



ISSN 0974-7907 (Online)
ISSN 0974-7893 (Print)

OPEN ACCESS

Flies from the family Tabanidae are commonly known as horse flies (*Tabanus* Linnaeus), deer flies (*Chrysops* Meigen) and clegs (*Haematopota* Meigen). This family belongs to the suborder Brachycera and infraorder Tabanomorpha. The tabanids are generally large in size, with characteristic sickle-shaped antennae and hyaline or spotted wings (e.g., *Haematopota* Meigen, *Chrysops* Meigen). Some species are with striped abdomen and thorax [e.g., *Tabanus (Tabanus) striatus* Fabricius] and some with long proboscis [e.g., *Philoliche taprobanes* (Walker)]. Adult male tabanids feed on nectar and pollen, while females are hematophagous, bearing piercing-like mandibles. This family has medical and veterinary importance. These flies can transmit several protozoan diseases among cattle during blood feeding. Fabricius (1805), Wiedemann (1824), Bigot (1892), Macquart (1846, 1855) and Walker (1848, 1850) have made considerable contributions working on Indian tabanids. In the beginning of this century, Ricardo (1902, 1906, 1909, 1911a, 1911b), Datta & Das (1978), Datta et al. (1997), Datta (1998), Mitra et al. (2006), Mitra & Sharma (2014) worked on tabanids. Recently, Veer (2004) carried out his work on this family of the Indian sub-region in addition to Indian fauna by Mitra et al. (2007). There are 197 species and four subspecies under 12 genera in three subfamilies found in India (Datta 1998). In the Oriental Region, approximately 548 species under 18 genera have been recorded. Mitra et al. (2011)

TABANID FLIES (INSECTA: DIPTERA) FROM CHHATTISGARH, INDIA

Kailash Chandra¹, Sumana Halder², Angshuman Raha³, Panchanan Parui⁴ & Dhriti Banerjee⁵

^{1,2,3,4,5} Zoological Survey of India, M-Block, New Alipore, Kolkata, West Bengal 700 053, India

¹ Kailash611@rediffmail.com (corresponding author),

² sumana zoology@gmail.com, ³ adroitangshuman@gmail.com,

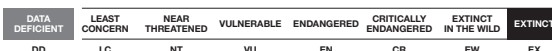
⁵ dhritibanerjee@gmail.com

reported 14 species from Chhattisgarh and Mitra & Parui (2014) reported 12 species from Achanakmar-Amarkantak Biosphere Reserve. The paper deals with the study of 16 species of the Tabanidae from Chhattisgarh. *Haematopota latifascia* Ricardo is added to the fauna of Chhattisgarh.

Materials and Methods

Study area: Chhattisgarh State lies between 17°46'–24°8'N & 80°15'–84°24'E in central India having a total area of 1,35,194km² (Fig. 1). Nearly 44% of the state area is covered by forests and a major part (35,736.239km²) is outside protected areas. Bio-geographically, the state belongs to the Deccan Peninsula bio-geographic zone including provinces, 6D - Chota Nagpur Plateau, 6C - Eastern Highland and 6E - Central Highland (Rodgers et al. 2002). The state bears mixed deciduous vegetation including both moist and dry deciduous tree species.

Methods: Specimens were collected during faunistic surveys in Chhattisgarh conducted by the Zoological



Tabanus (Tabanus) striatus



DOI: <http://dx.doi.org/10.11609/JoTT.o4082.7720-5> | ZooBank: urn:lsid:zoobank.org:pub:F6101916-6737-4209-A6D5-9ED0C57343D9

Editor: Alessandre Pereira Colavite, Universidade Federal da Paraíba, João Pessoa, Brazil.

