https://doi.org/10.48047/AFJBS.6.12.2024.4482-4485

African Journal of Biological Sciences

Journal homepage: http://www.afjbs.com

Research Paper Open Access

Redescription and Identification of *Eristalinus quinquestriatus* (Fabricius, 1794) and *Melanostoma orientale* (Wiedemann, 1824) Diptera: Syrphidae by DNA sequencing from the city Gorakhpur, Uttar Pradesh, India

Singh Anmol* and Samuel Raina Nivedita
Department of Zoology, St. Andrew's College, Gorakhpur, Uttar Pradesh, India.
Sam243010@gmail.com
Contact- 8299646945

Article History
Volume 6, Issue 12, 2024
Received: June 10, 2024
Accepted: July 5, 2024
doi:
10.48047/AFJBS.6.12.2024.4482-4485

Abstract- The hoverflies *Eristalinus quinquestriatus* and *Melanostoma orientale* both were reported from the Uttar Pradesh state but not from the specific area or city. *Eristalinus quinquestriatus* is the species belongs to subfamily Eristalinae is treated as forgotten species because its record from Uttar Pradesh is not constant according to the provided literature. Whereas *Melanostoma orientale* is constantly reported from the state. Here is an attempt to mark their presence from Gorakhpur city of Uttar Pradesh by DNA sequencing as it is the most reliable and efficient method of proper identification of species till the date. Detailed taxonomic characters, DNA report, distribution and photographs are given in this article. The analysed sequence is submitted to the National Centre of Biotechnology and Information (NCBI).

Keywords- Hoverflies, Syrphidae, DNA Sequencing, NCBI, Gorakhpur, Uttar Pradesh

Introduction- Uttar Pradesh is very diverse in abundance of flower flies but there is a dearth in scientific exploration of this economically and ecologically important insect group. According to the published literature6300 species are described worldwide (Skevington et al., 2019)out of them only 4.23% population of Syrphidae is reported from this state (Sengupta et al., 2016). *Eristalinus quinquestriatus* was reported by Mitra et al., in 2005 from Uttar Pradesh in general distribution from India but later in updated checklist (Sengupta et al., 2015, 2016) its presence is not noted. One more article by Sengupta et al., 2019 mentioned its distribution from many states of India but not from Uttar Pradesh. Above mentioned both species are earlier reported from the state but no one has given proper identification and DNA sequencing the most efficient method of molecular taxonomy has not been applied till the date, so here authors attempted to mark the differences among the species of same genus and to locate them in proper taxon by using DNA Sequencing, which is today's most prominent method of taxonomy. Detailed diagnostic characters, measurements, photographs are provided in present article.

One of the most intriguing aspects of above-mentionedspecies is their role in pollination. As a hoverfly, they play a crucial role in the ecosystem by acting as a pollinator for various flowering plants. The intricate relationship between these species and the plants their visit provides a captivating insight into the interconnectedness of different organisms within an ecosystem.*Melanostoma orientale* larvae are aphidophagous and act as biocontrol agent of aphids (Sengupta et al.2016)

India occupying about 2% of the earth's landmass, is among the top ten mega- diverse nations of the world in terms of insect diversity, harbouring about 7.10% of the world's insect fauna (Shankerganesh E 2017). In India~62,429 species of insects belonging to 595 families were described (ZSI 2012) but only 2330 species from 264 families possess DNA barcode. In case of Diptera, 2116 barcodes have been generated from 382 species covering 36 families. This indicates only 5.24% of dipteran species are barcoded among 87 families with 6337 species described from India (Shashank et al, 2022).
E. quinquestriatus and M. orientale (Diptera: Syrphidae) are frequent flower visitors in our study area. Their identification keys are well established and they can be easily placed in their respective genera but species identification is sometimes difficult and can lead to erroneous result, thus the DNA sequencing method is being applied to confirm the species identification.

Material and methods-
Study area- Gorakhpur city is situated on banks of river Rapti and covers the area of 3.483 sq kilometers.
Collection sites- Both species are abundantly present in the area but major collection was done from St. Andrew's College campus. Vindhyavasini Park and Railway Colony. *Eristalinus quinquestriatus* majorly collected from the garden of education department. Collection was done in the months of October, November and February, April 2020-2023.
Photographs, measurements have been done of specimens and then transferred into veils containing 90% ethanol and stored under optimum temperature. Samples were sent to Biologia India Private Limited, Haryana for DNA analysis after generation and identification of report sequences were submitted to NCBI (India) with following accession number-
Eristalinus quinquestriatus- OR 426655
Melanostoma orientale- OR 346330

Result and Discussion-
Measurements-
Eristalinus quinquestriatus- total body length- 11mm, head length- 2mm, head breadth- 3mm, abdomen breadth- 3mm, total wingspan 22mm.
Melanostoma orientale- total body length- 7mm, head length- 1mm, head breadth- 2mm, abdomen breadth- 1mm, total wingspan- 13mm.

