



New records and DNA barcoding of deer flies, *Chrysops* (Diptera: Tabanidae) in Thailand

Tanasak Changbunjong^{a,b,*}, Thekhawet Weluwanarak^b, Poonyapat Sedwisai^b,
Jiraporn Ruangsittichai^c, Gerard Duvallet^d, Theeraphap Chareonviriyaphap^e

^a Department of Pre-clinic and Applied Animal Science, Faculty of Veterinary Science, Mahidol University, Nakhon Pathom, 73170, Thailand

^b The Monitoring and Surveillance Center for Zoonotic Diseases in Wildlife and Exotic Animals (MoZWE), Faculty of Veterinary Science, Mahidol University, Nakhon Pathom, 73170, Thailand

^c Department of Medical Entomology, Faculty of Tropical Medicine, Mahidol University, Bangkok, 10400, Thailand

^d UMR5175 CEFE, Centre d'Ecologie Fonctionnelle et Evolutive, Université Paul-Valéry, Montpellier, France

^e Department of Entomology, Faculty of Agriculture, Kasetsart University, Bangkok, 10900, Thailand

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ABSTRACT

Chrysops spp. or deer flies (Diptera: Tabanidae) are hematophagous flies of medical and veterinary importance and some species are important vectors of *Trypanosoma evansi*, the causative agent of surra in Thailand. However, data regarding deer fly species and their molecular identification are limited. Accurate species identification will indicate the appropriate control measures. In this study, an entomological survey of deer flies from different sites in Thailand between May 2018 and June 2019 were conducted. In addition, mitochondrial cytochrome oxidase subunit I (COI) barcoding region was used for species identification. A total of 82 females were collected and 6 species were identified. Of these, three species are new records for Thailand: *C. designatus*, *C. fusc marginalis* and *C. vanderwulpi* bringing the species total found in Thailand to nine. The COI sequences revealed an intraspecific divergence of 0.0%–2.65% and an interspecific divergence of 7.03%–13.47%. Phylogenetic analysis showed that all deer fly species were clearly separated into distinct clusters according to morphologically identified species. These results indicated that COI barcodes were capable in discriminating between deer fly species on the basis of the barcoding gap and phylogenetic analysis. Therefore, DNA barcoding is a valuable tool for species identification of deer flies in Thailand.

1. Introduction

Chrysops spp. or deer flies are classified into the suborder Brachycera, infraorder Tabanomorpha and family Tabanidae. Approximately 300 known species have been described worldwide (Burger and Chainey, 2000). Females are blood feeders and some are the biological vectors of the filarial worm *Loa loa*, the causative agent of human loiasis in Africa (Baldacchino et al., 2014). They are also considered as mechanical vectors of several important pathogens such as *Trypanosoma evansi* causing severe disease (surra) in horses, camels and dogs and less severe illness in several other mammals, equine infectious anemia virus, the causative agent of equine infectious anemia (EIA) in horses, ponies and donkeys, *Anaplasma marginale*, the causative agent of anaplasmosis in cattle (Baldacchino et al., 2014). Moreover, they mechanically transmit other pathogens, the aetiologic agents of infectious diseases including anthrax, tularemia, pasteurellosis and vesicular

stomatitis (Burger and Chainey, 2000; Baldacchino et al., 2014; Mullen, 2019). In Thailand, *T. evansi* is an important hemoprotozoan pathogen of domesticated animals, livestock and wild animals (Desquesnes et al., 2013). Previous investigations from 2008 to 2012 in the northeastern Thailand revealed 66 confirmed cases of trypanosomosis and the prevalence of disease in beef cattle, buffaloes, dairy cattle and pigs was 51.5%, 39.4%, 6.1% and 3.0%, respectively (Pholpark and Pholpark, 2013). A seroprevalence study in dairy cattle demonstrated the presence of the parasite in most parts of the country. The mean seroprevalence was 8%, ranging from 0 to 100% at farm level and indicated that 25% of dairy cattle tested were exposed to the infection during this particular study (Desquesnes et al., 2009).

Deer flies range in size from 5.5 to 12.5 mm. and are usually brightly colored or black to wholly black (Burger and Chainey, 2000). The morphological identification of adult *Chrysops* is based largely on body and wing patterns. The body of flies has yellowish and black

* Corresponding author.

E-mail address: tanajak.cha@mahidol.edu (T. Changbunjong).