Date of publication: 26 August 2015 (online & print)

Manuscript details: Ms # o4082 | Received 01 July 2014 | Final received 17 June 2015 | Finally accepted 23 July 2015

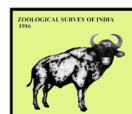
Citation: Chandra, K., S. Halder, A. Raha, P. Parui & D. Banerjee (2015). Tabanid flies (Insecta: Diptera) from Chhattisgarh, India. *Journal of Threatened Taxa* 7(10): 7720–7725; <http://dx.doi.org/10.11609/JoTT.o4082.7720-5>

Copyright: © Chandra et al. 2015. Creative Commons Attribution 4.0 International License. JoTT allows unrestricted use of this article in any medium, reproduction and distribution by providing adequate credit to the authors and the source of publication.

Funding: Chhattisgarh CAMPA (Compensatory Afforestation Management and Planning Authority).

Competing interests: The authors declare no competing interests.

Acknowledgements: Authors are thankful to Dr. K. Venkataraman, Director, ZSI, Kolkata for providing such opportunities and encouragement to continue this research work. We are also grateful to Chhattisgarh Forest Department for providing permissions to carry out the present research work.



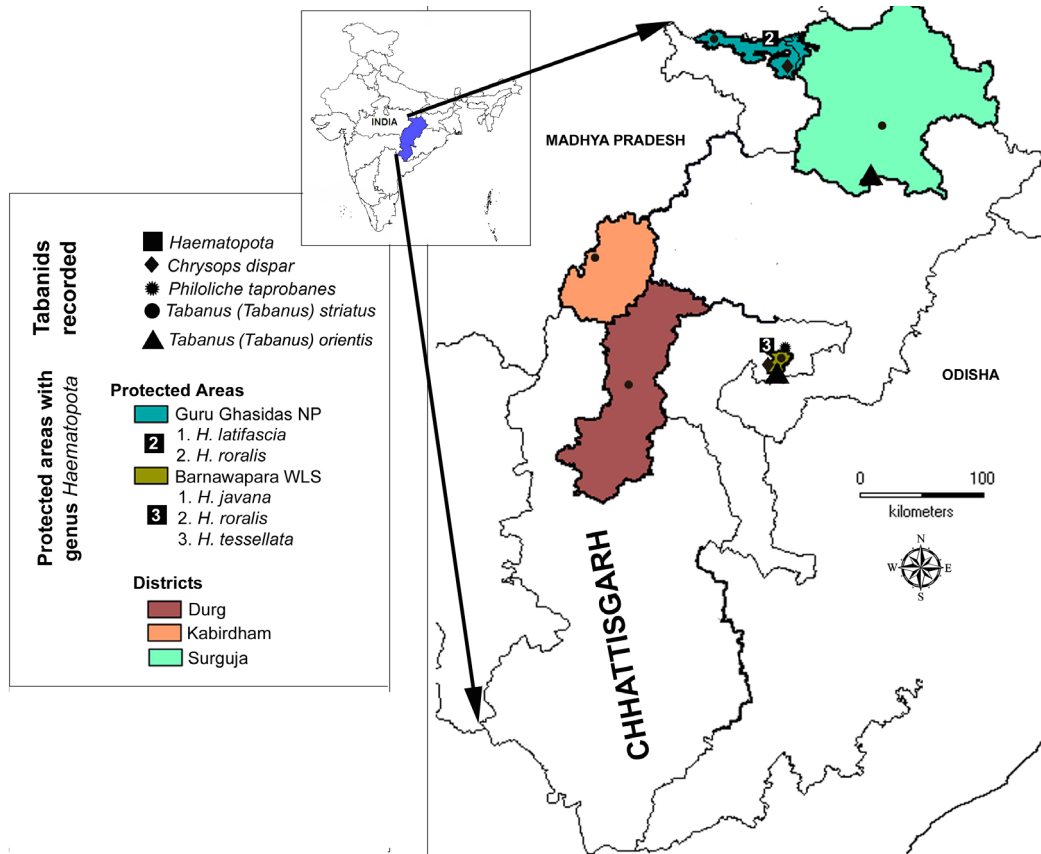


Figure 1. Map showing records of different species of tabanids collected during the present study from districts and protected areas of Chhattisgarh.

