THE INSECTS AND ARACHNIDS OF CANADA

PART 4

The Anthocoridae of Canada and Alaska

Heteroptera: Anthocoridae

Agriculture Canada

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Introduction

The Anthocoridae, or flower bugs, are economically important as a group because they prey on other arthropods. They have, however, received very little attention in North America. The group is poorly known, the species are poorly represented in collections, and much confusion exists in naming the species. Therefore, special efforts were made recently to collect them from across Canada and in the United States. As a result of these collections and subsequent study of the group, several new species were described and European introductions were reported by the author. The range and distribution of the known species were expanded and new information on their habitats and ecology have increased the knowledge of the group. The aim of this report is to help the economic entomologists and other field workers to recognize this important group of predators, often encountered in field surveys and control programs.

This faunal study brings together the species of Anthocoridae known to occur in Canada and Alaska. Van Duzee (1917) listed 33 species of Anthocoridae in America north of Mexico. In subsequent years, Van Duzee (1921), Drake and Harris (1926), and Blatchley (1925, 1926, 1928) described additional species. Blatchley (1926), Downes (1927), Torre Bueno (1930), Harris and Shull (1944), Moore (1944, 1950), and Anderson (1962) listed the Anthocoridae for smaller geographical areas within Canada and adjacent United States. In recent years, Kelton and Anderson (1962), Anderson and Kelton (1963), Herring (1966), and Kelton (1967, 1976*a*, 1976*b*, 1977*a*, 1977*b*) have dealt with additional species found in North America. Approximately 85 species of Anthocoridae are now known in America north of Mexico.

Forty-one species of Anthocoridae, representing 14 genera, have been recorded from Canada and Alaska. Most of them are native to this continent, but about one-quarter of the species are European introductions. Some of the Palaearctic species are recent introductions and are generally confined to the areas of importation; little dispersion has taken place. They are restricted to the west coast and the Okanagan Valley of British Columbia, the Niagara Peninsula of Ontario, and the east coast. Other species that are common to both North America and Europe are widely distributed in Canada.

The Anthocoridae have long been recognized as beneficial predators and are considered to be of economic importance to man. These insects, therefore, when established in large populations, may keep in check some pest species that are phytophagous and thus destructive to man. Some members of the family have attracted interest because of their beneficial nature, and attempts were made in the past to introduce species from Europe, India, and Pakistan that would control some of our pests in agriculture and forestry.

Because of their predatory nature, the Anthocoridae depend on insects and other arthropods for food. They prey on eggs and larvae of springtails,

thrips, psocids, aphids, scale insects, psyllids, leafhoppers, grain beetles, bark beetles, leafroller larvae, fly larvae, mites, and other arthropods. When the food supply is exhausted in one habitat, these predators seek out other areas of food and shelter. Normally the habitats of prey provide excellent hiding places for the predators. Although each group of species appears to have a preferred habitat, they are all able to exist and thrive under a wide range of conditions. Some inhabit leaf or straw litter, compost piles, or moldy grains. Many anthocorids are found in, or under, the bark of dead or decaying deciduous and coniferous trees, whereas others inhabit only the bark of living trees. Occasionally, some are found in bird nests and mammal burrows. Many species live on the flowering heads of plants or on the foliage and branches of shrubs and trees. Some species are known to bite man.

This faunal study includes brief descriptions of adults, illustrations of adults and of the male genital claspers, and scanning electron micrographs of the osteolar canals. The known habitats and the distribution of the species are given. Keys to subfamilies, tribes, genera, and species are also included.

Collecting and preserving specimens

In general, there are five ways to collect Anthocoridae. Collecting methods depend on the ecology, type of habitat, and type of species to be collected. The five ways are: 1) sweeping, using a regular sweep net; 2) beating the branches, using a beating stick and sheet; 3) barking, using a knife and axe to remove the bark; 4) sifting and searching in the litter; and 5) light trap.

The sweeping method is used to collect anthocorids living on flowering heads of plants, on shrubs, and on the foliage of deciduous trees. This method will gather most of the species belonging to *Anthocoris, Macrotracheliella, Orius,* and *Temnostethus.* Using the beating stick and sheet and beating the branches of coniferous trees will gather all of the *Tetraphleps, Melanocoris, Acompocoris, Cardiastethus,* and several of the *Elatophilus* species. The beating method is used exclusively on fruit trees in orchards, and often on deciduous trees to collect *Anthocoris, Temnostethus,* and *Orius* species.

There are two methods of looking for anthocorids in the bark. The first is to search for them in the bark of living trees. A hunting knife is used to carefully chip away the loose layers of bark and the anthocorids underneath are quickly picked up with an aspirator. Several species of *Elatophilus* on conifers and *Calliodis* and *Dufouriellus* species on deciduous trees are collected by this method. The other, more productive method is to search for the anthocorids under the bark of dead coniferous trees. *Lyctocoris* and *Scoloposcelis* species are found only in freshly cut logs or in standing trees recently killed by lightning. The bark on these trees barely peels off the trunk and is heavily infested with bark beetle larvae. Large sections of the bark are peeled with the axe, and the section is banged heavily against the axe over a beating sheet. The anthocorids and other insects are jarred loose and picked off the sheet with an aspirator.

The anthocorid fauna under the bark of dead trees is also varied and abundant. The bark in these trees readily peels off and the insects are found directly underneath. *Lasiochilus* and *Xylocoris* species are generally collected under the bark of dead deciduous and coniferous trees.

Another method of collecting anthocorids is by sifting or searching through moldy grain, leaf litter, compost piles, fleshy bracket fungi, mistletoe clumps on trees, bird nests, and mammal nests and burrows. *Lyctocoris stalii, Elatophilus, Calliodis, Lasiochilus, Cardiastethus,* and *Xylocoris* species are often collected in this way.

The use of a black light or ultraviolet light on a dark, warm, calm, and humid night will often attract *Anthocoris, Lasiochilus, Orius, Calliodis,* and *Tetraphleps* species.

The collected specimens are killed promptly in cyanide and mounted as soon as possible. If they cannot be mounted immediately, they may be stored dry between layers of cellucotton in pill boxes and mounted later. Because of their small size, the anthocorids are mounted on a narrow

bristol board point. The specimen is attached by the right side of the thorax above the intermediate coxa. Anthocorids should not be pinned directly and they should not be glued directly to the pin.

Classification

The classification proposed by Carayon (1972) is used in this faunal study. The Anthocoridae are divided into three subfamilies, Lasiochilinae, Anthocorinae, and Lyctocorinae. In our fauna the Lasiochilinae contains only the genus *Lasiochilus* and one species. The Anthocorinae is divided into two tribes, Anthocorini and Oriini. The Anthocorini contains six genera and 20 species, and the Oriini contains two genera and five species. The Lyctocorinae is divided into four tribes, Lyctocorini, Xylocorini, Cardiastethini, and Scolopini. Lyctocorini and Xylocorini contain one genus each with six and four species respectively. The Cardiastethini and Scolopini each contain two genera and two species.

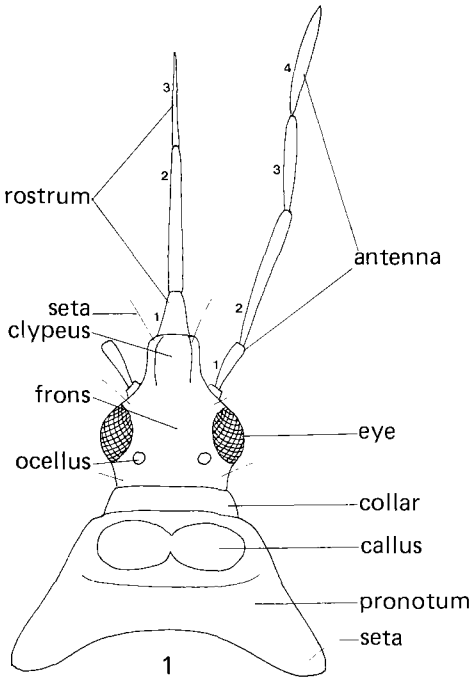
Morphology

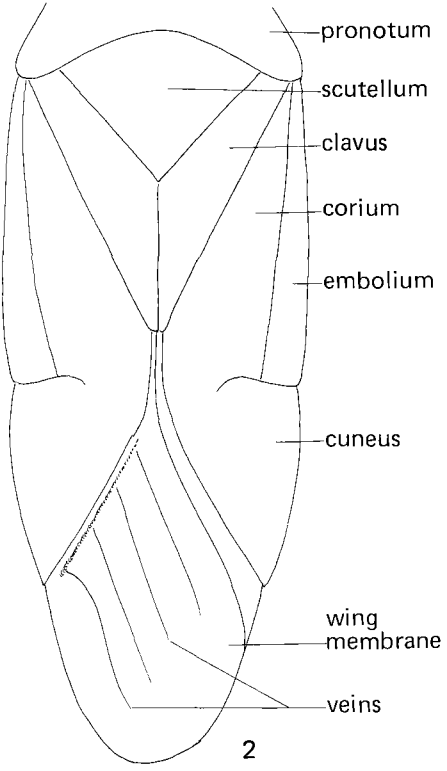
The general appearance of the Anthocoridae is similar to the Miridae, except that anthocorids have ocelli. The bugs vary from 1.7–4.9 mm in length. Generally, they are flattened, and glabrous or pubescent. The wings or the hemelytra are macropterous or brachypterous. The structures and structural terms are illustrated in Figs. 1–6.

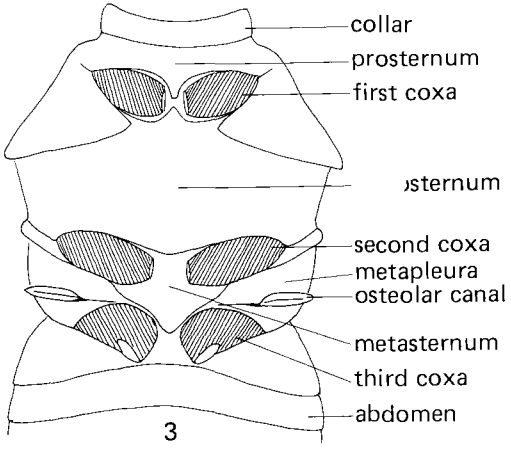
The head is horizontal and the large, conspicuous eyes are situated on the side of the head. The beak, or rostrum, is composed of three segments and may be short or long, extending to the anterior coxae or to the genital segment. The antennae have four segments and are inserted in front of the eyes. Setae are usually found on the head and may be long, intermediate, or short. The neck in most species is short, except for that of *Macrotracheliella,* which is long and prominent.

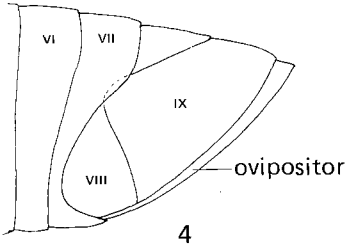
The pronotum is trapezoidal, and smooth or punctate; the calli are raised or inconspicuous. In *Dufouriellus* the calli are separated by a longitudinal median groove. The collar is prominent in some species and absent in others. The lateral margins of the pronotum are carinate in most of the species but may be explanate in others. Some species have setae at the basal and anterior angles. Normally the pronotum is divided by a transverse median groove into a narrower anterior portion and a broader basal portion.

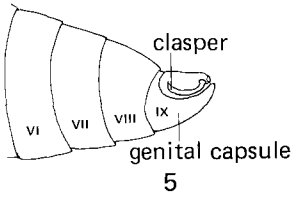
Figs. 1–6. *Tetraphleps* sp., showing typical anthocorid structures and illustrating structural terms. 1, head and pronotum; 2, hemelytron; 3, sternum; 4, female abdomen; 5, male abdomen; 6, leg.

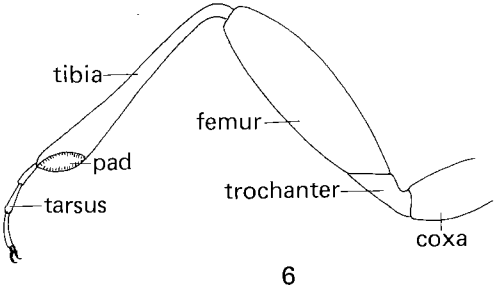

rostrum
antenna
seta
clypeus
frons
eye
ocellus
collar
callus
pronotum
seta
1
2
3
4


pronotum
scutellum
clavus
corium
embolium
cuneus
wing membrane
veins
2


collar
prosternum
first coxa
second coxa
metapleura
osteolar canal
metasternum
third coxa
abdomen
3


VI
VII
IX
VIII
ovipositor
4


clasper
VI
VII
VIII
IX
genital capsule
5


tibia
femur
pad
trochanter
tarsus
coxa
6

The abdomen of the Anthocoridae consists of nine abdominal segments. The first segment is reduced and is not visible, so there are only eight visible segments, which should be remembered when reference is made to abdominal segments or to certain structures on them.

The terminal abdominal segment contains the genitalia. The genital capsule in the male is usually asymmetric or strongly skewed to the left. The species in the genus *Lyctocoris* have left and right claspers, whereas the rest of the species in the family have only the left clasper. The female ovipositor is developed and symmetric in most species. However, in species of *Cardiastethus* and *Dufouriellus,* the ovipositor is not developed.

The osteolar canal is located on the metapleuron, which is the triangular plate between and above the second and third coxae. The shape and detail of the osteolar canal show marked differences for each species and similarities for closely related species. The sculpturing on the surface of the metapleuron aids in the rapid evaporation of the exudate. Each micrograph was taken from the left side using approximately 500× magnification, except for *Lyctocoris* and *Xylocoris,* which were taken at 300× magnification. The genital claspers were drawn at 40× magnification and the adults at 10× magnification.

Definitions of morphological terms

apex That part of any joint or structure opposite the base by which it is attached.
asymmetric Not alike on the two sides; not symmetrical; e.g., the genital capsule of the male twisted to the left.
brachypterous With short or abbreviated wings.
carina Elevated ridge.
carinate Ridged.
clubbed The enlarged terminal part of the antennae.
explanate Enlarged and flattened.
exudate Any discharge from the body or an organ through pores or openings.
filiform Thin throughout.
fuscous Dusky; dark brown, approaching black.
fusiform Thicker in the middle, tapering toward each end.
genital capsule Terminal abdominal segment containing the male genitalia.
glabrous Almost without hair.
hemelytron One-half of the wing containing the clavus, corium, embolium, and wing membrane.
incrassate Thickened; rather suddenly swollen at some point, especially near tip; e.g., antenna thickened toward the apex.
macropterous Wings fully developed.
metapleuron A lateral part of a thoracic segment.
osteolar canal A furrow leading from an osteole, specifically in Heteroptera.
penultimate segment Segment next to last.
pilosity A covering of erect, fine hair.

predaceous Living by preying on other insects.
pruinose Covered with whitish dust.
pubescence Fine, soft hair or down covering a surface.
punctate Marked with small depressions.
rugose Wrinkled.
seta Slender, bristle-like hair.
trapezoidal In the form of a four-sided figure of which two sides are parallel and two are not.
truncate Cut off squarely at the tip; e.g., having the apex flattened.

Key to subfamilies

1. Osteolar canal curved backward (Fig. 47) ..... **Lasiochilinae**

   Osteolar canal straight or curved forward (Figs. 48, 52, 77) 2

2. Pilosity on antennal segments 3 and 4 shorter than twice diameter of segments; segments 3 and 4 fusiform, equal to or thicker than base of segment 2; pronotum without median longitudinal groove; metasternum without median carina; ovipositor developed ..... **Anthocorinae**

   Pilosity on antennal segments 3 and 4 longer than twice diameter of segments; segments 3 and 4 filiform, thinner than base of segment 2; pronotum (in *Dufouriellus*) with median longitudinal groove; metasternum with median carina; ovipositor present or absent ..... **Lyctocorinae**

Subfamily Lasiochilinae Carayon

The subfamily characteristics are: 1) osteolar canal short and curved backward; 2) antennal segments 3 and 4 filiform, their diameter less than base of segment 2; 3) pilosity on antennal segments 3 and 4 longer than twice diameter of segments; 4) metasternum with longitudinal median carina; and 5) hemelytra pruinose and pubescent.

In Canada, the subfamily is represented by one genus and one species.

Genus *Lasiochilus* Reuter

Oblong, macropterous, pubescent. Head short, shiny; setae long. Rostrum extending to apex of mesosternum. Pronotum shiny; collar narrow; calli inconspicuous and smooth. Scutellum pruinose on apical half. Hemelytra pruinose, weakly punctate; wing membrane with one poorly defined vein; outer margin fringed. Hind coxae close together. Osteolar canal curved backward.

Only one species is known to occur in Eastern Canada.

Lasiochilus fusculus (Reuter)

Figs. 7, 47, 87; Map 1

Dalasia fuscula Reuter 1871*b*:563.
Lasiochilus fusculus Reuter 1884:22; Matthewman & Pielou 1971: 798.

Male. Length 2.73–2.80 mm, width 0.84–0.98 mm. Head: length 0.33 mm, width 0.42 mm; dark brown, shiny; ocelli small; setae long. Rostrum extending to apex of mesosternum; penultimate segment 0.56–0.59 mm long. Second antennal segment 0.41–0.44 mm long, light yellowish brown, incrassate, densely pilose; terminal segments filiform, pilose. Pronotum: 0.84–0.87 mm wide at base; reddish brown, shiny, mostly smooth; calli inconspicuous. Scutellum: basal portion smooth and shiny; apical half pruinose and transversely rugose. Hemelytron: brown, pruinose, finely punctate; pubescence long and erect; wing membrane fuscous, pruinose; veins poorly developed. Ventral surface: reddish brown, shiny; terminal segments of abdomen with long setae; femur brown; anterior femur swollen; tibia light brown with long setae; anterior tibia with large pad at apex.

Female. Length 2.80–2.94 mm, width 0.98–1.12 mm. Much like male in color and appearance but more robust; abdomen often extending beyond margins of hemelytra; ovipositor developed.

Remarks. This is the only representative of the genus in Canada and is readily distinguished from the other anthocorids by the filiform and pilose terminal antennal segments and the pruinose and pubescent hemelytra (Fig. 87). The genital clasper (Fig. 7) is large and distinctive in shape. The osteolar canal (Fig. 47) is short and gently curved backward.

The species is probably predaceous, preying on beetle and fly larvae and other small arthropods associated with a particular type of habitat.

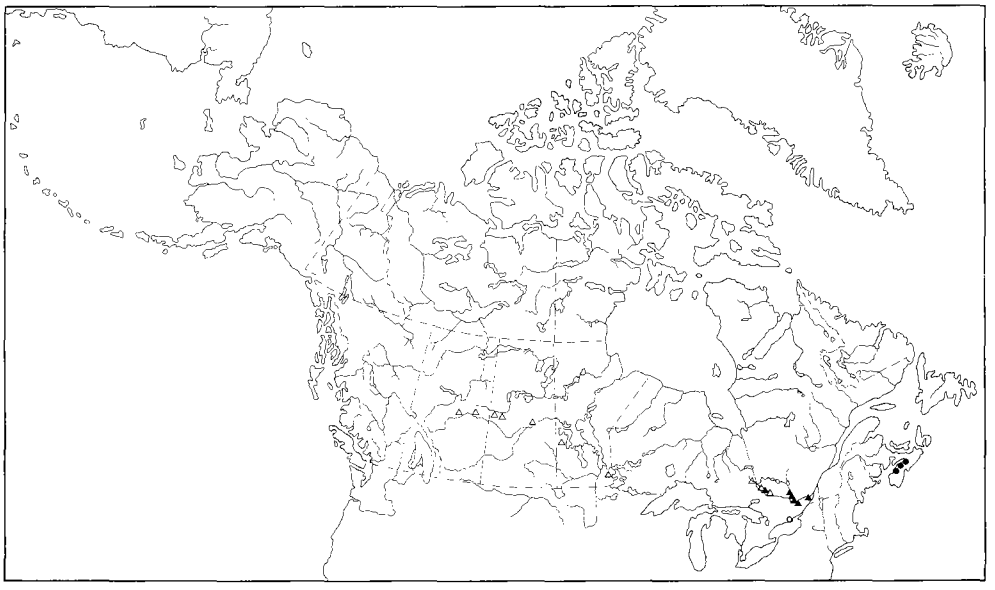
Habitat. Generally collected under bark of dead deciduous trees and in bracket fungi growing on dead *Betula* spp.

Distribution. Originally described from South Carolina; in Canada known only from Ontario and Quebec (Map 1).

Subfamily Anthocorinae Van Duzee

The subfamily characteristics are: 1) osteolar canal curved forward, or nearly straight; 2) antennal segments 3 and 4 fusiform, their maximum thickness greater than base of segment 2; 3) pilosity on segments 3 and 4 short; and 4) metasternum without longitudinal median carina.

In Canada the subfamily is represented by two tribes, eight genera, and 25 species.



Map 1. Distribution of *Lasiochilus fusculus* (Reuter) (▲), *Temnostethus gracilis* Horvath (●), *Elatophilus brimleyi* Kelton (○), and *E. minutus* Kelton (△).

Key to tribes of Anthocorinae

1. Generally larger species, 3.0–5.0 mm long; anterior tibia with pads ..... **Anthocorini**

   Generally smaller species, 2.0 mm long; anterior tibia without pads ..... **Oriini**

Key to genera of Anthocorini

1. Hind coxae widely separated; apex of metasternum truncate or rounded 2

   Hind coxae close together; apex of metasternum triangular 3

2. Hemelytra complete or reduced; osteolar canal knobbed at apex; in deciduous trees ..... ***Temnostethus* Fieber**

   Hemelytra complete; osteolar canal flattened; in conifers ..... ***Elatophilus* Reuter**

3. Osteolar canal nearly straight, with apical portion separated from metapleuron 4

Osteolar canal curved forward, with apical portion not separated but extending anteriorly as narrow carina 5

4. Lateral margins of pronotum greatly expanded ..... ***Melanocoris*** **Champion**

Lateral margins of pronotum not expanded ..... ***Tetraphleps*** **Fieber**

5. Rostrum extending beyond intermediate coxae; in conifers ..... ***Acompocoris*** **Reuter**

Rostrum extending between anterior coxae; in deciduous trees and shrubs ..... ***Anthocoris*** **Fallén**

Genus *Temnostethus* Fieber

Brachypterous or macropterous, shiny, almost glabrous. Head long; eyes small; ocelli prominent; setae short. Rostrum extending to hind coxae. Pronotum trapezoidal; collar well developed; calli raised and finely sculptured. Hemelytra very short or fully developed, pruinose, and finely sculptured; wing membrane almost absent or fully developed. Hind coxae wide apart. Osteolar canal slightly curved forward; apical portion somewhat knobbed; small carina extending anteriorly.

Only one species introduced from Europe is known to occur in Canada.

Temnostethus gracilis Horvath

Figs. 8, 48, 88; Map 1

Temnostethus pusillus var. *gracilis* Horvath 1907:310.
Temnostethus gracilis, Wagner 1940:33; Pericart 1972:91; Kelton 1977*a*:243.

Male. Length 2.10–2.38 mm, width 0.77–0.84 mm. Head: length 0.38 mm, width 0.36 mm; reddish brown, finely sculptured, shiny; setae short. Rostrum extending to hind coxae; penultimate segment 0.59–0.63 mm long. Second antennal segment 0.40–0.42 mm long, incrassate; yellow base and brown apex; terminal segments fusiform, brown. Pronotum: 0.59–0.63 mm wide at base; dark reddish brown, shiny; calli raised, finely sculptured; basal half transversely rugose and finely sculptured. Scutellum: finely sculptured; apical portion flattened and transversely rugose. Hemelytron: brachypterous, covering third abdominal segment; clavus, apical half of embolium, and corium brown, remainder whitish; pruinose, finely sculptured, almost glabrous; pubescence short and sparse; wing membrane very short, almost obsolete. Ventral surface: reddish brown, shiny, finely sculptured; hind and middle coxae wide apart; femur brown; tibia yellow; hind tibia pilose.

Female. Length 2.38–2.52 mm, width 0.84–0.91 mm. Much like male in color and appearance but more robust and penultimate rostral segment slightly longer. Macropterous forms very rare.

Remarks. This European species was reported in Canada by Kelton (1977*a*) and is the only representative of the genus in Canada. It is readily distinguished from the other anthocorids by the short and almost glabrous hemelytra (Fig. 88). The genital clasper (Fig. 8) is gently curved and grooved along its length. The osteolar canal (Fig. 48) is gently curved forward, is knobbed at apex, and extends anteriorly to the margin of the metapleuron as a narrow carina.

The macropterous forms are rare and only a few macropterous females have been collected in Canada. The species preys on small insects and other arthropods that are generally associated with moss- and lichen-covered deciduous trees.

Habitat. Collected on twigs and branches of *Acer plantanoides,* and on the trunks of *Quercus rubra, Acer saccharum,* and *Tilia cordata.*

Distribution. Widespread in Europe; in Canada known only from Grand Pré, Kentville, and Port Royal, N.S. (Map 1).

Genus *Elatophilus* Reuter

Elongate and flattened. Head long; eyes and ocelli prominent; setae short. Rostrum extending to mesosternum or beyond. Pronotum finely rugose; collar poorly defined; calli smooth and shiny. Hemelytra pruinose, macropterous; wing membrane with four veins. Hind coxae wide apart. Osteolar canal curved forward; apical half narrowed to a fine carina.

Three species occur in Canada and they are all found on conifers.

Key to species of *Elatophilus*

1. Second antennal segment greatly thickened ..... ***brimleyi* Kelton**

   Second antennal segment slender 2

2. Embolium completely white ..... ***minutus* Kelton**

   Embolium mostly brown or black 3

3. Rostrum 1.12 mm or longer; clavus mostly white; species more than 3.5 mm long ..... ***inimicus* (Drake & Harris)**

   Rostrum less than 1.12 mm; clavus mostly black; species less than 3.0 mm long ..... ***pullus* Kelton & Anderson**

Elatophilus brimleyi Kelton

Fig. 89; Map 1

Elatophilus brimleyi Kelton 1977*b*:1017.

Male. Unknown.

Female. Length 2.80 mm, width 0.84 mm. Head: length 0.45 mm, width 0.35 mm; black, shiny; ocelli small; setae long. Rostrum extending beyond middle of mesosternum; penultimate segment 0.54 mm long. Second antennal segment 0.47 mm long, black, greatly thickened; terminal segments thickly fusiform, black. Pronotum: 0.77 mm wide at base; black, shiny, finely rugose, glabrous; lateral margins carinate. Scutellum: black, shiny; anterior portion smooth; posterior portion sculptured. Hemelytron: clavus white; inner margin black; embolium, corium, and cuneus black; pruinose; pubescence short, sparse, and erect; wing membrane fuscous on apical half, and white on basal half. Ventral surface: black; legs black; hind tibia pilose on apical half.

Remarks. This species is distinguished by the greatly thickened second antennal segment and by the white clavus (Fig. 89). It is similar to *minutus* in size but differs markedly in the type of antennae and in the color pattern on the hemelytra.

Habitat. Unknown, but probably confined to *Pinus* spp. like the other members of the genus, preying on arthropods associated with the host plant.

Distribution. Known only from Prince Edward County, Ont. (Map 1).

Elatophilus minutus Kelton

Figs. 9, 49, 90; Map 1

Elatophilus minutus Kelton 1976*b*:632.

Male. Length 2.59–2.80 mm, width 0.84–0.91 mm. Head: length 0.49 mm, width 0.38 mm; dark reddish brown, shiny; ocelli prominent; setae short. Rostrum extending to middle of mesosternum; penultimate segment 0.49–0.52 mm long. Second antennal segment 0.43–0.49 mm long, incrassate; light yellow; base brown; terminal segments brown to black. Pronotum: 0.73–0.80 mm wide at base; dark reddish brown, shiny; calli inconspicuous; lateral margins carinate. Scutellum: dark reddish brown, smooth, shiny; apical portion finely wrinkled. Hemelytron: clavus and embolium white; corium and cuneus dark brown; pruinose; pubescence short and sparse; wing membrane fuscous on apical half, clear on basal half. Ventral surface: dark brown, shiny; femur dark brown; tibia pale yellow; apex of hind tibia pilose.

Female. Length 2.80–3.08 mm, width 0.84–0.98 mm. Much like male in appearance but more robust; abdomen often extending beyond margins of hemelytra; penultimate rostral segment slightly longer.

Remarks. This species is distinguished by its small size and by the color pattern on the hemelytra (Fig. 90). The clasper (Fig. 9) is slender, sickle-shaped, and grooved for its entire length. The osteolar canal (Fig. 49) is typical for the genus.

The species is probably predaceous, feeding on aphids and other small arthropods found on the host trees. It is active and hides quickly under the light scaly bark.

Habitat. Collected only on *Pinus banksiana.*

Distribution. Originally described from Quebec, Ontario, and the Prairie Provinces, and known only from those areas (Map 1).

Elatophilus inimicus (Drake & Harris)

Figs. 10, 50, 91; Map 2

Xenotracheliella inimica Drake & Harris 1926:38.
Xenotracheliella vicaria Drake & Harris 1926:39.
Elatophilus inimicus, Kelton & Anderson 1962:39.

Male. Length 3.63–3.92 mm, width 1.12–1.19 mm. Head: length 0.54 mm, width 0.47 mm; dark brown to black, shiny; ocelli small; setae short. Rostrum extending to metasternum or beyond; penultimate segment 0.73–0.80 mm long. Second antennal segment 0.66–0.73 mm long, incrassate, yellowish brown; base and apex reddish brown; terminal segments brown. Pronotum: 0.91–1.01 mm wide at base; dark reddish brown, shiny; calli obscured; lateral margins carinate. Scutellum: dark reddish brown, shiny; apical portion finely wrinkled. Hemelytron: clavus light fuscous to white; base and apex brown; corium and embolium brown; cuneus dark brown; pruinose; pubescence short and sparse; wing membrane fuscous, with basal half often clear. Ventral surface: brown; femur dark brown; tibia yellowish; hind tibia pilose.

