



## Identification of a species of deer fly attacking human and live stocks in Assam, India

**Dipankar Biswas, Dibya Ranjan Bhattacharyya\*, Kaushal Yadav, Pranjali Jyoti Baruah and Biswa Jyoti Borkakoty**

ICMR-Regional Medical Research Centre, NE Region, Dibrugarh 786001, Assam, India. Email: drbhattacharyya@yahoo.com; kaushal\_0101@yahoo.co.in; icmrrcdi.nic.in

**ABSTRACT:** During April 2018, a sudden appearance of some unknown flies was observed in some villages under Sibsagar district of Assam, Northeast India. The flies attacked in groups and had more attraction towards human than livestock. The present article describes the entomological and molecular identification of the fly at species level in Sibsagar district of Assam, northeast India. Preliminary examination revealed the fly to be an insect of order Diptera, Family *Tabanidae* and Genus *Chrysops* as they possess short proboscis, ocelli, third antennal joint with five divisions and wings demarcated with dark median cross-band. This was supported by molecular data where the partial nucleotide sequences of Mitochondrial COI gene revealed maximum identity (90.6%-92.3%) with genus *Chrysops*. The mitochondrial COI sequence data of *Chrysops flavocinctus* has been made available in NCBI Gen Bank. Gen Bank Accession No. MH998226. © 2019 Association for Advancement of Entomology

**KEY WORDS:** *Chrysops flavocinctus*, mitochondrial COI gene,

During April 2018, a sudden appearance of some unknown flies was observed in some villages under Sibsagar district of Assam, Northeast India which was reported in local media and national newspapers (Karmakar, 2018). The flies created panic among the residents as they were attacking human and live stocks in large numbers. Moreover people of the locality never experienced or heard about such type of incidence in their life time. As the fly was seen for the first time, it was necessary to identify the fly so as to implement control measures in the population. The present article describes the entomological and molecular identification of the fly at species level in Sibsagar district of Assam.

A team of scientists from ICMR-RMRC NE Dibrugarh investigated the affected area after

getting the information from local health authorities of Sibsagar district, Assam and collected several specimens of flies. The flies were brought to ICMR-RMRC Dibrugarh for morphological identification and molecular characterization. DNA barcoding of the fly specimen was done commercially (Eurofins, Genomics India) using amplification followed by sequencing of a part of mitochondrial cytochrome oxidase I gene. Molecular Phylogenetic analysis and rate of pairwise nucleotide divergence was calculated in MEGA software 7.0.

The flies were seen to attack in groups mostly on the exposed part of the human body usually in legs and hands. Bites resulted in allergy like reaction including severe itching, redness, and swelling in the affected site for a day or two. In some cases

\* Author for correspondence



Fig. 1. Skin infection caused due to biting of fly species.



Fig. 2. DeerFly (*Chrysops flavocinctus*).

secondary skin infection were also observed due to severe itching (Fig. 1). Field observations revealed that at least ten villages situated in both sides of a stretch of a dead river were mainly affected. Among these ten villages, five villages were affected more due to their close proximity to the water body.

Preliminary examination revealed this fly to be an insect of order Diptera, Suborder Brachycera, Infraorder Tabanomorpha, Family *Tabanidae* and Superfamily Tabanoidea (Maity *et al.*, 2016) Species belonging to this group are commonly called as horse flies (*Tabanus*), deer flies (*Chrysops*) or clegs (*Haematopota*) depending upon the genus (Maity *et al.*, 2016). The present species belonging to the family *Tabanidae* was further keyed to

Subfamily Chrysopsinae and Genus *Chrysops* as they possess short proboscis, ocelli, third antennal joint with five divisions, and wings demarcated with dark median cross-band (Chandra *et al.*, 2015) (Fig. 2). This was supported by molecular data where the NCBI BLAST search using partial Sequences of Mitochondrial COI gene revealed maximum identity with genus *Chrysops* (Gen Bank Accession no. MH998226). Nucleotide sequences corresponding to mitochondrial COI gene showing maximum homology with fly specimen identified in Assam were downloaded from NCBI genBank. Few other genera of related fly's sequences were also included in the phylogenetic tree. The sequences were aligned using CLUSTAL W in BioEdit Software v 7.0 and phylogenetic tree constructed in MEGA v 7.0 using the Maximum Composite

