



## NEW RECORD OF A MOSQUITO *Aedes mcintoshii* (HUANG) FROM INDIA

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### ABSTRACT

This study reports *Aedes mcintoshii* (Huang, 1985) for the first time from India. It was collected from Berhampur University Campus, District Ganjam, Odisha, India. This species is considered to have medical importance, as it can carry pathogens like viruses and protozoans and can act as a potential vector. Therefore, the present finding of this species will provide baseline information to understand its zoogeography, biology, and pathogenicity related to this mosquito.

**Key words:** *Aedes mcintoshii*, Culicidae, new record, diversity, zoogeography, vector, medical importance, viruses, protozoans.

Mosquitoes have been a nuisance for humans for over a million years. They are known to spread some of the world's most dangerous diseases like malaria, chikungunya, dengue, filariasis, and Japanese encephalitis. Thousands of people die every year due to these diseases in India (World Health Organization, 2014 and 2020), and nearly one million people die from mosquito-borne diseases worldwide (World Health Organization, 1995a and 1995b). Some of the mosquitoes do not routinely bite humans, but they act as the vectors for several animal diseases and may become dangerous zoonotic agents to spread new diseases. The global mosquito fauna consisted of 3541 species belonging to 50 genera, two subfamilies, and 12 tribes (Tyagi et al., 2015). More than 404 species and subspecies of mosquitoes are available in India, which accounts for more than 12% of the global mosquito fauna (Tyagi et al., 2015). The species *Aedes mcintoshii* is widely distributed in Africa, extending south from sub-Saharan Africa on both the west and east sides of the continent (WRBU, 2020). The species belongs to the *Lineatopennis* group of the *Aedes* subgenus *Neomelanoconion* together with *A. lineatopennis*, *A. circumluteolus*, *A. luridus*, *A. luteolateralis*, and *A. unidentatus*. For many years, the true identity of *A. mcintoshii* was hidden as this species was misidentified due to its overlapping morphological features with Austro-Oriental species *A. lineatopennis*. Later on, this species was separated from *A. lineatopennis* based on morphological features (Huang, 1985). Landscape genetics approaches supported the single

species status of *A. mcintoshii*. However, high genetic variation in subpopulations correlated with soil clay content and recent precipitation (Knight and Hull, 1953).

The species *A. mcintoshii* is a floodwater mosquito, and immatures are typically found in grassy ground pools and residual stream pools. The females bite at night, preferring cattle, but will readily feed on people outdoors. Females deposit their eggs in the upper layer of soil, in grassy sites most likely to flood. Eggs can remain in a dormant state for years, hatching occurs only following sustained submersion (Linley and Turell, 1994). Egg desiccation tolerance in floodwater mosquitoes is often associated with transovarian transmission of viruses between successive generations (Knight and Hull, 1953). The species *A. mcintoshii* is a major vector of Rift Valley fever virus in Africa and also carries other viruses and protozoans like Wesselsbron virus (WSLV), Pongola virus (PGAV), Middelburg virus (MIDV), Ngari virus (NRIV), Ndumu virus (NDUV), Bunyamwera virus (BUNV), Babanki virus (BBKV), and Plasmodium spp. (WRBU, 2020). Laboratory observations suggest that *A. mcintoshii* are effective vector of Rift valley fever virus (Mwaengo et al, 2012). Therefore, it is considered a main communal health concern. However, the study of this mosquito is crucial as it can carry pathogens, including viruses and protozoans. The present finding of the mosquito from Berhampur University campus, Ganjam, Odisha, is the first material evidence of this mosquito from India. The

current record will help us to understand the biology and ecology of this mosquito in future.

#### MATERIALS AND METHODS

Mosquitoes were collected from the campus area of Berhampur University, Odisha, India (19.2977358°N84.8781602°E). The collection was carried out from January 2018 to December 2019 using an insect battery-operated mechanical aspirator (Pooter) and torchlight. The collected mosquitoes were transferred to a test tube, covered with a loose cotton plug, and examined in the laboratory for identification. Identification of these mosquitoes were made with the help of a 10x fabric lens, and simultaneously the photographs were taken with the help of a mobile camera mounted with a 10x macro lens and L.E.D. Identification of the collected mosquitoes were based on adult characters using standard taxonomic keys

and catalogues of Mosquitoes Identification key of Christophers (1933), Barraud (1934), and online identification keys from Walter Reed Biosystematics Unit (WRBU) Website: <http://wrbu.si.edu/vectorspecies/mosquitoes/mcintoshi>. The identity of the mosquito was confirmed with Indian Council of Medical Research-Regional Medical Research Centre, Bhubaneswar and Indian Council of Medical Research-Vector Control Research Centre, Puducherry. These mosquitoes were deposited and registered in the national repository of Estuarine Biology Regional Centre, Zoological Survey of India, Gopalpur-on-Sea, Odisha, India.

