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## Studies on Indian Agromyzidae (Diptera) - 2

With 2 plates (Figs. 1-10)

The Agromyzidae are one of the most poorly worked out families of acalypterate Diptera in the Oriental region, being represented by only 80 species (SPENCER, 1961), in comparison with over 760 species known in the Palaearctic region. Recent observations by SPENCER (1961, 1962) and those of the present author indicate that there are many new species and new records awaiting to be discovered in this region.

The observations recorded in this paper are based on material collected by the author from Chotanagpur plateau of India (Lat. 23°-24 °N, Long. 84°-86°). *Agromyza tephrosiae* DE MEIJERE is transferred to the genus *Japanagromyza* SASAKAWA. A new *Melanagromyza* species bred from leaf mines on *Dolichos lablab* LINNAEUS is also described. *Melanagromyza cuscutae* HERING and *M. centrosematis* DE MEIJERE are recorded as new to India. The host plants of the widely reported tropical species *M. metallica* (THOMSON) were discovered to be *Ageratum conyzoides* LINNAEUS and *Bidens pilosa* LINNAEUS (Compositae). *Phytomyza atricornis* MEIGEN remains as the most widespread and polyphagous species in India.

### *Melanagromyza dolichi* sp. n.

Head: (Fig. 1) frons not projecting above eye in profile; two strong *ors* directed upwards; two *ori* slightly weaker, the upper one directed upwards, the lower directed downwards; orbital setulae few, reclinate; *vti* subequal to *vte*; compound eyes large and oval, not plumose; ocellar triangle small; gena one-fifth to one-seventh height of eye, slightly projecting forwards; lunule low, flattened at the top; third antennal segment rounded with upcurved pubescence, arista almost equal to width of eye, pubescent.

Mesonotum: two strong *dc*; *acr* numerous in 6-8 rows, extending in about 3 rows to first *dc*.

Leg: without any differentiated bristle on the mid-tibiae.

Wing: (Fig. 2) length 1.6 mm. to 1.7 mm.; costa extending strongly to vein  $m_{1+2}$ , *rm* beyond centre of discal cell, last section of  $m_4$  shorter than the penultimate.

Male genitalia: ninth sternite and aedeagus as shown in Fig. 3a, sperm sac short and narrow (Fig. 3b).

Colour: small black species; mesonotum moderately shining; wings clear, veins black, squamae grey, fringe black.

1\*

Holotype ♂ (with genitalia preparation) INDIA, Namkum, Ranchi, (Bihar), 1500', 26. xii. 1963, ex leaf mines on *Dolichos lablab* Linnaeus (Leguminosae). — Allotype ♀, 30. xii. 1963, same locality and data. — Paratypes 4 ♂♂ and 2 ♀♀, xii. 1963, same data; 2 ♂♂ (with one genitalia preparation) and 1 ♀, xii. 1963, same data, presented to Mr. K. A. SPENCER.

1 ♂ (Genitalia slide No. 109) INDONESIA, Sumbawa, Domboe, 24—25. v. 1927 (RENSCH) and 1 ♀, SOUTH AFRICA, Kirstenbosch, Cape Prov., 25—30. 1. 1964, ex leaf mines on *Dolichos gibbosus* THBG., both in Mr. K. A. SPENCER's collection, are also referable to this species.

Holotype ♂ and Allotype ♀ will be deposited in the Zoological Survey of India, Calcutta.

**Biology:**

Larvae make undersurface, linear leaf mines (Fig. 7), not epidermal, on *Dolichos lablab* LINNAEUS. The puparium is glued inside the mine and a knob like anterior spiracle protrudes out of the leaf epidermis. The important feature of the mine is the wide spacing of the frass granules.

**Description of the larva (Figs. 4—6):**

Full grown larva whitish in colour, measuring 2.67 mm. × 0.57 mm.

Mandibles black, serrated with about 12 well-developed teeth, labial sclerite long and narrow, darkly sclerotised on the ventral border, paraclypeal phragmata comparatively less sclerotised, dorsal and ventral processes almost equal, the upper arm of the dorsal process slender, ventral process broad, without a foramen.

