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STUDIES ON BOREAL AGROMYZIDAE (DIPTERA).  
XI. CHROMATOMYIA MINERS ON ELEAGNACEAE

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Chromatomyia species are here reported as leaf-miners on Elaeagnaceae for the first time. These consist of three weakly differentiated North American species, as follows: Chromatomyia shepherdiana n. sp. (type-locality Lake Laberge, Yukon Territory) on Shepherdia canadensis (L.), C. leptargyreae n. sp. (type-locality Elk Island National Park, Alberta) on Shepherdia canadensis (L.), and C. merula (Spencer) on Elaeagnus commutata Bernh.

Quelques espèces de Chromatomyia sont ici signalées pour la première fois comme mineuses dans les feuilles des Elaeagnacées. Elles consistent de trois espèces faiblement différencierées d'Amérique du nord, tel que: Chromatomyia shepherdiana n. sp. (localité-type Lac Laberge, Territoire du Yukon) sur Shepherdia canadensis (L.), C. leptargyreae n. sp. (localité-type Parc National Elk Island, Alberta) sur Shepherdia canadensis (L.) et C. merula (Spencer) sur Elaeagnus commutata Bernh.

Chromatomyia-Arten werden hier erstmals als Elaeagnaceae-Blattminierer nachgewiesen, und zwar folgende drei nur geringfügig voneinander abweichende nordamerikanische Arten: Chromatomyia shepherdiana n. sp. (Fundort des Typus: Lake Laberge, Yukon Territorium) an Shepherdia canadensis (L.), C. leptargyreae n. sp. (Fundort des Typus: Elk Island Nationalpark, Alberta) an Shepherdia canadensis (L.), und C. merula (Spencer) an Elaeagnus commutata Bernh.

Previously the only Agromyzidae reported as leaf-miners of Elaeagnaceae in boreal regions have been species of *Amauromyza*, namely *A. elaeagni* (Rohdendorf-Holmanová) in Europe and *A. shepherdiae* Sehgal in Alberta. However, these plants also support, at least in North America, a group of host-specific *Chromatomyia* leaf-miners. Only one of these, *C. merula* (Spencer), has previously been described (Spencer, 1969), and that from a caught specimen. However, the mines are quite common and I have succeeded in rearing several series. *Chromatomyia* mines on Elaeagnaceae can be readily distinguished in the field from those of *Amauromyza* by the manner of pupation: the larvae of *Chromatomyia* form puparia within the leaf (with their anterior spiracles projecting ventrally through the epidermis), while those of *Amauromyza* leave the leaf through an exit slit after completing their feeding.

My bred material of *Chromatomyia* is referable to three taxa, differentiated mainly in respect of their costal ratio, eye size (and, in correlation with this, the relative genal height), form of mine, and choice of host-plant. I am not able to detect any significant differences in the aedeagus (the most precise indicator of specific identity in most agromyzids). It is perhaps debatable whether all three taxa are distinct at the level of full species. In particular, it is possible that *C. shepherdiana* n. sp. and *C. leptargyreae* n. sp., which feed on the same host-plant, are geographical races (subspecies) of a single species. However, the morphological differences between them are of the same kind as those differentiating *C. merula* (Spencer), which is surely distinct at the species level as it is sympatric at least with *C. shepherdiana*. On balance I have therefore decided to regard all three taxa as full species, at least until further information is available.

The holotypes of the new species will be deposited in the Canadian National Collection (Ottawa). For explanation of my use of terms and abbreviations, and for introductory information on *Chromatomyia*, see Parts I and V of this series (Griffiths, 1972 & 1974).

## DIAGNOSIS

The key to North American species of *Chromatomyia* given in Part V (Griffiths, 1974) is amended as below to incorporate the two new species described in this paper. Note also that I have revised the description "supporting sclerite forked" given in the original key as a character of *C. merula* (Spencer). This was based on a misunderstanding of one of Spencer's (1969) figures. The forked structures in question are formed by fusion of the sclerites of the medial lobe with sclerites below the ejaculatory duct.

Amendment to Key to North American Species of *Chromatomyia* (Griffiths, 1974: 39).

