Alate viviparous females are described as follows from material taken in Nova Scotia: body yellowish-green to light brown; darker brown on sides of head and prothorax. Eyes dark red with red ocular tubercles. Femora brown; tibiae and tarsi dusky to black. Cauda, anal plate and cornicles pale yellowish green to light brown. Frontal tubercles slightly developed about even with produced vertex. Body length (1.4). Antennae (2) yellowish, with distal segmental ends brownish on III and IV; 5 oval secondary sensoria on III well spaced in proximal two-thirds of segment; hairs small (.023), well spaced and capitate; unguis (.112) and base of VI (.112). Cornicle truncate, small (.08), wider at base by nearly twice width of tip. Cauda (.11) knobbed, pale and hairy on tip. Anal plate deeply cleft, 2-lobed and hairy on tip. Rostral IV and V (.11) blunt and extending slightly beyond first coxae. Hind tarsal II (.13); hind tibia (1.3) hairy with hairs pointed and .05 long. Both fore and hind wings heavily bordered with fuscous on costal margin, stigma and wing tip; radial sector of fore wing indistinct.

No predators or parasites were encountered for this species and nothing concerning its life cycle is available. Very few ants were found in attendance.

Collections: In scattered colonies or isolated individuals on underside of leaves of *Quercus borealis* Michx. (red oak), usually along mid-rib. Very scarce in province. No significant damage produced. KINGS COUNTY, White Rock, July 23, 1948 (94). HALIFAX COUNTY, Sandy Lake, July 7, 1949 (329). LUNENBURG COUNTY, Spondu Lake, August 8, 1952 (677).

Subtribe **Panaphina**

3. *Myzocallis coryli* (Goeze)

Aphis coryli Goeze, 1778:311.
Myzocallis coryli, Davis, 1910d:419; Theobald, 1927:332; Gillette and Palmer, 1931:888; Palmer, 1952:72.

This rather small pale yellowish-green or white aphid is found quite commonly on alder and hazelnut throughout the province. It habitually locates on the underside of leaves of the host plant in scattered colonies of nymphae or as isolated alate forms. The type of infestation is very similar to that of *M. alnifoliae* and *M. bella* which is more or less common

to all the species of this genus. Likewise, they do not appear to produce extensive leaf damage to the host plant. Their numbers vary greatly from one infested host to the next; from one to a few leaves infested, to an occasional host with nearly all the leaves attacked. The infestations are, furthermore, sporadic in occurrence, only one or a few hosts in a given area being infested.

The alate viviparous female is characterized as follows from material taken in Nova Scotia. The body color varies from light yellowish-green to almost white, including extremities, with wings clear. The produced vertex extends beyond inner margins of slightly developed frontal tubercles. Body length varies from 1 to 1.5. Antennae (1.3-1.7) have distal tip of segments III-VI brown; antennal III with 3 round sensoria located near base of segment; unguis .28 and base of VI .112. Cornicles are small, truncate, pale (.04-.06); cauda knobbed (.05); anal plate bilobed (.08) with bristles on tips of cauda and anal plate. Rostrum IV and V V (.136). Hind tibia (.8-1) with hairs (.01-.02); hind tarsi (.10). Hairs on body and vertex (.02-.03). Wings and radial sector faint, media twice-branched, wings clear, not bordered with fuscous; small stigmal spot brown.

No data concerning predators, and parasites is available nor likewise concerning the life cycle of this species.

Collections: In scattered colonies or as isolated individuals on the underside of leaves of various hosts. Fairly common throughout region.

On *Alnus* B. Ehrh. spp. (alder). HALIFAX COUNTY, French Village, July 7, 1949 (328a). GUYSBOROUGH COUNTY; Melrose, July 16, 1953 (837); Country Harbour, July 17, 1953 (844); Stormont, July 17, 1953 (847.1)*; Whitehead, July 18, 1953 (857). INVERNESS COUNTY; Port Hastings, August 12, 1953 (885); Lorne, August 13, 1953 (898); Port Hood, August 14, 1953 (905); Glendale, August 15, 1953 (915).

On *Corylus cornuta* (Marsh) (hazelnut). ANTIGONISH COUNTY: Beech Hill Road, August 14, 1950 (471); September 7, 1950 (471.1)* (aphids still active). Beaver Mountain Road, August 22, 1950 (474); July 4, 1952 (626); June 5, 1953 (804). Route 4, September 7, 1950 (474.1)* (aphids still active). Fairmont Road, July 3, 1951 (474.2)*. INVERNESS COUNTY, Margaree Forks, July 17, 1951 (513). PICTOU COUNTY, Scotsburn, July 6, 1952 (635.1)*. QUEENS COUNTY, Caledonia, August 14, 1952 (700)*.

On *Ostrya virginiana* (Mill) K. Koch (hop hornbean). ANTIGONISH COUNTY, Fairmont Road, July 5, 1950 (436).

*Field observations only.

Subtribe **Panaphina**

4. *Myzocallis tiliae* (Linn.)

The Linden Aphid
Figs. 79, 80

Aphis tiliae Linnaeus, 1758:452.
Callipterus (*Eucallipterus*) *tiliae*, Davis, 1909a:33.

This species was taken on linden, listed as its normal host. The linden as recorded in *Native Trees of Canada* (1949:264) is not native to Nova Scotia. It occurs occasionally as plantings along driveways to estates or farms. Consequently, its distribution is very sporadic as well as scarce in the province. The aphid species under consideration has not been taken on any other host species, and is apparently specific to the linden. Its occurrence, therefore, in Nova Scotia is accidental and must have been brought in with the original importation of these trees. Furthermore, the host trees examined are similarly infested each year. Whether this aphid is monophagous to the linden, or has an alternate summer host, apparently is not known.

The lindens infested with this aphid were large mature trees. By mid-August practically all the leaves were so well populated on the underside that the upper surfaces of the leaves glistened from the honey-dew exudate falling on them from the aphids above. On July 16, a few alatae were first found scattered amongst the more or less isolated nymphae. By July 24, the winged forms were very plentiful as also on July 30. The alate forms were still present on August 30 and several were taken as late as September 17, when the last observation was made (Fig. 79).

Alate viviparous females are described from material taken in Nova Scotia as follows: body color yellow, with two rows of lateral brown spots on dorsum (Fig. 80). Abdominal V with an additional pair of lateral spots near side of abdomen. Legs pale, with femora and knees dark. Wings with fuscous at marginal ends of veins and along costal region, this latter forming a dark stripe along edge of fore wing which is very

distinctive even to the naked eye. Eyes are deep red, with red ocular tubercles. Lateral margins of head and thorax blackish. Vertex produced beyond slightly developed frontal tubercles. Body length (2.2); antennae (2.3); segments I, II, and III dusky; IV, V, VI with distal half dusky; 14 oval to transverse sensoria at base of III; unguis (.14), base of VI (.32). Cornicle (.08) pale, truncate and with tip oblique. Cauda (1.5) pale, knobbed; anal plate pale (.16) bilobed and both hairy on tip. Rostrum IV and V (.08) blunt. Hind tibia (.8-.9) with hairs (.02-.03) pointed; hind tarsi (.15) dusky. Body and antennae with pointed hairs (.015-.02).

No data is available concerning the complete life cycle, predators or parasites of this species. Ants are very common in attendance. Further descriptive data concerning sexuales is found in Palmer (1952:75).

Collections: In scattered colonies on the underside of leaves of *Tilia americana* Linn. (linden, basswood). Forms very active when disturbed. Not common, except on imported lindens. ANTIGONISH COUNTY: Crystal Cliffs, July 16, 1950 (448); July 24, 1950 (448.1)*, July 30, 1950 (448.2)*. Antigonish, August 30, (448.3), September 17, 1952 (704).

*Field observations only.

Subtribe **Panaphina**

5. *Myzocallis walshii* (Monell)

Fig. 176

Callipterus walshii Monell, 1879:29.
Myzocallis walshii (Monell), Hottes and Frison, 1931a:259.

These very small light yellowish aphids were found scattered along the median and radial veins on the underside of leaves of red oak. They are very similar in over-all appearance to *M. bella* (Walsh) which occurs on the same host, but differ from it in their smaller size, lighter-colored legs, and lighter-colored wings and lateral stripes. The species has only been encountered twice in the province. The hosts are not too abundant in Nova Scotia and usually are well scattered in a given region. This may be a factor in explaining this aphid's infrequent occurrence, although it was found on only a very few of all the oaks visited. Hottes and Frison (1931a:259)

state that it is quite widely distributed in Illinois and found it on a variety of oaks and on *Carya* sp. Palmer (1952) does not record its presence in Colorado.

Alate viviparous females are described from material collected in Nova Scotia as follows: body color light yellow, with lateral darker stripes on head, and thorax; body length (1.1); extremities pale yellow. Width of head through eyes (.32); eyes deep red. Frontal tubercles about equal to vertex. Antennae (1.4) serrate, with extreme tips of distal ends of segments III-VI dusky; 2-3 circular sensoria near base of III (.3); unguis (.36); base of VI (.16). Cornicle (.06) truncate, wider at base and with tip oblique. Cauda knobbed anal plate (.06) bilobed, and both with spines on tips. Rostrum IV and V (.06), blunt. Hind tarsi (.07); hind tibia (.42); hairs (.02-.025). Both pairs of wings with anterior costal margin lightly bordered with fuscous; radial sector of fore wing faint.

No data available concerning life cycle, predators and parasites. Ants often in attendance upon scattered individuals.

Collections: Scattered on underside of leaves of *Quercus borealis* Michx. (red oak). Very infrequent in occurrence. No significant damage produced. KINGS COUNTY, Wolfville, June 29, 1948 (41). QUEENS COUNTY, Caledonia, August 14, 1952 (699a).

Subtribe **Panaphina**

Genus NEOSYMYDOBIUS Baker

Baker, 1920a:32; Hottes and Frison, 1931a:261; Palmer, 1952:76.

The members of this genus are in many ways very similar to those of the genus *Myzocallis*, but differ chiefly in that these species possess a semilunar cauda, broader than long; anal plate slightly idented; body hairs simple, and spinelike. Other characters include slightly developed frontal tubercles. Antennae minutely denticulate, with small hairs, and unguis as a rule not longer than VI. (except in *annulatus*); secondary sensoria on antennal III circular or oval and present in apterae. Cornicles, minutely denticulate, truncate, broader at base than at tip, which is flanged. Wing venation normal. Forms living in colonies upon the twigs and bark of trees. Only two species taken in Nova Scotia.

Genus type (monotypical) *Symydobius albasiphus* Davis.

KEY TO THE SPECIES OF THE GENUS NEOSYMYDOBIUS

1. Unguis equal to twice or more length base of antennal VI; secondary sensoria on antennal III (17-26) circular to oval on raised base of different sizes, all along segment; wing veins heavily bordered..... .....**1. americanus**

–. Unguis about same length as base of antennal VI; secondary sensoria on antennal III (8-10) circular and located in proximal 3/4 of segment; wing veins only slightly bordered with fuscous..... .....**2. annulatus**

Subtribe **Panaphina**

1. *Neosymydobius americanus* (Baker)

The Dark Brown, Striped-Wing Birch Aphid
Fig. 41, 42, 46

Symydobius americanus Baker, 1918a:319 (desc.).
Neosymydobius americanus (Baker), Hottes and Frison, 1931a:261.

This is a rather uncommon brownish-black birch aphid but more frequent in occurrence in Nova Scotia than *N. annulatus*. The species has always been found in rather small compact colonies feeding head down on the stem of the host (Figs. 41, 42, 46). The colonies found have always been attended by numerous large black ants. At first this aphid is not easily disturbed, but then suddenly they begin to migrate up and down the stem from their original feeding position. Once disturbed they appear to have difficulty in relocating a suitable feeding position or situation. This restless type of activity is described as "fussy feeding habits." Their rather infrequent occurrence together with the rather small colonies formed on a given host, results in little visible damage to the host, other than general host debilitation in the case of severe infestation.

On the infested hosts examined, the species produced very few alate forms during July and August. Their behavior seemed to indicate rather strict host specificity, and monophagous habits. One group of colonies on a given host was examined at intervals throughout the summer and found to be still present and active by August 24 when further observations ceased. Occasionally alate forms would develop in the laboratory in a few days after collection, as was the case on July 17, 1953, but more often they would not. Alatae are

distinguished by the wing veins bordered with fuscous, which presented a rather striking contrast with the chocolate brown to black body.

Alate viviparous females are described from material taken in Nova Scotia, as follows: body (1.8) dark brown to almost black, with darker head and thorax. Eyes black with dark red ocular tubercles. Legs are dark brown; hind tibia (1.2); hind tarsus (.14). Antennae (2), with segments I and II light brown, III all dusky, IV, V, and VI with tips dusky, bases pale; III with 17-26 oval secondary, elevated sensoria of various sizes in more or less straight row; unguis (.2) the same length as base of VI. Cornicle (.07-.08) pale, truncate, wider at base and flanged. Cauda pale (.05), round, hairy on end; anal plate (.08) pale, slightly indented and hairy on end. Rostral IV and V (.15) rather blunt, dusky. Hairs on vertex (.07), on antennae (.04), on hind tibia (.06), all pointed. Wing veins, stigma, and costal region heavily bordered with fuscous; radial sector distinct. For further description of this species consult Baker (1918:319) for all forms except the male sexual.

Other than the presence of attending black ants, no predators or parasites were observed for this species. The suggestion was made above that the life cycle is possibly confined to one host.

Collections: Clustering in small compact colonies on the younger stems of birch as follows:

On *Betula lutea* Michx. (yellow birch). ANTIGONISH COUNTY, Route 7, July 24, 1951 (520), August 24, 1951 (520.1).

On *Betula papyrifera* Marsh (paper birch). ANTIGONISH COUNTY: Route 4, June 27, 1953 (818); St. Joseph's, August 22, 1950 (475).

On *Betula populifolia* Michx. (wire birch). HALIFAX COUNTY: Mill Lake, July 8, 1949 (330b); Rocky Lake, July 21, 1949 (339b). GUYSBOROUGH COUNTY, Country Harbour Valley, July 17, 1953 (846).

Subtribe **Panaphina**

2. *Neosymydobius annulatus* (Koch)

Figs. 160, 173

Chaitophorus annulatus Koch, 1854:7.

Calaphis annulata (Koch) Gillette and Palmer, 1931:901.

Neosymydobius annulatus (Koch), van der Goot, 1915; Davidson, 1917a:290; Hottes and Frison, 1931a:262; Palmer, 1952:76.

This small pale yellowish-green aphid was found in a colony of apterous and alate forms on the underside of leaves of yellow birch attended by numerous ants and apparently producing no significant damage to the host. Several trees in the same vicinity were thus infested, but the species has not been encountered since in Nova Scotia. Hottes and Frison (1931a:261) found it generally distributed throughout Illinois on *Betula pendula* (cut-leaf birch) and indicate further, that it is widely distributed in North America and Europe.

The species has questionable generic status having been placed in various genera in the past. As Palmer (1952:77) points out it "does not entirely fit *Neosymydobius*; disagreeing in the presence of more distinct frontal tubercles and longer unguis". Hottes and Frison (1931a:262) contend that "there is so little difference between this species . . . and species already placed in the genus *Neosymydobius* that we have placed it in the latter genus".

The alate viviparous female is described as follows from material taken in Nova Scotia: body color pale yellowish-green with brownish marks on head and thorax. Eyes are black with deep red ocular tubercles. Body length 1.6-1.8. Antennae (1.6) with distal three-fourths of segments III-VI dusky; serrate to slightly denticulate; antennal III (.54) with 6-10 circular sensoria in proximal three-fourths of segment; unguis (.24) longer than base (.11) of VI. Cornicle (.08) dusky and truncate; cauda dusky, and round; anal plate dusky, slightly indented. Rostral IV and V (.10-.12) almost reaching second coxae. Hind tibia (.0-1) with long pointed hairs (.06) longer than diameter of segment (.03-.04); hind tarsus (.14); pointed hairs on antennae (.02) shorter than diameter of segment (.025). Wings clear, but with veins slightly bordered with fuscous as well as long costal margin; half of radial sector faint. For further descriptions of all forms of this species consult van der Goot (1915) and Davidson (1917a: 290).

Concerning the life cycle of this species, Hottes and Frison (1931a:262) state that in Illinois apterous viviparous forms are common throughout the year. Further data on this phase of the species' biology as well as concerning its predators and parasites, is not available. Ants, however, are numerous in attendance upon their colonies.

Collections: On the underside of leaves of *Betula lutea* Michx. (yellow birch) clustered in small colonies. No significant damage produced. Rare in occurrence in Nova Scotia. KINGS COUNTY, Gaspereaux, Melanaton Road, July 9, 1948 (55).

Subtribe **Panaphina**

Genus OESTLUNDIELLA Granovsky

Granovsky, 1930:63; Palmer, 1952:78

The members of this genus are characterized by possessing antennae longer than body; antennal III of alatae and apterae with secondary sensoria subcircular. Cornicles are on mammiform base, and with enlarged distal tips. Cauda spatulate; anal plate with distinct U-shaped cleft. Distinct frontal tubercles on head. Radial sector present in fore wing. Some forms woolly. Found on leaves and twigs of trees and woody shrubs. Only one species taken in Nova Scotia.
Genus type (monotypical), *Euceraphis flava* Davidson.

Subtribe **Panaphina**

Oestlundiella flava (Davidson)

The Alder Aphid

Euceraphis flava Davidson, 1912:406 (orig. desc.), 1915:423 (desc. sexes); Knowlton, 1929a:4.
Eucalipterus flava (Davidson), Swain, 1919:20.
Oestlundiella flava (Davidson), Gillette and Palmer, 1931:903; Palmer, 1952:78.

This fragile delicate appearing aphid was found on the underside of leaves of alder in rather dense colonies. The alatae are woolly over dorsum. Body color pale yellow, with lateral areas of abdomen dusky. Cornicles dark brown and on mammiform bases (.10) with enlarged oblique distal tip. Cauda pale and spatulate shaped. Anal plate with shallow U-shaped cleft. Appendages dusky with segmental distal ends and tarsi black. Wings clear with slightly tinted stigma.

Apterous oviparae are yellow with dark brown spots arranged in two longitudinal rows on dorsum; otherwise similar to alatae. For more complete descriptions with figures, consult Gillette and Palmer (1931:903) or Palmer (1952:78).

The species has been taken in California on *Alnus rhombifolia* by Davidson (1915:423) who also states that sexes appear in October, eggs being laid in November at the axils of new buds. Hatching occurs in April when fundatrix appears. Palmer (1952:79) reports taking it from three species of *Alnus* spp. in Colorado. Despite the fact that Alder is a very common shrub throughout Nova Scotia, and has been examined many times, this species has been taken but once in August, 1948. Not much concerning the life cycle is available at this writing, and nothing concerning predators or parasites.

Collections: On underside of leaves of *Alnus* sp. B. Ehrh. (alder). KINGS COUNTY, North Mountain Lookoff, August 23, 1948 (72p).

Tribe *PANAPHINI*

Subtribe **Phyllaphina** Palmer

Phyllaphidina Baker, 1920a:35.
Phyllaphina Palmer, 1952:59.

The members of this subtribe are characterized by having cornicles which are mere rings on low conical base. Frontal tubercles underdeveloped; antennae 6-segmented, with transverse secondary sensoria; unguis shorter than base of VI. Cauda knobbed or semilunar; anal plate bilobed. Wing venation normal. Oviparae are often alate. Forms living free or in pseudo-galls; often covered with flocculence.

KEY TO THE GENERA OF THE SUBTRIBE PHYLLAPHINA

1. Anal plate deeply cleft and U-shaped (Not taken in region). **Shivaphis**
–. Anal plate entire or somewhat bilobed, not deeply cleft. 2
2. Cauda rounded, anal plate entire (Not taken in region). . . . **Tamalia**
–. Cauda knobbed, anal plate somewhat bilobed (Fig. 179) (p. 143) . . . . . **Phyllaphis**

Subtribe **Phyllaphina**

Genus PHYLLAPHIS Koch

Phyllaphis Koch, 1857:248.

The species of this genus possess cornicles which are chitinized rings on conical bases. Forms with normal wing venation;

cauda knobbed; and anal plate slightly divided. Antennae 6-segmented, slender, minutely setose, with narrowly oval sensoria. Living on foliage, occasionally causing leaf curl. Males alate; females apterous.

Genus type (monotypical), *Aphis fagi* L.

Subtribe **Phyllaphina**

Phyllaphis fagi (Linn.)

Figs. 73, 158, 179

Linnaeus, 1767:735; Swain, 1919:13; Theobald, 1927:391.

In Nova Scotia this species has been found to occur only on beech. The apterae and nymphae, especially, produce a large quantity of white flocculent waxy wool-like material which passes well beyond the ends of their bodies and makes them appear much larger than they really are. These flocculent colonies occur on the underside of the leaves (Fig. 73) causing them to shrivel or turn light yellow and die. The heaviest infestation was found in Southern Halifax County in 1949. Theobald states that the alatae are subject to much variation, some have dark abdominal spots only, others have the bands almost confluent. Both Swain (1919) and Theobald (1927) give good descriptive accounts of this aphid.

Collections: On underside of leaves of *Fagus grandifolia* (Ehrh.) (beech). HALIFAX COUNTY, Kearney Lake, July 20, 1949; CAPE BRETON, New Harris, July 16, 1951; ANTIGONISH COUNTY, 1950-1953. Only moderately abundant (334).

Tribe *PANAPHINI*

Subtribe **Pterocommina** Baker

Baker, 1920a:35; Palmer, 1952:104.

The members of this subtribe are characterized by possessing cornicles which are more or less elongate, cylindrical, swollen or clavate, and usually not reticulated and if imbricated, only slightly so near apex. Ocular tubercles are present; lateral tubercles on the prothorax and abdomen well developed; frontal tubercles underdeveloped. Body and extremities covered with prominent hairs. Anal plate entire; cauda semilunar. Usually found feeding on the bark of deciduous trees. Only one genus represented in Nova Scotia.

Subtribe **Pterocommina**

Genus PTEROCOMMA Buckton

Pterocomma Buckton, 1879:142; Baker, 1920a:36 (synonymy); Palmer, 1952:104.
Plocamaphis Oestlund, 1922:122.
Clavigerus Szepligeti, Baker, 1920a:89; Hottes and Frison, 1931a:165.

The members of this genus possesses 6-segmented antennae, shorter than body, with pointed hairs longer than diameter of segment on which they occur; sensoria subcircular. Cornicle cylindrical to swollen with flange. Cauda semi-lunar; anal plate entire. Body and extremities conspicuously hairy. Normal wing venation; wings clear. Lateral and ocular tubercles present. Usually found feeding on bark of *Populus* or *Salix*. Only one species found in Nova Scotia.

Genus type (monotypical), *Pterocomma pilosa* Buckton.

Subtribe **Pterocommina**

Pterocomma populifoliae (Fitch)

The Reddish-Brown Poplar Aphid
Figs. 130, 152, 155, 177

Aphis populifoliae Fitch, 1851:66.
Clavigerus populifoliae (Fitch), Hottes and Frison, 1931a:165.
Pterocomma populifoliae (Fitch), Baker, 1916a:280; Gillette Palmer, 1931:933; Palmer, 1952:108; MacGillivray and Spicer, 1953: 429.

A small colony of this reddish-brown poplar aphid was found feeding on the bark of large-toothed aspen. Both alate and apterous forms were present and the whole aggregation was attended by numerous ants. This species was found once in August 1948 and has never been encountered since during four summers of subsequent collecting.

The apterous forms are reddish brown with whitish markings between intersegmental lines. The cornicle is slightly swollen on distal two-thirds, with apical flange; non-reticulated, and only very slightly imbricated near distal end; longer than unguis. Cauda semilunar; anal plate entire. Antennal III with or without a few circular sensoria; the number varying on right or left segments. Body hairs fine and numerous. Alate forms are similar to apterae. Wings are clear. For

more complete descriptions with figures and measurements, consult Gillette and Palmer (1931:933) and Palmer (1952:108).

