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Title	SOME ANTHOMYIIDAE FROM INDIA (DIPTERA)
Author(s)	Suwa, Masaaki
Citation	Insecta matsumurana. New series : journal of the Faculty of Agriculture Hokkaido University, series entomology., 22, 15-28
Issue Date	1981-06
Doc URL	https://hdl.handle.net/2115/9810
Type	departmental bulletin paper
File Information	22_p15-28.pdf



SOME ANTHOMYIIDAE FROM INDIA (DIPTERA)

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Research Trips for Agricultural and Forest Insects in the Subcontinent of India (Hokkaidō University, University of Calcutta, and Zoological Survey of India Joint Project) [Grants-in-Aid for Overseas Scientific Survey, Ministry of Education, Japanese Government, 1978, No. 304108; 1979, No. 404307], Scientific Report No. 8.

Abstract

SUWA, M. 1981. Some Anthomyiidae from India (Diptera). *Ins. matsum. n.s.* 22: 15-28, 1 tab., 22 figs.

Eighteen Indian species of Anthomyiidae belonging to 8 genera are reviewed. Of them 3 species are new to India: - *Calythea limnophorina* (Stein), *Emmesomyia oriens* Suwa and *Emmesomyia villica* (Meigen). Eight species remain undetermined.

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INTRODUCTION

Although the Anthomyiidae have been recorded mostly from the Holarctic region, we know some occurring in the Neotropical and the Ethiopian regions, especially in the temperate or mountainous areas (Pont, 1974; Pont & Ackland, 1980). So far as known some of the Anthomyiidae are saprophagous or coprophagous, yet much more species are phytophagous and mainly associated with herbs belonging to Caryophyllaceae, Chenopodiaceae, Compositae, Polygonaceae, Solanaceae, Gramineae, etc., so that it may not be unreasonable to expect a fairly rich fauna of the family in the Oriental region, adjacent to the Palaeartic, at least in its mountainous districts, e.g. the Himalayas. Nevertheless, on the fauna of the region we still have a fragmentary knowledge only. According to Ackland & Pont (1977) and Suwa (1977), in the Oriental region have been recorded 67 species, of which 19 species are recognized in India and 35 in Nepal.

Recently, from October to December in 1978, I had the opportunity to collect flies in India as a member of the Research Trips for Agricultural and Forest Insects in the Subcontinent of India (Hokkaidô University, University of Calcutta, and Zoological Survey of India Joint Project). Among the collection made on that occasion I have found 18 species of Anthomyiidae, of which 10 species are referable to described ones, with the rest remaining undetermined owing to paucity of material or of knowledge. Thus, a total of 22 described and 8 undetermined species of Anthomyiidae are now known to occur in India.

Half of the material used here will be deposited in the collection of Entomological Institute, Hokkaidô University, and the other half in the collections of the Zoological Survey of India and the Department of Zoology, University of Calcutta.

ENUMERATION

1. *Anthomyia illocata* Walker, 1856

Anthomyia bisetosa: Brunetti, 1907: 383. *Anthomyia illocata*: Fan, 1965: 38; Hennig, 1968: 205; Suwa, 1974: 50; id., 1977: 19; Ackland & Pont, 1977: 439.

Material examined. Tamil Nadu: Mettupalayam View, Nilgiris, ca. 800 m, 1 ♀, 10-xii-78; Top Slip, Anaimalai, 550-800 m, 1 ♀, 3-xii-78.

Distribution. Oriental and Australian regions; Hawaii; East Asia.

In India, this species was recorded by Brunetti (1907), under the name *A. bisetosa*, from Mhow (Madhya Pradesh) and Calcutta.

2. *Anthomyia* sp. A

Anthomyia sp. A: Suwa, 1974: 51.

Material examined. Tamil Nadu: Coonoor, Nilgiris, 1700-1900 m, 1 ♂, 3 ♀, 23-26-xi-78.

Distribution. India; Japan.

The present specimens are referable to *Anthomyia* sp. A of Suwa (1974) from Japan. Further discussion will be given in another paper.

3. *Anthomyia* sp. B

Anthomyia sp. B: Suwa, 1974: 52. *Anthomyia* sp.: Suwa, 1981: 102.

Material examined. Himachal Pradesh: Solan, ca. 1500 m, 1 ♂, 28-30-x-78.

Distribution. India; Japan; Korea.

The present specimen is referable to *Anthomyia* sp. B of Suwa (1974) from Japan and *Anthomyia* sp. of Suwa (1981) from Korea. Further discussion will be given in another paper together with the preceding species.

4. *Anthomyia* sp. C

Material examined. Himachal Pradesh: Solan, ca. 1500 m, 1 ♀, 24-27-x-78.

