

**REVISIONARY STUDIES ON SUBFAMILY AGROMYZINAE FROM INDIA – PART I
A NEW GENUS AND REVISION OF *TROPICOMYIA* SPENCER
AND *MELANAGROMYZA* HENDEL (DIPTERA: AGROMYZIDAE)**

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Abstract

A new genus of family Agromyzidae (Diptera), *Epidermomyia* is being described to receive one of the three groups of *Tropicomyia* sensu stricto described by Spencer (1973) when he erected the Genus *Tropicomyia*. Comparative study of the larval and adult characters of the new genus and the genera *Tropicomyia* Spencer and *Melanagromyza* Hendel is also given. Keys for the identification of the six genera of sub-family Agromyzinae viz., *Agromyza*, *Japanagromyza*, *Epidermomyia*, *Melanagromyza*, *Tropicomyia*, and *Ophiomyia* along with listing of species so far described from India are included in this paper.

Keywords

Agromyzidae, *Epidermomyia*, *Melanagromyza*, *new genus*, *Tropicomyia*

Abbreviations

acr - Achrostichal bristles
M1+2 - Median vein 1+2
prsc - Prescutellar bristle
R4+5 - Radius vein 4+5
s.s. - sensu stricto

Dc - Dorso-central bristle
M3+4 - Median vein 3+4
R1 - Radius vein 1
r-m - Radio-medial cross vein

Introduction

Revisionary studies on the subfamily Agromyzinae have become imperative since the erection of the genus *Tropicomyia* by Spencer (1973) to receive a few diminutive epidermal miners of *Melanagromyza*, the addition of over 30 species to the genus *Melanagromyza* by Singh and Ipe (1973), and the new information that has emerged on the *Tropicomyia* s.s. included in *Tropicomyia* by Spencer (1973). The information gathered specially on their immature stages and biology since 1973 has necessitated the review of this group. Subfamily Agromyzinae in the Orient hitherto included genera *Agromyza* Fallen, *Japanagromyza* Sasakawa, *Melanagromyza* Hendel, *Tropicomyia* Spencer and *Ophiomyia* Brashnikov, dominated by *Melanagromyza* Hendel. *Melanagromyza* Hendel was erected in 1920 for species having black or dark brown halteres and separated from *Ophiomyia* due to the prominent facial keel

present in the latter. Genus *Hexomyia* was separated from this by Enderlain in 1936 which Frick in 1952 synonymized with *Melanagromyza*. However, *Hexomyia* now includes truly gall forming species and enjoys a separate generic status. *Melanagromyza* emerged as the dominant genus in the Oriental Region as a result of extensive studies by Spencer (1961, 1973) and, Singh and Ipe (1973).

The proposal to erect the genus as '*Epidermidomyia*' was first presented by the author at the Agromyzidae workshop at the I International Congress of Dipterology, Budapest in 1986. The correction of the name suggested at that time as *Epidermomyia* in place of *Epidermidomyia* is being accepted. The ensuing discussions at the workshop prompted further investigations and also comparative studies of the three genera concerned and the results are being presented hereunder.

Table 1. A comparative study of the diagnostic characters of the three genera, viz., *Epidermomyia* gen. nov., *Tropicomyia* Spencer and *Melanagromyza* Hendel is given below.

Characters	<i>Epidermomyia</i>	<i>Tropicomyia</i>	<i>Melanagromyza</i>
Mine	Linear, limited within upper cuticle, rarely transgress below	Linear, epidermal or mesodermal	Stem, root, seed, or leaf mesophyll mines
Adult size	Small invariably less than 2mm, rarely 2mm	Medium, 2-3mm, less than 3mm	Medium to large 2-4.2mm
Genitalia	Phallus especially distiphallus short and comparatively broad, rarely with phallic spines	Phallus characteristically club shaped usually with phallic spines	Typical of <i>Melanagromyza</i> , longer than <i>Tropicomyia</i> . Phallic vesicles distinct even in ordinary mounts
Larval mandibles	Equal always with 5 or more serrated teeth	Equal, each with 2 or more teeth	May or may not be equal, each with 1 or 2 teeth
Mandibular sclerite	Absent	Absent	Well developed sclerite usually bean shaped
Intermediate sclerite	Long	Comparatively short	Short
Paraclypeal phragma	Arms often fused distally	Not fused	Not fused
Lateral sclerite	Absent	Present	Absent
Frontal process	Present	Present	Absent
Size of larvae	2.2 ± 0.1 x 0.7 ± 0.1	2.7 ± 0.3 x 0.6 ± 0.1	4.3 = 0.4 x 1.2 ± 0.1
Size of Pupae	2.0 ± 0.2 x 0.9 ± 0.1	2.37 x 1.0	2.8 = 0.2 x 1.1 ± 0.1

