

Morphotaxonomic characterization of *Haematopota montana* and *Chrysops dispar* (Diptera: Tabanidae) from Warangal District, Telangana, India

Ramesh Bhumaiyya S^{*1}, Dhanalakshami H², Murthy G S S³, Rathnamma D⁴, Manjunatha Reddy G B⁵, Krishnamurthy C M⁶, Gracy Gandhi R⁷, Atanu Naskar⁸, David K J⁹, Ananda K J¹⁰, Sushmita¹¹, P Radhakrishna¹²

¹ Associate Professor and Head, Department of Veterinary Parasitology, Veterinary College Hebbal, College of Veterinary Science, Korutla dist. Jagtial, PVNRTVU, Telangana, India

² Associate Professor & Head, Department of Veterinary Parasitology, Veterinary College, Gadag, KVAFSU, Karnataka, India

³ Professor & University Head, Department of Veterinary Parasitology College of Veterinary Science, Rajendranagar, Hyderabad, PVNRTVU, Telangana, India

⁴ Director, IAH & VB, Hebbal, KVAFSU, Karnataka, India

⁵ Principal & Scientist, ICAR-NIVEDI, Yelahanka, Bangalore, Karnataka, India

⁶ Associate Professor & Head, Department of Veterinary Parasitology, Veterinary College, Hasan, KVAFSU Karnataka, India

⁷ Gracy Gandhi, R, Principal scientist, ICAR-NBAIR, Hebbal, Bangalore, Karnataka, India

⁸ Atanu Naskar Scientist and In Charge of Dipteran section, ZSI, Kolkata, West Bengal, India

⁹ Principal & Scientist, ICAR-NBAIR, Yelahanka, Bangalore, Karnataka, India

¹⁰ Professor & Head, Department of Veterinary Parasitology, Veterinary College Hebbal, KVAFSU Karnataka, India

¹¹ Research Assistant, ICAR-NBAIR, Hebbal, Bangalore, Karnataka, India

¹² Assistant Professor & Head, Department of Veterinary Physiology, CVSc, Korutla, Dist. Jagtial, PVNRTVU, Telangana, India

Corresponding Author: Ramesh Bhumaiyya S

DOI: <https://doi.org/10.66856/ijer.2026.11.3.11265>

Abstract

A total of 8,488 tabanid fly specimens were collected from August 2023 to July 2025 across the Warangal district of Telangana, India, using trapping and hand-picking methods. The collected specimens were subjected to detailed morphological examination and identified based on key diagnostic characters, including body size, head morphology, thorax, wings, legs, antennae, and abdominal features. These flies identified on the basis of morphological identification key for the family *Tabanidae*. Morphological characterization revealed the present out of seven Tabanids here listed and detailed each one species of *Haematopota montana* and *Chrysops dispar*. this study helps in accurate identification and taxonomic characterization of Tabanid flies occurring in the Warangal district and surrounding regions. It enables rapid discrimination of closely related species based on readily observable morphological traits, thereby improving the accuracy of species identification in both field and laboratory investigations.

Keywords: Tabanidae, *Haematopota montana*, *Chrysops dispar*, morphotaxonomy, Warangal District

Introduction

Family *Tabanidae* contains approximately 4,455 species and subspecies in 144 genera worldwide (Baldacchino *et al.*, 2014^[5] a; Morita *et al.*, 2016 a). In India, 247 species, one sub species in 14 genera, six tribes and three sub families have been recorded (Maity *et al.*, 2016 b) ^[32]. each one species of *Haematopota* and *Chrysops* species of *Tabanidae* have been recorded from Warangal district of Telangana. They belong to three genera viz., *Haematopota*, *Chrysops*, in two subfamilies viz., Tabaninae, Chrysopsinae (Kapoor *et al.*, 1990; Veer, 2004; Vasudeva, 2007a) ^[25, 69, 70]. This *Haematopota*, *Chrysops* flies shows different characters on the wing pattern and antenna and markings on the abdomen. Adults are diurnal, often most active in sunny weather and generally rest on trees. Males feed on nectar from flowers while females are hematophagous on animals and occasionally humans. Flies are abundant during monsoon, and the density of tabanids is influenced by rainfall (Vasudeva, 2007a) ^[69]. The females lay eggs in masses on vegetation overhanging in waterbodies. The hatched larvae predate on invertebrates and can spend more than one season. Pupation occurs underground; the pupa being

positioned vertically in the substrate. The whole life cycle of tabanids is completed in 4-5 months under favorable conditions.

