

STUDIES ON BOREAL AGROMYZIDAE (DIPTERA). XIII.
SOME *PHYTOMYZA* AND *CHROMATOMYIA* MINERS ON
CICHORIEAE (COMPOSITAE)

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The *Phytomyza* miners of Cichorieae belong to two groups, the *P. albiceps* group and the *P. robustella* group. Only the former is reviewed here. All the European material proves referable to a single species with wide host-range, *P. marginella* Fallén (with many synonyms), with the exception of *P. aposeridis* Groschke bred from *Aposeris* in Bavaria. A new species with wide host-range, *P. columbiana* n.sp. (type-locality Sitka, Alaska), is found in northwestern North America. North American material of *Chromatomyia* bred from Cichorieae is also reviewed. The following four species are represented: *C. syngenesiae* Hardy (polyphagous), *C. senecionella* (Sehgal) on *Hieracium* (previously known from *Senecio* and *Petasites*), *C. ixeridopsis* n.sp. on "Crepis" sect. *Ixeridopsis* (type-locality Kluane Lake, Yukon Territory) and *C. lactuca* (Frost) on ruderal species of *Crepidinae*.

Les *Phytomyza* mineurs de Cichorieae appartiennent à deux groupes, le groupe *P. albiceps* et le groupe *P. robustella*. Seulement le premier est révisé ici. Tous le matériel Européen ne réfère qu' à une seule espèce vivant sur plusieurs hôtes, *P. marginella* Fallén (avec beaucoup de synonymes), avec l'exception de *P. aposeridis* Groschke élevée de l'*Aposeris* en Bavière. Une espèce nouvelle vivant sur plusieurs hôtes, *P. columbiana* n.sp. (localité-type Sitka, Alaska), est trouvée dans le nord-ouest d'Amérique du nord. Matériel de *Chromatomyia* élevé de Cichorieae dans l'Amérique du nord est aussi révisé. Quatre espèces y sont représentées, tel que: *C. syngenesiae* Hardy (polyphage), *C. senecionella* (Sehgal) sur l'*Hieracium* (connue de *Senecio* et *Petasites* auparavant), *C. ixeridopsis* n.sp. sur la "Crepis" sect. *Ixeridopsis* (localité-type Lac Kluane, Territoire du Yukon) et *C. lactuca* (Frost) sur des espèces rudérales de *Crepidinae*.

Die *Phytomyza*-Minierer von Cichorieae gehören zu zwei Gruppen, der *P. albiceps*-Gruppe und der *P. robustella*-Gruppe. Nur erstere wird hier revidiert. Das ganze europäische Material erweist sich als einer einzigen Art, *P. marginella* Fallén (mit vielen Synonymen), mit breitem Wirtsareale zugehörig, mit Ausnahme der in Bayern aus *Aposeris* gezüchteten *P. aposeridis* Groschke. Eine neue Art mit breitem Wirkskreis, *P. columbiana* n.sp. (Fundort des Typus: Sitka, Alaska) wurde im nordwestlichen Nordamerika gefunden. Nordamerikanisches Material von *Chromatomyia*, gezüchtet aus Cichorieae, wird ebenfalls revidiert, und zwar folgende vier Arten: *C. syngenesiae* Hardy (polyphag), *C. senecionella* (Sehgal) an *Hieracium* (bisher aus *Senecio* und *Petasites* bekannt), *C. ixeridopsis* n.sp. an "Crepis" sect. *Ixeridopsis* (Fundort des Typus: Kluane Lake, Yukon Territorium) und *C. lactuca* (Frost) an für Ruderalstellen typischen *Crepidinae*-Arten.

This paper fills certain gaps in the treatment of Compositae-miners previously presented in Parts II, VI, VII, VIII and XII of this series (Griffiths, 1972b, 1974b, 1974c, 1974d and 1976). The *Phytomyza* miners of Cichorieae belong to the same two groups recorded from other Compositae, namely the *P. albiceps* group and the *P. robustella* group (as defined in Parts II and VI). I present here a complete treatment of the available material of the former group, which is reducible to only three species after account has been taken of several synonyms and doubtful or erroneous records. I do not treat the *P. robustella* group in this paper, since it is the intention of M. von Tschirnhaus to prepare a revision of the European species of this group (of which he has much new material). I have not bred any member of this group from Cichorieae in North America, although in Europe there is a considerable radiation of species whose larvae produce swellings ("gall-mines") in leaf bases.

The *Chromatomyia* miners of Cichorieae consist of species of the *C. syngenesiae* group (some confined to Cichorieae, some with wider host ranges) and the closely related *C. lactuca* (Frost). Information for the Old World is already available in the literature; see especially

Griffiths (1967) and von Tschirnhaus (1969). However, I have some interesting new North American material, which makes a complete review for this continent opportune.

My use of botanical names generally accords with Hultén (1968) for North American species, and with Rothmaler (1963) for European species. Descriptive terms and abbreviations were explained in the first paper of this series (Griffiths, 1972a).

The holotypes of the two new species will be deposited in the Canadian National Collection (Ottawa).

DIAGNOSIS

Amendments to my previously published keys to incorporate the two new North American species described in this paper are given below. The original key to North American species of the *Phytomyza albiceps* group was published in Part VI (Griffiths, 1974b), with consolidated amendments given in Part XII (Griffiths, 1976). The couplet now to be further amended was included in the latter. Similarly, my original key to North American species of *Chromatomyia* was given in Part V (Griffiths, 1974a), but the amendment now proposed further expands an amendment given subsequently in Part VII (Griffiths, 1974c).

Amendment to key to North American species of *Phytomyza albiceps* group (as previously amended in Griffiths, 1976).

18. Aedeagus as Fig. 4-6, with spinules mostly arranged in three groups, (i) distal row on right side towards centre-line, (ii) row at same level on left side, and (iii) more basally situated compact group anterior to angle of right basal sclerite. Sides of mesonotum extensively yellowish *P. columbiana* n.sp.
 — Aedeagus with spinules arranged otherwise (if basally situated compact group present, then row on right side absent) 18a
 18a-18e (as previous couplets 18-18d)

Amendment to key to North American species of *Chromatomyia* (as previously amended in Griffiths, 1974c: 218)

3. Sac below distal tubule of aedeagus strengthened by well-defined V-shaped sclerotization (Fig. 8). Centre of frons dark brown
 *C. ixeridopsis* n.sp.
 — Sac below distal tubule without or with only weakly differentiated sclerotization. Centre of frons paler (yellow to orange-brown) 3a
 3a-3b (as previous couplets 3-3a)

Amendment to key to adults of *Chromatomyia syngenesiae* group (Griffiths, 1974c: 217)

3. Aedeagus as Fig. 8, with sac below distal tubule strengthened by well-defined V-shaped sclerotization. Centre of frons dark brown
 *C. ixeridopsis* n.sp.
 — Sac below distal tubule without or with only weakly differentiated sclerotization. Centre of frons paler (yellow to orange-brown) 3a
 3a. (as previous couplet 3)