***Epidermomyia* gen. nov.**

Agromyza atomella Malloch, Ann. Hist. Nat. Mus. Hung., 1914, 12: 333 (Type)

Melanagromyza atomella (Malloch), Henning, Ent. Beihefte, 1941, 8: 1-239

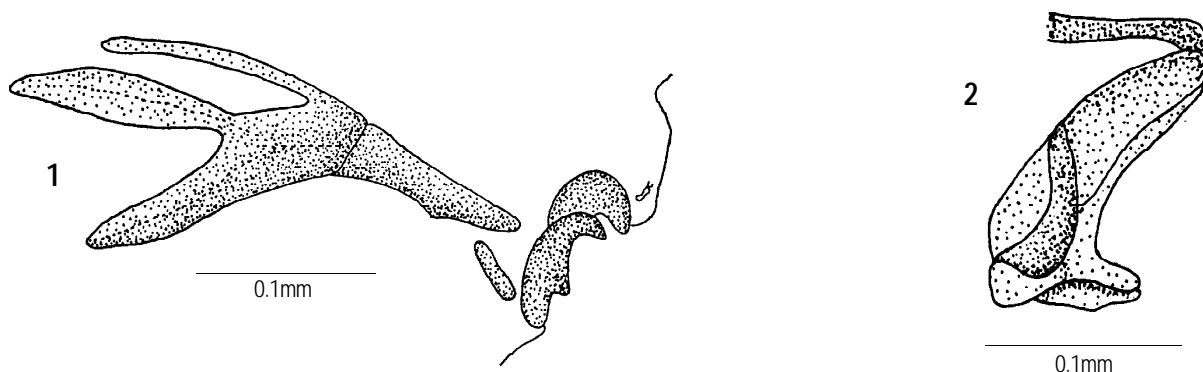
Tropicomyia atomella (Malloch), Spencer. Dr. Junk B.V. Publishers The Hague 1973: 180

Spencer (1973) erected a new genus *Tropicomyia* for the diminutive leaf miners of *Melanagromyza*. He included in this genus, all small- and medium-sized *Melanagromyza* making leaf mines in the tropics. His new genus included three groups, viz., *Tropicomyia* s.s., exclusively upper surface epidermal miners, an intermediate group where only first instar larvae remain as epidermal miners, the second and third instars becoming dermal miners and *Tropicomyia* s.lato where all instars make deeper upper surface leaf mines.

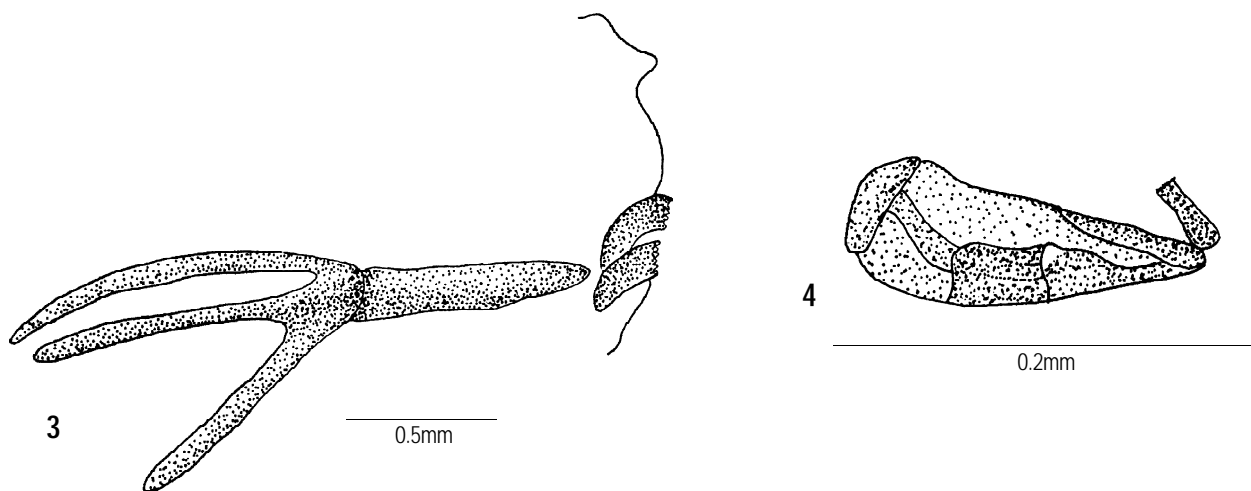
After the present detailed and careful study of the adults, their immature stages and biology, it has become evident that the redefinition of the existing groups and erection of a new genus for the diminutive upper surface cuticle miners are justifiable and essential to mainly accommodate the *Tropicomyia* s.s. of Spencer. They form a compact group of flies, almost all of them being oligophagous, and extending far beyond the northern