- |          |  |
|----------|--|
| 8. (5)   | Aedeagus as Fig. 1-3, with sclerites of medial lobe fused at base with pair of slender sclerites supporting terminal section of ejaculatory duct (sclerotization hence with characteristic forked appearance in anterior view, as Fig. 2) . . . . . 8a |
| —        | Aedeagus not as above . . . . . 9  |
| 8a. (8)  | Costal ratio $mg_2/mg_4$ 1.7-2.2. Eyes small (genae in middle 0.4-0.6 times eye height, as Fig. 6) . . . . . <i>C. merula</i> (Spencer)  |
| —        | Costal ratio $mg_2/mg_4$ 2.45-3.1 . . . . . 8b   |
| 8b. (8a) | Genae in middle 0.25-0.4 times eye height . . . . . <i>C. shepherdiana</i> n. sp.  |
| —        | Genae narrow, in middle only 0.15-0.25 times eye height (Fig. 7) . . . . . <i>C. leptargyreae</i> n. sp.   |

## TREATMENT OF SPECIES

*Chromatomyia shepherdiana* new species

*Adult.* — Head with orbits not or only slightly projecting above eye in lateral view; genae in middle 0.25 - 0.4 times eye height (intermediate between Fig. 6 and 7); eyes with fine inconspicuous pubescence. Frons at level of front ocellus about twice width of eye. Ores directed posteriorly, ori directed inwardly; normally two ores, posterior as long as or slightly shorter than anterior (but posterior ores absent from one side in one female; in two specimens additional short third ore on one side); normally two ori (but with additional short third ori on one side in one female), anterior in most specimens about half as long as posterior, but varying from fully as long (on one side in two females) to absent (on one side in two specimens); orbital setulae one-rowed. Peristomal margin with vibrissa and 3-5 upcurved peristomal setulae. Third antennal article rounded distally, with short pubescence.

3 + 1 dc; acr numerous, in 5-7 rows anteriorly; presutural ia numerous; 5-14 postsutural ia; inner pa 1/3 to 1/2 as long as outer pa.

Second cross-vein (m-m) absent. Costal ratio  $mg_2/mg_4$  2.45 - 2.9 (means: ♂, 2.6; ♀, 2.7). Wing length: ♂, 2.3 - 2.65 mm (mean 2.45 mm); ♀, 2.0 - 2.8 mm (mean 2.6 mm).

Colour largely dark. Frons largely brown or grey-brown (in two females becoming yellow-brown posteriorly), with upper part of orbits, vertex and ocellar plate black; face brown to grey-black; genae pale brown to brown. Antennae with first article yellow-brown to brown, second article dark brown to black, third article black. Palpi black; labella yellow. Thorax finely grey-dusted over black ground-colour, moderately shining, with contrastingly pale coloration along seams of sutures (especially notopleural and mesopleural sutures), in some specimens with sutural triangle brownish (slightly paler than rest of mesonotum); wing base yellowish white; squamae yellowish white or somewhat infuscated (greyish), with dark fringe. Legs with coxae, trochanters and femora largely dark, with tips of femora contrastingly yellow; tibiae with yellowish or yellowish brown bases and apices, dark medially; tarsi yellow-brown to red-brown. Abdomen largely dark brown, in many specimens narrowly yellowish on sides at base. Basal cone of ovipositor (♀) grey-dusted on about basal half.

Male postabdomen with 8th sternum more or less fused with 6th tergum along variably distinct suture line. Telomeres not delimited from periandrium, indicated by dense group of short setulae. Pregonites with only very short, scarcely pigmented ventral extensions. Aedeagus as Fig. 1-3; sclerites of medial lobe slender, fused at base with pair of slender sclerites supporting terminal section of ejaculatory duct (sclerotization hence appearing forked in anterior view, as Fig. 2); small subtriangular sclerites between this forked sclerotization and apex of basal sclerites; supporting sclerite complex (in "dorsal" lobe) consisting of pair of apically convergent lateral sclerites and small narrow forked sclerite on centre-line. Ejaculatory apodeme (Fig. 4) fan-shaped, very small, only weakly pigmented.

*Puparium and third instar larva.* — Mandibles with two alternating teeth; right mandible longer than left. Anterior spiracles with two equal horns, with 12 - 16 bulbs in irregular ellipse; posterior spiracles on short conical projections, with 11-16 bulbs in partly open, broad ellipse; pair of prominent tubercles situated below posterior spiracles on either side of anus. Puparium

golden yellow to red-brown, 1.9 - 2.4 mm long.

