

INSECTA : DIPTERA

By

M. DATTA AND (MISS) M. CHAKRABORTI

*Zoological Survey of India, Calcutta*

(With 3 Figures)

INTRODUCTION

After a long time since the Abor expedition 1911-1912, the Zoological Survey of India alone or in collaboration with other organizations in India and abroad conducted a number of faunistic surveys since 1961 in order to investigate the faunal compositions in a remote North-Eastern State, Arunachal Pradesh (erstwhile N.E.F.A.). Our knowledge on the Dipterous fauna of the State is mainly concerned with the contributions by Brunetti (1913), Philip (1970), Joseph and Rao (1972a, b), Joseph and Parui (1973, 1977), Stone and Philip (1974), Joseph and Ray (1976), Datta and Das (1978), and Datta (1980).

The Dipterous material collected during the Namdapha exploration includes families : Tipulidae, Stratiomyidae, Tabanidae, Syrphidae, Micropezidae, Diopsidae, Celyphidae, Muscidae, Calliphoridae and Sarcophagidae dealt with in the paper.

The type-specimens are deposited in the National Zoological Collections of the Zoological Survey of India, Calcutta.

SYSTEMATIC ACCOUNT

Family : TIPULIDAE

1. *Holorusia fulvolateralis* (Brunetti)

1911. *Tipula fulvolateralis* Brunetti, *Rec. Indian Mus.*, 6 : 249.

1912. *Tipula fuivolateralis* Brunetti : Brunetti, *Fauna Brit. India*, Diptera, 1 : 304.

1973. *Holorusia fulvolateralis* (Brunetti) : Alexander and Alexander, *A Catalog of Diptera of the Oriental Region*, 1 : 27.

*Material examined* : 1 ♀ (ZSI Reg. No. 6908/H<sub>6</sub>), Namdapha, 22.iv. 1981.

*Remarks* : The species originally described from Assam and Uttar Pradesh, has been recorded from Arunachal Pradesh, Sikkim and West Bengal (Brunetti, 1912 ; Joseph and Parui, 1977) in India. This has

also been reported from Burma and Nepal (Alexander and Alexander, 1973).

## 2. *Holorusia* sp.

*Material examined* : 1 ♀ (ZSI Reg. No. 6909/H<sub>6</sub>), Miao Reserve forest, 5.iv. 1981.

*Remarks* : The single female specimen is left undetermined for lack of associated male specimens.

Family : STRATIOMYIDAE

## 3. *Sargus metallinus* Fabricius

1805. *Sargus metallinus* Fabricius, *Syst. Antliat.*, : 258.

1920. *Sargus metallinus* Fabricius : Brunetti, *Fauna Brit. India, Diptera*, 2 : 82.

1975. *Sargus metallinus* Fabricius : James, *A Catalog of Diptera of the Oriental Region*, 2 : 21.

*Material examined* : 1 ♀ (ZSI Reg. No. 6910/H<sub>6</sub>), Deban, 27.iv.1981.

*Remarks* : This is a widespread Oriental species (James, 1975). The species originally described from Bihar and Uttar Pradesh in India, has so far been reported from Aru islands, Borneo, Celebes, Java, Moluccas, Rangoon, Singapore, Shanghai and Sri Lanka (Brunetti, 1920 ; James, 1975). This is, however, recorded for the first time from Arunachal Pradesh.

## 4. *Stratiosphecomyia variegata* Brunetti

1913. *Stratiosphecomyia variegata* Brunetti, *Rec. Indian Mus.*, 9 : 261.

1920. *Stratiosphecomyia variegata* Brunetti : Brunetti, *Fauna Brit. India, Diptera*, 2 : 37.

1975. *Stratiosphecomyia variegata* Brunetti : James, *A Catalog of Diptera of the Oriental Region*, 2 : 41.

*Material examined* : 1 ♂, 1 ♀ (ZSI Reg. Nos. 6911/H<sub>6</sub>-6912/H<sub>6</sub>), Gibbon Land, 3.v.1981.

*Remarks* : This species originally described from Darjeeling (West Bengal), has been recorded from Meghalaya and Sikkim (Brunetti, 1920 ; James, 1975). This is recorded for the first time from Arunachal Pradesh. This is the only known species under the genus from the Oriental region. The thoracic and abdominal colour variations may be regarded intraspecific at present (*cf.* Brunetti, 1920).

Family : TABANIDÆ

5. *Tabanus (Tabanus) namdaphaicus* sp. nov.

( Figs. 1-A, B, C )

A medium-sized brownish species having subquadrate basal and spindle-shaped median callosities, dark red antenna, slender sickle-shaped palpus, black legs with partly yellowish tibiae and pale median spot on first abdominal tergite.

*Female*.—Length 12-13 mm. *Head* : Eyes bare, uniformly buff-grey, unbanded (relaxed). Frons (Fig. 1-A) gradually divergent above ; index 1 : 5.5, distinctly yellow pollinose anteriorly and darker posteriorly, entirely black pilose ; vertex greyish. Basal callosity subquadrate, rugose, dark grey, resting on subcallus but not touching eye-margins ; median callus nearly spindle-shaped, rugose, black, an inverted v-shaped depression above median callus on frons. Subcallus greyish, yellow

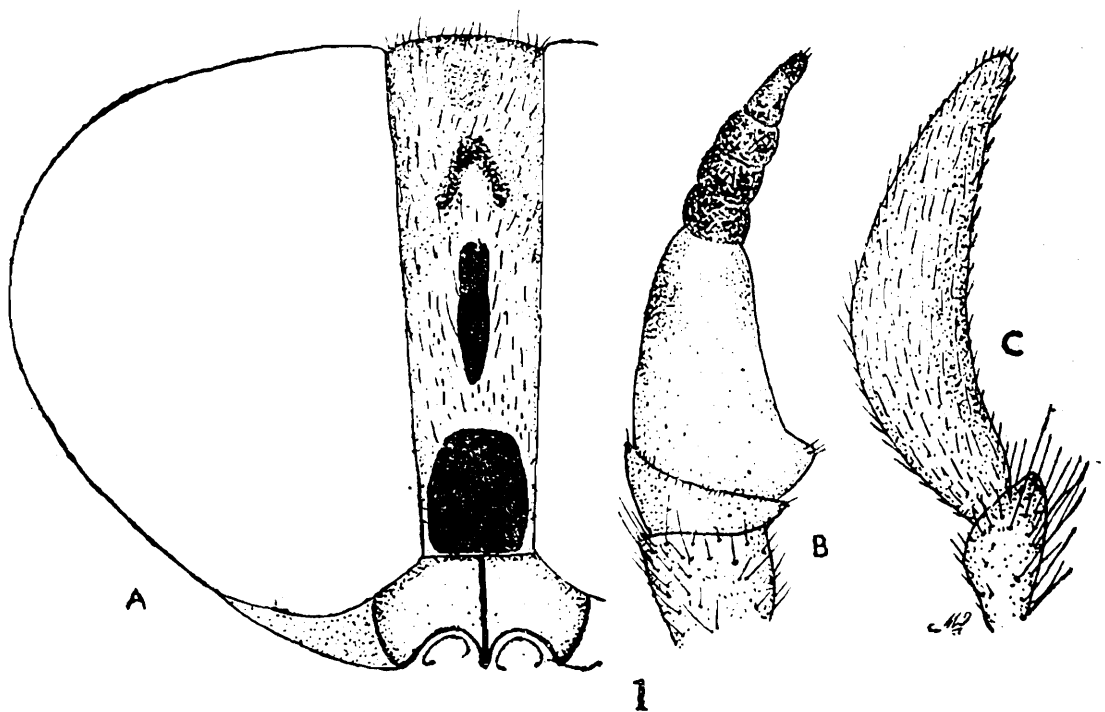


Fig. 1. *Tabanus (Tabanus) namdaphaicus* sp. nov.