Materials and methods

In this study five mandals of Warangal district were included which consists of sixteen villages (Laknavaram, Chalwai, Hasanparthi, Geeskonda, Laknepally, Govindraopet, Narsampet, Kazipet, Dharmasagar, Panthini, Singaram, Mamnoor, Bollikunta, Chintagattu, Mupparam, Pedapendyala of erstwhile district of Warangal, Hanamkonda and Mulugu area.

Morphological identification of adult flies was carried out by using keys provided by Kapoor *et al.*, (1990); Veer (2004) ^[25, 70]; Burton (1978); Stone and Philip (1974) ^[64]; Burger and Chainey (2000). The characters for morphological identification of fly included color of fly; length of fly; eyes and eye banding pattern; frons length and width ratio; shape, size, color of basal callus, median callus and sub callus; antennal shape, size, color, tomentum and number of annulations of flagellum; basic oostoma with or without setae, color of veins, structure and number of apical

band, number of rosettes or pale transverse streaks, presence or absence of appendix and color of the pterostigma of wing; abdomen and thorax with spots, stripes or bands of various shape and size either median, submedi or both, which are also taxonomically very much significant in various species of *Tabanids*. Colors of scutellum, presence of hair or tomentum are additional important characters.

Results

Morphological identification:

The characters for morphological identification of fly



Fig 1 A: *Haematopota montana* adult fly



Fig 1B: *Haematopota montana* abdomen

Observation: Medium sized species prevalent during May to July in the Warangal district of Telangana.

Details of the fly collected from: INDIA, Telangana, Warangal district Bollikunta 7° 53' 30" N, 79° 36' 54" E, 280 A , Singaram 17.9689° N, 79.5941° E, 302 A Panthani, 17.9° N 79.6° E, 270 A Mamnoor, 17.93800° N 79.52370° E, 285 A Hasanaparthi, 18°04'05" N, 79°31'25" E , 262 A Kazipet 7° 58' 0" N (17.9667°), 79° 30' 0" E (79.5000°) 304 A Chintagattu, 18°04'04" N , 79°29'39" E, 263.

Identification

A small greyish-brown fly measuring about 7.5–8.5 mm in length. The frons is grey, brown, slightly wider at the base, with a small central frontal spot. Paired circular spots are large and touch the eyes but are separated from the callus. The callus is brown, broad, and low, touching the eyes and showing a slight median projection above with a weakly curved lower edge. The subcallar region has a prominent black spot between the antennae. The face and parafacial areas are greyish yellow, often with dark markings on the upper face, while the upper parafacial region is irregularly mottled brown. The beard is white. The eyes are bare, larger than the thorax, and show three green zig-zag bands. The antennae have a shiny dark reddish scape, a pedicel with a small dorsal projection, and a reddish-brown flagellum that darkens toward the tip; it is long, slender, and only slightly tapers, with the first flagellomere slightly shorter than the

included color of fly; length of fly; eyes and eye banding pattern; antennal shape, size, color, number of annulations of flagellum; basi costa with or without setae, color of veins, structure and number of apical bands.

The collected flies were grouped into large, medium and small flies based on the body size. The size of the fly was variable, small (about 10 mm long or less), medium (about 15-18 mm long or less), large (18-20 mm long more).