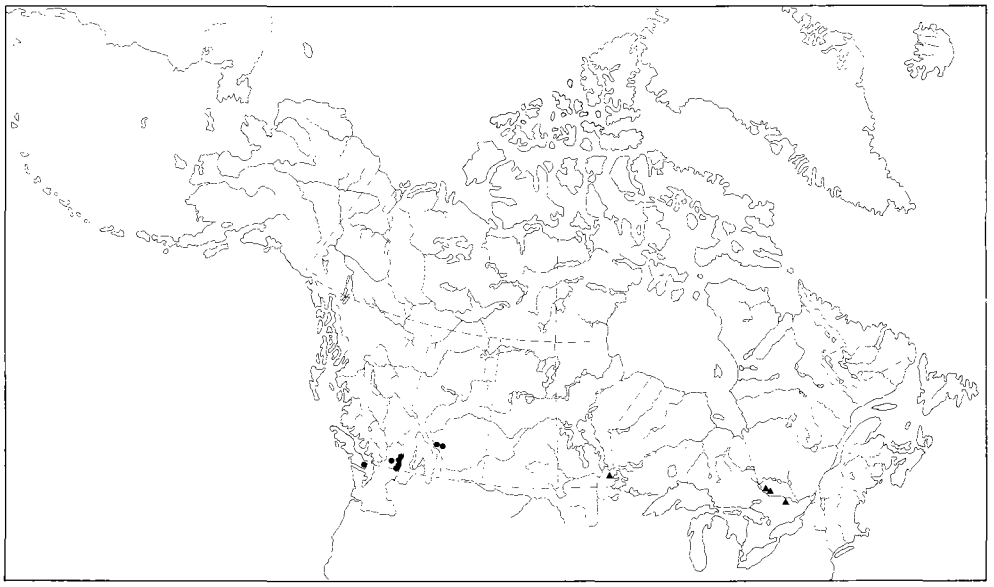
Female. Length 3.50–4.06 mm, width 1.12–1.26 mm. Much like male in appearance but more robust; abdomen often extending beyond hemelytra; penultimate segment longer.

Remarks. This is the largest species in the genus and it has the longest rostrum. The color pattern is also distinctive (Fig. 91). The genital clasper (Fig. 10) is gently curved and grooved along its length. The osteolar canal (Fig. 50) is typical for the genus.

This species is difficult to collect and as a result, it is rare in collections. It probably preys on small insects and arthropods associated with the host plant.

Habitat. Generally found in the bark of trunks of living *Pinus banksiana.*

Distribution. Originally described from New York and Michigan; in Canada known from Quebec, Ontario, and Manitoba (Map 2).



Map 2. Distribution of *Elatophilus inimicus* (Drake & Harris) (▲) and *E. pullus* Kelton & Anderson (●).

Elatophilus pullus Kelton & Anderson

Figs. 11, 51, 92; Map 2

Elatophilus pullus Kelton & Anderson 1962:1306.

Male. Length 2.66–2.94 mm, width 0.87–0.98 mm. Head: length 0.45 mm, width 0.42 mm; black, shiny; ocelli small; setae short. Rostrum extending to middle of mesosternum; penultimate segment 0.38–0.42 mm long. Second antennal segment 0.42–0.45 mm long, black, incrassate; terminal segments black. Pronotum 0.80–0.87 mm wide at base; black, shiny; calli raised, finely sculptured; lateral margins carinate. Scutellum: black, shiny; apical half finely sculptured. Hemelytron: black, pruinose; bases of corium and embolium, and middle of clavus sometimes pale; pubescence short and sparse; wing membrane fuscous, with basal half often pale. Ventral surface: dark brown to black; femur dark brown; tibia lighter; hind tibia pilose.

Female. Length 2.73–2.94 mm, width 0.94–1.01 mm. Much like male in appearance but more robust; abdomen often extending beyond hemelytra; penultimate rostral segment longer.

Remarks. This species is distinguished by the small size and the overall black color of the hemelytra (Fig. 92). The genital clasper (Fig. 11) is gently

curved and grooved along its length. The osteolar canal (Fig. 51) is typical for the genus.

The species is probably predaceous, feeding on aphids, mites, and other small arthropods found on the host plants.

Habitat. Generally collected on *Pinus ponderosa,* and in smaller numbers on *P. contorta, P. flexilis,* and *Picea glauca.*

Distribution. Originally described from British Columbia and Oregon; now known to occur in Alberta (Map 2).

Genus *Melanocoris* Champion

Macropterous, finely sculptured, and shiny. Head short; setae short; ocelli prominent. Rostrum extending between anterior coxae or beyond. Pronotum rugose, punctate; lateral margins broadly expanded and rounded at anterior angles; collar well developed; calli raised, finely sculptured. Hemelytra shiny, finely sculptured; wing membrane with four veins. Hind coxae close together. Osteolar canal nearly straight; apex separated from metapleuron.

Two species occur in Canada, one of which is an introduced European species.

Key to species of *Melanocoris*

1. Occurs in Western Canada; rostrum extending between anterior coxae; pubescence on hemelytra scale-like ..... ***nigricornis* Van Duzee**

   Occurs in Eastern Canada; rostrum extending beyond hind coxae; hemelytra almost glabrous, and pubescence not scale-like ..... ***longirostris* Kelton**

Melanocoris nigricornis Van Duzee

Figs. 12, 52, 93; Map 3

Melanocoris nigricornis Van Duzee 1921:143; Kelton & Anderson 1962:1307.

Male. Length 2.66–3.22 mm, width 0.98–1.19 mm. Head: length 0.35 mm; black, shiny, finely sculptured; ocelli prominent; setae very short. Rostrum extending between anterior coxae; penultimate segment 0.38–0.42 mm long. Second antennal segment 0.38–0.42 mm long, dark brown, incrassate; terminal segments black. Pronotum: 0.82–0.94 mm wide at base; black, finely sculptured; base and lateral margins often brown; calli slightly raised;

side margins broadly expanded at anterior angles. Scutellum: black, finely sculptured. Hemelytron: dark brown, sculptured, shiny; pubescence scale-like, serially arranged, silvery, short, and appressed; wing membrane lightly fuscous. Ventral surface: reddish brown; femur dark brown; tibia light brown.

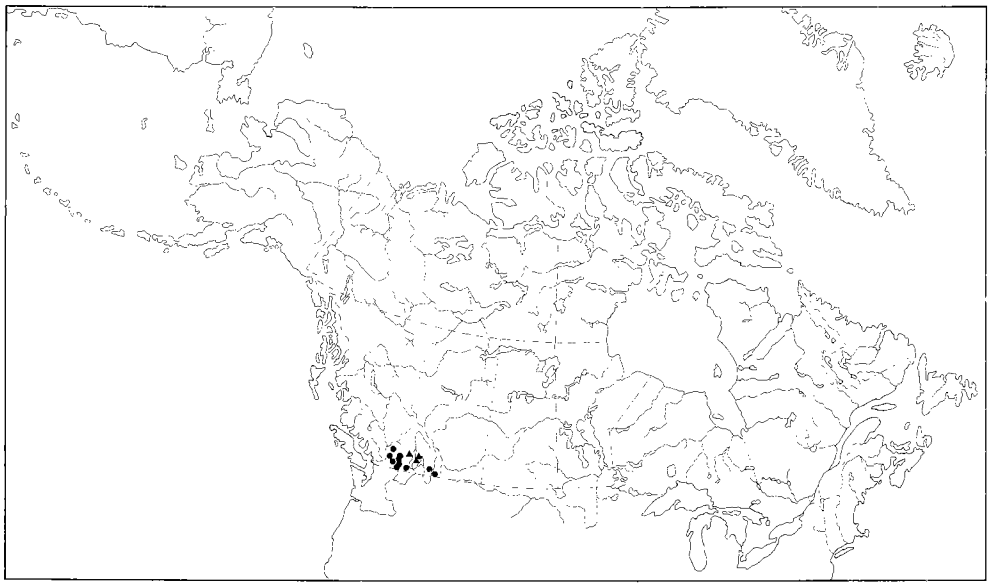
Female. Length 3.08–3.50 mm, width 1.26–1.47 mm. Much like male in appearance but more robust; hemelytra more brownish; penultimate rostral segment slightly longer.

Remarks. This species is easily recognized by the scale-like pubescence and the fine sculpturing on the hemelytra (Fig. 93). The clasper (Fig. 12) is slender, gently curved, and grooved along its length. The osteolar canal (Fig. 52) is short and straight, with the apex separated from the metapleuron.

The species is probably predaceous on aphids, scales, and other small arthropods associated with the host plants.

Habitat. Collected in large numbers in British Columbia on *Pinus sylvestris* heavily infested with scales and on *P. contorta, P. ponderosa,* and *Picea engelmannii* infested with scales, aphids, and adelgids.

Distribution. Originally described from California and now known to occur in southern British Columbia (Map 3).



Map 3. Distribution of *Melanocoris nigricornis* Van Duzee (●) and *M. longirostris* Kelton (▲).

Melanocoris longirostris Kelton

Figs. 13, 53, 94; Map 3

Melanocoris longirostris Kelton 1977*a*:246.

Male. Length 2.66–2.94 mm, width 0.94–0.98 mm. Head: length 0.40 mm, width 0.36 mm; black, shiny; ocelli prominent; setae absent. Rostrum extending beyond hind coxae; penultimate segment 0.73–0.94 mm long. Second antennal segment 0.38–0.42 mm long, light yellowish brown, incrassate; apex black; terminal segments black. Pronotum: 0.73–0.85 mm wide at base; black; lateral margins often brown, shiny; calli slightly raised, smooth; side margins broadly expanded at anterior angles. Scutellum: black, shiny; base smooth; apical half transversely rugose. Hemelytron: brown, finely sculptured, punctate, shiny; pubescence short and simple; wing membrane lightly fuscous. Ventral surface: black or dark reddish brown; tibia yellowish brown.

Female. Length 2.66–3.01 mm, width 1.19–1.26 mm. Much like male in color and appearance but more robust; penultimate rostral segment slightly longer.

Remarks. This species is distinguished by the long rostrum and by the simple and short pubescence on the hemelytra (Fig. 94). The pubescence is not scale-like as in *nigricornis,* but is simple. The hemelytra are almost glabrous, and punctuate rather than sculptured. The genital clasper (Fig. 13) is gently curved and the osteolar canal (Fig. 53) is nearly straight; both structures are similar to those found in *Tetraphleps* spp.

The species probably preys on aphids, scales, and other small arthropods living on the host plants.

Habitat. Collected on *Pinus monticola* in British Columbia and on *P. ponderosa, P. strombiformis, P. flexilis, Picea glauca,* and *Abies lasiocarpa* elsewhere.

Distribution. Originally described from Arizona, Colorado, New Mexico, Utah, and British Columbia (Map 3).

Genus *Tetraphleps* Fieber

Macropterous, pubescent, and shiny. Head, as long as, or longer than wide; setae short. Rostrum extending beyond anterior coxae. Pronotum punctate; lateral margins carinate; calli smooth. Hemelytra shiny, punctate; wing membrane with four distinct veins. Hind coxae close together. Osteolar canal fairly straight; apex separated from metapleuron.

Five species occur in Canada and most of them are confined to conifers. Two species of this genus from India and Pakistan were introduced and released in British Columbia, New Brunswick, and Nova Scotia in 1962–65

as predators of the balsam woolly aphid. However, no recoveries were made before 1971 and it is doubtful whether the species became established (*see* Clark et al. 1971).

Key to species of *Tetraphleps*

1. Rostrum extending beyond hind coxae ..... ***feratis* (Drake & Harris)**

   Rostrum not extending to hind coxae 2

2. Rostrum extending to middle coxae 3

   Rostrum extending only slightly beyond anterior coxae 4

3. Hind tibia with short, slanting bristles ..... ***canadensis* Provancher**

   Hind tibia with long erect bristles ..... ***pilosipes* Kelton & Anderson**

4. Basal half of pronotum, and hemelytra reddish; pubescence on hemelytra short ..... ***latipennis* Van Duzee**

   Pronotum entirely black; pubescence on hemelytra long and dense ..... ***uniformis* Parshley**

Tetraphleps feratis (Drake & Harris)

Figs. 14, 54, 95; Map 4

Acompocoris feratis Drake & Harris 1926:41.
Tetraphleps feratis, Kelton & Anderson 1962:1307; Kelton 1966:203.

Male. Length 3.50–3.57 mm, width 1.12–1.33 mm. Head: length 0.56 mm, width 0.47 mm; black, shiny; ocelli prominent; setae short. Rostrum extending to fourth abdominal segment; penultimate segment 1.26–1.40 mm long. Second antennal segment 0.56–0.59 mm long, yellowish brown at middle, incrassate; apex black; terminal segments black. Pronotum: 1.05–1.12 mm wide at base; black, shiny; calli raised, smooth; lateral margins carinate. Scutellum: black, shiny; base finely punctate; apical half transversely rugose. Hemelytron: brown, punctate, shiny; pubescence short but dense; wing membrane fuscous, lighter along veins. Ventral surface: reddish brown to black; femur brown; tibia yellowish brown.

Female. Length 3.50–3.78 mm, width 1.33–1.54 mm. Much like male in color and appearance but more robust; penultimate rostral segment longer; second antennal segment more slender.

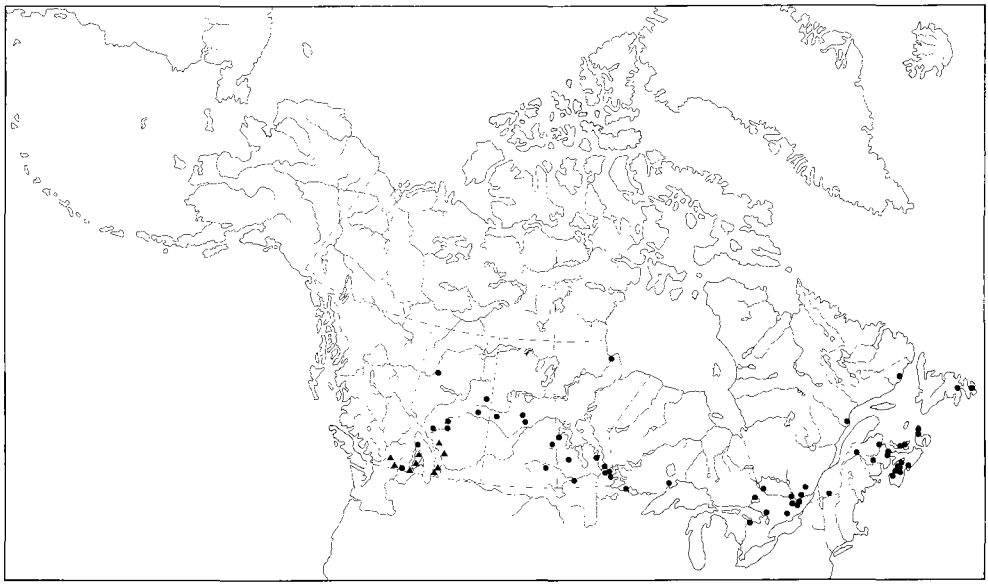
Remarks. This species is distinguished by the extremely long rostrum, which extends considerably beyond the hind coxae. The hemelytra are uniformly brown and strongly contrast with the black scutellum and pronotum

(Fig. 95). The clasper (Fig. 14) is gently curved and the osteolar canal (Fig. 54) is typical for the genus.

The species preys on aphids found in association with the host plants.

Habitat. Collected on *Larix occidentalis, L. lyallii, Picea engelmannii, Athyrium filix-femina,* and *Ulmus* spp.

Distribution. Originally described from British Columbia; also occurs in Alberta (Map 4).



Map 4. Distribution of *Tetraphleps feratis* (Drake & Harris) (▲) and *T. canadensis* Provancher (●).

Tetraphleps canadensis Provancher

Figs. 15, 55, 96; Map 4

Tetraphleps canadensis Provancher 1886:90; Drake & Harris 1928:50; Kelton 1966:199.

Male. Length 3.08–3.36 mm, width 1.19–1.26 mm. Head: length 0.47 mm, width 0.45 mm; black, shiny; setae long. Rostrum extending to middle of mesosternum; penultimate segment 0.56–0.59 mm long. Second antennal segment 0.49–0.52 mm long, incrassate, dark brown, often yellowish brown on basal half; terminal segments black. Pronotum: 0.98–1.05 mm wide at base; black, shiny; calli raised, smooth; lateral margins carinate. Scutellum: black, shiny; base finely punctate; apical half transversely rugose.

Hemelytron: variegated light brown, punctate, shiny; pubescence moderately long and dense; wing membrane fuscous, lighter along veins. Ventral surface: black; femur dark brown; apex yellow; tibia light brown.

Female. Length 3.64–3.85 mm, width 1.40–1.54 mm. Much like male in color and pubescence but more robust; penultimate rostral segment longer; second antennal segment more slender.

Remarks. This species resembles *pilosipes* in general appearance but is distinguished from it by the smaller size, shorter pubescence on the hemelytra, shorter rostrum, and short bristles on the hind tibia (Fig. 96). The genital clasper (Fig. 15) is more sharply curved than that of *pilosipes*. The osteolar canal (Fig. 55) is typical for the genus.

The species has been associated with the balsam woolly aphid in Eastern Canada, and probably preys on other small insects associated with the host plants.

Habitat. Collected on *Larix laricina, Abies balsamea, Pinus banksiana, Picea glauca,* and *P. mariana.*

Distribution. Originally described from Eastern Canada; now known to be transcontinental (Map 4).

Tetraphleps pilosipes Kelton & Anderson

Figs. 16, 56, 97; Map 5

Tetraphleps pilosipes Kelton & Anderson 1962:1307; Kelton 1966:200.

Male. Length 3.78–4.20 mm, width 1.27–1.43 mm. Head: length 0.50 mm, width 0.54 mm; black, shiny; ocelli large and prominent; setae long. Rostrum extending to apex of mesosternum; penultimate segment 0.70–0.77 mm long. Second antennal segment 0.54–0.59 mm long, black, densely pubescent, incrassate; terminal segments black. Pronotum: 1.10–1.22 mm wide at base; black, shiny; calli raised, smooth; lateral margins carinate. Scutellum: black, shiny; base finely punctate; apical half transversely rugose. Hemelytron: brown, punctate, shiny; pubescence long and dense; wing membrane fuscous, lighter along veins. Ventral surface: dark brown; femur dark brown; apex yellowish; tibia yellowish; hind tibia with prominent bristles.

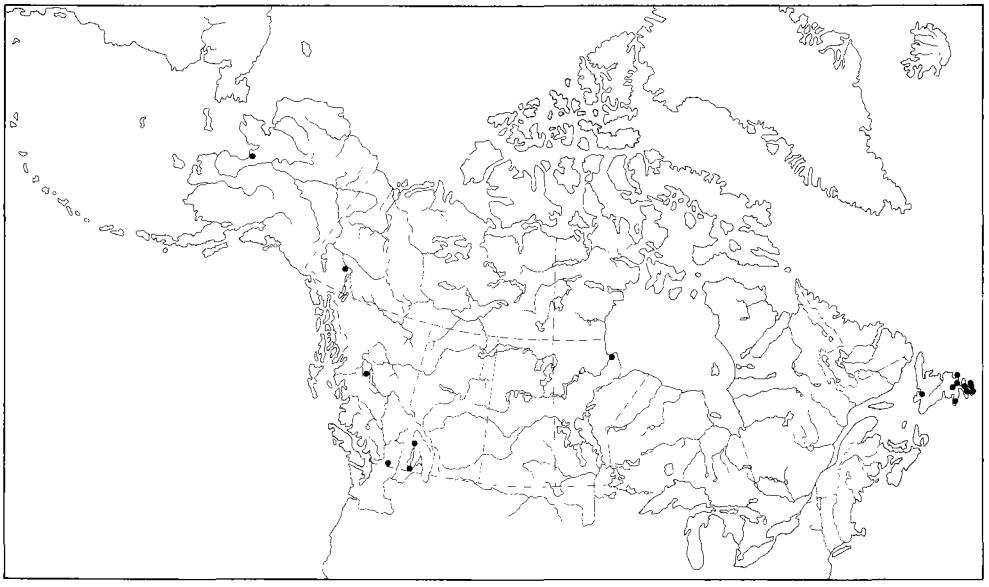
Female. Length 3.85–4.06 mm, width 1.45–1.75 mm. Much like male in color and appearance but more robust; penultimate rostral segment longer; second antennal segment more slender.

Remarks. This species is distinguished by long and dense pubescence on the hemelytra and the pilose hind tibia (Fig. 97). The clasper (Fig. 16) is slender and gently curved. The osteolar canal (Fig. 56) is typical for the genus.

The species is known to prey on balsam woolly aphid, and probably on other small insects associated with the host plants.

Habitat. Collected on *Abies lasiocarpa, A. procera, Larix laricina, Picea glauca, P. mariana, Pinus albicaulis,* and *P. contorta.*

Distribution. Originally described from British Columbia, Manitoba, Yukon Territory, and Oregon; later reported from Alaska and Newfoundland; probably occurs throughout boreal region of Canada (Map 5).



Map 5. Distribution of *Tetraphleps pilosipes* Kelton & Anderson.

Tetraphleps latipennis Van Duzee

Figs. 17, 57, 98; Map 6

Tetraphleps latipennis Van Duzee 1921:140; Anderson 1962:1331; Kelton 1966:201.

Male. Length 3.50–3.78 mm, width 1.40–1.54 mm. Head: length 0.47 mm, width 0.50 mm; black, shiny; setae short. Rostrum extending to anterior coxae; penultimate segment 0.42–0.49 mm long. Second antennal segment 0.45–0.52 mm long, black, incrassate; terminal segments black. Pronotum: 1.13–1.22 mm wide at base; black on apical half; brown or reddish brown on basal half; shiny; calli raised, finely sculptured; lateral

margins carinate. Scutellum: black, shiny; base finely punctate; apical half transversely rugose. Hemelytron: brown or reddish brown, punctate, shiny; pubescence short and appressed; wing membrane fuscous, lighter along veins. Ventral surface: black; femur black; tibia reddish brown.

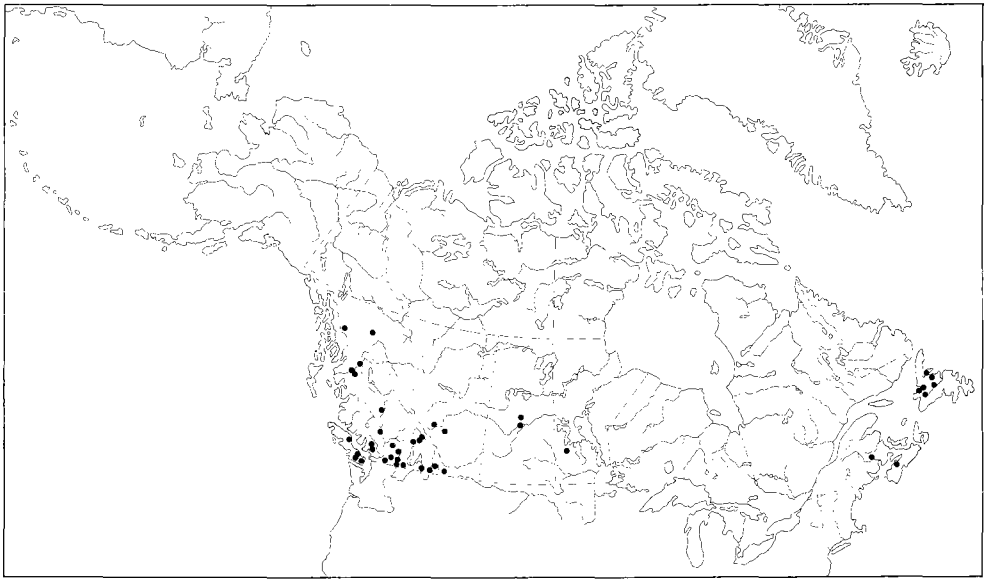
Female. Length 3.92–4.34 mm, width 1.61–1.82 mm. More robust than male and hemelytra more reddish than brown.

Remarks. This species is readily distinguished from the others in the genus by the bicolored pronotum, the reddish hemelytra, the short pubescence on the hemelytra (Fig. 98), and the short rostrum. The genital clasper (Fig. 17) is more sharply bent than in *canadensis*. The osteolar canal (Fig. 57) is typical for the genus.

The species preys on soft-bodied insects found on the host plants. It has been associated with the balsam woolly aphid in Eastern Canada and with adelgids and other aphids in British Columbia.

Habitat. Collected on *Abies balsamea* and *Picea glauca* in Eastern Canada; on *Pseudotsuga menziesii, Abies grandis, A. amabilis, A. lasiocarpa, Picea engelmannii, Larix occidentalis, Pinus ponderosa, P. contorta, P. monticola, P. albicaulis, Alnus* spp., and *Artemisia tridentata* in Western Canada.

Distribution. Originally described from California; probably occurs across Canada (Map 6).



Map 6. Distribution of *Tetraphleps latipennis* Van Duzee.

Tetraphleps uniformis Parshley

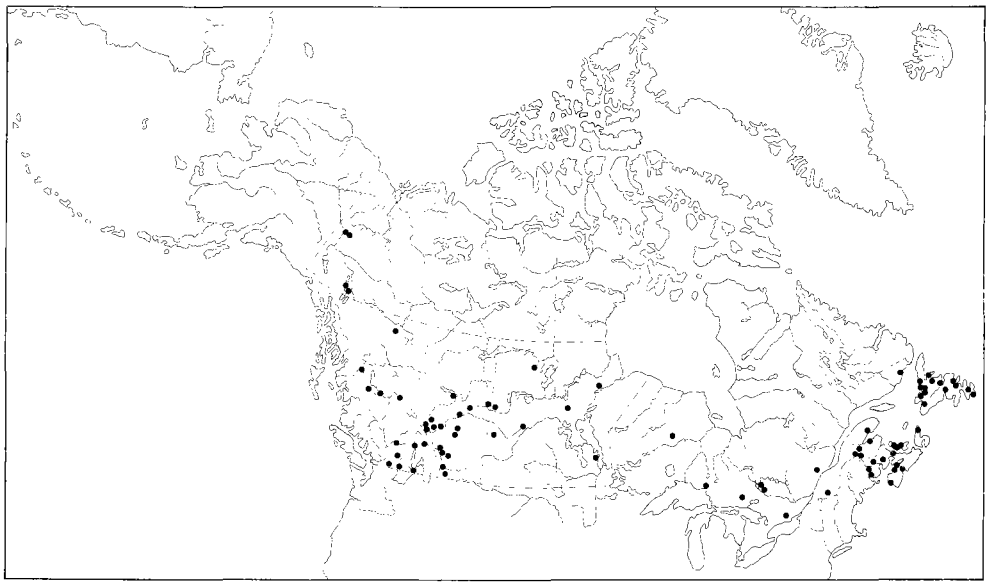
Figs. 18, 58, 99; Map 7

Tetraphleps uniformis Parshley 1920:86; Kelton & Anderson 1962: 1307; Kelton 1966:202.

Male. Length 3.50–4.06 mm, width 1.19–1.54 mm. Head: length 0.46 mm, width 0.48 mm; black, shiny; setae short. Rostrum extending slightly beyond anterior coxae; penultimate segment 0.45–0.52 mm long. Second antennal segment 0.45–0.52 mm long, incrassate, black, often light brown toward base; terminal segments black. Pronotum: 1.01–1.22 mm wide at base; black, shiny; calli raised, smooth; lateral margins carinate. Scutellum: black, shiny; base finely punctate; apical half transversely rugose. Hemelytron: uniformly light brown, punctate, shiny; pubescence long and dense; wing membrane fuscous, lighter along veins. Ventral surface: black; femur brown; tibia reddish brown.

Female. Length 3.64–4.20 mm, width 1.54–1.68 mm. Much like male in color and appearance but more robust.

Remarks. This species has a short rostrum similar to that of *latipennis,* but may be distinguished from that species by the uniformly black pronotum and the longer pubescence on the hemelytra (Fig. 99). The genital clasper (Fig. 18) is gently curved. The osteolar canal (Fig. 58) is typical for the genus.



Map 7. Distribution of *Tetraphleps uniformis* Parshley.

The species has been associated with the balsam woolly aphid in Eastern Canada and probably preys on other aphids associated with the host plants.

Habitat. Collected on *Abies balsamea, Picea glauca, P. mariana, Pinus contorta,* and *P. sylvestris.*

Distribution. Originally described from New Hampshire; transcontinental in Canada (Map 7).

Genus *Acompocoris* Reuter

Macropterous, pubescent, and shiny. Head short; setae short; ocelli prominent. Rostrum extending to hind coxae or beyond. Pronotum rugose, punctate; collar well developed; calli finely sculptured; lateral margins carinate. Hemelytra shiny, punctate, and finely sculptured. Hind coxae close together. Osteolar canal curved forward; apex extending anteriorly as narrow carina.

Two species occur in Canada, one a native western species and the other an introduced European species found in Eastern Canada. Both are confined to conifers.

Key to species of *Acompocoris*

1. Penultimate rostral segment 0.90 mm or longer; occurs in Western Canada ..... ***lepidus* (Van Duzee)**

   Penultimate rostral segment 0.80 mm or shorter; occurs in Eastern Canada ..... ***pygmaeus* (Fallén)**

Acompocoris lepidus (Van Duzee)

Figs. 19, 59, 100; Map 8

Tetraphleps lepidus Van Duzee 1921:142.
Acompocoris lepidus, Kelton & Anderson 1962:1307.

Male. Length 3.22–3.36 mm, width 1.12–1.26 mm. Head: length 0.45 mm, width 0.45 mm; dark brown to black, shiny; ocelli prominent; setae short. Rostrum extending beyond hind coxae; penultimate segment 0.84–0.94 mm long. Second antennal segment 0.49–0.52 mm long, brown, incrassate; terminal segments black. Pronotum: 0.94–1.01 mm wide at base; black, shiny; calli slightly raised, finely sculptured. Scutellum: dark reddish brown, shiny; basal half finely punctate; apical half transversely rugose. Hemelytron: brown, shiny, coarsely punctate, finely sculptured; pubescence moderately long and dense; wing membrane lightly fuscous, pruinose. Ventral surface: dark reddish brown; femur brown; tibia light yellowish brown.