pollinose ; face and parafacials also greyish, yellow pollinose ; face with a few black and brown hairs at upper corners only ; parafacials with a few short dark hairs and many long hairs. Antenna (Fig. 1-B) rather short, dark red with black style ; scape and pedicel black-haired ; plate of flagellum rather broad, little excised, tooth low, obtuse, with two or three black hairs ; ultimate annulus of flagellum narrower than others. Palpus (Fig. 1-C) rather slender, sickle-shaped, brown, densely black-haired. *Thorax* : Notum shiny black with reddish

prealar calli, with inconspicuously incomplete median stripe and complete broader lateral stripes; dorsum black-haired and prealar calli with mixed yellow and black hairs; Scutellum shiny black with black hairs and a few brown hairs apically. Pleura reddish brown with yellow hairs; sternopleuron with long brown hairs. *Wing*: 12-13 mm. long, clear, a little smoky costally; cell  $R_5$  open but slightly narrower posteriorly; spur vein absent; basicosta black setose. *Legs*: Fore coxa brownish; mid and hind coxae black; femora and tarsi black; basal half of fore tibia and one-fifth each of mid and hind tibiae yellowish, rest black. Halteres dark.

*Abdomen*: Broad, brownish black on basal 2 tergites, rest black; corners of tergite 1, sides of other tergites, across incisures, more prominently at tergite 1 and pale median spot on tergite 1 with bright yellow hairs, rest with black hairs. Venter also brownish black; all incisures with bright yellow hairs.

*Material examined*: *Holotype* ♀ (ZSI Reg. No. 6630/H<sub>8</sub>), INDIA: Arunachal Pradesh, Tirap District, Namdapha, Gibbon Land, 3. v. 1981, Coll. S. Biswas. *Paratype* ♀ (ZSI Reg. No. 6631/H<sub>8</sub>), Arunachal Pradesh, Tirap District, Namdapha, Deban, 27, iv. 1981, Coll. S. Biswas.

*Remarks*: This new species is apparently close to *Tabanus* (*Tabanus*) *hirtipalpis* Ricardo, 1911, described from Nepal and *T. (T.) scutellus* Philip, 1970, described from Arunachal Pradesh and Sikkim, India. Independent of the shape and size of the callosities these three species differ among others in the characters enumerated below:

<i>namdaphaicus</i>	<i>hirtipalpis</i>	<i>scutellus</i>
1. Brownish black species of 12-13 mm.	Black species of 9 mm.	Brownish species of 9.5-10.5 mm.
2. Antenna dark red with black style	Antenna reddish yellow with black style	Antenna entirely red
3. Palpus slender, sickle-shaped, black-haired	Palpus stout, ending in a fine short point, mainly pale-haired	Palpus stout, gradually ending in a point, black-haired
4. Thorax black with inconspicuous stripes	Thorax black, unstriped	Thorax black, unstriped
5. Wing without spur vein	Wing without spur vein	Wing with short spur vein

	<i>namdaphaicus</i>	<i>hirtipalpis</i>	<i>scutellus</i>
6.	Fore coxa brown, others black	All black	All pale yellow
7.	Abdomen with pale median spot on tergite 1	Abdomen without such median spot on tergite 1	Abdomen without such median spot on tergite 1

6. *Tabanus (Tabanus) shyamarupi* sp. nov.

( Figs. 2-A, B, C )

A medium-sized dull black species having broad frons with short club-shaped frontal callosity, mainly dark antenna, yellowish palpus with gradually narrowing end, mainly blackish legs and abdomen with inconspicuous reddish lateral spots.

*Female*.—Length 16-17 mm. *Head* : Eyes bare, uniformly buff-grey, unbanded (relaxed). Frons (Fig. 2-A) slightly wider above ; index 1 : 5.8, brown pollinose, darkening above and black pilose more at vertex. Callosity dark grey ; basal callus nearly square ; club-shaped linear extension occupying only half length of frons, without touching subcallus and eye-margins. Subcallus greyish, brown pollinose ; face

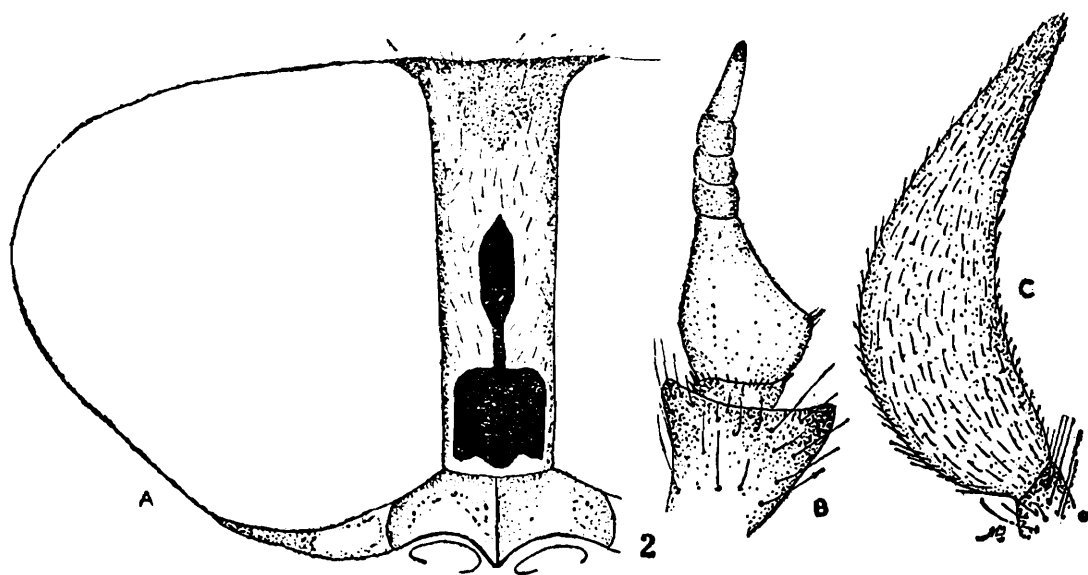


Fig. 2. *Tabanus (Tabanus) shyamarupi* sp. nov.

and parafacials also greyish, brown pollinose and black-haired. Antenna (Fig. 2-B) nearly 2.5 mm. long, scape much enlarged and almost concealing pedicel, both black with black hairs ; flagellum dark red, plate short, slightly longer than wide, last annulus longer and narrower ; tooth distinct with a few black hairs. Palpus (Fig. 2-C) large, yellowish, black haired, broad base gradually ending in an acute point.

**Thorax :** Notum black with dark red prealar and postalar calli ; dorsum with recumbent yellow hairs and erect long black hairs, sides black-haired. Scutellum concolourous with scutum, with long black hairs. Pleura and sternopleuron black with black hairs. **Wing :** 15-16 mm. long, clear, cell  $R_5$  open but slightly constricted distally, spur vein absent ; basicosta black setose. **Legs :** All black except dark red basal half of fore tibiae, nearly basal two-thirds of mid and hind tibiae, black-haired. Halteres reddish brown. **Abdomen :** Entirely black with inconspicuous reddish lateral spots on tergites 2, 3 and 4, black-haired except yellow-haired incisures medially. Venter black with white-haired incisures.

**Material examined :** *Holotype* ♀ (ZSI Reg. No. 6632/H<sub>6</sub>), India : Arunachal Pradesh, Tirap District, Namdapha, Deban, 8.iv.1981, Coll. S. Biswas. *Paratype* ♀ (ZSI Reg. No. 6633/H<sub>6</sub>), Arunachal Pradesh, Tirap District, Namdapha, Deban, 27.iv.1981, Coll S. Biswas.