1. *Haematopota montana*

scape. The palpus is dark reddish grey with black hairs. The thorax is brown with a pair of distinct triangular markings behind the transverse suture and a strong grey band before the scutellum; the scutellum is dark and the pleuron is grey. The wings are 7.3–8.7 mm long, brownish with a typical pattern of pale markings, including a complete, slightly broad, nearly straight subapical band and pale triangular markings in all posterior cells. The haltere has a brown knob. The legs are variably dark and pale: the fore coxa is grey with a darker apex, the femur is dark brown, and the fore tibia is about two-fifths white. The mid tibia has two pale bands, while the hind tibia shows a basal white band and a faint subapical pale spot. The basal tarsi of the mid and hind legs are white on their basal half. The abdomen is dark brown with pale segmental margins, a narrow mid-dorsal stripe, and pale lateral spots on the posterior segments, while the underside is dark with broad grey bands between segments (Fig. 1A, B).

Host: cattle, buffalo, horse, wild herbivorous and carnivorous animals.

Observation: This species is active from May to July in the Warangal region. It is closely related to *Haematopota brevis*, but can be distinguished by its fully developed, slightly broad, and almost straight subapical band, along with all posterior cells showing distinct pale triangular markings.

2. *Chrysops dispar*



Fig 2 A: *Chrysops dispar* adult fly



Fig 2B: *Chrysops dispar*



Fig 2C: *Chrysops dispar* head & antenna

(II segment of abdomen inverted V shaped mark)

Details of the fly collected from: INDIA, Telangana, Warangal district Bollikunta 7° 53' 30" N, 79° 36' 54" E, 280 A, Singaram 17.9689° N, 79.5941° E, 302 A Panthani, 17.9° N 79.6° E, 270 A Mamnoon, 17.93800° N 79.52370° E, 285 A Hasanaparthi, 18°04'05" N, 79°31'25" E, 262 A Kazipet 7° 58' 0" N (17.9667°), 79° 30' 0" E (79.5000°) 304 A Chintagattu, 18°04'04" N, 79°29'39" E, 263.

Identification

A small, slender fly measuring about 5.8–6.3 mm in length, with a yellow and black coloration pattern. The frons is yellow and about as long as it is wide, with a broad, shiny black callus. The vertex and area around the ocelli are glossy black, while the front clypeus is yellowish-brown with darker lateral shading and a pale yellow, hair-like median stripe. The maxillary palpi are light reddish-brown. The eyes are bare and appear black in preserved specimens, and the ocelli are well developed. The antennae are long and thin, with a yellow-brown scape, light brown pedicel, and a dark brown to black flagellum; all segments are roughly similar in length. The thorax is mainly black, with golden yellow hairs near the transverse suture and apex, and a dark brown to black scutellum. The legs are pale yellow brown to brown, with darker coxae and hind femur; the hind tibia is slightly swollen. The wings are 6.4–7.2 mm long, transparent, and marked by a broad dark band along the costal margin extending to the wing tip, along with a transverse band reaching from the costal to the anal margin and leaving a clear patch toward the rear. The abdomen is yellow with distinctive black markings: a narrow band on the posterior edge of the first tergite, a broad inverted V-shaped mark on the second tergite extending onto the third and sometimes fourth, and variable dark lateral margins on tergites two to six. The first to fifth sternites are yellow, while the sixth and seventh are brown to black (Fig.2 A, B, C).

Host: Cattle, buffalo

Observation: This species is identified by a distinctive inverted V-shaped dark mark on the abdomen extending up to the third abdominal segment (tergite III). It is found in the Warangal district of Telangana during May and June, and it

typically feeds on the forelegs and neck regions of cattle and buffalo.

Discussion

Warangal district of Telangana possesses a rich diversity of flora and fauna, including a wide variety of mammals and birds, which provides a favorable ecosystem for the survival and development of tabanid flies. The diverse habitats support all developmental stages of these flies. Females typically oviposit on grasses and fallen bamboo vegetation located near water bodies, while the moist soil beneath accumulated plant biomass in forested areas and paddy fields offers suitable conditions for larval development and pupation (Chainey, 2004). Domestic livestock, particularly cattle and buffaloes reared in villages adjoining forest areas, provides an ample source of blood meals for adult female tabanid flies, thereby supporting their reproduction and contributing to the maintenance of local populations.