Survey of India. Usually, tabanids are collected at day time by sweeping with an insect net. The female flies are generally found around and on cattle because of their haematophagous nature. The male flies are found feeding on plant sap. During collection, GPS coordinates of the surveyed sites were recorded with the help of Garmin Oregon 550 device. The coordinates were used to produce a distribution map of the collected species by using the software DIVA-GIS. The pinned specimens were investigated under Leica EZ4 HD binocular microscope for identification. Morphological characters like wing, head, eyes, abdomen and thorax were compared for identification confirmation with the description present in the published literature of Ricardo (1911a,b). Photographs of whole specimens and body parts were taken in the Leica Stereo Zoom M205A microscope (Images 1,2). After study the specimens were deposited in the designated repository of National Zoological Collection of Zoological Survey of India, Kolkata.

Key to subfamilies of Tabanidae

- 1. Hind tibiae with spurs, ocelli usually present.....2
- Hind tibiae without spurs, ocelli usually absent

- Tabaninae
- 2. Third antennal joint with seven to eight division; proboscis usually prolonged Pangoniinae
- Third antennal joint with five divisions; proboscis short; wings demarcated with dark median cross-band Chrysopsinae

Systematic account

Subfamily Pangoniinae
Tribe Philolichini

1. Philoliche taprobanes (Walker) (Image 1A)

1854. *Pangonia taprobanes* Walker, *List. Dipt. Colln. Br. Mus*; 5: 324.

2011. *Philoliche taprobanes*: Mitra, Parui & Sharma, *Fauna of Madhya Pradesh (including Chhattisgarh), State Fauna Series, Zool. Surv. India*; 15 (Part-3): 180.

Material examined: 6.viii.2011, (1 female), (15725/H₆), Raipur: Barnawapara Wildlife Sanctuary (WS) (21°24.000'N & 81°96.338'E), coll. Sunil Gupta; 10.viii.2011, (1 male ex.), (15726/H₆), Teak Plantation (21°23.656'N & 82°24.382'E), coll. A. Sarsavan.

Distribution: India: Chhattisgarh (Bilaspur and Raipur),

Himachal Pradesh, Karnataka, Madhya Pradesh and Maharashtra; Sri Lanka.

Subfamily Chrysopsinae

Key to the genera

- 1. 2nd antennal joint usually as long as or nearly as long as the first joint, wing with a dark median cross vein*Chrysops* Meigen
- 2nd antennal joint shorter than first segment, wing usually hyaline *Silvius* Meigen

2. *Chrysops dispar* (Fabricius) (Image 1B)

1798. *Tabanus dispar* Fabricius, *Ent. Syst. Suppl.*, 1: 567.

2011. *Chrysops dispar*: Mitra, Parui & Sharma, *Fauna of Madhya Pradesh (including Chhattisgarh), State Fauna Series, Zool. Surv. India.* 15(3): 180.

Material examined: 6.ix.2011, (1 female), (15729/H₆), Raipur: Barnawapara WS, Barnawapara RH (21°24'N & 82°25.312'E), coll. Sunil Gupta; 19.ix.2012, (2 males), (15727/H₆), (15728/H₆), Bilaspur: Karidongri Forest Rest House (22°20.551'N & 81°06.338' E), coll. A. Raha.

Distribution: India: Arunachal Pradesh, Assam, Bihar, Chhattisgarh (Bilaspur and Raipur) Himachal Pradesh, Karnataka, Kerala, Odisha, Sikkim, Tripura and West Bengal; Bangladesh, China, Indonesia (Sumatra, Java, Kalimantan), Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Singapore, Sri Lanka, Taiwan, Thailand and Vietnam.

3. *Silvius* sp.

2014. *Silvius* sp. : Mitra & Parui, *fauna of Achanakmar-Amarkantak Biosphere Reserve, conservation area series*, Zoological Survey of India, 49: 113.