**Remarks :** This new species is named after the Collector in concurrence with the Sanskrit word "Shyamarup" for its blackish appearance. *Tabanus (Tabanus) inobservatus* Ricardo, 1911, described from Sumatra resembles this species in its black appearance but differs among other characters in having very narrow frons, entirely black antenna, palpi and legs, and brownish tinged wings.

### 7. *Tabanus (Tabanus) miniatus* Datta & Biswas

1977. *Tabanus miniatus* Datta & Biswas, *Proc. Indian Acad. Sci. (B)*, 86 : 130.

**Material examined :** 5 ♀ ♀ (ZSI Reg. Nos. 6635/H<sub>6</sub>-6639/H<sub>6</sub>), Namdapha, Deban, 27.iv.1981 ; 1 ♀ (ZSI Reg. No. 6640/H<sub>6</sub>), Namdapha, Gibbon Land, 29.iv.1981 ; 1 ♀ (ZSI Reg. No. 6641/H<sub>6</sub>), Namdapha, Gibbon Land, 3.v.1981.

**Remarks :** This has originally been described from Garo hills of Meghalaya, India. This is for the first time recorded from Arunachal Pradesh.

### 8. *Tabanus (Tabanus) rubicundus* Macquart

1846. *Tabanus rubicundus* Macquart, *Dipt. exot. suppl.*, 1 : 33 (160).

1911. *Tabanus rubicundus* Macquart : Ricardo, *Rec. Indian Mus.*, 4 : 172.

1975. *Tabanus (Tabanus) rubicundus* Macquart : Stone, *A Catalog of Diptera of the Oriental Region*, 2 : 67.

**Material examined :** 5 ♀ ♀ (ZSI Reg. Nos. 6642/H<sub>6</sub>-6646/H<sub>6</sub>),

Namdapha, Deban, 27.iv.1981 ; 1 ♀ (ZSI Reg. No. 6647/H<sub>6</sub>), Namdapha, Deban, 28.iv.1981 ; 1 ♀ (ZSI Reg. No. 6648/H<sub>6</sub>), Namdapha, Gibbon Land, 29.iv.1981 ; 2 ♀ ♀ (ZSI Reg. Nos. 6649/H<sub>6</sub>-6650/H<sub>6</sub>), Namdapha, Gibbon Land, 3.v.1981.

*Remarks* : This has been described from India, most probably from Assam. This is recorded for the first time from Arunachal Pradesh. This species also occurs in Bangladesh, Burma and Java (Stone, 1975).

### 9. *Tabanus (Tabanus) monotaeniatus* (Bigot)

1892. *Atylotus monotaeniatus* Bigot, *Mém. Soc. zool. Fr.*, 5 : 655.

1911. *Tabanus monotaeniatus* (Bigot) : Ricardo, *Rec. Indian Mus.*, 4 : 159.

1975. *Tabanus (Tabanus) monotaeniatus* (Bigot) : Stone, *A Catalog of Diptera of the Oriental Region*, 2 : 64.

*Material examined* : 1 ♀ (ZSI Reg. No. 6634/H<sub>6</sub>), Namdapha, Deban, 27.iv.1981.

*Remarks* : This has originally been described from Assam and Meghalaya (Ricardo, 1911). Joseph and Rao (1972b) recorded it from Arunachal Pradesh. This species occurs also in Burma, China and Java (Stone, 1975).

### 10. *Tabanus (Tabanus) tenuifrons* sp. nov.

(Figs. 3-A, B, C)

A medium-sized reddish brown species having extremely narrow frons with linear frontal callus, entirely reddish brown antenna, acutely ended palpus, mainly reddish brown legs and unspotted abdomen.

*Female*.—Length 15-16 mm. *Head* : Eyes bare, uniformly buff-grey, unbanded (relaxed). Frons (Fig. 3-A) extremely narrow, anteriorly half as wide as at vertex ; index 1 : 12, yellow pollinose and black pilose, more at vertex ; vertex greyish. Frontal callus dark grey, narrow, with a long linear extension upward to more than two-thirds of frontal height, much above subcallus and without touching eye-margins. Subcallus greyish, yellow pollinose ; face and parafacials nearly black, yellow pollinose ; face with erect black hairs and parafacials with long brown and black hairs. Antenna (Fig. 3-B) about 2.8 mm long, entirely reddish brown ; scape and pedicel with black hairs ; plate of flagellum very long with distinct tooth ; tooth with some black hairs. Palpus (Fig. 3-C) large, yellowish, densely black-haired, ending in an acute point. *Thorax* : Notum black with reddish

prealar calli, three inconspicuous stripes—lateral stripes apparently wider; dorsum yellow-haired and shoulders long black-haired. Scutellum black with slightly reddish apex, mostly long, black-haired. Pleura greyish, mostly with long brown hairs; sternopleuron entirely with long brown hairs. *Wing*: 16-17 mm long, fumose anteriorly; cell  $R_5$  open but slightly narrower posteriorly; spur vein dot-like; basicosta black-setose.

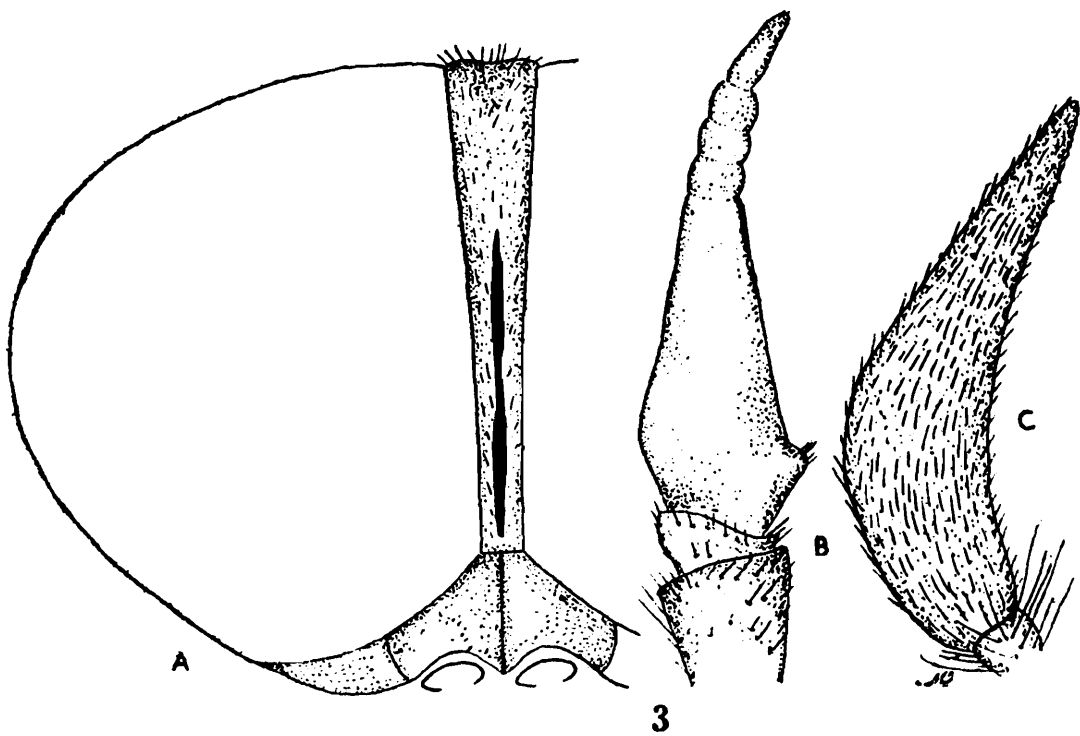


Fig. 3. *Tabanus (Tabanus) tenuifrons* sp. nov.

