

Agromyzidae (Diptera) of Nepal. Part 3.

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Abstract : Eight species of the Agromyzidae are recorded from Nepal. Four species: *Amauromyza crucifera*, *Phytoliriomyza marginalis* and *ypsilon*, and *Phytomyza distantia*, are described as new to science, and three species are recorded newly. The faunistic account of the Nepalese Agromyzidae is given.

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Key words : Insecta, Diptera, Agromyzidae, Nepal, new species, new records.

Introduction

The Agromyzidae have hitherto been poorly known in Nepal. Up to the present, only 34 species of 13 genera have been recorded by Spencer (1965) and Sasakawa (1979, 1996). This third paper on the Nepalese leafminers by myself is based on 14 specimens collected by the staffs of the Bishop Museum, Honolulu, in 1965-66. Eight species are represented, and four of these are described below as new to science and three new to the fauna.

Materials and Methods

The materials borrowed from the B. P. Bishop Museum were dried specimens collected mainly by L. W. Quate in September to November, 1965. The holotypes of the new species are deposited in the collection of the B. P. Bishop Museum, Honolulu, Hawaii, U. S. A.

The terminology follows the previous paper of Sasakawa (1996). The male genitalia of the holotype specimens were stored in a short polyethylene tubule with glycerol, respectively, and held on the same pin as the holotype.

Systematics

Melanagromyza sojae (Zehntner)

Agromyza sojae Zehntner, 1900, Indian natuur. 11: 113.

Melanagromyza sojae : de Meijere, 1922, Bijdr. Dierk. 22: 20; Spencer, 1961, 77; Spencer, 1973: 52; Sasakawa, 1977: 251.

Specimens examined. 2 ♀, Pokhara, 910 m, 18-27 Sept. 1965, coll. L. W. Quate.

This is a stem-borer of soy bean and other leguminous plants, and widespread in the Oriental, Australian and Ethiopian regions. New to Nepal.

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Amauromyza (Amauromyza) crucifera Sasakawa, n. sp.

(Figs 1-4)

Diagnosis. This black species is characterized by the entirely brown knob of halter and the cruciate basal tube of distiphallus.

Male. Black; parafrontalia slightly shining; antenna and palpus black, arista dark brown; mesoscutum sparsely gray-dusted, weakly shining; abdomen dark brown, each tergite paler along posterior margin, T6-7 and epandrium pale brown. Wing hyaline; calypter brownish, with fringe pale brown; halter with stalk yellow and knob brown. Legs brownish black.

Frons almost as wide as eye; parafrontalia slightly projecting above eye in profile; ors and ori each two; oh reclinate, in row; eye 1.4 times as high as wide; gena about 1/8 height of eye; pm four; first antennal flagellomere small, round; arista as long as height of eye, pubescent.

Mesoscutum with 0+3 dc, six rows of acr. Wing 2.3 mm long, costa extending to M_1 , with three sections in proportion of 3.3:1:0.9, r-m before middle of discal cell, ultimate section of M_1 five times as long as penultimate, ultimate section of CuA_1 twice as long as penultimate.

Epandrium with surstylus indistinctly separated from it by suture, lobate, bearing eight strong and five short setae; processus longi basally connected with membranous proctiger covered with minute scales throughout surface and provided with several setae at posterior lateral angles. Hypandrium circular, 200 μm long. Phallapodeme 670 μm long; phallus 380 μm long, basiphallus short but broad, hypophallus with narrow sclerites asymmetric, distiphallus with basal tube projected laterally at middle and distal part bulbous; ejaculatory apodeme 150 μm long, 90 μm broad, with basal bulb largely chitinized.