TREATMENT OF SPECIES

(a) the *Phytomyza albiceps* group*Phytomyza marginella* Fallén 1823

- Phytomyza marginella* Fallén. Fallén, 1823: 3. Rydén, 1953: 14. Spencer, 1965: 254. Holotype ♀, Skåne (Sweden), in Zoological Institute, University of Lund.
- Phytomyza sonchi* Robineau-Desvoidy. Robineau-Desvoidy, 1851: 400. Hendel, 1935: 481. De Meijere, 1937: 231. - 1943: 73. Holotype ♂, Cherbourg (France), not traced (presumably mislabelled in Bigot collection in University Museum, Oxford). Synonymy after Spencer, 1965: 254.
- Phytomyza lampsanae* Hering. Hering, 1925: 161. - 1927: 121. - 1932: 174. De Meijere, 1926: 267. Hendel, 1927: 255. Holotype ♂, Bavaria (Germany), in Zoologisches Museum, Humboldt Universität, Berlin. Synonymized with *P. sonchi* Robineau-Desvoidy (1851) by Hendel, 1935: 481.
- Phytomyza insperata* Hendel. Hendel, 1927: 262. Holotype ♀, Vienna (Austria), in Naturhistorisches Museum, Vienna. Synonymized with *P. sonchi* Robineau-Desvoidy (1851) by Hendel, 1935: 481.
- Phytomyza prenanthidis* Hering. Hering, 1932: 171. Holotype ♀, Pfäfers (Switzerland), in Zoologisches Museum, Humboldt Universität, Berlin. Synonymized with *P. sonchi* Robineau-Desvoidy (1851) by Hendel, 1935: 481.
- Phytomyza mulgedii* Hering. Hering, 1932: 173. Holotype ♂, Berlin (Germany), in Zoologisches Museum, Humboldt Universität, Berlin. Synonymized with *P. sonchi* Robineau-Desvoidy (1851) by Hendel, 1935: 481.
- Phytomyza hieracina* Hering. Hering, 1932: 1974. Holotype ♂, Bavaria (Germany), in Zoologisches Museum, Humboldt Universität, Berlin. Synonymized with *P. sonchi* Robineau-Desvoidy (1851) by Hendel, 1935: 481.
- Phytomyza sonchinea* Hering. Hering, 1934: 69. Syntypes ♂♀, Skåne (Sweden), in Zoologisches Museum, Humboldt Universität, Berlin. Synonymized with *P. sonchi* Robineau-Desvoidy (1851) by Hendel, 1935: 481.
- "*Phytomyza sonchi cicerbitae* Hendel". Hering, 1936: 153. (nomen nudum).
- Phytomyza sonchi mulgedii* Hering. Hering, 1936: 154.
- Phytomyza* sp. Hering, 1936: 183 (no. 900), 304 (no. 1494).
- Phytomyza sonchi lampsanae* Hering. Hering, 1936: 295.
- Agromyzide. Hering, 1937: 364 (no. 1823).
- Phytomyza sonchi prenanthidis* Hering. Hering, 1937: 406.
- Phytomyza sonchi hieracina* Hering. Hering, 1957: 532.

Adult. — Head with orbits not or only narrowly projecting above eye in lateral view; genae in middle 0.2 - 0.3 times eye height; eyes with only sparse fine pubescence. Frons at level of front ocellus 1.75 - 2 times width of eye. Ors directed posteriorly, ori directed inwardly; posterior ors strong, 0.6 times to fully as long as anterior ors; anterior ori variably developed, 0.2 - 0.8 times as long as posterior ori (also short third pair of ori in one specimen, holotype of the synonymous *P. hieracina*); orbital setulae more or less one-rowed. Peristomal margin with vibrissa, 1 - 2 similarly directed setulae near this and 3 - 6 up-curved peristomal setulae. Third antennal article rounded distally, with rather short pubescence.

3 + 1 dc; acr in 3 - 5 rows; 7 - 22 presutural ia; 6 - 14 postsutural ia; inner pa about half as long as outer pa.

Second cross-vein (m-m) absent. Costal ratio mg_2/mg_4 3.4 - 4.5 (mean 3.85). Wing length: ♂, 2.2 - 2.6 mm (mean 2.45 mm); ♀, 2.5 - 3.25 mm (mean 2.9 mm).

Frons and orbits yellow, except dark ocellar plate and vertex (vte on dark ground; vti more or less on boundary between dark and yellow ground). Face entirely deep yellow or at most weakly infuscated (brownish) in antennal pits. Genae yellow. Occiput entirely dark or becoming yellow-brown at sides ventrally. Antennae with first article yellow, second article brown to dark brown, third article dark brown to black. Palpi brown to black; labella yellow. Mesonotum dark centrally (finely grey-dusted over grey-brown to black ground-colour, only weakly shining), but with strongly contrasting whitish yellow side bands which enclose the humeral calli (indicated by brownish patch in centre) and extend posteriorly to the postalar calli (outer pa on boundary between yellow and dark ground); small whitish yellow patches also before corners of scutellum (posterior to inner pa); scutellum largely dark (grey-brown to black), with traces of yellow coloration only at basal corners; pleura largely dark, but with whitish yellow coloration around anterior spiracle, on dorsal margin and posterodorsal corner of mesopleuron and along sutures. Wing base and squamae yellowish white, latter with dark fringe. Legs with coxae, trochanters and femora largely dark, with tips of femora contrastingly yellow; tibiae yellowish at base, becoming brown to dark brown distally; tarsi yellow-brown to brown. Abdomen varying from yellow-brown with sides and posterior margins of terga yellowish to almost entirely dark brown. Basal cone of ovipositor (♀) entirely grey-dusted.

Male postabdomen with 8th sternum fused with 6th tergum. Telomeres represented by densely setulose apical lobes of perianthrium, not delimited by suture. Pregonites with rather small unpigmented ventral extensions. Aedeagus as Fig. 2; basal section with spinules arranged in pair of bands above basal sclerites (that on left side with 12 - 19 spinules; that on right extending further basally, with 21 - 25 spinules); sclerites of medial lobe relatively short, fused distally to form symmetrical V in ventral view, appearing slightly recurved in lateral view; distal section with pair of strongly pigmented, parallel or only weakly divergent terminal tubules (distiphallus) arising from cylindrical area of sclerotization, pigmented dorsally only,

about ejaculatory duct. Ejaculatory apodeme as Fig. 3.

The aedeagus of a specimen bred from *Sonchus oleraceus* L. has been figured by Spencer (1965).

Puparium and third instar larva. — Described by de Meijere (1926, 1937, 1943) (as *P. lamsanae* and *P. sonchi*). Mandibles with two alternating teeth; right mandible longer than left. Anterior spiracles with two short horns, with 9 - 15 bulbs in widely open ellipse; posterior spiracles on short conical projections, with 22 - 30 bulbs in narrow, partly open ellipse (irregular in higher part of range of bulb numbers). Puparia dark brown to black, 2.1 - 2.2 mm long; anal lobes not prominent.

Mine. — Larvae leaf-miners on Leontodontinae and Crepidinae. Mine long (up to 25 cm), basically linear throughout (1.5 - 3 mm wide terminally) but highly convolute and in some cases with secondarily blotchy areas, in most cases formed largely on lower surface of leaf with only terminal channels on upper surface (but occasional mines formed largely or entirely on upper surface), appearing whitish or greenish white in reflected light when fresh; faeces deposited as fine particles, all discrete in most mines but in a few partly forming short beaded strips; larva leaving leaf through semicircular slit, in most cases on upper surface, before puparium formation.

Figures of the mine on several different host-plants have been given by Hering (1957) (as *P. sonchi*) and Rydén (1934) (as *P. lamsanae*).

Material examined. — 1 ♂ from larva 7.vii.24 on *Lapsana* (= *Lampsana*) *communis* L., Passau (Bayrische Wald), Germany, emerged 1.viii.24, leg. O. & M. Hering (no. 2545) (holotype of *P. lamsanae*). 1 ♀ labelled (probably erroneously) as bred from larva 13.x.24 on *Solidago*, Bisamberg (near Vienna), Austria, emerged 27.ii.25 (forced), leg. F. Hendel (holotype of *P. insperata*). 1 ♀ from larva end-vi.25 on *Prenanthes purpurea* L., Pfäfers, Switzerland, emerged 20.vii.25, leg. W. Hopp (no. 2716) (holotype of *P. prenanthidis*). 1 ♂ from larva 17.vi.20 on *Cicerbita* (= *Mulgedium*) *alpina* (L.), Berlin Botanical Garden, Germany, emerged 9.vii.20, leg. M. Hering (no. 1526) (holotype of *P. mulgedii*). 1 ♂ from larva on *Hieracium vulgatum* Fries, Passau (Bayrische Wald), Germany, emerged 4.viii.24, leg. O. & M. Hering (no. 2566) (holotype of *P. hieracina*). 1♂ 1♀ from larvae on *Sonchus oleraceus* L., Hälsingborg (Skåne), Sweden, emerged 19.ii.33 (forced), leg. N. Rydén (syntypes of *P. sonchina*).

1♀ (caught), Budapest, Hungary, 15.ix.12, leg. Györfly (from Hendel collection). 2♀♀ (caught), Bad Villach, Austria, 30.vii.27, leg. Oldenberg (from Hendel collection). 1♂ (caught) without locality label (presumably Austria), 10.viii.25, leg. Oldenberg. 2♂♂ from larvae on *Lapsana communis* L., Słupsk (Stolp), Pomerania, Poland, emerged 20-24.ii.25 (forced), leg. O. Karl. 1♂ 1♀ from larvae 15.ix.61 on *Mycelis muralis* (L.), Penrice, Gower Peninsula, Wales, emerged 9-11.x.61, leg. G.C.D. Griffiths; also two preparations of larvae from this sample. 1♀ from larva 18.x.53 on *Mycelis muralis* (L.), Mickleham, Surrey, England, emerged 27.xi.53, leg. G.C.D. Griffiths. 1♀ from larva 6.ix.54 on *Hieracium sabaudum* agg., Chilworth, Surrey, England, emerged 3.x.54, leg. G.C.D. Griffiths.