*Legs*: All coxae blackish brown; femora reddish brown; fore tibia reddish brown with dark tip; mid and hind tibiae entirely reddish brown; fore tarsus black; mid and hind tarsi black with reddish brown first tarsomeres; hind tibial fringe black, inner hairs yellowish. Halteres reddish brown.

*Abdomen*: Broad, reddish brown, darker apically; dorsum entirely covered with black recumbent hairs. Venter reddish brown with black hairs; incisures yellow-haired, sides mainly with black hairs.

*Material examined*: *Holotype* ♀ (ZSI Reg. No. 6628/H<sub>6</sub>), INDIA: Arunachal Pradesh, Tirap District, Namdapha, Deban, 28. iv. 1981, Coll. S. Biswas. *Paratype* ♀ (ZSI Reg. No. 6629/H<sub>6</sub>), Arunachal Pradesh, Tirap District, Namdapha, Deban, 28. iv. 1981, Coll. S. Biswas.

**Remarks :** This new species resembles *Tabanus (Tabanus) fumifer* Walker, 1857, described from Borneo and subsequently recorded from Java, Sumatra, Celebes and Nias island (all in Indonesia) and from Malaysia, in having extremely narrow frons with linear frontal callus but differs in acutely ended palpus, essentially reddish brown legs and unspotted abdomen.

### 11. *Tabanus (Tabanus)* sp.

**Material examined :** 1 ♀ (ZSI Reg. No. 6651/H<sub>6</sub>), Namdapha, Deban, 27. iv. 1981, Coll. S. Biswas.

**Remarks :** This is very close to, if not merely a variant of, *T (T.) miniatus* Datta and Biswas, 1977 : the former appears to differ at least in having entirely red antenna. This is not, however, described for its partially damaged condition.

### 12. *Haematopota annandalei* Ricardo

1911. *Haematopota annandalei* Ricardo, *Rec. Indian Mus.* 4: 335.

1958. *Chrysozona annandalei* (Ricardo) : Liu, *Acta zool. Sin.*, 10 : 152.

1975. *Haematopota annandalei* Ricardo : Stone, *A Catalog of Diptera of the Oriental Region*, 2 : 73.

**Material examined :** 1 ♀, (ZSI Reg. No. 6653/H<sub>6</sub>), Namdapha, Gibbon Land, 29. iv. 1981 ; 4 ♀♀ (ZSI Reg. Nos. 6654/H<sub>6</sub>-6657/H<sub>6</sub>), Namdapha, Gibbon Land, 2. v. 1981 ; 1 ♀, (ZSI Reg. No. 6658/H<sub>6</sub>), Namdapha, Gibbon Land, 3. v. 1981, Coll. S. Biswas.

**Remarks :** This has originally been described from Meghalaya and subsequently recorded from Assam and Maharashtra, India (Stone and Philip, 1974). This species is recorded here for the first time. This species also occurs in Burma and ?China (Liu, 1958).

### Family : SYRPHIDAE

### 13. *Allograpta javana* (Wiedemann)

1824. *Syrphus javanus* Wiedemann, *Analecta Ent.*, : 34.

1923. *Sphaerophoria javana* (Wiedemann) : Brunetti, *Fauna Brit. India, Diptera*, 3 : 100.

1975. *Allograpta javana* (Wiedemann) : Knutson, Thompson and Vockeroth, *A Catalog of Diptera of the Oriental Region*, 2 : 308.

**Material examined :** 4 ♂♂, 1 ♀ (ZSI Reg. Nos. 6851/H<sub>6</sub>-6855/H<sub>6</sub>), Namdapha, 22. iv. 1981.

*Remarks* : The species originally described from Java, has been subsequently reported from Arunachal Pradesh, Karnataka, Meghalaya, Tamil Nadu in India and from Australia, Borneo, China, Fiji, Guadalcanal, Hawaii, Japan, Korea, Malaya, New Guinea, Philippines, Sumatra, Sri Lanka, Taiwan and Thailand (Brunetti, 1923 ; Joseph and Rao, 1972b ; Joseph and Parui, 1973 ; and Knutson, Thompson and Vockeroth, 1975).

#### 14. *Asarkina (Asarkina) ericetorum* (Fabricius)

1781. *Syrphus ericetorum* Fabricius, *Spec. Insect.*, 2 : 425.

1923. *Asarcina ericetorum* (Fabricius) : Brunetti, *Fauna Brit. India*, Diptera, 3 : 63.

1975. *Asarkina (Asarkina) ericetorum* (Fabricius) : Knutson, Thompson and Vockeroth, *A Catalog of Diptera of the Oriental Region*, 2 : 309.

*Material examined* : 2 ♂♂ (ZSI Reg. Nos. 6857/H<sub>6</sub>-6858/H<sub>6</sub>), Namdapha, 22. iv. 1981 ; 1 ♂ (ZSI Reg. No. 6859/H<sub>6</sub>), Deban, Namdapha, 2 iv. 1981 ; 3 ♀♀ ; (ZSI Reg. Nos. 6860/H<sub>6</sub>-6862/H<sub>6</sub>), Hornbill, Namdapha, 11-13. iv. 1981 ; 1 ♀ (ZSI Reg. No. 6863/H<sub>6</sub>), Deban, 27. iv. 1981.

*Remarks* : The species has been reported to occur throughout the Oriental region and has also been recorded from Australia, Fiji, Moluccas, New Guinea and Samoa (Brunetti, 1923 ; Joseph and Rao, 1972 ; Joseph and Parui, 1973, 1977 ; Knutson *et al.* ; 1975 ; Joseph and Ray, 1976 ; and Datta and Chakraborti, 1983). The species has originally been described from Africa.

#### 15. *Citrogramma* sp.

*Material examined* : 1 ♀ (ZSI Reg. No. 6905/H<sub>6</sub>), Namdapha, 22. iv. 1981.

*Remarks* : This species is left for confirmation in future when male specimens will be available for studies.

#### 16. *Episyrphus balteatus* (De Geer)

1776. *Musca balteata* De Geer, *Mém. pour surv. Hist. Ins.*, 6 : 116.

1923. *Syrphus balteatus* (De Geer) : Brunetti, *Fauna Brit. India*, Diptera, 3 : 82.

1975. *Episyrphus balteatus* (De Geer) : Knutson, Thompson and Vockeroth, *A Catalog of Diptera of the Oriental Region*, 2 : 314.

*Material examined* : 1 ♀ (ZSI Reg. No. 6856/H<sub>6</sub>), Hornbill, Namdapha, 11. iv. 1981,

*Remarks* : The species is widely distributed throughout the Oriental region and occurs also in Australia, Bonin islands, Ethiopian and Palaearctic regions (Burnetti, 1923 ; Joseph and Rao, 1972 ; Joseph and Parui, 1973 ; Knutson *et al.*, 1975 ; Joseph and Ray, 1976 ; and Datta and Chakraborti, 1983). This has been described from European material.

17. *Metasyrphus (Metasyrphus) confrater* (Wiedemann)

1830. *Syrphus confrater* Wiedemann, *Aussereurop zweifl. Insekt.*, 2 : 120.  
 1923. *Syrphus confrater* Wiedemann : Brunetti, *Fauna Brit. India*, Diptera, 3 : 92.  
 1975. *Metasyrphus (Metasyrphus) confrater* (Wiedemann) : Knutson, Thompson and Vockeroth, *A Catalog of Diptera of the Oriental Region*, 2 : 317.

*Material examined* : 1 ♀ (ZSI Reg. No. 6864/H<sub>6</sub>), Deban, Namdapha, 8.iv.1981 ; 1 ♀ (ZSI Reg. No. 6865/H<sub>6</sub>), Deban North, 28.iv.1981.