Distribution: India: Chhattisgarh (Bilaspur: AWLS).

Subfamily Tabaninae

Key to the Tribe

- 1. Frons in female much longer than width, frontal callus generally longitudinal, antennae short, flagellum having broad basal plate with 4 annuli; wing smoky or hyaline, basicosta bears strong setae*Tabanini*
- Frons in female broader than long, frontal callus transverse; antennae long and cylindrical, base of flagellum cylindrical with 3 annuli; wing with pale marks; basicosta bears sparse setae.....
.....*Haematopotini*

Tribe Tabanini

Genus *Tabanus* Linnaeus

Key to species

Group- A (with one or more stripes continuous on abdomen).

- 1. Frontal callus large, almost square with short

lineal extension; fore head narrowest anteriorly; a median grey stripe begins on the third abdominal segment and the lateral two stripes terminate at second segment..... *jucundus* Walker

- Frontal callus oblong or narrow with lineal extension 2
- 2. Abdomen with a median stripe and two lateral stripes; median and lateral stripes almost of same length; frontal callus with a spindle-shaped linear extension; median and lateral stripes almost of same length *striatus* Fabricius
- Abdomen with one median continuous stripe only, no lateral stripe or spots or only isolated ones on the second segment 3
- 3. Median stripe of abdomen black; fore head barely half as wide anteriorly as is at vertex; median abdominal stripe narrow; former black; wing brown *monotaeniatus* Bigot
- Median stripe black with golden hairs; a narrow grey stripe often apparent on it; abdomen reddish; last three segments black
..... *abscondens* Walker

Group- B (Species with median or lateral spots or both not forming a continuous stripe)

- 1. Abdomen reddish-brown with triangular white haired spots from 2-5th segments, underside (venter) with yellowish-white pubescence
..... *indianus* Ricardo
- Abdomen reddish-yellow pubescence with triangular grey spots from 1-5th segments, underside (venter) with white pubescence
..... *rubicundus* Ricardo

Group-C (Species with paler bands or with spots on abdomen)

According to present study, only one species [*Tabanus (Tabanus) orientis* Walker] included in this group, so no key characters have been provided here.

Subfamily Tabaninae

Tribe Tabanini

4. *Tabanus (Tabanus) abscondens* Walker

1860. *Tabanus abscondens* Walker, *Trans. Entom. Soc.* London, 5: 275

2011. *Tabanus abscondens*: Mitra, Parui & Sharma, *Fauna of Madhya Pradesh (including Chhattisgarh), State Fauna Series, Zool. Surv. India.* 15 (3): 180.

Distribution: India: Chhattisgarh (Bilaspur), Himachal Pradesh, Madhya Pradesh; China, Myanmar.

5. *Tabanus (Tabanus) indianus* Ricardo

1911. *Tabanus indianus* Ricardo, *Rec. Indian Mus.*, 4:

175.

2014. *Tabanus (Tabanus) indianus*: Mitra & Parui. *Fauna of Achanakmar- Amarkantak Biosphere Reserve, Conservation Area Series, Zool. Surv. India.* 49: 111–128.

Distribution: India: Assam, Chhattisgarh (Bilaspur), Karnataka, Madhya Pradesh; Indonesia (Sulawesi), China, Taiwan, Vietnam.

6. *Tabanus (Tabanus) jucundus* Walker

1848. *Tabanus jucundus* Walker, *List Dipt. Colln. Br. Mus.*, 1: 187.

2011. *Tabanus (Tabanus) jucundus*: Mitra, Parui & Sharma. *Fauna of Madhya Pradesh (including Chhattisgarh), State Fauna Series, Zool. Surv. India.* 15(3): 181.

Distribution: India: Arunachal Pradesh, Chhattisgarh (Bilaspur), Madhya Pradesh, Maharashtra, Punjab, Uttar Pradesh; China, Hong Kong, Philippines, Sri Lanka.