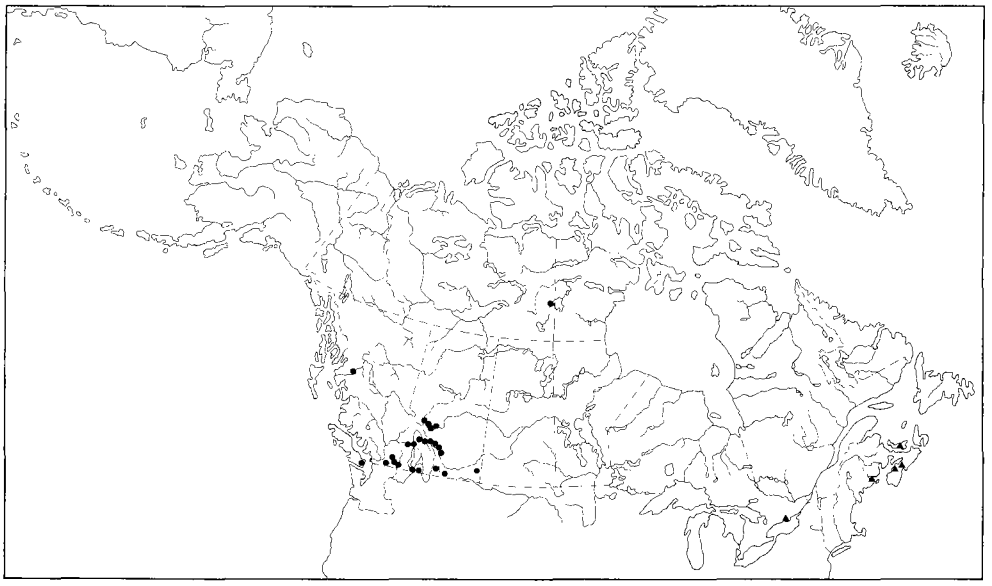
Female. Length 3.22–3.50 mm, width 1.26–1.54 mm. Much like male in color and appearance but more robust and rostrum slightly longer.

Remarks. This species (Fig. 100) is distinguished by dense pubescence on the hemelytra and by the long rostrum. The genital clasper (Fig. 19) is short and deeply grooved. The osteolar canal (Fig. 59) is gently curved forward and the apex extends anteriorly as a narrow carina. In color and appearance *lepidus* resembles species of *Tetraphleps* but the osteolar canals differ significantly.

The species is probably predaceous on adelgids, aphids, and other small arthropods that live on the host plants.

Habitat. Collected on *Pinus contorta, P. ponderosa, P. monticola,* and *Picea engelmannii.*

Distribution. Originally described from California; now known to occur in Alberta, British Columbia, and Northwest Territories (Map 8).



Map 8. Distribution of *Acompocoris lepidus* (Van Duzee) (●) and *A. pygmaeus* (Fallén) (▲).

Acompocoris pygmaeus (Fallén)

Figs. 20, 60, 101; Map 8

Lygaeus pygmaeus Fallén 1807:73.
Acompocoris pygmaeus, Reuter 1875:63; Pericart 1972:148; Kelton 1977*a*:243.

Male. Length 2.66–3.08 mm, width 1.05–1.12 mm. Head: length 0.40 mm, width 1.40 mm; black, shiny; setae short. Rostrum extending to metasternum; penultimate segment 0.66–0.71 mm long. Second antennal segment 0.43–0.45 mm long, incrassate, brown, often light brown near base; terminal segments black. Pronotum: 0.80–0.84 mm wide at base; black, shiny; calli smooth; lateral margins carinate. Scutellum: black, shiny; base finely punctate; apical half transversely rugose. Hemelytron: brown, punctate, finely sculptured, shiny; pubescence moderately long and dense; wing membrane fuscous, pruinose. Ventral surface: brown; femur brown; tibia yellowish brown.

Female. Length 3.08–3.22 mm, width 1.12–1.40 mm. Much like male in color and pubescence but more robust; penultimate rostral segment longer.

Remarks. This species (Fig. 101) is very similar to *lepidus* in size, color, and appearance but has a shorter rostrum. The genital clasper (Fig. 20) is fairly straight and deeply grooved. The osteolar canal (Fig. 60) is gently curved forward, and the apex extends anteriorly as a narrow carina.

The species probably preys on aphids, adelgids, and other small arthropods associated with the host plants.

Habitats. Collected on *Picea glauca, Pinus sylvestris,* and *P. strobus.*

Distribution. Widespread in Europe; in Canada known only from Prince Edward Island, Nova Scotia, New Brunswick, and Ontario (Map 8).

Genus *Anthocoris* Fallén

Elongate, pubescent, and shiny or pruinose. Head short; ocelli prominent; setae long. Rostrum short, extending to or slightly beyond anterior coxae. Pronotum punctate; collar broad and distinct; calli prominent, smooth; lateral margins carinate. Hemelytra practically smooth, shiny or pruinose, mostly macropterous, sometimes brachypterous. Hind coxae close together. Osteolar canal slightly curved forward; apex extending anteriorly as fine carina.

Seven species are represented in Canada and Alaska, two of which are recent introductions from Europe. They are generally confined to deciduous trees and herbaceous plants.

Key to species of *Anthocoris*

1. Hemelytra entirely shiny 2

   Hemelytra partly pruinose 5

2. Pronotum and antennae black ..... ***melanocerus* Reuter**

   Pronotum and antennae not entirely black, often pale or brown 3

3. Pubescence moderately long and erect ..... ***antevolens* White**

   Pubescence short and appressed, almost glabrous 4

4. Clavus entirely black; rostrum extending beyond anterior coxae; often brachypterous ..... ***dimorphicus* Kelton & Anderson**

   Clavus partly pale; rostrum extending to anterior coxae; macropterous ..... ***musculus* (Say)**

5. Apical half of corium shiny; anterior half of corium pruinose with shiny pubescence ..... ***whitei* Reuter**

   Apical half of corium pruinose 6

6. Embolium entirely shiny ..... ***nemoralis* (Fabricius)**

   Embolium partly pruinose along corium ..... ***confusus* Reuter**

Anthocoris melanocerus Reuter

Figs. 21, 61, 102; Map 9

Anthocoris melanocerus Reuter 1884:81; Hill 1957:172.

Male. Length 3.78–3.92 mm, width 1.40–1.54 mm. Head: length 0.49 mm, width 0.56 mm; black, shiny; setae long and erect. Rostrum extending to anterior coxae; penultimate segment 0.49–0.52 mm long. Second antennal segment 0.56–0.63 mm long, black, incrassate; terminal segments black. Pronotum 1.12–1.26 mm wide at base; shiny, black; calli elevated, finely sculptured. Scutellum: black, shiny. Hemelytron: clavus mostly pale, black along inner margin; corium and embolium pale at base, black on apical half; cuneus black; strongly shiny; pubescence long and erect; wing membrane mostly fuscous on apical half. Ventral surface: black; femur black; apex yellow; tibia yellow; basal third often black.

Female. Length 3.92–4.62 mm, width 1.54–1.75 mm. Penultimate rostral segment 0.52–0.56 mm long. Much like male in color and pubescence but more robust; second antennal segment more slender.

Remarks. This species is very shiny and has the longest pubescence encountered in the genus (Fig. 102). The pale areas on the hemelytra are

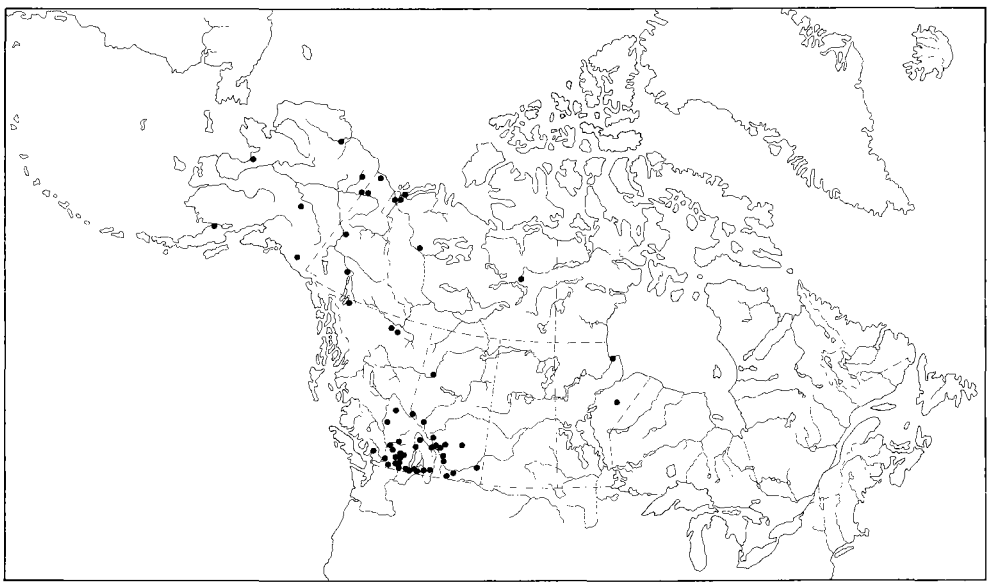
variable in size. Often the hemelytra are completely black, especially in the specimens collected at higher altitudes and latitudes.

The genital clasper (Fig. 21) is fairly slender, sharply curved, and shallowly grooved near the base. The osteolar canal (Fig. 61) is curved forward, and the apex extends anteriorly as an obscure carina.

This species preys on mites, aphids, psyllids, and other small insects. It may be an important predator in controlling pests on orchard trees and on ornamental trees and shrubs. Madsen (1961), Wilde (1962), Anderson (1962), Watson and Wilde (1963), Wilde and Watson (1963), and McMullen and Jong (1967*a*, 1967*b*) have observed *melanocerus* in orchards feeding on aphids, pear psylla, and mites in British Columbia. Wilde (1965) reported the introduction of the predator into Ontario to control the pear psylla. The species may also bite humans if allowed to crawl on the skin.

Habitat. Generally found in large numbers on deciduous trees, shrubs, and herbaceous plants. Collected on *Malus* spp., *Pyrus communis, Prunus nigra, Fraxinus* spp., *Tilia americana, Betula* spp., *Shepherdia* spp., *Cornus* spp., *Corylus* spp., *Crataegus* spp., *Acer* spp., *Elaeagnus angustifolia, Artemisia* spp., *Spiraea* spp., *Juglans* spp., *Salix* spp., *Medicago sativa, Daucus* spp., *Heracleum lanatum, Rumex* spp., and *Epilobium angustifolium.*

Distribution. Originally described from Colorado and recorded from British Columbia, the Yukon, Alaska, California, Idaho, and Utah; also occurs in Alberta, Manitoba, and the Northwest Territories (Map 9).



Map 9. Distribution of *Anthocoris melanocerus* Reuter.

Anthocoris antevolens White

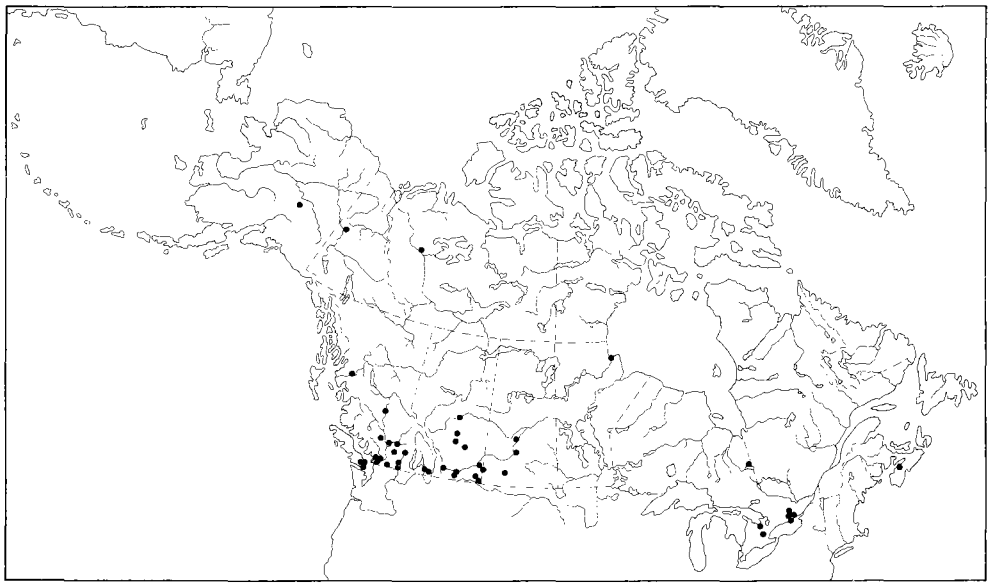
Figs. 22, 62, 103; Map 10

Anthocoris antevolens White 1879:146; Hill 1957:173.

Male. Length 3.64–3.78 mm, width 1.12–1.26 mm. Head: length 0.49 mm, width 0.52 mm; black, shiny; setae long and erect. Rostrum extending to anterior coxae; penultimate segment 0.52–0.56 mm long. Second antennal segment 0.52–0.59 mm long, incrassate; base black, with middle portion reddish brown; terminal segments black. Pronotum 0.98–1.19 mm wide at base; shiny, black; basal half often light brown; calli elevated, smooth. Scutellum: black, shiny. Hemelytron: clavus black, with outer portion often pale; corium and embolium mostly pale, with bases and large area at apex black; cuneus mostly black; shiny; pubescence moderately long and erect; wing membrane with characteristic fuscous pattern. Ventral surface: black; femur often light brown; tibia light brown.

Female. Length 3.78–4.34 mm, width 1.26–1.54 mm. Penultimate rostral segment 0.52–0.59 mm long. Much like male in pubescence but more robust and generally lighter in color.

Remarks. This species is shiny like *melanocerus* but the pubescence on the hemelytra is shorter, and the second antennal segment is normally light brown (Fig. 103). In teneral specimens the basal half of the pronotum may be light brown.



Map 10. Distribution of *Anthocoris antevolens* White.

The genital clasper (Fig. 22) is broadly thickened and shallowly grooved. The osteolar canal (Fig. 62) is similar to that of *melanocerus*.

This species is a very active predator. It is usually very abundant on deciduous trees and shrubs infested with pests species. In British Columbia, Marshall (1959), Anderson (1962), Wilde and Watson (1963), and McMullen and Jong (1967*a*, 1967*b*) have observed *antevolens* feeding on pear psylla and on mites in orchards. Also in British Columbia, the author observed large numbers of this species on ornamental *Betula* spp. infested with psyllids, on *Ulmus* spp. and *Crataegus* spp. infested with aphids, and on *Populus* spp. infested with gall aphids. It therefore may be an important predator in controlling certain pests in fruit orchards. Harper (1959) has reported the species feeding on poplar aphids in Alberta and Anderson and Kelton (1963) have reported the same findings for Ontario. Anderson (1962) reported that the species may also bite humans.

Habitat. Collected on *Alnus* spp., *Fraxinus* spp., *Tilia americana, Betula* spp., *Ulmus* spp., *Corylus* spp., *Lupinus* spp., *Quercus* spp., *Juglans* spp., *Salix* spp., and on *Malus* spp., *Prunus* spp., *Prunus persica,* and *Pyrus communis* in orchards.

Distribution. Originally described from California and reported from Colorado, Montana, the western provinces of Canada, and Ontario; appears to be transcontinental in Canada, and extends northward to Alaska (Map 10).

Anthocoris dimorphicus Anderson & Kelton

Figs. 23, 63, 104; Map 11

Anthocoris dimorphicus Anderson & Kelton 1963:440.

Male. Length 2.42–2.74 mm, width 0.84–1.05 mm. Head: length 0.45 mm, width 0.44 mm; black, shiny; setae short. Rostrum extending slightly beyond anterior coxae; penultimate segment 0.54–0.61 mm long. Second antennal segment 0.47–0.53 mm long, incrassate; base black; apical half often yellow. Pronotum 0.76–0.82 mm wide at base; shiny, black; basal half often light brown; calli elevated, smooth. Scutellum: black, shiny. Hemelytron: clavus black; corium and embolium generally pale on basal half, black on apical half; cuneus black; shiny; pubescence short and sparse with few widely scattered longer setae; wing membrane and cuneus greatly reduced in brachypterous forms. Ventral surface: black; legs light brown.

Female. Length 2.68–3.37 mm, width 1.0–1.26 mm. Much like male in appearance but more robust.

Remarks. The macropterous form of this species is much like that of *musculus* in appearance and pubescence but is generally smaller and less robust (Fig. 104). The clavus in *dimorphicus* is generally black, whereas in *musculus* it is partly pale along the claval suture. The penultimate rostral

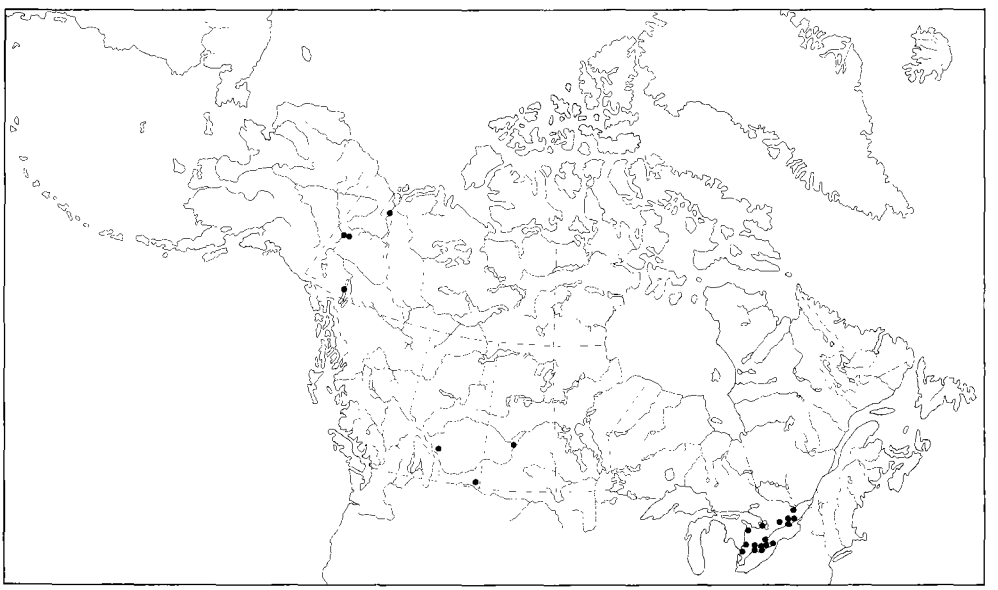
segment in *dimorphicus* is considerably longer than the cuneus, whereas in *musculus* it is shorter.

The genital clasper (Fig. 23) is similar in shape and detail to that of *antevolens,* but is smaller in size. The osteolar canal (Fig. 63) is typical for the genus.

This species is often found in association with *musculus* but in smaller numbers. It probably preys on aphids and other small insects associated with the host plant.

Habitat. Collected only on *Salix* spp.

Distribution. Originally described from Alberta, Ontario, the Northwest Territories, and the Yukon; also occurs in Saskatchewan (Map 11).



Map 11. Distribution of *Anthocoris dimorphicus* Anderson & Kelton.

Anthocoris musculus (Say)

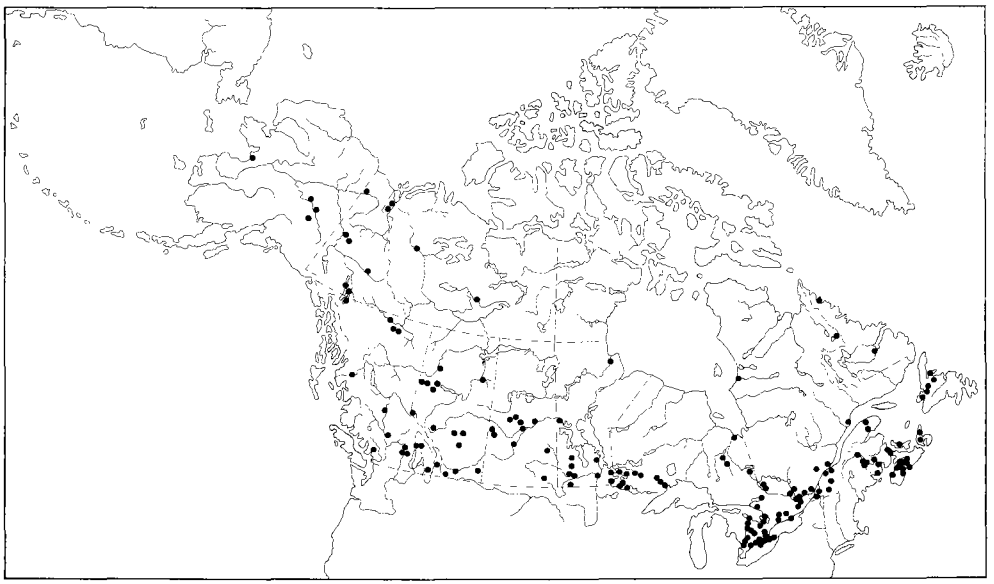
Figs. 24, 64, 105; Map 12

Reduvius musculus Say 1832:32.
Anthocoris musculus, Uhler 1876:321; Hill 1957:173.

Male. Length 3.36–3.64 mm, width 1.12–1.26 mm. Head: length 0.49 mm, width 0.52 mm; black, shiny; setae long. Rostrum extending to anterior coxae; penultimate segment 0.49–0.52 mm long. Second antennal segment 0.49–0.56 mm long, incrassate; base and apex black, with middle portion yellow; terminal segments black. Pronotum 0.87–1.05 mm wide at base; black, shiny; basal half often brown; calli elevated, smooth. Scutellum: black, shiny. Hemelytron: clavus mostly black, pale along claval suture; corium and embolium mostly pale, with bases and large areas at apices black; cuneus black; shiny; pubescence short and appressed, with few widely scattered longer setae; wing membrane with characteristic fuscous pattern. Ventral surface: black; femur light brown; tibia yellow.

Female. Length 3.78–4.06 mm, width 1.26–1.40 mm. Much like male in pubescence and color but more robust.

Remarks. This species is very much like *antevolens* in color and appearance but the pubescence is shorter (Fig. 105). The genital clasper (Fig. 24) is similar in shape to that of *antevolens* and *dimorphicus* but it is intermediate in size. The osteolar canal (Fig. 64) is typical for the genus.



Map 12. Distribution of *Anthocoris musculus* (Say).

This species is common on deciduous trees, shrubs, and herbaceous plants and is an active predator. It may be an important insect in the control of pests in orchards in Eastern Canada. Lord (1949, 1965, 1968*a*, 1968*b*) and MacPhee and Sanford (1954) have observed the species in apple orchards feeding on red mites and on eyespotted bud moth in Nova Scotia. Strickland (1953) reported it preying on aphids in leaf galls in Alberta.

Habitat. Collected on *Alnus* spp., *Betula* spp., *Tilia americana, Acer* spp., *Sorbus americana, Populus* spp., *Salix* spp., *Spiraea* spp., *Rosa* spp., *Epilobium angustifolium, Dentaria* spp., *Chrysanthemum leucanthemum, Solidago canadensis, Carex* spp., *Zea mays, Malus* spp., *Prunus persica, Pyrus communis,* and *Rubus* spp.

Distribution. Originally described from eastern United States; transcontinental in Canada and extends into Alaska (Map 12).

Anthocoris whitei Reuter

Figs. 25, 65, 106; Map 13

Anthocoris whitei Reuter 1884:74.

Male. Length 2.80–3.36 mm, width 0.91–1.05 mm. Head: length 0.42 mm, width 0.45 mm; black, sculptured, shiny; setae long. Rostrum extending to anterior coxae; penultimate segment 0.35–0.38 mm long. Second antennal segment 0.45–0.49 mm long, black, incrassate; terminal segments black. Pronotum: 0.80–0.94 mm wide at base; black; basal half often brown, shiny; calli smooth. Scutellum: black; basal half smooth; apical half transversely rugose, shiny. Hemelytron: light brown; clavus and adjacent margin of corium pruinose, with remainder of hemelytra shiny; pubescence long, dense, and silvery on pruinose area; wing membrane fuscous, area along base white, pruinose. Ventral surface: black or dark brown; femur and tibia black or reddish brown; anterior femur with tubercle on inner surface.

Female. Length 2.94–3.22 mm, width 0.98–1.12 mm. Much like male in appearance but not as dark in color and more robust; tubercle on anterior femur not as pronounced.

Remarks. This species is distinguished by the short tubercle on the anterior femur, by the pruinose clavus and inner margin of corium, and by the silvery pubescence (Fig. 106). The clasper (Fig. 25) is straight, slender, and grooved. The osteolar canal (Fig. 65) is typical for the genus.

This species was probably misidentified as *A. bakeri* by Downes (1927) and again reported as that species by Anderson (1962). Specimens of *bakeri* have not been found in British Columbia by the author, and it is presumed the species does not occur in Canada.

The species was found in large numbers in the early summer on *Purshia tridentata* and *Ceanothus sanguineus* heavily infested with psyllids. It probably preys on that species.

Habitat. Collected on *Purshia tridentata* and *Ceanothus sanguineus.*

Distribution. Originally described from California; occurs throughout dry interior of British Columbia (Map 13).

Anthocoris nemoralis (Fabricius)

Figs. 26, 66, 107; Map 13

Acanthia nemoralis Fabricius 1794:76.
Anthocoris nemoralis, Fallén 1829:67; Anderson & Kelton 1963:439; Pericart 1972:120.

Male. Length 3.36–3.85 mm, width 1.12–1.26 mm. Head: length 0.42 mm, width 0.47 mm; black, smooth, shiny; setae long. Rostrum extending to anterior coxae; penultimate segment 0.38–0.42 mm long. Second antennal segment 0.45–0.52 mm long, incrassate; base and apex black, with middle portion yellowish; terminal segments black. Pronotum; 1.08–1.22 mm wide at base; black, shiny; basal half often light brown; calli smooth. Scutellum: black, shiny. Hemelytron: basal half light brown; apical half darker brown; clavus and corium pruinose; embolium shiny; cuneus brown, shiny; pubescence long and dense; wing membrane fuscuous, with spot at tip of cuneus pale, often transversely bisecting membrane. Ventral surface: black; femur and tibia brown.

Female. Length 3.50–3.92 mm, width 1.91–1.40 mm. Much like male in appearance but more robust and penultimate rostral segment longer.

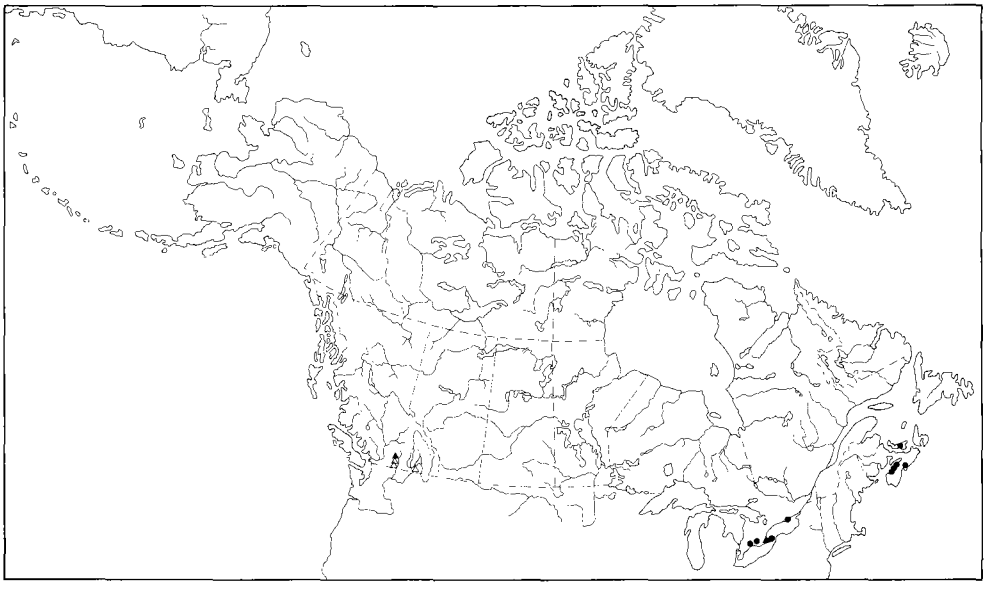
Remarks. This species (Fig. 107) very closely resembles *confusus* in size and appearance but may be distinguished from it by the shiny embolium and the shiny inner angle of the cuneus. In *confusus* the inner margin of the embolium and the inner angle of the cuneus are pruinose. The genital clasper (Fig. 26) is slender and sharply curved. The osteolar canal (Fig. 66) is typical for the genus.

In Europe this species has been reported from many trees and shrubs and is known to prey on psyllids, aphids, thrips, eggs and larvae of moths, and on some mites. It was first reported in Canada by Anderson and Kelton (1963) from several specimens collected in 1958, 1961, and 1962 in the Niagara peninsula of Ontario. In 1977 the author collected large numbers of this species at Vineland Station, Ont. The species was most abundant on *Juglans* spp. and especially on *J. regia,* which was heavily infested with aphids. According to R. A. Flemming (*in litt.*), Ontario Ministry of Agriculture and Food, Vineland Station, these trees were grown from seed. The anthocorids were also abundant on *Pyrus communis* infested with pear psylla, and in smaller numbers on *Prunus persica* infested with mites. Presumably this anthocorid was brought over from Europe undetected with importations of various nursery stocks and now is firmly established on *Juglans* spp. and *Pyrus communis.* There are no records for its formal introduction into this area. It is now widespread in the Niagara peninsula. The Commonwealth

Institute of Biological Control introduced this species into the Okanagan Valley of British Columbia in 1963 (McMullen and Jong 1967*a*; McMullen 1971) to control the pear psylla. It has become established on *Pyrus communis* and is slowly spreading from the release site to other host plants infested with aphids and psyllids.