*Remarks* : The species has been reported to occur throughout the Oriental region and has subsequently been recorded from Japan (Joseph and Rao, 1972a ; Knutson *et al.* (1975). This has originally been described from China (Knutson *et al.*, *op. cit.*).

18. *Syrphus isaaci* Bhatia

1933. *Syrphus isaaci* Bhatia, *Indian J. agric. Sci.*, 2 : 566.  
 1975. *Syrphus isaaci* Bhatia : Knutson, Thompson and Vockeroth, *A Catalog of Diptera of the Oriental Region*, 2 : 319.

*Material examined* : 1 ♂, 1 ♀ (ZSI Reg. Nos. 6866/H<sub>6</sub>-6867/H<sub>6</sub>), Hornbill, Namdapha, 13. iv. 1981 ; 1 ♀ (ZSI Reg. No. 6868/H<sub>6</sub>), Deban, 2. iv. 1981.

*Remarks* : This is distributed in Assam, Bihar and Uttar Pradesh in India and in Nepal (Knutson *et al.*, 1975). This is recorded for the first time from Arunachal Pradesh. The species has been left unplaced along with certain other species of *Syrphus* Fabricius by Knutson *et al.* (*op. cit.*).

19. *Melanostoma orientale* (Wiedemann)

1824. *Syrphus orientalis* Wiedemann, *Analecta Ent.*, : 36.  
 1923. *Melanostoma orientale* (Wiedemann) : Brunetti, *Fauna Brit. India*, Diptera, 3 : 48.  
 1975. *Melanostoma orientale* (Wiedemann) : Knutson, Thompson and Vockeroth, *A Catalog of Diptera of the Oriental Region*, 2 : 325.

*Material examined* : 1 ♀ (ZSI Reg. No. 6869/H<sub>6</sub>), Deban, 7. iv. 1981.

*Remarks* : The species has been reported to occur throughout the Oriental region (Knutson *et al.*, 1975) but has so far been recorded from Arunachal Pradesh, Assam, Himachal Pradesh, Jammu and Kashmir, Meghalaya, Uttar Pradesh and West Bengal in India and in Bhutan, Pakistan and Sri Lanka (Brunetti, 1923 ; Joseph and Rao, 1972b ; Joseph and Parui, 1973, 1977 ; Joseph and Ray, 1976 ; and Datta and Chakraborti, 1983). The species has been originally described from India (Knutson *et al.*, *op. cit.*).

## 20. *Chrysotoxum baphyrus* Walker

1849. *Chrysotoxum baphyrus* Walker, *List Dipt. Br. Mus.*, 3 : 542.

1923. *Chrysotoxum baphyrus* Walker : Brunetti, *Fauna Brit. India*, Diptera, 3 : 296.

1975. *Chrysotoxum baphyrus* Walker : Knutson, Thompson and Vockeroth, *A Catalog of Diptera of the Oriental Region*, 2 : 326.

*Material examined* : 1 ♂ (ZSI Reg. No. 6870/H<sub>6</sub>), Deban, 27. iv. 1981.

*Remarks* : This species originally described from West Bengal, has been reported to occur in Arunachal Pradesh, Himachal Pradesh, Jammu and Kashmir, Kerala, Meghalaya, Tamil Nadu and Uttar Pradesh in India (Brunetti, 1923 ; Joseph and Rao, 1972b ; Joseph and Parui, 1973 ; Joseph and Ray, 1976 ; and Datta and Chakraborti, 1983). It has also been recorded from Indochina, ? Java, Laos, Nepal and Sri Lanka (Knutson *et al.*, 1975).

## 21. *Volucella trifasciata* Wiedemann

1830. *Volucella trifasciata* Wiedemann, *Aussereurop. Zweifl. Insekt.*, 2 : 196.

1923. *Volucella trifasciata* Wiedemann : Brunetti, *Fauna Brit. India*, Diptera, 3 : 147.

1975. *Volucella trifasciata* Wiedemann : Knutson, Thompson and Vockeroth, *A Catalog of Diptera of the Oriental Region*, 2 : 336.

*Material examined* : 1 ♂ (ZSI Reg. No. 6871/H<sub>6</sub>), Chiria Camp, 25. iv. 1981.

*Remarks* : The species has originally been described from Java and has subsequently been recorded from Borneo, Burma, Celebes, China, India (Meghalaya and Sikkim), Malaya, Philippines and Taiwan (Brunetti, 1923 ; Knutson *et al.*, 1975). This is recorded for the first time in Arunachal Pradesh.

22. *Spheginobaccha macropoda* (Bigot)

1883. *Sphegina macropoda* Bigot, *Annl's Soc. ent. Fr.* (6) 3 : 331.  
 1923. *Spheginobaccha macropoda* (Bigot) : Brunetti, *Fauna Brit. India*, Diptera, 3 : 112.  
 1975. *Spheginobaccha macropoda* (Bigot) : Knutson, Thompson and Vockeroth, *A Catalog of Diptera of the Oriental Region*, 2 : 339.

*Material examined* : 1 ♀ (ZSI Reg. No. 6877/H<sub>8</sub>), Deban, 27.iv.1981.

*Remarks* : The species originally described from Burma, has subsequently been recorded from Anambas islands, Borneo, India (Meghalaya and West Bengal), Java, Laos, Malaya and Vietnam (Brunetti, 1923 ; Thompson, 1974 ; Knutson *et al.*, 1975). This is recorded here for the first time.

23. *Azpeytia bifascia* Brunetti

1907. *Azpeytia bifascia* Brunetti, *Rec. Indian Mus.*, 1 : pl. 13, figs. 1-5.  
 1908. *Azpeytia bifascia* Brunetti : Brunetti, *Rec. Indian Mus.*, 2 : 84.  
 1923. *Azpeytia bifascia* Brunetti : Brunetti, *Fauna Brit. India*, Diptera, 3 : 221.  
 1975. *Azpeytia bifascia* Brunetti : Knutson, Thompson and Vockeroth, *A Catalog of the Diptera of the Oriental Region*, 2 : 340.

*Material examined* : 1 ♀ (ZSI Reg. No. 6906/H<sub>6</sub>), Deban, 2.iv.1981.

*Remarks* : This has so far been recorded from India (Assam and West Bengal) and Laos (Brunetti, 1923 ; Knutson *et al.*, 1975). This is recorded for the first time from Arunachal Pradesh.

24. *Catacores cyanea* (Brunetti)

1913. *Axona cyanea* Brunetti, *Rec. Indian Mus.*, 9 : 272.  
 1923. *Axona cyanea* Brunetti : Brunetti, *Fauna Brit. India*, Diptera, 3 : 223.  
 1975. *Catacores cyanea* (Brunetti) : Knutson, Thompson and Vockeroth, *A Catalog of Diptera of the Oriental Region*, 2 : 347.

*Material examined* : 1 ♂ (ZSI Reg. No. 6907/H<sub>8</sub>), Hornbill, Namdapha, 13.iv.1981.

*Remarks* : This has so far been reported from Meghalaya and West Bengal in India (Brunetti, 1923 ; Knutson *et al.*, 1975). This is recorded for the first time from Arunachal Pradesh.

25. *Eristalinus arvorum* (Fabricius)

1787. *Syrphus arvorum* Fabricius, *Mantissa Insect.*, 2 : 335.  
 1923. *Eristalis arvorum* (Fabricius) Brunetti, *Fauna Brit. India*, Diptera, 3 : 181.  
 1975. *Eristalinus arvorum* (Fabricius) : Knutson, Thompson and Vockeroth, *A Catalog of Diptera of the Oriental Region*, 2 : 347.