*Mine.* — Larvae leaf-miners on *Shepherdia canadensis* (L.). Mine (Fig. 8) mainly linear, but becoming blotchy or at least broadly linear terminally, formed entirely on upper surface of leaf, appearing white or greenish white in reflected light when fresh; faeces deposited mostly in conspicuous beaded strips or threads. Puparium formed in most cases on upper surface of leaf, with its ventral surface adjacent to surface of leaf, with its anterior spiracles projecting ventrally through epidermis.

*Types.* — Holotype ♂, 1 ♂ 4 ♀♀ paratypes from larvae 29-30.viii.69 on *Shepherdia canadensis* (L.), Lake Laberge ( $61^{\circ} 5'N$ ,  $135^{\circ} 12'W$ ), Yukon Territory, emerged 14-18.v.70, leg. G. C. D. Griffiths. 1 ♂ 2 ♀♀ paratypes from puparia 20-28.vii.72 on *Shepherdia canadensis* (L.), near S end Kluane Lake (Wallace Mountain at 3500-4000 feet elevation), Yukon Territory, emerged 8.viii.72 (1 ♀) and 8-9.v.73, leg. G. C. D. Griffiths. 6 ♂♂ 6 ♀♀ paratypes from larvae and puparia 2.ix.73 on *Shepherdia canadensis* (L.), Jasper National Park (Meadow Creek Trail, 1 mile S Geikie; 5000 feet elevation), Alberta, emerged 26-30.iv.74, leg. G. C. D. Griffiths. 1 ♂ paratype (caught), 19.vi.66, Jasper National Park (near Jasper townsite), Alberta, leg. K. A. Spencer (designated as paratype of *merula* by Spencer, 1969).

*Remarks.* — Besides the localities listed above, I also refer to this species a small sample of mines collected 31.viii.69 on the East shore of Lake Teslin, Yukon Territory. It is evident from these records that this species is widely distributed in the Canadian Rockies and Yukon Territory. However it seems replaced in East-Central Alberta by the species next to be described.

As an isolated morphological anomaly I noted that in one female the 6th tergum is divided centrally.

#### *Chromatomyia leptargyreae* new species

*Adult.* — As described for *C. shepherdiana*, except as follows.

Genae narrower, in middle only 0.15 - 0.25 times eye height (Fig. 7). Acr in 4-7 rows anteriorly; 7-12 postsutural ia. Costal ratio  $mg_2/mg_4$  2.6 - 3.1 (mean 2.8). Wing length: ♂, 2.1 - 2.2 mm; ♀, 2.2 - 2.45 mm.

Colour somewhat paler on average. Frons largely yellow-brown to brown; face yellow-brown to brown; genae yellow-brown to brown. Second antennal article yellow-brown to brown. Mesonotum in most specimens distinctly yellow-brown on sides, especially on sutural triangle, postalar callus and corners of humeral callus. Legs with anterior trochanters and apices of anterior coxae yellow to yellow-brown; tarsi and apices of tibiae deep yellow.

Male postabdomen and genitalia as described for *C. shepherdiana*, except that the ejaculatory apodeme (Fig. 5) is narrower (scarcely fan-shaped) and even smaller.

*Puparium and third instar larva.* — As in *C. shepherdiana*. Anterior spiracles with 15-17 bulbs; posterior spiracles with 11 - 17 bulbs. Puparium golden yellow to yellow-brown, 1.9 - 2.4 mm long.

*Mine.* — Larvae leaf-miners on *Shepherdia canadensis* (L.). Mine (Fig. 9) entirely linear, 7-9 cm long, 2 - 2.5 mm wide terminally, appearing white or greenish white in reflected light when fresh; faeces deposited mostly in conspicuous beaded strips or threads; mine formed entirely on upper surface of leaf, but with puparium formation following in most cases on lower surface near end of mine channel. Puparium with its ventral surface adjacent to surface of leaf, with its anterior spiracles projecting ventrally through epidermis.

*Types.* — Holotype ♂, 2 ♂♂ 1 ♀ paratypes from larvae and puparia 24.vi-29.vii.71 on *Shepherdia canadensis* (L.), Elk Island National Park (isolated mines collected at many different sites throughout park), Alberta, emerged 13-18.vii.71 (3 ♂♂) and 13.v.72 (1 ♀), leg. G. C. D. Griffiths. 3 ♂♂ 2 ♀♀ paratypes from larvae and puparia 1-2.vii.75 on *Shepherdia canadensis* (L.), George Lake Field Station, Alberta, emerged 12-17.vii.75, leg. G. C. D. Griffiths.