♀. Mesonotum with a pair of presutural black spots expanding to the bases of *ph* and of 1st and 2nd *dc*, with 3 large postsutural black spots completely separated from each other by greyish pollinose stripes along *dc*-rows, and just near the base of each wing with a smaller black spot, which is not fused to the lateral postsutural spot; scutellum grey pollinose along basal suture, at basal corners, and at apex, and blackish on remaining part; lower calyptra about as large as the upper.

This species agrees with *Anthomyia inda* Ackland & Pont, 1977 (= *A. indica* Malloch, 1924, nec Walker, 1852) by having 3 large postsutural spots on the mesonotum, but disagrees by the lower calyptra not distinctly larger than the upper. It may be identical with the species which Brunetti (1907 & 1917) recorded from N.W. India (Simla district) under the name *Anthomyia pluvialis* (Linné, 1758). Anyhow, the material at hand is too meagre to determine.

5. *Calythea limnophorina* (Stein, 1915)

Fallacia limnophorina Stein, 1915: 29. *Calythea limnophorina*: Fan, 1965: 40; Ackland, 1968: 139; Ackland & Pont, 1977: 440.

Material examined. Kerala: Palghat Forest, ca. 200 m, 1 ♀, 6-xii-78.

Distribution. India; Burma; Thailand; Taiwan.

This species is new to India. Even in the female it can be readily distinguished from other known species of the genus by the bare prosternum and hypopleura, and by the thoracic dorsum banded alternately with black and golden yellow.

6. *Calythea setifrons* Ackland, 1968

Calythea setifrons Ackland, 1968: 137; Suwa, 1977: 44; Ackland & Pont, 1977: 440.

Material examined. Himachal Pradesh: Kufri, near Simla, 2500-2700 m, 2 ♀, 26-x-78. Uttar Pradesh: Municipal Park, Mussoorie, ca. 2000 m, 2 ♀, 3-xi-78.

Distribution. India; Nepal; Burma.

This species has been recorded from mountainous areas at altitudes of ca. 1500-3000 m in northern Oriental region.

7. *Calythea* sp.

Material examined. Himachal Pradesh: Kufri, near Simla, 2500-2700 m, 1 ♀, 26-x-78.

The present female specimen closely resembles the females of the preceding species, differing, however, in some characters:— Parafrontals less brownish in

pollinosity; interfrontalia with no setae apart from the normal pair of *if*; mesonotum paler in pollinosity, and more sharply vittate; rows of *pre-acr* closer to each other than to *dc*-rows. In a key to the world species of *Calythea* given by Ackland (1968) the specimen runs into the Palaearctic *nigricans* (Robineau-Desvoidy, 1830). As no associated male specimens are available the determination with that species is difficult. In this connection Fan (1965) described *C. cheni*, a closely related species to *nigricans*, from China (Chinan, Shantung Sheng, the type-locality, and Tibet), and he recorded *nigricans* too under the name of *albicincta* (Fallén, 1825) from China (Shanghai, Chiangsu Sheng).

8. *Craspedochoeta hamata* Ackland, 1968

(Figs. 1-8)

Craspedochoeta hamata Ackland, 1968: 110; Ackland & Pont, 1977: 441.

Material examined. Tamil Nadu: Coonoor, Nilgiris, 1700-1900 m, 1 ♂, 23-26-xi-78.

Distribution. India; Nepal.

The present specimen is referred to *C. hamata* by the following aspects: - *Pra* shorter than posterior *ntpl*; abdomen hardly flattened at base; t_3 with apical *pv* much shorter than height of the tibia; postgonite (Fig. 3) with the dorsal projection short and the ventral corner hardly protruded.

This species has been known from N.W. India (Simla, ca. 2000 m) and from Nepal, whereas Coonoor, the locality of the present specimen, is a hill station of the Nilgiris, South India. The species may represent a northern connection in the Nilgiris; otherwise it must be widely distributed in mountainous areas in the subcontinent.

9. *Delia bracata* (Rondani, 1866)

Delia flavibasis: Ackland, 1967: 119, nec Stein, 1903. *Delia bracata*: Hennig, 1974: 747; Suwa, 1977: 23; Ackland & Pont, 1977: 441; Pont & Ackland, 1980: 716.

Material examined. Himachal Pradesh: Solan, ca. 1500 m, 1 ♂, 24-27-x-78. Tamil Nadu: Coonoor, Nilgiris, 1700-1900 m, 5 ♂, 3 ♀, 23-26-xi-78; Mudmalai, ca. 1000 m, 2 ♀, 27-28-xi-78; Top Slip, Anaimalai, 550-800 m, 2 ♂, 1 ♀, 2-xii-78.

Distribution. India; Nepal; Iran; Near East; North Africa; South Europe; Ethiopian region.