*Material examined* : 2 ♀ ♀ (ZSI Reg. Nos. 6872/H<sub>6</sub>-6873/H<sub>6</sub>), Gibbon Land, 29.iv.1981 ; 1 ♀ (ZSI Reg. No. 6874/H<sub>6</sub>), Deban, 27.iv.1981 ; 2 ♀ ♀ (ZSI Reg. Nos. 6875/H<sub>6</sub>-6876/H<sub>6</sub>), Gibbon Land, 2-3.v.1981.

*Remarks* : The species originally described from China, has been reported to occur throughout the South-East Asia (Knutson *et al.*, 1975). Joseph and Rao (1972b) have already recorded it from Arunachal Pradesh. It has also been reported from Australia, Hawaii, Japan and Micronesia (Knutson *et al.*, *op. cit.*).

26. *Phytomia* (*Phytomia*) *zonata* (Fabricius)

1787. *Syrphus zonatus* Fabricius, *Mantissa Insect.*, 2 : 337.  
 1923. *Megaspis zonatus* (Fabricius) : Brunetti, *Fauna Brit. India*, Diptera, 3 : 203.  
 1975. *Phytomia* (*Phytomia*) *zonata* (Fabricius) : Knutson, Thompson and Vockeroth, *A Catalog of Diptera of the Oriental Region*, 2 : 357.

*Material examined* : 6 ♀ ♀ (ZSI Reg. Nos. 6878/H<sub>6</sub>-6883/H<sub>6</sub>), Hornbill, 11.iv.1981-13.iv.1981 ; 1 ♀ (ZSI Reg. No. 6884/H<sub>6</sub>), Deban, 27.iv.1981.

*Remarks* : The species originally described from China, has been reported to occur throughout the South-East Asia and has also been recorded from Japan, Korea and Manchuria (Knutson *et al.*, 1975). The species has so far been recorded from Arunachal Pradesh, Assam, Karnataka, Kerala, Meghalaya, Sikkim, Tamil Nadu and West Bengal in India (Brunetti, 1923 ; Joseph and Parui, 1973 ; Joseph and Ray, 1976).

Family : MICROPEZIDAE

27. *Mimegralla* sp.

*Material examined* : 1 ♀ (ZSI Reg. No. 6913/H<sub>6</sub>), Deban North, Namdapha, 28.iv.1981.

*Remarks* : The female specimen is left undetermined until the associated male specimen is available for studies.

Family : DIOPSIDAE

28. *Cyrtodiopsis whitei* (Curran)1936. *Diopsis whitei* Curran, *Am. Mus. Novit.*, 833 : 1.1977. *Cyrtodiopsis whitei* (Curran) : Steyskal, *A Catalog of Diptera of the Oriental Region*, 3 : 33.

*Material examined* : 2 ♂♂, 1 ♀ (ZSI Reg. Nos. 6659/H<sub>8</sub>-6661/H<sub>8</sub>), Hornbill, 11.iv.1981.

*Remarks* : The species originally described from Bihar, has been recorded from Assam (Steyskal, 1977). This is recorded for the first time from Arunachal Pradesh.

Family : CELYPHIDAE

29. *Celyphus (Celyphus) obtectus* Dalman1818. *Celyphus obtectus* Dalman, *K. Vetensk. Akad. Handl.*, 39 : 73.1977. *Celyphus (Celyphus) obtectus* Dalman : Tenorio, *A Catalog of Diptera of the Oriental Region*, 3 : 217.

*Material examined* : 1 ♀ (ZSI Reg. No. 6914/H<sub>8</sub>), M. B. Road, Arunachal Pradesh, 25.iv.1981.

*Remarks* : The species originally described from ? Assam, has subsequently been recorded from Arunachal Pradesh and Kerala (Tenorio, 1972 ; Joseph and Parui, 1977). This has also been recorded from Burma, Celebes, China, Java, Malaya, Nepal, Philippines, Sri Lanka, Sumatra, Thailand and Vietnam (Tenorio, 1977).

Family : MUSCIDAE

30. *Musca (Viviparomusca) bezzii* Patton and Cragg1913. *Musca bezzii* Patton and Cragg, *Indian J. med. Res.*, 1 : 19.1965. *Musca (Viviparomusca) bezzii* Patton and Cragg : Emden, *Fauna India, Diptera*, 7 : 83.1977. *Musca (Viviparomusca) bezzii* Patton and Cragg : Pont, *A Catalog of Diptera of the Oriental Region*, 3 : 461.

*Material examined* : 1 ♀ (ZSI Reg. No. 6915/H<sub>8</sub>), Hornbill, 13.iv.1981.

*Remarks* : The species originally described from Tamil Nadu, has subsequently been recorded from Assam, Himachal Pradesh, Kashmir, Meghalaya, Punjab, Uttar Pradesh and West Bengal in India and also from Nepal and possibly Malaya. This has also been reported from

Eastern Palaearctic region (Emden, 1965 ; Joseph and Rao, 1972b ; Joseph and Parui, 1977 ; Pont, 1977). This is recorded for the first time from the State.

### 31. *Musca (Viviparomusca) convexifrons* Thomson

1869. *Musca convexifrons* Thomson, *K. Fregatten Eugenes Resa, Zool., Diptera*, : 547.  
 1913. *Musca gibsoni* Patton and Cragg, *Indian J. med. Res.*, 1 : 14.  
 1965. *Musca (Viviparomusca) gibsoni* Patton and Cragg : Emden, *Fauna India, Diptera*, 7 : 86.  
 1977. *Musca (Viviparomusca) convexifrons* Thomson : Pont, *A Catalog of Diptera of the Oriental Region*, 3 : 461.

*Material examined* : 1 ♀ (ZSI Reg. No. 6916/H<sub>8</sub>), Deban, 27.iv.1981.

*Remarks* : The species originally described from China, has been recorded from Arunachal Pradesh, Assam, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal in India and has also been reported to occur in Borneo, Burma, Java, Malaya, Sri Lanka and Taiwan (Emden, 1965 ; Joseph and Rao, 1972a ; Joseph and Ray, 1976 : Pont, 1977).

### 32. *Orthellia coerulea* (Wiedemann)

1819. *Musca coerulea* Wiedemann, *Zool. Mag.*, 3 : 23.  
 1965. *Orthellia coerulea* (Wiedemann) : Emden, *Fauna India, Diptera*, 7 : 124.

*Material examined* : 4 ♀ ♀ (ZSI Reg. Nos. 6917/H<sub>8</sub>—6919/H<sub>8</sub> and 6926/H<sub>8</sub>), Tirap District., 16.iv.1981-28.iv.1981.

*Remarks* : The species originally described from Java, has been reported to occur in Arunachal Pradesh, Assam, Bihar, Sikkim, South India and Uttar Pradesh in India and also in Burma, China, Indonesia to Australia, Japan, Malaya, Nepal, Siam, Solomon Islands, Sri Lanka and Taiwan (Emden, 1965 ; Joseph and Rao, 1972b ; Joseph and Parui, 1973 ; 1977 ; Joseph and Ray, 1976),

### 33. *Atherigona* sp.

*Material examined* : 4 ♀ ♀ (ZSI Reg. Nos. 6927/H<sub>6</sub>-6930/H<sub>6</sub>). Hornbill, 11.iv.1981.

*Remarks* : The species is left undetermined for lack of associated male material.

## Family : CALLIPHORIDAE

34. *Catapicephala splendens* Macquart

1851. *Catapicephala splendens* Macquart, *Mém. Soc. Sci. Agric. Lille*, 1851 : 210 (1850 : 237).  
 1940. *Catapicephala splendens* Macquart : Senior-White, Aubertin and Smart, *Fauna Brit. India, Diptera*, 6 : 106.  
 1977. *Catapicephala splendens* Macquart : James, *A Catalog of Diptera of the Oriental Region*, 3 : 532.