7. *Tabanus (Tabanus) monotaeniatus* (Bigot)

1892. *Atylotus monotaeniatus* Bigot. *Mem. Soc. Zool. France*, 5: 655.

2014. *Tabanus (Tabanus) monotaeniatus*: Mitra & Parui. *Fauna of Achanakmar- Amarkantak Biosphere Reserve, Conservation Area Series, Zool. Surv. India.* 49: 111–128.

Distribution: India: Arunachal Pradesh, Assam, Chhattisgarh (Bilaspur), Madhya Pradesh, Meghalaya, Sikkim, West Bengal; China, Indonesia (Java), Myanmar.

8. *Tabanus (Tabanus) orientis* Walker (Image 1C)

1848. *Tabanus orientis* Walker, *List Dipt. Colln Br. Mus.*, 1: 152.

2014. *Tabanus (Tabanus) orientis*: Mitra & Parui. *Fauna of Achanakmar- Amarkantak Biosphere Reserve, Conservation Area Series, Zool. Surv. India.* 49: 111–128.

Material examined: 2.vii.2011, (1 male), (15730/H₆), Raipur: Barnawapara, Barnawapara Camp, coll. K. Chandra.

Distribution: India: Chhattisgarh (Bilaspur and Raipur), Sikkim, Uttar Pradesh; Bhutan, Nepal, Pakistan.

9. *Tabanus (Tabanus) rubicundus* Macquart

1846. *Tabanus rubicundus* Macquart, *Dipt. Exot. Suppl* 1: 33.

2014. *Tabanus (Tabanus) rubicundus*: Mitra & Parui. *Fauna of Achanakmar - Amarkantak Biosphere Reserve, Conservation Area Series, Zool. Surv. India.* 49: 111–128.

Distribution: India: Arunachal Pradesh, Assam, Chhattisgarh (Bilaspur), Meghalaya, West Bengal. Elsewhere : Bangladesh, Indonesia (Java), Laos.

10. *Tabanus (Tabanus) striatus* Fabricius (Image 1D)

1787. *Tabanus striatus* Fabricius, *Mantissa Insect.*, 2: 356

2014. *Tabanus (Tabanus) striatus* Fabricius: Mitra & Parui. *Fauna of Achanakmar- Amarkantak Biosphere Reserve, Conservation Area Series, Zool. Surv. India.* 49: 111–128.

Material examined: 17.vii.2011, (2 males), (15762/H₆, 15763/H₆), Raipur: Barnawapara WS, Akaltara (21°21.379'N & 82°27.02' E); 20.vii.2011, 6 (2 males, 4 females), (15744/H₆, 15745/H₆), Latadadar (21°25.289'N & 82°25.441'E); 6.vii.2011, (3 males), (15736/H₆, 15737/H₆, 15738/H₆), Kabirdham, Bhoramdev WS, Sarodadadar (22°10.46'N & 81°3.492'E); 21.vii.2011, 2 (1 female, 1 male), (15742/H₆, 15743/H₆), 22.vii.2011, 3 (1 female, 2 males), (15739/H₆, 15740/H₆, 15741/H₆), 2.viii.2011, (1 female), (15734/H₆); 27.vii.2011, 2(1 female, 1 male), (15732/H₆, 15733/H₆), Fam River, (22°10.889'N & 81°2.1'E); 31.viii.2011, (1 female), (15735/H₆), Chilpighati Forest Rest House (22°10.377'N & 81°3.1'E); 21.vii.2011, (1 male ex.), (15760/H₆), coll. Sunil Gupta; Durg: Bhilai (21°12.000'25.1"N & 81°23'37.6"E); 14.ix.2012, (1 male), (15731/H₆), Surguja: Bilgumpha, (23°19.147'N & 83°12.169'E), coll. A. Raha.

Distribution: India: widely distributed Chhattisgarh (Bilaspur, Raipur, Kabirdham, Durg and Surguja), Himachal Pradesh, Madhya Pradesh; Bangladesh, Bhutan, Cambodia, China, Laos, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand and Vietnam.