No predators or parasites were observed in this colony; however, MacGillivray and Spicer (1953:429) in New Brunswick list two species of braconids as parasitizing *Clavigerus populifoliae* (Fitch) which is here considered as a synonym.

Collections: On bark of *Populus grandidentata* (Michx.) (large-toothed aspen). KINGS COUNTY, Sunken Lake Road, August 3, 1948 (115p).

Subfamily APHINAE

Tribe *THELAXINI* Baker

Baker, 1920a:20.

This tribe is characterized by forms having 5-segmented antennae with terminal filament shorter than base of antennal VI, somewhat setose and with oval sensoria; cornicles present as mere ring on shallow hairy cones; cauda distinctly knobbed or semicircular; rounded anal plate; stout spines or hairs on body; oviparous females usually laying solitary egg.

KEY TO THE GENERA OF THE TRIBE THELAXINI

1. Cauda distinctly knobbed (Not taken in region)..... **Thelaxes**
–. Cauda not knobbed, rather semicircular (p. 146)..... **Glyphina**

Tribe *THELAXINI*

Genus GLYPHINA Koch

Glyphina Koch, 1857:259; Theobald, 1929:77.
Travaresiella Del Guercio, 1911:299.

Characters as given for tribe and in addition: fore wing with media once-branched; hind wing with media only; cauda and anal plate rounded, never knobbed; body hairy, antennae minutely setose with subcircular sensoria; rostrum rather long and acuminate. Living on foliage and more or less gregarious.

Genus type (monotypical), *Geyphina betulae* Kalt.

Tribe *THELAXINI*

Glyphina alni (Schrank)

The Alder Aphid

Aphis alni Schrank, 1801:107.
Vacuna betulae Kaltenbach, 1843:177.
Vacuna alni Passerini, 1863:83.
Glyphina betulae Koch, 1857:260.
Thelaxes betulina Buckton, 1883:17.
Thelaxes alni Schouteden, 1906:137.
Glyphina alni Del Guercio, 1900:84; Theobald, 1929:77.

The forms are somewhat variable as to color, younger nymphs being lighter green, gradually turning to black. The abdomen is marked by four white pulverulent areas, the posterior pair sometimes uniting to form one large patch. Apterous forms are dark to olive green, sometimes brown or even bright green, marked by two white broad bars on each side, the posterior pair being the larger. Apterae appear dark green, with head and thorax dark brown or black with two white patches of pulverulence on each side of abdomen. Character descriptions and figures are given by Theobald (1929:77).

Collections: Found only once on stem and leaves of *Alnus* sp. B. Ehrh. (alder). KINGS COUNTY, Sunken Lake Road, August 3, 1948 (112p). Though this alder is very common throughout the province, this aphid has not been taken since this date.

Family **APHIDAE**

Subfamily ERIOSOMATINAE Kirkaldy

Kirkaldy, 1905:418.

Because of the degree of specialization exhibited in this subfamily there is a difference of opinion as to its status. Essig (1942:329) gives it family status whereas Baker (1920a: 62) and Palmer (1952:347) assign it to a subfamily. It is most generally thought of as a subfamily of the Aphidae and will be so treated here. Baker (1920a:62) gives an interesting account of the probable evolutionary relationships which exist in this subfamily and to its closely allied forms in the subfamily Hormaphinae and tribe Thelaxini. He bases his argument chiefly upon the premise that the "sexual forms give a

true understanding of the relationships" which exist between the genera of this subfamily and other closely allied tribes. In this subfamily the sexes are very small, apterous, and with atrophied mouth parts being unable to feed; the oviparous female laying but a single egg. In the closely related tribes Hormaphini and Thelaxini, sexual females have normally developed ovaries and lay sexual eggs.

In other respects the subfamily shows specializations largely by reduction: fore wing with media once-forked or simple; hind wing may show loss of cubitus; rostrum only four-segmented; with V rudimentary; terminal filament of antennae shorter than base of VI; cornicle either absent or reduced to chitinized rings slightly elevated on shallow hairy cones; cauda semilunar and inconspicuous; variation in eye, three-faceted in fundatrix, rudimentary in summer apterae, and compound in alatae. Many of the species produce galls, pseudo-galls, leaf rolls, excrescences, and other types of malformations on the host plant; these traits, however, are also found in other tribes, but are more of a parallelism than any indication of relationship. The primary hosts are usually woody shrubs or trees; secondary hosts are grasses, annuals and perennials; roots as well as other parts of these plants being infested.

KEY TO TRIBES OF SUBFAMILY ERIOSOMATINAE

(Modified after Baker 1920a:65)

1. Cornicles present, always in alatae; often mere rings.....2
–. Cornicles absent.....3
2. Living in pseudo-galls (Fig. 81), galls, or free; sensoria annular nearly encircling segment in alatae (Fig. 135) wax glands developed (p. 149) ..... **Eriosomatini**
–. Usually living in true galls (Figs. 54, 58), sensoria narrow, transverse, somewhat oval or irregular or absent in alatae; wax glands poorly developed (p. 152)..... **Pemphigini**
3. Living in true galls or pseudo-galls.....4
–. Living in ant nests or are subterranean; antennae of alatae short and thick; sensoria oval; (Not found in region)..... **Fordini**
4. Antennae with annular sensoria living in true galls; wax plates poorly developed on head and thorax (Not found in region)..... ..... **Melaphini**
–. Antennae of alatae long and slender, with narrow oval or rounded sensoria; wax plates well developed on head, thorax (Fig. 146), (p. 155)..... **Prociphilini**

Subfamily ERIOSOMATINAE

Tribe *ERIOSOMATINI* Baker

Baker, 1920:65; Palmer, 1952:347.

Most of the members of this tribe are formed on elms living in galls, pseudo-galls, or free on roots, limbs or leaves, usually forming excrescences; secondary sensoria on antennal III annular; cornicles distinct and with wax glands present.

KEY TO THE GENERA OF THE TRIBE ERIOSOMATINI
(Modified after Baker, 1920a:65)

1. Fore wing with media once-branched..... 2
–. Fore wing with media simple....(Forms not taken in region)
2. Hind wings with both media and cubitus present (Figs. 123, 126); antennae 5-segmented; cornicle inconspicuous (p. 149). **Eriosoma**
–. Hind wings with only media present; antennae 4-segmented; cornicle distinct (Not taken in region)..... **Gobiashia**

Tribe *ERIOSOMATINI*

Genus ERIOSOMA Leach

Eriosoma Leach, 1818:60; Baker, 1920a:66 (synonymy); Davidson (J.), 1925:101; Palmer, 1952:349.

Forms with six-segmented antennae in summer viviparae; five-segmented in fundatrix and sexuals; annular secondary sensoria. Rounded cauda and anal plate; cornicles on mammiform base as distinct rings. Media of fore wing branched once; hind wing normal. Viviparae with wax glands.

Genus type (monotypical), *Aphis lanigera* Hausmann.

KEY TO THE SPECIES OF THE GENUS ERIOSOMA
(Modified after Palmer, 1952:349).

1. Antennal III shorter than segments IV, V and VI together in alate and apterous forms. (Found in rolled leaves of *Ulmus americana* or on roots and leaves of *Amelanchier* sp.).....1. **americanum**
–. Antennal III same or longer than segments IV, V and VI together in alatae and apterous forms (Fig. 135).....2
2. Antennal VI usually without annular secondary sensoria; sensoria on V, 4-6. (Found in leaf clusters or rosettes on elms). **3. lanigerum**
–. Antennal VI usually with annular secondary sensoria; sensoria on IV 6-9; on V, 6-10. (Never causing leaf clusters; found on lower sides of branches of hawthorn in dense flocculent colonies)...**2. crataegi**

Tribe *ERIOSOMATINI*

1. *Eriosoma americanum* (Riley)

The Woolly Elm Leaf-Rolling Aphid

Schizoneura americanum Riley, 1879:4; Patch, 1913b:268.

Eriosoma americanum, Patch, 1915a:197; Maxson, 1923:313; Gillette and Palmer, 1934:211; Palmer, 1952:349.

This species is very close to *E. lanigerum*, but is separated according to Patch (1913b:269) and Palmer (1952:349) in having antennal "III typically shorter than IV, V and VI"; also it "inhabits the roll or curl type of leaf deformation on *Ulmus americana*". *E. lanigerum* inhabiting curled terminal leaf-clusters or rosettes on the elm.

The apterous summer viviparae of this species are found on *Amelanchier* sp. and are light pink and woolly in appearance. The alate viviparae also occur on this host, being dark green to slateblack, woolly and with extremities black, similar to the alate viviparae on elm. Good descriptions of this species are found in Patch (1913b:268) and Palmer (1952:349).

Collections: Only one sample found, on summer host, *Amelanchier Wiegandii* Niels (wild pear). ANTIGONISH COUNTY, North Shore Road, July 12, 1950 (444). Not common.

Tribe *ERIOSOMATINI*

2. *Eriosoma crataegi* (Oestlund)

Fig. 126

Schizoneura crataegi Oestlund, 1887:27.

Eriosoma crataegi, Baker, 1915:15; Hottes and Frison, 1931a:351; Gillette and Palmer, 1934:211; Heriot, 1938: Feb. 16; Cox 1939:477; Palmer, 1952:350.

This species was taken on September 17, 1952 from the same host from which, on June 10, 1952, *Aphis crataegifoliae* Fitch was found. The colony was clustered around the stem of the host plant and was conspicuous because of the large amount of white flocculent or woolly secretion present.

The apterous forms appeared dark gray with brown appendages, the woolly substance extending in two long filaments from the end of the abdomen. The dorsum was covered with a compact granular flocculence, flat white in color. Alate forms appeared dull black with cottony-like projections.

Hottes and Frison (1931a:351) point out the difference between this species and the closely allied *E. lanigerum*, which is characterized by a flocculent secretion in "long, silken, fluffy threads and often a bluish white, whereas in this species *E.* crataegi the flocculent secretion is more granular, compact and chalky white in color". Palmer (1952:350) describes and gives figures for the forms of this species.

Collections: On stem of *Crataegus monogyna* Jacq. (english hawthorn). ANTIGONISH COUNTY, Antigonish, September 17, 1952 (703).

Tribe *ERIOSOMATINI*

3. Genotype *Eriosoma lanigerum* (Hausmann)

The Woolly Apple, Elm Rosette Aphid
Fig. 81, 82, 123, 135, 161, 183

On apple:

Aphis lanigera Hausmann, 1802:440.
Schizoneura lanigera, Gillette, 1908d:306 and 1915a:100; Patch, 1913b:264 and 1916:330; Baker, 1915:1; Maxson, 1915:367.
Eriosoma lanigerum, Beckner, 1918:3; Simms, 1927; Marchal, 1928:1; Theobald, 1929:275; Hori, 1930:35; Gillette and Palmer, 1934:210; Heriot, 1938:Feb. 16; Cox, 1939:477; Palmer, mer, 1952:351.

On Elm:

Schizoneura americana Riley, (Misidentification); Gillette, 1898: Fig. 32.
Schizoneura lanigera, Patch, 1913b:264 and 1916:329.
Eriosoma lanigerum, Gillette and Palmer, 1934:210; Palmer, 1952: 351.
Eriosoma rosetti, Gillette (in List and Gillette), 1936:3 (nomen nudum).
Eriosoma crataegi, (Oestlund), Heriot, 1938:Feb. 16.

The woolly apple aphid is common in central and north central Nova Scotia. It is present on *Ulmus americana* in June through the middle of July and sometimes as late as the end of August. Many collections have been made on apple of *Aphis pomi*, but none of *Eriosoma lanigerum*. The important discovery that *E. lanigerum* migrates to apple in spring

and early summer from leaf clusters or leaf rosettes on elm was first brought to general attention by Patch (1913b:264), whose observations have since been confirmed by numerous studies by others. Since apple is very common in Nova Scotia, *E. lanigerum's* occurrence on apple should be expected to occur. A very thorough biological and morphological study of this species has been worked out by Baker (1915).

Typical leaf damage caused by this species results in rather tight leaf curls or rosettes (Fig. 81). The upper surface of the attached leaf turns lighter yellow and swells outward in the area of discoloration. Entire clumps of young terminal leaves may be so infested resulting in over-all debilitation of the elm host. The alatae and apterous summer viviparae are pinkish to reddish brown, darker on tip of abdomen; covered with fluffy waxy secretions (Fig. 82).

Collections: On *Ulmus americana* L. (american elm) in curled terminal leaf-clusters or rosettes. KINGS COUNTY, Wolfville, June 23, 1948 (32); ANTIGONISH COUNTY, Antigonish, July 8, 1950 (437a, b), June 18, 1951 (500), June 16, 1953 (808), August 26, 1953 (925.1).

Subfamily ERIOSOMATINAE

Tribe *PEMPMIGINI* Baker

Baker, 1920a:68; Palmer, 1952:354.

The members of this tribe are true gall formers; usually alternating between hosts during the summer; alate forms have six-segmented antennae with linear, oval or irregular sensoria; cornicles are distinct. Sexual forms show some degeneration being small, beakless and apterous; oviparous forms somewhat specialized; laying but a single egg. Mostly found on *Populus* sp. Baker (1920a:69) lists seven genera under this tribe of which only *Pemphigus* is represented in this paper with two species. Palmer (1952:354) appears to combine the genera of the tribe Prociphilini (Baker, 1920a:75) with the tribe Pemphigini. However, Baker's tribal divisions will be followed here.

Tribe *PEMPHIGINI*

Genus PEMPHIGUS Hartig

Hartig, 1839:645; 1841:366; Jackson, 1908a:163; Baker, 1920a: 71; Maxson, 1923:326; Palmer, 1952:358.

The members of this genus have fore wings with media simple; both media and cubitus present in hind wing antennae 4-segmented in stem mother; 6-segmented in alatae; sensoria usually transverse or irregular; cornicles developed in alatae as mere rings; cauda semilunar. Sexuals are small, apterous and beakless; ovipara develop single egg. Baker (1920a:71) discusses the problem in synonomy for this genus and summarizes with Palmer (1952:358) the genus characters.

Genus type (fixed by Passerini, 1860), *Aphis bursaria* Linn.

KEY TO THE SPECIES OF THE GENUS PEMPHIGUS

(Modified after Palmer, 1952:359, and based on alatae from galls).

1. Antennal III longer than IV and V; secondary sensoria somewhat coalesced, 4-5 on IV; in petiole leaf galls (Fig. 54) on upper surface of *Populus* sp. ..... **1. junctisensoriatus**
–. Antennal III equal to or shorter than IV and V; secondary sensoria distinct, not coalesced, 2-5 on IV; in cockscomb-like gall on leaf upper-surface (Fig. 58) of *Populus* sp. ..... **2. populi-venae**

Tribe *PEMPHIGINI*

1. *Pemphigus junctisensoriatus* Maxson

The Poplar Petiole-leaf Gall Aphid

Figs. 54, 55

Pemphigus junctisensoriatus Maxson, 1934:34; Gillette and Palmer, 1934:223; Palmer, 1952:361.

These aphids were found inside a gall formed mostly from the petiole and partially from the upper surface of the leaf near the base (Fig. 54). One stem mother with immaturae were usually found inside each gall (Fig. 55), together with several predaceous larvae (Syrphidae) which were fast reducing the number of aphids.

Alatae obtained are characterized as follows: head and thorax blackish with green to yellow green abdomen, somewhat powdery; secondary sensoria transverse, raised, somewhat coalesced and nearly encircling the segment; cornicles discernable as small pore. The nymphs were light yellowish-green and appeared to be somewhat underdeveloped or generally vestigal in character.

The gall was pale yellowish-green tinged with reddish spots and seemed to be composed mostly of the distal part of the petiole together with the upper surface of the central part of the leaf base; the whole structure twisted and swollen. The exit hole was not too evident, but appeared to be a slit or crevice extending between the petiole and the leaf.

Collections: on *Populus balsamifera* Linn. (balsam poplar) in petiole-leaf galls on upper surface of leaf. ANTIGONISH COUNTY, Fairmont Road, June 28, July 3, 5, 1951 (502). Not common in region.

Tribe *PEMPHIGINI*

2. *Pemphigus populi-venae* Fitch

The Poplar-vein Gall Aphid
Figs. 58, 124

Pomphigus populi-venae Fitch, 1859:851; Thomas, 1879:154; Jackson, 1908a:194; Maxson and Knowlton, 1929:264; Gillette and Palmer, 1934:228; Palmer, 1952:365.

This species forms a cockscomb-like gall, greenish-yellow to reddish in color, along the mid-rib on the upper surface of the leaves of balsam poplar (Fig. 58). The gall is located generally nearer the central part of the leaf in contrast to the gall of *P. junctisensoriatus* near the leaf base. The exit hole is slitlike and located on underside of leaf beneath gall next to mid-rib.

Alatae taken had blackish heads and thorax with light green abdomen and brown extremities. Fore wing venation reduced, media simple. Nymphae in gall, pale yellowish-green and somewhat vestigial in character.

Hottes and Frison (1931a:368) records this species from Illinois, on *Populus deltoides*; Palmer (1952:365) from Colorado on *Populus augustifolia.* Palmer gives a brief description of the alate and fundatrix with figures. The only detailed description with synonomy is found in Maxson and Knowlton (1929: 264).

Collections: In cockscomb-like galls on upper leaf surfaces of *Populus balsamifera* Linn. (balsam poplar) as probable winter host. RICHMOND COUNTY, C. B., Loch Lomond, July 11, 1951 (508). Common on this host in this area.

Subfamily ERIOSOMATINAE

Tribe *PROCIPHILINI*

The members of this tribe differ from those of the Pemphigini and Eriosomatini chiefly in the complete absence of cornicles and their replacement with large wax areas. Found living in pseudogalls, crumpled or twisted leaves; fundatrix with 5-segmented antennae; alatae with 6-segmented antennae with transverse to oval sensoria.

KEY TO THE GENERA OF THE TRIBE PROCIPHILINI
(Modified after Baker, 1920a:75)

1. Fore wing with media once-branched; fundatrix without wax plates (p. 155)..... **Asiphum**
–. Fore wing with media simple; fundatrix with several rows of wax plates, on thorax well developed (p. 158)..... **Prociphilus**

Tribe *PROCIPHILINI*

Genus ASIPHUM Koch

Koch, 1856:246; Gerstaecker, 1859:249 (type fixation); Baker, 1920a:75; Theobald, 1929:217; Palmer, 1952:354.

Baker (1920a:75) discusses the synonomy for this genus and together with Palmer (1952:354) summarizes the genus characters, which largely appear above under tribal summary and in key to genera. Forms live in pseudo-galls or crumpled leaves of host.

Genus type (fixed by Gerstaecker, 1859), *Aphis populi* Fabricius (syn. *tremulae* DeGeer).

KEY TO THE SPECIES OF THE GENUS ASIPHUM
(Modified after Palmer 1952:355).

1. Hairs inconspicuous, equal to or shorter than diameter of antenna; fore wing clear..... 2
–. Hairs conspicuous, longer than diameter of antenna; fore wing smoky..... 3. **sacculi**
2. Hind tibia equal to 3 times antennal III; hind tarsal II of alatae almost two times as long as antennal IV..... 2. **rosettei**
–. Hind tibia shorter than 3 times antennal III: hind tarsal II of alatae shorter than 1½ times antennal IV..... 1. **pseudobyrsum**

Tribe *PROCIPHILINI*

1. *Asiphum pseudobyrsum* (Walsh)

The Poplar Leaf-purse Aphid

Brysacrypta pseudobyrsa Walsh, 1862:306.
Pemphigus pseudobyrsa, Oestlund, 1887:24.
Schizoneura populi, (misidentification) Gillette, 1908e:1.
Asiphum pseudobyrsa, (Gillette, 1914a:269; Hottes and Frison, 1931a:348; Gillette and Palmer, 1934:217; Palmer, 1952:355.

This species was found feeding on leaf petioles and on the undersides of leaves of trembling aspen, causing the leaves to bend around on themselves forming a type of pseudo-gall, or to cause adjacent leaves to become more or less held together in a type of leaf canopy. Alate and apterous forms were present with many exuviae, together with numerous ants in attendance.

Gillette (1914a:269) gives good descriptions (also Palmer, 1952:355) of the known forms and interesting observations concerning some of their habits. The fundatrix inhabits a small almond-shaped pseudo-gall on the midrib of the leaf. The young nymphs leave this structure and migrate to the lower side of the leaf where they feed along the main leaf veins, some becoming covered with a white flocculence. The fundatrigeniae (second generation alatae) leave the poplar and migrate to an unknown summer host. From the age of the colony it is probable that our specimens are the second generation alate viviparae, finding them just previous to migration to summer host.

The alate viviparae are dull black with some flocculence on abdomen; appendages yellow; wings clear with dark line bordering subcostal vein and media branched once or simple.

Collections: On petioles and underside of leaves of *Populus tremuloides* Michx. (trembling aspen), or in pseudo-galls of same. ANTIGONISH COUNTY, Fairmont Road, July 5, 1950 (443). Infrequent in occurrence.

Tribe *PROCIPHILINI*

2. *Asiphum rosettei* Maxson

The Aspen Rosette Aphid

Fig. 74

Asiphum rosettei Maxson, 1934:40; Gillette and Palmer, 1934: 218; Palmer, 1952:355.

This species has been found only once in the counties studied in Nova Scotia. It is peculiar in the kind of damage produced, causing the leaves to clump together forming a kind of protective canopy over the aphid colony (Fig. 74). This infestation was that of an older colony judging by the number of exuviae. Mostly apterous in form but a few alatae present, apparently migrating to unknown summer host. Several separate apterous colonies were scattered over the same host plant chiefly on leaf petioles, alatae tended to be located on underside of adjacent leaves; also found on a few nearby trees of the same species.

Palmer (1952:356) reports that this species feeds on petioles and leaves of host "causing leaves to be bent backward at base and stunting stems so as to form a rosette (fundatrix feeds on petiole and fundatrigeniae on unexposed side of leaves)". Her descriptions do not mention the woolly and waxy appearance of this species (Fig. 74), perhaps because balsam mounted specimens were described. Detailed descriptions and figures of this species are given in Gillette and Palmer (1934:218) and Palmer (1952:355).

Collections: Found only once in counties studied on *Populus tremuloides* Michx. (trembling aspen) feeding on petioles and underside of leaves, forming loose rosette of clumped leaves. ANTIGONISH COUNTY, Fairmont Road, July 3, 1950 (428).

Tribe *PROCIPHILINI*

3. *Asiphum sacculi* Gillette

The Aspen Leaf-Pocket Aphid
Figs. 56, 57

Asiphum sacculi Gillette, 1914b:65; Gillette and Palmer, 1934:217; Palmer, 1952:356.
Pemphiglachnus kaibabensis Knowlton, 1938a:264.

This gall-forming aphid is relatively rare in the counties of Nova Scotia studied, found only twice in two different locations in Antigonish County on aspen poplar (Fig. 56). In the Fairmont Road region one small tree was studied over a period of three summers. Each year in late June or early July this same tree was infested with this leaf-pocket gall. None of the adjacent poplars observed in the same region were so infested. Unfortunately when the region was revisited on the fourth

summer, the plot had been cleared with the resultant end of the observations on this tree. Gillette (1914b:66), the original describer of this species, reports that "all the young of the fundatrix, the second generation, become winged and leave the galls". He also reports finding the two empty galls near the half-way house, Pike's Peak. If this species has a summer alternate host which is unknown, and which is implied in Gillette's comments, how is it possible to find this same leaf-pocket gall on the same host in three consecutive summers, and not find it on any nearby aspens?

From the facts at hand it appears that the species is monophagous, and if so, would account for the observations given. The fact that Gillette found some empty galls, does not necessarily imply that they have migrated. Syrphid larvae predators have been observed in some galls opened, which by this means could dispose of the contained aphids.

Specimens of this species were at first verified by M. E. MacGillivray as *A. rosettei*, her determination being based solely on alatae in balsam. Upon further comparison with Gillette's *A. sacculi* (1914b:65, figs. 10-14) and figures 56 and 57 in this paper, there is little doubt that the species is *A. sacculi* Gillette. His description of the fundatrix and nymphs fits these specimens as does also the peculiar leaf-pocket gall.