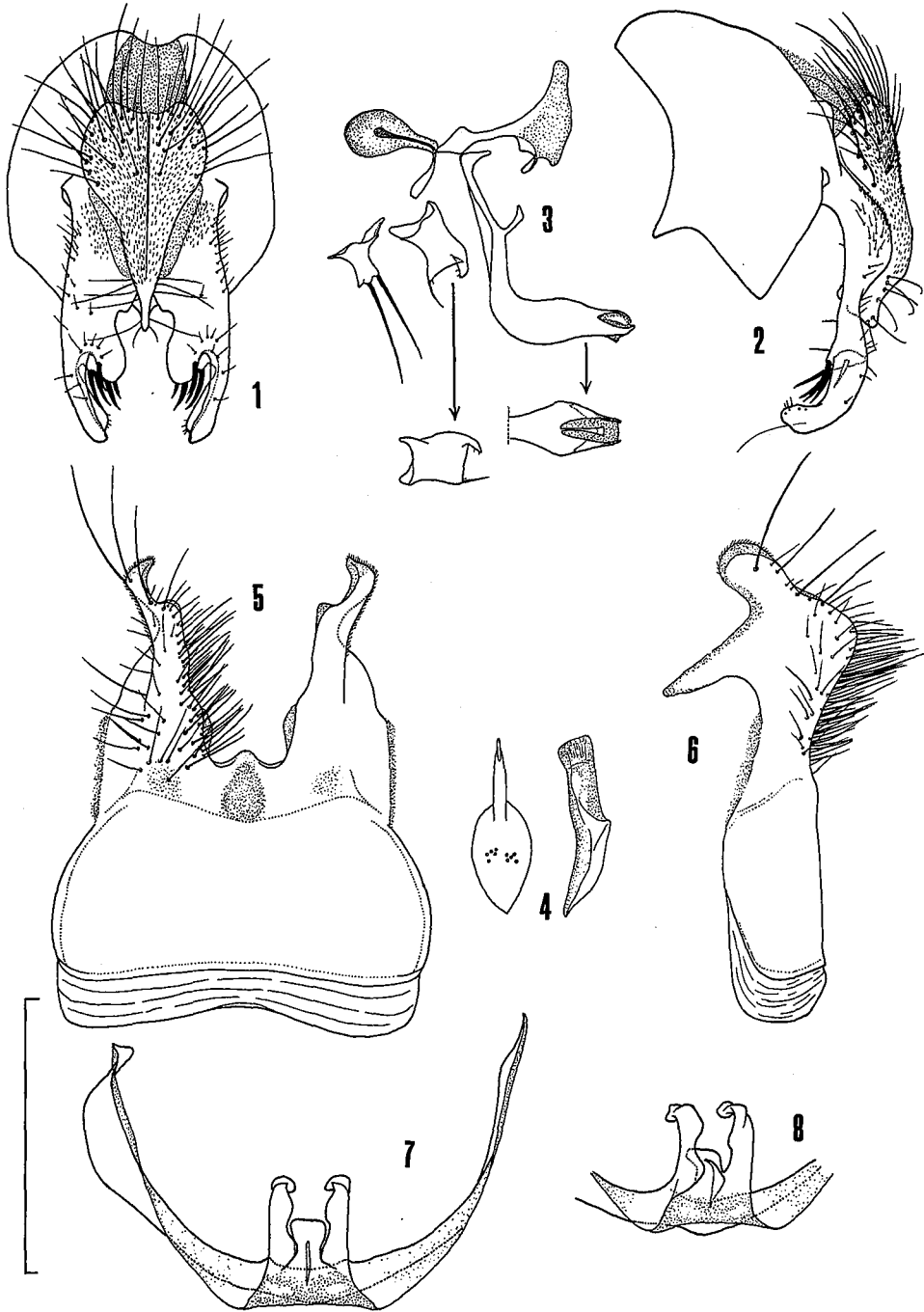
10. *Delia platura* (Meigen, 1826)

Hylemyia cilicrura: Kapur, 1960: 129; Gujrati et al., 1972: 366. *Delia platura*: Hennig, 1974: 881; Suwa, 1977: 23; Ackland & Pont, 1977: 441; Pont & Ackland, 1980: 716.

Material examined. Himachal Pradesh: Solan, ca. 1500 m, 2 ♀, 24-27-x-78. Tamil Nadu: Doddabetta, Nilgiris, ca. 2600 m, 25 ♂, 15 ♀, 24-xi-78.

Distribution. India; Nepal; Pakistan; Taiwan; Cosmopolitan.

This is a common agricultural pest known as the seed-corn maggot, and widely distributed in the world. In India it has been known from some localities of Himachal Pradesh, Uttar Pradesh, West Bengal and Madhya Pradesh (Kapur, 1960; Gujrati et al., 1972).



Figs. 1-8. *Craspedochoeta hamata* Ackland, ♂. 1, hypopygium, dorsal view; 2, ditto, lateral view; 3, aedeagus; 4, ejaculatory apodeme; 5, 5th sternite, ventral view; 6, ditto, lateral view; 7, 6th sternite, ventral view; 8, ditto, ventro-lateral view. Scale 0.5 mm. Coonoor, Tamil Nadu.