limits and elevation of tropical India deep into the temperate Himalaya above elevations of 2500m, thus also making *Tropicomyia* a misnomer for them. The new genus *Epidermomyia* is proposed to receive a distinct and exclusive group of predominantly black or metallic black, small to medium sized flies, whose immature stages make linear tunnels only on the upper surface cuticle of the host plants, very rarely transgressing deeper leaf tissue. It is astonishing that the larvae are able to fulfill their nutritive requirements from the substance of the cuticle alone and that too without rupturing the upper thin surface maintaining the mine intact. The male genitalia of the group is also distinctive.

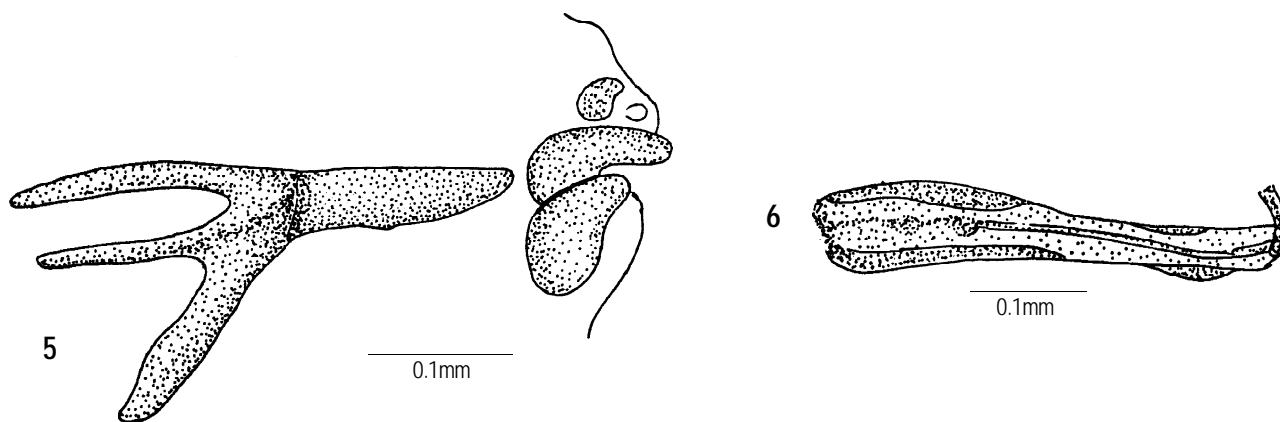
Sasakawa (1976) synonymised *Tropicomyia atomella* with *Melanagromyza theae* (Cotes) along with *Melanagromyza latigena* Garg and *Styricola* Sasakawa. I have verified the adults of *latigena* and also the genitalia of *Tropicomyia theae* at the British Museum (NH), London and also a series of 11 specimens from India. (Namkum, Ranchi, V.K.S. Collection, 1963), three specimens from the Saunda expedition and two from Colombo in the British Museum (NH). It is preferred to retain *Tropicomyia atomella* (Malloch), *Tropicomyia theae* (Cotes) and *Melanagromyza latigena* Garg as independent species.



Figures 1-2. *Tropicomyia akbari* (Singh & Ipe)
1 - Cephalopharyngeal skeleton; 2 - male phallic organ



Figures 3-4. *Epidermomyia atomella* (Malloch)
3 - Cephalopharyngeal skeleton; 4 - male phallic organ



Figures 5-6. *Melanagromyza obtusa* (Malloch)
5 - Cephalopharyngeal skeleton; 6 - male phallic organ

Keys to the identification of the genera belonging to sub-family Agromyzinae from India

(Modified from Singh & Ipe, 1973 and Spencer, 1969)