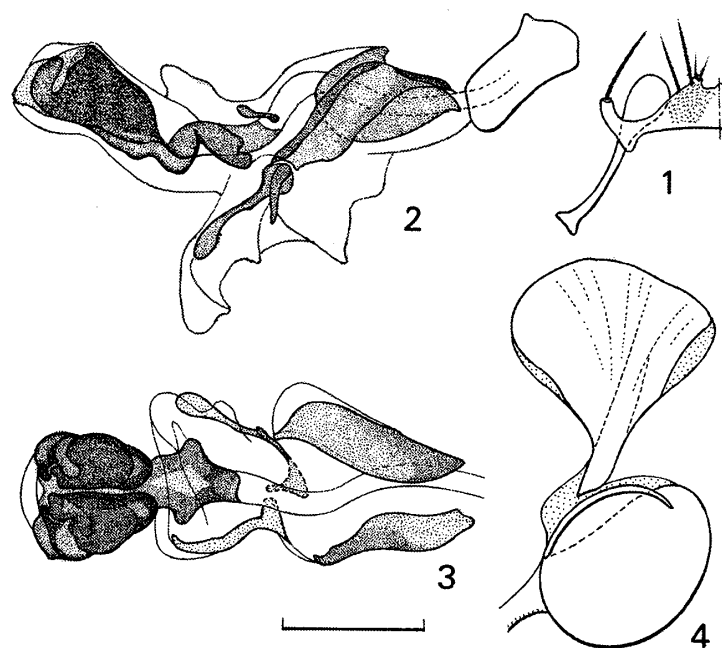
Female. Unknown.

Holotype male (BPBM 16806), Kathmandu, 1,300-1,400 m, 7-12 May 1966, coll. J. & M. Sedlack.

Distribution. Nepal.

Relationship. This species resembles Oriental *A. aliena* (Malloch, 1914), from which it differs in having the longer ultimate section of CuA_1 , pale knob of halter, minutely scaled and setose proctiger, and peculiar distiphallus (genitalia of *aliena*: see Spencer, 1962: figs 20a, b; Sasakawa, 1972: figs 22-24).

Etymology. The specific name, an adjective formed from Latin *crucis* (cross) and *fera* (have), refers to the basal cruciate tube of the distiphallus.



Figs 1-4. Male genitalia of *Amauromyza (A.) crucifera* Sasakawa, n. sp. 1, proctiger and processus longus, dorsal view; 2-3, phallus: 2, lateral view and 3, ventral view; 4, ejaculatory apodeme. Scale=0.1 mm.

Phytoliriomyza arctica (Lundbeck)

Agromyza arctica Lundbeck, 1900, Vidensk. Meddr. Dansk naturh. Foren. 5: 304.

Phytoliriomyza arctica: Shewell, 1953: 469; Sasakawa, 1979: 3.

Specimens examined. 1 ♀, Langtang Valley, ca. 60 km N. of Kathmandu, 2,700-3,400 m, 13-25 Oct. 1965, coll. L. W. Quate; 1 ♀, Dunche, 28 km N. of Trisuli (Nawakot), 1,950 m, 7-12 Nov. 1965, Quate.

Phytoliriomyza marginalis Sasakawa, n. sp.

Diagnosis. This yellowish species is unique by having the anteriorly darkened wings.

Female. Head yellow including postorbit, frontalia brownish yellow, ocellar triangle and occiput brownish black; antenna with scape and pedicel brownish yellow, first flagellomere black, arista pale brown; palpus yellow. Thorax yellow; mesoscutum with three brown, slightly gray-dusted stripes, of which median one between dc-rows ending behind level of second postsutural dc and lateral ones extending to level of posteriormost dc, all of them united together as an transverse band before transverse suture and extended laterally near by postpronotal lobes (humeri) and notopleura, additional narrow stripes running between sa and outer pa-bases; scutellum entirely brownish yellow; katepisternum with brown triangle ventrally, stpl arising at yellow margin. Abdomen shiny, yellowish brown; each tergite with posterior margin broadly yellowish; ovipositor sheath black. Wing hyaline but distinctly with brown anterior margin from base to apex of cell R₁, but not extending posteriorly to vein R₂₊₃; calypter yellow, with margin and fringe pale brown; halter yellow. Legs yellow, tarsi slightly tinged with brown.

Frons 2.5 times as wide as eye; parafrontalia slightly projecting above eye in profile; ors two, reclinate; ori one, inclinate; oh lacking; eye slightly higher than broad, hairy; gena about 1/3 height of eye; first antennal flagellomere small, round, distinctly pilose; arista as long as eye height, minutely pubescent.

Mesoscutum with 1+3 dc, two rows of acr. Wing 1.6 mm long, costa extending to M₁ and with three sections in proportion of 2.7:1:0.6, r-m before middle of discal cell, ultimate section of M₁ 4.5 times as long as penultimate, ultimate section of CuA₁ almost as long as penultimate one (10:12).

