https://doi.org/10.17576/serangga-2023-2803-07

AN UPDATED CHECKLIST OF THE HORSE FLIES (DIPTERA: TABANIDAE) FROM MALAYSIA WITH A NEW SPECIES AND FOUR NEW RECORDS

Hazem Al-Talafha[1*], Salmah Yaakop[2], Idris Abd Ghani[2] & Abdulrahim Aljamal[1]
[1]Department of Biological Sciences,
Faculty of Science Al al-Bayt University
130040 Al-Mafraq, Jordan.
[2]Centre for Insect Systematics,
Faculty of Science and Technology
Universiti Kebangsaan Malaysia (UKM),
43600 Bangi, Selangor, Malaysia
[*]Corresponding author: *hazt@aabu.edu.jo*

Received: 27 April 2023; Accepted: 10 September 2023

ABSTRACT

Tabanidae fauna of Malaysia consists of 116 species belonging to eight genera. The current studyadds one new species and four new records. *Tabanus atroflavus* sp. nov., was described and the main morphological characteristics were illustrated. The new records were listed, namely *Haematopota cilipes* Bigot; *Tabanus atristylatus* Burger; *Tabanus inflatipalpis* SchuurmansStekhoven; and *Tabanus tonglai* Surcouf. A checklist of Malaysian tabanids was provided based on the available scientific literature and material examined.

Keywords: *Tabanus*, Surra, *Trypanosoma evansi*, Oriental, *Tabanus atroflavus*

ABSTRAK

Fauna Tabanidae di Malaysia terdiri daripada 116 spesies di dalam lapan genus. Kajian terkini telah menambahkan satu spesies baru dan empat rekod baru. *Tabanus atroflavus* sp. nov., telah diperihalkan dan morfologi utama telah diilustrasi. Rekod baru telah disenaraikan, iaitu *Haematopota cilipes* Bigot; *Tabanus atristylatus* Burger; *Tabanus inflatipalpis* Schuurmans Stekhoven; dan *Tabanus tonglai* Surcouf. Senarai semak tabanid Malaysia disediakan berdasarkan kajian kepustakaan yang ada dan spesimen yang diperiksa.

Kata kunci: *Tabanus*, Surra, *Trypanosoma evansi*, Oriental, *Tabanus atroflavus*

INTRODUCTION

Surra is a major animal disease affects a wide range of domestic and wild animals, including cattle,buffaloes, camelids, equines, sheep, goats, pigs, dogs, deer, gazelles, and elephants (Ereqat et al. 2020; Veer et al. 2002). The disease caused by the protozoan parasite *Trypanosoma evansi* (Desquesnes et al. 2013; Foil 1989). The parasite mechanically

transmitted by several species of the family Tabanidae (Krinsky 1976; Veer & Parashar 2008). In this context, the identification of the Tabanidae fauna is very important for gathering biological information about vectors of surra disease.

Surra disease was reported in Malaysia. It was recorded for the first time in 1903 in Australian mare in Klange, and during the next five years several outbreaks were recorded (Fraser et al. 1908). An outbreak of the disease had occurred in the Equine Unit in the Universiti Pertanian Malaysia, Serdang, Selangor (Ng & Vanselow 1978). Moreover, outbreaks of infection with *T. evansi* were recorded in buffaloes and cattle herds in institutional farms (Adrian et al. 2010). Similarly, *T. evansi* was observed in captive Asian rhinoceros, *Dicerorhinus sumatrensis sumatrensis* (Khan etal. 2004). Nurulaini et al. (2007) reported a 27% mortality rate in Java deer (*Cervus timorensis*) due to surra disease in Perak state.

Recently, investigations in Peninsular Malaysia found that the seroprevalence and molecular prevalence of *T. evansi* in horses were, respectively, 13.90% and 1.14% (Elshafie et al. 2013 a; 2013b). The most recent studies reported the occurrence of *evansi* in a Siam B Mare in Kelantan (Mohd Rajdi et al. 2021).

The previous reports emphasize the importance of identifying the Tabanidae fauna as a basis for studying the biology of surra disease vectors and for establishing preventive measures to control the disease. The Tabanidae fauna of Malaysia was treated as a part of other Oriental studies. Ricardo (1911a, 1911b) revised the Oriental genera and recorded 31 species of tabanids from Malaysia with 22 species of the genus *Tabanus* Linnaeus, three species of the genus *Haematopota* Meigen,and six species of the genus *Chrysops* Meigen. Schuurmans Stekhoven (1926) described 25 species from the Federated Malay States. Philip (1960, 1961, 1962, 1963) prepared several taxonomic reports for Malaya, Borneo and Thailand, and reported 90 species in seven genera for the fauna of Malaysia. Moreover, Philip (1979) recorded *Olsufjevotabanus* as a new genus for Malaysian fauna.

Stone and Philip (1974) had the opportunity to revise the Oriental tribe Haematopotini after they got an access to large quantities of specimens from different depositories. They found that the tribeHaematopotini includes two genera; *Hippocentrodes* (2 species) and *Haematopota* (160 species).The authors, in their bulletin, recorded 14 species from Malaysia and Singapore and 15 from Borneo. On the other hand, Burger and Chainey (2000) revised the Oriental and Australian speciesof the genus *Chrysops* and they recorded 10 species from Malaysia.

Recently, two new species and 11 new records were added for Malaysian fauna. (Al-Talafha et al. 2018a, 2018b; Idris et al. 2016). The present study aims to provide an updated checklist based on the material examined and the scientific literature available. The checklist is of mandatory importance since several species of Tabanidae have recently been recorded, and many changed their status.

MATERIALS AND METHODS

Collection of Specimens

The collection of Centre for Insect Systematics (CIS) at Universiti Kebangsaan Malaysia (UKM) was examined. To confirm identification of the specimens, the holotypes of species were loaned from insect repositories, in addition to consulting the professional photos available from online databases of British Museum of Natural History (BMNH); Bishop Museum Honolulu, Hawaii (BPBM), National Museum of Natural History-USA (NMNH), Field

Museum of Natural History-Chicago (FMNH), National Museum of Natural History-France (NMNH) Zoological Collection-Lund University Sweden.

Species Identification
The specimens were identified using publications of Ricardo (1911a, 1911b), Schuurmans Stekhoven (1926), Philip (1960a, 1960b) and Burton (1978). The specimens were examined using a Stemi D4 stereomicroscope.

Species Illustration and Description
Terminology followed McAlpine et al. (1989). Illustrations were prepared for the main morphological characteristics of the new species. The holotype of the new species and other identified specimens were deposited in the CIS. The checklist was prepared by surveying and checking the available published literature.

RESULTS

Taxonomy Account
The current report added one new species (*Tabanus atroflavus*) and four new records to the family Tabanidae in Malaysia (*Haematopota cilipes*; *Tabanus atristylatus; Tabanus inflatipalpis*; and *Tabanus tonglai*).

Haematopota cilipes Bigot 1890 (Figure 1)
Haematopota cilipes, 1890, Nouvelles annales du Muséum d'histoire naturelle (3) 2: 205.
Chrysozona cilipes, 1960, Studies from the Institute for Medical Research Federation of Malaya29: 75.

Distribution. Burma, Cambodia, India (Assam), Laos, Thailand (Stone & Philip 1974).

Materials examined. Kedah 3♀♀: Kota Setar, Kota Sarang Semut, 23. VIII. 2016, 3♀♀; Perlis2♀♀: Wang Kelian, Taman Negeri Perlis, 29. IX - 4. X. 1999, 2♀♀.

Diagnosis. Frons width almost equal to height (Figure 1A). Upper parafacial with broken black spot. Palpus quit thin (Figure 1B). Scape long and slender (Figure 1C). Subapical band complete, strong (Figure 1D). Scutellum white, posteriorly dark. Hind tibiae swollen with thick long white hair, hind femur with dense tuft of longhair above and fringe of long hair at the ventral surface. Tergites 2–7 with clear pale apical borders (Figure 1E).