The fundatrix is very large, oval and dull gray and pulverulent. The nymphs have a dark olive green abdomen and gray head and thorax, the abdomen being white tipped on five lateral tufts along the abdominal margins, and with intersegmental darker bands transversely placed across the dorsum. The wings of the alate second generation are slightly smoky; head and thorax blackish, abdomen dark olive-green.

Collections: In leaf-pocket pseudo-galls on *Populus tremuloides* Michx. (trembling aspen). ANTIGONISH COUNTY, Fairmont Road, July 4, 1950 (429); June 28, 1951 (501); June 26, 1952 (501); West River Road, July 30, 1952 (652).

Tribe *PROCIPHILINI*

Genus PROCIPHILUS Koch

Koch, 1856:279; Tullgren, 1909:74; Baker, 1920a:76; Palmer, 1952:366.

This genus is characterized as follows: fore wings with media unbranched, hind wings normal. Fundatrix with 5-

segmented antennae; 5-6 segmented in summer apterae; 6-segmented in alatae. No cornicle; cauda semilunar, with 4 to several hairs. Wax glands large, well developed. Hairs variable from sparse and fine, to equal in length of diameter of segment on which they occur. Sexes undeveloped, small and beakless. Oviparous females lay single egg. Found living in pseudo-galls, usually fundatrix and nymphs together. *P. venafuscens* on bark). Baker (1920a:76) discusses synonomy in the genus and together with Palmer (1952:366) summarize genus characters.

Genus type (fixed by Gerstaecker, 1859) *Aphis bumeliae* Schrank.

KEY TO THE SPECIES OF THE GENUS PROCIPHILUS

(Modified after Palmer (1952:366) and based on alatae from pseudo-galls).

1. Secondary sensoria on antennal V 0-4; hind tibia with hairs sparse, not equal to diameter of tibia. (in pseudo-galls of loosely curled leaves (Fig. 63) ..... **1. corrugatans**
–. Secondary sensoria on antennal V absent (in fundatrigenia), hind tibia with numerous hairs, longer than diameter of tibia (on bark of host) (Fig. 65) ..... **2. venafuscus**

Tribe *PROCIPHILINI*

1. *Prociphilus corrugatans* (Sirrine)

The Woolly Hawthorn Aphid
Figs. 63, 64, 147

Pemphigus corrugatans Sirrine, 1893:129.
Prociphilus alnifoliae Williams, 1910:7; Davis, 1911b:4.
Prociphilus corrugatans, Maxson, 1923:322 (synonomy); Gillette and Palmer, 1934:230; Palmer, 1952:366.

Several colonies of this aphid were found on a young hawthorn with both alate and apterous forms on the underside of the leaf and causing a rather tight leaf roll or pseudo-gall, which was colored a dark purplish-red. Many large black ants were inside the gall when opened. The material kept well in a paper carton and was taken to the laboratory and photographed by strobe light (Fig. 63, 64).

The nymphs were light olive-green, elongate oval in shape, and marked by tufts of woolly flocculence protruding laterally from each abdominal segment. A single row of large woolly

tufts protruded dorsally from the prothorax and thorax, dividing into two rows of smaller dorsal tufts over the dorsum of abdomen. Alate forms with head and thorax dark green; abdomen olive-green and flocculent with dark appendages. Palmer (1952:366) describes the fundatrix as "light greenish-yellow, black on head; woolly; appendages black".

Collections: In curled leaves, pseudo-galls, of *Crataegus macrosperma* var. *acutibola* (Sarg.) Eggl. (hawthorn) which is thought to be the winter host. Summer host unknown. Not common in region. ANTIGONISH COUNTY, Jimtown, July 6, 1953 (831).

Tribe *PROCIPHILINI*

2. *Prociphilus venafuscus* (Patch)

The Smoky-Winged Ash Aphid
Figs. 65, 66, 119, 146, 180

Pemphigus venafuscens Patch, 1909:319 (original description).
Prociphilus venafuscus Baker, 1916:1118 (synonomy); Patch, 1919:45; Maxson, 1923:323; Hottes and Frison, 1931a:373; Gillette and Palmer, 1934:232; Palmer, 1952:368.

The winter host of this aphid, white ash, occurs from Cape Breton and generally throughout the Province. It will thrive on a wide range of sites, but makes its best growth on a deep, well-drained soil along streams and on lower slopes in protected situations, where it is found scattered or in small groups among other hardwoods. It never forms pure stands. Very often it is planted in farm yards as a shade tree. The relatively isolated occurrence of this tree may account for the few occasions it has been found infested with this aphid, plus the fact that by the end of June or first part of July it leaves the ash and migrates to the roots of its summer host, *Abies balsamea*, according to Patch (1918:45), and Maxson (1923:323). It has not been taken on these roots in this region as yet.

Swain (1919:146) reports its presence on the leaves (not bark) of ash (winter host) in San Francisco Bay region, and (according to Wilson, 1915a:85) on roots of douglas fir in Oregon as summer host. Gillette and Palmer (1934:233) have found it in Colorado on the bark of *Fraxinus pennsylvanica* as winter host, but not on summer host. Hottes and Frison (1931a:373) indicate its rare occurrence in Illinois having found but a single fall migrant. Patch (1909:319)

who first described the species, points out that the fall migrants are found on lilac and elm as well as ash. Sexual forms are produced on these hosts and winter eggs deposited. Spring forms occur in the region of "the angles of the twigs or about the swelling buds "of lilacs and ash.

This rather large brown aphid was first found in an extensive compact colony a foot or more in length along the stem of an isolated ash in a farm yard, adjacent to an apple orchard in Kings County (July 2, 1948). Only apterous forms were present, but alatae developed later in the laboratory. The colony is characterized by its compactness, extensive amount of white woolly flocculence and waxy secretion produced (Fig. 65). The species was not encountered again until June of 1951 in Antigonish County, Cape George area, on an isolated host planted as a shade tree. Each June thereafter (1952-53) this same ash was so infested until about the end of the first week in July.

The fundatrix is medium brown with intersegmental rows of tufted flocculence, three rows extending along the dorsum, and one on each lateral margin of the abdomen (Fig. 66). Alate forms are darker brown, flocculent and with extremities nearly black. The wings smoky, veins narrowly bordered and body slightly longer than fundatrix. Apterae similar to fundatrix. Complete descriptions are given by Patch (1909: 319) and Palmer (1952:368); Baker (1916:1118) discusses synonomy as well as giving descriptions and notes on this species.

Collections: On bark near terminal branches and new buds of *Fraxinus americana* Linn. (white ash), winter host; summer host, roots of *Abies balsamea* (Linn) Mill. (Not taken on latter host in Nova Scotia). KINGS COUNTY, Porter's Point, July 2, 1948 (48). ANTIGONISH COUNTY, Cape George, June 28, 1951 (503); June 23, 1953 (814).

Family **APHIDAE**

Subfamily HORMAPHINAE Gillette and Palmer

Hormaphidinae Baker, 1920a:81.
Hormaphinae Gillette and Palmer, 1934:241; Palmer, 1952:376.

The members of this subfamily are characterized by having wings with reduced venation; media of fore wing simple or oncebranched; cubitus and anal veins often fused near

base; hind wing with cubitus often absent. Frontal tubercles and thoracic lobes lacking. Cornicle mere ring or absent. Scalelike or aleyrodiform generations often occur. Sexuales small and apterous. Living in galls or free on leaves of host.

KEY TO THE TRIBES OF SUBFAMILY HORMAPHINAE

1. Aleyrodiform generations not developed. (Not taken from this region..... **Oregmini**
–. Aleyrodiform generations developed.....2
2. Cornicles absent; insects usually gall formers (Plates IX A, B) (p. 162)..... **Hormaphini**
–. Cornicles usually present; insects usually not gall formers; (Not taken from this region).....**Cerataphini**

Subfamily HORMAPHINAE

Tribe *HORMAPHINI* Gillette and Palmer

Hormaphidini Baker, 1920a:83.
Hormaphini Gillette and Palmer, 1934:242; Palmer, 1952:377.

The members of this tribe are separated from the other tribes of this subfamily in that the cornicles are absent and aleyrodiform generations are developed. Wax is secreted from special glands, secondary sensoria annular; cauda knobbed and anal plate bilobed. Two genera are represented in Nova Scotia.

KEY TO GENERA OF TRIBE HORMAPHINI

1. Antennae of alatae 3-segmented (Fig. 133); hind wing with only media (p. 163).....**Hormaphis**
–. Antennae of alatae 5-segmented; hind wing with both media and cubitus (p. 162).....**Hamamelistes**

Tribe *HORMAPHINI*

Genus HAMAMELISTES Shimer

Shimer, 1867:284; Baker, 1920a:83; Palmer, 1952:378.

Genotype *Hamamelistes spinosus* Shimer

Figs. 49, 50, 51

Hamamelistes spinosus Shimer, 1867:284; Pergande, 1901:25; Hottes and Frison, 1931a:375; Gillette and Palmer, 1934:242; Palmer, 1952:378.

Purplish-black apterous and alate forms were found in dense colonies on the underside of leaves of the host, *Betula papyrifera* Marsh (Fig. 49). This same species was taken on *Hamamelis virginiana* Linn. It was found by Pergande (1901:25) to alternate in its life history between the same two hosts, i.e., witch-hazel and birch. The overwintering eggs are laid on witch-hazel in the spring or early summer and do not hatch until the following spring, at which time the stem mothers bud-galls of spiny appearance on witch-hazel (Figs. 50, 51). An overwintering coccidiform generation is also known to occur on birch, and their offspring produce the common corrugations or pseudo-galls between the lateral veins of birch leaves (Fig. 49). The winged migrants produced on the birch return to witch-hazel in late spring and produce the sexual generation.

Collections: On underside of leaves of *Betula papyrifera* Marsh, (paperbirch), PICTOU COUNTY, Scotsburn, July 6, 1952 (643). On underside of leaves of *Hamamelis virginiana* Linn., (witch-hazel). CUMBERLAND COUNTY, Collingwood, July 7, 1952 (642).

Tribe *HORMAPHINI*

Genus HORMAPHIS Osten-Sacken

Osten-Sacken, 1861:422; Sanborn, 1904:17; Baker, 1920a:84; Hottes and Frison, 1931a:376.

Hormaphis hamamelidis (Fitch)

Figs. 51.1, 51.2, 51.3, 116, 133, 182

Brysocrypta hamamelidis Fitch, 1851:69.

Hormaphis hamamelidis (Fitch); Perganda, 1901:25; Baker, 1920a: 84; Hottes and Frison, 1931a:376.

This small gall-forming aphid was found on practically all *Hamamelis virginiana* Linn. (witch-hazel) in the vicinity of Halifax and Sackville, Halifax County. The upper leaf surface was covered with small cone-shaped galls (Fig. 51.1), red and yellowish-green in color, which projected upward from the leaf surface. Alatae, apterae and nymphs were taken from within these galls.

The rather complicated life history of this species was worked out by Pergande (1901). The egg stage overwinters on witch-hazel, hatching into stem mothers in the spring which

cause the formation of these conical galls on the upper surface of the leaves. The second generation produced in these galls (Fig. 51.3) are alate and migrate to birches (as did *H. spinosus*) in late spring or early summer. These alate migratory forms produce "aleurodiform" generations on the birch. By late summer the aleurodiform generations produce alatae which migrate back to witch-hazel and then produce sexual forms that lay the eggs which overwinter.

Collections: On *Hamamelis virginiana* Linn., (witch-hazel) in region of Halifax and Sackville, HALIFAX COUNTY, August 9, 1949 (355). Common in this area. None taken from alternate host, *Betula* spp. (birch).

Family **APHIDAE**

Subfamily MINDARINAE Baker

Baker, 1920a:61.

Characters described below under genus Mindarus.

Subfamily MINDARINAE

Genus MINDARUS Koch

Koch, 1856:277; Baker, 1920a:62; Theobald, 1929:318; Palmer, 1952:346.

This genus is characterized by having the radial sector of the fore wing arising at the proximal end of stigma; media is only once-branched; stigma long and tapering, reaching to tip of wing; hind wing with both media and cubitus present. Frontal tubercles lacking; vertex slightly convex. Antennae 6-segmented; unguis shorter than base of VI; secondary sensoria oval to transverse. Cornicles mere rings; cauda small, elongate, not semilunar. Rostrum obtuse, V indistinct. Sexulaes small, and apterous with functional beaks; oviparae without tibial sensoria; lay 8-9 eggs. Forms living free upon twigs of conifers, causing curling of needles.

Genus type (monotypical), *Mindarus abietinus* Koch.

Subfamily MINDARINAE

Mindarus abietinus Koch

The Balsam Twig Aphid
Figs. 12, 13, 14, 15, 110, 144

Mindarus abietinus Koch, 1856:277; Patch, 1910a:242; Theobald, 1929:318; Gillette and Palmer, 1934:242; Palmer, 1952:346.
Schizoneura pinicola Thomas, (1879:137).

These aphids feed between the needles of the host along the growing meristems of *Abies balsamea* (Fig. 14), producing so much flocculence that it appears like a covering of snow on the light green new growth of the stem tips (Fig. 12). The young needles are caused to curl and remain malformed until they drop off (Fig. 13). In most cases only apterous forms were present, but alatae were produced in the laboratory in about three days after collections.

On *Picea glauca* this same aphid feeds at the base of the needles on the stem near the distal end of growing branches, producing whittish flocculent masses encasing droplets of honey-dew exudate (Fig. 15). Other than general debilitation of host as result of feeding, it does not appear to produce any curling of needles as it does on *Abies balsamea*, perhaps because of the greater rigidity of the spruce needles, nor has the spruce been as heavily infested with this aphid as the fir. Usually by mid-July these aphids have migrated from both spruce and fir to some other host, though specimens have been taken on spruce and fir as late as mid-August.

The fundatrix of this species is pale yellow with dusky lateral areas and woolly secretion posteriorly. Alate viviparous forms have a brown head and thorax with pale greenish abdomen, marked by dusky dorsal dashes and covered with flocculence. For further descriptive data on all forms consult Theobald (1929:318) and Palmer (1952:346).

Collections: On growing meristem of *Abies balsamea* (L) Mill. (balsam fir). HALIFAX COUNTY: Kearney Lake, June 24, 1949 (310); Hammond Lake, June 28, 1949 (312); Sandy Lake, June 29, 1949 (319); Sheldrake Lake, August 30, 1949 (354); Fletcher's Lake, August 12, 1949 (346.1). ANTIGONISH COUNTY: Beech Hill Road, June 14, 1950 (407), June 16, 1950 (409), June 21, 1950 (411), June 30, 1950 (409), June 15, 1951 (409), July 2, 1952 (617). Culington Forks, June 24, 1950 (413-415); Beaver Mountain Road, June 24, 1950 (417); Fairmont Road, July 3,

1950 (409); Lochaber (10 miles east), July 4, 1953 (829); Route 7, August 9, 1950 (465); Route 4, June 27, 1953 (816); North Shore Road, July 11, 1950 (409). GUYSBOROUGH COUNTY: Sloane Lake, July 27, 1951 (409); Larry's River, July 18, 1953 (855). PICTOU COUNTY, Sunnybrae, July 28, 1951 (409). RICHMOND COUNTY: Port Hastings, August 13, 1951 (409); Grand River, past St. Peter's, July 11, 1951 (407). INVERNESS COUNTY: Glendale, August 14, 1951*; East Lake Ainslee, August 15, 1951*. VICTORIA COUNTY: Aspee River Valley, August 17, 1951*; Bay St. Lawrence, August 17, 1951*; Neil Harbour, August 17, 1951*; Dingwall, August 17, 1951*.

On young stems of *Picea glauca*, (white spruce). HALIFAX COUNTY: Route 2, August 12, 1949 (346.1); Fletcher's Lake, August 12, 1949 (346.1); Fairmont Road, July 4, 1950 (431.1 and 432); Hammond Lake, June 28, 1949 (313). ANTIGONISH COUNTY: Fairmont Road, June 26, 1952 (616); Jimtown, July 4, 1952 (830).

*Field observations only.

PART III

HOST PLANT LIST

This list includes all host plants recorded in connection with the foregoing descriptions of the aphids collected in the regions of Nova Scotia herein treated. The identifications of the plants were made with the assistance of the following botanical works: Roland, A. E. (1944-45); MacDonald, D. A. (1949); Preston, R. J., Jr. (1848); Bailey, L. H. (1942); and Dore, W. G. and A. E. Roland (1942).

The host determinations were checked by various students and members of the department of biology of Acadia University, Wolfville, N. S. where exists the best and most extensive herbarium in the Maritime Provinces.

Abies balsamea (L) Mill. (Balsam Fir)
Mindarus abietinus (Koch)

Acer Pensylvanicum L. (Striped Maple)
Eriosoma lanigerum (Hausmann)

Acer rubrum L. (Red Maple)
Drepanaphis spp. Del Guercio
Drepanaphis parvus (Smith)
Periphyllus americanus (Baker)
Periphyllus lyropictus (Kesslar)
Periphyllus testudinacea (Fernie)

Acer saccharinum L. (Silver Maple)
Drepanaphis acerifolii (Thomas)
Periphyllus americanus (Baker)
Periphyllus lyropictus (Kessler)

Acer saccharum Marsh (Sugar Maple)
Drepanaphis utahensis (Knowlton and Smith)
Periphyllus americanus (Baker)
Periphyllus testudinacea (Fernie)

Achillaea Millefolium L. (Yarrow)
Macrosiphum frigidae (Oestlund)
Macrosiphum ludovicianae (Oestlund)

Aesculus Hippocastanum L. (Horse chestnut)
Periphyllus americanus (Baker)

Alnus spp. B. Ehrh. (Alder)
Drepanaphis acerifoliae (Thomas)
Glyphina alni (Shrank)
Myzocallis alnifoliae (Fitch)
Myzocallis coryli (Goeze)
Oestlundiella flava (Davidson)

Amelanchier Wiegandii Niels. (Wild Pear)
Aphis cerasifoliae (Fitch)
Aphis crataegifoliae (Patch)
Eriosoma americanum (Riley)
Mindarus abietinus Koch (Possibly a stray)
Rhopalosiphum fitchii (Sanderson)

Anaphalis margaritacea (L.) (Pearly Everlasting)
Macrosiphum ambrosiae (Thomas)
Macrosiphum erigeronensis (Thomas)

Aralia nudicaulis L. (Wild Sarsaparilla)
apterous only

Arctium minus (Hill.) Benth. (Common Burdock)
Aphis fabae Scopoli (Aphis rumicis (L.))
Macrosiphum spp.

Aster spp. (Tourn.) L. (Aster)
Macrosiphum ambrosiae (Thomas)
Macrosiphum erigeronensis (Thomas)
Macrosiphum rudbeckiae (Fitch)

Aster umbellatus Mill. (Tall White Aster)
Macrosiphum ambrosiae (Thomas)
Macrosiphum rudbeckiae (Fitch)

Barbarea vulgaris R. Br. (Sweet Rocket)
Rhopalosiphum pseudobrassicae (Davis)

Betula alba L. (Birch)
Euceraphis betulae (L)
Euceraphis gillettei Davidson

Betula lutea Michx. (Yellow Birch)
Aphis maculatae (Oestlund)
Calaphis betulaecolens (Fitch)

Euceraphis betulae (L.)
Euceraphis deducta Baker
Euceraphis gillettei Davidson
Myzocallis spp.
Neosymydobius annulatus (Koch)
Neosymydobius americanus (Baker)

Betula papyrifera Marsh. (White, Paper or Canoe Birch)
Aphis pomi (DeGeer)
Calaphis betulaecolens (Fitch)
Euceraphis betulae L.
Euceraphis gillettei Davidson
Hamamelistes spinosus (Shimer)
Neosymydobius americanus (Baker)

Betula populifolia Michx. (Wire Birch)
Calaphis betulaecolens (Fitch)
Euceraphis betulae (L.)
Euceraphis deducta Baker
Euceraphis gillettei Davidson
Neosymydobius americanus Baker

Chenopodium album L. (Lamb's Quarters, Pigweed)
Hyalopterus atriplicis (L.)

Cirsium (Tourn) L. spp. (Thistle)
Aphis cardui (L.)

Comptonia peregrina (L) Coulter (Sweet Fern)
Cepegilletea myricae (Patch)

Corylus cornuta Marsh (Hazelnut)
Myzocallis alnifoliae (Fitch)
Myzocallis coryli (Goeze)

Cornus stolonifera Michx. (Red Osier Dogwood)
Aphis L. spp.
Aphis helianthi Monell
Aphis neogillettei Palmer

Crataegus macrosperma var. *acutibola* (Hawthorne) (Sarg.) Eggl.
Amphorophora crataegi (Monell)
Myzus cerasi (Fab.)
Prociphilus corrugatans (Sirrine)

Crataegus monogyna Jacq. (English Hawthorn)
Aphis crataegifoliae Fitch
Eriosoma crataegi (Oestlund)

Daucus carota L. (Wild Carrot, Queen Anne's Lace)
Toxopera aurantii (Fonse) (Errant to Daucus)

Diervilla Lonicera Mill. (Bush Honeysuckle)
apterous only

Epilobium angustifolium L. (Fireweed)
Aphis oenotherae Oestlund

Erigeron L. spp. (Fleabane)
Macrosiphum ambrosiae (Thomas)

Eupatorium maculatum L. (Joe Pye Weed)
Macrosiphum ambrosiae (Thomas)

Eupatorium perfoliatum L. (Boneset)
Macrosiphum solanifolii (Ashmead)

Fagus grandifolia Ehrh. (Beech)
Euceraphis betulae (Koch)
Euceraphis gelletei Davidson
Phyllaphis fagi (L.)

Fraxinus americana L. (White Ash)
Periphyllus testudinacea (Fernie)
Prociphilus venafuscus (Patch)

Galeopsis Tetrahit L. (Hemp Nettle)
Capitophorus ribis (L.)

Hamamelis virginiana L. (Witch-hazel)
Hamamelistes spinosus (Shimer)
Hormaphis hamamelidis (Fitch)

Helianthus tuberosus L. (Artichoke)
Aphis cardui L.

Hieracium (Tourn.) L. spp. (Hawkweed)
Macrosiphum rudbeckiae (Fitch)

Hieracium floribundum Wimm. and Grab. (King Devil)
Kakima purpurascens (Oestlund)
Macrosiphum Passerini spp.
Macrosiphum erigeronensis (Thomas)
Macrosiphum solanifolii (Ashmead)

Hieracium scabum Michx. (Rough Hawkweed)
Macrosiphum rudbeckiae (Fitch)

Impatiens capansis Meerb. (Spotted Touch-me-not)
Macrosiphum sp. apterous only

Kalmia angustifolia L. (Sheep Laurel, Lambskill)
apterous only

Larix laricina (DuRoi) Koch. (Tamarack, Larch, Hackmatack)
Cinara laricis (Hartig)
Mindarus abietinus (Koch)

Lathyrus japonicus Willd. (Wild Pea)
Macrosiphum solanofolii (Ashmead)

Lupinus (Tourn.) L. (Lupine)
Macrosiphum albifrons (Essig)

Malus pumila L. (Apple)
Aphis pomi (DeGeer)

Matricaria matricarioides (Pineapple Weed) (Less.) Porter
Rhopalosiphum maidis (Fitch)

Myrica pensylvanica (Loisel) (Bayberry)
Aphis L. spp.