11. *Emmesomyia oriens* Suwa, 1974

Emmesomyia oriens Suwa, 1974: 187.

Material examined. Tamil Nadu: Coonoor, Nilgiris, 1700–1900 m, 1 ♂, 23–26-xi-78.

Distribution. India; Japan.

The present specimen is referred to *E. oriens*, which was originally described from Japan and is new to India. Although differing from the Japanese form by the femora not blackish but wholly yellow, it agrees well with the latter in other characters.

12. *Emmesomyia villica* (Meigen, 1838)

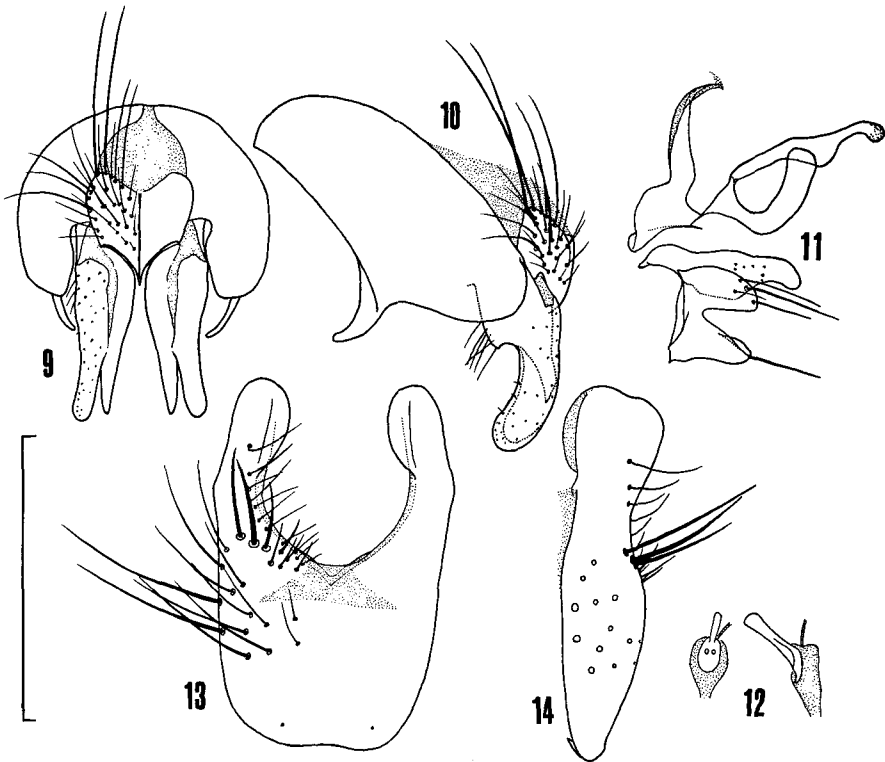
(Figs. 9–14)

Emmesomyia villica: Hennig, 1972: 454; Suwa, 1974: 184.

Material examined. Uttar Pradesh: Dehra Dun, 600–700 m, 1 ♂, 2–6-xi-78.

Distribution. India; Japan; Manchuria; Europe.

By the processes of the 5th sternite expanded on the apical half, and by the postgonite with the dorsal lobe broad and armed with 4 setae, the present specimen agrees with the Japanese, rather than the European, form. The processes of the