Habitat. Collected on *Juglans* spp., *Pyrus communis,* and *Prunus persica* in Ontario, and on *Pyrus communis, Corylus* spp., *Salix* spp., and *Fraxinus* spp. in British Columbia.

Distribution. Common in Europe; in Canada known only from Ontario and British Columbia (Map 13).



Map 13. Distribution of *Anthocoris whitei* Reuter (△), *A. nemoralis* (Fabricius) (▲), and *A. confusus* Reuter (●).

Anthocoris confusus Reuter

Figs. 27, 67, 108; Map 13

Anthocoris confusus Reuter 1884:71; Anderson & Kelton 1963:439; Pericart 1972:134.

Male. Length 3.36–3.78 mm, width 1.12–1.26 mm. Head: length 0.42 mm, width 0.47 mm; black; setae long. Rostrum extending to anterior coxae; penultimate segment 0.45–0.49 mm long. Second antennal segment

0.42–0.45 mm long, yellow, incrassate; base and apical one-third usually black; terminal segments black. Pronotum: 0.98–1.12 mm wide at base; shiny, black; basal angles often brown; calli elevated, finely sculptured. Scutellum: black, shiny. Hemelytron: brown to black; clavus and corium pruinose; embolium shiny, pruinose on inner margin; cuneus shiny, with inner angle pruinose; pubescence long and dense, yellowish; wing membrane fuscous, with spot at tip of cuneus pale. Ventral surface: black; femur brown; tibia light brown.

Female. Length 3.36–3.71 mm, width 1.12–1.26 mm. Much like male in color, size, and pubescence.

Remarks. This European species was first reported from Canada by Anderson and Kelton (1963). It was probably introduced into this country with nursery stock importations. It is a predator of aphids and other small arthropods associated with the host plants.

This species and *nemoralis* are similar in appearance and they both have pruinose hemelytra. In *confusus* (Fig. 108) the inner margin of the embolium and the inner angle of the cuneus are pruinose, whereas in *nemoralis* the embolium and cuneus are entirely shiny. In *confusus* the clasper (Fig. 27) is distinctive. The osteolar canal (Fig. 67) is typical of the genus.

Habitat. In Europe generally found on *Quercus* spp.; in Canada most abundant on *Fagus* spp., and in smaller numbers on *Acer* spp., *Tilia* spp., *Dentaria* spp., and *Rosa* spp.

Distribution. Holarctic; reported fom Ontario and Tennessee, and recently collected by the author in Nova Scotia and Prince Edward Island (Map 13). An additional record was provided by K. Dorward, Survey and Detection Operations, Plant Pest Control Division, USDA, Washington, D.C. The specimens were collected at Mount Desert, Bar Harbor, Maine, on October 11 and 12, 1938.

Key to genera of Oriini

1. Base of head prolonged into a neck; front lobe of pronotum narrowed; wing membrane with two veins ..... ***Macrotracheliella* Champion**

   Base of head not prolonged; neck very short; wing membrane with three veins ..... ***Orius* Wolff**

Genus *Macrotracheliella* Champion

Elongate-oblong, black, shiny. Head longer than wide; neck prominent. Rostrum extending to anterior coxae. Pronotum subconcical; apical half narrow, continuous with cylindrical neck. Hemelytra macropterous; wing

membrane with two veins. Hind coxae wide apart. Osteolar canal sharply curved forward, elevated along its length. Metasternum truncate. Ovipositor developed.

One species is known to occur in Canada.

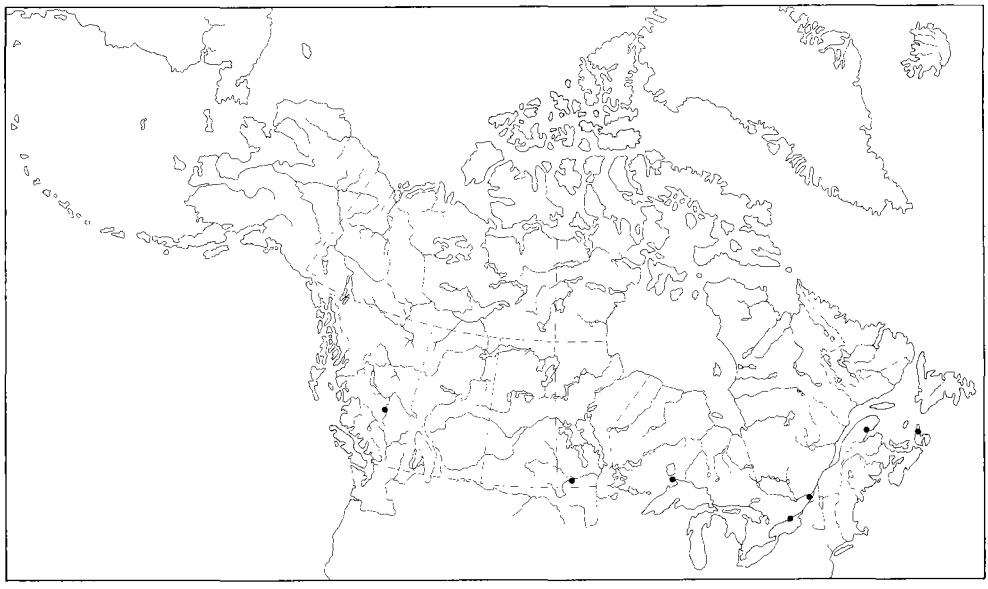
Macrotracheliella nigra Parshley

Figs. 28, 68, 109; Map 14

Macrotracheliella nigra Parshley 1917:38.

Male. Length 2.24 mm, width 0.77 mm. Head: length 0.45 mm, width 0.35 mm; dark reddish brown, shiny; setae short. Rostrum extending to anterior coxae; penultimate segment 0.28 mm long. Second antennal segment 0.28 mm long, black; terminal segments light reddish brown. Pronotum: 0.73 mm wide at base; black, shiny; anterior lobe subcylindrical; posterior lobe elevated, and separated from anterior portion by depression; calli inconspicuous. Scutellum: black, shiny; anterior half smooth; posterior half transversely rugose. Hemelytron: black, shiny; pubescence short and sparse; wing membrane fuscous, pruinose, pale along inner margin. Ventral surface: black; legs reddish brown.

Female. Length 2.52–2.66 mm, width 0.91–0.98 mm. Much like male in appearance but more robust.



Map 14. Distribution of *Macrotracheliella nigra* Parshley.

Remarks. This species is distinguished by the long neck and the shape of the pronotum (Fig. 109). The genital clasper (Fig. 28) is similar to that found in species of *Orius*. The osteolar canal (Fig. 68) is distinctive.

In 1976 while collecting at Cape Breton Highlands National Park, N.S., the author observed large numbers of this predaceous species on *Cornus sericea (stolonifera)*. The leaves on this plant, curled and discolored, contained red apterous thrips and the predator.

Habitat. Collected on *Cornus stolonifera* in Nova Scotia; habitat of specimens collected elsewhere unknown.

Distribution. Originally described from Massachusetts; transcontinental in Canada (Map 14).

Genus *Orius* Wolff

Oval, small, shiny. Head short; setae very short; ocelli prominent. Rostrum extending to anterior coxae. Pronotum punctate; collar short; calli raised, smooth. Hemelytra punctate, shiny; wing membrane with three veins, pruinose. Hind coxae close together; anterior tibia finely denticulate on inner surface. Osteolar canal curved forward; enclosed area shiny. Metasternum triangular.

Four species occur in Canada. One species is introduced from Europe, and all are generally collected on flowering heads of shrubs and herbaceous plants.

Key to species of *Orius*

1. Hemelytra densely pubescent ..... ***minutus* (Linnaeus)**

   Hemelytra with short, sparse pubescence 2

2. Clavus and corium black ..... ***diespeter* Herring**

   Clavus and corium with pale areas 3

3. Clavus mostly pale as corium ..... ***insidiosus* (Say)**

   Clavus mostly black ..... ***tristicolor* (White)**

Orius minutus (Linnaeus)

Figs. 29, 69, 110; Map 15

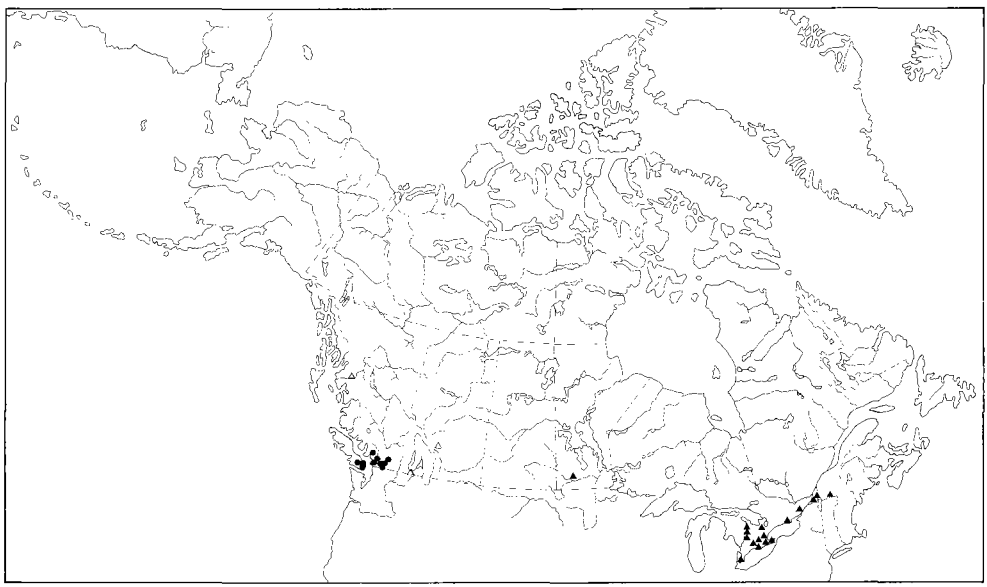
Cimex minutus Linnaeus 1758:446.
Triphleps minutus, Reuter 1884:92.
Orius minutus, Tonks 1953:28; Kelton 1963:632; Herring 1966:1097.

Male. Length 2.24–2.38 mm, width 0.98–1.05 mm. Head: length 0.31 mm, width 0.42 mm; black, shiny; frons finely sculptured. Rostrum extending to anterior coxae; penultimate segment 0.28 mm long. Second antennal segment 0.31–0.35 mm long, pale yellow, fuscous at apex, incrassate; terminal segments black. Pronotum: 0.80–0.87 mm wide at base; black, shiny; calli slightly raised, smooth. Scutellum: black, shiny; basal portion punctuate; apical portion transversely rugose. Hemelytron: clavus, corium, and embolium pale yellowish brown; cuneus black; shiny; pubescence long and dense; wing membrane fuscous, pruinose; three veins barely visible. Ventral surface: dark brown; legs pale brown.

Female. Length 2.24–2.38 mm, width 1.0–1.12 mm. Much like male in general appearance, color, and pubescence, but second antennal segment shorter and more slender.

Remarks. This is the largest species in the genus. It is also distinguished by the pale clavus and corium and by the long and dense pubescence on the hemelytra (Fig. 110). The genital clasper (Fig. 29) will readily distinguish the males. The osteolar canal (Fig. 69) is curved forward and the enclosed polished area is narrow.

This European species was probably introduced into British Columbia with importations of shrubs and other herbaceous plants. It is a known predator and preys on mites, aphids, psyllids, leafhoppers, thrips, and other small insects.



Map 15. Distribution of *Orius minutus* (Linnaeus) (●), *O. diespeter* Herring (△), and *O. insidiosus* (Say) (▲).

Habitat. Generally found on shrubs and herbaceous plants; collected on *Corylus* spp., *Spiraea* spp., *Cytisus scoparius, Alnus* spp., *Rubus loganobaccus, Rubus* spp., *Humulus lupulus, Trifolium* spp., *Prunus nigra,* and *Malus* spp.

Distribution. Holarctic; first recorded from British Columbia by Tonks (1953), and known only from that region (Map 15).

Orius diespeter Herring

Figs. 30, 70, 111; Map 15

Orius diespeter Herring 1966:1098.

Male. Length 1.96–2.10 mm, width 0.91–0.98 mm. Head: length 0.28 mm, width 0.38 mm; black, shiny; frons finely sculptured. Rostrum extending to anterior coxae; penultimate segment 0.28 mm long. Second antennal segment 0.24–0.28 mm long, mostly pale, incrassate; terminal segments black. Pronotum: 0.73–0.80 mm wide at base; black, rugose, punctate, shiny; calli raised, smooth. Scutellum: black, shiny; basal portion punctate; apical portion transversely rugose. Hemelytron: dark brown to black; embolium on basal half often pale, shiny; pubescence short and sparse; wing membrane fuscous, pruinose; veins barely visible. Ventral surface: dark brown to black; femora dark brown; anterior femur pale on apical third, swollen, with several black tubercles on inner surface; hind and middle tibiae light brown; anterior tibia pale.

Female. Length 1.96–2.10 mm, width 0.91–1.05 mm. Much like male in appearance but second antennal segment thinner; anterior femur less swollen and tubercles absent; spinules on anterior tibia absent.

Remarks. This is the only species in Canada with a brown or black clavus and corium (Fig. 111).

The type deposited in the United States National Museum, Washington, D.C., was examined. The genital clasper originally prepared on a slide had drifted to the edge and had to be remounted. The study of it showed that the flagellum was broken off and the basal stub was twisted to the opposite direction than illustrated by Herring (1966). Several specimens collected in the type locality by Dr. W. R. Richards of the Biosystematics Research Institute, Ottawa, in 1960 were compared by Dr. Herring with the type, and confirmed to be specimens of *diespeter*. The clasper (Fig. 30) in the topotypic material is similar to that of *tristicolor*. The osteolar canal (Fig. 70) is typical for the genus.

The species is probably predaceous as it has been found in association with large populations of aphids and thrips.

Habitat. Collected on flowering heads of *Trifolium pratense* and *Chrysanthemum leucanthemum.*

Distribution. Originally described from British Columbia; now known to occur in Alberta (Map 15).

Orius insidiosus (Say)

Figs. 31, 71, 112; Map 15

Reduvius insidiosus Say 1832:32.
Orius insidiosus, Blatchley 1926:637; Barber 1936:1; Kelton 1963:633; Herring 1966:1102.

Male. Length 1.76–1.96 mm, width 0.70–0.84 mm. Head: length 0.28 mm, width 0.36 mm; black, shiny; frons finely sculptured. Rostrum extending to anterior coxae; penultimate segment 0.24 mm long. Second antennal segment 0.21–0.27 mm long, pale yellow, incrassate; terminal segments light brown. Pronotum: 0.61–0.70 mm wide at base; black, rugose, punctate, shiny; calli raised, finely sculptured. Scutellum: black, shiny; basal portion punctate; apical portion transversely rugose. Hemelytron: light yellowish brown; base of clavus and cuneus black; shiny; pubescence short and sparse; wing membrane pale, pruinose; veins barely visible. Ventral surface: black; femora dark brown, with apices pale; anterior femur with few black tubercles on inner surface; hind tibia brown; anterior and middle tibiae pale.

Female. Length 1.82–2.17 mm, width 0.77–0.98 mm. Much like male in appearance but more robust; second antennal segment thinner; anterior femur without tubercles; spinules on anterior tibia absent.

Remarks. This species resembles *minutus* in coloration, but is smaller and practically glabrous (Fig. 112). The genital clasper (Fig. 31) has two, almost equal prongs. The osteolar canal (Fig. 71) is typical for the genus.

The species is predaceous and to a lesser extent, phytophagous. It feeds mostly on aphids, thrips, eggs of other insects, mites, and other small arthropods.

Habitat. Generally collected on flowering heads of Compositae and other herbaceous plants.

Distribution. Originally described from eastern United States; now known to occur in southern Manitoba, Ontario, and Quebec. Records for Alberta by Strickland (1953) and for Nova Scotia by Lord (1949) should refer to *tristicolor* (Map 15).

Orius tristicolor (White)

Figs. 32, 72, 113; Map 16

Triphleps tristicolor White 1879:145.
Orius tristicolor, Blatchley 1926:637; Kelton 1963:634; Herring 1966: 1103.

Male. Length 1.82–2.0 mm, width 0.73–0.82 mm. Head: length 0.28 mm, width 0.37 mm; black, shiny; frons finely sculptured. Rostrum extending to anterior coxae; penultimate segment 0.28 mm long. Second antennal segment 0.22–0.24 mm long, yellow, incrassate; terminal segments brown. Pronotum: 0.61–0.70 mm wide at base; black, rugose, punctate, shiny; calli raised, smooth. Scutellum: black, shiny; anterior portion transversely rugose. Hemelytron: dark brown to black; anterior half of corium and often part of adjacent clavus pale, shiny; pubescence short and sparse; wing membrane fuscous; two veins clearly visible. Ventral surface: black; femora black; anterior femur with few black tubercles on inner surface; anterior and middle tibiae pale; hind tibia black.

Female. Length 2.03–2.24 mm, width 0.84–0.98 mm. Much like male in general appearance, coloration, and pubescence, but more robust; second antennal segment thinner; anterior tibia without spinules.

Remarks. This species (Fig. 113) has often been confused with *insidiosus.* It resembles *insidiosus* in size and pubescence, but the clavus is usually all black. The genital clasper (Fig. 32) has a long curving bristle. The osteolar canal (Fig. 72) is typical for the genus.

The habits and behavior of *tristicolor* are similar to those of *insidiosus.* Wilde and Watson (1963) and McMullen and Jong (1967*a*) have observed *tristicolor* feeding on pear psylla in British Columbia. It may also bite man.

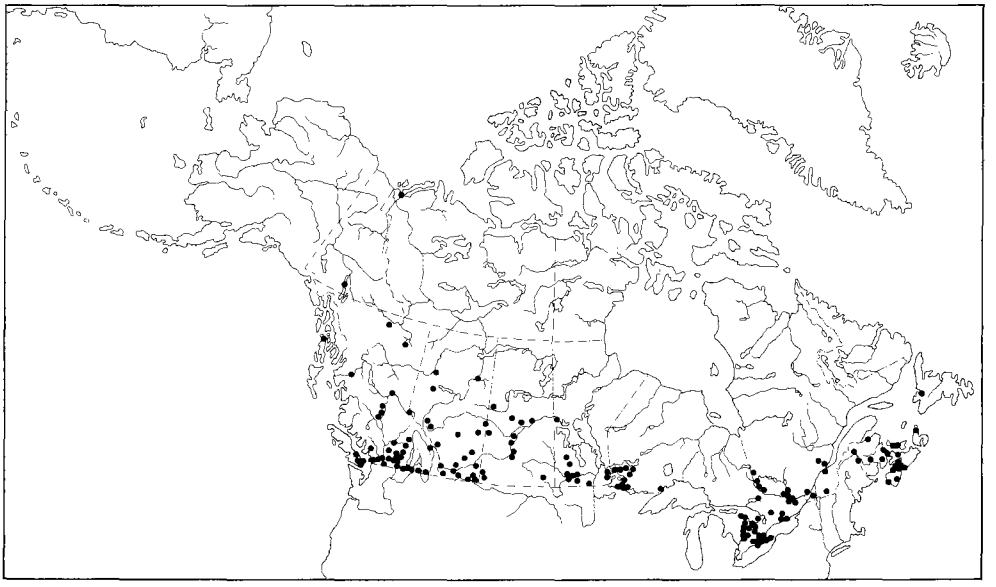
Habitat. Very abundant on the flowering heads of many herbaceous plants.

Distribution. Originally described from western United States; transcontinental in Canada (Map 16).

Subfamily *Lyctocorinae* Van Duzee

The subfamily characteristics are: 1) osteolar canal curved forward; 2) antennal segments 3 and 4 generally filiform, with diameters equal to or less than base of segment 2; 3) pilosity on segments 3 and 4 generally longer than diameter of segment; 4) metasternum with longitudinal median carina developed or absent; and 5) pads on anterior tibiae in male usually developed.

In Canada the subfamily is represented by four tribes, six genera, and 14 species.



Map 16. Distribution of *Orius tristicolor* (White).

Key to tribes of Lyctocorinae

1. Osteolar canal short and gently curved forward, with apex near middle of metapleuron (Figs. 73, 74) ..... **Scolopini**

   Osteolar canal long and sharply bent forward, with apex reaching or nearly reaching anterior margin of metapleuron (Figs. 75, 85) 2

2. Ovipositor not developed; anterior tibia slender; pad absent or very small ..... **Cardiastethini**

   Ovipositor developed; anterior tibia enlarged at apex; pad large 3

3. Species more than 3.36 mm in length; setae very short or absent; males with two claspers ..... **Lyctocorini**

   Species less than 3.36 mm in length; setae prominent; males with left clasper only ..... **Xylocorini**

Key to genera of Scolopini

1. Anterior femur swollen, armed beneath with rows of teeth .... ***Scoloposcelis*** **Fieber**

   Anterior femur slender, unarmed ..... ***Calliodis*** **Reuter**

Genus *Scoloposcelis* Fieber

Elongate, macropterous, glabrous. Head short, shiny; setae long. Rostrum extending to middle of mesosternum. Pronotum finely rugose; side margins carinate; collar narrow; calli rounded, finely wrinkled, shiny; basal angle with seta. Scutellum shiny, finely sculptured. Hemelytra shiny, very finely punctate, sculptured, almost glabrous; wing membrane with four veins. Mesosternum with longitudinal median groove; metasternum triangular. Osteolar canal gently curved forward, short. Anterior and posterior femora enlarged; anterior femur armed with several teeth on inner surface. Terminal abdominal segments with long setae; fourth abdominal segment in male with gland opening, indicated by clump of setae; ovipositor developed.

Only one species is known to occur in Canada, generally found under the bark of conifers.

Scoloposcelis flavicornis Reuter

Figs. 33, 73, 114; Map 17

Scolopscelis flavicornis Reuter 1871:561; Kelton 1976*a*:196.

Male. Length 2.80–3.50 mm, width 0.87–1.12 mm. Head: length 0.45 mm, width 0.49 mm; brown to dark reddish brown, shiny; setae long. Rostrum extending beyond middle of mesosternum; penultimate segment 0.59–0.66 mm long. Second antennal segment 0.42–0.45 mm long, yellowish brown, incrassate; terminal segments filiform, pilose. Pronotum: 0.87–0.98 mm wide at base; dark reddish brown, shiny, finely wrinkled; lateral margins carinate; calli rounded. Scutellum: dark reddish brown, shiny. Hemelytron: clavus and corium mostly clear; embolium and cuneus mostly reddish brown, shiny; almost glabrous; wing membrane clear with four straight veins. Ventral surface: dark reddish brown; anterior femur armed with several teeth; pads on anterior tibia absent; gland opening on fourth abdominal segment marked by clump of long bristles; genital segment with several long setae.

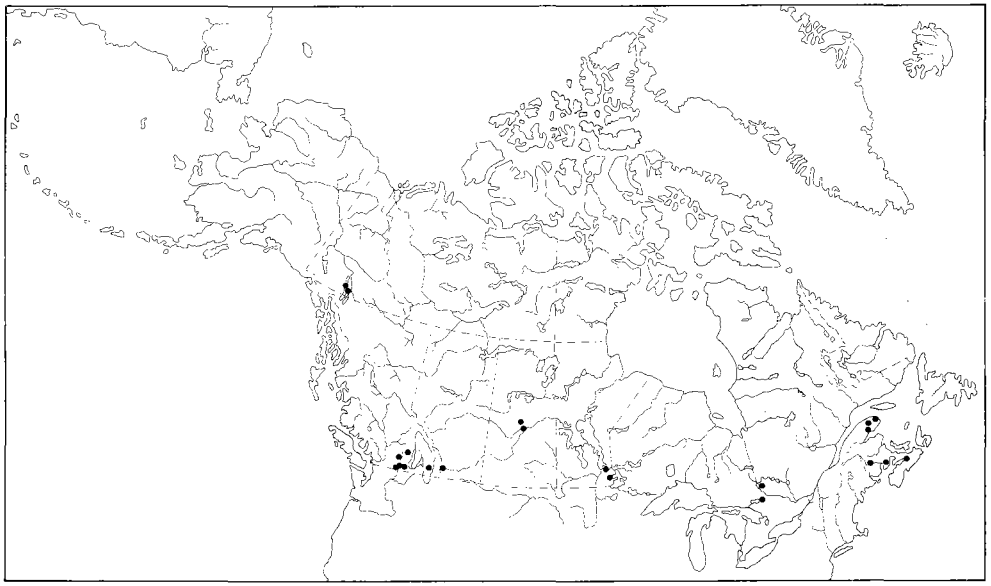
Female. Length 3.15–3.64 mm, width 0.91–1.05 mm. Much like male in color and appearance but more robust; rostrum slightly longer; abdomen often extending beyond hemelytra; gland opening and clump of bristles absent.

Remarks. This species (Fig. 114) is distinguished by the elongate form, the color pattern on the hemelytra, the shiny and glabrous appearance, and the enlarged and toothed anterior femur. The left clasper is flattened and characteristic in shape (Fig. 33). The right clasper is absent. The osteolar canal (Fig. 73) is short and gently curved forward. The apex does not reach the anterior margin of the metapleuron.

The species generally preys on bark beetle larvae under the bark of dead conifers. It is very active in the burrows of the bark beetles and is often difficult to capture. However, they may be collected by removing sections of the bark from the trunk and banging the bark sharply against an axe held over a beating sheet. The specimens are jarred loose onto the sheet and promptly picked up with an aspirator.

Habitat. Generally found under the bark of dead *Pinus banksiana, P. ponderosa, P. resinosa, Picea glauca,* and *Abies balsamea.*

Distribution. Originally described from Texas; transcontinental in Canada (Map 17).



Map 17. Distribution of *Scoloposcelis flavicornis* Reuter.

Genus *Calliodis* Reuter

Oblong; hemelytra pruinose and pubescent. Head short, shiny; setae long. Third and fourth antennal segments filiform, pilose. Rostrum extending almost to tip of mesosternum. Pronotum rugose, punctate, shiny; side margins carinate; collar narrow; calli raised, smooth. Scutellum shiny on basal half, pruinose on apical half. Hemelytra punctate, pruinose; pubescence long and dense; wing membrane with one visible vein. Mesosternum with longitudinal median groove; metasternum rounded, medially carinate.

Osteolar canal short, slightly curved forward; apex near middle of metapleuron. Anterior tibia with pad; fourth abdominal segment in male with two gland openings; ovipositor developed.

Only one species of the genus occurs in Canada and is generally confined to deciduous trees.

Calliodis temnostethoides (Reuter)

Figs. 34, 74, 115; Map 18

Asthenidea temnostethoides Reuter 1884:51; Matthewman & Pielou 1971:798.

Calliodis temnostethoides, Carayon 1972:341.

Male. Length 2.38–2.52 mm, width 0.84–0.98 mm. Head: length 0.31 mm, width 0.38 mm; reddish brown, smooth; ocelli large and far apart. Rostrum extending almost to tip of mesosternum; penultimate segment 0.42–0.48 mm long. Second antennal segment 0.35–0.38 mm long, light brown, incrassate; terminal segments brown. Pronotum: 0.80–0.87 mm wide at base; dark reddish brown; calli prominent. Scutellum: basal portion smooth; apical portion transversely rugose. Hemelytron: clavus, corium, and embolium light yellowish brown; outer cuneus dark brown; wing membrane lightly fuscous but transparent. Ventral surface: dark reddish brown, shiny, finely sculptured; fourth abdominal segment in male with two gland openings, marked by two triangular tubercles; area between tubercles bearing long setae; terminal abdominal segments with long setae.

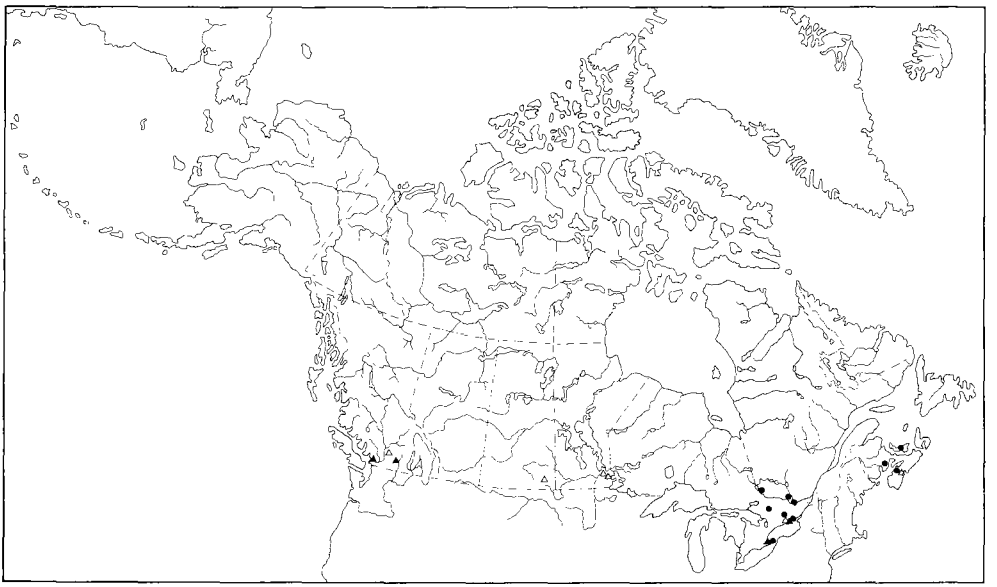
Female. Length 2.52–2.94 mm, width 0.98–1.12 mm. Much like male in color and appearance but more robust; gland openings on abdomen absent.