In the present study, a total of 7 species belonging five genera of tabanus were identified but here only 2 were mentioned related to Morphological characters of *Haematopota* and *Chrysop* Warangal district. In the present study, one species of genus *Haematopota* was recorded. The morphological description of *H. montana* concurrence with Stone and Philip, 1974, Kapoor *et al.*, 1990, Veer, 2004 and Vasudeva *et al.* 2007b^[25, 64, 69, 70]. The identification of *C. dispar* was in concurrence with Ricardo, 1911, Kapoor *et al.*, 1990, Burger and Chainey 2000, Veer, 2004 and Vasudeva *et al.*, 2007^[25, 61, 69, 70] b.

Conclusion

This is first report from Warangal district, Telangana to understanding the Morpho-taxonomic Characterization of tabanid vectors is crucial for developing effective management strategies to control the transmission of economically important diseases such as Surra, Anthrax, Blackleg, and Hemorrhagic septicemia. Such comprehensive data would support the implementation of timely and targeted vector control measures, thereby minimize disease spread and improving livestock health.

Acknowledgement

ICAR-NBAIR, Yelahanka unit and Hebbal unit, Bangalore and National Zoological collection, *Diptera* section,

Zoological survey of India, Kolkata, ICAR-NIVEDI, Yelahanka, Bangalore.