Diagnostic characters-
1. *Eristalinus quinquestriatus*

Head- eyes spotted or irregularly marked, antennae brownish orange with bare arista, smaller vertical triangle; whole frons with dark brown hairs.
Thorax- thorax with yellowish dorsum along with shining black stripes.
Abdomen- comparatively shorter, ovate- conical the 4th abdominal segment with an inverted open V mark, abdomen covered with yellow pubescence.
Leg- tarsi yellowish white nearly to tip.
Wing- clear 3rd vein (R4+5) looped downward into 1st posterior cell (R5).

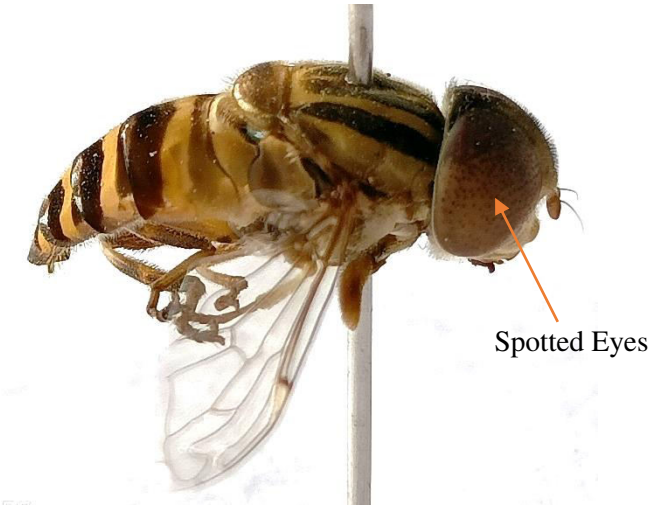
2. *Melanostoma orientale*-

Melanostoma are medium sized hover flies, very similar to platycheirus. They differ from platycheirus by having metasternum reduced, with deep posterior incision on each side; facial pruinosity neither punctate nor rippled; protibial and protarsi slender; and femora or tibiae without bristles or modified pili; species with antennae yellowish ventrally; abdomen black with yellow macalae; face and frons shiny, arista almost bare.

Distribution-
Melanostoma orientale- Karnataka, Madhya Pradesh, Orissa, Tamil Nadu, Uttarakhand, Uttar Pradesh, West Bengal. Arunchal Pradesh, Assam, Manipur, Himachal Pradesh, Nagaland (mitra et al., 2008)
Eristalinus quinquestriatus- Tamil Nadu

Acknowledgement-
We would like to express our gratitude to Principal, St. Andrew's College Gorakhpur for providing infrastructure and all the faculty staff for encouraging and providing basic necessities. Huge thanks to members of Biologia services India Pvt Limited, Haryanafor sampling specimens.

E. quinquestriatus Fig(i) dorsal view



E.quinquestriatus Fig (ii) lateral view

M. orientale Fig(iii) dorsal view

M. orientale Fig(iv) ventral view

References-

1. Skevington, J.H., Locke, M.M., Young, A.D., Moran, K., Crins, W.J. & Marshal, S.A. 2019. Guide to the flower Flies of Northeastern North America. United States, Princeton University Press. 512 p. http://doi.org/10.2307/j.ctv7xbrvz
2. Mitra Bulganin, Parri. P, Banerjee D and Ghosh A. 2005. Studies on the Dipteran Pollinators of Medicinal Plants in India. Rec. Zool. Surv. India: 104 (Part 3-4): 23-39.
3. Sengupta Jayita, Naskar Atanu, Maity Aniruddha, Hazra Surajit, Mukhopadhyay Emon, Banerjee Dhriti and Ghosh Shyamasree.2016. An Updated Distributional Account of Indian Hover flies (Insecta: Diptera: Syrphidae). Journal of Entomology and Zoology Studies. 4(6): 381-396.
4. Mitra, Bulganin, Mukherjee, M. and Banerjee, D.2008. A Check-list of hover- flies (Diptera: Syrphidae) of Eastern Himalayas. Rec. Zool. Surv. India, Occ. Paper No., 284: 1-47.
5. Bulganin Mitra, Sankaran Roy, Imtiaz Imam, Maitree Ghosh. 2015. A review of the hover flies (Syrphidae: Diptera) from India. International Journal of Fauna and Biological Studies; 2(3): 61-73.
6. Shankarganesh E. 2017. Insect biodiversity: The teeming millions- A review. Bull Env Pharmacol Life Sci 6(3): 101-105.
7. ZSI. 2012 COP XI publications.www.zsi.gov.in/Cop-11/cop-11.html/[Accessed on Nov 2023]
8. Pathour R. Shashank, Nadur L. Naveena, Nernakallu N. Rajgopal, Tyler A. Elliot, Kolla Sreedevi, Sunil Sunil, Naresh M. Meshram. 2022. DNA barcoding of insects from India: Current status and future perspectives. Molecular Biology Reports. 49:10617-10626. https://doi.org/10.1007/s11033-022-07628-2.