*Remarks.* — The specific epithet *leptargyreae* is based on *Leptargyrea* ("lightly silvered"), a synonym of *Shepherdia*. I have chosen the spelling which seems to me linguistically preferable over the other variants (such as *Lepargyreia* and *Lepargyraea*).

The clearest distinctions between this species and *C. shepherdiana* lie in the larger eyes (and consequently smaller relative genal height) and in the form of the leaf mines. The colour differences are not as clear-cut as might be wished, since a few of the palest specimens of *C. shepherdiana* could be confused with darker specimens of this species.

*Chromatomyia merula* (Spencer 1969)

*Phytomyza merula* Spencer, 1969: 254. Holotype ♂, Jasper (Alberta), in K. A. Spencer's collection.

*Chromatomyia merula* (Spencer). Griffiths, 1974: 37.

*Adult.* — As described for *C. shepherdiana*, except as follows.

Eyes smaller, margined ventrally by conspicuously broad "cheeks"; genae in middle 0.4 - 0.6 times eye height (Fig. 6). Acr 4-rowed anteriorly; 5-7 postsutural ia. Costal ratio  $mg_2/mg_4$  1.7 (holotype ♂), 2.2 (♀). Wing length: ♂, 2.25 mm; ♀, 2.35 mm.

Colour more uniformly dark. Frons largely blackish, becoming brown only posteriorly on either side of ocellar plate; genae dark brown. Mesonotum uniformly black (sutural triangle not paler). Legs somewhat darker, with only tips of femora contrastingly yellow; tarsi and apices of tibiae dark brown.

Male postabdomen and genitalia as described for *C. shepherdiana*. (Ejaculatory apodeme lost).

The aedeagus has been figured by Spencer (1969).

*Puparium and third instar larva.* — As in *C. shepherdiana*. Anterior spiracles with 13-15 bulbs; posterior spiracles with 14-17 bulbs. Puparium dark red-brown, 2.3 mm long.

*Mine.* — Larvae leaf-miners on *Elaeagnus commutata* Bernh. Mine (Fig. 10) entirely linear, 5-7 cm long, 2-3 mm wide terminally, formed entirely on upper surface of leaf, appearing white or greenish white in reflected light when fresh; faeces deposited mostly in beaded strips or threads. Puparium formed at end of mine channel, with its ventral surface adjacent to upper surface of leaf, with its anterior spiracles projecting ventrally through epidermis.

*Material examined.* — Holotype ♂ (caught), 16.vi.66, Jasper National Park (near Jasper townsite), Alberta, leg. K. A. Spencer. 1 ♀ from puparium 25.vii.72 on *Elaeagnus commutata* Bernh., near S. end Kluane Lake (gravel bar in Sheep Creek at 2800 feet elevation), Yukon Territory, emerged 9.viii.72, leg. D. E. Griffiths.

*Remarks.* — I am not able to detect any significant difference between the aedeagus of this species and those of the two preceding on the basis of the single preparation available. However the smaller eyes and lower costal ratio should serve to distinguish it readily. On the basis of these characters I can only associate Spencer's holotype with my female bred from *Elaeagnus*. Since *Elaeagnus* is abundant in the Athabasca Valley around Jasper, this association seems highly credible. But note that Spencer's paratype (not taken together with the holotype, as might seem implied in his description) has narrower genae and a higher costal ratio. I refer it to *C. shepherdiana*.

I have also collected *Chromatomyia* mines on *Elaeagnus commutata* Bernh. at Edmonton (slopes of river valley, 20.vii.70) and in Elk Island National Park (Elk Island in Astotin Lake, 20.vii.71 and 18.ix.71). These are probably referable to *C. merula*, but I obtained no flies to confirm this.