Host range. — The host range of this species may be described as all large-leaved Crepidinae (in sense of Stebbins, 1953) available in North-Central Europe, with the possible exception of *Aposeris*, and, less frequently, *Leontodon* and *Picris* belonging to the Leontodontinae. The omission of *Aposeris* may, however, be fortuitous, since this plant has rarely been examined. Since there is no evidence of differences in host selection in different areas, it is convenient to summarize the host records separately from the geographical distribution. All except the most recent records were attributed to *P. sonchi* or one of the other synonyms.

Leontodon. — Reported by Buhr (1964) as occurring uncommonly on *L. autumnalis* L. and *L. hispidus* L.; also entered under *Leontodon* as *Phytomyza* sp. (no. 1494) in Hering (1936).

Picris (= *Helminthia*). — Entry no. 1823 under *Picris* in Hering's (1937) key was subsequently attributed by him to this species (for the reprinted figure of the leaf mine is attributed to *P. sonchi* in his 1957 book); de Meijere (1943) describes a larva collected by Buhr on *Picris echioides* L.; also sheet of *Picris hieracioides* L. from Rostock Botanical Garden in Hering's mine herbarium.

Sonchus. — The synonymous *P. sonchi* Robineau-Desvoidy and *P. sonchina* Hering were bred from *S. oleraceus* L.; there are several additional published records for this host as well as for *S. asper* (L.) and *S. arvensis* L., and also a single record for *S. paluster* L. (Nowakowski, 1954).

Reichardia. — Reported without details in Hering's (1957) key.

Hieracium. — Hieracia have been frequently reported as hosts of this species, and one synonym (*P. hieracina* Hering) is based on a specimen bred from *H. vulgatum* Fries. Recent treatments of European Hieracia have recognized hundreds of so-called microspecies (mostly apomictic clones), which none save a few specialists can identify. It is impossible to revise all published host-records to accord consistently with these modern treatments, so all host names are quoted here in the

form published. Probably all Hieracia are suitable as hosts, except those whose leaves are too small. Primary sources of published host names are as follows (records for botanical gardens indicated with an asterisk *): *H. amplexicaule* L. (sheet in Hering's mine herbarium *), *H. aurantiacum* L. (Hendel, 1935; Buhr, 1941a *), *H. caespitosum* Dum. (Buhr, 1960), *H. lachenalii* Gmel. (Buhr, 1960; Griffiths, 1966), *H. laevigatum* Willd. (Buhr, 1932; Závřel, 1960), *H. laevigatum* Willd. var. *tridentatum* (Fries) (de Meijere, 1939), *H. murorum* L. (Buhr, 1932, 1941b & 1960; Rydén, 1934; Michna, 1975), *H. prenanthoides* Vill. (Buhr, 1941a *), *H. pulmonarioides* Zahn. (Buhr, 1932 * & 1941a*), *H. sabaudum* L. (Nowakowski, 1954; Závřel, 1956; Buhr, 1960), *H. schistosiphon* Juz. (Buhr, 1941a *), *H. silvaticum* L. (four sheets in Hering's mine herbarium), *H. thapsoides* Panc. (Buhr, 1941a *), *H. transylvanicum* Heuff. (sheet in Hering's mine herbarium *), *H. umbellatum* L. (Buhr, 1932 & 1960; Beiger, 1959 & 1965b; Michalska & Nowak, 1965), *H. villosum* L. (Buhr, 1941a * and sheet for Julische Alpen in Hering's mine herbarium), *H. vulgatum* Fries (Voigt, 1929; Hering, 1932; Buhr, 1932) and *H. sp.* (Buhr, 1941b; Skala & Závřel, 1945; Seidel, 1957; Buhr, 1964).

Prenanthes. — The synonymous *P. prenanthidis* Hering was bred from *Prenanthes purpurea* L., for which host there are numerous subsequent records.

Cicerbita (= *Mulgedium*). — The synonymous *P. mulgedii* Hering was bred from *C. alpina* (L.) in Berlin Botanical Garden. This species is recorded as a host in the wild by Buhr (1964). Buhr (1941a) also recorded cultivated plants of *C. alpina* (L.), *C. bourgaei* (Boiss.) and *C. prenanthoides* (Bieb.) as hosts. (The latter two species are presumably to be transferred to *Lactuca* in Stebbins' system, if I understand him correctly).

Mycelis. — There are numerous records for *M. muralis* (L.). The subspecific name "*cicerbitae*" (here considered a nomen nudum) was introduced by Hering for material bred from this host (formerly placed in *Cicerbita*).

Lactuca. — Reported for *L. serriola* L. (Buhr, 1941a; Nowakowski, 1954), *L. spicata* (Lam.) in Rostock Botanical Garden (Buhr, 1941a), *L. virosa* L. (two sheets in Hering's mine herbarium) and *L. tatarica* (L.) (Buhr, 1941a; Hering in Hering & Spencer, 1968: 327); also by Sønderup (1949) (species not stated).

Lapsana. — The synonymous *P. lamsanae* Hering was bred from *L. communis* L., for which host there are numerous subsequent records; Buhr (1941a) also found larvae once on *L. grandiflora* Bieb. in Rostock Botanical Garden.

Taraxacum. — There are several published records for *T. sp.* or *T. officinale* agg. Records of mines attributed to "*P. taraxaci* Hendel" are also probably attributable to this species.

Crepis. — There are several published records for *C. paludosa* (L.), partly attributed to *Phytomyza* sp. (no. 900 in Hering, 1936); Buhr (1954) also records as hosts *C. biennis* L., *C. capillaris* (L.) and in botanical gardens also *C. jacquini* Tausch, *C. rubra* L. and *C. sibirica* L.

Distribution. — This species is widespread in Northern and Central Europe, extending as far South as Corsica and Bulgaria. Distribution records are summarized as follows:

Britain. — Probably universally distributed from South-East England to Sutherland in the North of Scotland and the West Coast of Ireland; localities given by Parmenter (1952), Manning (1956), Griffiths (1966) and Spencer (1965, 1972).

France. — In addition to the type locality (Cherbourg) of the synonymous *P. sonchi*, localities in Brittany and Normandy given by Buhr (1954).

Holland. — Localities given by de Meijere (1926, 1939).

Germany. — Probably universally distributed; localities given by Hering (1925, 1932, 1955), Hendel (1927), Voigt (1929), Buhr (1932, 1941a, 1954, 1960, 1964), Starke (1942) and Griffiths (1966).

Switzerland. — Pfäfers (type locality of the synonymous *P. prenanthidis*).

Austria. — See Hendel (1927) and above under "material examined".

Italy. — Merano, Alto Adige (Hartig, 1939).

Denmark. — Localities given by Buhr (1932) and Sønderup (1949).

Sweden. — Widespread in the South, extending at least to Jämtland; localities given by Rydén (1934, 1940, 1947, 1948, 1952), Hering (1934) and Lundqvist (1949).

Finland. — Records of caught specimens given by Frey (1946).

Poland. — Widespread in the West and South, but apparently absent from the Kampinos Forest (Nowakowski, 1962: 153); localities given by Karl (1936), Nunberg (1948), Nowakowski (1954), Beiger (1959, 1960, 1965a, 1965b, 1970), Kubska (1961), Nowicki (1963), Michalska & Nowak (1965), Griffiths (1966), Mazur (1969) and Michna (1975).

Czechoslovakia. — Localities given by Starý (1930), Skala & Závřel (1945), Závřel (1956, 1960) and Seidel (1957).

Hungary. — See above under "material examined".

Corsica. — Corté (Buhr, 1941b).

Bulgaria. — Rila Mountains (Buhr, 1941b).

Remarks. — The identity of Fallén's type of *Phytomyza marginella* has been discussed by Spencer (1965), who states that Rydén (1953) erred in describing it as having a yellow scutellum.

The holotype of *P. sonchi* Robineau-Desvoidy could not be traced, though it may well be in the Bigot collection over some erroneous label. Two specimens were found relabelled by Bigot as *P. sonchi* R.-D., but they proved on examination to be the types of *P. minuscula* Goureau (= *P. aquilegiae* R.-D.). Fortunately there seems no doubt about the specific identity of *P. sonchi*.