Remarks. *Haematopota cilipes* is a close relative of *H. scanloni* Stone & Philip but shows some differences. It differs from *scanloni* by having longer antenna, scutellum with a broad white band,and tergites with pale apical margins. Specimens of *H. cilipes* from Malaysia are in accordance with the species description of Stone and Philip (1974). However, the examined materials did notclearly show a midfrontal spot.

Figure 1. *Haematopota cilipis*; A, Frons (anterior view); B, Maxillary palpus (lateral view); C, Antenna (lateral view); D, Wing; E, Abdomen (dorsal view)

Tabanus atristylatus Burger 1988 (Figure 2)
Tabanus atristylatus, 1988, The Pan-Pacific Entomologist 64(2): 163.

Distribution. Indonesia (Burger 1988b); Malaysia (current report).

Materials examined. Sabah 14 ♀♀: Kota Belud, Sayap, 948-956m, 19. III. 2005, 5 ♀♀; Ranau, Poring, Poring Hot Spring, 1884-1906m, 20. III. 2005, 6 ♀♀; Tambunan, Mahua, 1075m, 16. III.2005, 3 ♀♀.

Diagnosis. Relatively large species with brown body. Frons narrow, callus triangular with linear dorsal extension (Figure 2A). Flagellum with strong dorsal tooth (Figure 2B). Apical palpomere nearly slender (Figure 2C). Tergites 2–5 with median pale, yellow haired triangles, without pale apical bands (Figure 2D).

Remarks. *Tabanus atristylatus* is related to *Tabanus immanis-fumifer* group and is very close to *T. angustitriangularis* Schuurmans Stekhoven. *T. atristylatus* can be distinguished from *T. angustitriangularis* as follows: (1) *T. atristylatus* (16–18 mm) is larger than *T. angustitriangularis*(14–15 mm). (2) *T. atristylatus* has unclearly striped thorax, scutum with faint three brown stripes anteriorly. Thorax of *T. angustitriangularis* bears three visible longitudinal red brown stripes. (3) *T. atristylatus* has small median triangles on abdomen; the lateral borders of tergites are whitish gray haired. Triangles of *T. angustitriangularis* are elongated and narrow; the lateral borders of tergites are black haired. Specimens Identified in this report agree well with the description of typespecimen by Burger (1988b). The examined specimens have frontoclypeus with gray tomentum. The notopleural lobe grayish red and the last two femora pairs are dark brown.

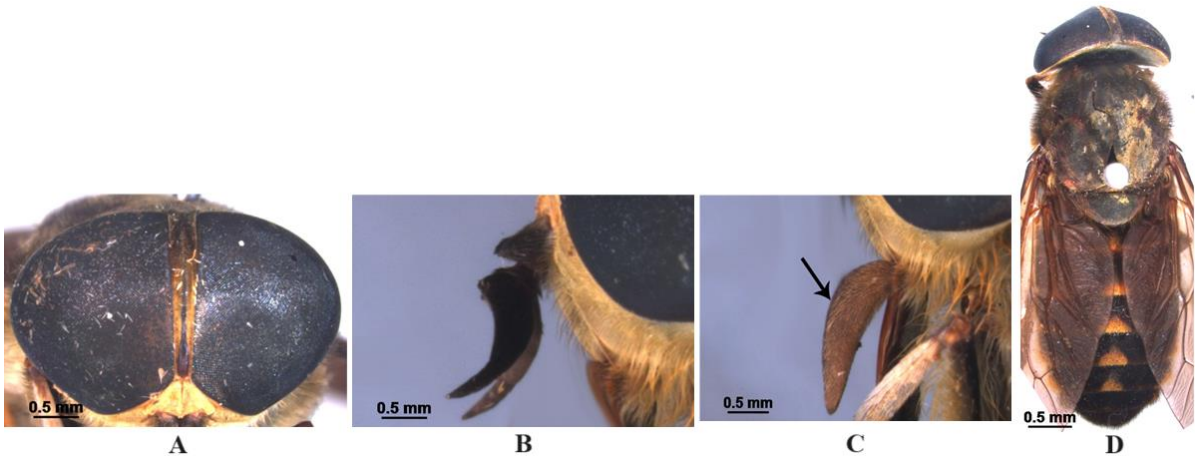

Figure 2. *Tabanus atristylatus*; A, Frons (anterior view); B, Antenna (lateral view); C, Maxillary palpus (lateral view); D, Abdomen (dorsal view)

Tabanus atroflavus sp. nov. (Figure 3 & 4)

Distribution. Malaysia (Peninsular Malaysia).

Materials examined. Holotype ♀: Pahang, Taman Negara, Merapoh, 12–17. VIII. 1999.

Diagnosis. Relatively large species (21 mm) with bicolored abdomen, the four apical segmentsyellow orange and the basal three black, frons narrow, callus elongated triangle with dorsalextension.

Description

Head. Frons narrow (Index: 1:8.3), gray tomentose, upper half darker with black hair (Figure 3 & 4A). Callus reddish brown with nearly thin equilateral triangle shape, tapering into a long linear extension, separated from eye margins (Figure 3 & 4A). Subcallus cleaved in the middle, brownish gray dusted; parafacial brownish tomentose, gena grayish white tomentose with fine and scattered blackhair; beard black. Maxillary palpi black, black haired; apical palpomere elongated and nearly cylindrical, not stout at base (Figure 3 & 4B). Antennae: scape dark brown, black haired, upper corner with cap-like projection; pedicel black fringed with apical spur; basal flagellomere black with distinct dorso-basal projection, 1.7 times as long as widest part, 1.6 times as long as apical flagellomeres (Figure 3 & 4C).

Thorax. Scutum, scutellum with dense black hair, scutellum with two small tufts of yellow hair posterolaterally; notopleural lobe dark gray with black hair. Pleura olive green, black haired, tuft of anepisternum, katepisternum and katatergite black. Legs black, black haired, depending on viewing angle hind femur appears red brown, tarsi black. Wing clear with very weak shadow apically, r5 open, no spur vein. Halter with yellowish white knob and dark stem.

Abdomen. Bicolored, basal three tergites black with thick black hair, the remaining apical tergitesorange yellow with yellow hair; yellow coloration of the 4th segment elevate to reach the posteriormargin of the previous segment, leaving black corners on both sides (Figure 3 & 4D). Lateral border of abdominal tergites as following: 1 black, black haired; 2–3 yellow with black hair, 4–7 yellow with yellow hair. Sternites 1–2 black, black haired; sternites 3–7 yellow, golden yellow haired.

Etymology. The name was derived from the Latin words flavus (= yellow) and ater (=dull black),to indicate the coloration of the abdomen.

Remarks. Schuurmans Stekhoven (1926) assigned group VI to species with a bicolor abdomen. This group includes three species with whitish to rusty brown basal segments and dark brown or black apical segments. However, *Tabanus atroflavus* sp. nov. is distinguished from all other known species in group VI by the abdomen, with the first three segments black, and the last four yellow.