References

1. Al-Talafha HA, Amr ZS, Al-Sheyab F. Seasonal abundance of horse flies (*Diptera: Tabanidae*) in Suwayma (Dead Sea area). *Journal of Entomological Research Society*, 2005;7(3):39–45.
2. Al-Talafha H, Yaakop S, Nurulfatihah AL, Idris AB. New species of the genus *Tabanus* Linnaeus, 1758 (*Diptera: Tabanidae*) from Malaysia. *Serangga*, 2018;23(2):110–116.
3. Altunsoy F, Ayaz B. Distribution and seasonality of horseflies (*Diptera: Tabanidae*) in Van province of Türkiye with new records. *Journal of Insect Biodiversity and Systematics*, 2024;10(3):605–615.
4. Altunsoy F, Kilic AY. Seasonal abundance of horsefly (*Diptera: Tabanidae*) in Western Anatolia. *Journal of Entomological Research Society*, 2012;14(1):95–105.
5. Baldacchino F, Puech L, Manon S, Lionel RH, Jay-Robert P. Biting behaviour of *Tabanidae* on cattle in mountainous summer pastures, Pyrenees, France, and effects of weather variables. *Bulletin of Entomological Research*, 2014;104:471–479.
6. Barros ATM. Seasonality and relative abundance of *Tabanidae* (*Diptera*) captured on horses in the Pantanal, Brazil. *Memórias do Instituto Oswaldo Cruz*, 2001;96(7):917–923.
7. Barros ATM, Foil LD. The influence of distance on movement of tabanids (*Diptera: Tabanidae*) between horses. *Veterinary Parasitology*, 2007;144:380–384.
8. Basu BC, Menon PB, Sen Gupta CM. Regional distribution of *Tabanus* flies in India and its relationship to the incidence of Surra. *Indian Journal of Veterinary and Animal Sciences*, 1952;22:273–292.
9. Cardenas RE, Buestán J, Dangles O. Diversity and distribution models of horse flies (*Diptera: Tabanidae*) from Ecuador. *International Journal of Entomological Research*, 2009;45(4):511–528.
10. Carmo DDD, Henriques AL. Taxonomy of *Tabanus trivittatus* species group (*Diptera: Tabanidae*), with description of five new species. *Zootaxa*, 2019;4554(1):63–100.
11. Chandra K, Halder S, Raha A, Parui P, Banerjee D. Tabanid flies (Insecta: *Diptera*) from Chhattisgarh, India. *Journal of Threatened Taxa*, 2015;7(10):7720–7725.
12. Changbunjong T, Bhusri B, Sedwisai P, Weluwanarak T, Nitiyamatawat E, Chareonviriyaphap T, et al. Species identification of horse flies (*Diptera: Tabanidae*) in Thailand using DNA barcoding. *Veterinary Parasitology*, 2018;259:35–43.
13. Changbunjong T, Sedwisi P, Weluwanarak T, Nitiyamatawat E, Sariwongchan R, Chareonviriyaphap T, et al. Species diversity and abundance of *Tabanus* spp. (*Diptera: Tabanidae*) in different habitats of Thailand. *Journal of Asia-Pacific Entomology*, 2018;21(1):134–139.
14. Choi KS, Kim HC, Chong ST, Kim MS, Klein TA, Kim HS, et al. Seasonal surveillance of deer and horse flies (*Diptera: Tabanidae*), Gyeonggi province, Republic of Korea. *Journal of Asia-Pacific Entomology*, 2020;23(2):315–319.
15. Chowdhury M, Mondal S, Das M, Saha SK, Banerjee D, Naskar A. Tabanid fauna (Insecta: *Diptera*) of Manipur, an Indo-Burma biodiversity hotspot in India with three new state records. *Records of the Zoological Survey of India*, 2025;124(4):345–352.
16. Coher EI. Asian biting fly studies III: *Tabanidae* species related to *Tabanus caeruleus* Macq., 1838, with the description of a new species from Nepal. *Pacific Insects*, 1971;13(2):325–328.
17. Coscaron S, Martínez M. Checklist of *Tabanidae* (Insecta: *Diptera*) from Uruguay. *Revista de la Sociedad Entomológica Argentina*, 2019;78(1):40–46.
18. Croof H, Nour M, Ali N. Morphological identification of horseflies (*Diptera: Tabanidae*) and estimation of their seasonal abundance in Al-Showak district, Gedaref State, Eastern Sudan. *International Journal of Applied Sciences*, 2017;6(2):41–54.
19. Paulraj GM, Yuvasri K, Siva Ranjani S, Perumal RM, Eswaran D, Senbagapriya S, et al. Evaluation of different trap models to monitor and control haematophagous insects which transmit diseases to captive animals in Zoological Parks. Project Report, Annual Plan of Operations 2023–24, Advanced Institute for Wildlife Conservation (R, T & E), Vandalur, Tamil Nadu, 2025, 54.
20. Guimaraes RR, Júnior RRG, Rodrigues HRS, Guimarães RR, Carvalho RW, Xerez R, et al. Seasonality and relative abundance of tabanids (*Diptera, Tabanidae*) on Marambaia Island, Rio de Janeiro, Brazil. *EntomoBrasilis*, 2017;10(2):82–88.
21. Guimaraes RR, Júnior RRG, Rodrigues HRS, Guimarães RR, Carvalho RW. First record of *Leptus* sp. (Latreille) (Acari: Erythraeidae) parasitizing horse fly (*Diptera: Tabanidae*) from Marambaia Island, Mangaratiba, Rio de Janeiro, Brazil. *EntomoBrasilis*, 2019;12(1):31–34.
22. Halder S, Parui P, Chandra K, Banerjee D. *Diptera* fauna of Achanakmar WLS, Chhattisgarh. In: Fauna of Achanakmar Tiger Reserve, Chhattisgarh. *Zoological Survey of India*, 2019, 256–277.
23. Jezek J, Obona J, Wamiti W, Njoroge N. Upswing of collections of horse flies (*Diptera, Tabanidae*) held at the National Museums of Kenya, Nairobi. *Acta Musei Silesiae, Scientiae Naturales*, 2017;66:53–63.
24. Joseph-Marie AO, Lendzele SS, Roland ZKC, Franck M, Aubin KA, Mints R, et al. Species composition and diurnal activity rhythm of tabanids (*Diptera: Tabanidae*) at the Ivindo National Park and its environs. *Asian Journal of Science and Research*, 2019;2(2):1–7.
25. Kapoor VC, Grewal JS, Sharma SK, Gupta SK. Taxonomic Studies of Indian tabanids (*Diptera: Tabanidae*): final report of the work done in the PL-480 Research Project no. FG-IN-684 (IN-AES-328). Ludhiana, India: Department of Zoology, Punjab Agricultural University, 1990, 232.
26. Koller WW, Barros ATM, Teodoro PE. Diversity and population dynamic of *Tabanidae* (Insecta: *Diptera*) in the Cerrado-Pantanal Ecotone. *Bioscience Journal*, 2019;35(5):1390–1398.
27. Mukherjee K, Naskar A, Banerjee D. First record of *Tabanus dorsiger* Wiedemann, 1821 (Insecta: *Diptera: Tabanidae*) from Andaman and Nicobar Islands. 2023.