Remarks. This species (Fig. 115) was formerly placed in the genus *Asthenidea* Reuter. It is easily distinguished from the other anthocorids by the osteolar canal (Fig. 74), and the gland structures on the male abdomen. The hemelytra are light yellowish brown, except for the cuneus, and strongly contrast with the reddish brown pronotum and scutellum. The scutellum and hemelytra are also pruinose. The genital clasper (Fig. 34) is short, gently curved, and grooved.

The species is rare in collections and little is known of its habits. It is probably predaceous.

Habitat. Collected under the bark of *Carya* spp., *Picea* spp., *Pinus sylvestris*, and *P. banksiana*, and in bracket fungi growing on *Betula papyrifera.*

Distribution. Originally described from Illinois; now known to occur in Saskatchewan, Ontario, Quebec, Nova Scotia, Prince Edward Island, and New Brunswick (Map 18).



Map 18. Distribution of *Calliodis temnostethoides* (Reuter) (●), *Dufouriellus ater* (Dufour) (▲), and *Cardiastethus borealis* Kelton (△).

Key to genera of Cardiastethini

1. Pronotum with longitudinal median groove; median carina on metasternum absent ..... ***Dufouriellus*** **Kirkaldy**

   Pronotum without longitudinal median groove; median carina on metasternum present ..... ***Cardiastethus*** **Fieber**

Genus *Dufouriellus* Kirkaldy

Elongate, flattened, shiny. Head short; setae long. Rostrum extending to anterior coxae. Pronotum finely rugose; side margins carinate; collar absent; calli inconspicuous, separated by longitudinal median groove; basal angle with seta. Scutellum finely sculptured. Hemelytra finely sculptured, shiny; pubescence short and sparse; wing membrane with four veins. Mesosternum with longitudinal median groove; metasternum rounded; hind coxae wide apart. Osteolar canal curved forward; apex extending to anterior margin of metapleuron; femora slender, unarmed; anterior tibia with pad; terminal abdominal segments with long setae; ovipositor not developed.

Only one species is known in the genus and it is Holarctic in distribution. In Canada it is rare in collections.

Dufouriellus ater (Dufour)

Figs. 35, 75, 116; Map 18

Xylocoris ater Dufour 1833:106.
Dufouriellus ater, Kirkaldy 1906:121.

Male. Length 2.10–2.24 mm, width 0.70–0.84 mm. Head: length 0.31 mm, width 0.35 mm; dark reddish brown, shiny; ocelli small, wide apart. Rostrum extending to anterior coxae; penultimate segment 0.24–0.28 mm long. Second antennal segment 0.31–0.35 mm long, yellowish brown, incrassate; terminal segments filiform, brown. Pronotum: 0.59–0.63 mm wide at base; black, shiny; longitudinal median groove distinct. Scutellum: black, finely sculptured. Hemelytron: black, appears glabrous; pubescence short and sparse; wing membrane fuscous on apical half, clear on basal half. Ventral surface: dark reddish brown; femora dark brown; tibiae yellowish brown.

Female. Length 2.10–2.24 mm, width 0.70–0.84 mm. Much like male in size, color, and appearance but pads on anterior tibiae absent.

Remarks. This species (Fig. 116) is distinguished by the longitudinal median groove on the pronotum, the small size, the flattened form, and the uniformly black color. The genital capsule is asymmetric and skewed to the left; the genital clasper (Fig. 35) is slender, sharply curved, and grooved along its length. The osteolar canal (Fig. 75) is similar in outline to that found in *Elatophilus* spp.

The behavior of this rare species is unknown in Canada. As reported by Southwood and Leston (1959) and Pericart (1972), it is found in Europe and preys on a wide variety of small insects.

Habitat. Found on coniferous and deciduous trees, including fruit trees, in Europe; collected under the bark of *Prunus persica* in the Niagara peninsula; habitat of specimens from British Columbia unknown.

Distribution. Holarctic; probably introduced into Canada and now occurs in Ontario and British Columbia (Map 18).

Genus *Cardiastethus* Fieber

Oblong, shiny, pubescent. Head short, setae long. Rostrum extending to middle of mesosternum. Pronotum punctate; side margins carinate; collar narrow; calli raised, smooth. Scutellum smooth on basal half, transversely rugose on apical half. Hemelytra finely punctate; pubescence long and dense; wing membrane with four veins, pruinose. Mesosternum with longitudinal median groove; metasternum triangular, medially carinate. Osteolar canal hemispherical, curved forward; apex extending to anterior margin of metapleuron. Anterior tibia with several spinules on inner surface near base. Terminal abdominal segments with long setae. Ovipositor not developed.

Only one species of this genus occurs in Canada and is generally confined to conifers.

Cardiastethus borealis Kelton

Figs. 36, 76, 117; Map 18

Cardiastethus borealis Kelton 1977*a*:246.

Male. Length 2.24–2.66 mm, width 0.91–0.98 mm. Head: length 0.28 mm, width 0.38 mm; reddish brown, smooth; ocelli large; eyes hairy. Rostrum extending to middle of mesosternum; penultimate segment 0.35–0.38 mm long. Second antennal segment 0.31–0.36 mm long, light brown, uniformly thickened, densely pubescent; terminal segments brown. Pronotum: 0.84–0.91 mm wide at base; reddish brown; calli prominent. Scutellum: dark reddish brown. Hemelytron: light brown; cuneus reddish brown; wing membrane lightly fuscous; outer margin fringed. Ventral surface: reddish brown; femora brown; tibiae light brown; pad on anterior tibia absent.

Female. Length 2.24–2.38 mm, width 0.84–0.98 mm. Much like male in color and appearance but second antennal segment incrassate and thinner.

Remarks. This species (Fig. 117) is distinguished by the small size and the long and dense pubescence on the hemelytra. The clavus, corium, and embolium are light brown and strongly contrast with the reddish brown pronotum, scutellum, and cuneus. The genital clasper (Fig. 36) is distinctive in shape and is grooved along its length. The osteolar canal (Fig. 76) is unique in shape and outline.

The behavior of the species is unknown.

Habitat. Collected on *Pinus ponderosa, P. banksiana,* and *P. sylvestris.*

Distribution. Transcontinental in Canada (Map 18).

Genus *Lyctocoris* Hahn

Oblong, shiny, macropterous. Head short; setae very short. Third and fourth antennal segments filiform, pilose. Rostrum extending to middle coxae or beyond. Pronotum finely punctate; lateral margins explanate; collar narrow; calli raised. Scutellum finely punctuate on basal half, rugose on apical half. Hemelytra punctate; pubescence short and appressed; wing membrane with four veins. Mesosternum with longitudinal median groove; metasternum rounded, medially carinate. Osteolar canal angular, bent forward; apex extending to anterior margin of metapleuron. Anterior and middle tibiae with pads. Left and right clasper present; ovipositor developed.

Six species are known to occur in Canada and are generally found under the bark of conifers.

Key to species of *Lyctocoris*

1. Rostrum extending to middle coxae; widespread in Canada ..... ***campestris* (Fabricius)**

   Rostrum extending to hind coxae or beyond 2

2. Male genital capsule small; claspers as in Fig. 37*A*, *B*; median process on seventh abdominal segment of female small (Fig. 37*C*) ..... ***stalii* (Reuter)**

   Male genital capsule large and twisted to left; median process large or absent 3

3. Left clasper grooved (Fig. 39*A*); median process on seventh abdominal segment of female absent (Fig. 39*C*) ..... ***canadensis* Kelton**

   Left clasper not grooved; median process large 4

4. Left clasper narrow toward apex (Fig. 40*A*); median process on seventh abdominal segment of female broadly obtuse (Fig. 40*C*) ..... ***rostratus* Kelton & Anderson**

   Left clasper broad throughout; median process triangular 5

5. Male eighth abdominal segment with prominent tubercle; claspers as in Fig. 41*A*, *B* ..... ***tuberosus* Kelton & Anderson**

   Male eighth abdominal segment without tubercle; claspers as in Fig. 42 *A*, *B* ..... ***okanaganus* Kelton & Anderson**

Lyctocoris campestris (Fabricius)

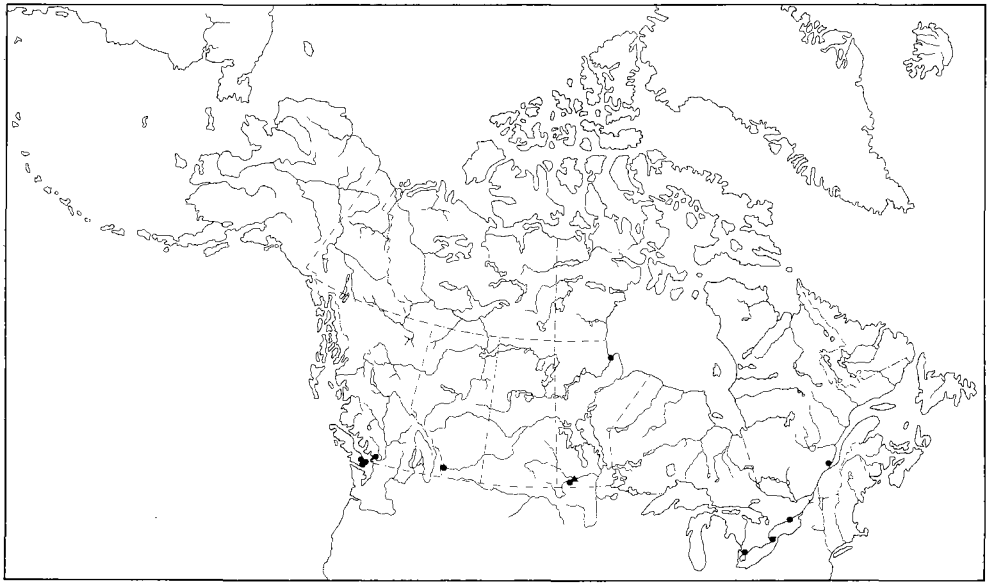
Figs. 37, 77, 118; Map 19

Acanthia campestris Fabricius 1794:75.
Lyctocoris campestris, Kelton 1967:808.

Male. Length 3.36–3.64 mm, width 1.40–1.61 mm. Head: length 0.43 mm, width 0.57 mm; brown, finely punctuate. Rostrum extending to middle coxae; penultimate segment 0.57–0.59 mm long. Second antennal segment 0.49–0.56 mm long, light brown, incrassate; terminal segments brown. Pronotum: 1.15–1.27 mm wide at base; brown; calli punctate. Scutellum: brown; anterior portion finely punctate; posterior portion rugose. Hemelytron light brown; cuneus somewhat darker; wing membrane clear; outer vein distinct; other veins faint. Ventral surface: brown; legs lighter.

Female. Length 3.57–3.85 mm, width 1.40–1.61 mm. Much like male in color and appearance.

Remarks. This is the smallest species in the genus (Fig. 118). Although all *Lyctocoris* spp. are similar in color, appearance, and type of pubescence, they are readily distinguished from each other by the differences in genital claspers and female abdominal segments (Fig. 37). This species



Map 19. Distribution of *Lyctocoris campestris* (Fabricius) (●) and *L. stalii* (Reuter) (▲).

has the shortest rostrum and small genital claspers. The osteolar canal (Fig. 77) is sharply bent forward and the apex extends to the anterior margin of the metapleuron.

The species preys on a large variety of immature insects and on mites. It is also known to bite man. It is readily transported in grain shipments.

Habitat. Generally found in compost piles, old haystacks, moldy stored grain, bird nests, animal burrows, and occasionally under bark of decaying trees.

Distribution. Worldwide; known from Quebec, Ontario, Manitoba, and British Columbia in Canada (Map 19).

Lyctocoris stalii (Reuter)

Figs. 38, 78; Map 19

Dolichomerus stalii Reuter 1871*b*:558.
Lyctocoris stalii, Reuter 1884:10; Kelton 1967:808.

Male. Length 3.64–3.92 mm, width 1.40–1.47 mm. Head: length 0.49 mm, width 0.55 mm; brown, finely punctate. Rostrum extending to hind coxae; penultimate segment 0.80–0.87 mm long. Second antennal segment 0.57–0.63 mm long, light brown, incrassate; terminal segments

brown. Pronotum: 1.22–1.26 mm wide at base; brown; calli punctate. Scutellum: brown; anterior portion finely sculptured; posterior portion rugose. Hemelytron: light brown; cuneus darker; wing membrane clear; veins distinct. Ventral surface: brown; legs lighter.

Female. Length 3.85–4.06 mm, width 1.40–1.54 mm. Much like male in color and appearance.

Remarks. The rostrum of this species is much longer than that of *campestris*. The claspers and the female abdominal segments (Fig. 38) are distinctive. The osteolar canal (Fig. 78) is typical for the genus.

The species is rare in collections and its behavior is unknown. It is probably predaceous like the other species in the genus.

Habitat. Generally found under the bark of *Betula* spp. and *Quercus* spp. and occasionally in bracket fungi growing on these trees; rarely found on conifers.

Distribution. Originally described from Texas and South Carolina; now found in Manitoba (Map 19).

Lyctocoris canadensis Kelton

Figs. 39, 79, 119; Map 20

Lyctocoris canadensis Kelton 1967:810.

Male. Length 3.78–4.55 mm, width 1.40–1.54 mm. Head: length 0.55 mm, width 0.64 mm; dark brown, finely punctate. Rostrum extending to abdominal segments; penultimate segment 1.05–1.13 mm long. Second antennal segment 0.73–0.77 mm long, brown, incrassate; terminal segments dark brown. Pronotum: 1.22–1.36 mm wide at base; dark brown; calli punctate. Scutellum: reddish brown; anterior portion finely sculptured; posterior portion rugose. Hemelytron: light brown; cuneus darker; wing membrane clear; veins distinct. Ventral surface: reddish brown; legs lighter.

Female. Length 4.83–4.90 mm, width 1.61–1.68 mm. Much like male in color and appearance but more robust.

Remarks. This is the largest species in the genus (Fig. 118). It is distinguished by the grooved genital claspers (Fig. 39*A*, *B*) and the truncate female abdominal segment (Fig. 39*C*). The osteolar canal (Fig. 79) is typical for the genus. The rostrum is longer than that of *stalii*.

The species preys on the larvae of bark beetles that are normally associated with *Pinus banksiana*.

Habitat. Collected in large numbers in or under the bark of *Pinus banksiana* cut into logs for lumber and heavily infested with bark beetles.

Distribution. Originally described from Quebec; now known to extend into Manitoba (Map 20).

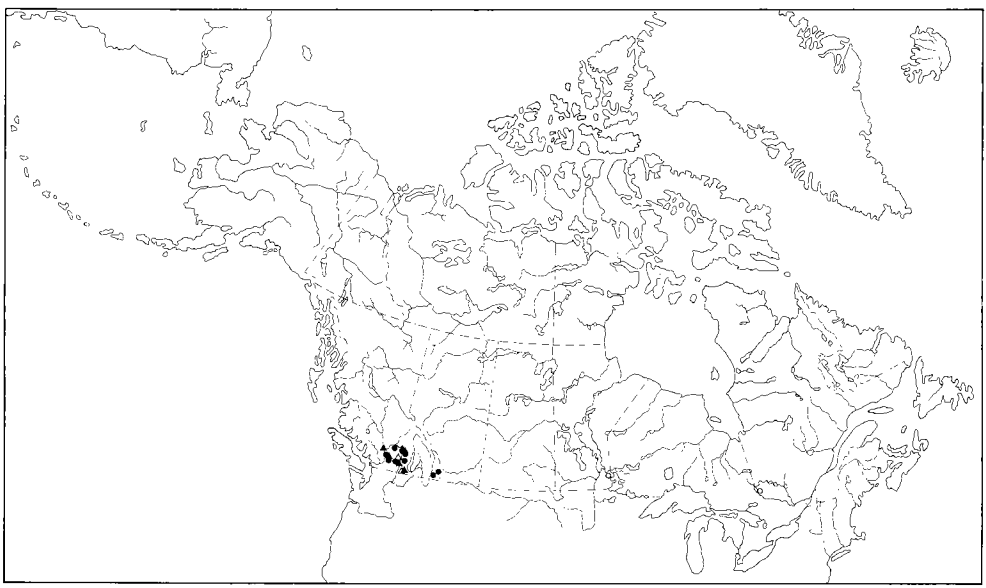
Lyctocoris rostratus Kelton & Anderson

Figs. 40, 80; Map 20

Lyctocoris rostratus Kelton & Anderson 1962:1304; Kelton 1967:811.

Male. Length 3.92–4.34 mm, width 1.54–1.61 mm. Head: length 0.49 mm, width 0.64 mm; dark brown, finely punctate. Rostrum extending to abdominal segments; penultimate segment 1.05–1.13 mm long. Second antennal segment 0.70–0.77 mm long, brown, incrassate; terminal segments brown. Pronotum: 1.27–1.36 mm wide at base; dark brown; calli punctate. Scutellum: dark brown to black; anterior portion finely sculptured; posterior portion rugose. Hemelytron: brown; cuneus darker; wing membrane clear, pruinose; veins distinct. Ventral surface: dark brown; abdomen finely sculptured; legs lighter.

Female. Length 4.24–4.48 mm, width 1.61–1.68 mm. Much like male in appearance but more robust.



Map 20. Distribution of *Lyctocoris canadensis* Kelton (○), *L. rostratus* Kelton & Anderson (▲), *L. tuberosus* Kelton & Anderson (●), and *L. okanaganus* Kelton & Anderson (△).

Remarks. This species is distinguished by the genital claspers and the female abdominal segments (Fig. 40). The osteolar canal (Fig. 80) is typical for the genus. The rostrum is about the same length as in *canadensis.*

The species preys on the larvae of bark beetles that infest conifers.

Habitat. Collected in large numbers in or under the bark of standing, dead *Pinus ponderosa;* smaller numbers collected on *P. monticola.*

Distribution. Originally described from British Columbia; occurring widely in that province (Map 20).

Lyctocoris tuberosus Kelton & Anderson

Figs. 41, 81; Map 20

Lyctocoris tuberosus Kelton & Anderson 1962:1303; Kelton 1967:812.

Male. Length 3.64–3.92 mm, width 1.40–1.43 mm. Head: length 0.44 mm, width 0.62 mm; reddish brown, finely punctate. Rostrum extending to hind coxae or slightly beyond; penultimate segment 0.87–0.91 mm long. Second antennal segment 0.56–0.63 mm long, brown, incrassate; terminal segments brown. Pronotum: 1.22–1.31 mm wide at base; reddish brown; calli punctate. Scutellum: dark brown; anterior portion finely sculptured and punctate; posterior portion rugose. Hemelytron: yellowish brown; cuneus darker; wing membrane fumate, pruinose; veins distinct. Ventral surface: reddish brown; abdomen finely sculptured; legs lighter.

Female. Length 3.85–3.99 mm, width 1.40–1.47 mm. Much like male in color and appearance.

Remarks. This species is distinguished by the genital claspers and the female abdominal segments (Fig. 41). The male also has a prominent tubercle on each side of the eighth abdominal segment. The osteolar canal (Fig. 81) is typical for the genus. The rostrum is shorter than that of *rostratus.*

The species preys on the larvae of bark beetles that infest conifers.

Habitat. Collected in or under the bark of *Pinus ponderosa, P. contorta,* and *Picea engelmannii* logs or in standing, dead trees.

Distribution. Known in Canada only from British Columbia (Map 20).

Lyctocoris okanaganus Kelton & Anderson

Figs. 42, 82; Map 20

Lyctocoris okanaganus Kelton & Anderson 1962:1303; Kelton 1967:812.

Male. Length 3.78–3.92 mm, width 1.40–1.43 mm. Head: length 0.46 mm, width 0.64 mm; reddish brown, finely punctate. Rostrum extending to hind coxae or slightly beyond; penultimate segment 0.96–1.08 mm long. Second antennal segment 0.63–0.70 mm long, brown, incrassate; terminal segments brown. Pronotum: 1.22–1.33 mm wide at base; brown, finely punctate. Scutellum: dark brown; anterior portion finely sculptured and punctate; posterior portion rugose. Hemelytron: yellowish brown; cuneus tinged with red; wing membrane fumate, pruinose; veins distinct. Ventral surface: brown; abdomen finely sculptured; legs lighter.

Female. Length 3.92–4.20 mm, width 1.52–1.61 mm. Much like male in color and appearance but more robust.

Remarks. This species is distinguished by the genital claspers and the female abdominal segments (Fig. 42). These structures closely resemble those of *tuberosus*, but have small specific differences. The abdominal segment in the male lacks the tubercles. The osteolar canal (Fig. 82) is typical for the genus. The rostrum is about the same length as that of *tuberosus*.

The species is not as abundant in nature as *tuberosus* and *rostratus*, but is probably also a predator.

Habitat. Collected under the bark of *Pinus ponderosa*, and in association with *rostratus*, but not with *tuberosus*.

Distribution. Originally described from British Columbia; known only from that province (Map 20).

Genus *Xylocoris* Dufour

Oval, small, macropterous or brachypterous. Head short; setae long. Third and fourth antennal segments filiform, pilose. Rostrum extending to middle of mesosternum or beyond. Pronotum shiny; lateral margins carinate; collar narrow. Scutellum shiny. Hemelytra variable, smooth or punctate, glabrous or pubescent; wing membrane when present with four veins, pruinose. Mesosternum grooved at apex; metasternum triangular, rounded, medially carinate. Metacoxae close together. Osteolar canal large, and angled or curved forward. Anterior tibia enlarged at apex; anterior and middle tibiae of males with pads. Only left clasper developed; ovipositor developed.

Four species are known to occur in Canada, two of which are believed to be European introductions. They are generally found under bark of deciduous trees, in stored grain, and in leaf litter.

Key to species of *Xylocoris*

1. Femora yellow; pubescence on hemelytra long and erect ..... ***hirtus* Kelton**

   Femora brown or black; pubescence on hemelytra short and appressed 2

2. Hemelytra mostly grayish white; cuneus often brownish; macropterous ..... ***galactinus* (Fieber)**

   Hemelytra mostly brown or black; mostly brachypterous 3

3. Pubescence on hemelytra short and sparse ..... ***umbrinus* Van Duzee**

   Pubescence on hemelytra long and dense ..... ***cursitans* (Fallén)**

Xylocoris hirtus Kelton

Figs. 43, 83, 120; Map 21

Xylocoris hirtus Kelton 1976*a*:193.

Male (brachypterous). Length 2.52–2.80 mm, width 0.91–1.12 mm. Head: length 0.36 mm, width 0.43 mm; brown, smooth, shiny; eyes hairy. Rostrum extending to tips of intermediate coxae; penultimate segment 0.49–0.56 mm long. Second antennal segment 0.38–0.42 mm long, pale yellow, incrassate; terminal segments pale yellow. Pronotum: 0.80–0.87 mm wide at base; yellowish brown, shiny; calli raised, smooth; pubescence pale, long, dense, semiappressed. Scutellum: yellowish brown, shiny; pubescence as on pronotum. Hemelytron: very short, truncate, covering only second abdominal segment; light yellowish brown, smooth, pruinose; wing membrane very short; pubescence silvery, long, dense. Ventral surface: yellowish brown; legs yellow.

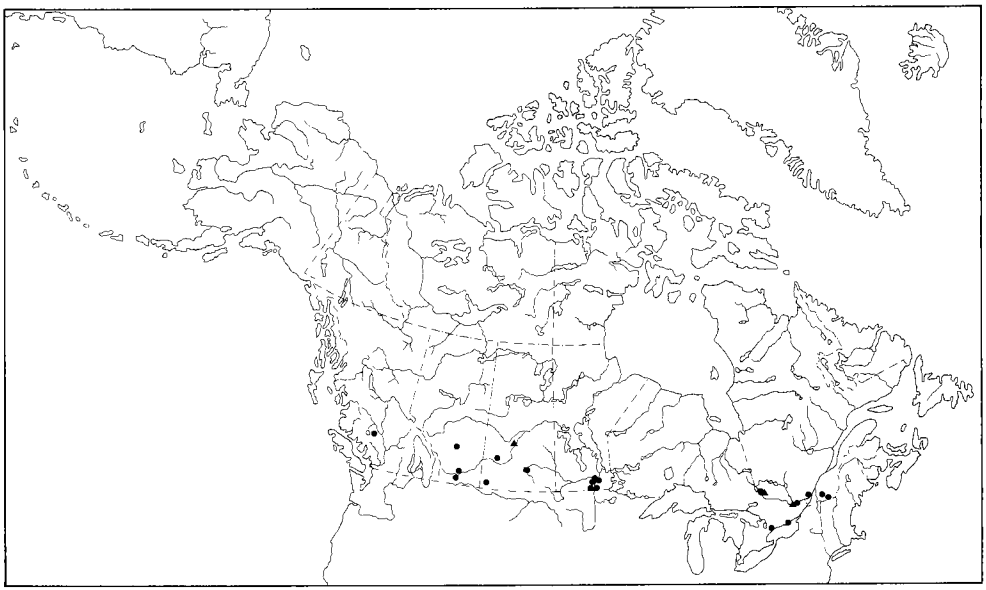
Female (brachypterous). Length 2.94–3.36 mm, width 1.05–1.19 mm. Much like male in color and pubescence but more robust; abdomen much wider than hemelytra; penultimate rostral segment slightly longer.

Male (macropterous). Unknown.

Female (macropterous). Hemelytra fully developed.

Remarks. This species (Fig. 120) is distinguished by the long and dense pubescence on the dorsum and by the yellowish brown color. The genital clasper (Fig. 43) is short, grooved along its length, and gently curved. The osteolar canal (Fig. 83) is long and sharply angled forward.

The species is probably predaceous, feeding on the arthropod life that is found near the roots of plants and in leaf litter.



Map 21. Distribution of *Xylocoris hirtus* Kelton (▲) and *X. galactinus* (Fieber) (●).

Habitat. Collected on the roots and litter layer of the prairie grassland; habitat of specimens collected in Ontario and Quebec unknown.

Distribution. In Canada known only from Saskatchewan, Ontario, and Quebec (Map 21).

Xylocoris galactinus (Fieber)

Figs. 44, 84, 121; Map 21

Anthocoris galactinus Fieber 1836:107.
Piezostethus galactinus Fieber 1861:139.
Piezostethus flaccidus Van Duzee 1914:14.
Xylocoris galactinus, Van Duzee 1916:34; Kelton 1977*b*:1017.

Male. Length 2.52–2.80 mm, width 0.91–1.12 mm. Head: length 0.31 mm, width 0.43 mm; reddish brown to black, smooth, shiny; clypeus often paler. Rostrum extending to apex of mesosternum; penultimate segment 0.38–0.42 mm long. Second antennal segment 0.35–0.42 mm long, dark brown, incrassate; terminal segments brown. Pronotum: 0.87–0.98 mm wide at base; black, shiny; calli smooth; basal portion slightly depressed and finely punctate. Scutellum: reddish brown, shiny; basal half smooth; apical half very finely rugose, punctate. Hemelytron: clavus, corium, and embolium grayish white; tip of clavus and inner margin of cuneus often

fuscous, shiny; pubescence silvery, short, semiappressed; wing membrane pruinose with four straight veins; outer vein distinct. Ventral surface: reddish brown to black; femora brown; tibiae yellowish brown.

Female. Length 2.66–3.08 mm, width 0.98–1.12 mm. Much like male in color and appearance but only front tibia with pad; rostrum longer.

Remarks. This species (Fig. 121) is readily distinguished from the others in the genus by the grayish white hemelytra. The genital capsule is strongly skewed to the left and conical in outline. The genital clasper (Fig. 44) is slender and sharply curved. The osteolar canal (Fig. 84) is broad and sharply angled. Only macropterous forms are known.

The species is predaceous and feeds on beetle larvae, fly larvae, and other small arthropods.

The record of *X. sordidus* (Reuter) in Quebec given by Moore (1944, 1950) should be for *galactinus*.

Habitat. In Canada generally found in grain bins, compost piles, and often under bark of dead trees.

Distribution. Holarctic; reported from Alberta to Quebec (Map 21).

Xylocoris umbrinus Van Duzee

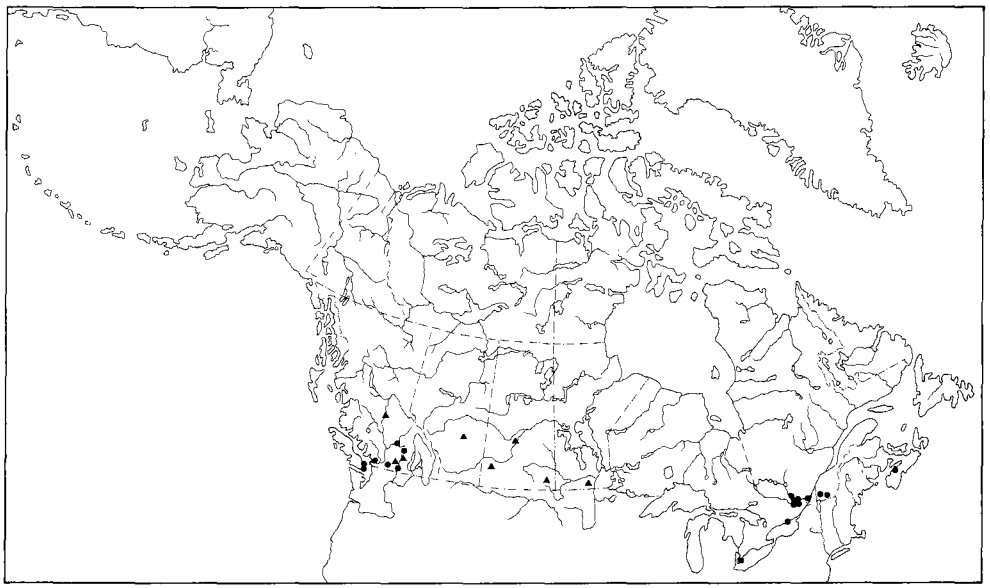
Figs. 45, 85, 122; Map 22

Xylocoris umbrinus Van Duzee 1921:137.