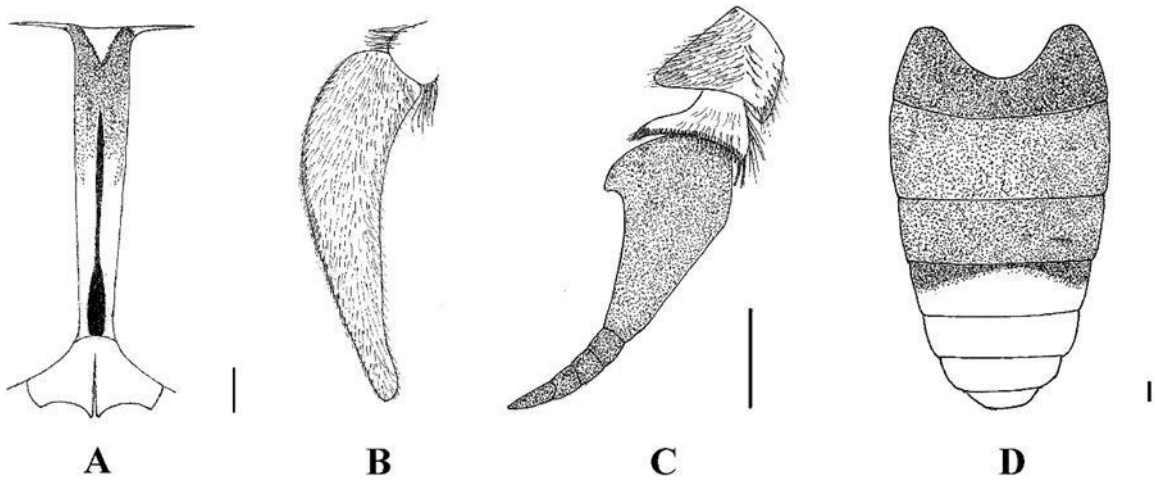

Figure 3. Main taxonomical features of *Tabanus atroflavus* sp. nov. A, frons; B, palpus; C, antenna; D, abdomen. (Scale bar = 0.5 mm)

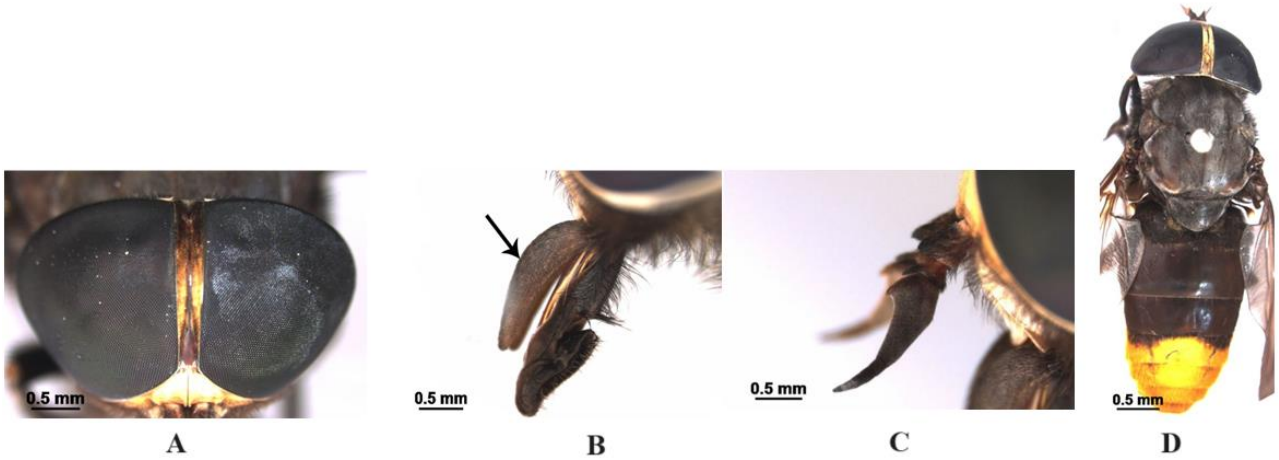

Figure 4. *Tabanus atroflavus* sp. nov. A, Frons (anterior view); B, Maxillary palpus (lateral view); C, Antenna (lateral view); D, Abdomen (dorsal view)

Tabanus inflatipalpis Schuurmans Stekhoven 1926
Tabanus inflatipalpis, 1926, Treubia, 6 (supplement): 300.

Distribution. Sri Lanka (Schuurmans Stekhoven, 1926); Malaysia (current paper).

Materials examined. Kelantan 15♀♀: Pasir Puteh, HutanSimpan Kekal Lembah, 4–11. X.

2001,15♀♀; Negeri Sembilan 3♀♀, Simpang Pertang, Pasoh Forest Reserve, 22–29. III. 2002, 3♀♀; Pahang 5♀♀: Bentong, Genting, 22–28. V. 2003, 2♀♀; Temerloh, Kuala Lompat, 31. X. 2000, 3♀♀; Selangor 4♀♀: Hulu Langat, Bangi, 11–19. VII. 2001, 4♀♀; Terengganu 7♀♀: Hulu Terengganu, Kenyir Sungai Cacing, 22–26. III. 2001, 7♀♀.

Diagnosis. Frons with oval callus and narrow lanceolate dorsal extension. Thorax olive gray, yellow haired; wings hyaline. Abdomen brown, darker to apex, mainly black haired, apical borderspale with orange hair, lateral border of tergites yellowish brown, black haired.

Remarks. Schuurmans Stekhoven (1926) described *Tabanus inflatipalpis* from a female that wasidentified as *T. fuscicauda* Bigot by Ricardo (1911a). This female was considered a close relative to *T. fuscicauda*, according to a note on 14.XI.1922 by Austen. Schuurmans Stekhoven (1926) separated *T. inflatipalpis* from *T. fuscicauda* as follows: (1) The parafacial of *T. inflatipalpis* is yellow with black hair and the beard brownish yellow. The parafacial of *T. fuscicauda* is grayish white with white hair and the beard white. (2) The abdomen of *T. inflatipalpis* is black-brown, theapical margins and lateral borders of tergites are yellow haired, and the second tergite has no blackspot at the middle. In *T. fuscicauda*, the abdomen is yellow-brown becomes darker caudally, the dorsum is uniformly black haired with a black spot on the second tergite.

Tabanus tonglai Surcouf 1921
Tabanus tong-Lai Surcouf, 1921, Bulletin de la Société entomologique de France 1922 (1): 13.
Tabanus insidiator Austen, 1922, Bulletin of Entomological Research12(4): 437-440.

Distribution. Laos, Thailand (Burton 1978).

Materials examined. Kelantan 5♀♀: Kuala Krai, Stong Forest Reserve, 24–28. V. 2003, 5♀♀; Pahang 11♀♀: Lipis, Merapoh, 19–25. VIII. 2001, 1♀; Lipis, Merapoh, 8–15. IV. 2002, 10♀♀; Perak 2♀♀: Sungkai, 1–7. IX. 2015, 2♀♀; Sabah 4♀♀, Kota Belud, Sayap, 948–956m, 19. III. 2005, 1♀; Ranau, Poring, Poring Hot Spring, 8. IX. 2011, 3♀♀.

Diagnosis. Frons narrow with two calli; upper callus oval, connected with lower rectangular callusby linear connection at the middle. Subcallus bare, shiny blackish brown. Tergites 3–4 with apicalbands of grayish tomentum and yellowish-white hair, elevated at the middle.

Remarks. The specimens of *T. tonglai* from Malaysia show high agreement with the descriptionof *T. tonglai* from Thailand. However, Malaysian *T. tonglai* has gray parafacial area with yellowishwhite hair and the scape of antenna completely black haired (no pale hairs). In addition, examinedspecimens did not show jagged basal callus as appeared in some specimens from Thailand.

Species Checklist
A species list of Malaysian Tabanidae is presented (Table 1). The checklist is thought to be complete that offers remarks on the newly recorded species. However, more species are expectedto occur in Malaysia and waiting to be added to update the current checklist. The current list contains a clear species account comparing with the older literature.