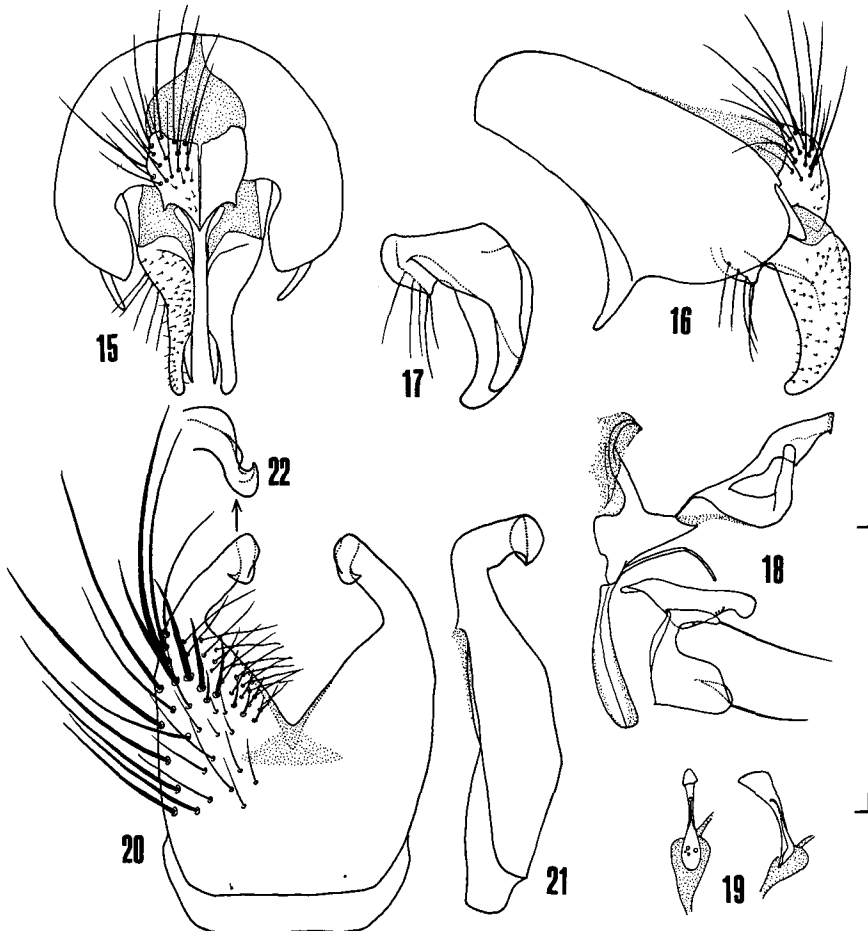
Figs. 9–14. *Emmesomyia villica* (Meigen), ♂. 9, hypopygium, dorsal view; 10, ditto, lateral view; 11, aedeagus; 12, ejaculatory apodeme; 13, 5th sternite, ventral view; 14, ditto, lateral view. Scale 0.5 mm. Dehra Dun, Uttar Pradesh.

5th sternite are, however, somewhat less expanded in the present specimen. This species is new to India.

13. *Emmesomyia* sp.
(Figs. 15-22)

Material examined. Uttar Pradesh: Mohand Forest, near Dehra Dun, ca. 500 m, 1 ♂, 7-9-xi-78; Dehra Dun, ca. 650 m, 1 ♀, 10-13-xi-78.

♂. Body-length ca. 6 mm. Body blackish in ground colour; abdomen with median vitta narrow and sharp; fore coxa partly yellow; mid and hind coxae brownish, partly blackish; fore trochanter brownish yellow; mid and hind trochanters brownish; femora and tibiae wholly yellow; tarsi dark brownish. Mesonotum with *pra* slightly longer than posterior *ntpl*; pteropleura with 1 fine and 3 strong setae.



Figs. 15-22. *Emmesomyia* sp., ♂. 15, hypopygium, dorsal view; 16, ditto, lateral view; 17, surstylus (right), inside view; 18, aedeagus; 19, ejaculatory apodeme; 20, 5th sternite, ventral view; 21, ditto, lateral view; 22, ditto, apical half of process, caudal view. Scale 0.5 mm. Dehra Dun, Uttar Pradesh.

Abdomen half-depressed and ovoid, about 1.3 times as long as wide; 5th sternite (Figs. 20–22) with processes narrowly prolonged apicad, the apical part turning ventrad, then a little returned dorsad.

♀. Fore femur with a dark suffusion on dorsal to posterior surface; *pra* about as long as posterior *ntpl*.

In having the body blackish in ground colour, the femora yellow, and the abdomen short and ovoid, the present specimens agree well with the original description of *Pegomyia ovata* Stein, 1915 from Taiwan, which was recently transferred to the genus *Emmesomyia* by Ackland & Pont (1977). However, they are not determined here, for I have examined no specimens from Taiwan myself.

14. *Hylemya* sp. A

Material examined. Uttar Pradesh: Kemptee Fall, Mussoorie, 1400–1600 m, 1 ♀, 4–xi–78.

♀. Body-length 5.7 mm; body blackish in ground colour; femora and tibiae yellow; fore femur darkened on dorsal to posterior surface; mid and hind femora faintly darkened at apex. Mesonotum with 2 pairs of *pre-acr* and 3 pairs of *post-acr* excluding *prsc-acr*; lower anterior *stpl* short and fine.

This species is close to *H. detracta* (Walker, 1852). Compared with Nepalese specimens referred to that species, the present specimen is characterized by the *acr* more numerous and by the mesonotum and abdomen less shining.

15. *Hylemya* sp. B

Material examined. Uttar Pradesh: Bhatta Reservoir, near Dehra Dun, ca. 1500 m, 1 ♀, 3–xi–78.

♀. Body-length 6 mm; body including appendages black in ground colour; occiput with some setulae just below the postocular series.

This specimen might be a female of *H. probilis* Ackland, 1967 known from Nepal.

16. *Paregle cinerella* (Fallén, 1825)

Hylemyia (*Paregle*) *cinerella*: Fan, 1965: 52. *Paregle cinerella*: Ackland, 1967: 125; Hennig, 1967: 161; Suwa, 1977: 22; Ackland & Pont, 1977: 444.