*Material examined* : 4 ♀ ♀ (ZSI Reg. Nos. 6931/H<sub>8</sub>-6934/H<sub>8</sub>), Deban, 7.iv.1981.

*Remarks* : The species originally described from Java, is recorded for the first time from Arunachal Pradesh in India. This has also been reported to occur in Burma, Borneo, Malaya and Singapore (Senior-white *et al.*, 1940 : James, 1977).

35. *Lucilia papuensis* Macquart

1842. *Lucilia papuensis* Macquart, *Mém. Soc. Sci. Agric. Lille*, 1842 : 298 (1843 : 141).  
 1940. *Lucilia papuensis* Macquart : Senior-White, Aubertin and Smart, *Fauna Brit. India, Diptera*, 6 : 52.  
 1977. *Lucilia papuensis* Macquart : James, *A Catalog of Diptera of the Oriental Region*, 3 : 534.

*Material examined* : 1 ♂, 1 ♀ (ZSI Reg. Nos. 6935/H<sub>8</sub>-6936/H<sub>8</sub>), Deban, 27.iv.1981 ; 1 ♀ (ZSI Reg. No. 6937/H<sub>8</sub>), Hornbill, 13.iv.1981.

*Remarks* : The species originally described from Papua, has been reported to occur throughout the Oriental region, Micronesia and Moluccas (James, 1977). This is, however, recorded for the first time from Arunachal Pradesh besides the earlier record from the Malabar Coast in India (Senior-White *et al.*, 1940).

36. *Chrysomya defixa* (Walker)

1856. *Musca defixa* Walker, *J. Proc. Linn. Soc. Lond. Zool.*, 1 : 24.  
 1940. *Chrysomya defixa* (Walker) : Senior-White, Aubertin and Smart, *Fauna Brit. India, Diptera*, 6 : 146.  
 1977. *Chrysomya defixa* (Walker) : James, *A Catalog of Diptera of the Oriental Region*, 3 : 542.

*Material examined* : 2 ♂ ♂ (ZSI Reg. Nos. 6938/H<sub>8</sub>-6939/H<sub>8</sub>), Hornbill, 16.iv.1981 ; 1 ♀ (ZSI Reg. No. 6940/H<sub>8</sub>), Hornbill, 14.iv.1981.

*Remarks* : The species originally described from Singapore, is recorded for the first time from India. This may also occur in Philippines (James, 1977).

37. *Chrysomya megacephala* (Fabricius)

1784. *Musca megacephala* Fabricius, *Syst. Ent.*, 4 : 317.  
 1940. *Chrysomyia megacephala* (Fabricius) : Senior-White, Aubertin and Smart, *Fauna Brit. India, Diptera*, 6 : 138.  
 1977. *Chrysomya megacephala* (Fabricius) : James, *A Catalog of Diptera of the Oriental Region*, 3 : 542.

*Material examined* : 3 ♂♂, 11 ♀♀ (ZSI Reg. Nos. 6941/H<sub>8</sub>-6954/H<sub>8</sub>), Hornbill, 13-14.iv.1981.

*Remarks* : The species is very common in the Oriental and Australian regions. The species has already been recorded from Arunachal Pradesh in India (Joseph and Rao, 1972a, b ; Joseph and Parui, 1973 ; 1977). According to Senior-White *et al.* (*op. cit.*) the type-locality "Guinea" is an error.

38. *Chrysomya pinguis* (Walker)

1858. *Lucilia pinguis* Walker, *Trans. ent. Soc. Lond. (n. Ser.)* 4 : 213.  
 1940. *Chrysomyia pinguis* (Walker) : Senior-White, Aubertin and Smart, *Fauna Brit. India, Diptera*, 6 : 144.  
 1977. *Chrysomya pinguis* (Walker) : James, *A Catalog of Diptera of the Oriental Region*, 3 : 542.

*Material examined* : 1 ♂, 1 ♀ (ZSI Reg. Nos. 6955/H<sub>8</sub>-6956/H<sub>8</sub>), Hornbill, 13.iv.1981.

*Remarks* : The species has been reported to occur in Arunachal Pradesh, Assam, Himachal Pradesh, Meghalaya, Tamil Nadu and West Bengal in India and also in China, Java, Malaya, Moluccas, Philippines, Sri Lanka and Thailand (Senior-White *et al.*, 1940 ; Joseph and Ray, 1976 ; James, 1977). The type-locality of the species is India.

Family : SARCOPHAGIDAE

39. *Bercaea haemorrhoidalis* (Fallén)

1816. *Musca haemorrhoidalis* Fallén, *Vetensk. Acad. Handl.*, : 237.  
 1940. *Sarcophaga haemorrhoidalis* (Fallén) : Senior-White, Aubertin and Smart, *Fauna Brit. India, Diptera*, 6 : 276.  
 1977. *Bercaea haemorrhoidalis* (Fallén) : Lopes, Kano, Shinonaga and Kurahashi, *A Catalog of Diptera of the Oriental Region*, 3 : 564.

*Material examined* : 2 ♂♂ (ZSI Reg. Nos. 6957/H<sub>8</sub>—6958/H<sub>8</sub>), Dist. Tirap, 16. iv. 1981.

*Remarks* : The species has been reported to occur in Africa, Europe, Hawaii, India (Arunachal Pradesh to Himachal Pradesh), Korea,

Nepal, North America and Sheyachelles (Senior-White *et al.*, 1940 ; Joseph and Rao, 1972b ; Lopes *et al.*, 1977). The species has originally been described from Sweden.

**40. Parasarcophaga (Parasarcophaga) albiceps (Meigen)**

1826. *Sarcophaga albiceps* Meigen, *Syst. Besch. europ. zweifl. Insekt.*, 5 : 22.  
 1940. *Sarcophaga albiceps* Meigen : Senior-White, Aubertin and Smart, *Fauna Brit. India, Diptera*, 6 : 242.  
 1977. *Parasarcophaga (Parasarcophaga) albiceps* (Meigen) : Lopes, Kano, Shinonaga and Kurahashi, *A Catalog of Diptera of the Oriental Region*, 3 : 570.

*Material examined* : 2 ♂♂, 3 ♀♀ (ZSI Reg. Nos. 6659/H<sub>8</sub>—6963/H<sub>8</sub>), Deban, 27. iv. 1981 ; 1 ♂ (ZSI Reg. No. 6964/H<sub>8</sub>), Gibbon Land, 29. iv. 1981 ; 1 ♂ (ZSI Reg. No. 6965/H<sub>8</sub>), Dist. Tirap, 16. iv. 1981.

*Remarks* : This species has been reported to occur throughout the Oriental region and has also been recorded from Bismarck Archipelago, Europe, Hawaii, Japan, Korea, New Britain, New Guinea and Solomon islands (Senior-white *et al.*, 1940 ; Joseph and Rao, 1972b ; Lopes *et al.*, 1977). The type-locality of the species is Europe.

**41. Sarcorohdendorfia flavinervis (Senior-White)**

1859. *Sarcophaga basalis* Walker, *J. Proc. Linn. Soc. Lond., Zool.*, 3 : 129.  
 1924. *Sarcophaga flavinervis* Senior-White, *Rec. Indian Mus.*, 26 : 229.  
 1940. *Sarcophaga basalis* Walker : Senior-White, Aubertin and Smart, *Fauna Brit. India, Diptera*, 6 : 223.  
 1977. *Sarcorohdendorfia flavinervis* (Senior-White) : Lopes, Kano, Shinonaga and Kurahashi, *A Catalog of Diptera of the Oriental Region*, 3 : 574.

*Material examined* : 1 ♂, 1 ♀ (ZSI Reg. Nos. 6966/H<sub>8</sub>-6967/H<sub>8</sub>), Deban, 27.iv.1981 ; 1 ♀ (ZSI Reg. No. 6969/H<sub>8</sub>), Namdapha, Zero Camp, 9.iv.1981.