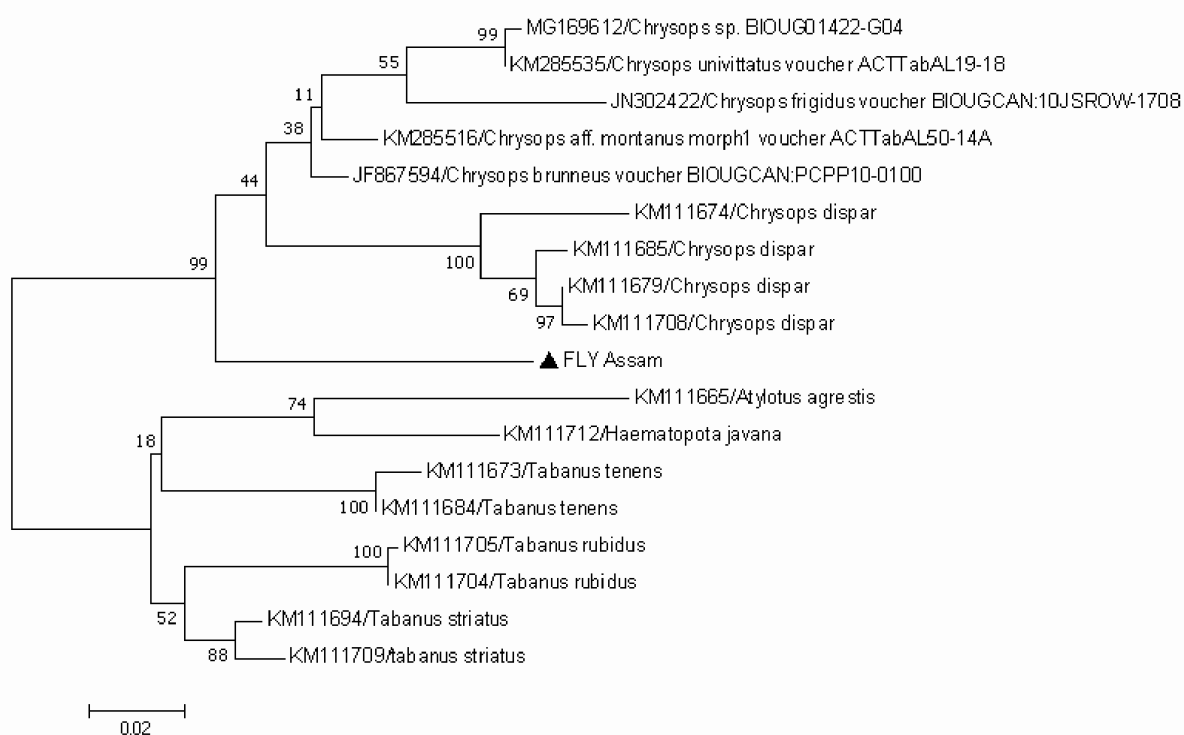


Fig. 3. Molecular phylogenetic analysis of deer fly specimens from Assam

Likelihood (MCL) approach with Maximum Likelihood method based on the General Time Reversible model based on best fit model. A discrete Gamma distribution was used to model evolutionary rate differences among sites (five categories) (+G, parameter = 0.2733) (Fig. 3).

There are about 300 described species in the genus *Chrysops* worldwide (Burger and Chainey, 2000). In the Oriental region, which includes India, contains 34 described species of *Chrysops* and in India 13 species of *Chrysops* recorded (Maity *et al.*, 2016). Burger and Chainey (2000) provided the identification key and description of all valid taxa of genus *Chrysops* prevalent in Oriental and Australasian regions (Maity *et al.*, 2016). Following the key the present species was identified as *C. flavocinctus* Ricardo, 1902. Summarized diagnostic characters provided by them for this species are slender black-brown species with very large frontal callus, shining black-brown frontoclypeus, undivided cross-band on wing and tergite two with yellow basal band. These characters completely matched with our specimens. *Chrysops dubiens*,

a species reported from southern India (Kerala) is closely related with *C. flavocinctus*. However, *C. dubiens* can be separated from *C. flavocinctus* as it possesses characters like distinctly concave outer margin of the cross band in the wing, tergite 2 yellow basally but apical black band with a large triangular (rounded in case of *C. flavocinctus*) marking extending anteriorly, tergites 3, 4, and occasionally 5 with median yellow to light brown spots of variable sizes. *Chrysops flavocinctus* was originally described from specimens collected from Khasi hills of Meghalaya by Ricardo in 1902. In addition to that, this species was also reported from Assam, Arunachal Pradesh, Sikkim, and West Bengal. Occurrence records of this species in countries other than India are Myanmar, China, Laos, Malaysia, Taiwan, Thailand, and Vietnam (Burger and Chainey, 2000).

Scanty information is available regarding the habits and abundance of Oriental *Chrysops* (Maity *et al.*, 2016). The available information on the feeding habit of *C. flavocinctus* stated that this species commonly attack human and their bite resulted in

swelling, pain, and intense itching which may persist for several days (Stekhoven Jr., 1926). This observation reported long years back have similarity with the present feeding behavior of this fly attacking human in Assam. Very little information is available on the medical importance of Oriental *Chrysops*. However, some species are reported to transmit *Pasteurella multocida*, *Trypanosoma evansi* (Surra) and anthrax (*Bacillus anthracis*) mechanically in animals (Burger and Chainey, 2000).

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