Material examined. Himachal Pradesh: Solan, ca. 1500 m, 1 ♂, 4 ♀, 24–27–x–78; Kufri, near Simla, 2500–2700 m, 1 ♂, 1 ♀, 26–x–78. Uttar Pradesh: Bhatta Reservoir, near Dehra Dun, ca. 1500 m, 1 ♂, 4 ♀, 3–xi–78. Delhi, 2 ♂, 22–23–x–78.

Distribution. India; Nepal; Burma; Philippines; Taiwan; Holarctic region.

In India this species has been recorded from Calcutta (Hennig, 1967) and from Kashmir (Ackland & Pont, 1977).

17. *Pegomyia quadrivittata* Karl, 1935

Pegomyia quadrivittata: Hennig, 1973: 619; Suwa, 1974: 196; Ackland & Pont, 1977: 445; Suwa, 1981: 107.

Material examined. Tamil Nadu: Coonoor, Nilgiris, 1700–1900 m, 1 ♀, 29–xi–78. Kerala: Thekkady (Periyar Sanctuary), ca. 900 m, 4 ♀, 19–21–xii–78.

Apart from the above material a lot of larvae and puparia were obtained from the following localities (some emerged to adults, which are mostly in bad condition

for shrinkage): — Himachal Pradesh: Solan, ca. 1500 m, 25-x-78, ex *Rumex hastatus* and *Rumex* sp.; Simla, ca. 2100 m, 26-x-78, ex *Rumex* sp. Uttar Pradesh: Bhatta Reservoir, near Dehra Dun, ca. 1500 m, 3-xi-78, ex *Rumex* sp., 4 ♂ and 3 ♀ emerged; Municipal Park, Mussoorie, ca. 2000 m, 3-xi-78, ex *Rumex* sp., 2 ♂ and 3 ♀ emerged; Kemptee Fall, Mussoorie, ca. 1600 m, 4-xi-78, ex *Rumex* sp., 1 ♀ (pharate). Tamil Nadu: Top Slip, Anaimalai, 550–800 m, 3-xii-78, ex *Polygonum chinense*. Kerala: Thekkady (Periyar Sanctuary), ca. 900 m, 19–21-xii-78, ex *Polygonum chinense*, 10 ♂ and 7 ♀ emerged.

Host plants. *Polygonum chinense*, *Rumex hastatus* and *Rumex* sp. (in India); *Polygonum nepalense*, *Polygonum sieboldi*, *Polygonum thunbergi* and *Polygonum filiforme* (in Japan, after Suwa, 1974); *Polygonum* sp. (in Korea, after Suwa, 1981). This species is a leaf-miner on these plants.

Distribution. India; Ceylon; Malaya; Taiwan; Korea; Japan.

It is noteworthy that the present species attacks not only *Polygonum* but also *Rumex* in India. Recently I have also reared it from both *Polygonum* and *Rumex* in Taiwan. On the other hand, in Japan it has only been reared from *Polygonum* in spite of the abundant occurrence of *Rumex*, on which *Pegomya bicolor* (Wiedemann, 1817) is common. So far as I am aware, *P. bicolor* has never been recorded from the Oriental region except for records from Shanghai, China. The differentiation in host plants between *P. quadrivittata* and *P. bicolor* where these species are sympatric, coupled with the occurrence of *P. quadrivittata* on both *Polygonum* and *Rumex* where *P. bicolor* is absent, strongly suggests some form of interaction between them. Morphologically little difference has been found among the examined specimens of *P. quadrivittata* from Japan, Taiwan and India.

18. *Pegomya* sp.

Material examined. Tamil Nadu: Top Slip, Anaimalai, 550–800 m, 1 ♀, 3-xii-78; Kallar, Nilgiris, 700–850 m, 1 ♀, 9-xii-78.

A yellowish species, belonging to the *geniculata*-group of Hennig (1973).

CONCLUDING REMARKS

In the subcontinent of India, 35 species of Anthomyiidae have been recorded from Nepal. It may be reasonable to take them into consideration together with the Indian species. The species recorded from both countries are given in Table 1. Undetermined species are omitted from the table except for *Anthomyia* sp. A and sp. B.

As shown in the table comparatively few species are common to India and Nepal. This may be due partly to the faunal difference between India and Nepal, but mainly to our fragmentary knowledge. In this connection the season I spent in India for collecting was too late especially for herb-feeding species. Among the species collected in India by myself only a few, i.e. *Delia braccata*, *Delia platura* and *Pegomya quadrivittata*, are probable or actual herb-feeders (*D. platura* is rather omnivorous), while almost all of the rest are coprophagous or saprophagous or probably so. In Nepal not a few species of *Delia*, *Pegohylemyia* and *Phorbia* are recorded. So far as known, species of these genera are mostly herb-feeders.