*Remarks* : The species has been reported to occur in Arunachal Pradesh, Assam and Bihar in India and has also been reported from Java and Moluccas (Senior-White *et al.*, 1940 ; Lopes *et al.*, 1977).

SUMMARY

The paper deals with 126 examples comprising 41 species belonging to 10 families of Diptera from the Namdapha Wild Life Sanctuary in Arunachal Pradesh, India. Of these, 14 species are new records from

Arunachal Pradesh and 1 species new to India. The family Tabanidae contains 8 species of which 3, viz., *Tabanus (Tabanus) namdaphaicus*, *T. (T.) shyamarupi* and *T. (T.) tenuifrons* are described as new to science.

#### ACKNOWLEDGEMENTS

The authors are grateful to Dr. B. K. Tikader, Director of the Zoological Survey of India and to Drs. R. K. Varshney, Superintending Zoologist in charge of the Entomology Division (B) and A. N. T. Joseph, Officer-in-Charge of the Diptera Section of the same organization for kindly providing them with laboratory facilities and encouragement. The authors are also grateful to Dr. S. Biswas, Officer-in-Charge of the Coleoptera Section for kindly placing the material at their disposal. The help rendered in identifying certain species by Shri P. Parui, Senior Zoological Assistant of the Diptera Section is also thankfully acknowledged.

The authors cannot pass over without acknowledging gratitude to Dr. H. Hippa of the University of Turku, Finland, for kindly allowing them to draw upon his knowledge on the Syrphidae.

#### REFERENCES

- ALEXANDER, C. P. AND M. M. ALEXANDER. 1973. *A Catalog of the Diptera of the Oriental Region*. The University Press of Hawaii, Honolulu, 1 : 10-224.
- BRUNETTI, E. 1912. *The Fauna of British India including Ceylon and Burma, Diptera, Nematocera (excluding Chironomidae and Culicidae)*, Taylor and Francis, London, : 574 pp.
- BRUNETTI, E. 1913. Zoological results of the Abor Expedition, 1911-12. XI. Diptera, *Rec. Indian Mus.*, 8 : 149-190.
- BRUNETTI, E. 1920. *The Fauna of British India, including Ceylon and Burma. Diptera, Brachycera*, Taylor and Francis, London, : 401 pp.
- BRUNETTI, E. 1923. *The Fauna of British India including Ceylon and Burma, Diptera*, Taylor and Francis, London, : 424 pp.
- DATTA, M. 1980. *Tabanus biswasi* nom nov., a replacement name for *Tabanus minusculus* Datta and Das, 1978 (Diptera : Tabanidae). *Bull. zool. Surv. India*, 3 : 123.

- DATTA, M. AND S. BISWAS. 1977. A preliminary study of the insect fauna of Meghalaya, India. 12. Species of the genera *Tabanus* L. and *Haematopota* Mg. of the family Tabanidae (Diptera). *Proc. Indian Acad. Sci. (B)*, **86** : 127-133.
- DATTA, M. AND (MISS) M. CHAKRABORTI. 1983. On a collection of flower flies (Diptera : Syrphidae) with new records from Jammu and Kashmir. *Rec. zool. Surv. India*, **81** : 237-253.
- DATTA, M. AND B. N. DAS. 1978. Three new species of the genus *Tabanus* L. (Diptera : Tabanidae) from Arunachal Pradesh, India. *Bull. zool. Surv. India*, **1** : 181-185.
- EMDEN, F. I. VAN. 1965. *The Fauna of India and the adjacent countries*. Diptera 7, Muscidae, part 1, Delhi XIV + 647 pp.
- JAMES, M. T. 1975. *A Catalog of the Diptera of the Oriental Region*. The University Press of Hawaii, Honolulu, **2** : 14-42.
- JAMES, M. T. 1977. *A Catalog of the Diptera of the Oriental Region*. The University Press of Hawaii, Honolulu, **3** : 526-556.
- JOSEPH, A. N. T. AND P. PARUI. 1973. Diptera from NEFA and Assam Foot Hills, Part III, Siang Frontier Division and North Lakhimpur. *Rec. zool. Surv. India*, **67** : 325-342.
- JOSEPH, A. N. T. AND P. PARUI. 1977. Diptera from Arunachal Pradesh and Assam Foot Hills, Part V, Tirap Division. *Rec. zool. Surv. India*, **72** : 333-339.
- JOSEPH, A. N. T. AND K. R. RAO. 1972a. Diptera from NEFA and Assam Foot Hills, Part I, Kameng Frontier Division and Assam Foot Hills. *Rec. zool. Surv. India*, **66** : 63-74.
- JOSEPH, A. N. T. AND K. R. RAO. 1972b. Diptera from NEFA and Assam Foot Hills, Part II, Kameng Frontier Division, Subansiri Frontier Division, North Lakhimpur and Assam Foot Hills. *Rec. zool. Surv. India*, **66** : 103-128.
- JOSEPH, A. N. T. AND K. K. RAY. 1976. Diptera from Arunachal Pradesh and Assam Foot Hills, Part IV, Lohit Frontier Division, Lakhimpur District and Sibsagar District. *Rec. zool. Surv. India*, **69** : 275-290.
- KNUTSON, L. V., F. C. THOMPSON AND J. R. VOCKEROTH. 1975. *A Catalog of the Diptera of the Oriental Region*, **2** : 307-374.
- LIU, WI-TEH. 1958. Uber die *Chrysozona* bremsen aus China. *Acta Zool. Sinica*, **10** : 151-160.

- LOPES, H. S., R. KANO, S. SHINONAGA AND H. KURAHASHI. 1977. *A Catalog of the Diptera of the Oriental Region*, 3 : 557-583.
- PHILIP, C. B. 1970. Further notes on Oriental Tabanidae (Diptera) IV. Descriptions of *Cydistomyia* and *Tabanus* and other records, particularly from India and Sikkim. In H. D. Srivastava Commen. Vol., *Indian vet. Res. Inst. Izatangar, U. P.* : 443-452.
- PONT, A. C. 1977. *A Catalog of the Diptera of the Oriental Region*, 3 : 451-523.
- RICARDO, G. 1911. A revision of the species of *Tabanus* from the Oriental region, including notes on species from surrounding countries. *Rec. Indian Mus.*, 4 : 111-258.
- SENIOR-WHITE, R. A., D. AUBERTIN AND J. SMART. 1940. *The Fauna of British India*, including the remainder of the Oriental Region. Diptera, Calliphoridae, Taylor and Francis, London, 6 : 288 pp.
- STEYSKAL, G. C. 1977. *A Catalog of the Diptera of the Oriental Region*, 3: 32-36.
- STONE, A. 1975. *A Catalog of the Diptera of the Oriental Region* 2 : 43-81.
- STONE, A. AND C. B. PHILIP. 1974. The Oriental species of the tribe Haematopotini (Diptera, Tabanidae). *U. S. D. A. Tech. Bull.* 1489 : 240 pp.
- TENORIO, J. M. 1972. A revision of the Celyphidae (Diptera) of the Oriental Region. *Trans. R. ent. Soc. Lond.*, 123 : 359-453.
- TENORIO, J. M. 1977. *A Catalog of the Diptera of the Oriental Region*, 3 : 215-222.
- THOMPSON, F. C. 1974. The genus *Spheginobaccha* de Meijere (Diptera : Syrphidae). *Trans. Am. ent. Soc.*, 100 : 255-287.
- WALKER, F. 1857. Catalogue of the Dipterous insects collected at Sarawak, Borneo, by Mr. A. R. Wallace, with descriptions of new species. *J. Proc. Linn. Soc. Lond, Zool.* 1 : 105-136.