Oenothera biennis L. (Common Evening Primrose)
Macrosiphum pseudorosae Patch

Ostrya virginiana (Mill.) K. Koch. (Hop Hornbean)
Myzocalis coryli (Goeze)

Parthenocissus quinquefolia (L.) Virginia Creeper, Planch. (Boston Ivy)
Aphis folsomii (Davis)

Picea glauca (Moench) Voss (White Spruce)
Chermes abietis L. (Adelgid)
Chermes lariciatus Patch (Adelgid)
Chermes similis (Gillette) (Adelgid)
Cinara curvipes (Patch)
Cinara laricis (Hartig)
Cinara palmerae (Gillette)
Cinara piceicola (Cholodkovsky)
Cinara pinicola (Kaltenbach)
Cinara thatcheri Knowlton and Smith
Mindarus abietinus (Koch)

Picea mariana (Mill.) BSP (Black or Bog Spruce)
Cinara palmerae (Gillette)

Pinus resinosa Ait. (Red Pine)
Eulachnus rileyi (Williams)

Pinus Strobus L. (White Pine)
Cinara strobi (Fitch)

Poa spp. (Grass)
Amphorophora nebulosa (H. and F.)
Macrosiphum granarium (Kirby)

Populus balsamifera L. (Balsam Poplar)
Chaitophorus populleus G. & P.
Pemphigus junctisensoriatus (Mason)
Pemphigus populi-venae (Fitch)

Populus grandidentata (Large-toothed Aspen) (Michx.)
Chaitophorus populifoliae (Davis)
Periphyllus populicolus (Thomas)
Pterocomma populifoliae (Fitch)

Populus tremuloides Michx. (Trembling Aspen)
Amphorophora sonchi (Oestlund)
Aphis maculatae Oestlund
Asiphum pseudobrysum (Walsh)
Asiphum rosettei Maxson
Asiphum sacculi Gillette
Chaitophorus populifoliae (Oestlund)
Periphyllus populicolus (Thomas)
Pterocomma populifoliae (Fitch)

Prunus pensylvanica L. (Pin Cherry)
Aphis cerasifoliae Fitch
Myzus cerasi (Fabricius)
Myzus persicae (Sulzer)

Prunus virginiana L. (Choke Cherry)
Aphis cerasifoliae Fitch

Pryus (Aronia) spp. (Chokeberry)
apterous only

Quercus borealis Michx. (Red Oak)
Myzocallis bella (Walsh)
Myzocallis walshii (Monell)

Rosa L. spp. (Wild Rose)
Capitophorus fragifolii (Cockerrell)
Macrosiphum rosae (L.)

Rosa florabunda (Cultivated Rose)
Macrosiphum rosae (L.)
Macrosiphum solanofolii (Ashmead)

Rubus L. spp. (Raspberry, Blackberry)
Amphorophora rubi (Kaltenbach)
Amphorophora rubicola (Oestlund)
Cerosipha rubifolii (Thomas)

Rumex crispus L. (Curled Dock)
Aphis fabae Scopoli

Salix (Tourn.) L. spp. (Willow)
Aphis saliceti (Kaltenbach)
Chaitophorus populifoliae Davis

Sambucus canadensis L. (Common Elder)
Aphis sambucifoliae (Fitch)

Sambucus pubens Michx. (Red-berried Elder)
Aphis sambucifoliae (Fitch)

Scirpus (Tourn.) L. spp. (Bulrush)
apterous only

Senecio Jacobaea L. (Ragwort, Stinking Willie)
Aphis cardui L.
Macrosiphum rudbeckiae (Fitch)
Macrosiphum valerianae (Clarke)
Rhopalosiphum spp. Koch

Solidago L. spp. (Golden-rod)
Macrosiphum ambrosiae (Thomas)
Macrosiphum erigeronensis (Thomas)
Macrosiphum rudbeckiae (Fitch)

Sonchus (Tourn.) L. (Sow Thistle)
Amphorophora sonchi (Oestlund)

Spiraea latifolia Borkh. (Meadow-sweet, Hardhack)
Aphis spiraephila (Patch)
Macrosiphum Passerini spp.

Spiraea tomentosa L. (Steeplebush)
apterous only

Tilia americana L. (Linden, Basswood)
Myzocallis tiliae (L.)

Trifolium pratense (L.) (Red Clover)
Macrosiphum pisi (Kaltenbach)

Ulmus americana L. (American Elm)
Eriosoma lanigerum (Hausmann)

Ulmus Montana (Imported Elm)
apterous only

Vaccinium (L.) spp. (Blueberry)
Cinara Curtis spp.
Mindarus abietinus Koch (Errant to Vaccinium)

Viburnum alnifolium (Marsh) (Hobble Bush)
Aphis viburniphila Patch

Viburnum cassinoides L. (Withe-rod, Wild Raisin)
Aphis viburniphila Patch

Zea Mays (Cultivated Corn)
Rhopalosiphum maidis (Fitch)

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ILLUSTRATIONS

FOREST APHIDAE OF NOVA SCOTIA

PLATE I

(12). Young stem tips of balsam fir, *Abies balsamea* (Linn.) Mill, infested with the aphid, *Mindarus abietinus* Koch, resulting in a cottony or snowy appearance, causing twisting or curling of new needles. Beech Hill Road, Antigonish County, June 16, 1950. (409)

(13). Shows the effect of the 1950 infestation of the aphid, *Mindarus abietinus* Koch, causing curly needles. The 1951 growth on tips of *Abies balsamea* (Linn.) Mill is normal. Sunnybrae, Pictou County, July 28, 1951. (601.2)

(14). A young twig of balsam fir, *Abies balsamea* (Linn.) Mill, infested with the aphid, *Mindarus abietinus* Koch, feeding along the stem. Route 4, 2 mi. S. W. Antigonish, Antigonish County, June 27, 1953. (816)

(15). Young branch of white spruce, *Picea glauca* (Moench) Voss, infested with the aphid, *Mindarus abietinus* Koch, showing flocculence and drops of honey dew produced by this stem feeding aphid. Jimtown, Antigonish County, July 5, 1953. (830)

(16). The bow-legged fir aphid, *Cinara curvipes* (Patch), feeding at the region of new growth on the stem of white spruce, *Picea glauca* (Moench) Voss. Both alate and apterous forms of this large bronze aphid are present. Beaver Mountain Road, Antigonish County, July 4, 1952. (624)

(17). The spotted spruce aphid, *Cinara palmerae* (Gillette), feeding on the top most axillary branches of a young white spruce, *Picea glauca* (Moench) Voss, attended by a large red ant. Gillis Lake, Cape Breton County, C. B., July 12, 1951. (509)


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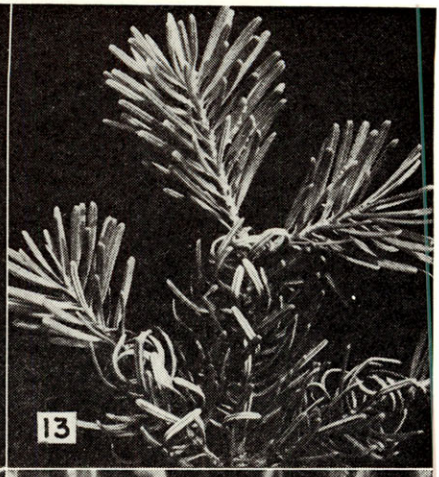
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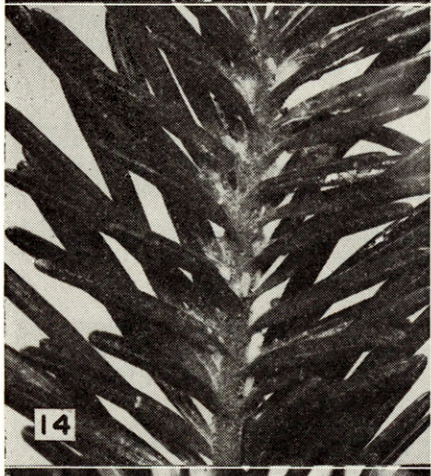
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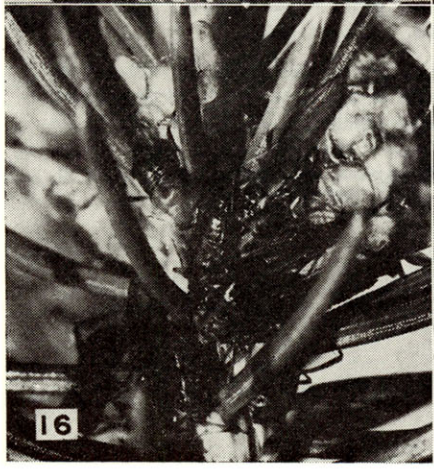
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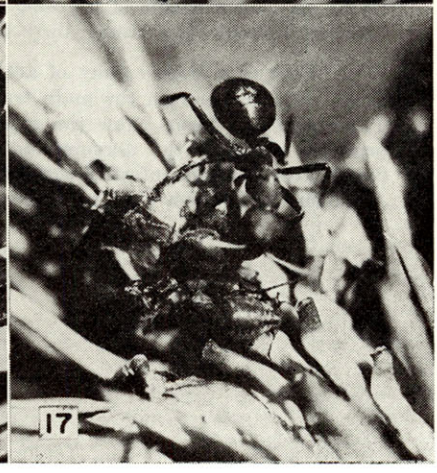
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PLATE II

(18). Part of a large dense colony of black apterous spotted spruce aphids, *Cinara palmerae* (Gillette), feeding on a stem below the needles with their heads pointing downward. The colony extended over a foot along the main stem of a young swamp or black spruce, *Picea mariana* (Mill) B.S.P. New Harbour, Guysborough County, July 17, 1953. (849)

(19). A young terminal stem tip of white spruce, *Picea glauca* (Moench) Voss, infested with the dark brown to greenish spruce aphid, *Cinara piceicola* (Cholodkovsky), attended by large black ants. Port Hastings, Cape Breton, August 12, 1953. (887)

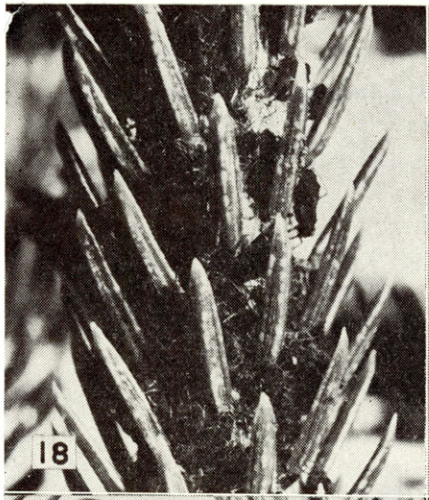
(20). Apterous forms of the larch aphid, *Cinara laricis* (Hartig), are seen feeding on the stem of the larch host, *Larix laricina* (DuRoi) Koch, attended by ants. Port Hood, Cape Breton, August 14, 1953. (900)

(21). A stem mother and young of the larch aphid, *Cinara laricis* (Hartig) seen feeding on a mature stem of the larch host, *Larix laricina* (DuRoi) Koch. West River Road, Antigonish County, June 29, 1950. (412b)

(22). Apterous forms of the powdery pine needle aphid, *Eulachnus rileyi* (Williams), are seen lined up in typical fashion along a needle of a young red pine, *Pinus resinosa* Ait. East Chester, Lunenburg County, July 18, 1955. (1052)

(23). One alate form of the powdery pine needle aphid, *Eulachnus rileyi* (Williams), on a needle of a young red pine, *Pinus resinosa* Ait. East Chester, Lunenburg County, July 18, 1955. (1052)

(24). Part of a large colony of active white pine aphids, *Cinara strobi* (Fitch) can be seen on the main trunk of the host, *Pinus strobus* Linn. These apterous forms show the typical black metallic color with white pruinose spots on the dorsum and three pairs of lateral white spots. Small trees, heavily infested with this aphid, may be seriously injured. Jimtown, Antigonish County, August 21, 1953. (919)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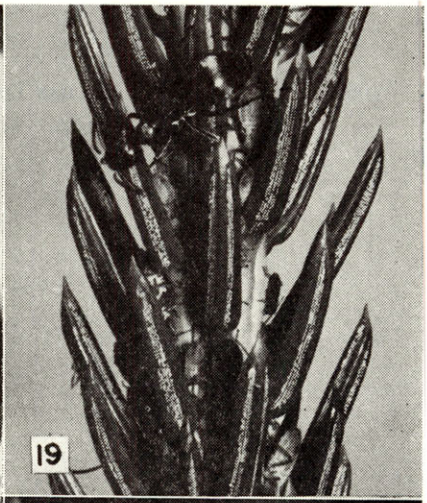
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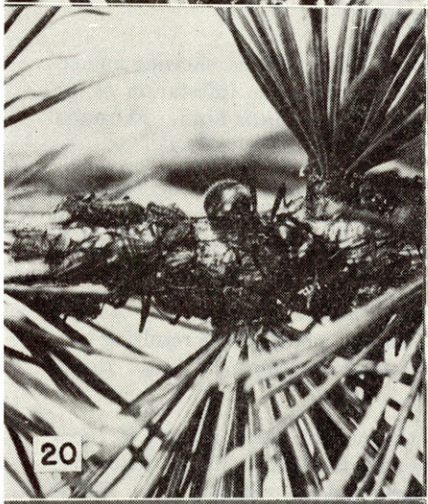
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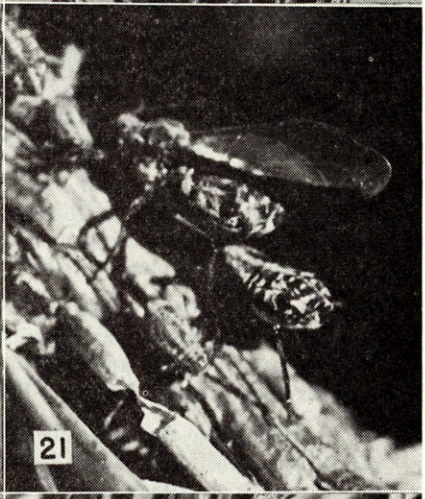
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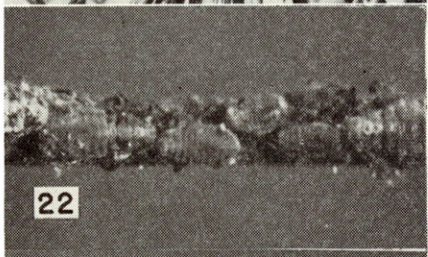
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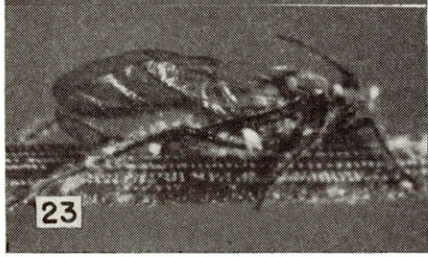
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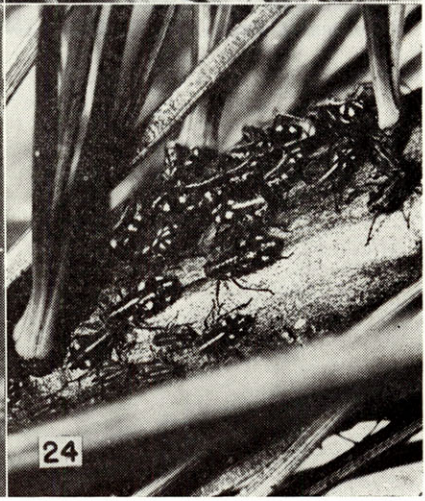
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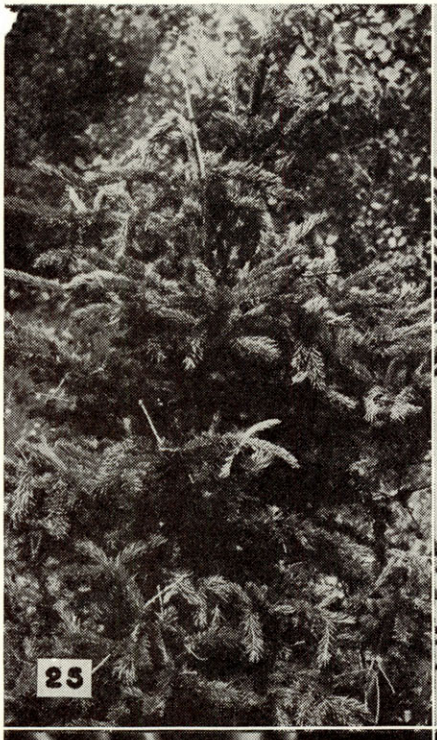
PLATE III

(25). Young white spruce, *Picea glauca* (Moench) Voss, showing numerous dead twigs and malformed growth caused by an infestation of the eastern spruce gall adelgid (Aphidoidea), *Adelges abietis* Linn. Fairmont Road, Satation 3, Antigonish County, June 28, 1951. (464.1)

(26). Growing stem tips of *Picea glauca* (Moench) showing cone-like or pineapple galls formed by the fusion of the basal portion of the needles as a result of the infestation of *Adelges abietis* Linn. West River Road, Antigonish County, August 9, 1950. (464)

(27). One gall of the eastern spruce gall adelgid (Aphidoidea), *Adelges abietis* Linn. illustrating the fusion of swollen needle bases resulting in a cone-like or pineapple-shaped gall on *Picea glauca* (Moench) Voss. Route 7, Antigonish County, August 9, 1950. (464)

(28). Three loose terminal galls on the current year's growth of *Picea glauca* (Moench) Voss, caused by the adelgid, *Adelges similis* (Gillette), which appear to attack the white spruce alone. Sloane Lake, Guysborough County, July 27, 1951. (526)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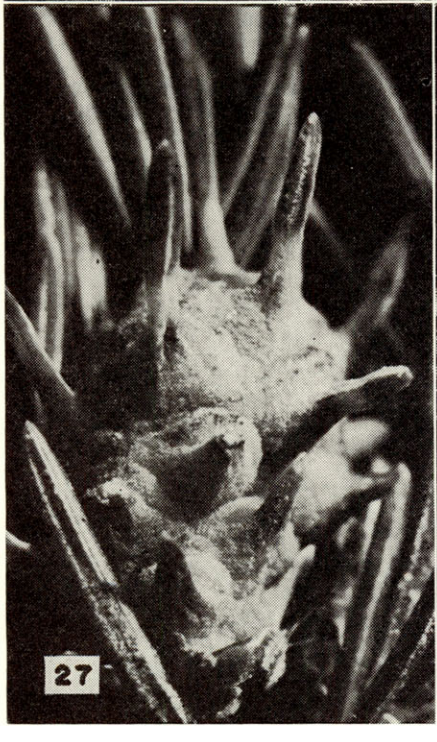
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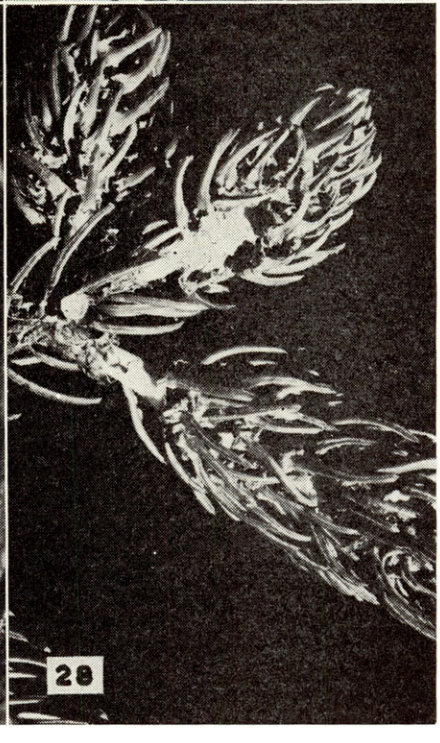
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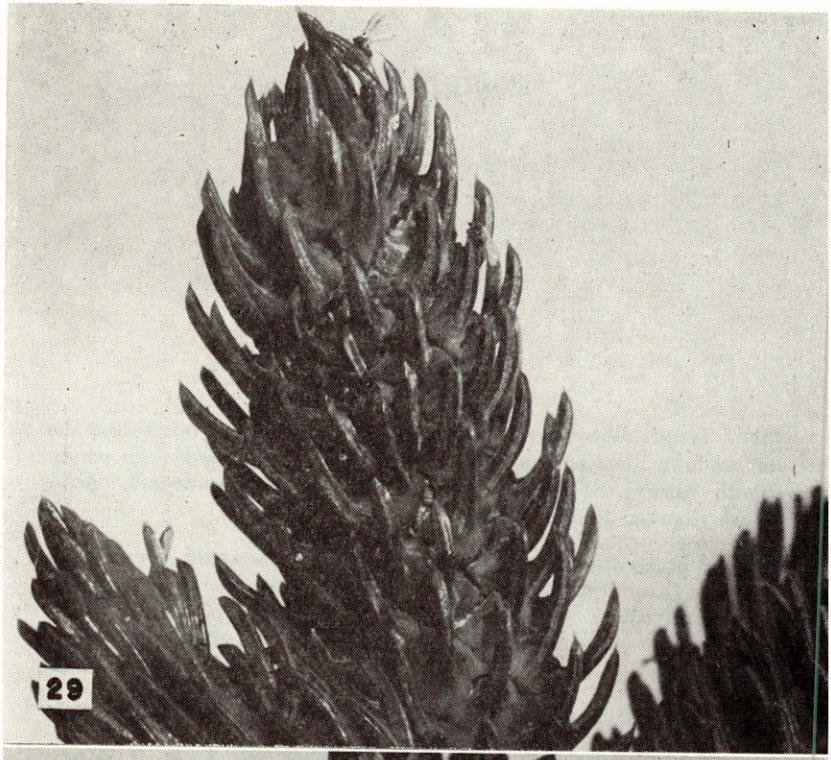
PLATE IV

(29). A growing terminal shoot of white spruce, *Picea glauca* (Moench) Voss, heavily infested with the gall-forming adelgid, *Adelges similis* (Gillette). Winged forms can be seen emerging through the breaks in the needle bases. Walden, Lunenburg County, July 19, 1955. (1063)

(30). A cross section of the gall in Fig. 29, showing many apterous forms of this adelgid arranged concentrically in small lacunae at the swollen bases of the needles. (1063)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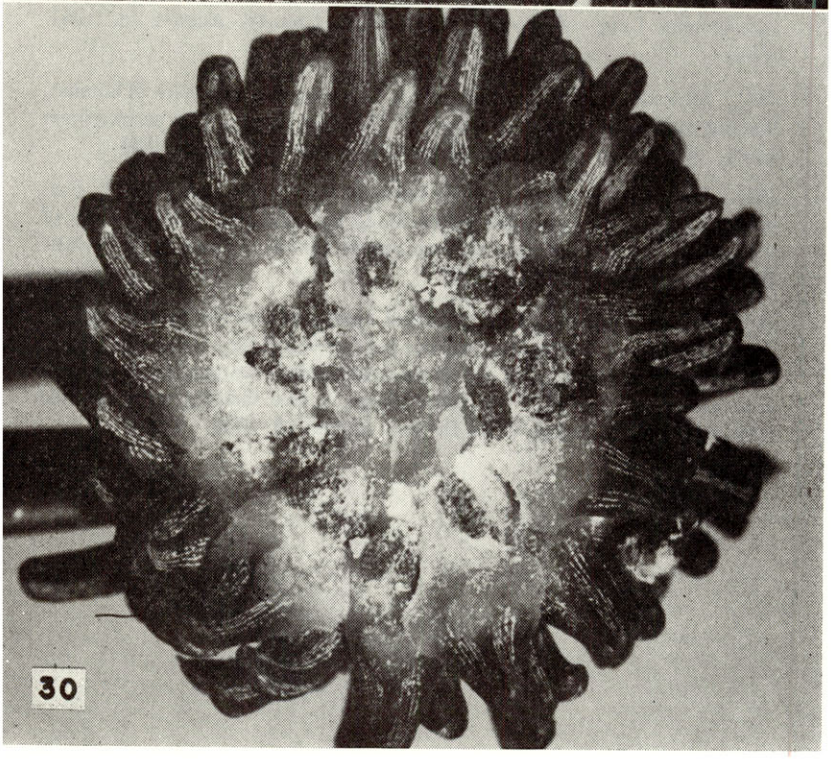
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PLATE V

(31). Terminal leaves of red maple, *Acer rubrum* Linn., infested on the underside by alate and apterous forms of the aphid, *Drepanaphis parvus* (Smith) causing the leaves to curl, forming a type of pseudo-gall. Antigonish County, June 20, 1952. (613)