The extensive synonymy due to Hering has been well discussed by Hendel (1935). Hering believed that the mining flies of the Compositae and Umbelliferae were almost exclusively monophagous (confined to single genera) because of the great protein differentiation in these groups revealed by the work of the Mez school of serum diagnosis. This theory raises general questions which are still controversial, and this is not the place to discuss them. But it may be noted that Hering was so convinced of its validity that he tended to assume that samples of flies bred from different genera of Compositae represented different species on the basis of inadequate morphological evidence. In the case of the synonyms of *P. marginella*, the stated differences in numbers of mesopleural setulae, distribution of acr and length of anterior ori are all of a kind which occur as individual differences within series of many species of the *P. albiceps* group. The same applies to the stated differences in leaf mines. Hendel was able to refute all supposed differences by study of additional material, and subsequent genitalia studies have also failed to reveal any significant morphological differences between specimens bred from different hosts. Subsequent to Hendel's findings, Hering compromised by considering his names to denote ecological subspecies (host races), a usage which persists in some recent literature. However, even the recognition of ecological subspecies requires the production of some kind of evidence, such as different frequency distributions of structural characters or different appearance times, that specimens from different hosts belong to more or less distinct populations. Such evidence has never been produced in this case, and the naming of ecological subspecies is therefore unjustified.

I have already accepted in Part XII (Griffiths, 1976) Hendel's (1935) opinion that his *P. insperata*, based on a female labelled as bred from *Solidago*, must be a mislabelled specimen of this species.

Note that the syntypes of the synonymous *P. sonchina* are from Hålsingborg, not Ulricehamn as stated in Hering's (1934) description.

Hering's (1936) introduction of the subspecific name "*cicerbitae* Hendel" is incredible in view of Hendel's repeated criticism of Hering's proposal of new names for material bred from different hosts. Subsequently Hering (1957) has indicated that Hendel proposed the name in correspondence ("in litteris"). Presumably some misunderstanding occurred. I can scarcely believe that Hendel intended to formally propose such a name, though he might perhaps have used it in discussing the consequences of Hering's views.

Phytomyza columbiana new species

Adult. — Head with orbits only narrowly projecting above eye in lateral view; genae in middle 0.3 - 0.4 times eye height; eyes with only sparse fine pubescence. Frons at level of front ocellus about twice width of eye. Ors directed posteriorly, ori directed inwardly; posterior ors strong, 0.7 times to fully as long as anterior ors (but absent on one side in one male); normally two ori, anterior varying from absent to 0.8 times as long as posterior (also short third pair of ori in one male); orbital setulae more or less one-rowed. Peristomal margin with vibrissa and 3 - 5 upcurved peristomal setulae. Third antennal article rounded distally, with short fine pubescence.

3 + 1 dc; acr in 4 - 5 rows; 15 - 18 presutural ia; 10 - 12 postsutural ia; inner pa about half as long as outer pa.

Second cross-vein (m-m) absent. Costal ratio mg_2/mg_4 2.7 - 3.1 (mean 2.9). Wing length: ♂, 2.7 - 3.1 mm (mean 2.9 mm); ♀, 2.95 - 3.2 mm (mean 3.1 mm).

Frons orange-yellow centrally, with ocellar plate and vertex contrastingly black (vte on dark ground; vti on boundary between dark and yellow ground); orbits at least partly yellow, but in most specimens somewhat infuscated (brownish) to varying extent along eye margins and around bases of orbital setae. Face infuscated centrally (brown to blackish), becoming orange-yellow towards sides. Genae yellow. Occiput black. Antennae with first article brown to dark brown, second and third articles black. Palpi black; labella yellow. Mesonotum dark centrally (finely grey-dusted over black ground-colour, only weakly shining), but extensively whitish yellow on sides from humeral to postalar calli (dark central patch of humeral callus largely surrounded by yellow); weak traces of yellow also before corners of scutellum (posterior to inner pa); scutellum entirely dark; pleura largely dark, with whitish yellow coloration around anterior spiracle, narrowly along dorsal margin of mesopleuron and in seam of mesopleural suture. Wing base and squamae yellowish white, latter with dark fringe. Legs largely dark, with tips of femora contrastingly yellow; tibiae and tarsi largely dark brown. Abdomen largely dark brown to black. Basal cone of ovipositor (♀) entirely grey-dusted.

Male postabdomen with 8th sternum fused with 6th tergum. Telomeres represented by densely setulose apical lobes of periandrium, not delimited by suture. Pregonites with well developed, weakly pigmented ventral extensions (shielding base of aedeagus at rest). Aedeagus as Fig. 4 - 6; basal sclerites strongly divergent distally, the right somewhat angulate at end of expanded area on basal third; spinules on dorsal surface of basal section mostly arranged in three groups, (i) 6 - 11 spinules in distal row on right side towards centre-line, (ii) 6 - 8 spinules in row at same level on left side, and (iii) 4 - 8 spinules in more basally situated compact group anterior to angle of right basal sclerite, as well as 1 - 6 additional spinules between the last group and group (ii); sclerites of medial lobe conspicuously angled near base, in ventral view almost forming U (only narrowly separated at apex), distinctly recurved distally in lateral view; distal section with pair of somewhat divergent pigmented tubules (distiphallus) arising from (partly unpigmented) cylindrical area of sclerotization about ejaculatory duct, the latter with basal pigmentation on dorsal surface continuous with that of short pigmented stretch of duct; V-shaped ventral sclerite (? apically fused paramesophalli) at base of distal section. Ejaculatory apodeme as Fig. 7.

Puparium and third instar larva. - Mandibles with two alternating teeth; right mandible longer than left. Anterior spiracles with two short horns, with 8 - 13 bulbs in widely open ellipse; posterior spiracles on short conical projections, with 15 - 30 bulbs in rather narrow, partly open ellipse (irregular in higher part of range of bulb numbers). Puparia dark brown to black, 2.1 - 2.4 mm long; anal lobes not prominent.

Mine. - Larvae leaf-miners on Cichorieae, forming long and convolute mines (Fig. 12) with initial channels on lower surface of leaf, as described for *P. marginella*; larvae normally leaving leaf through semicircular slit, in most cases on upper surface, before puparium formation (but paratype from *Agoseris* bred from puparium formed loose inside mine).

Types. - Holotype ♂, 1♂ 2♀♀ paratypes from larvae 19.viii.69 on *Hieracium triste* Willd., Harbour Mountain (1900 feet elevation; 57° 6' N, 135° 22' W), Sitka, Alaska, emerged 15-19.v.70, leg. G.C.D. Griffiths. 1♂ paratype from larva 1.ix.73 on *Agoseris glauca* (Pursh), 2 miles SW Athabasca Falls (4000 feet elevation), Jasper National Park, Alberta, emerged 30.iv.74, leg. G.C.D. Griffiths. 1♂ 1♀ paratypes from larvae 6.ix.75 on *Hieracium gracile* Hook., Swan Hills (unnamed lake at 3750 feet elevation; 54°42' N, 115°49' W), Alberta, emerged 27.iv.76, leg. G.C.D. Griffiths; 1♂ paratype from larva 6.ix.75 on *Hieracium albiflorum* Hook., same locality, emerged 29.iv.76, leg. G.C.D. Griffiths.

Remarks. - I have also collected similar mines on *Taraxacum officinale* agg. in Jasper National Park, Alberta (26.viii.73, near S end Medicine Lake at 4900 feet elevation). If these prove to be caused by *P. columbiana*, then it will be clear that this species has a wide host range within the Cichorieae comparable with that of the European *P. marginella*. Unfortunately I obtained only an eulophid (Chalcidoidea) from this *Taraxacum* sample.

It seems likely that *P. columbiana* and *P. marginella* are geographically vicariant sister-species. The entirely grey-dusted basal cone of the ovipositor and similar form and pigmentation of the distal section of the aedeagus probably constitute synapomorphous characters. The external structure of the two species is very similar, although they are well differentiated with respect to colour and the structure of the aedeagus.

The specific epithet *columbiana* refers to the apparent cordilleran ("columbian") distribution of this species. It seems absent from the lowland boreal forest around Edmonton. The most easterly known locality in the Swan Hills is situated in a refugium for cordilleran species (among which the two host-plants there must be numbered).

Phytomyza aposeridis Groschke 1957 (♀)

Phytomyza aposeridis Groschke. Groschke and Hering, 1957: 126. Holotype ♀, Bavaria (Germany), in Staatliches Museum für Naturkunde, Ludwigsburg.

As far as I am aware, this species is still only known in collections from the holotype female bred by Groschke from long linear mines on *Aposeris foetida* (L.) at Obersee bei Starnberg (Bavaria). The original description suggests a typical species of the *Phytomyza albiceps* group, differing from the two preceding in respect of the completely dark mesonotum. Further clarification must await discovery of the male. In addition to the Bavarian localities stated in the original description, Beiger (1973) has recently reported mines of this species in the beech-fir forests of the Słonne Góry in the vicinity of Sanok (South-East Poland), but she has not yet obtained adults.