#### RESULTS AND DISCUSSION

*Aedes mcintoshi* (Huang, 1985) (Fig. 1)

##### Redescription

Head narrow decumbent scales on the vertex;



Fig. 1. *Aedes mcintoshi*: A. Habitus, B. Lateral view, C. Dorsal view, D. Bare spiracular area, E. Scutum with yellow scales laterally, F. Head, G. Wing with dark scales and fringed squama, H. Pointed abdomen showing tergum with pale basal bands

numerous erect forked scales on the head, not limited to the occiput. Palps are short, proboscis is long, and the palps and proboscis are both dark. Thorax: From the anterior promontory to the scutellum, the scutum is surrounded by a lateral band of yellow scales; the scutellar scales are all narrow; the acrostichal and dorsocentral setae are present; the paratergite is bare; and the mesepimeron has a lower anterior seta. Wings: Squama fringed. Dark scaled except pale scales on basal radius vein. Legs: Hind femur mostly dark with pale ventrally on basal 2/3. Tibia and tarsi are dark. Abdomen: Whole abdomen pointed. Terga with basal pale bands (Fig. 1A-H)

**Materials examined:** 17 examples, Registration Number: EBRC/ZSI/In-12259 A-Q, collected by: Santhosh Goud, Adults: ♀ Medium sized; body length 0.6 to 0.7 cm.

**Distribution:** South Africa, Angola, Botswana, Democratic Republic of the Congo, Ethiopia, Gambia, Kenya, Mali, Nigeria, Republic of South Africa, Senegal, South Sudan, Tanzania, Uganda, Zambia, Zimbabwe (WRBU, 2020).

**Remarks:** The species *A. mcintoshii* was first described by Huang (1985), and bionomics, distribution and larval forms were documented by Knight and Hull (1953) as *A. lineatopennis*. Earlier this species was misidentified as *A. lineatopennis* (Ludlow) from African regions, which is considered to be widespread in Oriental and Afrotropical regions. Later on, in 1985 it was discriminated from *A. lineatopennis* by Huang based on differences in the wing scale pattern and male genitalia. The presence of the mosquito *A. mcintoshii* from Odisha constitutes the first material evidence of this mosquito from the Indian subcontinent. This finding will provide baseline information to understand the zoogeography, biology, and pathogenicity related to this mosquito.

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#### AUTHOR CONTRIBUTIONS STATEMENT

S Goud conducted the survey, collected the specimen, taken the photograph of the specimen. Identified by S Goud and J K Seth, I Biswal, B B Panda, S Pattnaik, R K Hazra, S Poopathi prepared the manuscript. All authors read and approved the manuscript.

#### REFERENCES

- Barraud P J. 1934. The Fauna of British India, Including Ceylon and Burma. Diptera. Vol. V. Family Culicidae. Tribes Megarhinini and Culicini. London: Taylor and Francis.
- Christophers S R. 1933. Fauna of British India. Diptera, Family Culicidae. Tribe Anophelini. Vol. 4. London: Taylor and Francis.
- Christophers S R. 1933. The fauna of British India. Diptera, Vol. IV. Family Culicidae. Tribe Anophelini. In Taylor and Francis. Vol. 4. <https://doi.org/10.1038/041101a0>.
- Huang Y M. 1985. A new African species of *Aedes* (Diptera: Culicidae). *Mosquito Systematics*, 17(2): 108-120.
- Knight K L, Hull W B. 1953. The *Aedes* mosquitoes of the Philippine Islands. III. Subgenera *Aedimorphus*, *Banksinella*, *Aedes*, and *Canraedes*. *Pacific Science* 7: 453-481.
- Mwaengo D, Lorenzo G, Iglesias J, Warigia M, Sang R, Bishop R P, & Brun A. 2012. Detection and identification of Rift Valley fever virus in mosquito vectors by quantitative real-time PCR. *Virus Research* 169(1): 137-143.
- Tyagi B K, Munirathinam A, Venkatesh A. 2015. A catalog of Indian mosquitoes. *International Journal of Mosquito Research*, 2(2): 50-97.
- Walter Reed Biosystematics Unit. 2020. *Aedes mcintoshii* species page. Walter Reed Biosystematics Unit Website, <http://wrbu.si.edu/vectorspecies/mosquitoes/mcintoshii>, accessed on 28<sup>th</sup> December 2020.
- World Health Organization. 1995a. Dengue and dengue hemorrhagic fever in the Americas: Guidelines for prevention and control. PAHO Washington DC, USA; Scientific Publication N° 548.
- World Health Organization. 1995b. Guidelines for dengue surveillance and mosquito control. Western Pacific Education in Action Series, Manila N° 8, Geneva, Switzerland.
- World Health Organization. 2014. A global brief on vector-borne diseases (No. WHO/DCO/WHO/2014.1). World Health Organization.
- World Health Organisation. 2020. Vector-borne diseases. <https://www.who.int/news-room/fact-sheets/detail/vector-borne-diseases>. Accessed December 20, 2020.