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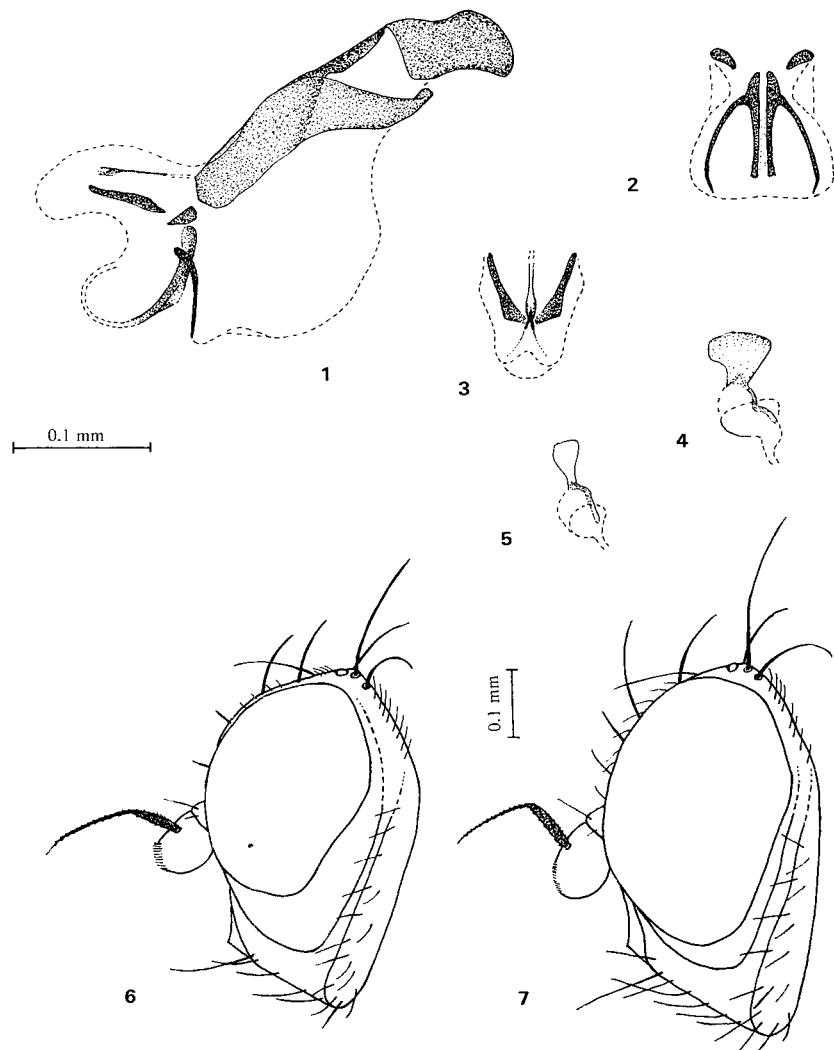


Fig. 1-4. *Chromatomyia shepherdiana* n. sp., holotype ♂: 1, aedeagus in left lateral view; 2, distal section and medial lobe of aedeagus in anterior view; 3, dorsal lobe of aedeagus in ventral view; 4, ejaculatory bulb and apodeme. Fig. 5. *Chromatomyia leptargyreae* n. sp. (holotype ♂), ejaculatory bulb and apodeme. Fig. 6. *Chromatomyia merula* (Spencer) (Yukon), head in left lateral view. Fig. 7. *Chromatomyia leptargyreae* n. sp., head in left lateral view.

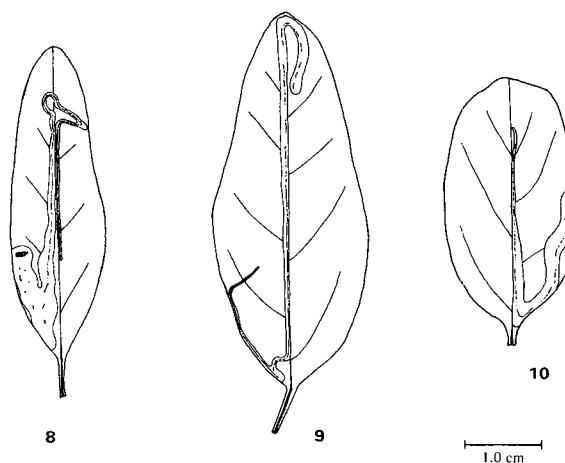


Fig. 8-9. Leaves of *Shepherdia canadensis* (L.) with mines of: 8, *Chromatomyia shepherdiana* n. sp. 9, *Chromatomyia leptargyreae* n. sp. Fig. 10. Leaf of *Elaeagnus commutata* Bernh. with mine of *Chromatomyia merula* (Spencer).