On the basis of their distribution the species listed in the table are divided into some groups as follows: —

Group A. Species recorded only in the Oriental region. Here are recognized 30 species (60%), i.e. *Anthomyia inda*, *Calythea limnophorina*, *Calythea setifrons*, *Craspedochoeta hamata*, *Delia coei*, *Delia impilosa*, etc. Some of them may be restricted to certain districts, e.g. the Himalayas, and some others may widely occur in the region. It is possible that some of the species here belong to the Group B.

Group B. Species recorded in the subcontinent of India and adjacent districts in Central Asia. *Delia gracilis* from Nepal and Tibet and *Paregle alatavensis* from India, Tadzhikistan and Kirgisia are included here.

Group C. Species recorded from east Asia including the subcontinent and Japan. The following 7 or 8 species are included in this group: — *Anthomyia illocata* (found in Australian region too), *Anthomyia* sp. A, *Anthomyia* sp. B, *Pegomya nigra*, *Pegomya quadrivittata*, *Emmesomyia oriens*, *Emmesomyia villica*, and possibly *Emmesomyia socia*. *E. villica* is found in Europe too, but the Indian specimen examined distinctly differs in some characters from the European form and agrees well with the Japanese form. The same might be expected in the case of *E. socia*. These species may be reasonably placed here.

Group D. Species recorded from the subcontinent and Europe, with or without other records. Here are included 3 species: — *Calythea dedecorata*, *Delia braccata* and *Lasiomma nitidicauda*.

Group E. Species with a wide distribution in the Oriental and Palaearctic regions or with a wider distribution. In this group the following 7 species are recognized: — *Delia echinata*, *Delia platura*, *Nupedia aestiva*, *Paregle cinerella*, *Pegohylemyia striolata*, *Subhylemyia longula* and *Craspedochoeta pullula*.

From Table 1 and the grouping mentioned above a few points will be noted: —

1) In spite of our insufficient knowledge on the fauna not a few (13) genera are found in the subcontinent of India. According to Ackland & Pont (1977) 4 other genera of the family are recognized in the Oriental region. None of these genera are, however, endemic to the Oriental region, and all of them are found in Europe and even in North America, too. On the other hand comparatively numerous species have been found only in the subcontinent or in the Oriental region. This seems to imply that the historical time for the establishment of the Oriental anthomyiid fauna has been too short to produce endemic genera though long enough to create endemic species. We can expect a rich fauna with a rich endemism at the specific level rather than at the generic level in the Oriental Anthomyiidae.

2) Of the 50 species listed in the table, 12 species (24%) are common to Japan and the same number of species, including *Emmesomyia villica* and *E. socia*, common to Europe. If the species with a wide distribution, members of Group E, are disregarded, the difference between the faunal relation to Europe and that to Japan will become clearer. The species of Group C are more than twice as many as those of Group D. This, though based on the meagre data, suggests that the faunal relation of the subcontinent to the eastern side of the Palaearctic region is more remarkable than that to the western side. On the other hand, the Japanese fauna (ca. 170 species recorded) shows a close relation to the European, with ca. 60% of species common to Europe.

Table 1. Species of the Anthomyiidae known from India and Nepal, and their distributional records.

	Oriental region			Palearctic region					Other regions				Localities in India
	India	Nepal	Others	Japan	Europe	N. Africa	Central Asia	Others	Ethiopian	Nearctic	Neotropical	Australian	
1. <i>Anthomyia illocata</i>	○	○	○	○				○				○	Madhya Pradesh (Mhow); W. Bengal (Calcutta); Tamil Nadu (Nilgiris & Anaimalai).
2. <i>A. inda</i>	○												Uttar Pradesh; Punjab (Kasauli).
3. <i>A. sp. A</i>	○			○									Tamil Nadu (Nilgiris).
4. <i>A. sp. B</i>	○			○				○					Himachal Pradesh (Solan).
5. <i>Calythea dedecorata</i>	○				○			○					Himachal Pradesh.
6. <i>C. limnophorina</i>	○												Kerala (Palghat).
7. <i>C. setifrons</i>	○	○	○										Sikkim; W. Bengal (Darjeeling Dist.); Himachal Pradesh (Kufri); Uttar Pradesh (Mussoorie).
8. <i>Craspedochoeta hamata</i>	○	○											Himachal Pradesh (Simla); Tamil Nadu (Nilgiris).
9. <i>C. pullula</i>	○				○	○		○	○	?			India.
10. <i>Delia bracata</i>	○	○			○	○		○	○				Himachal Pradesh (Solan); Tamil Nadu (Nilgiris, Mudumalai & Anaimalai); India.
11. <i>D. coei</i>		○											
12. <i>D. echinata</i>	○			○	○	○	○	○		○			Himachal Pradesh.
13. <i>D. gracilis</i>		○					○						
14. <i>D. impilosa</i>		○					○						
15. <i>D. humatai</i>		○											
16. <i>D. nepalensis</i>		○											
17. <i>D. platura</i>	○	○	○	○	○	○	○	○	○	○	○	○	Himachal Pradesh (Rohtang Pass, Simla Hills & Solan); Uttar Pradesh (Nainital & Mussoorie); W. Bengal (Darjeeling); Madhya Pradesh (Jabalpur); Tamil Nadu (Nilgiris).
18. <i>D. repens</i>		○											Assam.
19. <i>Emmesomyia kempi</i>	○	○	○										Tamil Nadu (Nilgiris).
20. <i>E. oriens</i>	○			○									