Male. Unknown.

Holotype female (BPBM 16807), Pokhara, 910 m, 18-27 Sept. 1965, coll. L. W. Quate.

Relationship. This new species is similar to Australian *P. cognata* Spencer, 1977, in the coloration of body and number of the fronto-orbital bristles, but its dark mesoscutal stripes are shorter and united anteriorly with one another, the acrostichals are present, and the ultimate section of CuA₁ is shorter. The wings of *cognata* are clear.

Etymology. The specific name refers to the anteriorly darkened wings.

Phytoliriomyza ypsilon Sasakawa, n. sp.

(Figs 5-7)

Diagnosis. This species is characterized by the dark thorax and whitish femora, the minutely spinulose surstylus, and the Y-shaped sclerite of hypophallus, and the tubulate distiphallus.

Male. Head yellow, occiput black, ocellar triangle and vertical angle brown, frontalia brown-tinged; antenna and palpus yellow but dorso-apical margin of first antennal flagellomere and arista brown. Thorax brownish black, slightly gray-dusted; mesoscutum and scutellum weakly shining; mesopleural suture linearly yellow. Abdomen dark brown, epandrium paler. Wing hyaline, veins with bases whitish yellow; calypter whitish, with margin yellowish and fringe whitish yellow; halter whitish yellow. Legs with coxae, tibiae and tarsi pale brown, basitarsomere paler, femora yellowish white.

Frons 1.3 times as wide as eye, almost parallel-sided; parafrontalia slightly projecting above eye in profile; ors and ori each two; oh reclinate, in sparse row; oc as long as first ors; eye 1.2 times as high as wide; gena about 1/5 height of eye; first antennal flagellomere round, as long as wide, minutely pilose; arista longer than eye height, pubescent.

Mesoscutum with 1+3 dc, anterior two dc 2/3 length of the third, two sparse rows of acr. Wing 1.2 mm long, costa with three sections in proportion of 2.2:0.9:0.6, r-m slightly beyond middle of discal cell, ultimate section of M_1 5.5 times as long as penultimate, ultimate section of CuA_1 1.3 times as long as penultimate.

Epandrium with surstylus narrowly chitinized along inner margin, bearing three or four spinules on tip, of which dorsal one stronger; cercus slightly curved laterally near apex; processus longus minutely serrated. Hypandrium 280 μ m long, narrowed at basal one-third. Phallapodeme 450 μ m long; phallus 350 μ m long, basiphallus slightly longer than mesophallus; left hypophallic sclerite Y-shaped, weakly sclerotized, right one well-sclerotized; distiphallus with tubules about thrice as long as mesophallus, well-chitinized but membranous distally and slightly swollen at ends; ejaculatory apodeme 110 μ m long, asymmetrically expanded distally, with two short processes at base, 105 μ m wide.

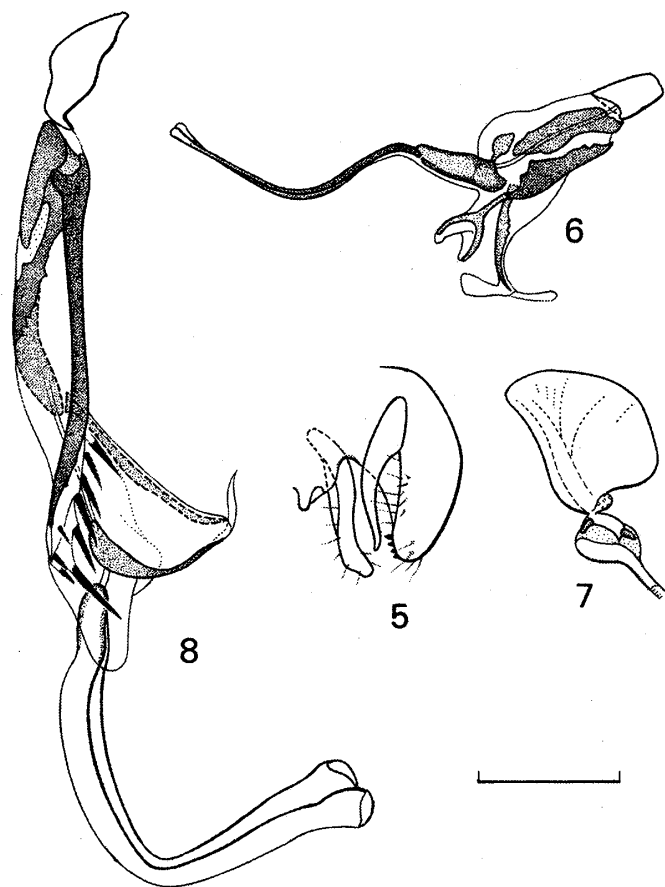
Female. Unknown.