Table 1. Checklist of recorded Tabanidae species from Malaysia. The species are arranged alphabetically and their distribution in the states indicated. States are marked as follows: 0= no specific locality, 1= Johor, 2= Kedah, 3=Kelantan, 4= Malacca, 5= Negri Sembelan

Family Tabanidae From Malaysia					
Subfamily	**Tribe**	**Genus**	**Species**	**Distribution**	**References**
Pangoniinae	Pangoniini	*Mesopangonius*	*Mesopangonius brackleyae* Burger 1988	10	Burger 1988a.
			Mesopangonius philipi Burger 1988	6, 10.	Philip 1960b; Burger 1988a
Chrysopsinae	Bouvieromyiini	*Gressittia*	*Gressittia aterrima* (Schuurmans Stekhoven 1926)	5, 6.	Schuurmans Stekhoven 1926; Philip & Mackerras 1959; Philip 1960b.
			Gressittia fusca (Schuurmans Stekhoven 1926)	12	Schuurmans Stekhoven 1926; Philip & Mackerras 1959; Philip 1960b
			Gressittia media Philip & Mackerras 1959	12	Philip & Mackerras 1959; Philip 1960b.
	Rhinomyzini	*Rhinomyza*	*Rhinomyza cincta* Philip 1960	12	Philip 1960 a, b
			Rhinomyza oculata Philip & Mackerras 1959	10	Philip & Mackerras 1959
	Chrysopsini	*Chrysops*	*Chrysops alter* Rondani 1875	11	Rondani 1875; Schuurmans Stekhoven 1926; Philip 1960b; Burger & Chainey 2000.
			Chrysops cinctus Bigot 1892	10	Bigot 1892; Schuurmans Stekhoven 1926; Philip 1960b; Burger & Chainey 2000.
			Chrysops dispar (Fabricius 1798)	2, 4, 5, 6, 8, 9, 10, 11, 12.	Fabricius 1798; Schuurmans Stekhoven 1926; Philip 1959, 1960b, 1979; Datta 1985, 1998; Burger & Chainey 2000; Ilango 2009.
			Chrysops fasciatus Wiedemann 1821	8, 11, 12, 13.	Wiedemann 1821; Schuurmans Stekhoven 1926; Philip 1959, 1960b, 1979; Datta 1985; Burger & Chainey 2000.
			Chrysops fixissimus Walker 1857	6, 11, 12.	Walker 1857; Schuurmans Stekhoven 1926; Philip 1959, 1960b; Datta 1985; Burger & Chainey 2000.
			Chrysops flaviventris Macquart 1846	2	Macquart 1846; Schuurmans Stekhoven 1926; Philip 1960b, 1979; Datta 1985; Burger & Chainey 2000.
			Chrysops flavocinctus Ricardo 1902	6, 8, 10, 12.	Ricardo 1902; Schuurmans Stekhoven 1926; Philip 1960b; Datta 1985; Burger & Chainey 2000.
			Chrysops fuscomarginalis Burger & Chainey 2000	5, 10, 11, 12.	Burger & Chainey 2000
			Chrysops idlani Al-Talafha et al. 2018	6, 8.	Al-Talafha et al. 2018
			Chrysops incisuralis Philip 1979	5	Philip 1979; Burger & Chainey 2000.
			Chrysops translucens Macquart 1838	5, 10, 12.	Macquart 1838; Schuurmans Stekhoven 1926; Philip 1960b; Burger 1988b; Burger & Chainey 2000.
Tabaninae	Diachlorini	*Cydistomyia*	*Cydistomyia delicata* Philip 1980.	11	Philip 1980
	Haematopotini	*Haematopota*	*Haematopota achlys* Stone & Philip 1974	11	Stone & Philip 1974; Philip 1980.
			Haematopota albiocrea Stone & Philip 1974	3, 6, 8, 12.	Stone & Philip 1974
			Haematopota atomaria Walker 1856	10, 11.	Walker 1856; Ricardo 1906; Philip 1960b; Stone & Philip 1974.
			Haematopota bizonata Schuurmans Stekhoven 1932	10	Schuurmans Stekhoven 1932; Philip 1960b, 1963; Stone & Philip 1974.
			Haematopota cilipes Bigot 1890	2, 9.	Bigot 1890; Stone & Philip 1974
			Haematopota cingulata Wiedemann 1828	10	Wiedemann 1828; Bigot 1891; Ricardo 1906, 1911b; Meijere 1911; Schuurmans Stekhoven 1926, 1928; Philip 1960a, b, 1963.
			Haematopota clarkeana Stone & Philip 1974	11	Stone & Philip 1974.
			Haematopota gressitti Philip 1963	10	Philip 1963; Stone & Philip 1974.
			Haematopota irregularis Schuurmans Stekhoven 1926	10, 11.	Schuurmans Stekhoven 1926; Philip 1960b; Stone & Philip 1974.
			Haematopota irrorata Macquart 1838	2, 5, 6, 10, 12.	Macquart 1838; Ricardo 1911b; Schuurmans Stekhoven 1926, 1928, 1932; Philip 1960b, 1963; Stone & Philip 1974.
			Haematopota javana Wiedemann 1821 (= Haematopota iavana)	5, 8, 12.	Wiedemann 1821; Schuurmans Stekhoven 1926; Philip 1960b, 1963; Stone & Philip 1974; Datta 1985; Ilango 2009.
			Haematopota lunulata (Macquart 1848)	2, 5, 6, 10, 12.	Macquart 1848; Schuurmans Stekhoven 1926, 1928, 1932; Philip 1960b; Stone & Philip 1974; Ilango 2009.
			Haematopota malayensis Ricardo 1916	10, 12.	Ricardo 1916; Schuurmans Stekhoven 1926; Philip 1960b; Stone & Philip 1974.

		Haematopota pachycera Bigot 1890	0	Bigot, 1890; Austen 1922; Schuurmans Stekhoven 1926; Philip 1960b; Stone & Philip 1974.
		Haematopota pendleburyi Stone & Philip 1974.	10	Stone & Philip 1974; Burger 1988b
		Haematopota quadrifenestrata Burger 1988	10	Burger 1988b
		Haematopota rubida Ricardo 1906	0	Ricardo 1906; Ricardo 1911b; Schuurmans Stekhoven 1926; Senior-White 1927; Philip 1960b; Stone & Philip 1974.
		Haematopota splendens Schuurmans Stekhoven 1926	3, 5, 6, 8, 12, 13.	Schuurmans Stekhoven 1926; Philip 1960b, 1963; Stone & Philip 1974.
		Haematopota tenasserimi Szilády 1926	5	Szilády 1926; Philip 1960b, 1963; Stone & Philip 1974.
		Haematopota tiomanensis Stone & Philip 1974	6	Stone & Philip 1974
		Haematopota varifrons Stone & Philip 1974	9	Stone & Philip 1974
Tabanini	*Olsufievotabanus*	*Olsufievotabanus rarus* (Philip 1979)	6, 12, 13.	Ricardo 1911a; Philip 1960b; Philip 1979
	Tabanus	*Tabanus albitriangularis* Schuurmans Stekhoven 1926	6, 8, 10, 12, 13.	Schuurmans Stekhoven 1926; Philip 1960b
		Tabanus albiscutellus Philip 1969, new name for *T. albivittatus* Schuurmans Stekhoven 1926	8, 13.	Schuurmans Stekhoven 1926, 1928; Philip 1960b, 1969.
		Tabanus angustitriangularis Schuurmans Stekhoven 1926	8, 12.	Schuurmans Stekhoven 1926, 1932; Philip 1960b
		Tabanus atratoides Burger 1988	10	Burger 1988b
		Tabanus atristylatus Burger 1988	2, 10	current report
		Tabanus atroflavus sp. nov.	6	current report
		Tabanus atropilosus Burger 1988	10	Burger 1988b
		Tabanus audyi Philip 1960	13	Philip 1960a, b.
		Tabanus auricircus Philip 1979	3, 8, 10, 13.	Philip 1979; Idris et al. 2016.
		Tabanus aurilineatus Schuurmans Stekhoven 1926	2, 3.	Schuurmans Stekhoven 1926, 1928; Philip 1960b.
		Tabanus aurisparsus Schuurmans Stekhoven 1926	10	Schuurmans Stekhoven 1926, 1928; Philip 1960b.
		Tabanus biannularis Philip 1960, new name for *T. bicinctus* Ricardo 1911	6, 8, 12.	Ricardo 1911a; Schuurmans Stekhoven 1926; Philip 1960b, 1962, 1979; Datta 1985; Ilango 2009; Maity 2016.
		Tabanus birmanicus (Bigot 1892)	5, 6, 12.	Bigot 1892; Ricardo 1911a; Schuurmans Stekhoven 1926; Philip 1960b, 1979; Datta 1985.
		Tabanus borniensis Ricardo 1911	11	Ricardo 1911a; Schuurmans Stekhoven 1926; Philip 1960b.
		Tabanus ceylonicus Schiner 1868	5, 6, 8, 10, 11, 12, 13.	Schiner 1868; Ricardo 1917; Schuurmans Stekhoven 1926, 1928, 1932; Oldroyd 1949; Philip 1960b, 1979; Chvála & Lyneborg 1970; Datta 1985.
		Tabanus cinnamoneus Doleschall 1858	10	Doleschall 1858; Oldroyd 1949; Philip 1960b.
		Tabanus crassus Walker 1850	5	Walker 1850; Burton 1978; Datta 1985; Idris et al. 2016.
		Tabanus cylindricallosus Schuurmans Stekhoven 1926	11	Schuurmans Stekhoven 1926; Philip 1960b.
		Tabanus dissimilis Ricardo 1911	1, 4, 8, 5, 11, 12.	Ricardo 1911a; Schuurmans Stekhoven 1926, 1928; Philip 1960b.
		Tabanus effilatus Schuurmans Stekhoven 1926	4, 7, 8, 12.	Schuurmans Stekhoven 1926, 1928, 1932; Philip 1960b.
		Tabanus ekor Al-Talafha et al. 2018	6	Al-Talafha et al. 2018.
		Tabanus flavipilosus Schuurmans Stekhoven 1926	11	Schuurmans Stekhoven 1926; Philip 1960b.
		Tabanus flavohirtus Philip 1960	13	Philip 1960a.
		Tabanus flavothorax Ricardo 1911	1, 5, 8, 11, 12.	Ricardo 1911a; Schuurmans Stekhoven 1926; Philip 1960b.
		Tabanus fontinalis Schuurmans Stekhoven 1926	2, 5, 10, 12.	Schuurmans Stekhoven 1926; Philip 1960b; Burton 1978; Al-Talafha et al. 2018.
		Tabanus fulvissimus Rondani 1875	10, 12.	Rondani 1875; Schuurmans Stekhoven 1926; Philip 1960b.
		Tabanus fumifer Walker 1856	3, 5, 6, 8, 11, 12, 13.	Walker 1856; Kröber 1924; Schuurmans Stekhoven 1926, 1928, 1932; Philip 1960b.
		Tabanus fuscifrons Schuurmans Stekhoven 1926	3, 6, 12, 13.	Schuurmans Stekhoven 1926; Philip 1960b; Al-Talafha et al. 2018.
		Tabanus fusciventer Schuurmans Stekhoven 1926	8, 12.	Schuurmans Stekhoven 1926; Philip 1960b.
		Tabanus griseipalpis Schuurmans Stekhoven 1926	3, 5, 6, 8, 12, 13.	Schuurmans Stekhoven 1926, 1928, 1932; Philip 1960b, 1962.
		Tabanus hirtistriatus Ricardo 1911	5, 6, 8, 11, 13.	Ricardo 1911a; Schuurmans Stekhoven 1926, 1932; Philip 1960b.

