

Stomoxyinae Flies in Thailand: A Précis, with Abridged Taxonomic Key to the Adult Species

Naritsara Malaithong,^{1,2} Gerard Duvallet,³ Ratchadawan Ngoen-Klan,¹
Michael J. Bangs,^{1,4} and Theeraphap Chareonviriyaphap¹

Abstract

Stomoxyinae flies (Diptera: Muscidae) are cosmopolitan obligate hematophagous insects of medical and veterinary importance. The subfamily Stomoxyinae includes 51 known species within 10 genera. Five genera, *Stomoxys*, *Haematobosca*, *Haematobia*, *Haematostoma*, and *Stygeromyia*, represent important livestock pests causing substantial economic losses in the commercial animal industry. The majority of Stomoxyinae research and control efforts have focused on *Stomoxys* species. Following the earliest descriptions of Stomoxyinae in Asia in the beginning of the past century, the first published list of species identified in Thailand did not occur until 1978. Currently, there are 11 confirmed species in the country with 3 others suspected present. This includes six species of *Stomoxys* with *Stomoxys calcitrans* the most common and widespread in the country. Since 1978, 20 publications, 17 of which since 2006, have covered original research on Stomoxyinae fly biology, species distribution, patterns of daily and seasonal activity, gene flow, and phylogenetics in Thailand. All Stomoxyinae-related published research from Thailand through 2017 is reviewed herein, and include an updated identification key to the Stomoxyinae genera and all known or suspected species, both male and female adults, present in Thailand.

Keywords: *Stomoxys*, *Haematobosca*, *Haematobia*, *Haematostoma*, *Stygeromyia*, Thailand

Introduction

STOMOXYINAE FLIES (DIPTERA: Muscidae) are obligate hematophagous insects with some species considered significant economic pests of livestock (cattle for beef and dairy, horses, sheep, and swine) and other warm-blooded animals (poultry). Collectively, these flies are assigned to the subfamily Stomoxyinae (De Carvalho 1989, Couri and De Carvalho 2003), with at least 51 described species distributed across 10 genera (Zumpt 1973, Pont and Mihok 2000, Pont and Dsouli 2008). Species within five genera (*Stomoxys*, *Haematobosca*, *Haematobia*, *Haematostoma*, and *Stygeromyia*) represent important livestock pests causing substantial economic losses in the commercial animal industry, particularly cattle production (Steelman 1976). Blood feeding can result in host of defensive behavioral responses, stress, loss of energy, immunosuppression, and weight loss in attacked animals, which, in turn, influences

general fitness (*e.g.*, weight gain) of the animal (Campbell et al. 2001).

Secondarily, some species have been implicated as occasional mechanical biological vectors (actual or suspected) or intermediate hosts of disease-causing pathogens in animals. These include viruses (equine infectious anemia, bovine leucosis, lumpy skin disease, West Nile, and others), bacteria (*Bacillus anthracis*, *Enterobacter sakazakii*, *Dermatophilus congolensis*, and likely others), spirurid nematodes (*Habronema microstoma* and possibly others), and various protozoa (*Trypanosoma* spp., *Besnoitia besnoiti*) of livestock and other animals (Greenberg 1973, Yeruham et al. 1995, Baldacchino et al. 2013, Sharif et al. 2017). Additionally, *Stomoxys calcitrans* has been suspected or implicated as possible mechanical vectors of blue tongue virus, Rift Valley fever virus, *Trypanosoma evansi*, *Borrelia recurrentis* (louse-borne relapsing fever), *Anaplasma marginale*, *Brucella abortus*, *Francisella tularensis*, and other agents; however, the

¹Department of Entomology, Faculty of Agriculture, Kasetsart University, Bangkok, Thailand.

²Center for Advanced Studies for Agriculture and Food (CASAF), Kasetsart University Institute for Advanced Studies (NRU-KU), Kasetsart University, Bangkok, Thailand.

³UMR5175 CEFE, Centre d'Écologie Fonctionnelle et Évolutive, Université Paul-Valéry, Montpellier, France.

⁴Public Health & Malaria Control Department, Kuala Kencana, Indonesia.