Holotype male (BPBM 16808), Pokhara, 910 m, 18-27 Sept. 1965, coll. L. W. Quate, Malaise trap.

Distribution. Nepal.

Relationship. This species differs from the known *P. arctica* (Lundbeck, 1900), *admirabilis* (Spencer, 1965), *australensis* Spencer, 1963, and Indian *dimidiatipennis* (Garg, 1971) in the coloration of mesoscutum and legs, and the structures of male genitalia, especially surstylus and phallus. The mesoscutum of the related species are gray to black, and legs are also black except for *australensis* largely yellow; the distiphallus of both *arctica* and *australensis* is membranous, long and coiled, and of both *admirabilis* and *dimidiatipennis* is short, chitinized and bifurcated distally (genitalia of each related species: see Spencer, 1969: fig. 364; Spencer, 1965: figs 53-55; Spencer, 1977: figs 233-234; Singh and Ipe, 1973: figs 73e-j).

Etymology. The specific name refers to the Y-shaped (Greek *ypsilon*) hypophallus.



Figs 5-8. Male genitalia of *Phytoliriomyza ypsilon* Sasakawa, n. sp. (5-7) and *Phytomyza distantia* Sasakawa, n. sp. (8). 5, epandrium, cercus and processus longus, left half, inner view; 6, 8, phallus, lateral view; 7, ejaculatory apodeme. Scale=0.1 mm.

Pseudonapomyza spinosa Spencer

Pseudonapomyza spinosa Spencer, 1973, Series ent. 9: 275.

Specimens examined. 3 ♂, Pokhara, 910 m, 18-27 Sept. 1965, coll. L. W. Quate.

This minute, black species is identical with the original description and figures of the phallus (figs 428-429). The ejaculatory apodeme is extremely large, only a little shorter than length of the phallus (250 μ m).

Widely distributed in the Oriental, Australian and Ethiopian Regions. New to Nepal.

Phytomyza distantia Sasakawa, n. sp.

(Fig 8)

Diagnosis. This species has the dark parafrontalia, lunule, face and lateral side of the mesoscutum, two rows of acr, the long or short spines on distal membrane of the basiphallus, and the membranous tubules of the distiphallus.

Male. Head with frontalia yellow, parafrontalia and vertical angle dark brown except for yellow inner margin of parafrontalia, occiput black, ocellar triangle brownish black except for yellow anterior apex, lunule and face black, gena brown, ventral margin of face linearly yellow; antenna and palpus black, arista dark brown. Thorax black, mesoscutum and scutellum gray-dusted, the former slightly shining; thoracic pleura shiny, notopleuron and anepisternum slightly gray-dusted, narrowly yellow along dorsal margin of anepisternum, wing base yellow. Abdomen shiny black, but T2-4 with lateral sides orange. Wing hyaline; calypter yellow, with margin brownish and fringe black. Legs brownish black, only fore knee yellow.

Frons nearly twice as wide as eye, converging ventrally; parafrontalia slightly projecting above eye in profile; ors two, first ors 2/3 length of the second; ori two, incurved, second shorter than first ors; oh in sparse row; eye 1.3 times as high as wide; gena 1/6 height of eye; lunule lower than semicircle; first antennal flagellomere as long as wide, rounded apically and minutely pilose; arista as long as width of eye, microscopically pubescent.

Mesoscutum with 1+3 dc, presutural dc short, as long as first postsutural dc, but posterior two strong; acr in two rows, postsutural ia-setulae one or two. Wing 2.5 mm long, second costal section 3.6 times as long as the fourth.