Tabanus hybridus Wiedemann 1828	6, 8, 11, 12.	Wiedemann 1828; Schuurmans Stekhoven 1926, 1932; Philip 1960b; Datta 1985.
Tabanus ignobilis Rondani 1875	10, 11.	Rondani 1875; Ricardo 1911a; Schuurmans Stekhoven 1926; Philip 1960b.
Tabanus inflatipalpis Schuurmans Stekhoven 1926	3, 5, 6, 12, 13	current report
Tabanus immanis Wiedemann 1828	3, 6, 8, 12.	Wiedemann 1828; Ricardo 1911a; Schuurmans Stekhoven 1926, 1928, 1932; Philip 1959, 1960b.
Tabanus justorius Rondani 1875	11	Rondani 1875; Ricardo 1911a; Philip 1960b.
Tabanus Khasiensis Ricardo 1909	7	Ricardo 1909; Philip 1960b.
Tabanus latifascies Schuurmans Stekhoven 1926	6, 11.	Schuurmans Stekhoven 1926; Philip 1960b; Al-Talafha et al. 2018.
Tabanus lentisignatus Schuurmans Stekhoven 1926	3, 11.	Schuurmans Stekhoven 1926; Philip 1960b.
Tabanus leucocnematus (Bigot 1892)	10	Bigot 1892; Philip 1960b, 1979; Datta 1985; Ilango 2009; Maity 2016.
Tabanus macdonaldi Philip 1960	12	Philip 1960a, 1962.
Tabanus malayensis Ricardo 1911	2, 8, 10, 11, 12, 13.	Ricardo 1911a; Schuurmans Stekhoven 1926, 1928, 1932; Philip 1959, 1960b.
Tabanus megalops Walker 1854	1, 3, 4, 5, 6, 9, 12.	Walker 1854; Burton 1978; Al-Talafha et al. 2018.
Tabanus melanognathus (Bigot 1890)	6, 8.	Bigot 1890; Schuurmans Stekhoven 1926; Philip 1960b; Burton 1978; Datta 1985.
Tabanus mesogaeus Burton 1978	6, 8, 12.	Burton 1978; Idris et al. 2016.
Tabanus minimus Wulp 1881	5, 6, 8.	Wulp 1881; Szilády 1926; Schuurmans Stekhoven 1926, 1932; Philip 1960b; Burton 1978.
Tabanus nephodes (Bigot 1892)	2	Bigot 1892; Philip 1960b; Datta 1985.
Tabanus nexus Walker 1856	11	Walker 1856; Philip 1960b.
Tabanus nigrinus Szilády 1926	11	Szilády 1926; Philip 1960b.
Tabanus optatus Walker 1856	3, 6, 11, 12.	Walker 1856; Ricardo 1911a; Schuurmans Stekhoven 1926, 1928; Philip 1960b; Datta 1985.
Tabanus parabrunneus S chuurmans Stekhoven 1932	10	Schuurmans Stekhoven 1932; Philip 1960b; Burger 1988b.
Tabanus parallelifrons Schuurmans Stekhoven 1926	10	Schuurmans Stekhoven 1926; Philip 1960b; Burger 1988b.
Tabanus pauper Rondani 1875	11	Rondani 1875; Ricardo 1911a; Philip 1960b.
Tabanus pendleburyi Philip 1960	10	Philip 1960a, b.
Tabanus perakiensis Ricardo 1911	2, 3, 6, 9, 10, 12, 13.	Ricardo 1911a; Schuurmans Stekhoven 1926, 1928; Philip 1960a, b.
Tabanus pratti Ricardo 1911	1, 3, 6, 11, 12.	Ricardo 1911a; Schuurmans Stekhoven 1926, 1928; Philip 1960b.
Tabanus rhinargus Philip 1962	3, 4, 6, 8, 12, 13.	Philip 1962; Burton 1978; Al-Talafha et al. 2018.
Tabanus rubidus Wiedemann 1821	2, 5, 6, 8, 9, 12.	Wiedemann 1821; Schuurmans Stekhoven 1926, 1928, 1932; Philip 1960b; Burton 1978; Datta 1985.
Tabanus ruficoloratus Philip 1960	12	Philip 1960a; Burton 1978.
Tabanus rufiventris Fabricius 1805	3, 5, 6, 12.	Fabricius 1805; Isaac 1924, Schuurmans Stekhoven 1926, 1928; Philip 1960b; Burton 1978; Datta 1985.
Tabanus salvazai Surcouf 1921	2	Surcouf 1921; Burton 1978; Al-Talafha et al. 2018.
Tabanus samawangensis Burger 1988	10	Burger 1988b.
Tabanus serus Walker 1861	10	Walker 1861; Schuurmans Stekhoven 1926, 1932; Oldroyd 1949; Philip 1960b.
Tabanus significans Ricardo 1911	12	Ricardo 1911a; Schuurmans Stekhoven 1926, 1932; Philip 1960b.
Tabanus simplicissimus Walker 1856	2, 11, 12, 13.	Walker 1856, Ricardo 1911a; Schuurmans Stekhoven 1926, 1932; Philip 1960b.
Tabanus stekhoveni Philip 1960	11	Philip 1960b.
Tabanus striatus Fabricius 1787	4, 5, 8, 9, 12.	Fabricius 1787; Mitzmain 1913a, b; Austen 1922; Schuurmans Stekhoven 1926, 1928,1932; Philip 1959, 1960b; Chvála & Lyneborg 1970; Burton 1978;Burger & Thompson 1981; Datta 1985; Maity 2016.
Tabanus subhybridus Philip 1960	8, 12.	Philip 1960a, 1960b.
Tabanus tinctothorax Ricardo 1911	1, 4, 6, 8, 12, 13.	Ricardo 1911a; Schuurmans Stekhoven 1926; Philip 1960b.
Tabanus tonglai Surcouf 1921	3, 6, 8, 10	current report
Tabanus transversus Burger 1988	10	Burger 1988b