Phytomyza japonica Sasakawa 1953

I have already discussed this Japanese species in Part VIII (Griffiths, 1974d: 302). It has been reported from a wide range of Compositae, including one member of the Cichorieae, *Hieracium japonicum* Fr. & Sav. (Sasakawa, 1961: 454). No other species of the *Phytomyza albiceps* group has so far been reported from Cichorieae in Japan.

(b) North American species of *Chromatomyia**Chromatomyia syngenesiae* Hardy 1849

This species is well known as occurring on a wide range of cultivated and ruderal Compositae on both the East and West coasts of the United States. Host records for Cichorieae in the United States include cultivated lettuce (*Lactuca* sp.), *Sonchus asper* (L.), *S. oleraceus* L., *Picris echioides* L. and *Taraxacum kok-sghyz* Rodin. For further details and discussion of synonymy, see Frick (1959, 1972) and Griffiths (1967).

In the northern extremity of its range in Central Alberta the main hosts seem to be species of *Senecio* (Senecioneae) (Griffiths, 1974c), but Sehgal (1971) also bred a series from *Crepis* (Cichorieae) in Edmonton. He records the host as *Crepis gracilis* (D.C. Eat.) (= *atribarba* Heller), but the species was probably misidentified. The only species of *Crepis* confirmed from the Edmonton area are *C. runcinata* (James) and *C. tectorum* L.

Chromatomyia senecionella (Sehgal 1971)

Phytomyza senecionella Sehgal. Sehgal, 1971: 377. Griffiths, 1972b: 389. Holotype ♂, Elk Island National Park (Alberta), in Canadian National Collection, Ottawa.

Chromatomyia senecionella (Sehgal). Griffiths, 1974a: 37. - 1974c: 218.

This species was described by Sehgal on the basis of material collected by me on *Senecio congestus* (R. Br.) var. *palustris* (L.) at Elk Island National Park. Subsequently (Griffiths, 1972) I referred to it material bred from *Senecio atropurpureus* (Ledeb.) subsp. *tomentosus* (Kjellm.) and *Petasites frigidus* (L.) collected at Eagle Summit, Alaska. This material differed from the typical series in having a darker head, with the frons largely orange-brown with grey-dusted orbits. In the typical series the frons are yellow, as normally in all other species of the *C. syngenesiae* group except the new species next to be described.

I have now obtained two further specimens (♂♀) agreeing with the Alaskan material in

having an orange-brown frons with grey-dusted orbits. These were bred from *Hieracium gracile* Hook. collected 17-19.viii.71 on alpine heath, dominated by *Cassiope mertensiana* (Bong.), at 6800-7200 feet elevation near the Mount Cavell Chalet in Jasper National Park, Alberta (emerged 23-28.viii.71, leg. G.C.D. Griffiths).

The mines on *Hieracium* are linear, in many cases highly convolute, up to 9 cm long, 1-1.5 mm wide terminally, formed on upper or lower surface of leaf; faecal particles discrete, mostly separated by over 1 mm in terminal part of mine. Puparium with its ventral surface adjacent to surface of leaf, with its anterior spiracles projecting ventrally through epidermis, formed in petiole or on lower surface of leaf.

Chromatomyia ixeridopsis new species

Adul. — Conforming with my general description of the *C. syngenesiae* group (Griffiths, 1967: 2), except for the dark head coloration.

Anterior ori vestigial or absent. Pubescence of third antennal article short; arista with thickened basal section 2/5 to slightly less than half arista length, not angularly delimited from terminal section. 3 - 9 fine isolated acr; 4 - 6 presutural ia; 1 - 2 postsutural ia. Costal ratio mg_2/mg_4 1.8 - 1.9. Wing length: ♂, 2.5 mm; ♀, 2.7 - 2.8 mm. Length of hind metatarsus: ♂, 0.35 mm; ♀, 0.365 - 0.4 mm.

Head entirely infuscated. Frons entirely grey-dusted, dark brown centrally with black ocellar plate, vertex and orbits; face black; genae dark brown; occiput black. Antennae entirely black. Palpi black; labella yellow-brown. Costa dark brown. Basal cone of ovipositor (♀) entirely grey-dusted.

Aedeagus as Fig. 8; basal sclerites narrow and well defined, scarcely expanded distally; dorsal lobe cleft distally, with pigmentation confined to centre-line and margins of cleft; distal tubule largely straight, bent upwards only at apex; sac below distal tubule not papillose, with its hind margins strengthened by well-defined V-shaped sclerotization (distally fused sclerites of medial lobe). Ejaculatory apodeme as Fig. 9.

Puparium and third instar larva. — Differing from those of most other species of the *C. syngenesiae* group, except *C. kluanensis* Griffiths and *C. asteris* (Hendel), in respect of the slightly larger spiracles with more numerous bulbs. Anterior spiracles knob-shaped, with 13 - 15 irregularly distributed bulbs; posterior spiracles on short conical projections, knob-shaped, with 10 - 15 bulbs in irregular, partly stellate pattern. Puparia yellowish to red-brown, 2.4 - 2.85 mm long.

Mine. — Larvae leaf-miners on *Crepis* sect. *Ixeridopsis*. Mine (Fig. 13) initially linear, becoming broadly linear or in most cases blotchy terminally, formed on upper or lower surface of leaf, varying from greenish white to dark brown in reflected light (with feeding debris forming fine herring-bone pattern in most mines, apparently absent in a few); faeces deposited as discrete particles, mostly well separated in terminal part of mine. Puparium with its ventral surface adjacent to (upper or lower) surface of leaf, with its anterior spiracles projecting ventrally through epidermis.

Types. — Holotype ♂, 2♀♀ paratypes from larvae and puparia 25-28.vii.72 on *Crepis (Ixeridopsis) elegans* Hook., near S end Kluane Lake (gravel bars along Sheep and Williscroft Creeks at 2700-3500 feet elevation; 61°N, 138°30' W), Yukon Territory, emerged 10-16.viii.72, leg. G.C.D. Griffiths. 1♀ paratype from puparium 2.viii.72 on *Crepis (Ixeridopsis) nana* Richards., Kathleen Lake (2400 feet elevation), Kluane National Park, Yukon Territory, emerged 14.v.73, leg. G.C.D. Griffiths.

Remarks. — I first discovered larvae of this species on 23.viii.71 at 8300 feet elevation feeding on *Crepis nana* Richards. on a scree just below the summit of a lesser peak North-East of Mount Cavell (Jasper National Park, Alberta). This discovery was remarkable both because of the high altitude and the extreme wind exposure of the site. *Crepis nana* was the only vascular plant able to survive there. This plant consists of a dense tuft of leaves and yellow flowers anchored in loose gravel by a long taproot. I did not succeed in breeding the flies on that occasion. However my visit to the Kluane area the following year enabled me to collect samples both from *Crepis nana* and the closely related *C. elegans* Hook., which occur commonly in this area in the gravel of torrent beds. The resulting flies prove to belong to the *Chromatomyia syngenesiae* group, representing a distinctive new species distinguishable by its dark head and the structure of the aedeagus (particularly the well differentiated distally fused sclerites of the medial lobe).

It is evident from Babcock's (1947) remarks that the correctness of placing in *Crepis* the host-plants *C. nana* Richards. and *C. elegans* Hook. is doubtful. Babcock sets these species

and five Central Asian relatives apart in a section *Ixeridopsis*, which he suggests may have arisen through hybridization between *Crepis* and *Ixeris* or their progenitors. He further notes that the chromosome number and structure of *Ixeridopsis* agrees with that of the Japanese *Ixeris alpicola* Nakai. So, if I refer to these species as *Crepis*, it is merely because an entomological paper is not the place to propose new botanical nomenclature. If the principle of naming only monophyletic groups were adhered to by botanists, then *Ixeridopsis* would surely be separated from *Crepis*. This is confirmed by Babcock's statements on page 33 where he indicates that this section has been included in *Crepis* "on morphological grounds", although not monophyletic with the rest of the genus. Since the mines of *Chromatomyia ixeridopsis* have not been found on any true *Crepis*, I have accordingly named this species after Babcock's sectional name.

Chromatomyia lactuca (Frost 1924)

Phytomyza lactuca Frost. Frost, 1924: 85. - 1928: 77. Frick, 1959: 430. Spencer, 1969: 249. Sehgal, 1971: 366. Holotype ♂, Arendtsville (Pennsylvania), not traced (supposed to have been sent to U.S. National Museum, Washington).