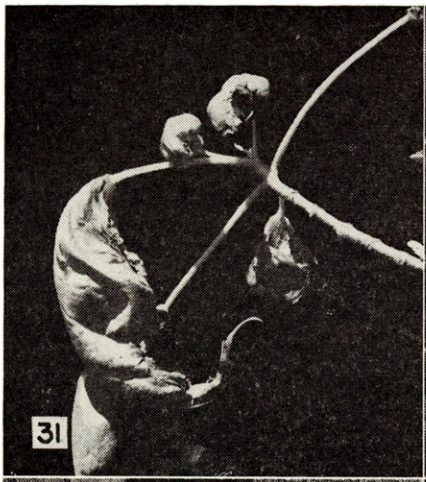
(32). A heavy infestation of scattered colonies of the aphid, *Drepanaphis utahensis* (Knowlton and Smith) can be seen on the underside of a leaf of the sugar maple, *Acer saccharum* Marsh. All stages of agamic individuals are present. Antigonish, Antigonish County, August 22, 1951. (535)

(33). A scattered colony of the light yellow aphid, *Drepanaphis acerifolii* (Thomas), is seen on the underside of a leaf of the silver maple, *Acer saccharinum* Linn. Antigonish, Antigonish County, August 18, 1951. (534)

(34). One alate and immature aphid, *Drepanaphis acerifolii* (Thomas), feeding on the underside of a leaf of the silver maple, *Acer saccharinum* Linn. Antigonish, Antigonish County, August 18, 1951. (534)

(35). Very dense colonies of the bark feeding wooly alder aphid, *Prociphilus* spp. can be seen extending along the sheltered side of stems of *Alnus* spp. Koch, in clumps of from one to twelve inches. Lorne, Cape Breton, August 13, 1953. (899)

(36). A small portion of an extended colony of the wooly alder aphid, *Prociphilus* spp., seen feeding on the bark of the alder, *Alnus* spp. Koch. The white flocculent spots are characteristically arranged in transverse rows along the dorsum. No other alders in this vicinity were infested with this aphid. Lorne, Cape Breton, August 13, 1953. (899)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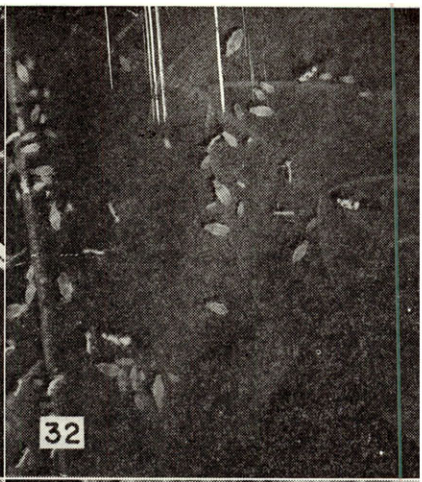
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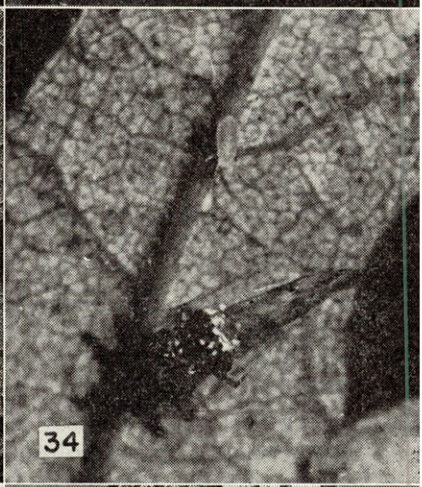
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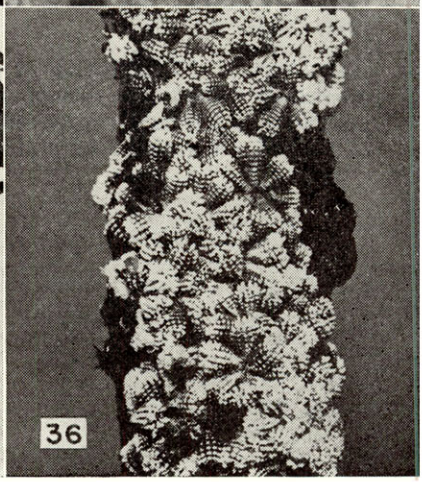
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PLATE VI

(37). Syrphid fly larvae are seen preying upon a dense colony of *Aphis crataegifoliae* (Patch) on the underside of the leaves of wild pear, *Amelanchier Wiegandii* Niels. West River Road, Antigonish County, June 29, 1950. (422a)

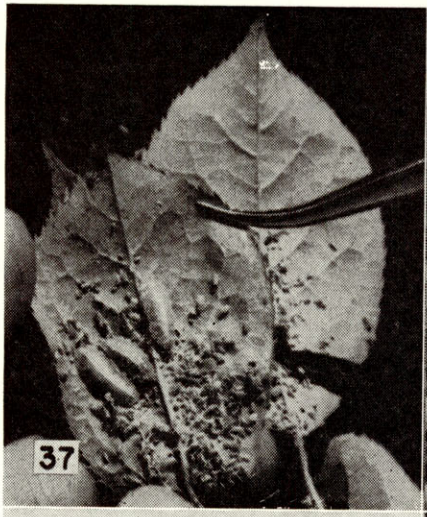
(38). Part of a dense colony of the aphid, *Rhopalosiphum fitchii* (Sanderson) as seen on the underside of the curled leaves of the wild pear, *Amelanchier Wiegandii* Niels. All stages of agamic forms are present. West River Road, Antigonish County, June 29, 1950. (422b)

(39). Terminal growing tip of a young yellow birch, *Betula lutea* Michx., attacked by the spotted poplar aphid, *Aphis maculatae* Oestlund, causing the young stem and leaves to wilt and discolor. Collingwood, Cumberland County, July 7, 1952. (643)

(40). Light green, translucent apterous agamic forms of the aphid, *Calaphis* spp. Walsh, scattered on the underside of a leaf of yellow birch, *Betula lutea* Michx. in typical feeding position. Green Hill, Pictou County, July 7, 1952. (628)

(41). A small compact colony of chocolate colored aphids, *Neosymydobius americanus* (Baker) feeding on the hardened stem of a yellow birch, *Betula lutea* Michx. Station II, Route 7, Antigonish County, July 24, 1951. (520)

(42). Part of a dense colony of bark-feeding aphids, *Neosymydobius americanus* (Baker) on a stem of yellow birch, *Betula lutea* Michx. An uncommon form from this region and very active when disturbed. Station II, Route 7, Antigonish County, July 24, 1951. (520)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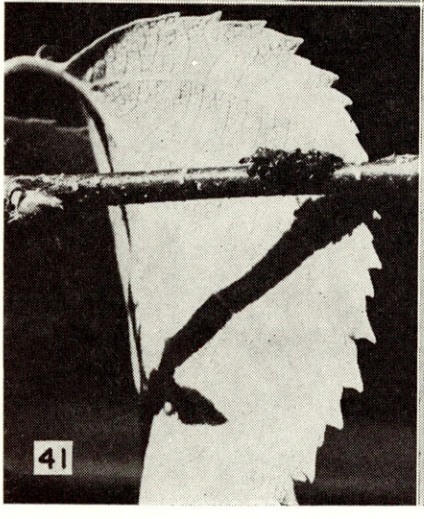
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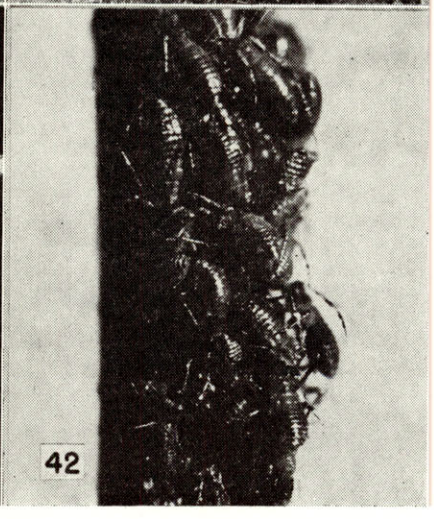
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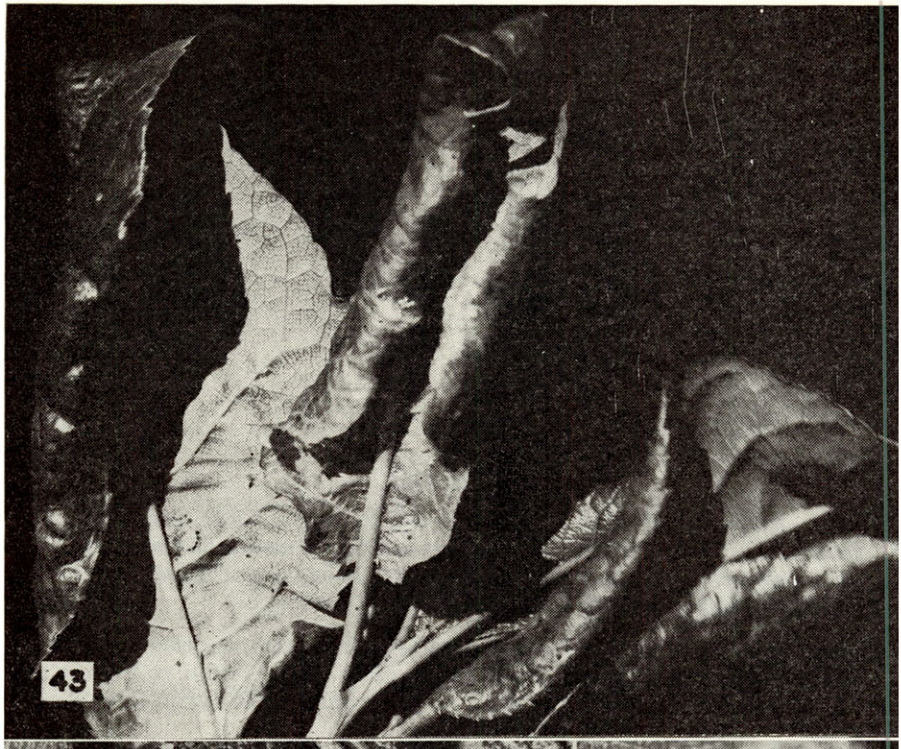
PLATE VII

(43). Curling terminal leaves of the wild pear, *Amelanchier Wiegandii* caused by the aphids, *Aphis cerasifoliae* (Fitch), feeding on the underside of the leaves. Station II, Route 7, Antigonish County, July 24, 1951. (521a)

(44). The underside of a leaf of the wild pear, *Amelanchier Wiegandii* Niels, showing a heavy infestation of the various agamic stages of the leaf-feeding aphid, *Aphis cerasifoliae* (Fitch). Station II, Route 7, Antigonish County, July 24, 1951. (521a)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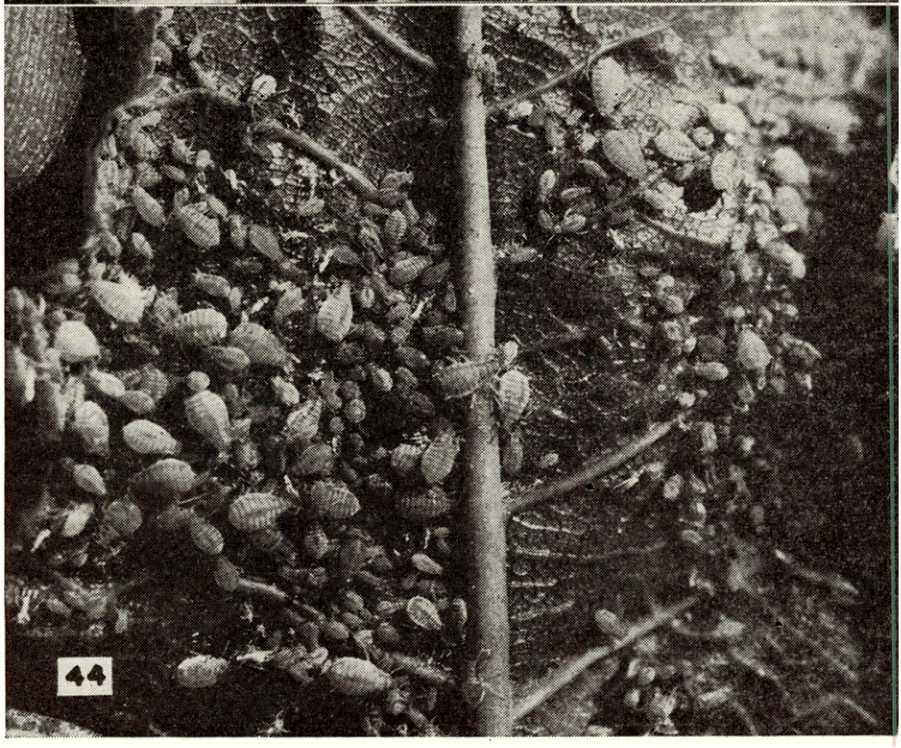
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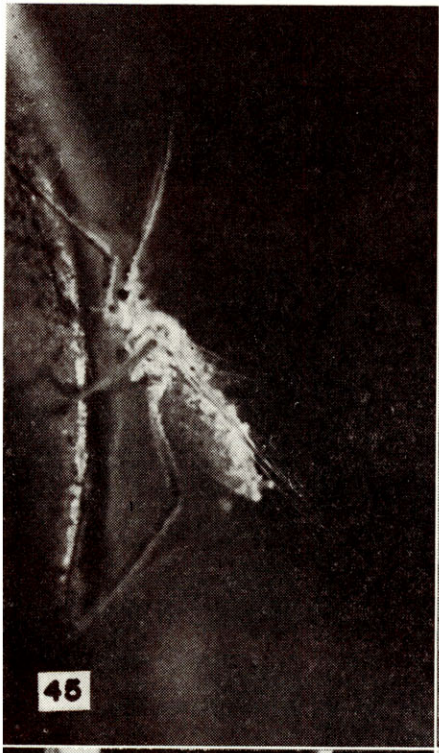
PLATE VIII

(45). Alate European birch aphid, *Euceraphis betulae* Linn., perched on thumb nail. Taken from a dense colony of wooly apterous an alate forms on the underside of a leaf of white birch, *Betula papyrifera* Marsh. Crystal Cliffs, Antigonish County, July 12, 1950. (455a, b)

(46). A small colony of the stem-feeding aphid, *Neosymydobius americanus* (Baker), feeding on the bark of white birch, *Betula papyrifera* Marsh. Route 4, two miles west of Antigonish, Antigonish County, June 27, 1953. (818)

(47). Blackish-green to grayish-yellow apterous and alate forms of the European maple aphid, *Periphyllus testudinacea* (Fernie), feeding on the petioles and both sides of the leaves of white ash, *Fraxinus americana* Linn. This aphid is normally recorded from *Acer* spp. Antigonish, Antigonish County, June 20, 1952.

(48). Young stem tip of the English hawthorn, *Crataegus monogyna* Jacq., infested on leaves and twigs with the long-beaked clover-hawthorn aphid, *Aphis crataegifoliae* Fitch. Summer host is red clover. Antigonish Antigonish County, June 19, 1952. (610)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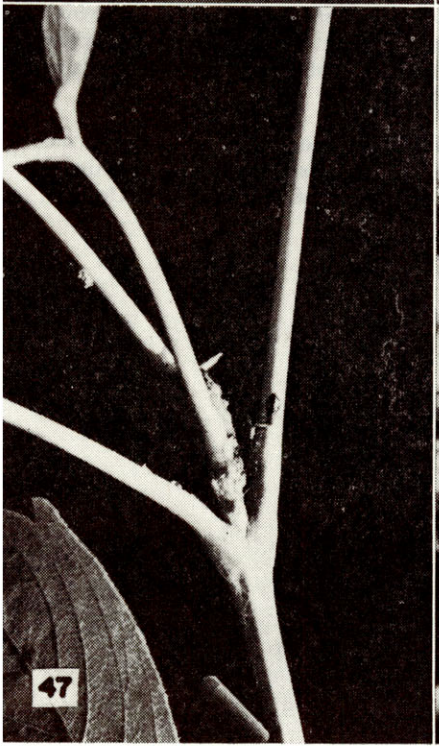
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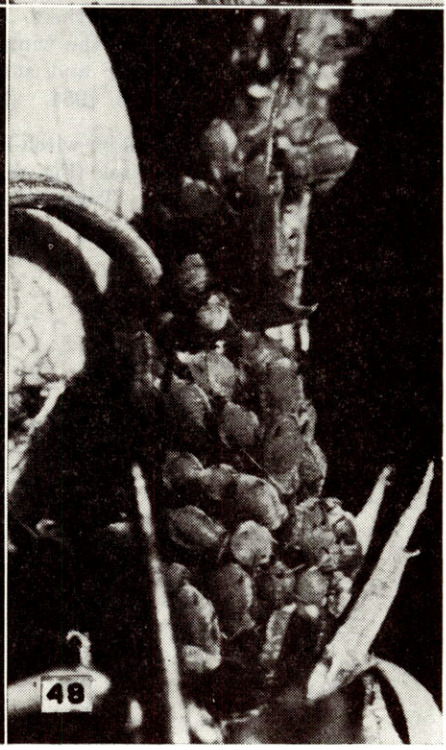
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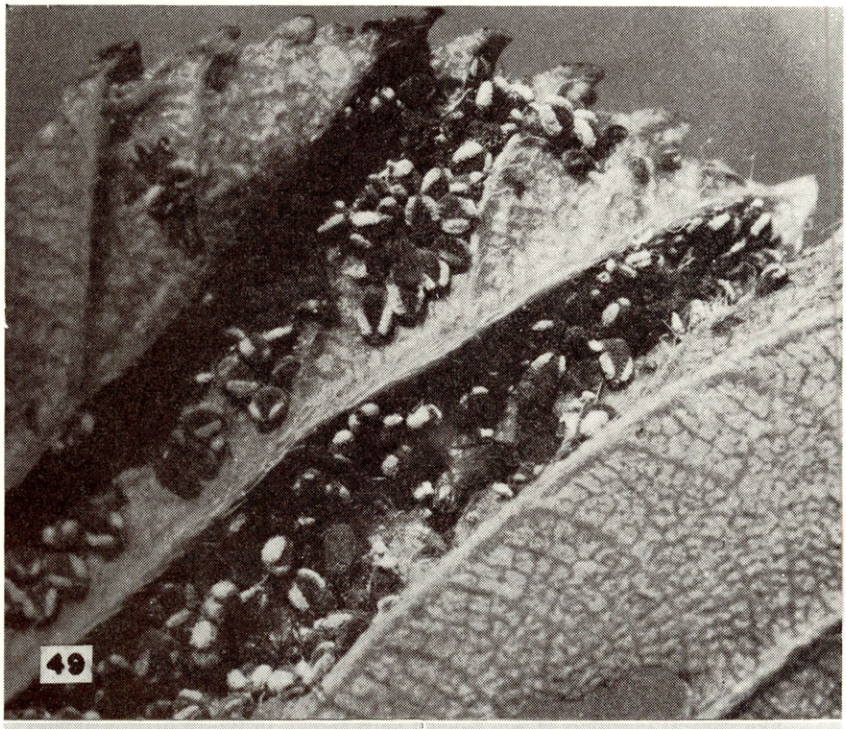
PLATE IX A

(49). Alate and apterous forms of the witch-hazel and birch aphid, *Hamamelistes spinosus* Shimer, feeding on the underside of a leaf of white birch, *Betula papyrifera* Marsh, producing leaf corrugations, or pseudo-galls. Scotsburn, Pictou County, July 6, 1952. (634)

(50). One spring bud-gall on witch-hazel, *Hamamelis virginiana* L., caused by the aphid stem mothers, *Hamamelistes spinosus* Shimer, which hatched from eggs laid by the winged migrants coming from the white birch the previous spring and summer. Tobeatic Game Sanctuary, Queens County, August 5, 1954. (995)

(51). One spiny bud-gall on witch-hazel cut open to show both apterous and alate migrants to birch (Fig. 49) of *Hamamelistes spinosus* Shimer, feeding on the inside. Tobeatic Game Sanctuary, Queens County, August 5, 1954. (995)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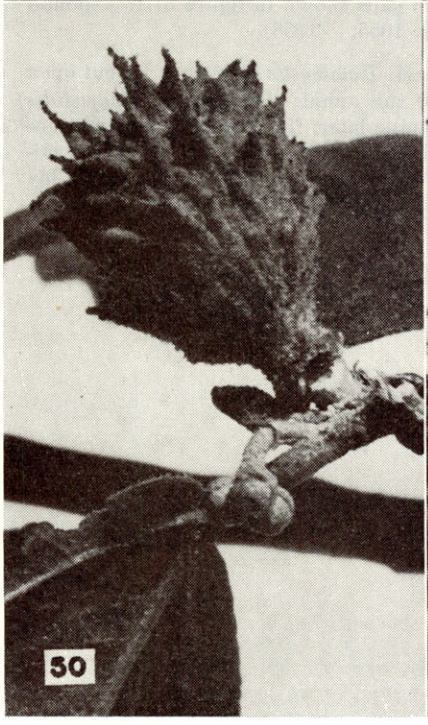
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51

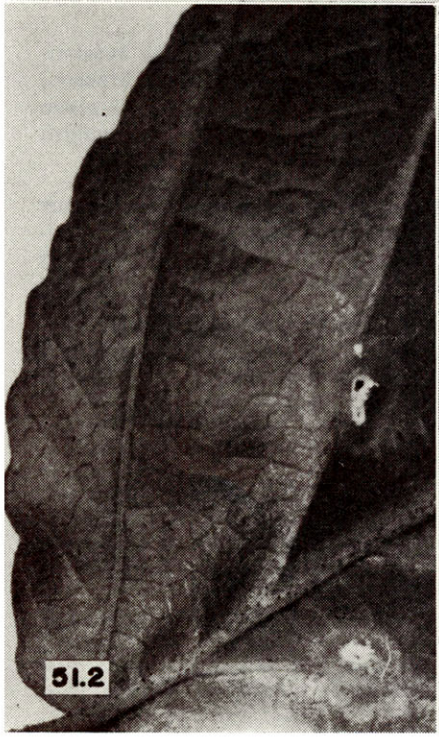
PLATE IX B

(51.1). A leaf of witch-hazel, *Hamamelis virginiana* L., showing four conical galls on the upper leaf surface caused by the activity of aphid stem mothers, *Hormaphis hamamelidis* (Fitch), which hatched from overwintering eggs. Spondu Lake, Lunenburg County, July 19, 1955. (1058)

(51.2). Ventral surface of a leaf of witch-hazel, *Hamamelis virginiana* L., infested with the aphid, *Hormaphis hamamelidis* (Fitch), showing rim-like ventral openings of the conical galls shown in figure 51.1. Spondu Lake, Lunenburg County, July 19, 1955. (1058)

(51.3). A conical gall on witch-hazel, *Hamamelis virginiana* L., cut open to show several agamic forms of the aphid, *Hormaphis hamamelidis* (Fitch). Winged migrants, developing later, fly to birches and produce aleurodiform generations, which give rise in the early fall to winged migrants back to the witch-hazel. These forms produce sexuals which lay the overwintering eggs. Spondu Lake, Lunenburg County, July 19, 1955. (1058)

51.1



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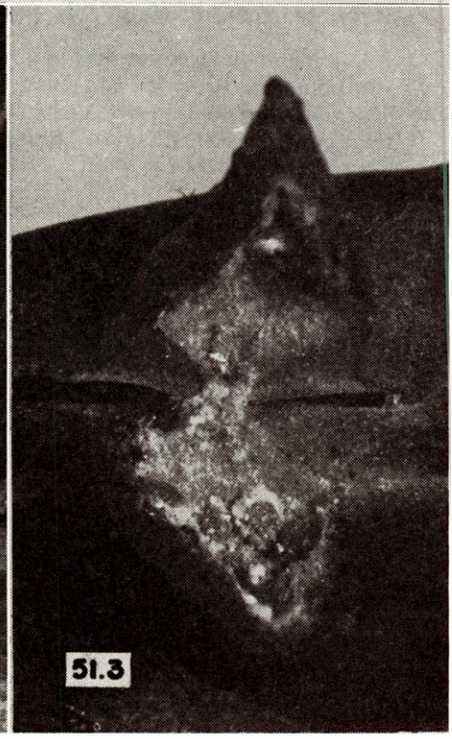