	Tabanus uniformis Ricardo 1911	5	Ricardo 1911a; Schuurmans Stekhoven 1926, 1928, 1932; Philip 1960b.
	Tabanus varicolor Ricardo 1911	11	Ricardo 1911a; Philip 1960b.
	Tabanus ventriflavimarginatus Schuurmans Stekhoven 1926	10	Schuurmans Stekhoven 1926; Philip 1960b.
	Tabanus vix Philip 1960	10	Philip 1960a, b.

(3) *T. dives* and *T. stantoni* will be excluded from Malaysian fauna until further studied. *Tabanusdives* Rondani was described based on one specimen from Sarawak, and no other specimens havebeen reported. Ricardo (1911a) studied the type of *T. dives* in Genoa and she said, this one is eitherthe same as *Tabanus stantoni*, n. sp., or very nearly allied to it. *T. stantoni* Ricardo was described as a new species from a long series from Malaysia. Schuurmans Stekhoven (1926) synonymized *T. dives* and *T. stantoni* under *T. immanis* Wiedemann. However, Philip (1960b) considered *T. stantoni* and *T. immanis* as similar, but not the same.

(4) *Haematopota borneana* Rondani was shortly described using one specimen. The description was not enough to confirm the identity of the species (Ricardo 1911b). Stone and Philip (1974) uncertainly indicated *H. borneana* as a previous name for *H. angustisegmentata* Schuurmans Stekhoven. Therefore, until the type can be critically compared with related species, *H. borneana* will not be listed in the current checklist. (5) *Haematopota angustisegmentata* was recorded by Philip (1960b, 1963). Stone & Philip (1974)considered this occurence doubtful. The authors identified the specimens of Philip (1960b) as *H. albiocrea* Stone & Philip and those of Philip (1963) as *H. albimanica* Stone & Philip. On the otherhand, the type specimen of *H. angustisegmentata* was collected from Middle East Borneo without further specification. So, *Haematopota angustisegmentata* was excluded from the current list. (6) Occurrence of *Haematopota cordigera* Bigot was reported by Philip (1960b, 1963) in Malaysia. Later, the occurrence was determined as a misidentification, and the specimens examined should be assigned under *H. tenasserimi* Szilády (Stone & Philip 1974).

However, the systematic contributions to the family Tabanidae of Malaysia were provided withinwide Oriental studies (Burger & Chainy 2000; Philip 1960a, b; Ricardo 1911a; Schuurmans Stekhoven 1926; Stone & Philip 1974). Due to the lack of comprehensive studies investigating thefauna of horse flies in Malaysia, all available sources of data are becoming progressively outdated.Recently, eleven new records from Malaysia were recorded (Al-Talafha et al. 2018a, 2018b; Idris et al. 2016).

DISCUSSION

The current report describes one new species and adds four new records to the checklist of Tabanidae in Malaysia. *Tabanus atroflavus* sp. nov is described and illustrated. The first records of *Haematopota cilipes* Bigot; *Tabanus atristylatus* Burger; *Tabanus inflatipalpis* Schuurmans Stekhoven; *Tabanus tonglai* Surcouf are reported. This work updated the checklist bringing the total recorded species to 116 taxa under eight genera: *Chrysops* (11 species), *Cydistomyia* (1 species), *Gressittia* (3 species), *Haematopota* (21 species), *Mesopangonius* (2 species), *Olsufievotabanus* (1 species), *Rhinomyza* (2 species), and *Tabanus* (75 species).

The studies carried out by Philip (1960a, 1960b) are the most comprehensive ones that described the Tabanidae fauna of Malaysia. These reports offered reliable systematic data on some horseflies and deerflies in addition to providing descriptions of several new species. Moreover, the following replacement names for preoccupied names of Malaysian species were suggested by Philip (1960b): *Tabanus biannularis* Philip (for *T. bicinctus* Ricardo), *T. brunnicolor* Philip (for *T. brunneus* Macquart), *T. stekhoveni* Philip (for *T. elegans* Schuurmans Stekhoven). However, Philip (1960a, 1960b) used old names for some taxa. For example, the author used *Chrysozona* for the genus *Haematopota*, and the names of *Chrysops fasciatus* Wiedemann, *C. fixissimus* Walker, and *C. flavocinctus* Ricardo, were indicated as *C. fasciata, C. fixissima,* and *C.flavocincta* respectively.

Previous records of nine species were excluded from the current checklist: (1) *Haematopota pungens* Doleschall; *Tabanus crocinctipennis* Schuurmans Stekhoven; and *Eucompsa tecticallosa* Schuurmans Stekhoven are currently excluded because of the lack of reliable records from Malaysia. All of them were recorded from only one specimen (type), without specified locality. (2) Identity of *Tabanus infamis* Szilády has not been verified. Philip (1960b) and Stone (1975) listed *T. infamis* as a questionable synonymy for *T. minimus*. However, Burton (1978) was not persuaded and did not see any reason to synonymize it. Therefore, this species will be excluded from Malaysian tabanids and kept under *T. minimus*, until the type specimen further studied, and more materials collected.

CONCLUSION

The present study added new records for four species and described a new species to the science, all of them are Oriental. *Haematopota cilipes* shows a wide distribution throughout the Oriental region; it was recorded from India in the west to Malaysia and Thailand in the east. In Malaysia, *H. cilipes* was collected from two localities (Kedah, Perlis) that experience a tropical monsoon climate, which may indicate a species with a climatic tolerance. Occurrence of *Tabanus atristylatus* from Malaysian Borneo (Sabah) and *T. atroflavous* indicates that the fauna of Tabanidae in Malaysia is rich and needs more strenuous efforts to survey its diversity. More attention is needed to study the assemblage of tabanids in both parts of the country.

ACKNOWLEDGMENTS

We are grateful to Mr. Ruslan from Center for Insect Systematics for his help during this study.

AUTHORS DECLARATIONS

Funding Statement

This project was supported by The National University of Malaysia under grant TAP-K013317.

Conflict of Interest

All authors declare that they have no conflicts of interest to influence the findings reported in thispaper.

Ethics Declarations

Ethics declarations are not applicable for this research.

Data Availability Statement

This manuscript has no associated data.

Authors' Contributions

HAA was the principal researcher, processed and manipulated the specimens, described the new species and discussed the new records, and wrote the first draft of the manuscript. SBY and IBA provided materials and references, revised the manuscript, and refined the final draft.

REFERENCES

Adrian, M.S., Sani, R.A., Hassan, L. & Wong, M.T. 2010. Outbreaks of trypanosomiasis and the seroprevalence of *T. evansi* in a deer breeding center in Perak, Malaysia. *Tropical Animal Health and Production* 42 (2010): 145–150.

Austen, E.E. 1922. Some Siamese Tabanidae. *Bulletin of Entomological Research* 12(4): 431-455.

Al-Talafha, H., Yaakop, S. & Idris, A.B. 2018a. Two new species and seven new records of horse fly(Diptera: Tabanidae) from Malaysia, including a description of new species and modified keys. *Journal of Medical Entomology* 55(1): 112–121.