Surstylus with 15-17 setae; hypandrium 270 μ m long; phallapodeme 600 μ m long. Epiphallus 90 μ m, basiphallus 300 μ m long, bearing nine spines on distal membrane, left hypophallic sclerite narrow, right one broadened at base, each sclerite not connected on tip; distiphallus with tubules entirely membranous, 360 μ m long, curved ventrally at middle; ejaculatory apodeme small, 90 μ m long, 115 μ m broad.

Holotype male (BPBM 16809), Bokaihunde, 20 km N. of Trisuli (Nawakot), 2,100 m, 13-17 Nov. 1965, coll. L. W. Quate.

Female. Unknown.

Distribution. Nepal.

Relationship. This species is similar to European *P. cicuta* Hendel, 1922, in general appearance, but is distinguishable by its entirely darkened parafrontalia and lunule, broader frons, isolated hypophallic sclerites and entirely membranous distiphallic tubules. Also, it differs distinctly from *P. nepalensis* Spencer, 1965, and *fusicarinata* Sasakawa, 1979, by its pale frontalia and longer second costal section.

Etymology. The specific name, Latin *distantia* (distal), refers to the membranous and curved tubules of the distiphallus.

Chromatomyia loniceræ (Robineu-Desvoidy)

Phytomyza loniceræ Robineau-Desvoidy, 1851, Rev. Mag. Zool. 3: 396.

Phytomyza loniceræ: Hering, 1951, Notul. ent. 31: 36.

Paraphytomyza loniceræ: Spencer, 1969, Mem. ent. Soc. Canada 64: 205.

Chromatomyia loniceræ: Griffiths, 1974, Quaes. ent. 10: 44.

Specimen examined. 1 ♀, Dunche, 28 km N. of Trisuli (Nawakot), 1,950 m, 7-12 Nov. 1965, coll. L. W. Quate. This *Lonicera*-leafminer is widespread in much of Europe. New to Nepal.

Faunistic account

The distributional pattern shown by the known Nepalese species in 14 genera is summarized in the following table. Among 42 known species, 15 species are endemic to Nepal, but some will be found elsewhere in the Oriental Region in future. Most of the nonendemic species are Oriental.

Geographical distribution of Nepalese Agromyzidae

Genus	Number of Species	Geographical Regions				
		P	O	A	E	N
<i>Melanagromyza</i>	5 (1)	2	3	1	2	
<i>Ophiomyia</i>	1		1	1	1	
<i>Tropicomyia</i>	1		1			
<i>Japanagromyza</i>	2	1	2	1		
<i>Phytobia</i>	1		1			
<i>Amauromyza</i>	1 (1)		1			
<i>Cerodontha</i>	4 (2)	1	3			
<i>Calycomyza</i>	1	1				
<i>Liriomyza</i>	3	2	1			
<i>Metopomyza</i>	1 (1)		1			
<i>Phytoliriomyza</i>	7 (4)	1	4	1		1
<i>Pseudonapomyza</i>	3	1	2	2	1	
<i>Phytomyza</i>	6 (4)	2	4			
<i>Chromatomyia</i>	6 (2)	4	2		1	1
Total	42 (15)	15	26	6	5	2

Number of species endemic to Nepal are represented in parentheses.

Geographical Regions: A, Australian; E, Ethiopian; N, Nearctic; O, Oriental; P, Palaeartic.

The endemic species are present in eight genera, as follows:

Melanagromyza libratifera Sasakawa, 1996

Amauromyza crucifera n. sp.

Cerodontha (Icteromyza) bispinulosa Sasakawa, 1996

Cer. (Dizygomyza) quatei Sasakawa, 1996

Metopomyza nepalensis Sasakawa, 1996

Phytoliriomyza admirabilis (Spencer, 1965)

Phytol. curtifistula Sasakawa, 1996

Phytol. marginalis n. sp.

Phytol. ypsilon n. sp.

Phytomyza distantia n. sp.