51.3

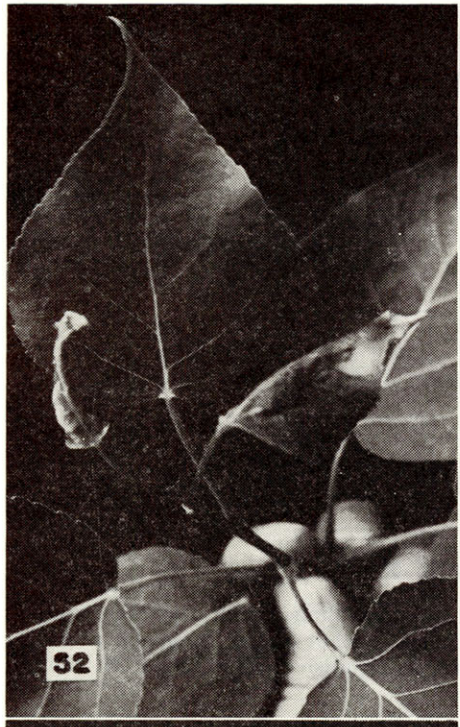
PLATE X

(52). Terminal leaves of young balsam poplar, *Populus balsamifera* Linn., forming a pseudo-gall as a result of the feeding of the aphid, *Chaitophorus populellus* Gillette and Palmer, on the underside of the folded leaf and on both sides of the midrib. Station 4, North Shore Road, Antigonish County, July 12, 1950. (447)

(53). Pseudo-gall from *Populus balsamifera* Linn., opened to show an apterous colony of the aphid, *Chaitophorus populellus* Gillette and Palmer, scattered along either side of the leaf midrib. Station 4, North Shore Road, Antigonish County, July 12, 1950. (447)

(54). The poplar petiole-leaf gall on balsam poplar, *Populus balsamifera* Linn., caused by the gall aphid, *Pemphigus junctisensoriatus* Maxson. The gall, composed mostly of the swollen petiole, is pale yellowish-green tinged with reddish spots. Station 3, Fairmont Road, Antigonish County, July 3, 1951. (502)

(55). The balsam poplar petiole-leaf gall cut open revealing agamic females and immaturae of *Pemphigus junctisensoriatus* Maxson. Dipterous larval predators were found in each gall. Station 3, Fairmont Road, Antigonish County, July 3, 1951. (502)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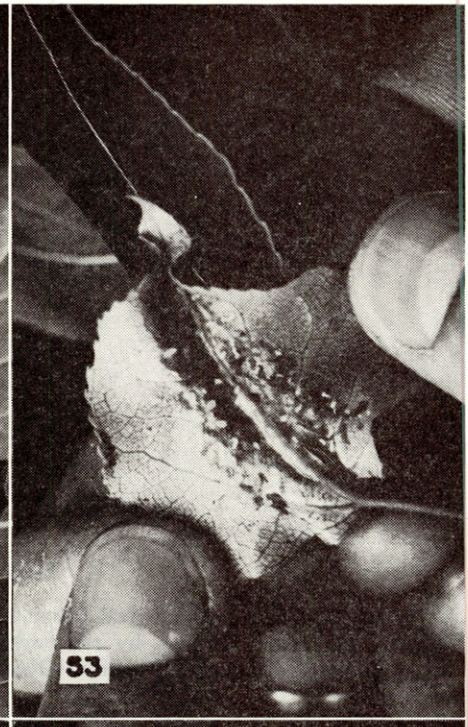
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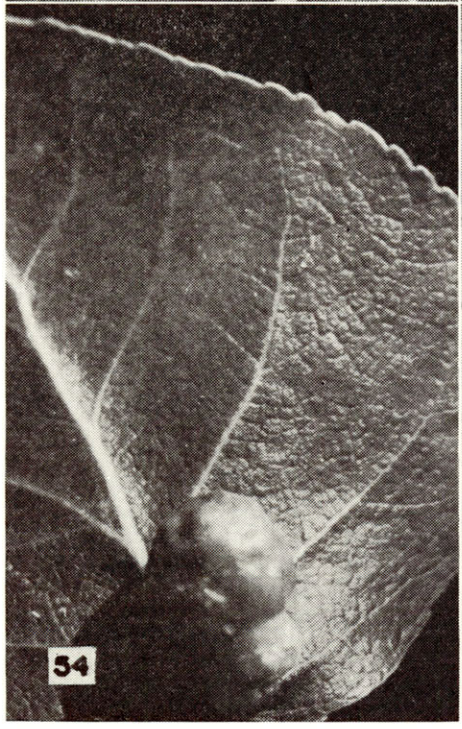
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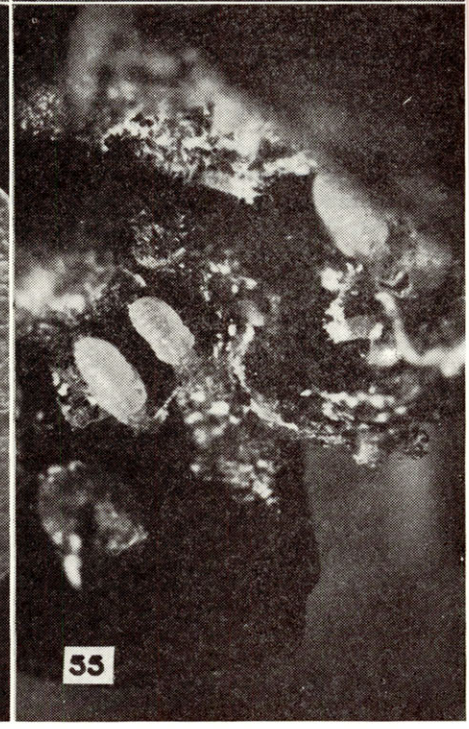
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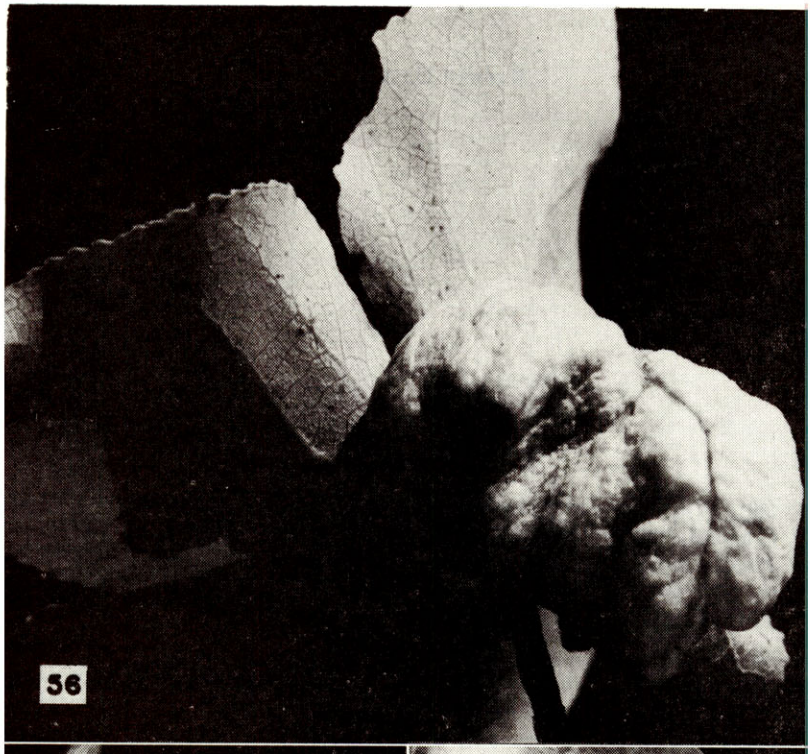
PLATE XI

(56). A large pseudo-gall taken from trembling aspen, *Populus tremuloides* Michx., caused by the aspen leaf-pocket aphid, *Asiphum sacculi* Gillette. Station 1, Fairmont Road, Antigonish County, June 28, 1951. (501)

(57). The same pseudo-gall as in fig. 56, cut open to reveal the apterous agamic forms and immaturae of the aphid, *Asiphum sacculi* Gillette, on the host, *Populus tremuloides* Michx., Station 1, Fairmont Road, Antigonish County, June 28, 1951. (501)

(58). The poplar-vein gall aphid, *Pemphigus populi-venae* Fitch, on a leaf of balsam poplar, *Populus balsamifera* L., causing greenish-yellow to reddish galls along the leaf midrib. Loch Lomond, Cape Breton, July 11, 1951. (508)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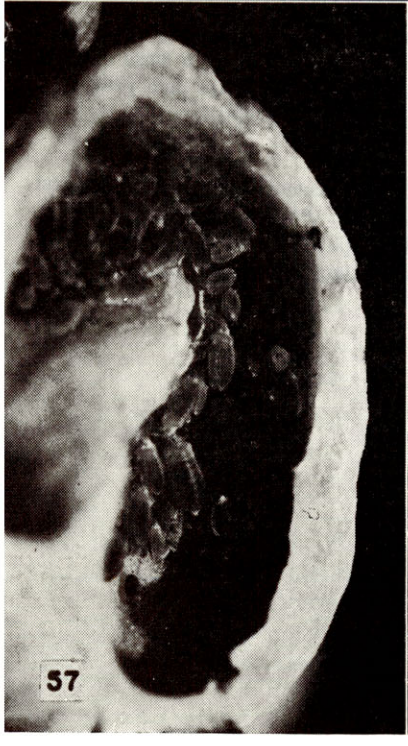
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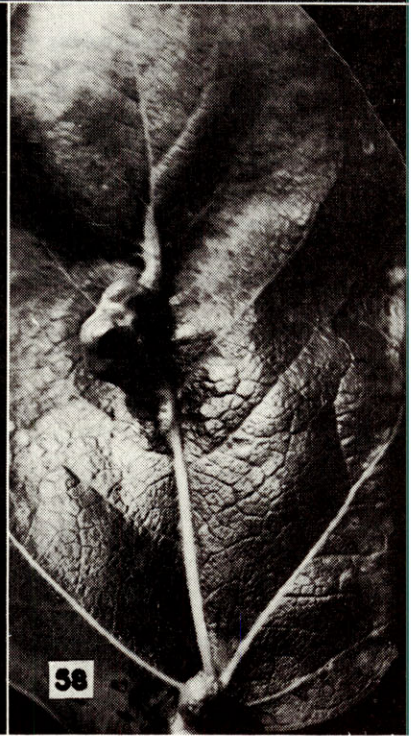
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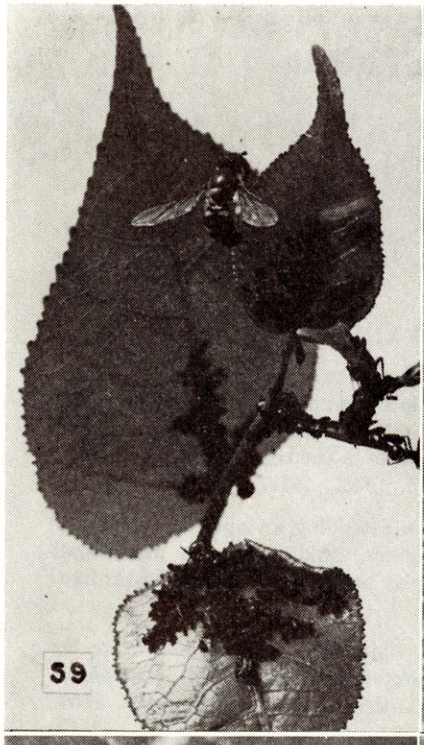
PLATE XII

(59). The cloudy-winged cottonwood leaf aphid, *Periphyllus populicolus* (Thomas), on the terminal stems and leaf surfaces of the aspen poplar, *Populus tremuloides* Michx. A syrphid fly can be seen ovipositing near the edge of one leaf. Station 2, West River Road, Antigonish County, July 30, 1952. (654)

(60). Part of a dense colony of apterous forms of the cloudy-winged aspen aphid, *Periphyllus populicolus* (Thomas), feeding on the basal portion of the upper leaf surface of *Populus tremuloides* Michx. Crystal Cliffs, Antigonish County, July 25, 1950. (458b)

(61). Part of a scattered colony of the clear-winged aspen aphid, *Chaitophorus populifoliae* Davis, on the bottom leaf surface of a large toothed aspen, *Populus grandidentata* Michx. These aphids are pale yellowish-green with transverse stripes across the dorsum. Fossil Road, Antigonish County, July 25, 1950. (457)

(62). The spotted poplar aphid, *Aphis maculatae* Oestlund, feeding on the upper leaf surface of an aspen poplar, *Populus tremuloides* Michx. The larger apterous forms show white spots on the dorsal and lateral intersegmental lines. Crystal Cliffs, Antigonish County, July 25, 1950. (458a)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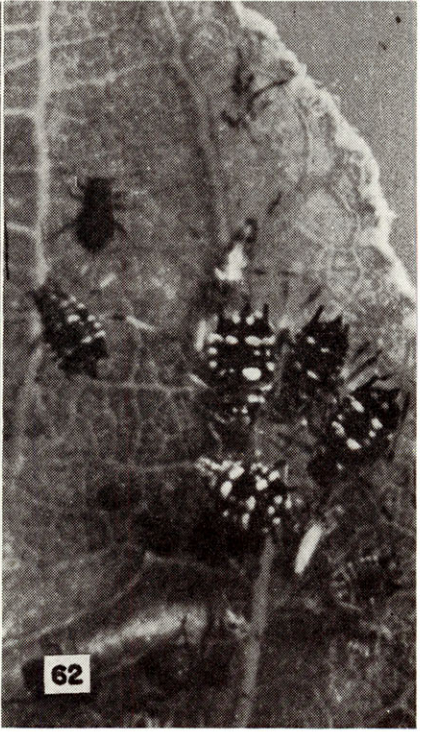
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PLATE XIII

(63). Normal and infested leaves of the hawthorn, *Crataegus macrosperma* var. *acutibola* (Sarg.) Eggl. Alate and apterous forms of the aphid, *Prociphilus corrugatans* (Sirrine), on the underside of the leaves caused the leaves to curl and turn a dark purple in the region of a pseudo-gall. Jimtown, Antigonish County, July 5, 1953. (831)

(64). A large black ant can be seen attending an apterous colony of aphids, *Prociphilus corrugatans* (Sirrine), inside a purple pseudo-gall taken from the same hawthorn plant as in figure 63. Jimtown, Antigonish County, July 5, 1953. (831)

(65). A branch of the winter host, white ash, *Fraxinus americana* L., infested with the bark feeding, smoky-winged ash aphid, *Prociphilus venafuscus* (Patch). Cape George, Antigonish County, June 28, 1951. (503)

(66). Part of a colony of medium brown, heavily flocculent aphids, *Prociphilus venafuscus* (Patch), feeding on the bark of the winter host, white ash, *Fraxinus americana* L. The roots of the balsam fir, *Abies balsamea* (L) Mill., serve as the summer host. Cape George, Antigonish County, June 28, 1951. (503)

(67). A heavily infested growing stem tip of the apple, *Malus pumila* L., with terminal buds, leaves and stem attacked by the apple aphid, *Aphis pomi* DeGeer. West River Road, Antigonish County, June 29, 1950. (419)

(68). A ventral leaf surface of the apple, *Malus pumila* L., attacked by the aphid, *Aphis pomi* DeGeer. All stages of agamic, apterous and alate forms are seen with many exuviae. West River Road, Antigonish County, June 29, 1950. (419)


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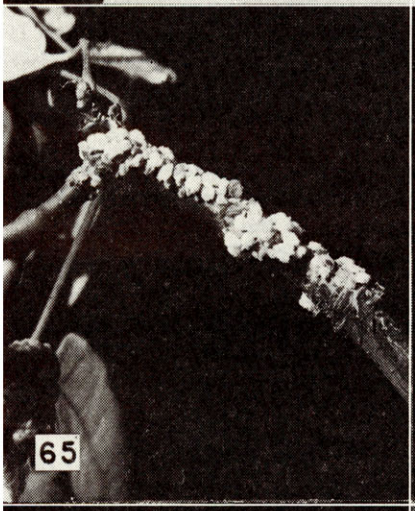
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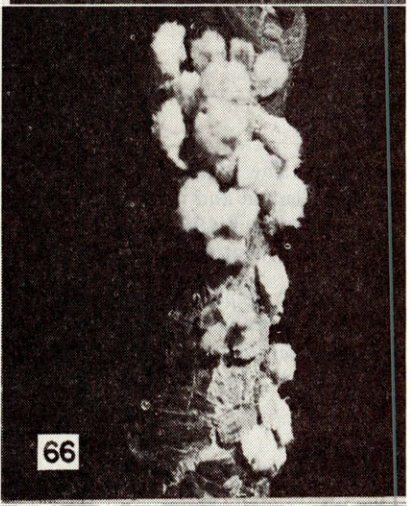
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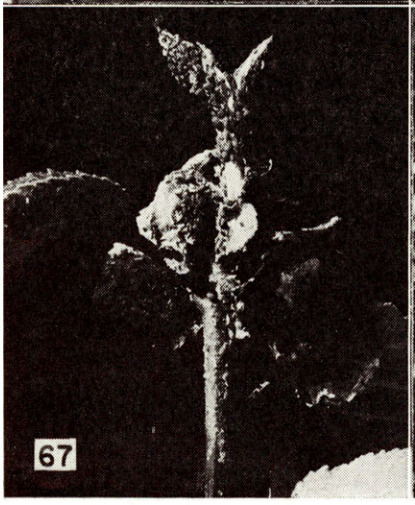
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PLATE XIV

(69). The terminal leaves of a young pin cherry, *Prunus pensylvanica* L.F., curled and malformed as a result of the choke cherry aphid, *Aphis cerasifoliae* Fitch, feeding on the underside of the leaves. Station 1, Route 7, Antigonish County, July 10, 1953. (832)

(70). A syrphid fly ovipositing in a young colony of choke cherry aphids *Aphis cerasifoliae* Fitch, feeding inside a curled pseudo-gall of *Prunus pensylvanica* L.F. Station 1, Route 7, Antigonish County, July 10, 1953. (832)

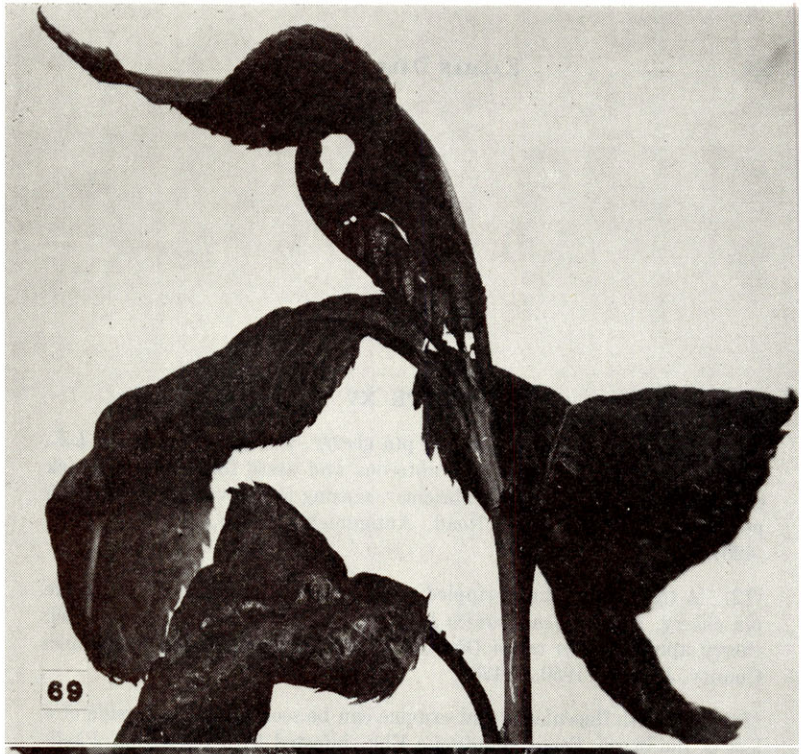

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PLATE XV

(71). Terminal leaves of a young pin cherry, *Prunus pensylvanica* L.f., infested on the underside with apterous and alate forms of the black cherry aphid, *Myzus cerasi* (Fabricius), causing the leaves to curl forming pseudo-galls. West River Road, Antigonish County, June 29, 1950. (420)

(72) A tightly curled and rippled undersurface of an infested leaf of the pin cherry, *Prunus pensylvanica* L.f., caused by the feeding of the black cherry aphid, *Myzus cerasi* (Fabricius). West River Road, Antigonish County, June 29, 1950. (420)

(73). Whitish flocculence and exuviae can be seen on the underside of a leaf of the beech, *Fagus grandifolia* Ehr., infested with the aphid, *Phyllaphis fagi* (Linn.). Each flocculent mass contained one aphid and was entirely hidden by it. Interveinal areas on the dorsal leaf surface become discolored to a light yellowish hue and are swollen. Station 1, Fairmont Road, Antigonish County, July 4, 1950. (430)

(74). A petiole feeding aphid, *Asiphum rosettii* Maxson, is seen feeding on an aspen poplar, *Populus tremuloides* Michx., causing the leaves to bend backwards and clump together forming a protective canopy or rosette over the aphids. The fundatrigeniae feed mostly on the unexposed side of the leaves and the fundatrix on the petioles. Rarely found in Nova Scotia. Station 1, Fairmont Road, Antigonish County, July 3, 1950. (428)


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PLATE XVI

(75). A growing stem tip of willow, *Salix* sp. (Tourn.) Linn., heavily infested with a large colony of the green and pink willow aphid, *Aphis saliceti* Kaltenbach. Station 1, Route 7, Antigonish County, July 24, 1951. (517)

(76). The underside of a leaf of the willow, *Salix* sp. (Tourn.) Linn., attacked by the aphid, *Aphis saliceti* Kaltenbach, causing the leaf to curl and discolor. Oue predator syrphid larva is present and several apterous aphids can be seen with their abdomens swelled to a round ball as a result of internal larval parasites. Station 1, Fairmont Road, Antigonish County, July 27, 1953. (869a)

(77). The underside of a leaf of hazel nut, *Corylus cornuta* Marsh, with green apterous aphids, *Myzocallis alnifoliae* (Fitch), distributed in a characteristic manner along the midrib and laterial veins of the leaf. Spondu Lake, Lunenburg County, August 8, 1952. (672)

(78). The underside of a leaf of the red oak, *Quercus borealis* Michx., infested with a scattered colony of active, light greenish-yellow aphids, *Myzocallis bella* (Walsh), feeding along a laterial vein, most of which had crawled to the unexposed leaf surface prior to taking the photograph. Spondu Lake, Lunenburg County, August 8, 1952. (677)