Chromatomyia lactuca (Frost). Griffiths, 1974a: 37.

Adult. — Head with orbits narrowly projecting above eye in lateral view; genae in middle 0.3 - 0.4 times eye height; eyes with only sparse fine pubescence. Frons at level of front ocellus 2 - 2.5 times width of eye; orbits broad, together occupying about half frons width. Two ors, of about equal length, posteriorly directed; only one strong (inwardly directed) ori (anterior ori short or in a few specimens absent); orbital setulae in 1 - 2 rows. Peristomal margin with vibrissa and 2 - 5 upcurved peristomal setulae. Antennae with third article sexually dimorphic, enlarged in female (Fig. 1), clothed with conspicuous long hairs in both sexes; arista with thickened basal section short, only about 1/3 of arista length (not angularly delimited from terminal section).

3 + 1 dc; acr few (4 - 10), in two rows: 1 - 9 presutural ia; 1 - 3 postsutural ia; inner pa about 1/3 as long as outer pa. Second cross-vein (m-m) absent. Costal ratio mg_2/mg_4 2.2 - 2.9 (mean 2.5 in both sexes). Wing length: ♂, 2.35 - 2.55 mm (mean 2.45 mm); ♀, 2.1 - 2.6 mm (mean 2.45 mm).

Frons and orbits whitish yellow, with ocellar plate and vertex contrastingly black (vte on dark ground; vti on boundary between dark and yellow ground). Face more or less entirely whitish yellow, scarcely infuscated in antennal pits. Genae whitish yellow. Occiput largely black, becoming yellow on sides ventrally. Antennae with first article yellow-brown, second article dark brown to black, third article black with white hairs. Palpi black; labella yellow. Thorax densely grey-dusted (scarcely shining) over black ground-colour, with seams of notopleural and mesopleural sutures whitish; wing base and squamae whitish, latter with dark fringe. Legs dark, with tips of all femora contrastingly bright yellow. Abdomen largely dark brown. Basal cone of ovipositor (♀) entirely grey-dusted.

Male postabdomen with 8th sternum fused with 6th tergum. Telomeres not delimited from perianthium, indicated by dense group of short setulae. Pregonites with short, largely unpigmented ventral extensions. Aedeagus as Fig. 10; dorsal lobe with pigmentation confined to centre-line; terminal section of ejaculatory duct forming sclerotized and pigmented distal tubule; sclerites of medial lobe slender, in some specimens more or less fused distally to form U-shaped sclerotization. Ejaculatory apodeme slender (Fig. 11).

The aedeagus has previously been figured by Spencer (1969) and Sehgal (1971).

Puparium and third instar larva. — Mandibles with two alternating teeth; right mandible longer than left. Anterior spiracles knob-shaped, with 15 - 20 bulbs in irregular ellipse; posterior spiracles on large conical projections, more or less knob-shaped, with 14 - 20 bulbs in irregular ellipse. Puparia yellow-brown to dark red-brown, 2.1 - 2.7 mm long.

Mine. — Larvae leaf-miners on Crepidinae. Mine (Fig. 14) confined to lower surface of leaf, entirely linear, 25 - 30 cm long, 1.5 - 2 mm wide terminally, appearing white or greenish white in reflected light in samples on *Lactuca*, *Sonchus oleraceus* L. and *S. asper* (L.) but light green (scarcely contrasting) in sample on *Sonchus arvensis* L.; faeces deposited as discrete particles, widely separated (by several mm) in terminal part of mine. Puparium with its ventral surface adjacent to lower surface of leaf, with its anterior spiracles projecting ventrally through epidermis.

A photograph of the mine on *Lactuca serriola* L. was given by Frost (1924).

Material examined. — 5 ♂♂ 4 ♀♀ from larvae and puparia 18.viii-9.ix.73 on *Sonchus asper* (L.), Edmonton (house garden near University), Alberta, emerged 23-25.iv.74, leg. G.C.D. Griffiths; 1 ♂ 1 ♀ from larvae and puparia 18.viii.73 on *Sonchus arvensis* L. subsp. *uliginosus* (Bieb.), same locality, emerged 24-25.iv.74, leg. G.C.D. Griffiths; 1 ♂ 2 ♀♀ from larvae and puparia 8.ix.73 on *Sonchus oleraceus* L., same locality, emerged 24-26.iv.74, leg. G.C.D.

Griffiths; 2 ♂♂ 2 ♀♀ from larvae and puparia 18.viii-8.ix.73 on *Lactuca serriola* L., same locality, emerged 24-25.iv.74, leg. G.C.D. Griffiths. 1 ♂ from puparium 7.x.66 on *Taraxacum officinale* agg., Edmonton (University Campus), Alberta, emerged 19.xii.66 (forced), leg. V.K. Sehgal. 1 ♀ from puparium 6.ix.66 on *Taraxacum officinale* agg., Waterton National Park, Alberta, emerged 21.ix.66, leg. V.K. Sehgal.

Remarks. — This species was described by Frost (1924) on the basis of four specimens bred from *Lactuca serriola* L. (as "*L. scariola* var. *integrata*") at Arendtsville, Pennsylvania. Although the genitalia of the type specimens have never been examined, the external structure of this species is sufficiently distinctive for it to be identified on the basis of the external characters stated in the original description. Particularly characteristic is the form of the antennae. Sexual dimorphism in the size of the antennae is not known in any other species of *Chromatomyia*.

Subsequent records are for Michigan and New York (Frick, 1959), Ottawa (series bred from *Lactuca canadensis* L. recorded by Spencer, 1969) and Alberta (Spencer, 1969; Sehgal, 1971). The Alberta records are for Blairmore and Waterton in the extreme South-West (Sehgal, 1971) and for the City of Edmonton, where Sehgal records series bred from *Crepis tectorum* L., *Sonchus arvensis* L. subsp. *uliginosus* (Bieb.) and *Taraxacum officinale* agg. This species is probably a recent introduction in Central Alberta, since I have never found it here in native vegetation outside the City of Edmonton. All recorded hosts are ruderal (weedy) species belonging to the *Crepidinae*, as defined by Stebbins (1953).

The aedeagal structure of this species suggests that it is very closely related to the *Chromatomyia syngenesiae* group, but I did not include it when writing my 1967 revision since it lacks one of the characteristic apomorphous characters of that group (a much reduced costal ratio below 2.0). The mines can be distinguished from those of members of the *C. syngenesiae* group by their greater length.

Some unclarified or incorrect records

1. *Phytomyza archhieracii* Hering (1928: 173). Hering (1928) described this species on the basis of a single male allegedly bred from "*Archhieracium* sp." (leaf in his herbarium subsequently reidentified as *Hieracium lachenalii* Gmel.) at Bellinchen an Oder. Recently Spencer (1976) has examined the holotype and synonymized the name with *Phytomyza erigerophila* Hering. Since this species has never subsequently been bred from *Hieracium* (nor from any other Cichorieae), it seems likely that Hering's data were confused. I suspect that a specimen from the original series of *P. erigerophila*, which was bred during the same season, was incorrectly labelled as bred from the mine on *Hieracium*.

2. *Phytomyza taraxaci* Hendel (1927: 267). Hendel (1927) described this species on the basis of a single female allegedly bred from *Taraxacum* by Karl at Stolp (Pomerania, Poland). The fly was described as almost entirely black in colour, thus quite different from *P. marginella*. However, the supposed distinction between the mines of these species stated by Hering (1963: 247) is not significant, being within the range of variation of some of my samples of mines of *P. marginella*. I have not been able to trace any flies bred subsequently from *Taraxacum* which agree with the description of *P. taraxaci*, although the name has occasionally been used in identifying leaf-mines (for instance by Nowakowski, 1954). Since nearly 50 years have now elapsed, I think it reasonable to suppose that the holotype of *P. taraxaci* is a mislabelled specimen erroneously associated with a mine of *P. marginella* on *Taraxacum*. Since the species cannot be reliably identified on the basis of a female, the name *P. taraxaci* is a nomen dubium.

3. Nowakowski (1954) reports a species of the *Phytomyza albiceps* group as making linear mines on *Cichorium intybus* L. on the Isle of Wolin (Poland). The identity of this remains

unclarified.