Ph. fusicarinata Sasakawa, 1979

Ph. kumatai Sasakawa, 1979

Ph. nepalensis Spencer, 1965

Chromatomyia acinoposthia Sasakawa, 1979

Ch. vitricornuta Sasakawa, 1979

The dominant genus *Melanagromyza* throughout the Oriental Region is represented by only five species: one endemic, two Palaeartic *cuscutae* Hering, 1958 (Sasakawa 1979) and *pubescens* Hendel, 1923

(Sasakawa 1996), and two Ethiopian/Oriental/Australian *metallica* (Thomson, 1869) (Spencer 1965), and *sojae* (Zehntner, 1900) recorded newly here. It is undoubted that further species remain to be discovered, because this genus is demonstrated in India as the largest one with a total of 27 species (Singh and Ipe 1973; Spencer 1986), as well as in the countries of South Asia (cf. Sasakawa 1977). Also, much more species of the genera *Ophiomyia* (only *phaseoli* Tryon, 1895, known as a stem-borer of the leguminous plants; Spencer 1965, 1973), *Tropicomyia* [*atomella* (Malloch, 1914); Sasakawa 1979, 1996] and *Japanagromyza* [*delecta* Spencer, 1962, and *tristella* (Thomson, 1869); Spencer 1965] of the subfamily Agromyzinae, and the genus *Phytobia* (*magna* Sasakawa, 1963a, only known) of the subfamily Phytomyzinae, might have been expected.

In Phytomyzinae, no species of the genus *Amauromyza* have previously been recorded from Nepal, as represented poorly in the Oriental Region. However, the occurrence of a single new species described above has now been confirmed. The genus *Cerodontha* (three subgenera: *Icteromyza*, *Cerodontha* and *Dizygomyza*) is represented in Nepal, with a total of four species, including two endemic species listed above. *Cer. (Ict.) duplicata* (Spencer, 1961) was described from Indonesia and recorded later from Nepal (Spencer 1965). A leaf-sheath miner of grasses, *Cer. (Cer.) denticornis* (Panzer, 1806), known from the Palaearctic Region to the Ethiopian, was recorded from Nepal by Sasakawa (1996). *Calycomyza artemisiae* (Kaltenbach, 1856) was identified with the larvae and leaf-mines on *Artemisia vulgaris* collected at Kathmandu, 17 May 1970, by Beri. The cephalopharyngeal sclerites, anterior and posterior spiracles, and anal lobes of the third instar larva (Beri 1971: Fig. 3a-j) are distinct (cf. Sasakawa 1961: Fig. 61k-n). Two Palaearctic species of the genus *Liriomyza*: *bryoniae* (Kaltenbach, 1858) and *congesta* (Becker, 1903), one Oriental *L. brunifrons* (Malloch, 1914), and only a single endemic species of the genus *Metopomyza*, have previously been recorded from Nepal (Sasakawa 1979, 1996). Two species of the genus *Pseudonapomyza*: *hispanica* Spencer, 1973, and *spicata* (Malloch, 1914), have been known to occur in Nepal. One more leafminer on the Poaceae, *Pseudonapomyza spinosa* Spencer, 1973, was recorded for the first time from Nepal.

It was of interest to find the genus *Phytoliriomyza* well represented, with seven species: cosmopolitan (except for Australia) *arctica* (Lundbeck, 1900), Australian *australensis* Spencer, 1963, and Palaearctic *perpusilla* (Meigen, 1830), two endemic and two new species listed above (Spencer 1965; Sasakawa 1979, 1996). This genus has been found to be of wide distribution in the tropics (Australia: Spencer 1963, 1977b; Tahiti: Sasakawa 1963b; Formosa: Sasakawa 1972; Ceylon: Spencer 1975; Papua New Guinea: Spencer 1977a).

The genus *Phytomyza*, known mainly in temperate areas of the northern hemisphere, is present with six species: four endemic species including one new species listed above, and two Palaearctic *homogyneae* Hendel, 1927, and *vitalbae* Kaltenbach, 1874 (Sasakawa 1979, 1996). *Ph. vitalbae* has been known to occur in Formosa (Sasakawa 1972) and Australia (Spencer 1963). The genus *Chromatomyia* is represented in Nepal with a total of six species: two endemic and four Palaearctic species: *horticola* (Goureau, 1851), *loniceriae* (Robineau-Desvoidy, 1851), *mili* (Kaltenbach, 1864), and *nigra* (Meigen, 1830) (Sasakawa 1979, 1996).

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