Maxillae, antenna and 2 pairs of sensalia as shown in figure, anterior spiracle short and knob like, darkly sclerotised, posterior spiracle born on a short peduncle, with about 8 small bulbs.

*Melanagromyza dolichi* belongs to the group of small black species, which are extremely difficult to separate only from external characteristics. The presence of a quite different aedeagus makes it possible to distinguish *M. dolichi* from the very similar species *M. atomella* (MALLOCH) and *M. centrosematis* DE MELJERE. It also differs from the above two species, in the absence of any differentiated bristle on the mid-tibiae.

In the larval characteristics *M. dolichi* resembles *M. atomella* in having serrated mouth parts, but is readily distinguished by the quite different posterior spiracles, which have about eight small bulbs, instead of the three usual amongst epidermal leaf miners.

*M. dolichi* can be included in SPENCER's (1961) key to Oriental *Melanagromyza* species by amending and extending couplet 22 as under:

- 22 Mid-tibiae with one bristle . . . . . 22a
- Mid-tibiae without any differentiated bristle, jowls broad, one fifth to one-seventh height of eye; puparium yellow with about 8 bulbs on the posterior spiracle . . . . . *dolichi* n. sp
- 22a Mid-tibiae with fine short bristle, minute species; puparium yellow-brown . . . . . *atomella* (MALLOCH)
- Mid-tibiae with one strong bristle, larger species . . . . . 23

***Japanagromyza tephrosiae* (DE MELJERE), comb. nov.**

*Agromyza tephrosiae* DE MELJERE, 1917.

In the fresh specimens bred from leaf mines on *Tephrosia candida* DC. in India: Namkum, Ranchi, 1500', Bihar, it was discovered that there are only two strong

dorsocentral bristles together with well developed prescutellars. On this combination of characters it is therefore transferred from *Agromyza* FALLÉN to *Japanagromyza* SASAKAWA.

The species was discussed briefly by SPENCER (1961) on the basis of three damaged females deposited in the Zoological Museum, Amsterdam.

The aedeagus (Fig. 10) of the species is characteristic in having a long rod-like chitinised process in front of the distiphallus; the ninth sternite has also a very much elongated hypandrial apodeme; the sperm sac is long and narrow.

The leaf mine (Fig. 8) is an elongated blotch, with larvae pupating outside the mine.

***Melanagromyza centrosematis* DE MEIJERE, 1940**

INDIA: Namkum, Ranchi, 1500', Bihar, 5 ♂♂ and 2 ♀♀, xi. 1963, ex pods of *Tephrosia candida* DC.

This has been recorded earlier from Java, Formosa, Malaya and Africa (SPENCER, 1961). New to India.

It has been reported to feed in the young shoots and roots of *Centrosema pubescens* BENTH. and *Glycine soja* SIEB. & ZUCC. (SPENCER, 1961). During the present investigations, the flies were bred from blotch mines (Fig. 9) on the external surface of the pods of *Tephrosia candida* DC. The flies seem to lack the normal sense of topospecificity. The examination of the male genitalia confirms the species.

***Melanagromyza cuscutae* HERING, 1958**

INDIA: Namkum, Ranchi, 1500', Bihar, February-March, 1963, bred from seeds of *Cuscuta reflexa* ROXB., 2 ♂♂ (one presented to Mr. K. A. SPENCER). Nov., 1963, same locality, ex stems of *Cuscuta reflexa* ROXB.

This species was described from the palaeartic region, where it feeds in the fruits of *Cuscuta europaea* LINNAEUS (HERING, 1958), but has subsequently been reported from West Pakistan and North East Burma (SPENCER, 1962), in the Oriental region. New to India.

Besides their normal occurrence in the seeds, the species was also recorded feeding in the stems of *Cuscuta reflexa* ROXB. The puparia in the stems were lighter in shade than those found in the seeds. This degree of adaptation in the Agromyzidae is of course uncommon, but the examination of the male genitalia confirms the species. There is, however, an exactly similar case of a species feeding in seeds, stems and roots in *Phytomyza orobanchia* KALT.

***Melanagromyza metallica* (THOMSON); SPENCER, 1959**

INDIA: Namkum, Ranchi, 1500', Bihar, bred from stems of *Ageratum conyzoides* LINNAEUS (Compositae); 5 ♂♂ and 3 ♀♀, same locality, ex stems of *Bidens pilosa* LINNAEUS (Compositae).