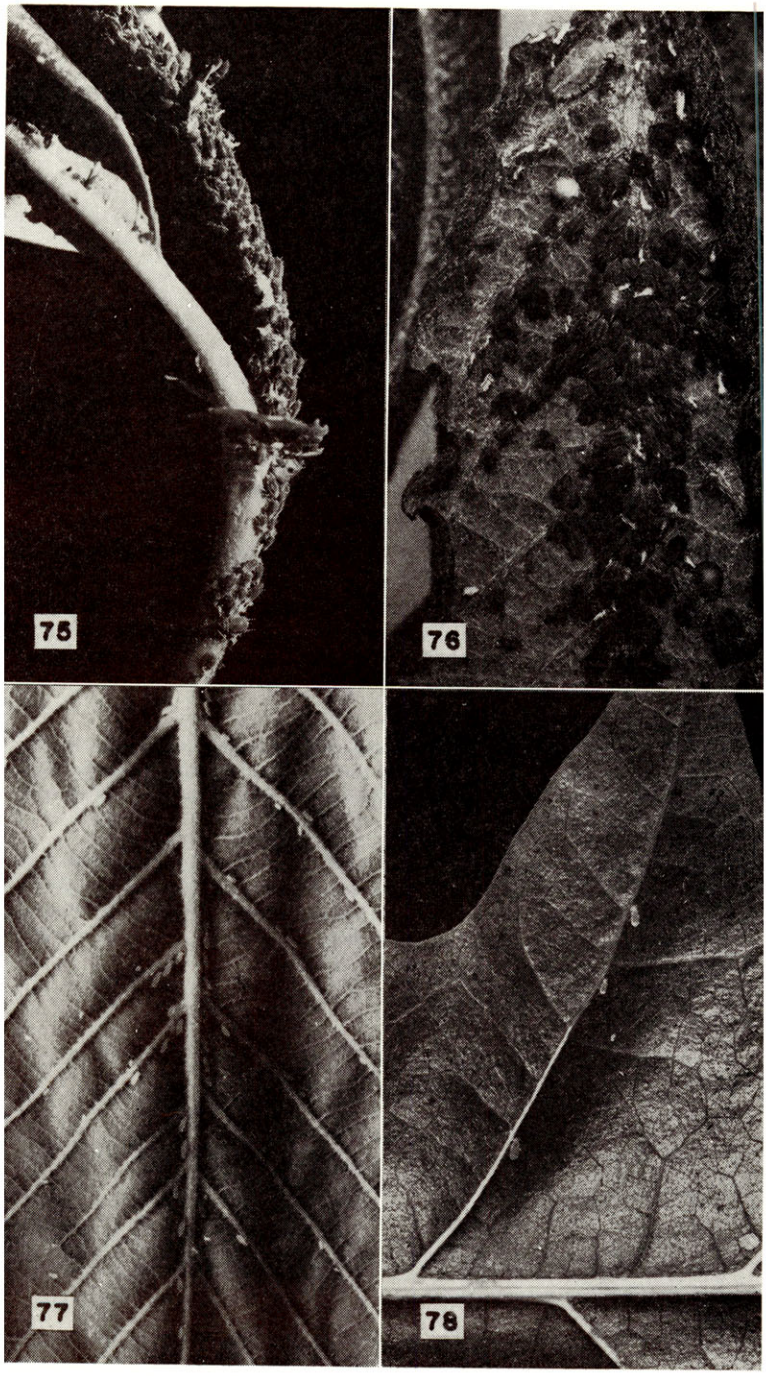
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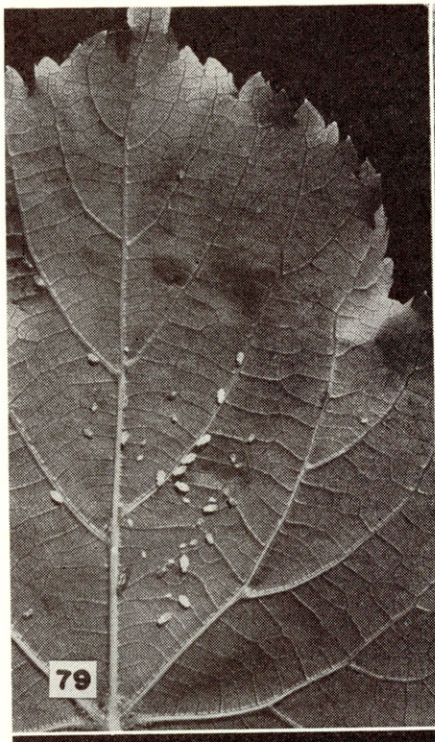
PLATE XVII

(79). A scattered colony of the linden aphid, *Myzocallis tiliae* (Linn.)' is seen on the underside of a leaf of the linden (basswood), *Tilia americana* Linn. Crystal Cliffs, Antigonish County, July 15, 1950. (448)

(80). The underside of a leaf of the linden (basswood), *Tilia americana* Linn., with a scattered colony of apterous and alate forms of the aphid, *Myzocallis tiliae* (Linn.). The alate vivipara are light yellow with black lateral vittae on the head and thorax, which is continued on the abdomen by medially broken black bands and lateral areas. A species which is very active when disturbed. Crystal Cliffs, Antigonish County, July 15, 1950. (448)

(81). Typical light yellow leaf-cluster galls or rosettes on the white elm' *Ulmus americana* Linn., caused by the wooly elm aphid, *Eriosoma lanigerum* (Hausmann). St. Francis Xavier University Campus, Antigonish County, July 8, 1950. (437b)

(82). The underside of an infested leaf of the white elm, *Ulmus americana* Linn., showing a dense colony of the wooly elm aphid, *Eriosoma lanigerum* (Hausmann), with many alatae and apterous forms covered with flocculence and exuding droplets of honey dew. St. Francis Xavier University Campus, Antigonish County, July 8, 1950. (437a)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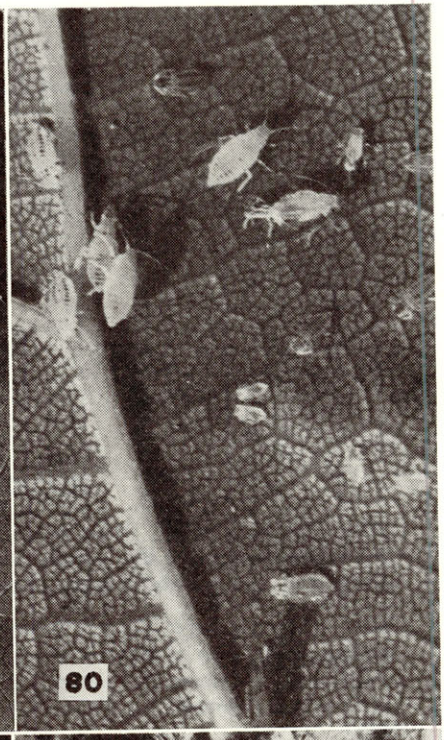
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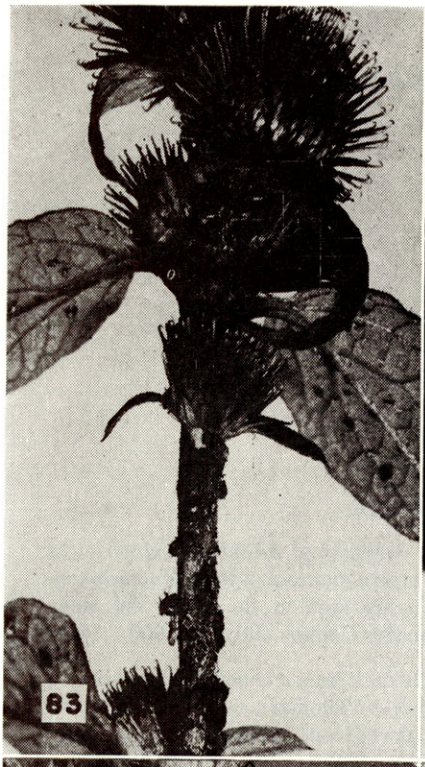
PLATE XVIII

(83). The bean aphid, *Aphis fabae* Scoploi, found feeding on the stem, leaves and blossoms of the common burdock, *Arctium minus* (Hill) Benth. Antigonish, Antigonish County, August 10, 1953. (880)

(84). Part of a large colony of velvety black aphids, *Aphis fabae* Scopoli, feeding on the stem of the common burdock, *Arctium minus* (Hill) Benth. Visible are the characteristic markings of four dorsal rows of powdery spots on the abdomen. Antigonish, Antigonish County, August 10, 1953. (880)

(85). This large yellowish slate-green, slightly pulverulent aphid, *Macrosiphum ludovicianae* (Oestlund), with both apterous and alate forms is seen feeding head down along a stem of yarrow *Achillea Millefolium* Linn. South west St. Andrews, Antigonish County, July 4, 1953. (826)

(86). All agamic forms of this aphid, *Amphorophora sonchi* (Oestlund), heavily infesting the growing stem tip and blossoms of the sow thistle, *Sonchus* sp. (Tourn.) Linn., as the summer host; winter host, on the leaves of the current, ribes spp. Antigonish, Antigonish County, August 12, 1953. (881)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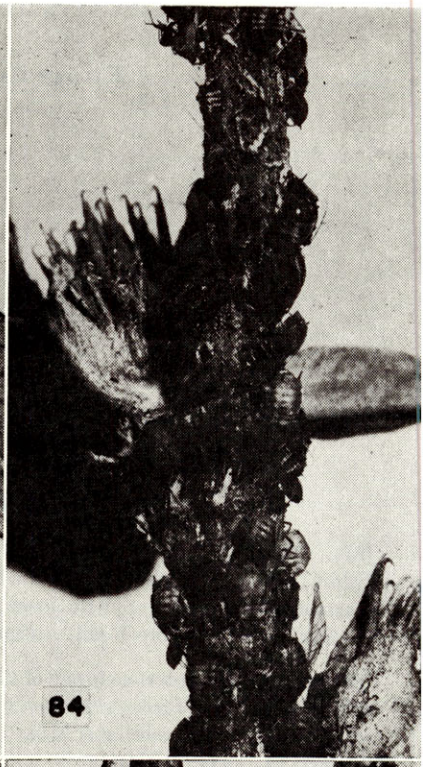
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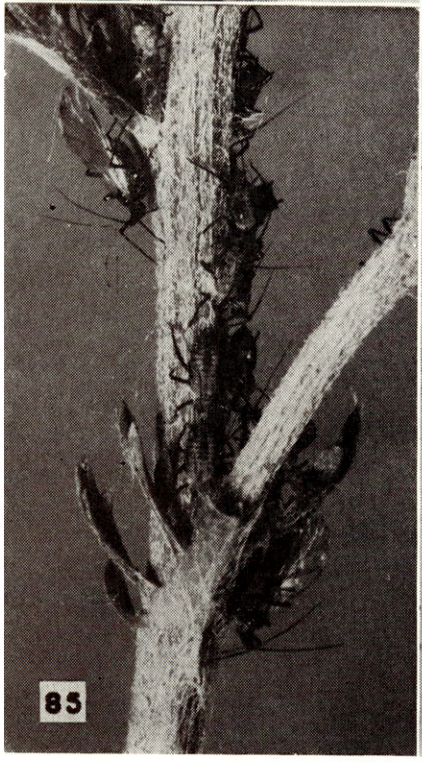
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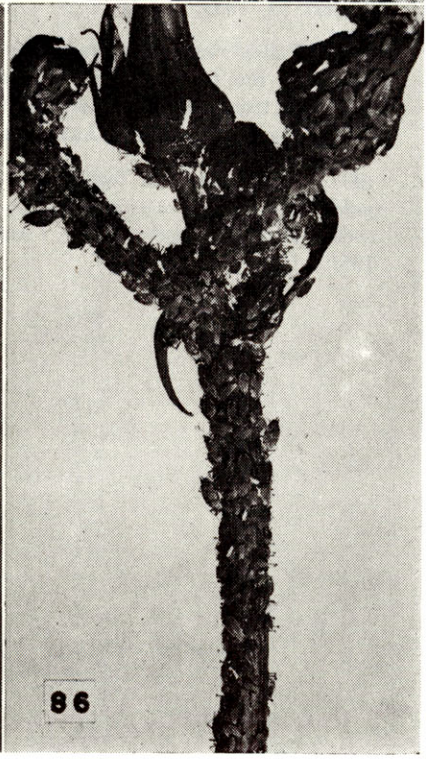
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PLATE XIX

(87). Terminal leaves of the pearly everlasting, *Anaphalis margaritacea* (Linn.) B. and H., infested with the brown ambrosia aphid, *Macrosiphum ambrosiae* (Thomas). Spittle insects are seen in the lower leaf axils. Station 4, North Shore Road, Antigonish County, July 12, 1950. (445)

(88). Alate and apterous forms of the dark brown or sepia colored brown ambrosia aphid, *Macrosiphum ambrosiae* (Thomas), feeding head down on a stem of *Aster umbellatus* Mill. Port Hood, Inverness County, C.B., August 14, 1953. (904)

(89). Yellow rocket, *Barbarea vulgaris* R. Br., malformed and dying as a result of the turnip aphid, *Rhopalosiphum pseudo-brassicae* (Davis), feeding in tremendous numbers on the leaves, stem and blossoms over the entire plant. Antigonish, Antigonish County, July 7, 1951. (505)

(90). Larval predator feeding on apterae of the turnip aphid, *Rhopalosiphum pseudobrassicae* (Davis), which are infesting the host, yellow rocket, *Barbarea vulgaris* R. Br. Antigonish, Antigonish County, July 7, 1951. (505)

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PLATE XX

(91). Red osier dogwood, *Cornus stolonifera* Michx., infested with the aphid, *Aphis helianthi* Monell, at the base of terminal flowers and fruits. Many large black ants were in attendance upon the aphids. Station 2, Fairmont Road, Antigonish County, July 5, 1950. (434)

(92). The yellowish-green thistle aphid, *Aphis cordui* Linn., scattered and clumped over the inner surface of the central young growing leaves of the artichoke, *Helianthus tuberosus* Linn., resulting in debilitation and subsequent death of the host plant. Antigonish, Antigonish County, July 7, 1950. (453)

(93). A dark olive-green colony of apterous aphids, *Aphis neogillettei* Palmer, causing severe leaf curl on the host, red osier dogwood, *Cornus stolonifera* Michx. Station 2, Route 7, Antigonish County, July 24, 1951. (522)

(94). Large black ants in attendance upon a colony of aphids, *Aphis neogillettei* Palmer, on the underside of a leaf of the red osier dogwood, *Cornus stolonifera* Michx. Station 2, Route 7, Antigonish County, July 24, 1951. (522)


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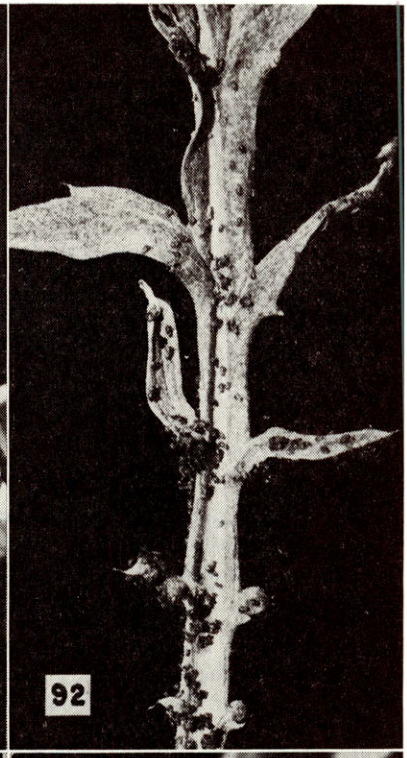
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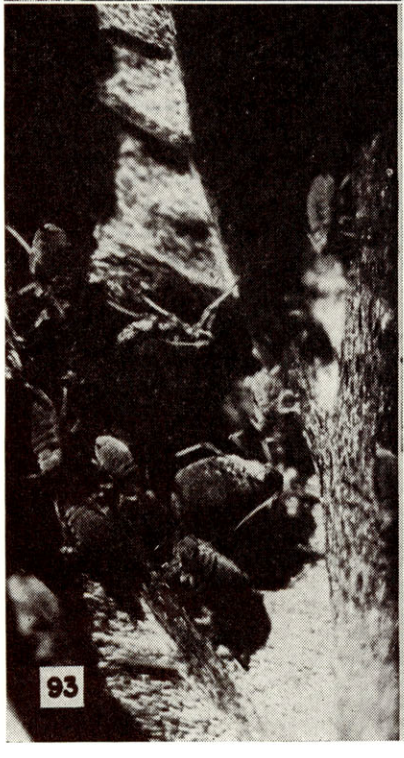
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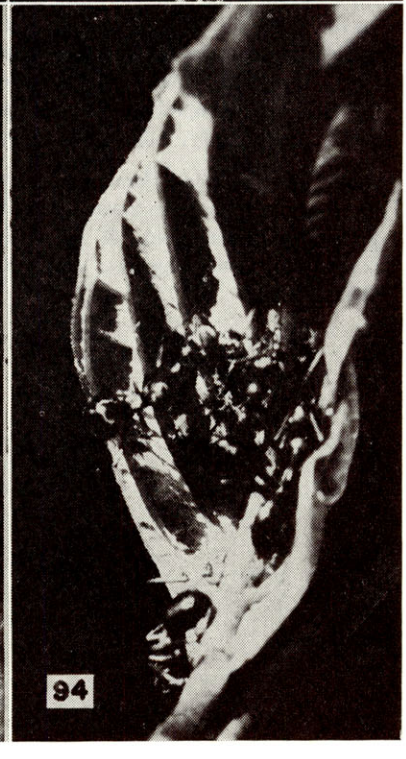
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PLATE XXI

(95). The blossom tips of joe pye weed, *Eupatorium maculatum* Linn. infested with the brown ambrosia aphid, *Macrosiphum ambrosiae* (Thomas) on the petioles and stems. Route 7, Antigonish County, August 9, 1950. (461)

(96). Apterous agamic forms of the aphid, *Macrosiphum ambrosiae* (Thomas), feeding head down on a stem of joe pye weed, *Eupatorium maculatum* Linn. Route 7, Antigonish County, August 9, 1950. (461)

(97). Light green apterous forms of the aphid, *Capitophorus ribis* (Linn.), on the underside of a leaf of hemp nettle, *Galeopsis tetrahit* Linn. These aphids were in dense colonies when undisturbed, but are extremely negatively phototropic, such that when the leaf is turned into the sunlight, they crawl rapidly to the unexposed side of the leaf. Spondu Lake, Lunenburg County, August 12, 1952. (697)

(98). The rose, *Rosa florabunda*, heavily infested on the terminal shoots and buds with the pale green aphid, *Macrosiphum rosae* (Linn.). A few pink or pale green aphids, *M. solanofolii* (Ashmead), were found scattered among the former species. Antigonish, Antigonish County, July 21, 1950. (450)


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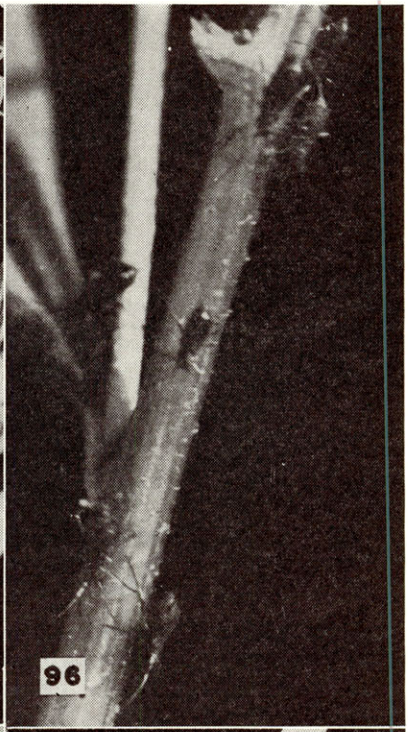
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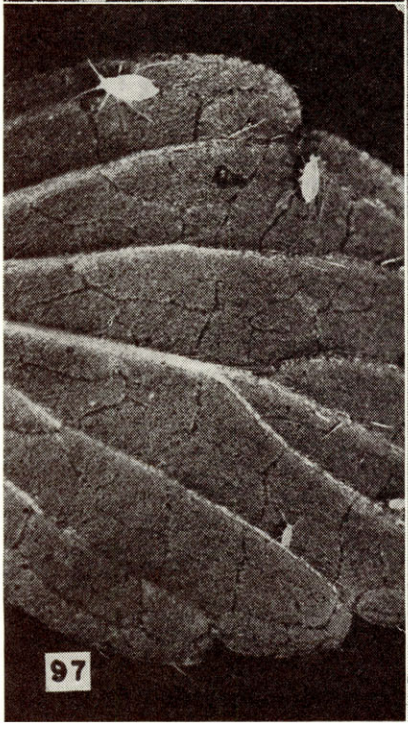
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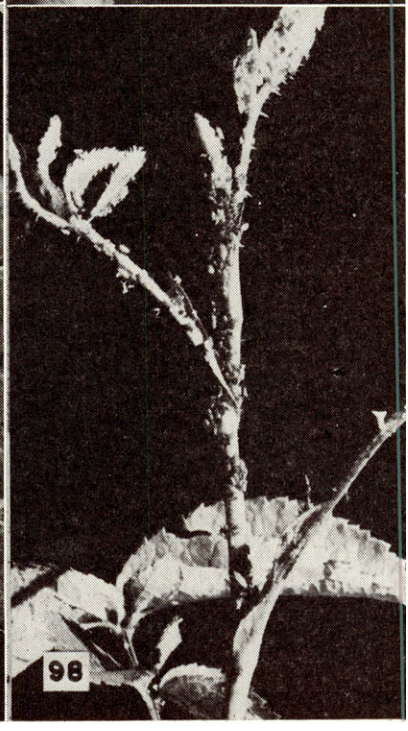
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PLATE XXII

(99). A rough hawkweed, *Hieracium scabrum* Michx., infested with the stem feeding aphid, *Macrosiphum rudbeckiae* (Fitch), Collingwood, Cumberland County, July 7, 1952. (641)

(100). The dull, brick-red goldenglow aphid, *Macrosiphum rudbeckiae* (Fitch), feeding head down on a pubescent stem of the rough hawkweed, *Hieracium scabrum* Michx. Collingwood, Cumberland County, July 7, 1952. (641)

(101). Small grayish-brown apterous and alate forms of the aphid, *Amphorophora nebulosa* Hottes and Frison, in dense colonies on buds and stem tips of grass, *Poa* sp. Linn. Spondu Lake, Lunenburg County, August 12, 1952. (693)

(102). Grass-green apterous forms of the english grain aphid, *Macrosiphum granarium* (Kirby), on the inflorescence and stem at the base of the inflorescence of grass, *Poa* sp. Linn. East of Melrose, Guysborough County, July 16, 1953. (840)


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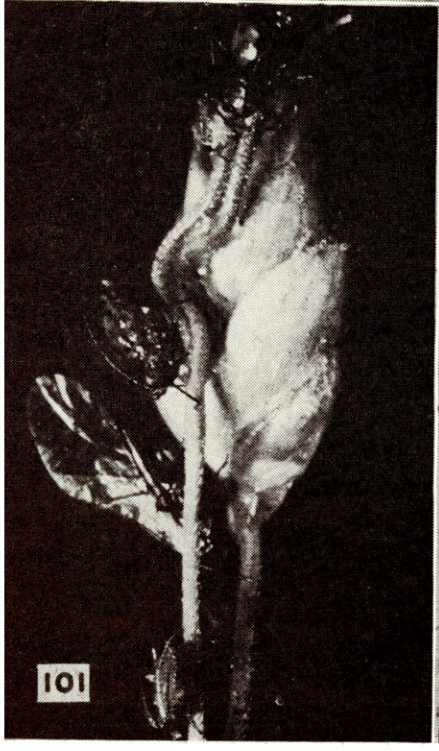
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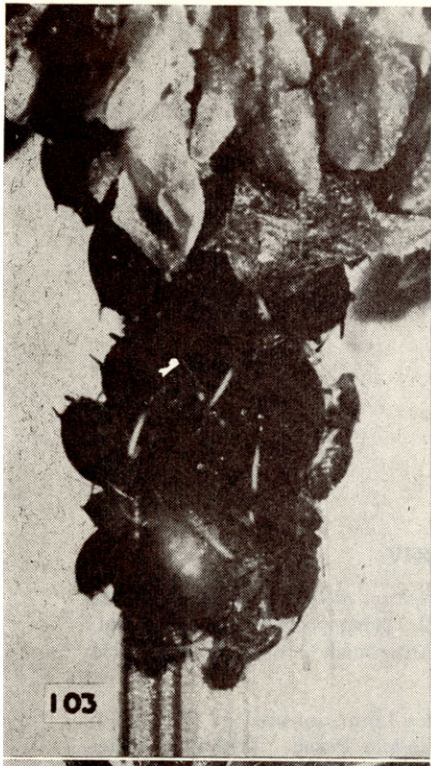
PLATE XXIII

(103). A velvety, dull slaty black colony of apterous dock aphids, *Aphis fabae* Scopoli, clustered around the stem under the flower axils of curled dock, *Rumex crispus* Linn. Rossville, Colchester County, July 6, 1952. (637)