Male (macropterous). Length 2.52–2.66 mm, width 0.98–1.05 mm. Head: length 0.35 mm, width 0.45 mm; reddish brown to black, smooth, shiny. Rostrum extending beyond mesosternum; penultimate segment 0.38–0.45 mm long. Second antennal segment 0.28–0.36 mm long, dark brown, incrassate; terminal segments light brown. Pronotum: 0.80–0.87 mm wide at base; black, shiny; calli smooth; basal portion slightly depressed and somewhat transversely rugose and punctate. Scutellum: reddish brown, shiny; basal portion smooth; apical portion transversely rugose with wedge-shaped median elevation. Hemelytron: black; apical portion of corium often lighter brown, shiny; pubescence silvery, short, sparse, appressed; wing membrane whitish; outer vein distinct; other veins only slightly visible. Ventral surface: reddish brown to black; femora reddish brown; tibia lighter brown.

Female (macropterous). Length 2.66–2.80 mm, width 1.05–1.12 mm. Much like male in color and pubescence but more robust.

Male (brachypterous). Length 1.82–2.10 mm, width 0.84–0.91 mm. Smaller than macropter but similar in color and pubescence; hemelytra greatly reduced, covering only three abdominal segments; wing membrane very short.



Map 22. Distribution of *Xylocoris umbrinus* Van Duzee (▲) and *X. cursitans* (Fallén) (●).

Female (brachypterous). Much like corresponding male in color, general appearance, and pubescence, but slightly more robust and pads on intermediate tibia absent.

Remarks. This description appears to be the first report of brachyptery for this species. The species is rare in collections.

It is readily distinguished from the others in the genus by the uniformly dark reddish or black color and by the short pubescence on the hemelytra (Fig. 122). The genital clasper (Fig. 45) is gently curved and grooved. The osteolar canal (Fig. 85) is sharply angled.

The behavior of the species is unknown. It is probably predaceous and feeds on small insect larvae and other small arthropods.

Habitat. Allotype collected under bark of old log of *Abies* spp. Two specimens from Saskatchewan recovered from roots and litter layer in prairie grasslands; habitat of other specimens recorded from Canada unknown.

Distribution. Originally described from California; now known to occur in Western Canada (Map 22).

Xylocoris cursitans (Fallén)

Figs. 46, 86, 123; Map 22

Lygaeus cursitans Fallén 1807:74.
Piezostethus cursitans, Reuter 1871:411; 1884:43.
Xylocoris cursitans, Van Duzee 1916:34; Anderson 1962:1326.

Male (macropterous). Length 2.31–2.52 mm, width 0.84–0.98 mm. Head: length 0.28 mm, width 0.38 mm; reddish brown, smooth, shiny; clypeus often paler. Rostrum extending to middle of mesosternum; penultimate segment 0.35–0.38 mm long. Second antennal segment 0.28–0.31 mm long, brown, incrassate; terminal segments brown. Pronotum: 0.73–0.80 mm wide at base; black, shiny; calli smooth; basal portion slightly depressed and transversely rugose. Scutellum: dark reddish brown, shiny; basal portion smooth; apical portion transversely rugose; median longitudinal area slightly elevated. Hemelytron: corium and adjacent clavus grayish white; remainder of clavus, embolium, and cuneus dark brown to black, shiny; pubescence golden, moderately long and dense, semierect; wing membrane pruinose; outer vein distinct; other veins faintly visible. Ventral surface: reddish brown to black; femora brown; tibiae light brown.

Female (macropterous). Length 2.38–2.52 mm, width 0.84–0.98 mm. Much like male in color, appearance, and pubescence.

Male (brachypterous). Length 1.82–2.10 mm, width 0.70–0.84 mm. Smaller than macropter but similar in pubescence, and hemelytra uniformly colored and greatly reduced, covering only three abdominal segments; wing membrane very short.

Female (brachypterous). Much like corresponding male in color, general appearance, and pubescence, but slightly more robust; pads on intermediate tibiae absent.

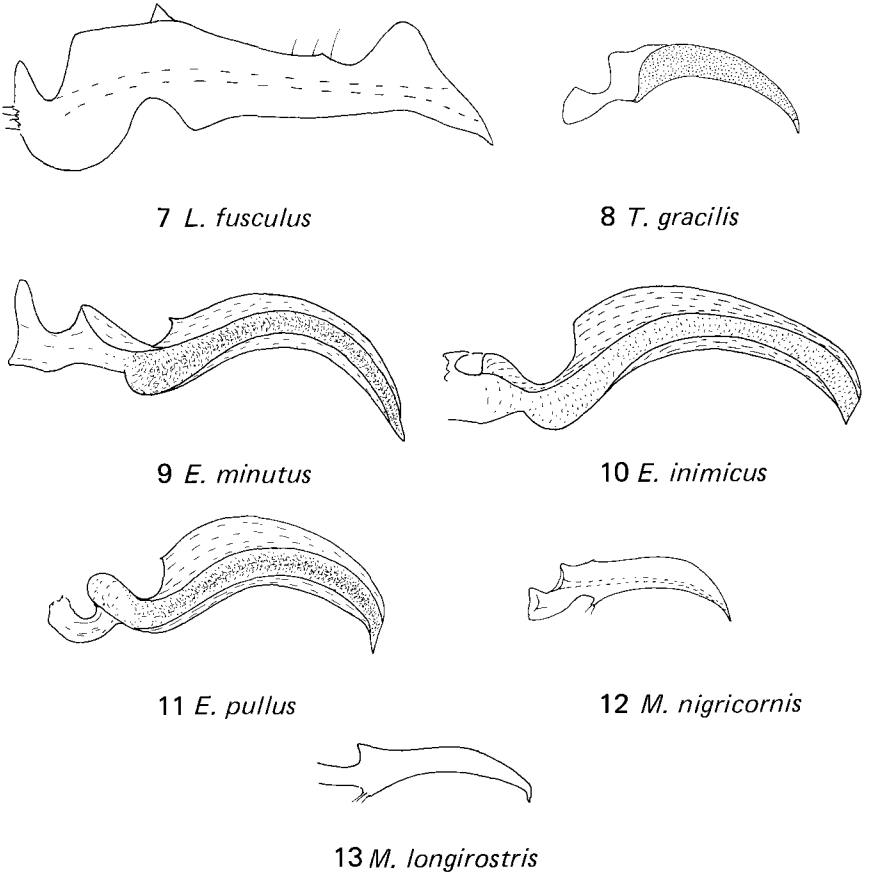
Remarks. This species (Fig. 123) may be confused with *umbrinus* but is readily distinguished from it by the longer and denser pubescence on the hemelytra. The genital capsule is asymmetric, or strongly skewed to the left, and grooved to hold the clasper. The genital clasper (Fig. 46) is slender, sinuate, and grooved along its length. The osteolar canal (Fig. 86) is angular.

The presence of *Xylocoris vicarius* (Reuter) in British Columbia reported by Anderson (1962) should refer to *cursitans*.

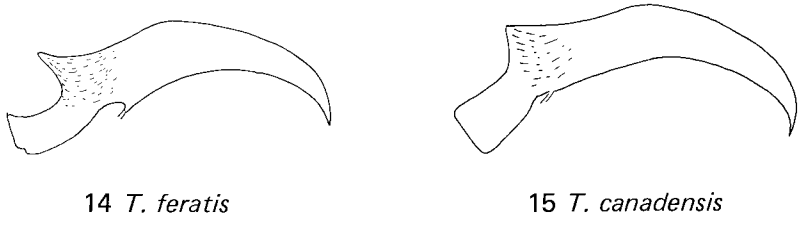
The species is predaceous and feeds on various insect larvae and other small arthropods.

Habitat. Generally collected under the bark of dead deciduous and coniferous trees.

Distribution. Holarctic; widely distributed in Canada (Map 22).



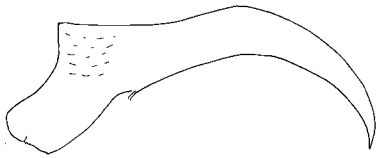
Figs. 7–13. Genital claspers of various species of Anthocoridae. 7, *Lasiochilus fusculus*; 8, *Temnostethus gracilis*; 9, *Elatophilus minutus*; 10, *E. inimicus*; 11, *E. pullus*; 12, *Melanocoris nigricornis*; 13, *M. longirostris*.



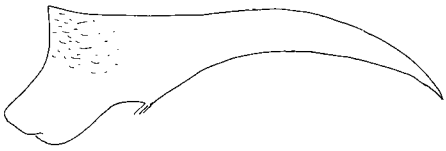
14 *T. feratis*

15 *T. canadensis*

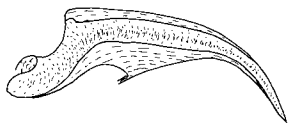
16 *T. pilosipes*



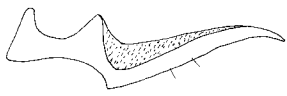
17 *T. latipennis*



18 *T. uniformis*

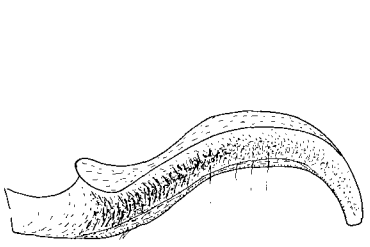


19 *A. lepidus*

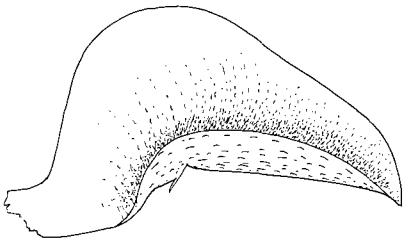


20 *A. pygmaeus*

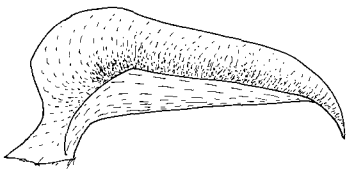
Figs. 14–20. Genital claspers of various species of Anthocoridae. 14, *Tetraphleps feratis*; 15, *T. canadensis*; 16, *T. pilosipes*; 17, *T. latipennis*; 18, *T. uniformis*; 19, *Acompocoris lepidus*; 20, *A. pygmaeus*.



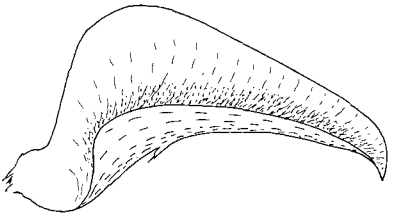
21 *A. melanocerus*



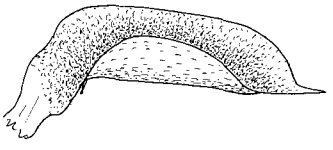
22 *A. antevolens*



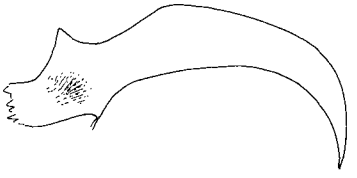
23 *A. dimorphicus*



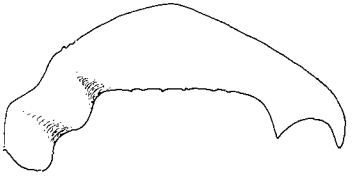
24 *A. musculus*



25 *A. whitei*

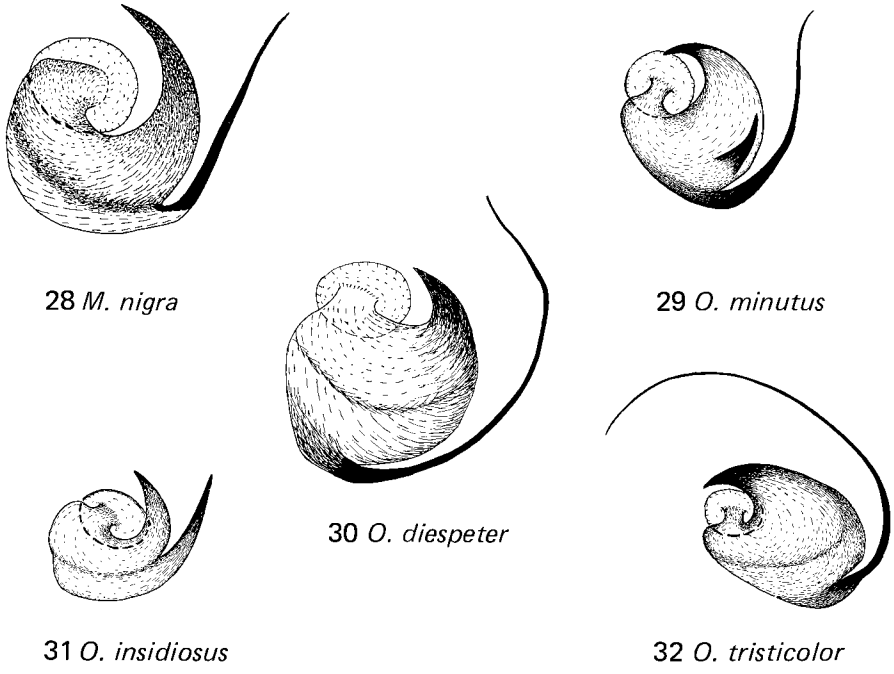


26 *A. nemoralis*

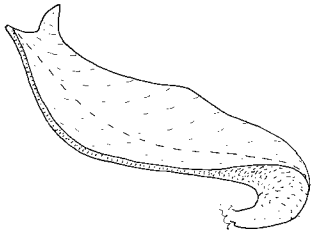


27 *A. confusus*

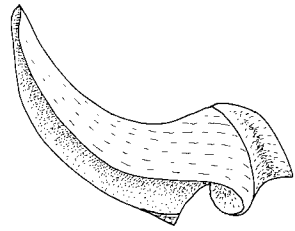
Figs. 21–27. Genital claspers of *Anthocoris* spp. 21, *A. melanocerus*; 22, *A. antevolens*; 23, *A. dimorphicus*; 24, *A. musculus*; 25, *A. whitei*; 26, *A. nemoralis*; 27, *A. confusus*.



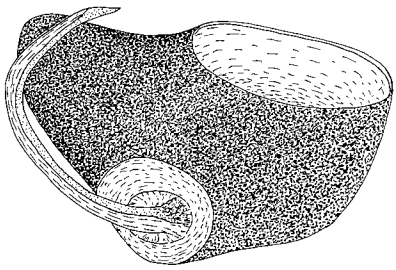
Figs. 28–32. Genital claspers of various species of Anthocoridae. 28, *Macrotracheliella nigra*; 29, *Orius minutus*; 30, *O. diespeter*; 31, *O. insidiosus*; 32, *O. tristicolor*.



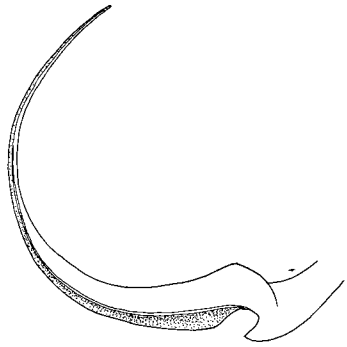
33 *S. flavicornis*



34 *C. temnostethoides*

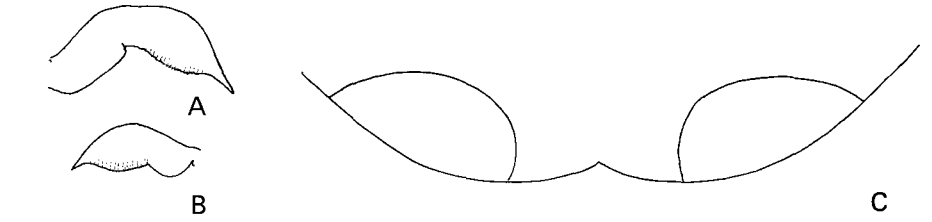


35 *D. ater*

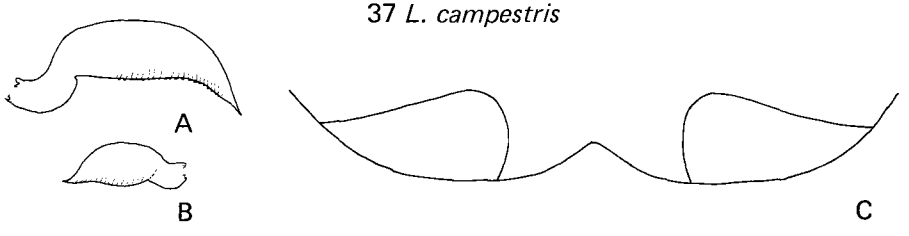


36 *C. borealis*

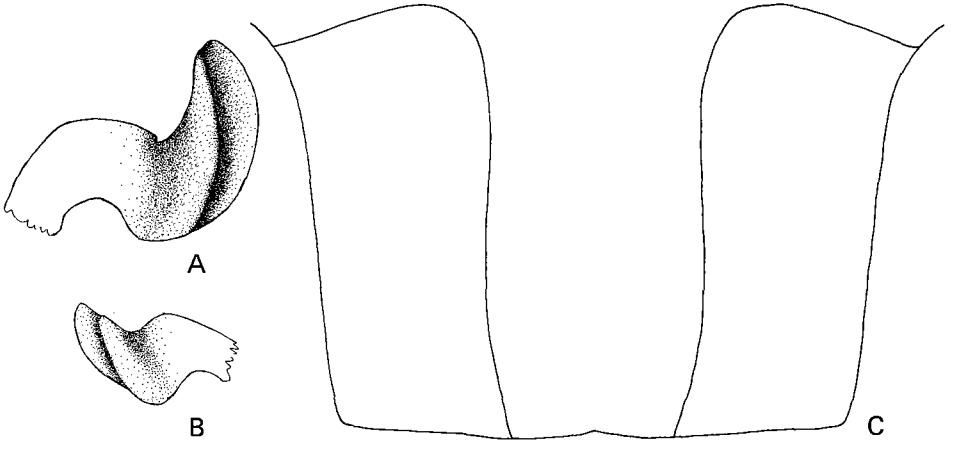
Figs. 33–36. Genital claspers of various species of Anthocoridae. 33, *Scoloposcelis flavicornis*; 34, *Calliodis temnostethoides*; 35, *Dufouriellus ater*; 36, *Cardiastethus borealis.*



37 *L. campestris*

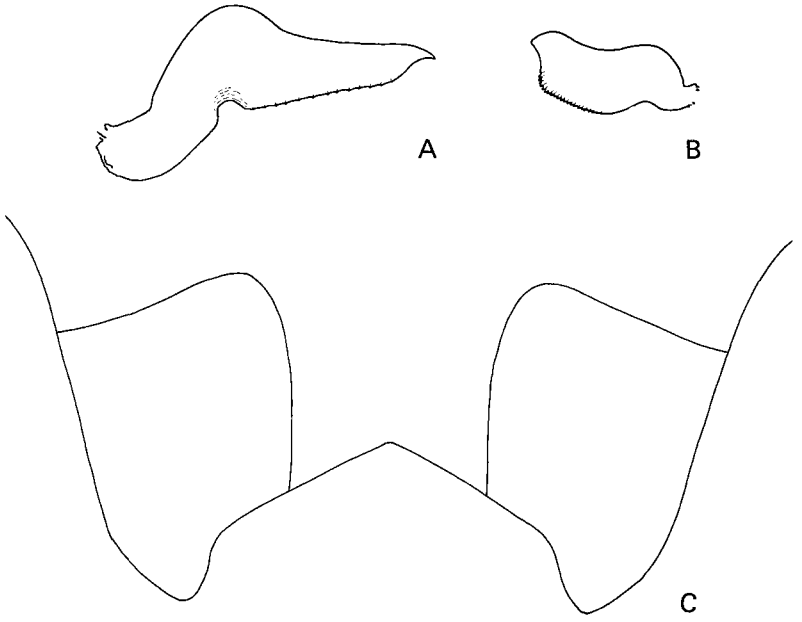


38 *L. stalii*

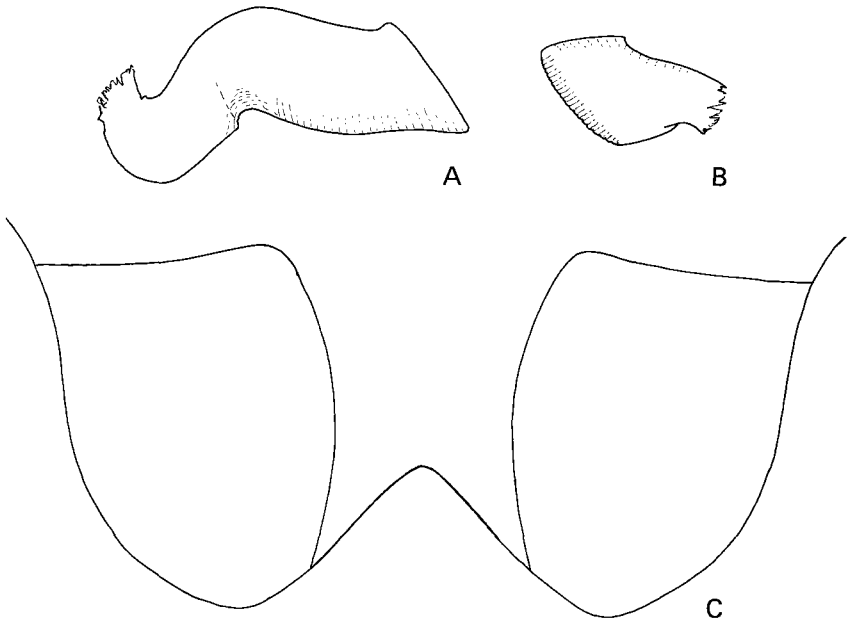


39 *L. canadensis*

Figs. 37–39. Genital claspers and female abdominal segments of *Lyctocoris* spp. 37, *L. campestris*; 38, *L. stalii*; 39, *L. canadensis*. *A*, left clasper; *B*, right clasper; *C*, 7th and 8th abdominal segments.

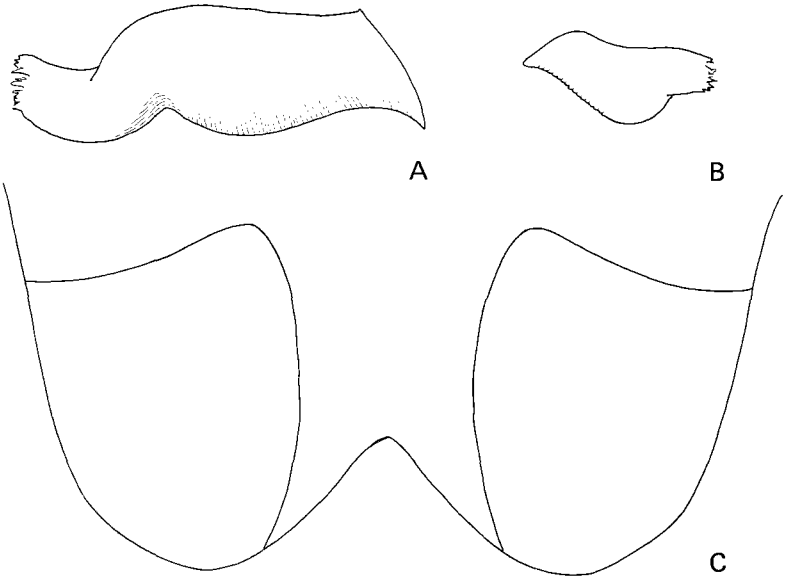


40 *L. rostratus*

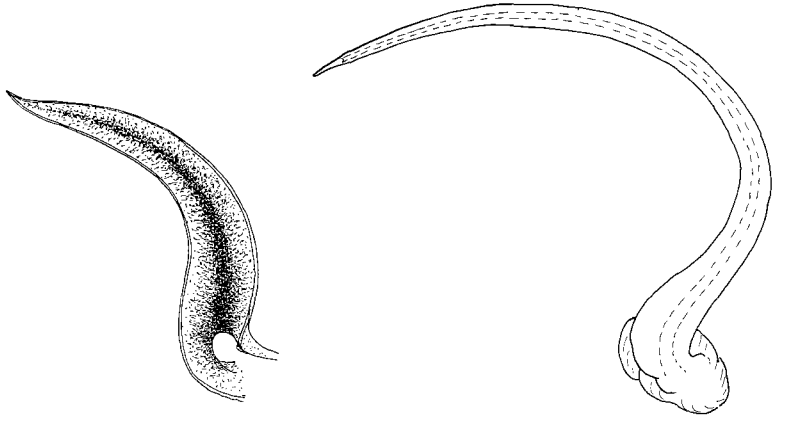


41 *L. tuberosus*

Figs. 40 and 41. Genital claspers and female abdominal segments of *Lyctocoris* spp. 40, *L. rostratus*; 41, *L. tuberosus*. *A*, left clasper; *B*, right clasper; *C*, 7th and 8th abdominal segments.