4. Dovnar-Zapolski (1969) has recorded several mines of the *Phytomyza albiceps* group in Central Asia, under the names *P. archhieracii* Hering (on *Hieracium*), "*P. sonchi* Hendel" (on *Crepis*, *Picris* and *Sonchus*), *P. sonchi hieracina* Hering (on *Hieracium*), *P. sonchi mulgedii* Hering (on *Cicerbita*) and *P. taraxaci* Hendel (on *Taraxacum*). Two of these identifications mean nothing, as they consist of unclarified names; the records of *P. marginella* (= *P. sonchi*) may be correct, but it seems prudent to wait until bred material from Central Asia can be critically examined before accepting them.

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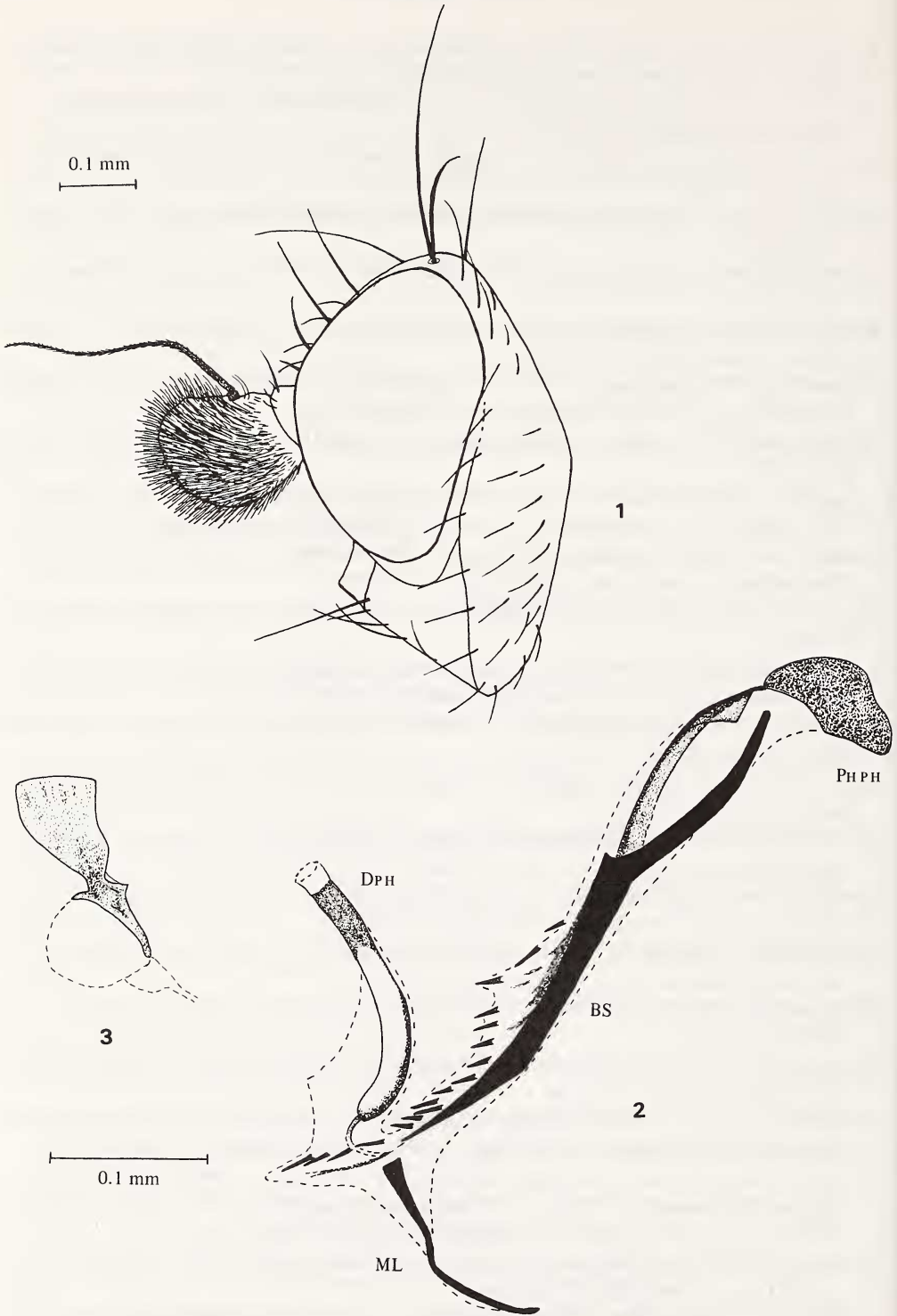


Fig. 1. Head in left lateral view of *Chromatomyia lactuca* (Frost) (♀), Edmonton. Fig. 2-3. *Phytomyza marginella* Fallén (♂), Gower, Wales: 2, aedeagus in left lateral view (BS basal section; DPH distiphallus; ML medial lobe; PHPH phallosphore); 3, ejaculatory bulb and apodeme.

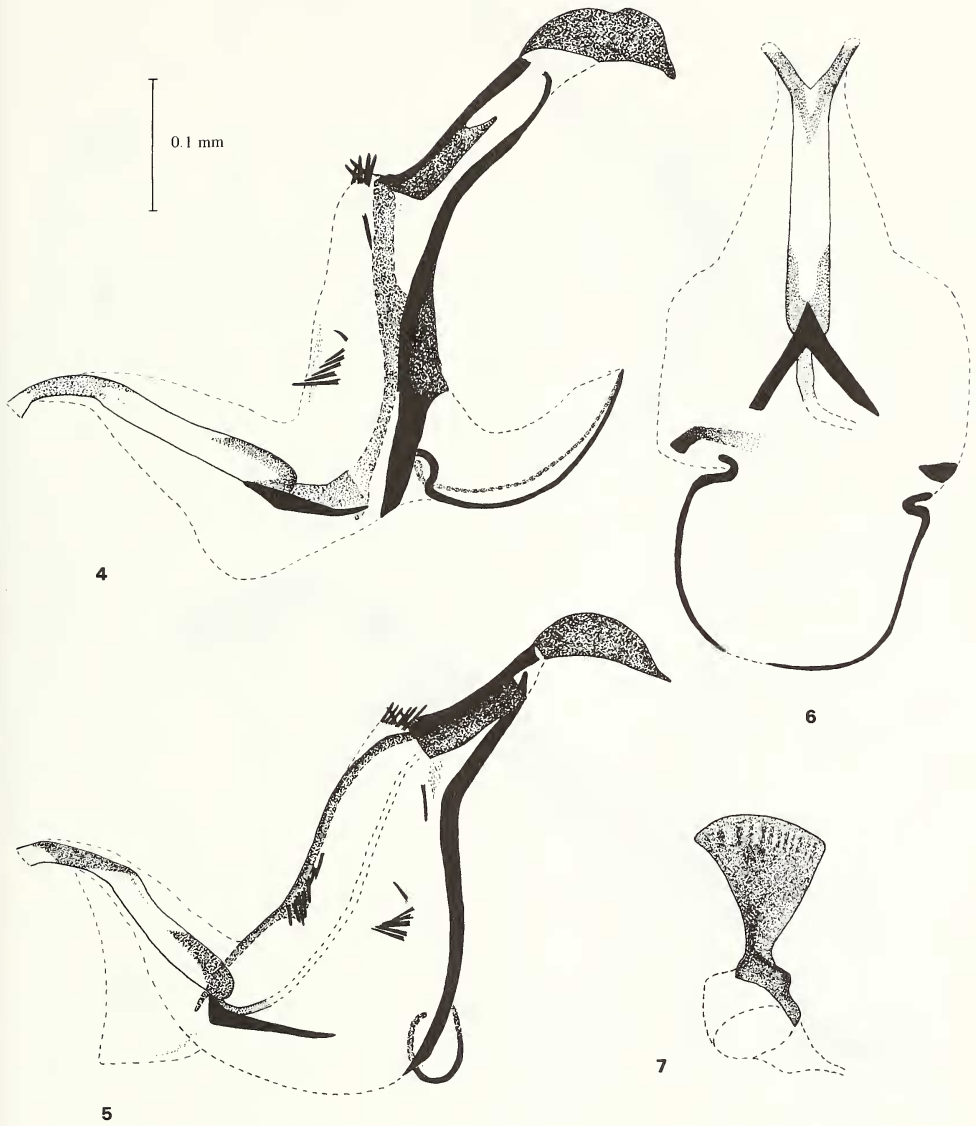


Fig. 4-7. *Phytomyza columbiana* n.sp., holotype ♂: 4, aedeagus in left lateral view; 5, aedeagus in anterolateral view obliquely from left side; 6, distal section and medial lobe of aedeagus in \pm ventral view; 7, ejaculatory bulb and apodeme.