28. Krcmar S. Seasonal abundance of horse flies (*Diptera: Tabanidae*) from two locations in eastern Croatia. *Journal of Vector Ecology*, 2005;30(2):316–321.
29. Krüger RF, Krolow TK. Diversity and distribution of horse flies (*Diptera: Tabanidae*) and their medical and veterinary importance. *Journal of Insect Science*, 2015;15(1):147.
30. Lucas M, Krolow TK, Riet-Correa F, Barros ATM, Kruger RF, Saravia A, *et al.* Diversity and seasonality of horse flies (*Diptera: Tabanidae*) in Uruguay. *Scientific Reports*, 2020;10:401–409.
31. Maity A, Naskar A, Mukhopadhyay E, Hazra S, Sengupta J, Ghosh S, *et al.* Taxonomic studies on *Tabanidae* (Insecta: *Diptera*) from Himachal Pradesh, India. *International Journal of Fauna and Biological Studies*, 2015;2(4):43–52.
32. Maity A, Naskar A, Hazra S, Sengupta J, Parui P, Banerjee D. Taxonomic mapping of *Tabanidae* (*Diptera: Tabanidae*) from Darjeeling Himalaya, a part of Indo-Burmese biodiversity hotspot. *Oriental Insects*, 2016;51(1):11–45.
33. Maity A, Naskar A, Sengupta J, Hazra S, Parui P, Home Chaudhuri S, *et al.* An annotated checklist of horse flies (*Diptera: Tabanidae*) from India with remarks on surra disease vectors. *Journal of Zoology*, 2016;3(4):53–84.
34. Maity A, Naskar A, Hazra S, Sengupta J, Parui P, Home Chaudhuri S, *et al.* New distributional records of *Tabanidae* (Insecta: *Diptera*) from different geo-climatic regions of West Bengal, India. *Journal of Entomology and Zoology Studies*, 2016;4(4):1291–1298.
35. Maity A, Naskar A, Hazra S, Sengupta J, Parui P, Homechaudhuri S, *et al.* Taxonomic notes on *Tabanidae* (Insecta: *Diptera*) of Sundarban biosphere reserve and associated Mangrove ecosystem of coastal region of West Bengal, India. *Journal of Advanced Zoology*, 2016;37(2):96–113.
36. Maity A, Naskar A, Hazra S, Sengupta J, Banerjee D, Parui P. Tabanid fauna (*Diptera: Tabanidae*) along the lower most Gangetic plains of India: A taxonomic approach. *Indian Journal of Entomology*, 2017;79(3):354–375.
37. Maity A, Naskar A, Hazra S, Sengupta J, Parui P, Homechaudhuri S, *et al.* Taxonomic accounts of horse flies (*Diptera: Tabanidae*) from arid zone, part of Chotanagpur Plateau, West Bengal. *Munis Entomology & Zoology*, 2017;12(2):419–429.
38. Maity A, Naskar A, Homechaudhuri S, Banerjee D. Taxonomic accounts of horse flies (Insecta: *Diptera: Tabanidae*) of West Bengal. *Records of the Zoological Survey of India*, 2017;381:1–112.
39. Maity A, Naskar A, Home Chaudhuri S, Banerjee D. Taxonomic accounts with notes on spatial diversity and relative abundance pattern of horseflies (*Diptera: Tabanidae*) from Sonamukhi Protected Forest Area of West Bengal, India. *Munis Entomology & Zoology*, 2020;15(1):200–225.
40. Metri RB, Puttalakshamma GC, Dhanalakshmi H, David KJ, Venkatesan T, Anand KJ, *et al.* Seasonal abundance of horseflies (*Diptera: Tabanidae*) in the Western Ghats of Karnataka. *Journal of Entomology and Zoology Studies*, 2020;8(3):983–990.