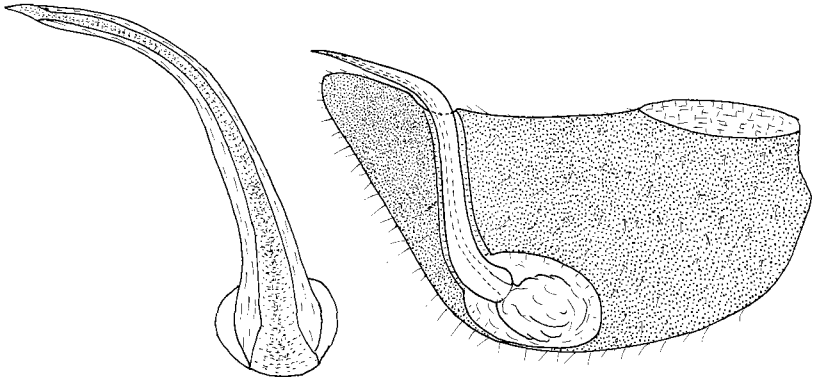


42 *L. okanaganus*



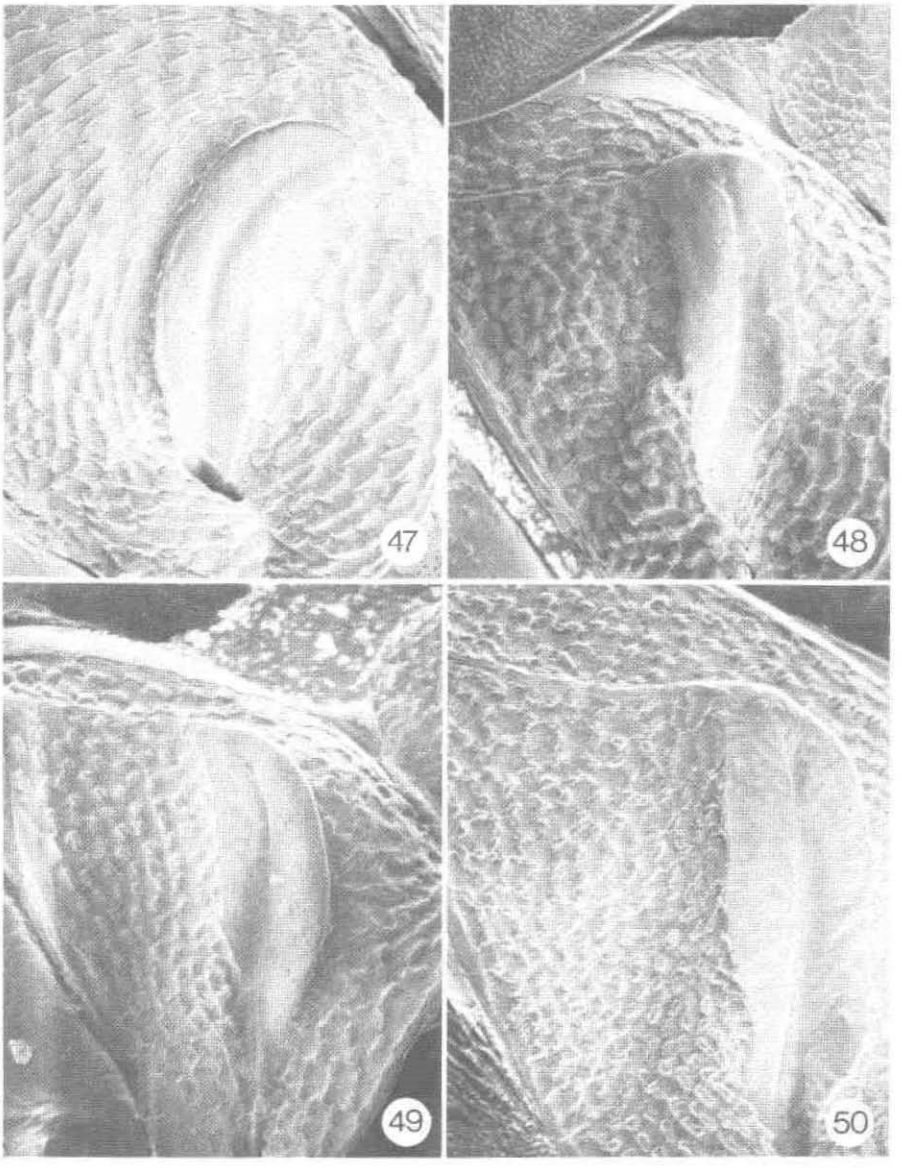
43 *X. hirtus*

44 *X. galactinus*



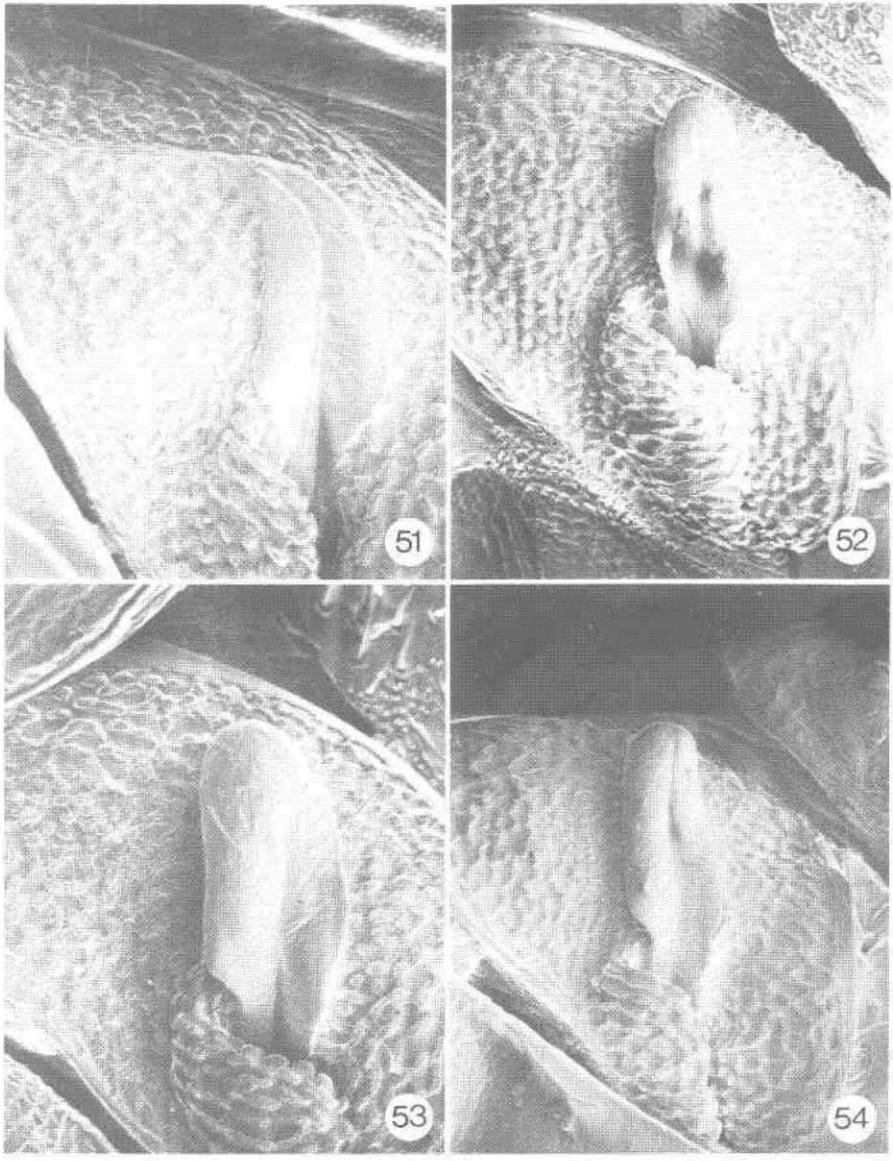
45 *X. umbrinus*

46 *X. cursitans*

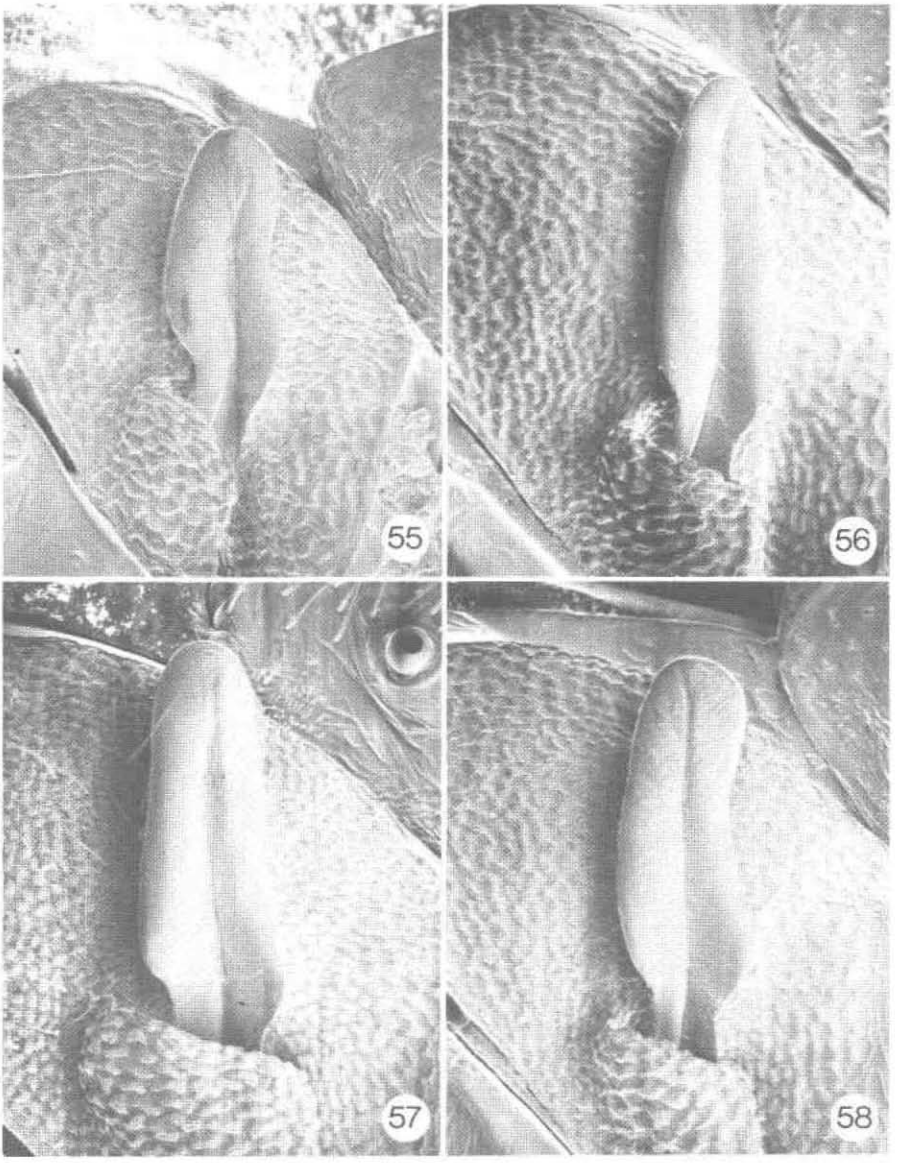


Figs. 47–50. Osteolar canals of various species of Anthocoridae. 47, *Lasiochilus fusculus*; 48, *Temnostethus gracilis*; 49, *Elatophilus minutus*; 50, *E. inimicus*.

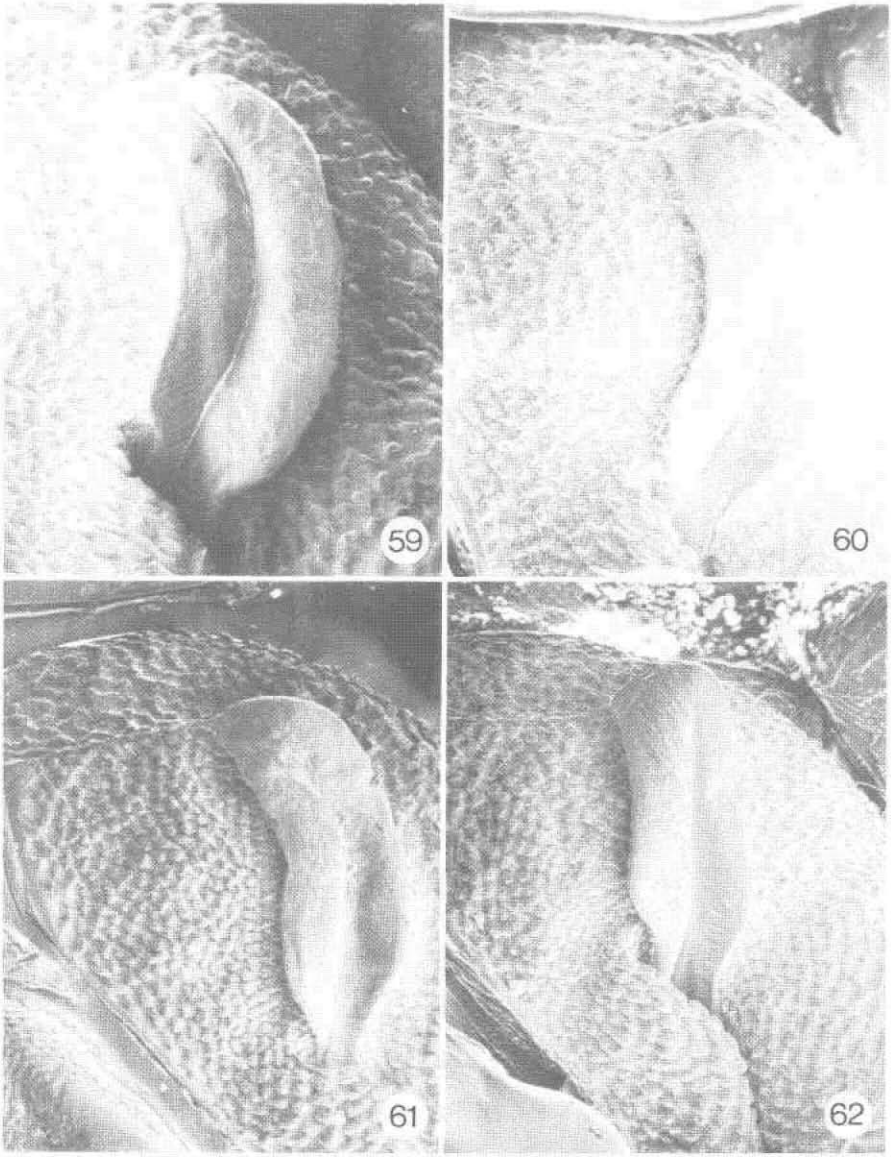
Figs. 42–46. 42, Genital claspers and female abdominal segments of *Lyctocoris okanaganus*. *A*, left clasper; *B*, right clasper; *C*, 7th and 8th abdominal segments. 43–46, Genital claspers of *Xylocoris* spp. 43, *X. hirtus*; 44, *X. galactinus*; 45, *X. umbrinus*; 46, *X. cursitans*.



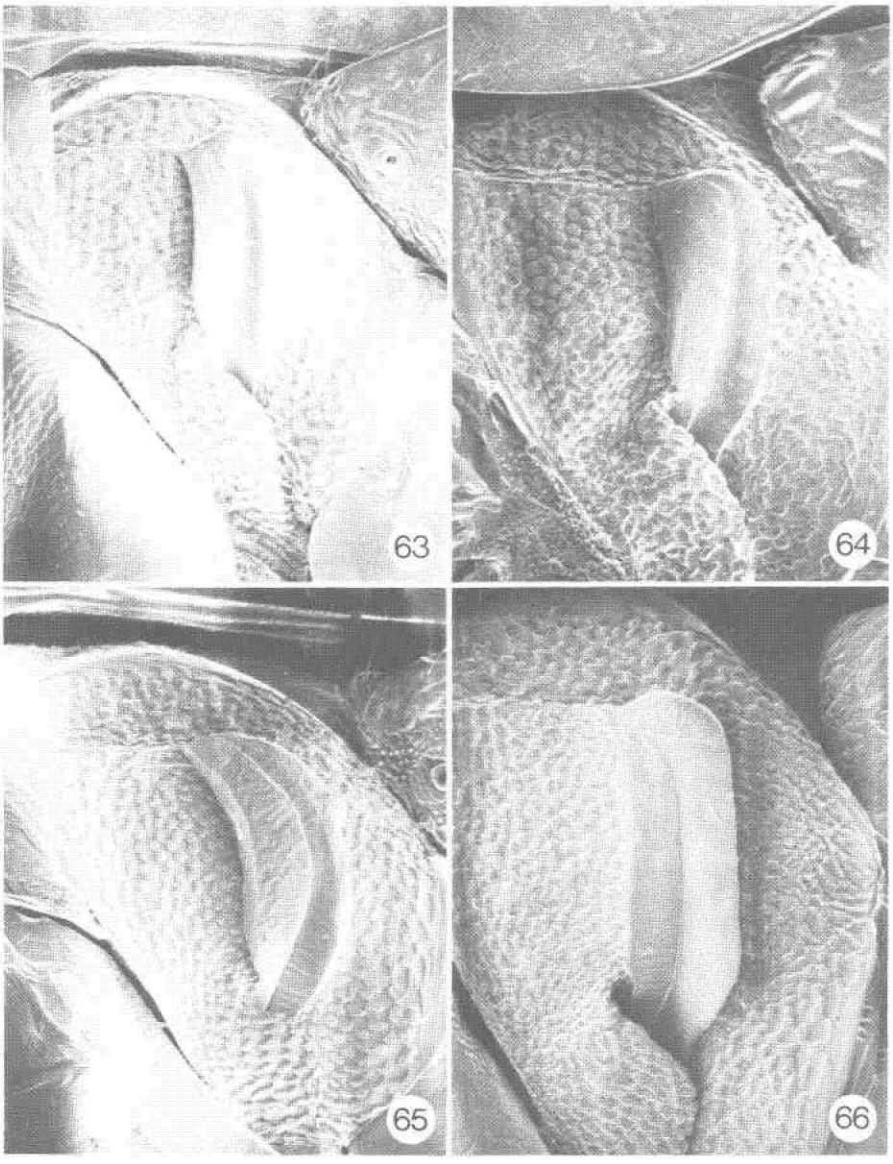
Figs. 51–54. Osteolar canals of various species of Anthocoridae. 51, *Elatophilus pullus*; 52, *Melanocoris nigricornis*; 53, *M. longirostris*; 54, *Tetraphleps feratis*.



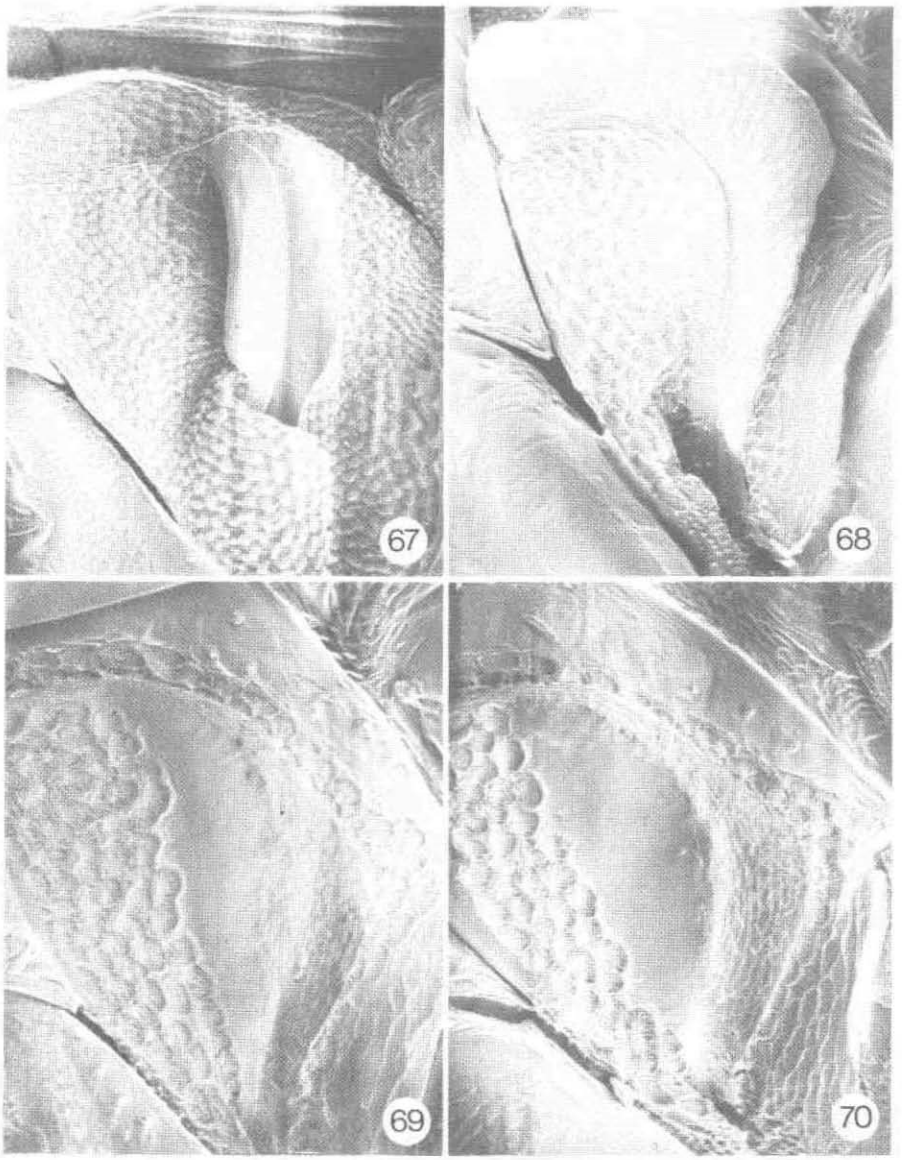
Figs. 55–58. Osteolar canals of *Tetraphleps* spp. 55, *T. canadensis*; 56, *T. pilosipes*; 57, *T. latipennis*; 58, *T. uniformis*.



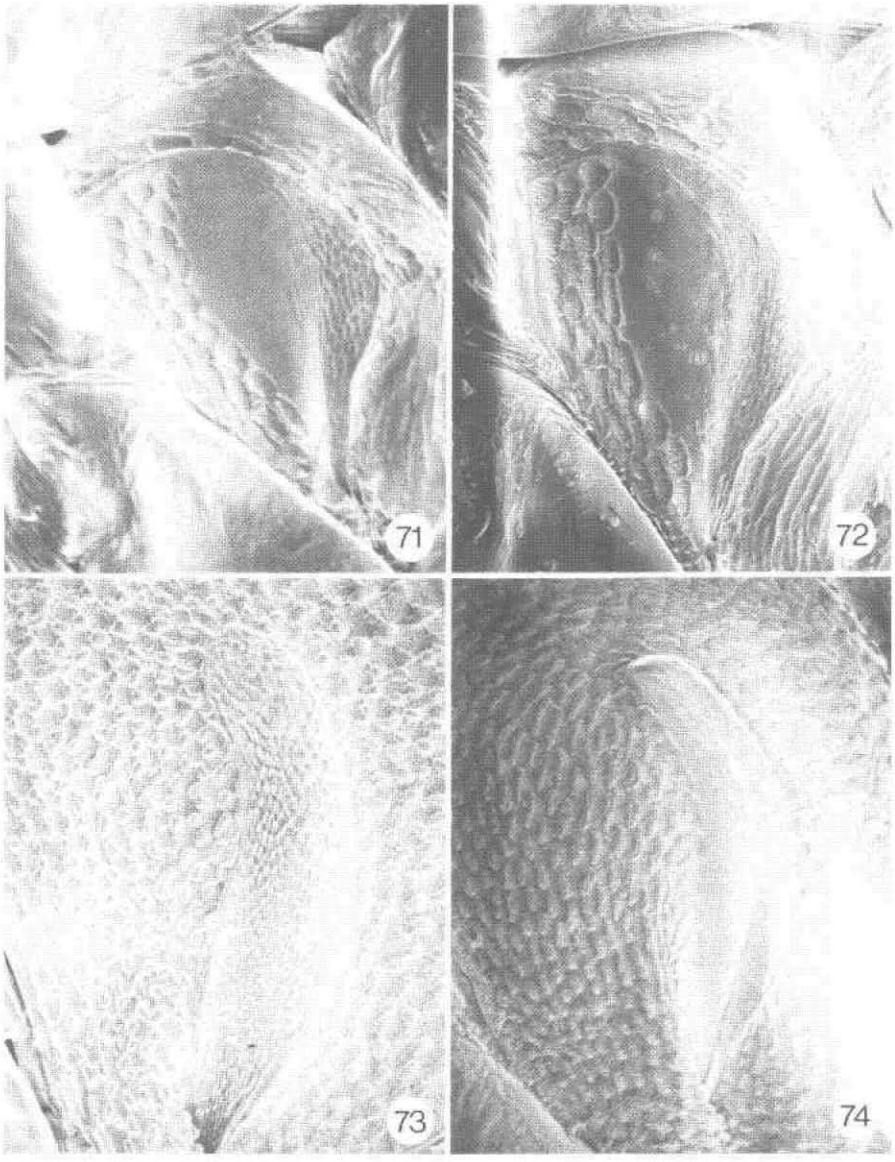
Figs. 59–62. Osteolar canals of various species of Anthocoridae. 59, *Acompocoris lepidus*; 60, *A. pygmaeus*; 61, *Anthocoris melanocerus*; 62, *A. antevolens*.



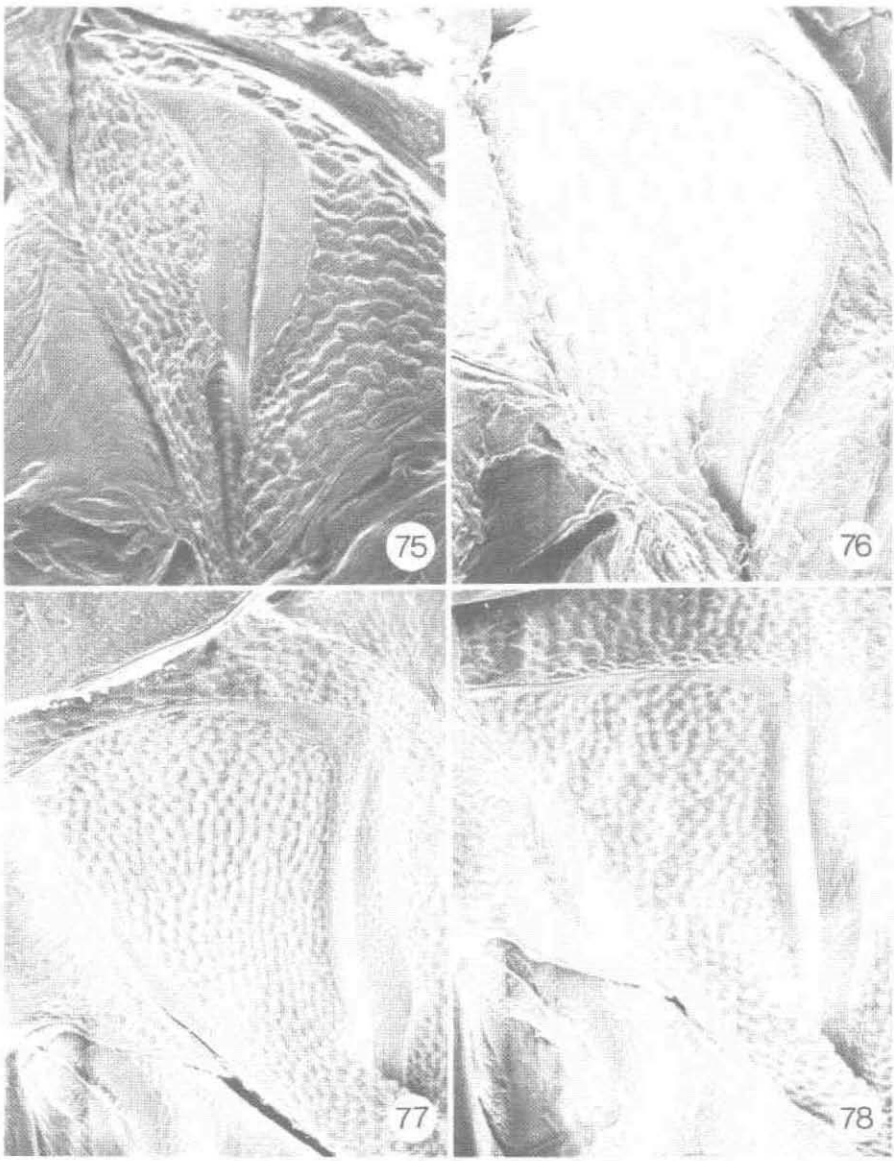
Figs. 63–66. Osteolar canals of *Anthocoris* spp. 63, *A. dimorphicus*; 64, *A. musculus*; 65, *A. whitei*; 66, *A. nemoralis*.



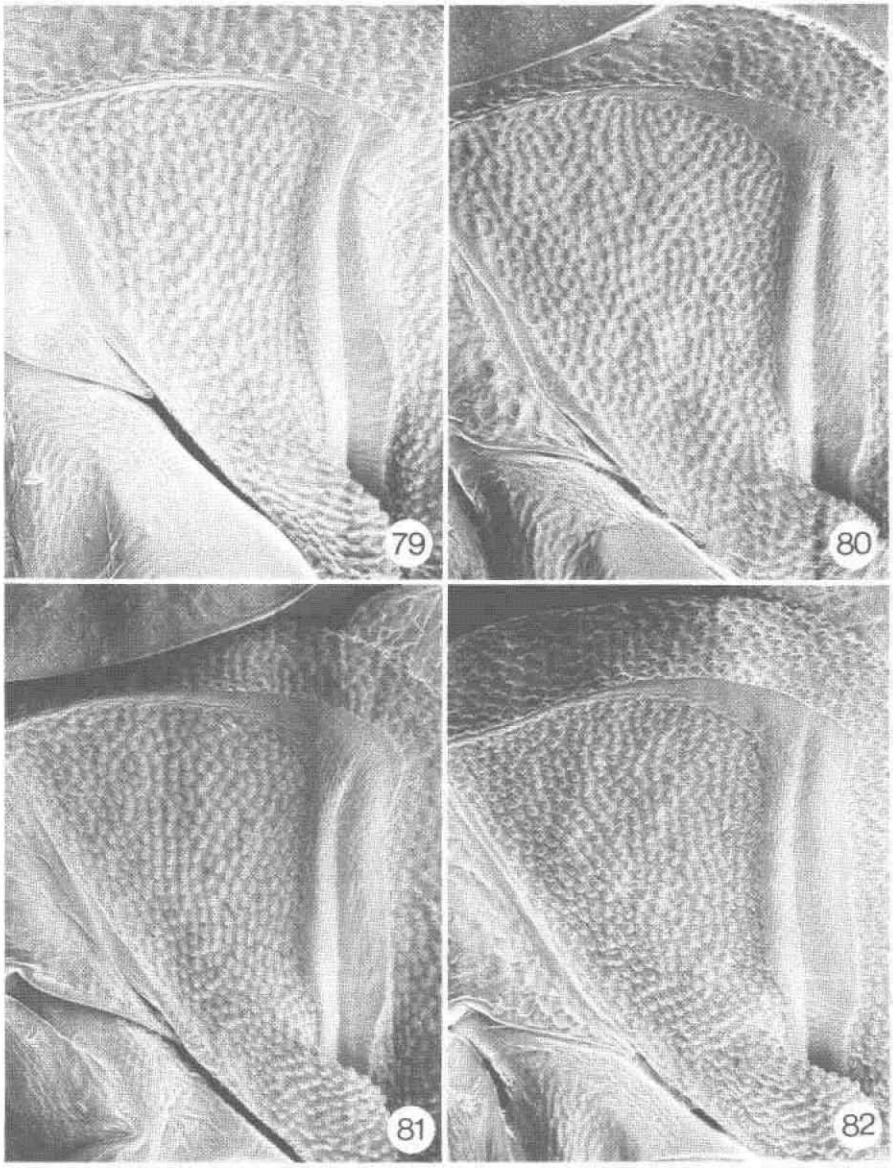
Figs. 67–70. Osteolar canals of various species of Anthocoridae. 67, *Anthocoris confusus*; 68, *Macrotracheliella nigra*; 69, *Orius minutus*; 70, *O. diespeter*.



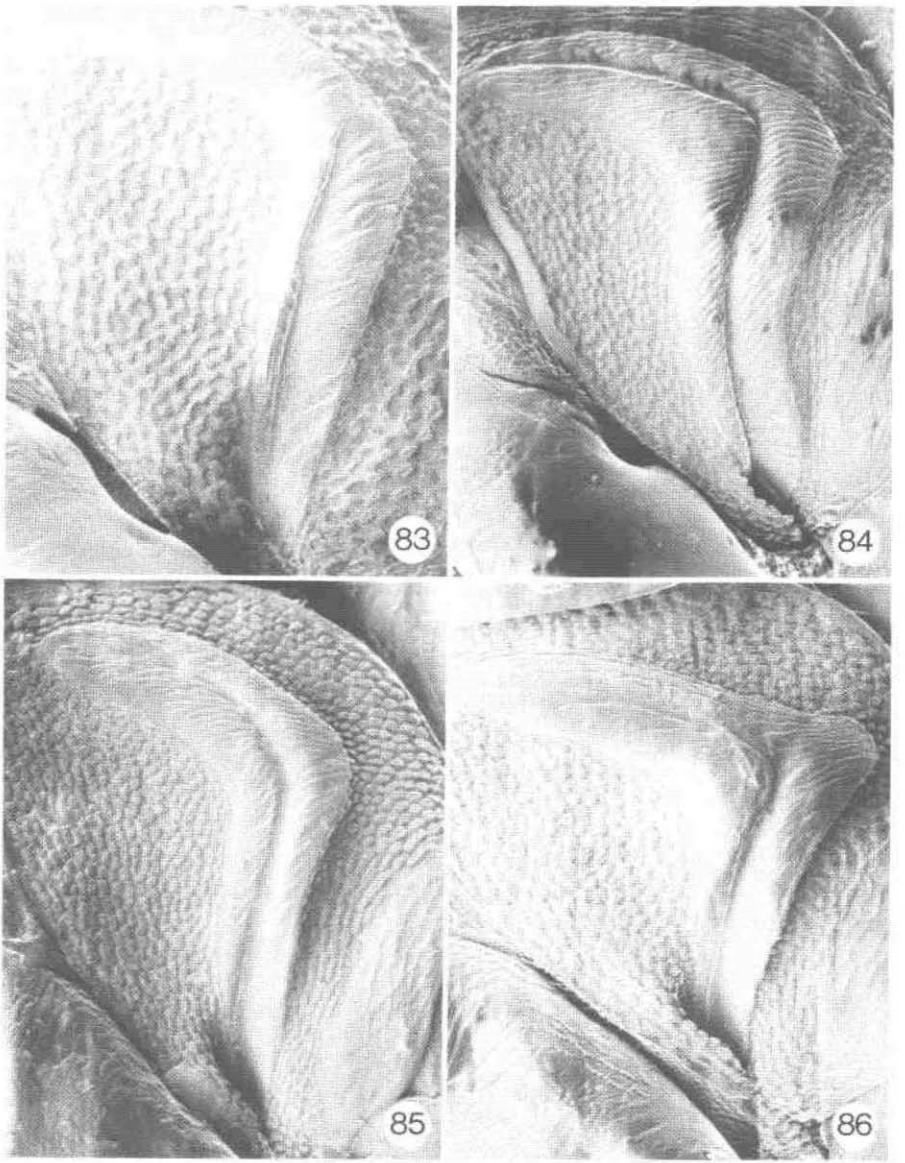
Figs. 71–74. Osteolar canals of various species of Anthocoridae. 71, *Orius insidiosus*; 72, *O. tristicolor*; 73, *Scoloposcelis flavicornis*; 74, *Calliodis temnostethoides*.