Tribe Haematopotini

Genus *Haematopota* Meigen

1. Apical band of wing single 2
- Apical band of wing double 4
2. Abdomen blackish-brown with a distinct ashy grey median stripe and grey roundish spots on each segment *roralis* Fabricius
- Abdomen brownish with whitish segmentations..3
3. Apical band of wing broad, band-like, extends across the whole breadth of apex of wing
..... *latifascia* Ricardo
- Apical band broad at base, gradually narrowed starting from apex of second vein ends at posterior branch of third vein..... *assamensis* Ricardo
4. Apical bands almost filling up the apex of wings, lower band very narrow; first joint of antennae smaller than 1st annulation of third joint
..... *marginata* Ricardo
- Apical bands not filling up the apex of wings5
5. Both the apical bands join at base and diverge later, the upper branch end at 1st posterior cell
..... *tessellata* Ricardo
- Both the apical bands run separately, the upper band narrow, lower band convex at upper end continued across the lower branch



Image 1. Tabanids recorded in the present study. A - *Philoliche taprobanes*; B - *Chrysops dispar*; C - *Tabanus (Tabanus) orientis*; D - *Tabanus (Tabanus) striatus*; E - *Haematopota javana*; F - *Haematopota latifascia*; G - *Haematopota roralis*; H - *Haematopota tessellata*.

of third vein and ends at apex of first posterior cell *javana* Wiedemann

11. *Haematopota assamensis* Ricardo

1911. *Haematopota assamensis* Ricardo. *Rec. Indian Mus.*, 4: 343.
2014. *Haematopota assamensis*: Mitra & Parui.

© A. Raha

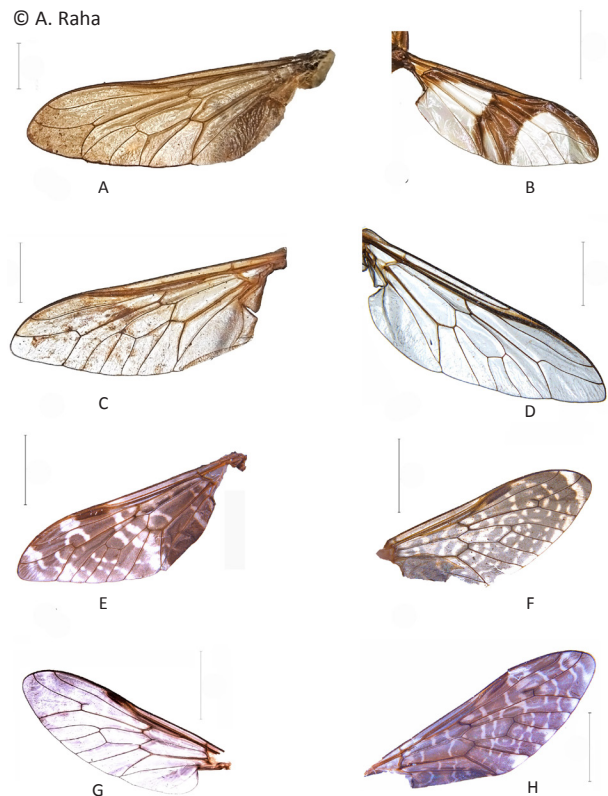


Image 2. Wings of the tabanids identified in the present study. A - *Philoliche taprobanes*; B - *Chrysops dispar*; C - *Tabanus (Tabanus) orientis*; D - *Tabanus (Tabanus) striatus*; E - *Haematopota javana*; F - *Haematopota latifascia*; G - *Haematopota roralis*; H - *Haematopota tessellata* (scale bar - 2mm)

Fauna of Achanakmar- Amarkantak Biosphere Reserve, Conservation Area Series, Zool. Surv. India. 49: 111–128.