41. Metri RB, Puttalakshamma GC, David KJ, Jaya NL, Dhanalakshmi H. Taxonomic notes on *Tabanidae* from south India with special reference to Western Ghats. *Journal of Entomology and Zoology Studies*, 2020;8(5):2013–2030.
42. Metri RB, Puttalakshamma GC, Jaya NL, D'Souza PE, Satyanarayana ML. Species composition, meteorological and zoogeographical aspects of the horse fly fauna (*Diptera: Tabanidae*) in the Western Ghats, Karnataka, India. *International Journal of Current Microbiology and Applied Sciences*, 2020;9(7):2636–2649.
43. Metri RB. Morphological and Molecular Identification of Tabanids in Western Ghats of Karnataka and Evaluation of Fly Traps. PhD thesis, submitted to KVAFSU, Bidar, 2021.
44. Mitra B, Sharma RM. Check list of Indian horse and deer flies (Insecta: *Diptera: Tabanidae*). 2009:1–11.
45. Chowdhury M, Mondal S, Das M, Saha SK, Banerjee D, Naskar A, *et al.* Tabanid fauna (Insecta: *Diptera*) of Manipur, an Indo-Burma biodiversity hotspot in India with three new state records. *Records of the Zoological Survey of India*, 2024;124(4):345–352.
46. Mukherjee K, Naskar A, Banerjee D. First record of *Tabanus dorsiger* Wiedemann, 1821 (Insecta: *Diptera: Tabanidae*) from Andaman and Nicobar Islands, India. *Records of the Zoological Survey of India*, 2023;123(2S):145–150.
47. Mullens BA. Horse flies and deer flies (*Tabanidae*). In: *Medical and Veterinary Entomology*. 3rd ed. Academic Press, 2019, 327–343.
48. Muller GC, Revay EE, Hogsette JA, Zeegers T, Kline D. An annotated checklist of the horse flies (*Diptera: Tabanidae*) of the Sinai Peninsula Egypt with remarks on ecology and zoogeography. *Acta Tropica*, 2012;122:205–211.
49. Narladkar BW, Patil VG. Observation on breeding sites and seasonal dynamics of *Tabanus rufrostris* in Marathwada region. *Journal of Veterinary Parasitology*, 2012;26(2):134–136.
50. Parra G, Alarcon E, Lopez G. Ecology and parasitological analysis of horse flies (*Diptera: Tabanidae*) in Antioquia, Colombia. *Caldasia*, 2008;30:179–188.
51. Phasuk J, Tharawoot T, Beaver RA, Jittapalapong S. Seasonal abundance of *Tabanidae* (*Diptera*) on dairy farms in Saraburi Province, Thailand. *Thai Journal of Agricultural Science*, 2011;44(3):175–181.
52. Phetcharat Y, Wongtawan T, Fungwithaya P, Amendt J, Sontigun N. Species diversity and seasonal abundance of stomoxynae (*Diptera: Muscidae*) and tabanid flies (*Diptera: Tabanidae*) on a beef cattle and a buffalo farm in Nakhon Si Thammarat Province, Southern Thailand. *Insects*, 2024;15:818.
53. Philip CB. A new era in ideas of systematic relationships of world *Tabanidae* (*Diptera*) inaugurated by Mackerras and its impact on nomenclature of horse flies of Western Hemisphere. *Annals of the Entomological Society of America*, 1957;50:550–555.
54. Philip CB. Further notes on far eastern *Tabanidae* with descriptions of five new species. *Pacific Insects*, 1961;3(4):473–479.
55. Philip CB. Further notes on far eastern *Tabanidae* III. Records and new species of *Haematopota* and a new