This is one of the most widespread tropical species and has been reported to occur from Cape Verde Islands to Australia (SPENCER 1961, 1961a, 1962, 1963) but its host had remained unknown. However, SPENCER (1961) suggested that the species will prove to be a feeder in Compositae, either in stems or in flower heads.

The larvae were first discovered to mine the stems of *Ageratum conyzoides* LINNAEUS at Delhi, by Mr. K. A. SPENCER and the author during the former's visit to India in September, 1962.

The species was bred later at Ranchi from the stems of *Ageratum conyzoides* LINNAEUS and *Bidens pilosa* LINNAEUS. Such a wide range of distribution suggests that it must have more food plants in the family Compositae.

***Melanagromyza obtusa* (MALLOCH)**

INDIA: Namkum, Ranchi, 1500', Bihar, Nov.—Dec. 1962, bred from pods of *Moghania macrophylla* (WILLD.) O. KTZE. (Leguminosae), 2 ♂♂, 1 ♀, ii. 1964 same locality, bred from the pods of *Cajanus indicus* SPRENG.

This species is commonly known as the Tur-pod-fly and has been widely reported in India associated with the pods of *Cajanus indicus* SPRENG.

Its biology and morphology under Indian environments have been discussed by AHMAD (1938), VENUGOPAL (1954), PANDEY and AGRAWAL (1962) and GANGRADE (1963).

The species is of considerable economic importance, as during November and December, 1963 its larvae or puparia were found infesting 80% of the pods of *Moghania macrophylla* (WILLD.) O. KTZE. which is also a new host for the species. The eggs are laid on the tender pods and the larvae bore into the seeds. These plants are being cultivated at the Indian Lac Research Institute Plantation, as a major host of the lac insect *Laccifer lacca* (KERR.).

***Liriomyza brassicae* (RILEY)**

This is a cosmopolitan species (SPENCER, 1963) and the author has found it quite abundant throughout North-east India associated with *Brassica oleracea* LINNAEUS, *B. campestris* LINNAEUS and *Tropaeolum* sp. (Tropaeolaceae). At Ranchi, Bihar, 3 ♂♂, 2 ♀♀ bred from leaf mines on *Pisum sativum* LINNAEUS (Leguminosae) were also found to represent this species. The genitalia of the specimens bred from *Pisum sativum* LINNAEUS agree exactly with those found on *Tropaeolum* sp.

*Liriomyza brassicae* is an oligophagous leaf miner feeding on many genera of Cruciferae, Capparaceae and Resedaceae belonging to the order Parietales, on *Tropaeolum* sp. (Tropaeolaceae) of the order Geraniales and *Pisum sativum* LINNAEUS (Leguminosae) belonging to the order Rosales.

HERING (1951) explained this oligophagy because of the presence of myrosin cells in *Tropaeolum* which are so characteristic of Cruciferous plants. But its occurrence on *Pisum sativum* LINNAEUS, a member of the order Rosales, suggests that there is something else also which affects the choice of food in this species.

***Pseudonapomyza spicata* (MALLOCH)**

This species occurs widely throughout the Oriental and Pacific areas and during the present investigations it was bred from *Alloteropsis cimicina* STAFF., *Cynodon dactylon* PERS., *Zea mays* LINNAEUS and some unidentified grasses.

***Phytomyza atricornis* MEIGEN**

This is an extremely polyphagous species in India and was reported to feed on 54 plants (TREHAN and SEGHAL, 1963). Further additions to the list of host plants

are: *Bidens pilosa* LINNAEUS, *Coreopsis* sp., *Erigeron asteroides* ROXB., *Pisum sativum* LINNAEUS and *Solanum tuberosum* LINNAEUS.

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#### Summary

The observations recorded in this paper are based on material collected by the author from Chotanagpur plateau of India. *Agromyza tephrosiae* DE MEIJERE is transferred to the genus *Japanagromyza* SASAKAWA. A new *Melanagromyza* species bred from leaf mines on *Dolichos lablab* LINNAEUS is also described. *Melanagromyza cuscutae* HERING and *M. centrosematis* DE MEIJERE are recorded as new to India. The host plants of the widely reported tropical species *M. metallica* (THOMSON) were discovered to be *Ageratum conyzoides* LINNAEUS and *Bidens pilosa* LINNAEUS (Compositae). *Phytomyza atricornis* MEIGEN remains as the most widespread and polyphagous species in India.