(104). Apterous agamic forms of the greenish-yellow thistle aphid, *Aphis cardui* Linn., densely clustered around the stem of ragwort, *Senecio Jacobeae* Linn. Antigonish, Antigonish County, August 7, 1953. (878)

(105). Alate and apterous forms of the goldenglow aphid, *Macrosiphum rudbeckiae* (Fitch), in typical feeding position on a stem of goldenrod, *Solidago* sp. Linn. Port Hood, Inverness County, C.B., August 14, 1953. (903)

(106). Goldenrod, *Solidago* sp. Linn., infested with the aphid, *Macrosiphum erigeronenis* (Thomas), feeding head down on a young stem and leaves. Station 3, Route 7, Antigonish County, July 25, 1951. (523.2)



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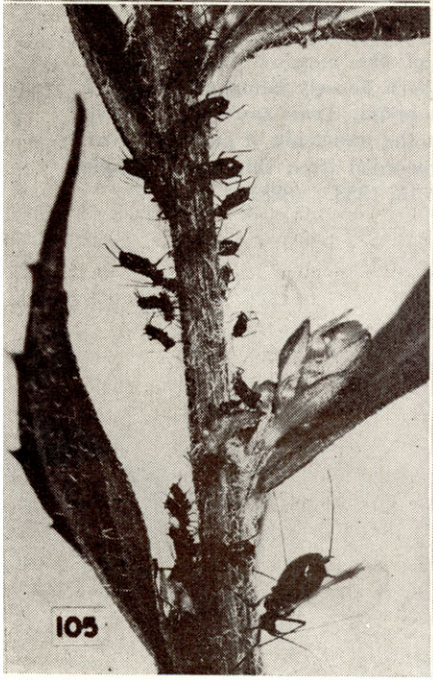

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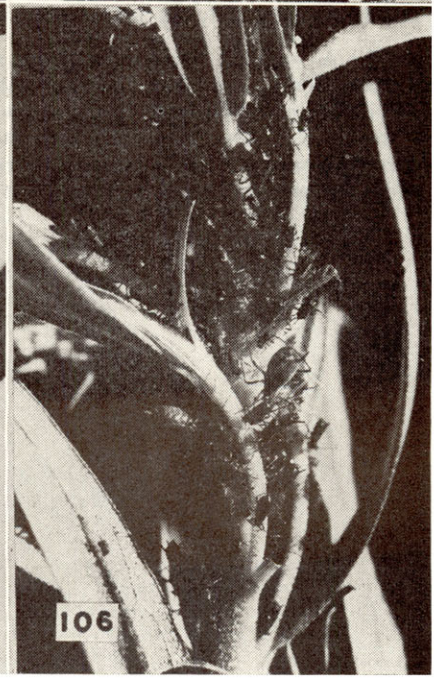

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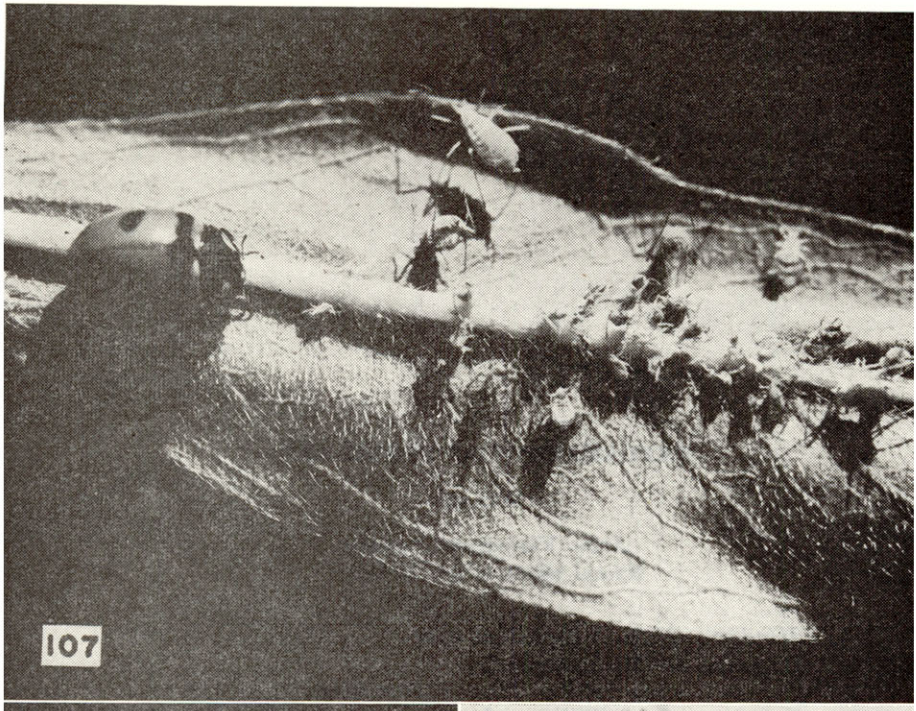
PLATE XXIV

(107). A colony of the aphid, *Macrosiphum albifrons* Essig, on a leaf of the lupine, *Lupinus polyphyllus* Lindl., being preyed upon by a lady bug beetle, Coccinellidae. Antigonish, Antigonish County, July 10, 1951. (504)

(108). Wild raisin, *Viburnum cassinoides* Linn., infested at the base of the fruit with the aphid, *Aphis viburniphila* Patch. Lochaber Mines, Halifax County, July 26, 1951. (525)

(109). A terminal blossoming shoot of the meadow sweet, *Spiraea latifolia* Borfh., completely covered with a densely compact colony of grayish alate and apterous forms of the aphid, *Aphis spiraephila* Patch, at the base of the inflorescence and on the underside of curling leaves. Twelve separate dense colonies were recorded from this host. Maple Ridge, Inverness County, C. B., August 13, 1953. (888)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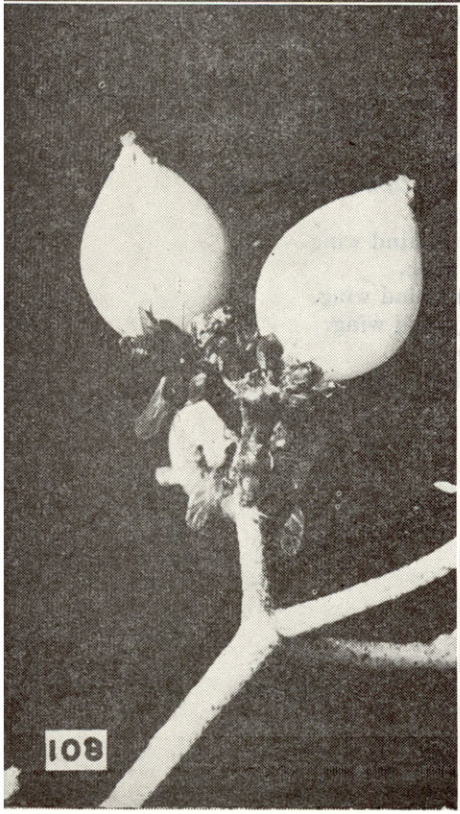
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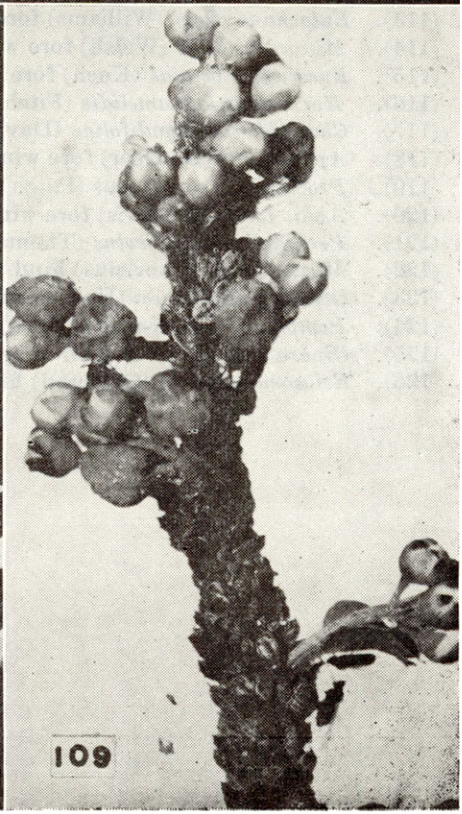
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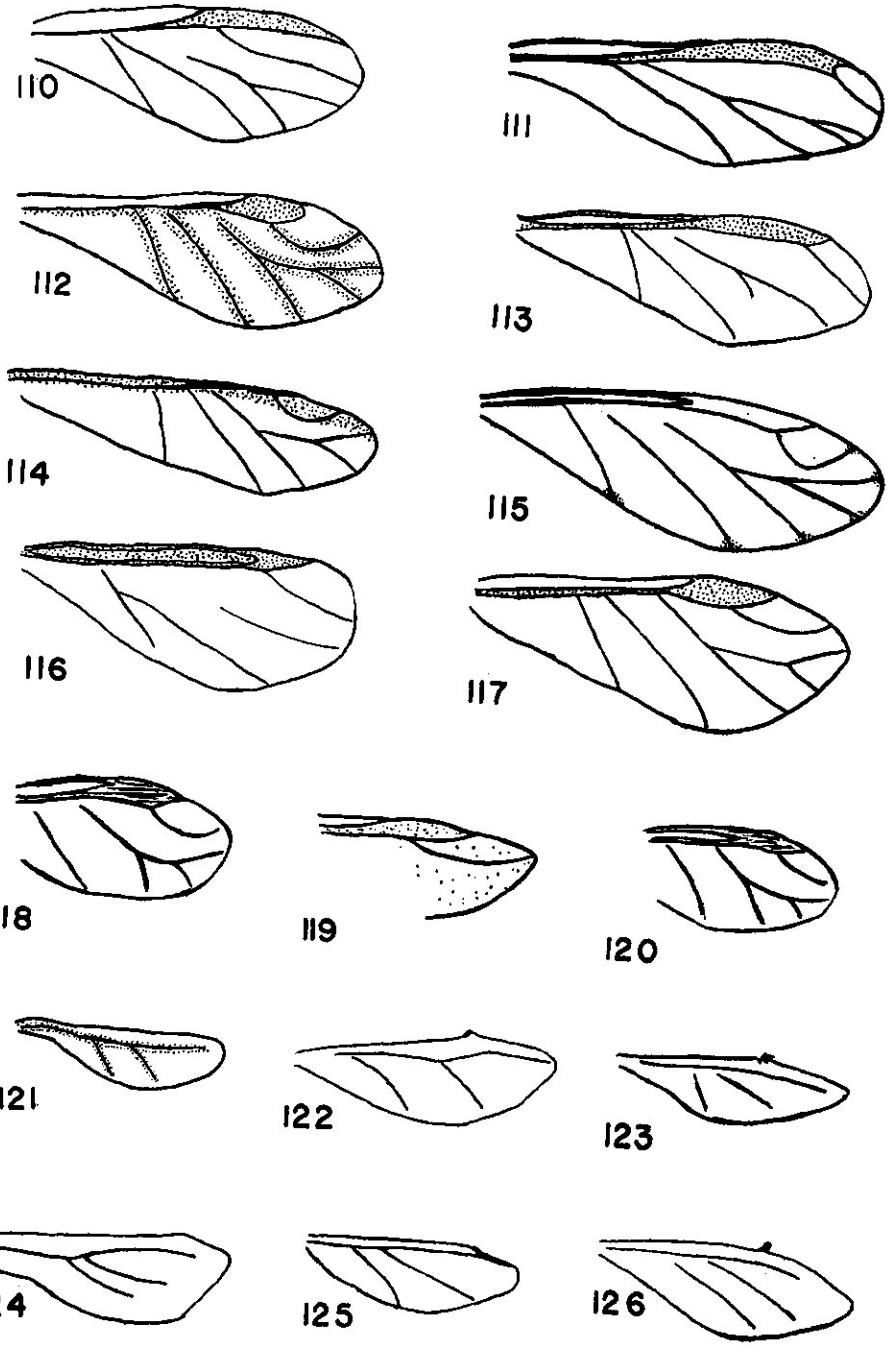
EXPLANATION OF PLATE XXV

Wings

Alate Viviparous Females
Except where otherwise stated

(110). *Mindarus abietinus* Koch fore wing.
(111). *Cinara strobi* (Fitch) fore wing.
(112). *Periphyllus populicolus* (Thomas) fore wing.
(113). *Eulachnus rileyi* (Williams) fore wing.
(114). *Myzocallis bella* (Walsh) fore wing.
(115). *Euceraphis betulae* (Koch) fore wing.
(116). *Hormaphis hamamelidis* (Fitch) fore wing.
(117). *Chaitaphorus populifoliae* (Davis) fore wing.
(118). *Aphis pomi* (De Geer) fore wing.
(119). *Prociphillus venafuscus* (Patch) portion of fore wing.
(120). *Aphis folsomii* (Davis) fore wing.
(121). *Periphyllus populicolus* (Thomas) hind wing.
(122). *Myzus cerasi* (Fabricius) hind wing.
(123). *Eriosoma lanigerum* (Hausmann) hind wing.
(124). *Pemphigus populi-venae* (Fitch) hind wing.
(125). *Cinara strobi* (Fitch) hind wing.
(126). *Eriosoma crataegi* (Oestlund) hind wing.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EXPLANATION OF PLATE XXVI

Heads and Antennae

Alate Viviparous Females
Except where otherwise stated

(127). *Myzocallis alnifoliae* (Fitch) head.
(128). *Aphis fabiae* (Scopoli) head.
(129). *Macrosiphum rosae* (Linn) head.
(130). *Ptercomma populifoliae* (Fitch) head.
(131). *Myzus cerasi* (Fabricius) head.
(132). *Aphis sambucifoliae* (Fitch) head.
(133). *Hormaphis hamamelidis*, (Fitch) three segmented antenna.
(134). *Drepanaphis acerifoliae* (Thomas) sixth segment.
(135). *Eriosoma lanigerum* (Hausmann) third segment.
(136). *Aphis saliceti* (Kaltenbach) sixth segment.
(137). *Calaphis betulacolens* (Fitch) third segment.
(138). *Drepanaphis acerifoliae* (Thomas) sixth segment.
(139). *Amphorophora nebulosa* (Hottes and Frison) third segment.
(140). *Myzocallis alnifoliae* (Fitch) third segment.
(141). *Macrosiphum erigeronesis* (Thomas) oviparous female.
(142). *Chaitophorus populifoliae* (Oestlund) third segment.
(143). *Macrosiphum ambrosiae* (Thomas) third segment, apterous, viviparous female.
(144). *Mindarus abietinus* (Koch) third segment.
(145). *Euceraphis betulae* (Linnaeus) third segment.
(146). *Prociphilus venafuscus* (Patch) (Sexupora) dorsal wax-pore plates of mesothorax.
(147). *Prociphilus corrugatans* (Sirrine) (fundratrigenia) dorsal wax-pore plates of mesothorax.
(148). *Capitaphorus fragaefolii* (Cockerell) apterous viviparous female, globate setae.
(149). *Drepanaphis acerifoliae* (Thomas) alate viviparous female, dorsal abdominal tubercles.


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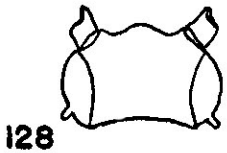
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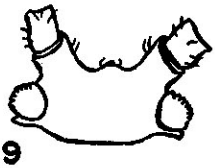
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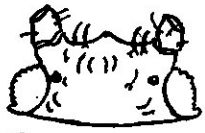
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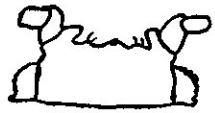
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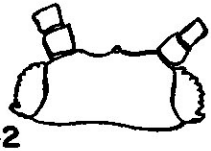
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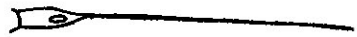
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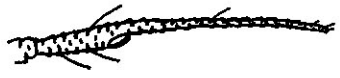
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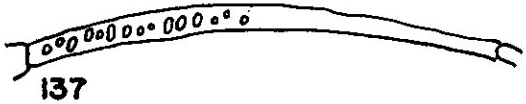
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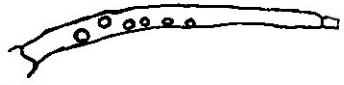
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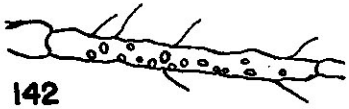
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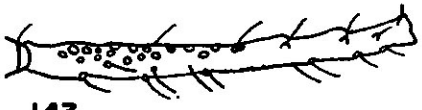
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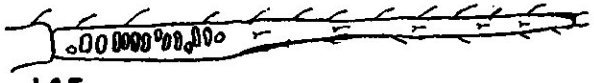
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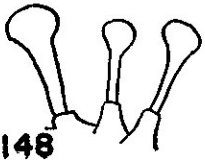
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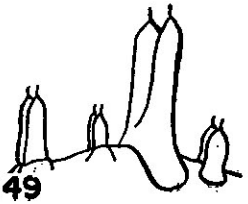
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EXPLANATION OF PLATE XXVII

Cornicles and Caudae

Alate Viviparous Females
Except where otherwise stated

(150). *Amphorophora nebulosa* (Hottes & Frison) cornicles.
(151). *Drepanaphis acerifoliae* (Thomas) cornicle.
(152). *Pterocomma populifoliae* (Fitch) cornicle.
(153). *Macrosiphum ambrosiae* (Thomas) cornicle.
(154). *Aphis folsomii* (Davis) cornicle.
(155). *Pterocomma populifoliae* (Fitch) tip of cornicle.
(156). *Myzus cerasi* (Fabricius) cornicle.
(157). *Chaitophorus populifoliae* (Davis) cornicle.
(158). *Phyllaphis fagi* (Linnaeus) cornicle.
(159). *Macrosiphum rosae* (Linnaeus) cornicle.
(160). *Neosymydobius annulatus* (Koch) cornicle.
(161). *Eriosoma lanigerum* (Hausmann) cornicle.
(162). *Cinara laricis* (Hartig) cornicle.
(163). *Amphorophora nebulosa* (Hottes & Frison) cauda.
(164). *Macrosiphum ambrosiae* (Thomas) cauda.
(165). *Macrosiphum pisi* (Kaltenbach) cauda.
(166). *Aphis spiraephila* (Patch) caudae.
(167). *Myzocallis alnifoliae* (Fitch) cauda.
(168). *Chaitophorus populifoliae* (Oestlund) cauda.
(169). *Macrosiphum rudbeckiae* (Fitch) cauda.
(170). *Aphis sambucifoliae* (Fitch) cauda and anal plate.
(171). *Macrosiphum albifrons* (Essig) cauda.
(172). *Cinara laricis* (Hartig) cauda.
(173). *Neosymydobius annulatus* (Koch) cauda.
(174). *Aphis folsomii* (Davis) cauda.
(175). *Chaitophorus populifoliae* (Davis) color pattern of abdomen.
(176). *Myzocallis walshii* (Monell) anal plate.
(177). *Pterocomma populifoliae* (Fitch) anal plate.
(178). *Aphis pomi* (De Geer) anal plate.
(179). *Phyllaphis fagi* (Linnaeus) anal plate.
(180). *Prociphilus venafuscus* (Patch) anal plate.
(181). *Cinara laricis* (Hartig) anal plate.
(182). *Hormaphis hamamelidis* (Fitch) cauda and anal plate.
(183). *Eriosoma lanigerum* (Hausmann) cauda and anal plate.
(184). *Euceraphis betulae* (Koch) anal plate.

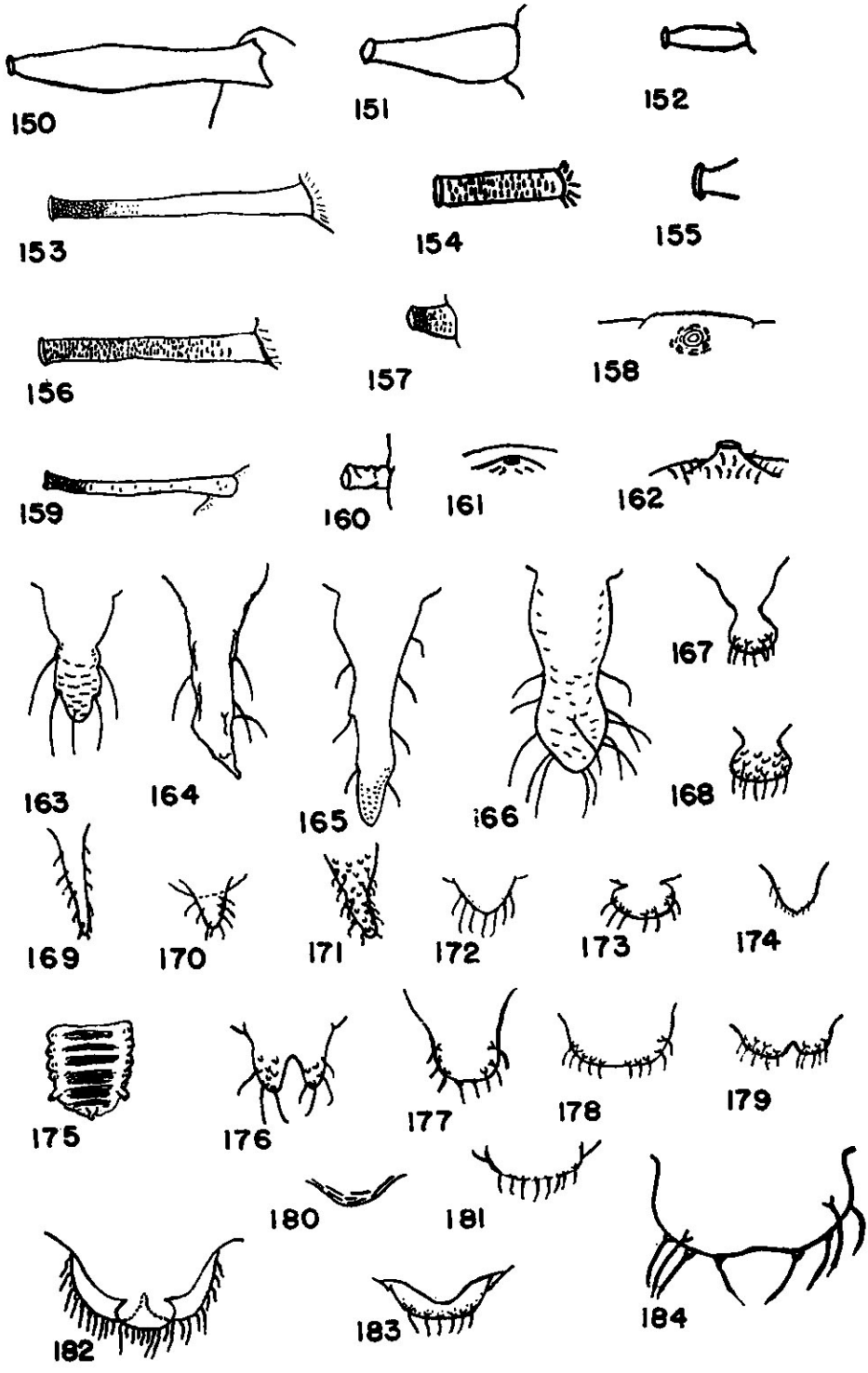
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PLATE XXVIII

(185). Outline map of Nova Scotia, Canada, showing counties referred to in text.


MAP OF
NOVA SCOTIA
64°
62°
60°
48°
46°
44°
66°
PRINCE EDWARD ISLAND
NEW BRUNSWICK
VICTORIA
INVERNESS
CAPE BRETON
RICHMOND
Antigonish
ANTIGONISH
PICTOU
CUMBERLAND
GUYSBOROUGH
COLCHESTER
Wolfville
KINGS
HANTS
HALIFAX
Halifax
ANNAPOLIS
LUNENBURG
DIGBY
QUEENS
YARMOUTH
SHELBURNE
ATLANTIC OCEAN
MILES
0 20 40 60 80 100

INDEX TO GENERA AND SPECIES

The names of all species discussed in this paper are listed under their generic names, and also in alphabetical order.

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