Al-Talafha, H., Yaakop, S., Nurul Fatihah, A.L. & Idris, A.B. 2018b. New species of the Genus *Tabanus* Linnaeus, 1758 (Diptera: Tabanidae) from Malaysia. *Serangga* 23(2): 110–116.

Bigot, J.M.F. 1890. Collection d'Insectes formee dans l'Indo-Chine par M. Pavie. Dipteres. *Nouvelles Archives du Muséum d'Histoire Naturelle Paris* (Ser. 3)2: 203–208.

Bigot, J.M.F. 1891. Diptères nouveaux ou peu connus. *Bulletin de la Société Zoologique de France* 16: 74–79.

Bigot, J.M.F. 1892. Descriptions de Diptères nouveaux. Tabanidi. *Mémoires de la Société Zoologique de France* 5: 602–691.

Burger, J.F. 1988a. A new genus and two new species of Pangoniini (Diptera: Tabanidae) of zoogeographic interest from Sabah, Malaysia. *Proceedings of the Entomological Society of Washington* 90(1): 12–19.

Burger, J.F. 1988b. Notes on Tabanidae (Diptera) of the Oriental Region III. New and little-knownTabanidae from Borneo. *Pan-Pacific Entomologist* 64(2): 159–172.

Burger, J.F. & Chainey, J.E. 2000. Revision of the Oriental and Australasian species of *Chrysops* (Diptera: Tabanidae). *Invertebrate Taxonomy* 14(5): 607–654.

Burger, J.F. & Thompson, F.C. 1981. The *Tabanus striatus* complex (Diptera: Tabanidae): A revision of some Oriental horse fly vectors of surra. *Proceedings of the Entomological Society of Washington* 83(2): 339–358.

Burton, J.J.S. 1978. *Tabanini of Thailand above the Isthmus of Kra (Diptera: Tabanidae)*. Los Anglos: Entomological Reprint Specialists.

Chvála, M. & Lyneborg, L. 1970. Tabanidae (Diptera) from the Philippines, collected by the Noona Dan Expedition 1961. *Journal of Medical Entomology* 7(3): 362–366.

Datta, M. 1985. A synopsis of Tabanidae. *Bulletin of Zoological Survey of India* 7(1): 127–138.

Datta, M. 1998. Insecta: Diptera: Tabanidae. In The Director of Zoological Survey of India (eds.). *Fauna of Meghalaya*, pp 65–89. Calcutta: The Director, Zoological Survey of India.

Desquesnes, M., Holzmuller, P., Lai, D.H., Dargantes, A., Lun, Z.R. & Jittaplapong, S. 2013. *Trypanosoma evansi* and surra: a review and perspectives on origin, history, distribution, taxonomy, morphology, hosts, and pathogenic effects. *BioMed research international* 2013: 1–22.

Doleschall, C.L. 1858. Derde bijdrage tot de kennis der dipterologische fauna van Nederlandsch Indië. *Natuurkunde Tijdschrift voor Nederlandsch-Indië* 17: 73–128.

Elshafie, E.I., Sani, R.A., Hassan, L., Sharma, R., Bashir, A. & Abubakar, I.A. 2013a. Active infection and morphometric study of *Trypanosoma evansi* among horses in Peninsula Malaysia. *Tropical Biomedicine* 30(3): 444–450.

Elshafie, E.I., Sani, R.A., Hassan, L., Sharma, R., Bashir, A. & Abubakar, I.A. 2013b. Seroprevalence and risk factors of *Trypanosoma evansi* infection in horses in Peninsular Malaysia. *Research in Veterinary Science* 94(2): 285-289.

Ereqat, S., Nasereddin, A., Al-Jawabreh, A., Al-Jawabreh, H., Al-Laham, N. & Abdeen, Z. 2020.Prevalence of Trypanosoma evansi in livestock in Palestine. *Parasites & vectors* 13(1): 1-8.

Fabricius, J.C. 1787. *Mantissa Insectorum II*. Copenhagen: Impensis Christ. Gottl. Proft,

Fabricius, J.C. 1798. *Supplementum Entomologiae Systematicae IV*. Copenhagen: Impensis Christ. Gottl. Proft.

Fabricius, J.C. 1805. *Systema Antliatorum*. Brunswick: Apud Carolum Reichard.

Foil, L.D. 1989. Tabanids as vectors of disease agents. *Parasitology Today* 5(3): 88–96.

Fraser, H., Symonds, S.L. & Pratt, H.S. 1908. *Surra in the Federated Malay States*. Singapore. Kelly & Walsh.

Idris, A.B., Yaakop, S. & Al-Talafha, H. 2016. Taxonomic notes and new records of the genus *Tabanus* Linnaeus 1758 (Diptera: Tabanidae) from Malaysia. AIP 487 Conference and Proceedings, The 16th Postgraduate Colloquium, Faculty of Science and Technology, National University of Malaysia, 13th–14th April 2016 UKM Bangi.

Ilango, K. 2009. Insecta: Diptera: Tabanidae. In The Director of Zoological Survey of India (eds.). *Fauna of Tamil Nadu*, pp 115–116. Calcutta: The Director, Zoological Survey of India.

Isaac, P.V. 1924. Papers on Indian Tabanidae (1-3). *Memoirs of the Department of Agriculture inIndia* 8: 53–62.

Khan, M., Foose, T. & Strien, N. 2004. Asian rhino specialist group report. *Pachyderm* 36(2): 11–13.

Krinsky, W.L. 1976. Review Article: Animal disease agents transmitted by horse flies and deerflies (Diptera: Tabanidae). *Journal of Medical Entomology* 13(3): 225–275.

Kröber, O. 1924. Die Tabaniden der Philippinen. *Archiv für Naturgeschichte* 90: 1–27.

Macquart, J. 1838. Dipteres exotiques nouveaux ou peu connus. *Mémoires de la Société Royaledes Sciences, de l'Agriculture, et des Arts à Liège* 1838: 9–225.

Macquart, J. 1846. Diptères exotiques nouveaux ou peu connus, supplement I. *Mémoires de laSociété des Sciences, de l'Agriculture et des Arts de Lille* 1844: 133–364.

Macquart, J. 1848. Diptères exotiques nouveaux ou peu connus, suite du II.me supplement. *Mémoires de la Société des Sciences, de l'Agriculture et des Arts de Lille*. 1847: 161–237.

Maity, A., Naskar, A., Sengupta, J., Hazra, S., Parui, P., Homechaudhuri, S. & Banerjee, D. 2016. An annotated checklist of horse flies (Diptera: Tabanidae) from India with remarks on Surra disease vectors. *The Journal of Zoology Studies* 3(4): 53–84.

McAlpin, J.F. 1989. Morphology and Terminology-Adult. In. McAlpine, J.F., Peterson, B.V., Shewell, G.E., Teskey, H.J., Vockeroth, J.R. & Wood, D.M. (eds.). *Manual of Nearctic Diptera*, Vol. 1, pp 9–37. Quebec: Canadian Government Publishing Centre.

Meijere, J.C.H.DE. 1911. Studien über sudostasiatische dipteran, VI. *Tijdschrift voor Entomologie* 54: 258–432.

Mitzmain, M.B. 1913a. The biology of *Tabanus striatus* Fabricus, the horsefly of the Philippines. *Philippine Journal of Science* 8(3): 197–221.

Mitzmain, M.B. 1913b. The mechanical transmission of surra by *Tabanus striatus* Fabricus. *Philippine Journal of Science* 8(3): 223–229.

Mohd Rajdi, N.Z.I., Mohamad, M.A., Tan, L.P., Choong, S.S., Reduan, M.F.H., Hamdan, R.H. & Zalati, C.S. 2021. First case report on the occurrence of *Trypanosoma evansi* in a Siam B Mare in Kelantan, Malaysia. *Veterinary Medicine and Science* 7(2): 303–309.

