a few dark
blue or blue-green individuals. These occur
with a frequency of about 11%. The
coppery-bronze or dark bronze colour variant
also extends into southern Manitoba, South
Dakota and Colorado.

There is some geographical variation in
the punctuation of the pronotum. Specimens
from western Canada and northwestern United
States generally have the major punctures
denser and both major and minor punctures
slightly coarser than in specimens from
eastern Canada and United States and
midwestern and southern United States. The
width of the elytral margins also varies
geographically. The green or blue-green
eastern specimens have the margins
moderately broad in dorsal view. In all
other populations, the lateral elytral
margins are generally narrower, only
occasionally moderately broad. A similar
geographical pattern of variation occurs in
the pubescence of the first abdominal
sternum in males. In eastern populations
(as defined above), males have the setae of
the first abdominal sternum denser apically,
usually forming a distinct, well-defined
brush. In males of populations in northern
and western Canada and in the central and
western United States, the brush of setae
ranges from poorly-developed to obsolete.

The external characters given in the
diagnosis should separate nana from all the
other species except vaga, decora, luminosa,
opulenta and, possibly, solita and
sculpturata. Males and females of nana can be
distinguished from some of these species
by characters given in their respective
diagnoses but are most easily separated by
the distinctive male genitalia (Fig. 32) and
female spermatheca (Fig. 52).

Incetae Sedia

Crepidodera bicolor Boheman 1859
Crepidodera puberella Boheman 1859
Crepidodera suturella Boheman 1859
Crepidodera vafra Boheman 1859

In 1859, Boheman described as
Crepododera a number of species taken during the 1851-1853 voyage of the Swedish frigate "Eugenie". These included C. vafra from "California (St. Francisco)" , C. suturella from "California (St. Francisca), Insula Puna", C. bicolor from "California (St. Francisco), Taiti" , and C. puberula from "Montevideo, California, Insulae Puna, Taiti et Nahu". These names were apparently not noticed and not referred to by North American authors until 1989 when Horn pointed them out and made the following comment:

The localities of the Eugenies Resa material are notoriously badly mixed, and no reliance can be placed upon them. As I have been unable to identify them, notwithstanding all the collecting that has been done in California I think it best to omit them from our lists.

Confusion in the labelling of some of the "Eugenies Resa" specimens was also reported by Smith and Lawrence (1967) who found, for example, that two species of Diabrotica listed by Boheman (1859) as from "California (St. Francisco)" are actually Ecuadorian forms. They also pointed out that "Insulae Puna" and "Taiti" (Paita) are localities in Ecuador.

I have not seen Boheman's types but, after careful examination of his descriptions, I am very doubtful that his species belong in the genus Crepidodera. Since the distributions given for some of these species are unusual, it is also possible that specimens were mislabelled. Therefore, it is probably best to regard these species, supposedly from California, as "incertae sedis".

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The abbreviations in parentheses in the above list are those used in the text when citing material examined.

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Fig. 1. Crepidodera violacea Melsheimer. Male, head and pronotum. Fig. 2. C. bella n. sp. Male, head and pronotum. Fig. 3. C. aereola (LeConte). Male, head and pronotum; (A) Anterior pronotal angle. Fig. 4. C. sculpturata (Lazorko). Male, head and pronotum. Figs. 5, 6. C. bella n. sp. 5. Male, dorsal habitus; (B) Elytral depression. 6. Male, dorsal lateral view of elytral depression.
Fig. 7. Crepidodera aereola (LeConte). Male, habitus view. Fig. 8. C. browni n. sp. Male, holotype, dorsal view of elytra. Fig. 9. C. heikertingeri (Lasorko). Male, dorsal view of elytra. Fig. 10. C. luminosa n. sp. Male, dorsal view of elytra. Figs. 11, 12. C. sculpturata (Lasorko). 11. Male, ventral view. 12. Female, ventral view.
Fig. 13. Crepidodera digna n. sp. Male, ventral view of metasternum. Fig. 14. C. solita n. sp. Male, ventral view of metasternum. Fig. 15. C. heikertingeri (Lazorko). Male, ventral view of metasternum. Fig. 16. C. digna n. sp. Female, ventral view of metasternum. Fig. 17. C. longula Horn and Fig. 18. C. violacea Melsheimer. Male genitalia, dorsal, left lateral, and ventral view of median lobe and tegmen.
Fig. 19. Crepidodera spenderi (Lazorko); Fig. 20. C. solita n. sp.; Fig. 21. C. decora n. sp.; Fig. 22. C. brownii n. sp.; Fig. 23. C. opulenta (LeConte); Fig. 24. C. luminosa n. sp.; Male genitalia, dorsal, left lateral, and ventral view of median lobe and tegmen.
Fig. 25. Crepidodera vaga n. sp.; Fig. 26. C. heikertingeri (Lazorko); Fig. 27. C. diguana n. sp.; Fig. 28. C. populivora n. sp.; Fig. 29. C. bella n. sp., holotype; Fig. 30. C. aereola (LeConte); Male genitalia, dorsal, left lateral, and ventral view of median lobe and tegmen.
Fig. 31. Crepidodera sculpturata (Lazorko); Fig. 32. C. nana (Say); Male genitalia, dorsal, left lateral, and ventral view of median lobe and tegmen. Figs. 33-36. C. heikertingeri (Lazorko); third instar larva. 33. Dorsal view of head. 34. Dorsal view of prothorax. 35. Dorsal view of typical abdominal segment. 36. Dorsal view of anal plate (9th abdominal tergum).
Fig. 37. Crepidodera longula Horn; Fig. 38. C. violacea Melsheimer; Fig. 39. C. spenceri (Lazorko); Fig. 40. C. salita n. sp.; Fig. 41. C. decora n. sp.; Fig. 42. C. browni n. sp.; Fig. 43. C. opulenta (LeConte); Fig. 44. C. luminosa n. sp.; Fig. 45. C. vaga n. sp.; Fig. 46. C. heikertingeri (Lazorko); Fig. 47. C. digna n. sp.; Fig. 48. C. populivora n. sp.; Fig. 49. C. bella n. sp.; Fig. 50. C. serena (LeConte); Fig. 51. C. sculpturata (Lazorko); Fig. 52. C. nana (Say); Spermathecae, lateral view.