1. Subcosta developed throughout its length, coalescing with R1 before reaching costa
..... (sub-family Agromyzinae) 2
- 1A. Subcosta becoming a fold distally, and ending in costa separately and basad of R1
..... (sub-family Phytomyzinae)
2. Dc 2 pairs, if not 3 or 4 pairs, halteres black 3
- 2A. Dc atleast 3 pairs, prsc always present, halteres normally white or yellow, at most brown
..... *Agromyza* Fallen
3. Halteres invariably black or dark brown, prsc lacking 4
- 3A. Either prsc or foretibial bristle present or halteres yellowish. *Japanagromyza* Sasakawa
4. Costa extending to M1+2, r-m before, at, or away from the midpoint of the discal cell; Phallus long ,
mandibular teeth never more than two, internal leaf or stem borers. 5
- 4A. Costa extending to M1+2, ending at R4+5, r-m away from the mid point of the discal cell; phallus short, not
with spine or papillae, mediphallus and distiphallus broad; mandibular teeth always with more than five
serrations, posterior spiracles with 3 bulbs and never more; strictly linear cuticular or epidermal miners,
adults small in size. ***Epidermomyia* gen. nov.**
5. Size medium; mesonotum dark often shining; costa extending to M1+2, or ending at R4+5; distiphallus
expanded with spine or papillae. 6
- 5A. Size large; mesonotum frequently with metallic colouration, greenish, bluish or coppery; costa extending
strongly to M1+2; mid tibiae with 1-3 lateral bristles, antennae not separated by facial keel; male never with
vibrissal horn; distiphallus long. never with diverging arms; mandibular sclerite well developed with usually
club shaped; posterior spiracles always with many bulbs, usually in a semicircle
..... *Melanagromyza* Hendel
6. Size medium; costa extending to M1+2 or ending at R4+5, distiphallus expanded often with spines or
papillae; facial keel or vibrissal horn absent, first instar epidermal, 2nd and 3rd dermal miners.
..... *Tropicomyia* Spencer
- 6A. Uniformly black species, costa ending at R4+5 or extending to M1+2; midtibiae with lateral bristles; antennae
normally separated by conspicuous facial keel; males frequently with vibrissal horn, aedeagus with
basiphallus, generally having diverging side arms, distiphallus long and reticulate at times.
..... *Ophiomyia* Brashnikov

Species included in *Epidermomyia* gen.nov.

atomella (malloch)
polyphaga Spencer
vignae (Seguy)
flacourtiae (Seguy)
sanctijohani Garg
padmanabhi Singh & Ipe
thekadi Singh & Ipe
theae Green
eravensis Singh & Ipe
latifrons Garg

Transferred from genus

Tropicomyia Spencer
Tropicomyia Spencer
Tropicomyia Spencer
Tropicomyia Spencer
Melanagromyza Hendel
Melanagromyza Hendel
Melanagromyza Hendel
Tropicomyia Spencer
Melanagromyza Hendel
Melanagromyza Hendel

Keys to the Indian species of *Epidermomyia* gen. nov.

1. Frons projecting in front and above the level of the eye in profile. 5
 - 1A. Frons not projecting in front and above the level of the eye in profile. 2
 2. Costa reaching only upto R4+5. 4
 - 2A. Costa extending upto M1+2. 3
 3. *acr* four rows of five and two rows of two; distiphallus swollen, bend upwards with distinct phallic vesicle; ejaculatory bulb medium apodeme more than twice the bulb. *atomella* (Malloch)
 - 3A. *acr* in eight fairly regular rows; genitalia not as above *polyphaga* Spencer
 4. Ultimate and penultimate sectors of M3+4 unequal; arista half the vertical height of eye; distiphallus with prominent sclerotisation, posteriorly forked; anteriorly produced into acutely pointed process. *vignae* (Seguy)
 - 4A. Ultimate and penultimate sectors of M3+4 equal; arista half the vertical height of the eye. *flacourtae* (Seguy)
 5. Arista bare; basiphallus broad, mediphallus long, triangular, forked anteriorly, distiphallus cup shaped. *sanctijohani* Garg
 - 5A. Arista not bare 6
 6. Ultimate and penultimate sectors of costa equal 7
 - 6A. Ultimate and penultimate sectors of costa unequal 8
 7. Gena 1\4th the vertical height of eye, lunule broad, semicircular. *Padmanabhi* Singh & Ipe
 - 7A. Gena narrow, 1\6th the vertical height of eye, lunule low. *thekadi* (Singh & Ipe)
 8. Costa ending at M1+2. 9
 - 8A. Costa extending to R4+5 *thae* (Green)
 9. r-m cross vein away from midpoint of discal cell as 135:65, ultimate and penultimate sectors of M3+4 in the ratio of 145:188 gena 1\20th the vertical height of the eye *eravensis* Singh & Ipe
 - 9A. r-m cross vein away from midpoint of discal cell as 17:13, coastal ratio as 50:14:11; distiphallus long with many phallic spines; ejaculatory apodeme about 7 times the bulb. *latifrons* Garg

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