Distribution: India: Arunachal Pradesh, Chhattisgarh (Bilaspur), Madhya Pradesh, Meghalaya, West Bengal; China, Nepal, Thailand, Vietnam.

12. *Haematopota javana* Wiedemann (Image 1E)

1821. *Haematopota javana* Wiedemann, *Dipt. Exot.*, 1: 100.

2014. *Haematopota javana*: Mitra & Parui. *Fauna of Achanakmar- Amarkantak Biosphere Reserve, Conservation Area Series, Zool. Surv. India.* 49: 111-128.

Material examined: 23.vii.2011, (1 female), (15797/H₆), Raipur: Barnawapara WS, Guragarh, (21°28.381'N & 82°29.961'E), coll. S. Gupta.

Distribution: India: Chhattisgarh (Bilaspur and Raipur), Bihar, Kerala, Madhya Pradesh, Meghalaya, Mizoram, Tamil Nadu, West Bengal; Bangladesh, China, Java, Laos, Malaysia, Myanmar, Pakistan, Thailand.

13. *Haematopota latifascia* Ricardo (Image 1F)

1911. *Haematopota latifascia* Ricardo, *Rec. Indian Mu.*,

4: 356.

Material examined: 2.viii.2011, (1 male), (15796/H₆), Koriya: Guru Ghasidas National Park, Ramgarh, coll. A. Raha.

Distribution: India: Assam, Chhattisgarh (Bilaspur and Koriya); Myanmar, Laos.

14. *Haematopota marginata* Ricardo

1911. *Haematopota marginata* Ricardo, *Rec. Indian Mus.*, 4: 347.

2014. *Haematopota marginata*: Mitra & Parui. *Fauna of Achanakmar- Amarkantak Biosphere Reserve, Conservation Area Series, Zool. Surv. India.* 49: 111–128.

Distribution: India: Assam, Bihar, Chhattisgarh (Bilaspur), Madhya Pradesh, Meghalaya, West Bengal; Bangladesh.

15. *Haematopota roralis* Fabricius (Image 1G)

1805. *Haematopota roralis* Fabricius, *Syst. Antliat.*: 107.

2014. *Haematopota roralis*: Mitra & Parui. *Fauna of Achanakmar- Amarkantak Biosphere Reserve, Conservation Area Series, Zool. Surv. India.* 49: 111–128.

Material examined: 17.viii.2011, (1 male ex.), (15775/H₆), Raipur: Barnawapara WS, Akaltara, coll. S. Gupta.

Distribution: India: Chhattisgarh (Bilaspur and Raipur), Himachal Pradesh, Madhya Pradesh, Tamil Nadu; Sri Lanka.

16. *Haematopota tessellata* Ricardo (Image 1H)

1906. *Haematopota tessellata* Ricardo, *Ann. Mag. Nat. Hist.* (7) 18: 120.

Material examined: 2.vii.2011, 2 (1 male, 2 females), (15794/H₆, 15795/H₆), Raipur: Barnawapara WS, Paraspani, coll. K. Chandra.

Distribution: India: Chhattisgarh (Bilaspur AWLS, Raipur); Sri Lanka.

Discussion

The study area comprises four districts, Durg, Kabirdham, Surguja, Bilaspur and three protected areas, Guru Ghasidas National Park, Achanakmar Wildlife Sanctuary, Barnawapara Wildlife Sanctuary. The tabanids are distributed throughout the area, but the maximum numbers of species were recorded from Bilaspur among districts and Barnawapara Wildlife Sanctuary among protected areas. After this study, it can be predicted that cattle and flower plants are abundant in these areas, because nectar and cattle blood are the major food source for these flies. Chhattisgarh being a tribal dominated state, high abundance of cattle is expected to be found in more or less every part of the state. So, further taxonomic studies

of Tabanidae involving extensive field surveys are highly recommended which may reveal many unknown tabanids with their distributional data in Chhattisgarh.