#### Zusammenfassung

Die in dieser Arbeit mitgeteilten Untersuchungen beruhen auf Material, das der Autor vom Chotanagpur Plateau in Indien gesammelt hat. Danach wird *Agromyza tephrosiae* DE MEIJERE zur Gattung *Japanagromyza* SASAKAWA gestellt. Eine neue *Melanagromyza*-Art wird beschrieben, die von Blattminen an *Dolichos lablab* LINNAEUS gezogen wurde. *Melanagromyza cuscutae* HERING und *M. centrosematis* DE MEIJERE werden als neu für Indien gemeldet. Als Wirtspflanzen der weit verbreiteten tropischen *M. metallica* (THOMSON) wurden *Ageratum conyzoides* LINNAEUS und *Bidens pilosa* LINNAEUS (Compositae) festgestellt. *Phytomyza atricornis* MEIGEN bleibt die in Indien am weitesten verbreitete und polyphage Art.

#### Резюме

Сообщенные в работе исследования основываются на материале, собранном автором в плато Чотанагпур в Индии. *Agromyza tephrosiae* DE MEIJERE был отнесен к роду *Japanagromyza* SASAKAWA. Описывается новый вид *Melanagromyza*, который был выращен из минированных листьев *Dolichos lablab* LINNAEUS. *Melanagromyza cuscutae* HERING и *M. centrosematis* DE MEIJERE впервые описываются для Индии. Установлено, что растениями-хозяевами для часто упоминаемой тропической *M. metallica* (THOMSON) являются *Ageratum conyzoides* LINNAEUS и *Bidens pilosa* LINNAEUS (Compositae). *Phytomyza atricornis* MEIGEN продолжает оставаться самым распространенным и многоядным видом Индии.

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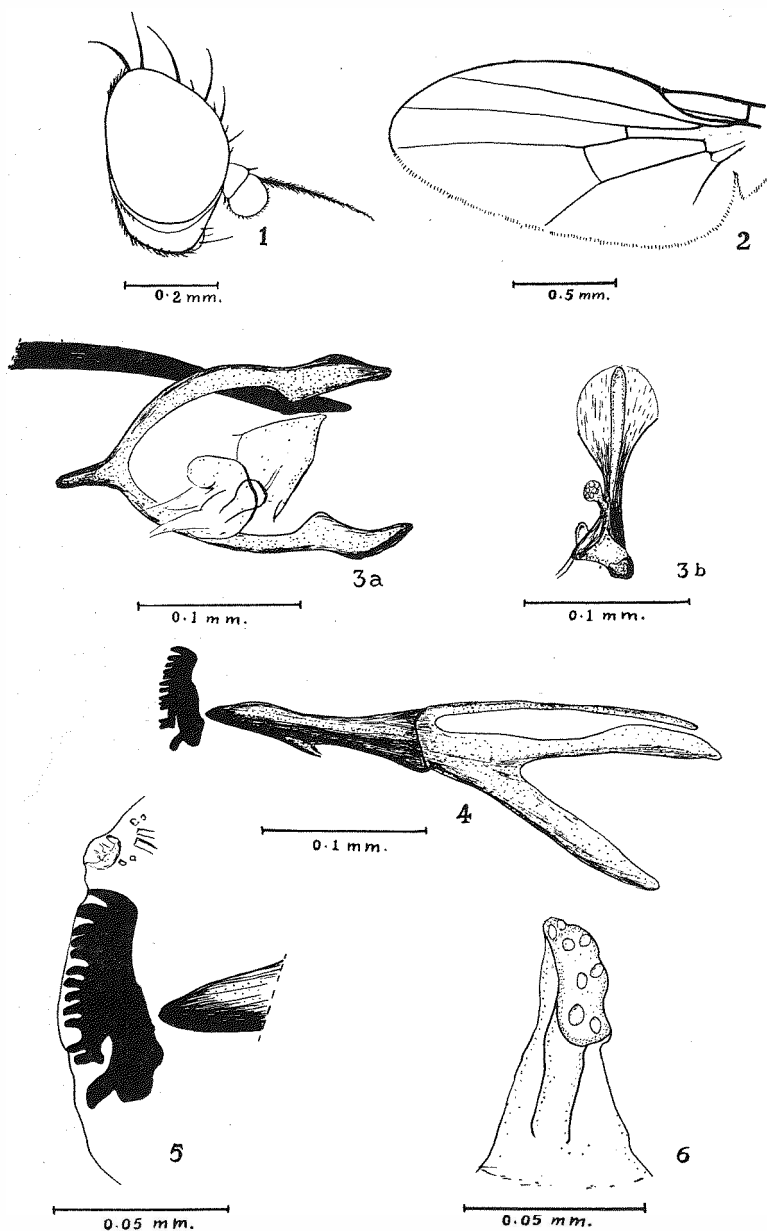