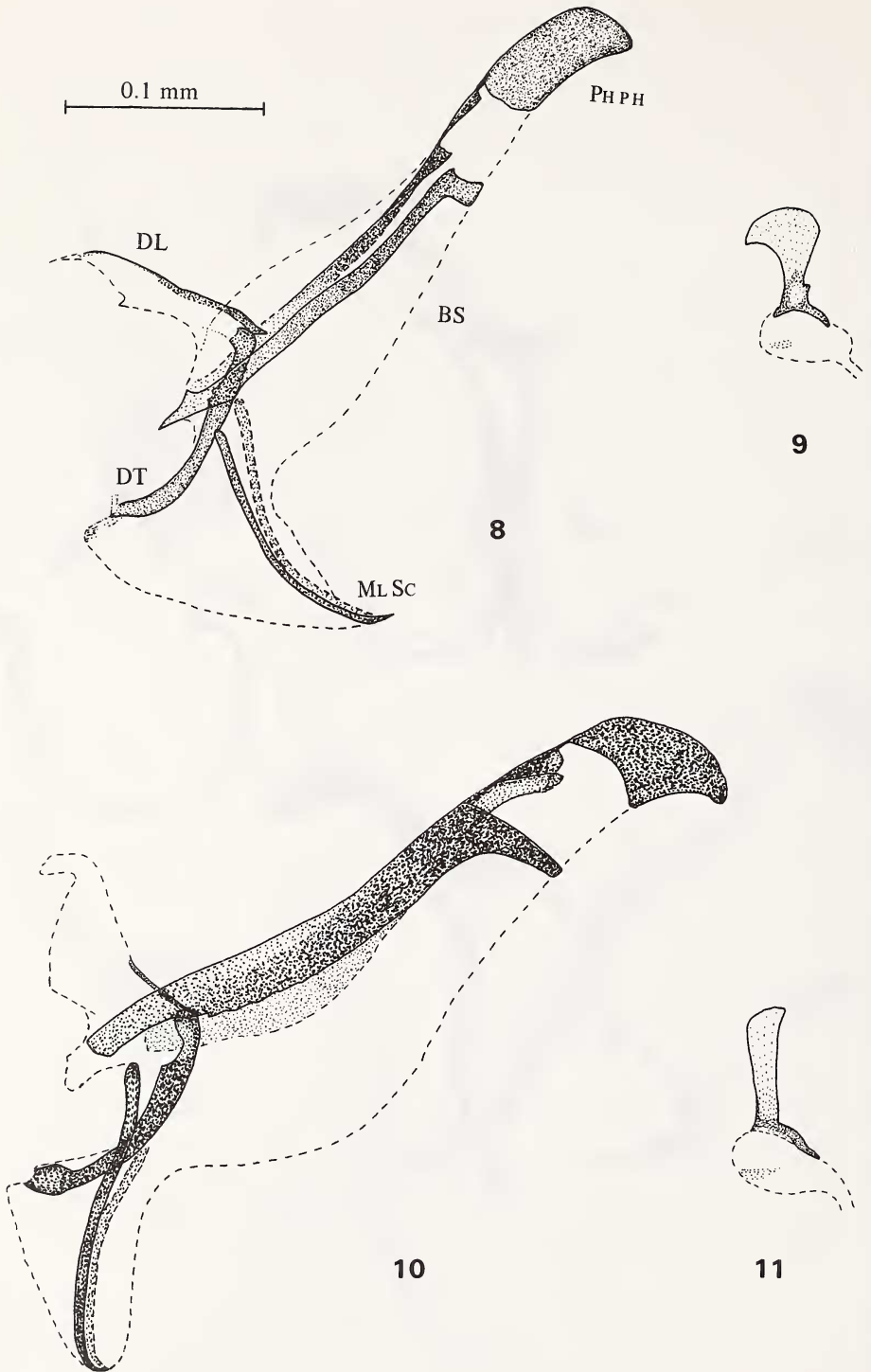


Fig. 8-9. *Chromatomyia ixeridopsis* n.sp., holotype ♂: 8, aedeagus in left lateral view (BS basal section, DL dorsal lobe, DT distal tubule, ML Sc sclerites of medial lobe, P HPH phallosophore); 9, ejaculatory bulb and apodeme. Fig. 10-11. *Chromatomyia lactuca* (Frost) (♂), Edmonton; 10, aedeagus in left lateral view; 11, ejaculatory bulb and apodeme.

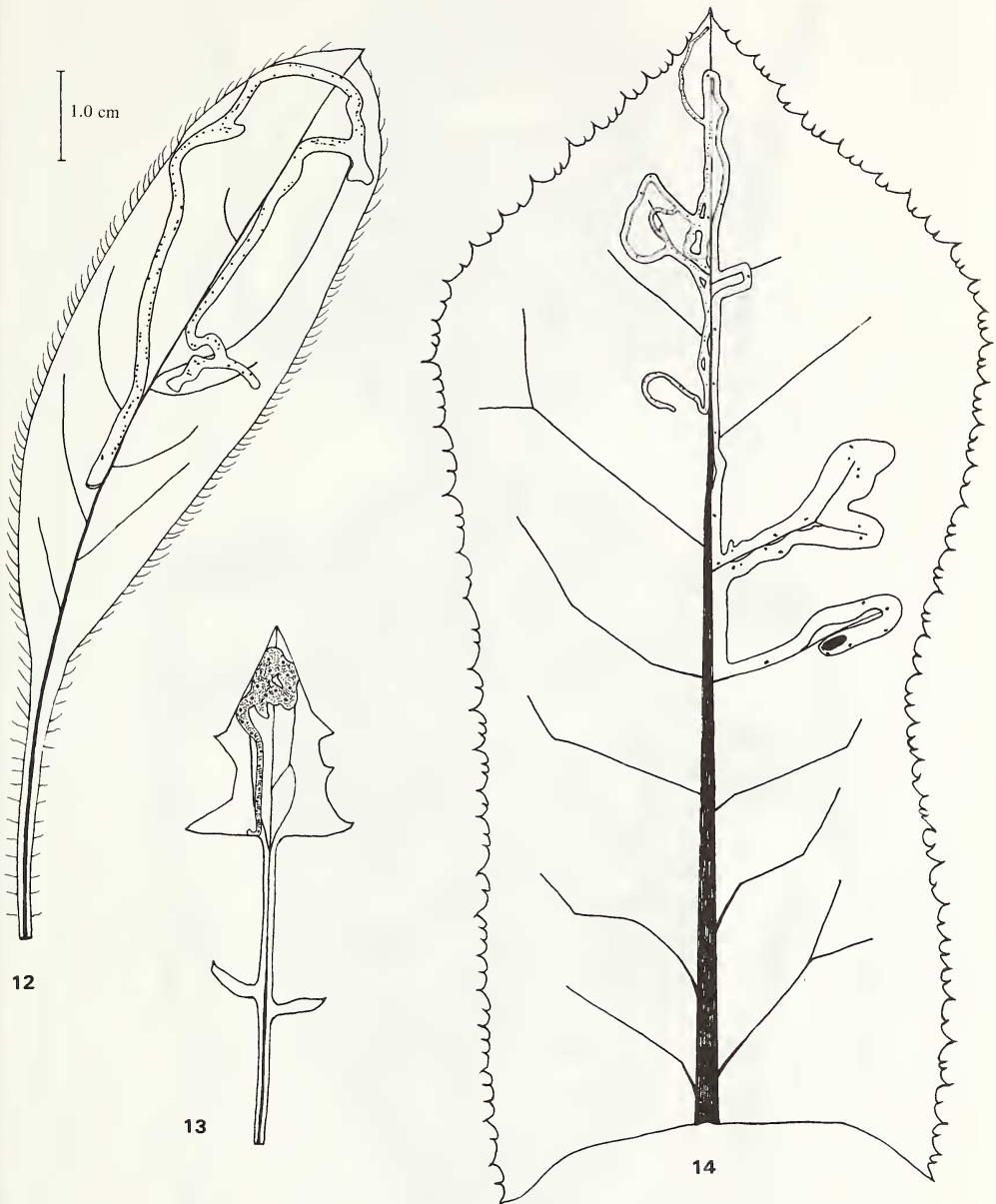


Fig. 12. Leaf of *Hieracium triste* Willd. with mine of *Phytomyza columbiana* n.sp. Fig. 13. Leaf of *Crepis (Ixeridopsis) elegans* Hook. with mine of *Chromatomyia ixeridopsis* n.sp. Fig. 14. Leaf of *Lactuca serriola* L. (lower surface), with mine of *Chromatomyia lactuca* (Frost).