References

- Bigot, J.M.F. (1892). Description de Dipteres nouveaux, *Memoires Societe Zoologique de France* (Paris) 5: 602–691.
- Datta, M. & B.N. Das (1978). Three new species of the genus *Tabanus* (Diptera: Tabanidae) from Arunachal Pradesh, India. *Bulletin of the Zoological Survey of India* 1(2): 81–185.
- Datta, M. (1998). Insecta: Diptera, pp. 1–64. In: *Fauna of Meghalaya. State Fauna Series* 4(6), Zoological Survey of India.
- Datta, M., P. Parui & M. Mukherjee (1997). Insecta: Diptera, In: *Fauna of West Bengal, State Fauna Series*, Zoological Survey of India, Kolkata, 3: 1–224.
- Fabricius, J.C. (1805). *Systema Antliatorum Secundum Ordines, Genera. Species, Brunsvigae (=Brunswick)*, 373+30pp.
- Macquart, J. (1846). *Diteres esotiques nouveaux ou peu connus*, suppl., 1: 5–238.
- Macquart, J. (1855). *Diteres esotiques nouveaux ou peu connus*, suppl., 5: 25–156.
- Mitra, B. & P. Parui (2014). Insecta: Diptera, 111–128. In: *Fauna of Achanakmar-Amakantak Biosphere Reserve, Chhattisgarh and Madhya Pradesh. Conservation Area Series - 49*. Zoological Survey of India, Kolkata.
- Mitra, B. & R.M. Sharma (2014). Checklist of Indian Horse and Deer Flies (Insecta: Diptera: Tabanidae). <<http://www.zsi.gov.in/checklist/Tabanidae.pdf>> (downloaded on 17.06.2014).
- Mitra, B., D. Banerjee & S. Roy (2007). A check-list of tabanid flies (Tabanidae: Diptera) of the eastern Himalayas, India. *Journal of Advanced Zoology* 28(2): 55–66.
- Mitra, B., P. Parui & D. Banerjee (2006). Insecta: Diptera, pp. 257–281. In: *Fauna of Arunachal Pradesh, State Fauna Series 13(2)*. Zoological Survey of India, Kolkata.
- Mitra, B., P. Parui & R.M. Sharma (2011). Insecta: Diptera, 167–202. In: *Fauna of Madhya Pradesh (including Chhattisgarh), State Fauna Series 15(3)*. Zoological Survey of India, Kolkata.
- Ricardo, G. (1902). Further notes on the Pangoniinae of the family Tabanidae in the British Museum Collection. *Annals and Magazine of Natural History* 9(7): 366–381.
- Ricardo, G. (1906). Notes on the genus *Haematopota* of the family Tabanidae in the British Museum Collection. *Annals and Magazine of Natural History* 18(7): 94–127.
- Ricardo, G. (1909). Four new Tabanidae from India and Assam. *Annals and Magazine of Natural History* 3(8): 487–490.
- Ricardo, G. (1911a). A revision of the species of *Tabanus* from the Oriental Region including notes on species from surrounding Countries. *Records of the Indian Museum* 4: 111–258.
- Ricardo, G. (1911b). A revision of the Oriental species of the genera of the family Tabanidae other than *Tabanus*. *Records of the Indian Museum* 4: 321–397.
- Rodgers, W.A., H.S. Panwar & V.B. Mathur (2002). Wildlife and protected areas network in India: A review (Executive Summary). Wildlife Institute of India, Dehradun, 44 pp.
- Veer, V. (2004). Tabanidae flies (Diptera) from the Indian subregion. *Annals of Forestry* 12(2): 301–447.
- Walker, F. (1848). Lists of specimens of dipterous insects in the Collection on the British Museum 1: 1–229.
- Walker, F. (1850). *Insecta Saundersians or characters of undescribed insects in the Collection of W.W. Saunders, Diptera*, 1: 1–76.
- Wiedemann, C.R.W. (1824). *Analecta Entomologica Ex Museo Regio Hafniensi Congesta Kiliae (=Kiel)*: 1–60.