Plate 1

Fig. 1—6. *Melanagromyza dolichi* sp. n.: 1, head; 2, wing; 3a, aedeagus; 3b, sperm sac; 4, larval cephalopharyngeal skeleton; 5, larval fascial mask; 6, posterior spiracle

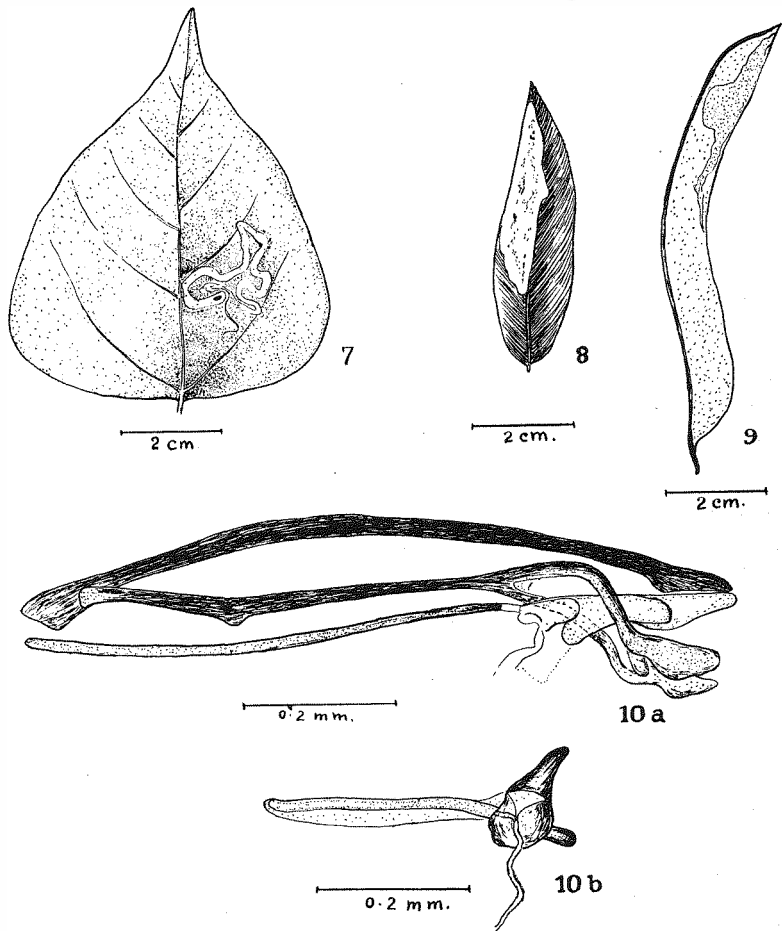


Plate 2

Fig. 7. *Melanagromyza dolichi* sp. n.: Leaf mine on *Dolichos lablab* LINNAEUS. —

Fig. 8. *Japanagromyza tephrosiae* (DE MEIJERE): Leaf mine on *Tephrosia candida* DC. —

Fig. 9. *Melanagromyza centrosematis* DE MEIJERE: Mine on the pod of *Tephrosia candida* DC. —

Fig. 10. *Japanagromyza tephrosiae* (DE MEIJERE): a, aedeagus; b, sperm sac



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