Figs. 75–78. Osteolar canals of various species of Anthocoridae. 75, *Dufouriellus ater*; 76, *Cardiastethus borealis*; 77, *Lyctocoris campestris*; 78, *L. stalii*.

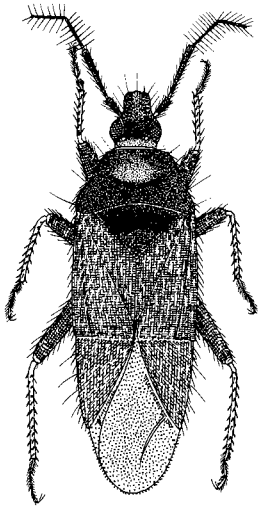


Figs. 79–82. Osteolar canals of *Lyctocoris* spp. 79, *L. canadensis*; 80, *L. rostratus*; 81, *L. tuberosus*; 82, *L. okanaganus*.

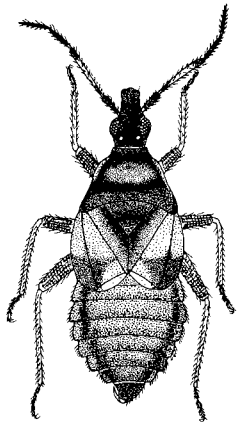


Figs. 83–86. Osteolar canals of *Xylocoris* spp. 83, *X. hirtus*; 84, *X. galactinus*; 85, *X. umbrinus*; 86, *X. cursitans*.

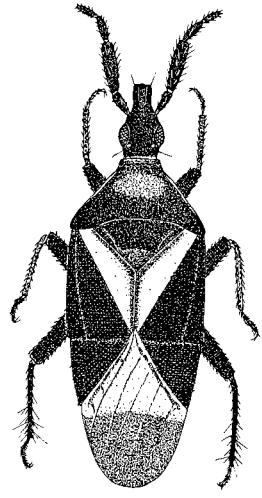
Figs. 87–91. Adult Anthocoridae. 87, *Lasiochilus fusculus* (Reuter); 88, *Temnostethus gracilis* Horvath; 89, *Elatophilus brimleyi* Kelton; 90, *Elatophilus minutus* Kelton; 91, *Elatophilus inimicus* (Drake & Harris).



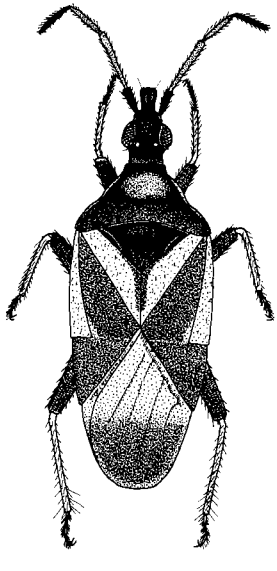
87 *L. fusculus*



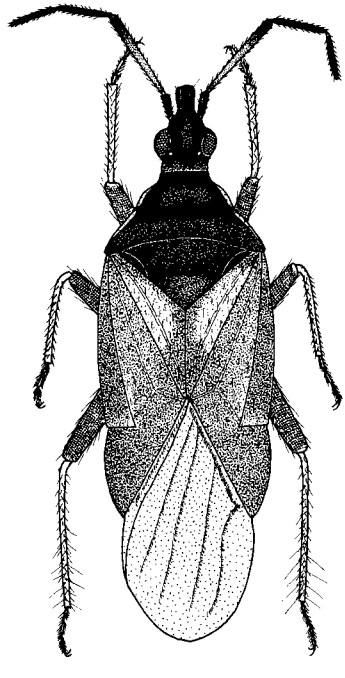
88 *T. gracilis*



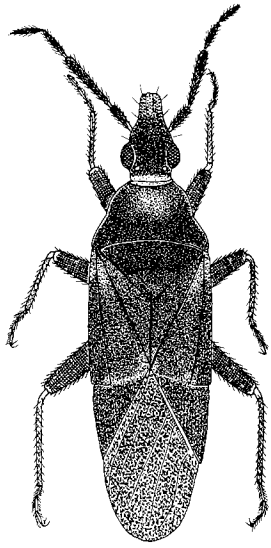
89 *E. brimleyi*



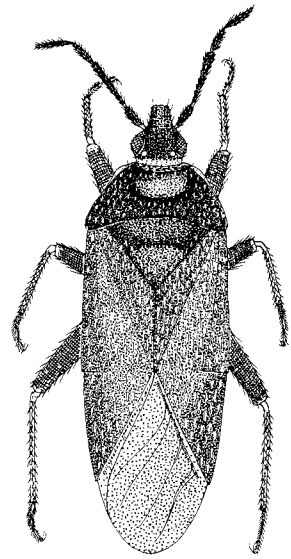
90 *E. minutus*



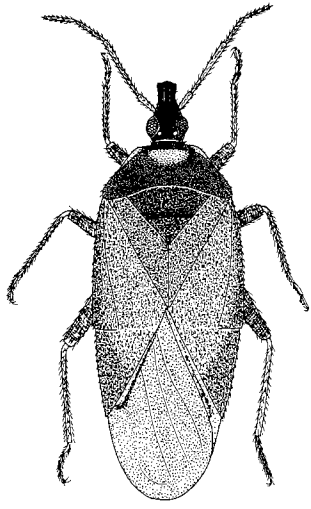
91 *E. inimicus*



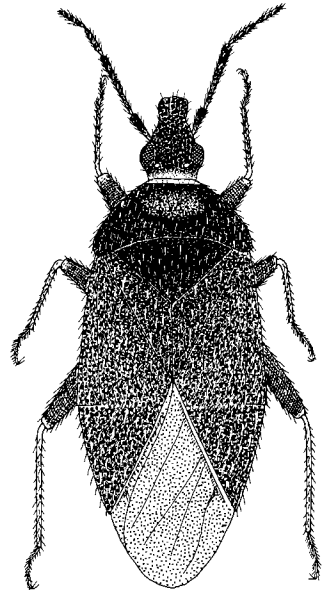
92 *E. pullus*



93 *M. nigricornis*



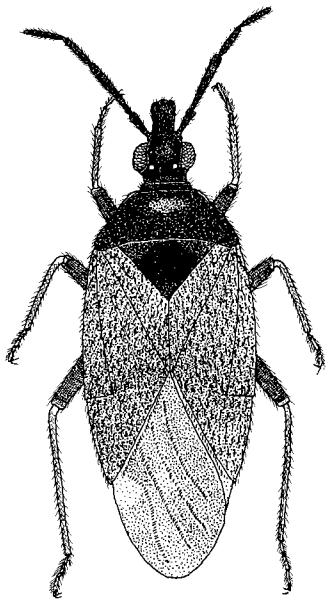
94 *M. longirostris*



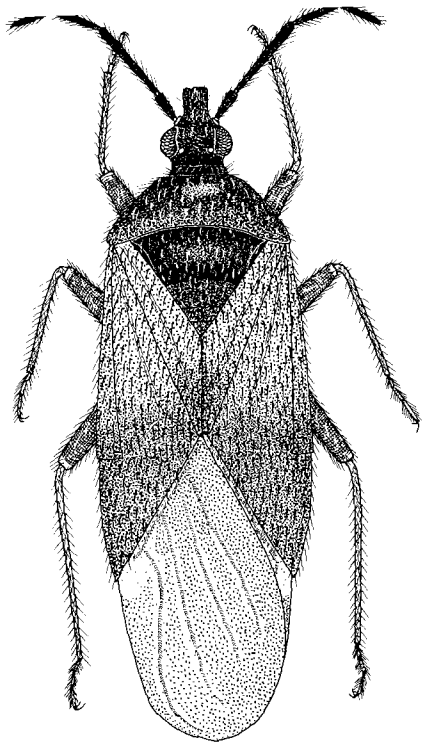
95 *T. feratis*

Figs. 92–95. Adult Anthocoridae. 92, *Elatophilus pullus* Kelton & Anderson; 93, *Melanocoris nigricornis* Van Duzee; 94, *Melanocoris longirostris* Kelton; 95, *Tetraphleps feratis* (Drake & Harris).

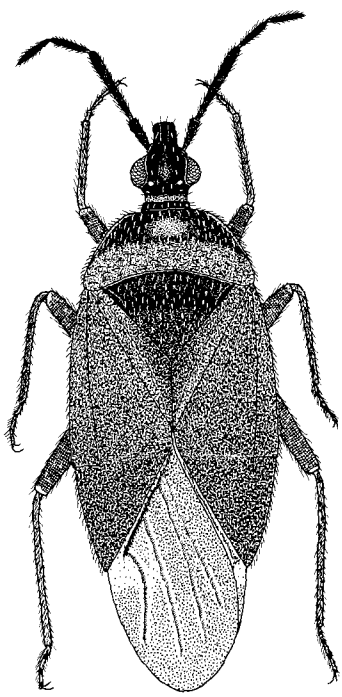
Figs. 96–99. Adult Anthocoridae. 96, *Tetraphleps canadensis* Provancher; 97, *Tetraphleps pilosipes* Kelton & Anderson; 98, *Tetraphleps latipennis* Van Duzee; 99, *Tetraphleps uniformis* Parshley.



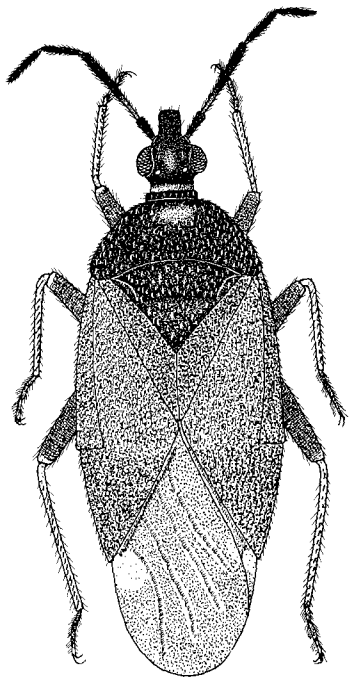
96 *T. canadensis*



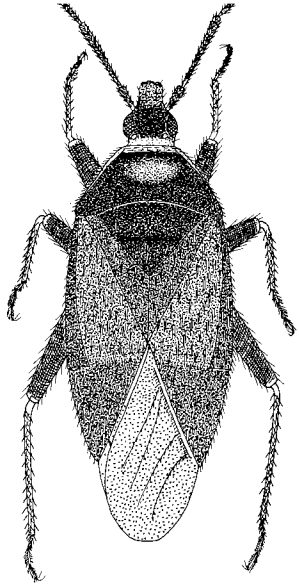
97 *T. pilosipes*



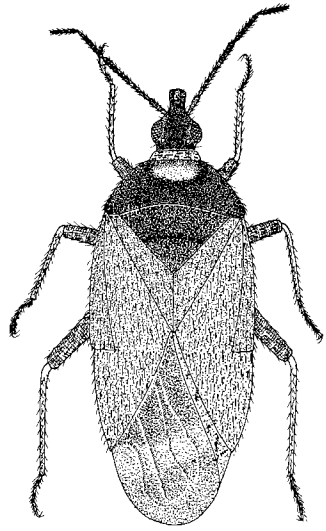
98 *T. latipennis*



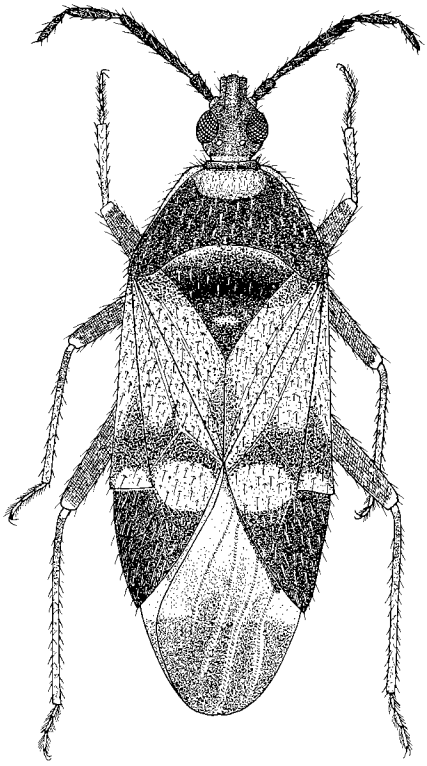
99 *T. uniformis*



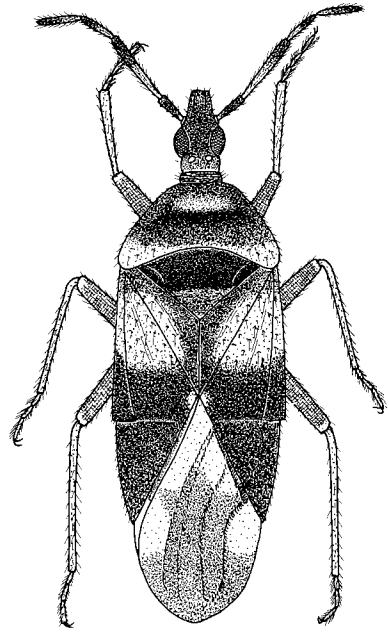
100 *A. lepidus*



101 *A. pygmaeus*

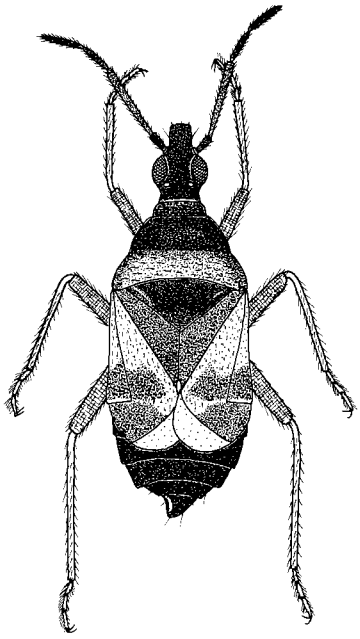


102 *A. melanocerus*

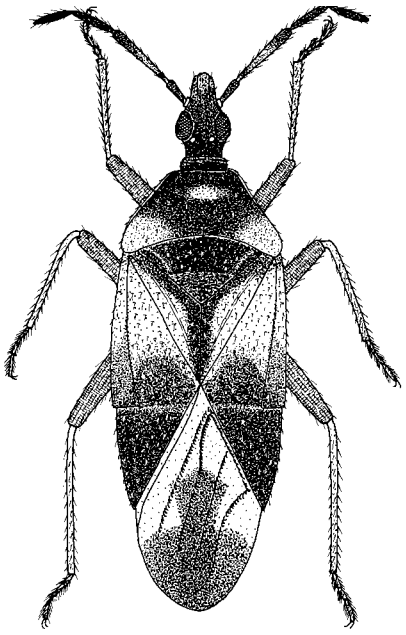


103 *A. antevolens*

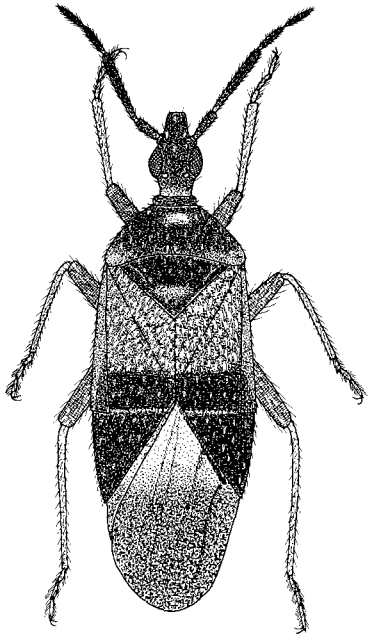
Figs. 100–103. Adult Anthocoridae. 100, *Acompocoris lepidus* (Van Duzee); 101, *Acompocoris pygmaeus* (Fallén); 102, *Anthocoris melanocerus* Reuter; 103, *Anthocoris antevolens* White.



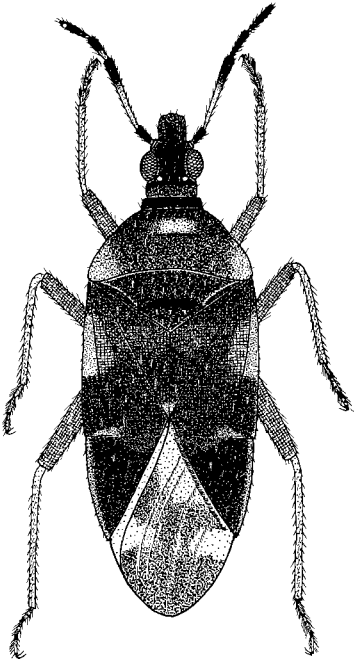
104 *A. dimorphicus*



105 *A. musculus*

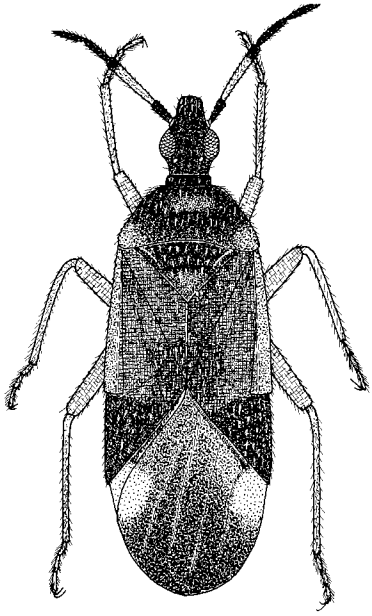


106 *A. whitei*

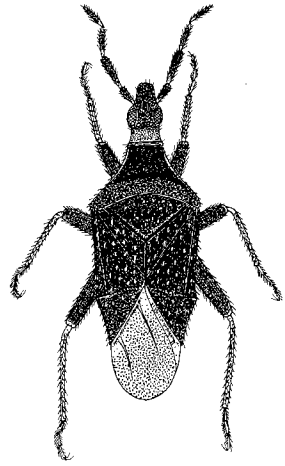


107 *A. nemoralis*

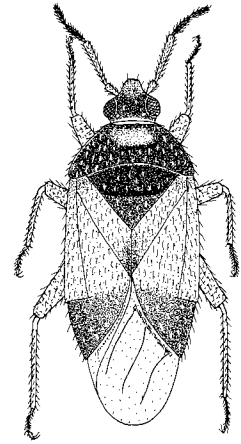
Figs. 104–107. Adult Anthocoridae. 104, *Anthocoris dimorphicus* Anderson & Kelton; 105, *Anthocoris musculus* (Say); 106, *Anthocoris whitei* Reuter; 107, *Anthocoris nemoralis* (Fabricius).



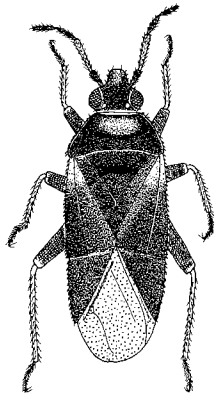
108 *A. confusus*



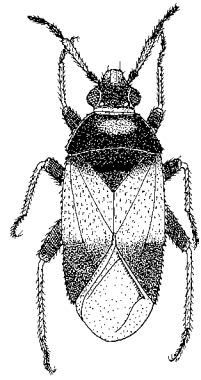
109 *M. nigra*



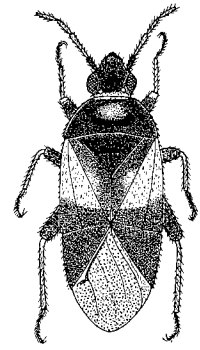
110 *O. minutus*



111 *O. diespeter*



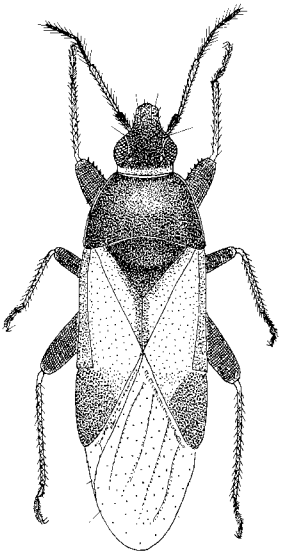
112 *O. insidiosus*



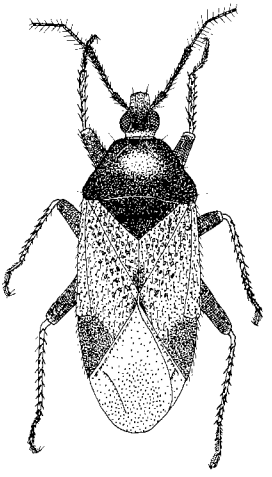
113 *O. tristicolor*

Figs. 108–113. Adult Anthocoridae. 108, *Anthocoris confusus* Reuter; 109, *Macrotracheliella nigra* Parshley; 110, *Orius minutus* (Linnaeus); 111, *Orius diespeter* Herring; 112, *Orius insidiosus* (Say); 113, *Orius tristicolor* (White).

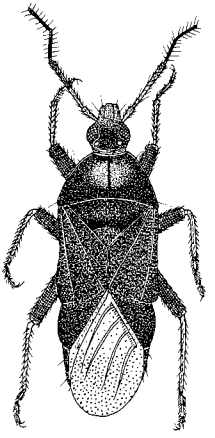
Figs. 114–118. Adult Anthocoridae. 114, *Scoloposcelis flavicornis* Reuter; 115, *Calliodis temnostethoides* (Reuter); 116, *Dufouriellus ater* (Dufour); 117, *Cardiastethus borealis* Kelton; 118, *Lyctocoris campestris* (Fabricius).



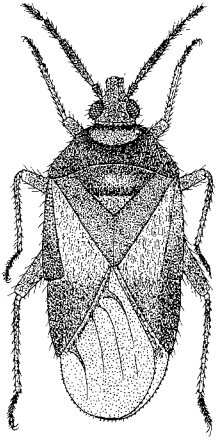
114 *S. flavicornis*



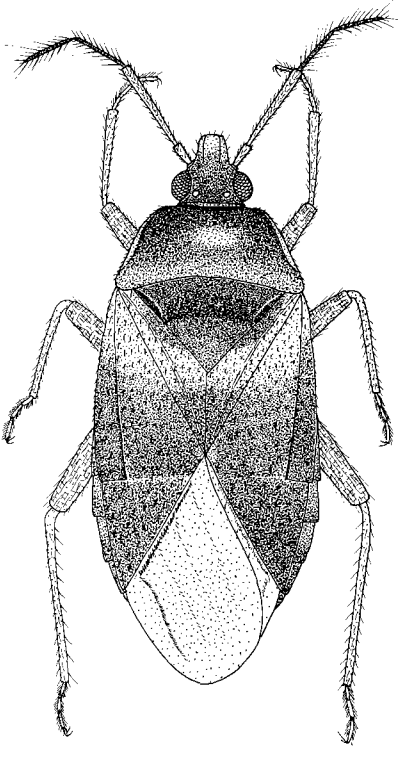
115 *C. temnostethoides*



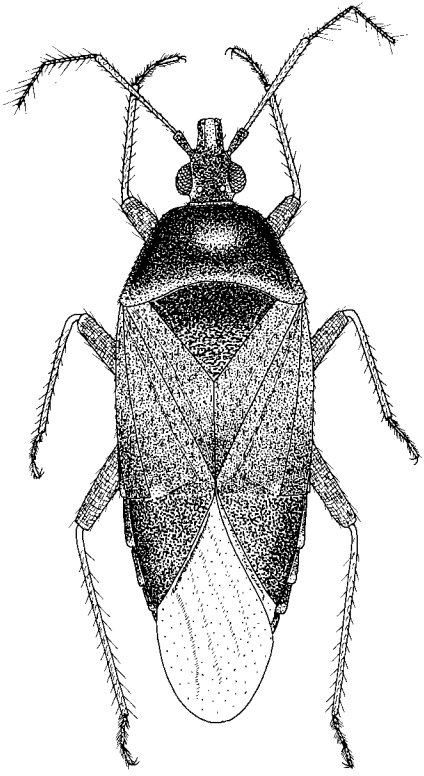
116 *D. ater*



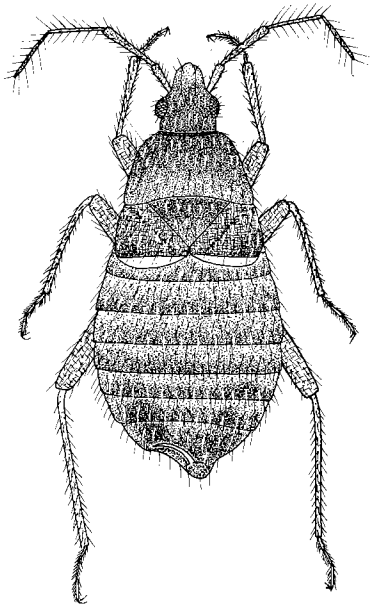
117 *C. borealis*



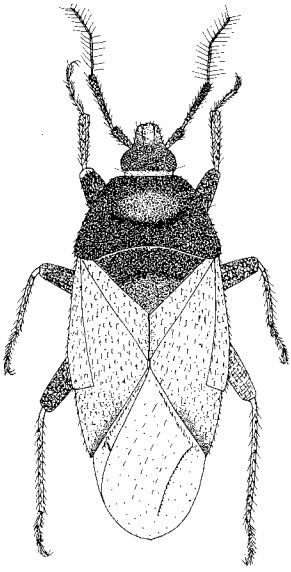
118 *L. campestris*



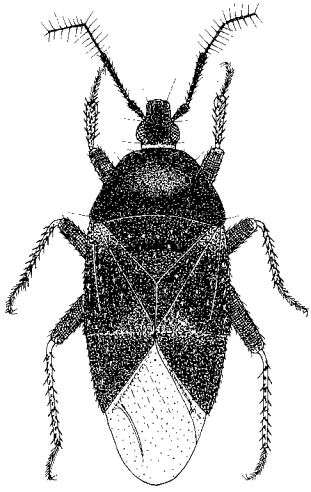
119 *L. canadensis*



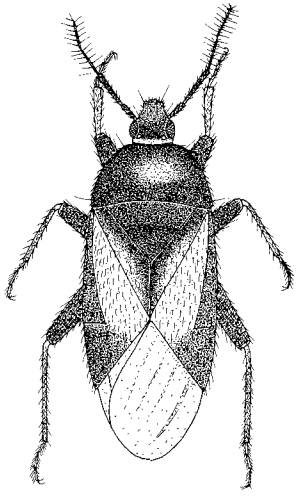
120 *X. hirtus*



121 *X. galactinus*



122 *X. umbrinus*



123 *X. cursitans*

Figs. 119–123. Adult Anthocoridae. 119, *Lyctocoris canadensis* Kelton; 120, *Xylocoris hirtus* Kelton; 121, *Xylocoris galactinus* (Fieber); 122, *Xylocoris umbrinus* Van Duzee; 123, *Xylocoris cursitans* (Fallén).

Scientific and common names of plants

Abies spp.	fir
amabilis	amabilis fir, Pacific silver fir
balsamea	balsam fir
grandis	grand fir, giant fir
lasiocarpa	alpine fir
procera	noble fir
Acer spp.	maple
platanoides	Norway maple
saccharum	sugar maple
Alnus spp.	alder
Artemisia spp.	wormwood
tridentata	common sagebrush
Athyrium filix-femina	lady fern
Betula spp.	birch
papyrifera	white birch
Carex spp.	sedge
Carya spp.	hickory
Ceanothus sanguineus	snowbrush
Chrysanthemum leucanthemum	oxeye daisy
Cornus spp.	dogwood
stolonifera	red-osier dogwood
Corylus spp.	hazelnut, filbert
Crataegus spp.	hawthorn
Cytisus scoparius	broom
Daucus spp.	carrot
Dentaria spp.	toothwort
Elaeagnus angustifolia	Russian olive
Epilobium angustifolium	fireweed
Fagus spp.	beech
Fraxinus spp.	ash
Heracleum lanatum	cow parsnip
Humulus lupulus	common hop
Juglans spp.	walnut
regia	English walnut
Larix spp.	larch
laricina	tamarack
lyallii	alpine larch
occidentalis	western larch
Lupinus spp.	lupine
Malus spp.	apple
Medicago sativa	alfalfa
Picea spp.	spruce
engelmannii	Engelmann spruce
glauca	white spruce
mariana	black spruce

Pinus spp.	pine
albicaulis	white-bark pine
banksiana	jack pine
contorta	lodgepole pine
flexilis	limber pine
monticola	western white pine
ponderosa	ponderosa pine, western yellow pine
resinosa	red pine
strobus	eastern white pine
strombiformis	southwestern white pine
sylvestris	scots pine
Populus spp.	poplar
Prunus spp.	cherry
nigra	Canada plum
persica	peach
Pseudotsuga menzesii	Douglas-fir
Purshia tridentata	antelope bush
Pyrus communis	pear
Quercus spp.	oak
rubra	red oak
Rosa spp.	rose
Rubus spp.	raspberry
loganobaccus	loganberry
Rumex spp.	dock
Salix spp.	willow
Shepherdia spp.	buffaloberry
Spiraea spp.	meadowsweet, spirea
Solidago canadensis	Canada goldenrod
Sorbus americana	American mountain ash
Tilia spp.	basswood
americana	American basswood
cordata	small-leaved basswood
Trifolium spp.	clover
pratense	red clover
Ulmus spp.	elm
Zea mays	corn

References

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