ACKNOWLEDGEMENTS

The material used in this paper was obtained in connection with the Research Trips for Agricultural and Forest Insects in the Subcontinent of India (Hokkaidô University, University of Calcutta, and Zoological Survey of India Joint Project). On this occasion I wish to express my hearty thanks to Prof. T. Nakashima (Hokkaidô University), the leader of the project, for his kindness in giving me a chance to join the project, and to Prof. D.N. Raychaudhuri (University of Calcutta), Dr. T.N. Ananthkrishnan (the Director of Zoological Survey of India) and Dr. B. S. Lamba (the Director of Northern Regional Station of Zoological Survey of India) for their great help and co-operation in the project. My cordial thanks are also due to the following scientists for their help in various ways: — Dr. N.B. Chatterjee, Dr. M.R. Gosh, Dr. P.K. Mandal, Dr. Dinendra N. Raychaudhuri, Dr. B.K. Agarwala, Mr. S.K. Das, Mr. J.L. Ganguly and Mr. S. Sarkar (University of Calcutta); Dr. O.B. Chhotani, Dr. R.K. Varshney, Dr. G.S. Arora, Dr. R.C. Basu, Dr. N. Muraleedharan, Dr. B.C. Das and Mr. S.K. Mandal (Zoological Survey of India); Dr. Arun Kumar and Dr. S.C. Verma (Northern Regional Station of Zoological Survey of India); Dr. J.M. Julka (High Altitude Zoology Field Station of Zoological Survey of India). Last but not least I am grateful to Prof. S. Takagi (Hokkaidô University) for his kindness in reading the manuscript and giving me critical advice.

REFERENCES

- Ackland, D.M. 1967. Diptera from Nepal. Anthomyiidae. Bull. Br. Mus. nat. Hist. (Ent.) 20 (4): 105–139.
- 1968. The world species of *Calythea* Schnabl and Dzied. (Dipt., Anthomyiidae) with notes on Bigot's types. Ent. month. Mag. 104: 135–144.
- & Pont, A.C. 1977. Family Anthomyiidae. In Delfinado, M.D. & Hardy, D.E. (ed.), A catalog of the Diptera of the Oriental region. 3: 439–446.
- Brunetti, E. 1907. Notes on Oriental Diptera. IV. On some Indian species of *Limnophora* and *Anthomyia*, with a description of a new species of the former genus. Rec. Ind. Mus. 1: 381–385, 1 pl.
- 1917. Diptera of the Simla District. Rec. Ind. Mus. 13: 59–101.
- Fan, T. 1965. [Keys to common flies in China.] 330 pp. (in Chinese). Peking.
- Gujrati, J.P., Kapoor, K.N. & Gangrade, G.A. 1972. Incidence and control of seed-corn maggot, *Hylemya cilicrura* (Rond.) on soybean. Ind. Journ. Ent. (1971) 33: 366–368.
- Hennig, W. 1966–1976. Anthomyiidae. In Lindner's Flieg. palaeark. Region. 63a: 1–974.
- Kapur, A.P. 1960. First record of *Oscinella frit* (Linn.) (Chloropidae, Diptera) and *Hylemyia cilicrura* (Rond.) (Anthomyiidae, Diptera) from India. Rec. Ind. Mus. (1957) 55: 127–132.
- Pont, A.C. 1974. Family Anthomyiidae. In A catalogue of the Diptera of the Americas south of The United States. 96a: 1–21.
- & Ackland, D.M. 1980. Family Anthomyiidae. In Crosskey, R.W. (ed.), Catalogue of the Diptera of the Afrotropical region. Pp. 715–718.
- Stein, P. 1915. Anthomyiidae (Dipt.). Suppl. Ent. 4: 13–56.
- Suwa, M. 1974. Anthomyiidae of Japan (Diptera). Ins. matsum. n.s. 4: 1–247.
- 1977. Anthomyiidae collected by the Hokkaidô University Expeditions to Nepal Himalaya, 1968 and 1975 (Diptera). Ins. matsum. n.s. 10: 17–51.
- 1981. Notes on Anthomyiidae (Diptera) from Korea, with description of a new species. Kontyû 49: 102–108.