Ng, B.K.Y. & Vanselow, B. 1978. Outbreak of surra in horses and the pathogenesis of the anaemia. *Kajian Veterinaire* 10: 88-89.

Nurulaini, R., Jamnah, O., Adnan, M., Zaini, C.M., Khadijah, S., Rafiah, A. & Chandrawathani, P. 2007. Mortality of domesticated java deer attributed to Surra. *Tropical biomedicine* 24(2): 67–70.

Oldroyd, H. 1949. The Diptera of the territory of New Guinea, XIV, Family Tabanidae, Part III. *Proceedings of the Linnean Society of New South Wales* 73: 304–361.

Philip, C.B. 1959. Philippine zoological expedition 1946-1947. Tabanidae (Diptera). *Fieldiana*: *Zoology* 33(6): 543–625.

Philip, C.B. 1960a. Malaysian Parasites, XXXV. Descriptions of some Tabanidae (Diptera)

fromthe Far East. *Studies from the Institute for Medical Research Federation of Malaya* 29(1960): 1–32.

Philip, C.B. 1960b. Malaysian parasites XXXVI. A summary review and records of Tabanidae from Malaya, Borneo, and Thailand. *Studies from the Institute for Medical Research Federation of Malaya* 29(1960): 33–78.

Philip, C.B. 1961. Further notes on Far Eastern Tabanidae with descriptions of five new species. *Pacific Insects* 3(4): 473–479.

Philip, C.B. 1962. A review of the Far Eastern *biannularis* group of *Tabanus*. *Pacific Insects* 4(2):293–301.

Philip, C.B. 1963. Further notes on Far Eastern Tabanidae III. Records and new species of *Haematopota* and a new *Chrysops* from Malaysia. *Pacific Insects* 5(3): 519–534.

Philip, C.B. 1969. Supplemental notes on the Far Eastern *biannularis* group of *Tabanus*. *Journalof Medical Entomology* 6(2): 197–198.

Philip, C.B. 1979. Further notes on Far Eastern Tabanidae (Diptera) VI. New and little known species from the Orient and additional records, particularly from Malaysia. *Pacific Insects*21(2): 179–202.

Philip, C.B. 1980. Further notes on far eastern Tabanidae VII. New generalized oriental species of unusual zoogeographic interest Diptera. *Pan Pacific Entomologist* 56(1): 71–78.

Philip, C.B. & Mackerras, I.M. 1959. On Asiatic and related Chrysopinae (Diptera: Tabanidae). *Philippine Journal of Science* 88(3): 279–324.

Ricardo, G. 1902. LXII.-Further notes on the Pangoninae of the family Tabanidae in the British Museum collection. *Annals and Magazine of Natural History* 9(53): 366–381.

Ricardo, G. 1906. Notes on the genus *Haematopota* of the family Tabanidae in the British museumcollection. *The Annals and Magazine of Natural History; Zoology, Botany, and Geology* 18(7): 94–127.

Ricardo, G. 1909. Four new *Tabanus* species from India and Assam. *The Annals and magazine ofnatural history; zoology, botany, and geology* 3(18): 487–491.

Ricardo, G. 1911a. A revision of the species of *Tabanus* from the Oriental region, including noteson 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 otherthan *Tabanus*. *Records of the Indian Museum* 4: 321–400.

Ricardo, G. 1916. Two new species of *Haematopota* from the Federated Malay States. *Bulletin ofEntomological Research* 6(4): 403–404.

Ricardo, G. 1917. New species of Tabanidae from Australia and the Fiji Islands. *Annals and Magazine of Natural History* 19(8): 207–224.

Rondani, C. 1875. Muscaria exotica Musei Civici januensis. Fragmentum III. Species in Insula Bonae Fortunae (Borneo), provincia Sarawak annis1865-1868, lectae a March. J. Doria etDoct. O Beccari. *Annali del Museo Civico di Storia Naturale di Genova* 7: 421–464.

Schiner, I.R. 1868. Diptera. In Wullerstorf-Urbair, B. (ed.). *Reise der Osterreichischen Fregatte Novara*, pp 3–388. Wien: Gerold's Sohn.

Schuurmans Stekhoven, J.H.Jr. 1926. The bloodsucking arthropods of the Dutch East Indian ArchipelagoVII. The tabanids of the Dutch East Indian Archipelago. *Treubia* 6: 1–552 (Suppl.).

Schuurmans Stekhoven, J.H.Jr. 1928. The blood-sucking Arthropods of the Dutch East Indian Archipelago. IX. Recent collections of tabanids from Sumatra, middle east Borneo, Soemba, etc. *Zoologische Jahrbücher* 54: 425–448.

Schuurmans Stekhoven, J.H.Jr. 1932. Bloodsucking arthropods of the Dutch East Indian Archipelago. X. Further notes on tabanids of India, Sumatra, Java, Borneo, Celebes and some of the Moluccas. *Archiv für Naturgeschichte (NF)(B)* 1: 57–94.

Senior-white, R.A. 1927. *Catalogue of Indian Insects, PT. 12, Tabanidae*. Calcutta: Governmentof India.

Surcouf, J. 1921. Note sur les dipteres piqueurs [Tabanidae] recueillis au Laos par M. Vitalis de Salvaza. *Bulletin de la Société Entomologique de France* 26(19): 285–287.

Stone, A. & Philip, C.B. 1974. *The Oriental Species of the Tribe Haematopotini (Diptera, Tabanidae)*. Los Anglos: Entomological Reprint Specialists.

Stone, A. 1975. Family Tabanidae. In. Delfinado, M.D. & Hardy, D.E. (eds.). *A Catalog of the Diptera of the Oriental Region, Suborder Brachycera II*, pp. 43–81. Honolulu: University Press of Hawaii.

Veer, V., Parashar, B.D. & Prakash, S. 2002. Tabanid and muscoid haematophagous flies, vectors of trypanosomiasis or surra disease in wild animals and livestock in Nandankanan Biological Park, Bhubaneswar (Orissa, India). *Current Science* 82(5): 500–503.

Veer, V. & Parashar B.D. 2008. Tabanid flies (Tabanidae: Diptera) of India and their managementwith a note on disease vectors. In. Tyagi, B. (ed.). *Vector-Borne Diseases: Epidemiologyand Control*, pp. 282–298. India: Scientific Publishers.

Walker, F. 1850. Diptera. In. Saunders W.W. (ed.). *Insecta Saundersiana: or characters of undescribed insects in the collection of William Wilson Saunders Esq. Vol. I*, pp. 1–76. London: John Van Voorst.

Walker, F. 1854. *List of the Specimens of Dipterous Insects in the Collection of the British Museum, Part V/supplement I*. London: British Museum.

Walker, F. 1856. Catalogue of the dipterous insects collected at Sarawak, Borneo, by Mr. A.R. Wallace, with descriptions of new species. *Journal and Proceedings of the Linnaean*

Society of London, Zoology 1: 105–136.

Walker, F. 1857. Characters of undescribed Diptera in the collection of W. W. Saunders, Esq., F. R. S., &c. [part]. *Transactions of the Entomological Society of London* (New Series) 4: 119–158.

Walker, F. 1861. Catalogue of the dipterous insects collected at Gilolo, Ternate and Ceram, by Mr. R. Wallace, with descriptions of new species. *Journal and Proceedings of the LinnaeanSociety of London, Zoology* 6: 4–23.

Wiedemann, C. 1821. *Diptera Exotica Sectio II (Antennis Parumarticulatis)*. Staffordshire: Kiliae.

Wiedemann, C. 1828. *Aussereuropäische Zweiflügelige Insekten*. Der Schulzischen Buchhandlung: Hamm.

Wulp, F.M. van der. 1881. Diptera. In. Veth, P.J. (ed.). *Midden-Sumatra, Reizen en onderzoekingen der Sumatra-Expeditie 1877-1879*, pp 1–60. Leiden: Brill E.J.

Szilády, Z. 1926. New and old world horse flies. *Acta Biologica Hungarica* 1(7): 1–30.