- Chrysops* from Malaysia. Pacific Insects, 1963;5(3):519–534.
56. Philip CB. A new *Tabanus* from south India (*Diptera: Tabanidae*). Entomologica Scandinavica, 1972;3:159–160.
 57. Philip CB. Further notes on far eastern *Tabanidae* (*Diptera*) VI. New and little-known species from the Orient and additional records, particularly from Malaysia. Pacific Insects, 1979;21(2–3):179–202.
 58. Prajapati RC. Biodiversity of Karnataka at a glance. Karnataka Biodiversity Board. Annual Bulletin, 2010, 1–73.
 59. Qiu HY, Lv QB, Wang CR, Ju H, Luo CF, Liu SS, *et al.* Microbiota profile in organs of the horseflies (*Diptera: Tabanidae*) in Northeastern China. Frontiers in Microbiology, 2024;15:1467875.
 60. Rao D, Pragada P, Kumar O. Plant biodiversity and phytosociological studies on tree species diversity of Khammam district, Telangana state, India. Journal of Pharmaceutical Sciences and Research, 2015;7:518–522.
 61. Ricardo G. A revision of the species of *Tabanus* from the oriental region, including notes on species from surrounding countries. Records of the Indian Museum, 1911;4:111–255.
 62. Sasaki H. Comparison of capturing tabanid flies (*Diptera: Tabanidae*) by five different color traps in the fields. Applied Entomology and Zoology, 2001;36(4):515–519.
 63. Sevidzem SL, Koumba AA, Yao-Acapovi GL, Mavoungou JF. A nationwide survey of the tabanid fauna of Cameroon. Parasites & Vectors, 2021;14:392.
 64. Stone A, Philip CB. The oriental species of the tribe Haematopotini (*Diptera: Tabanidae*). USDA Technical Bulletin, 1974;1489:1–240.
 65. Suh SJ, Kim HC, Chong ST, Kim MS, Klein TA. Seasonal abundance of deer and horse flies (*Diptera: Tabanidae*) in the northern part of Gyeonggi-do, Republic of Korea. Korean Journal of Parasitology, 2015;53(3):307–314.
 66. Varapu V, Hanumantha Rao V, Vaidyula, Vasudeva Rao, Railla, Sravan, *et al.* Biodiversity in Telangana. 2015.
 67. Chandra K, Raghunathan C, Jadhav S, Karuthapandi M. Current Status of Faunal Diversity in Telangana. 2021.
 68. Vasudeva SP. Studies on the ecology and population dynamics of a few species of *Tabanidae*. M.Sc. Thesis, submitted to University of Mysore Manasagangotri, Mysore, 2007.
 69. Vasudeva P, Hegde H, Veer V. Tabanid flies (*Diptera: Tabanidae*) of Rajiv Gandhi National Park, Karnataka, India. Journal of Entomological Research Society, 2007;9(1):53–62.
 70. Veer V. *Tabanidae* flies (*Diptera*) from the Indian sub-region. Annals of Forest, 2004;12(2):301–447.
 71. Veer V, Parashar BD, Rao KM. Notes on *Tabanidae* (*Diptera*) that are surra vectors or pestiferous with description of a new species of *Tabanus* from India. Oriental Insects, 1999;33:247–266.