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Another correction: Egregious misidentification of a native Indian species of *Aedes* as the North American *Aedes infirmatus* (Diptera: Culicidae)

RALPH E. HARBACH[1*] & NATHAN DANIEL BURKETT-CADENA[2*]
[1]*Department of Science, Natural History Museum, Cromwell Road, London SW7 5BD, UK.*
r.harbach@nhm.ac.uk; https://orcid.org/0000-0003-1384-6972
[2]*Florida Medical Entomology Laboratory, University of Florida, Vero Beach, Florida, USA.*
nburkettcadena@ufl.edu; https://orcid.org/0000-0001-6168-1637
**Corresponding authors*

In a previous paper (Burkett-Cadena & Harbach 2025), we corrected the serious misidentification of specimens of *Mansonia indiana* Edwards, 1930 in India that were implausibly determined by Jangir & Prasad (2023) to be specimens of the North American *Psorophora columbiae* (Dyar & Knab, 1906a)—members of the genus *Psorophora* Robineau-Desvoidy, 1827 do not occur outside of the Americas. Here we report another instance of misidentification by the same authors (Jangir & Prasad 2024)—the misidentification of an Indian mosquito as *Aedes* (*Ochlerotatus*) *infirmatus* Dyar & Knab, 1906b, which is found mainly in southeastern areas of the United States, with records of occurrence in Honduras and Mexico (Wilkerson *et al*. 2021). As in their first paper, Jangir & Prasad (2024) used keys for North American mosquitoes to identify their specimens: "The specimen was morphologically identified as *Aedes infirmatus* Dyar and Knab (1906) using a taxonomic key and research literature [3, 8, 9, 10]." Those publications were, in numerical order, Reeves *et al*. (2021), Darsie & Ward (2016), Tyagi *et al*. (2015) and Carpenter & LaCasse (1955) (erroneously listed as LaCasse 1955). Only two of the publications, Darsie & Ward (2016) and Carpenter & LaCasse (1955), include keys that would lead to the identification of *Ae. infirmatus*. The paper by Reeves *et al*. deals with *Ae. scapularis* (Rondani, 1848) and its phylogenetic relationships with other species of the Ochlerotatus Group that occur in the United States based on DNA barcode sequences of the mitochondrial *COI* gene. Tyagi *et al*. (2015) provide keys to the genera of mosquitoes and the larvae and adult females of major vector species of public health importance in India. The keys only include *Ae. aegypti* (Linnaeus, 1762) and *Ae. albopictus* (Skuse, 1895).

Jangir & Prasad (2024) stated that "*Aedes infirmatus* larvae were collected with *Aedes aegypti* and *Aedes albopictus* larvae." Nine larvae were reared to adults (two males and seven females), but "Unfortunately, the males lived [a] very short [time] and died before the hatching of females." From the abstract of the paper and the sentence quoted above, it would seem that the identification of *Ae. infirmatus* was based on a single female; however, this is paradoxical considering that photographs of a male and a female of "*Aedes infirmatus*" are shown in figure 2 of their paper. Although not mentioned by the authors, it is obvious that the larvae of the three species must have been collected from phytotelmata or artificial containers, because the immature stages of *Ae. aegypti* and *Ae. albopictus* are only found in those sorts of habitats. On the face of it, this may seem to be unimportant, but it reveals a crucial contradiction—the larvae of *Ae. infirmatus* develop exclusively in temporary groundwater pools in woodlands that form after rainfall and flooding (Carpenter & LaCasse 1955; Horsfall 1972; Wilkerson *et al.* 2021). Jangir & Prasad must have known this, which explains why they suggested that groundwater habitats in the "area from where the sample was collected that can provide breeding sites."

Using the keys of Barraud (1934) and Rattanarithikul *et al*. (2010), the female illustrated by Jangir & Prasad (2024) is quite easily identified as *Aedes feegradei* Barraud, 1934 (described as a species of the subgenus *Finlaya* Theobald, 1903 and treated as a species of the genus *Phagomyia* Theobald, 1905 by Rattanarithikul *et al*., it is currently classified as a species of the subgenus *Phagomyia* of *Aedes* Meigen, 1818). The specimen agrees well with Barraud's description of the species.

Morphological characters that identify the Indian species as *Ae. feegradei* and distinguish it from *Ae. infirmatus* are as follow (anatomical terminology of Harbach 2024: Section 3) (for clarity, figures 2–8 of Jangir & Prasad 2024 can be compared with images a–e of *Ae. infirmatus* shown on page 437 of Wilkerson *et al*. 2021). The defining characters include: (1) Erect forked scales of head dark, arranged in a narrow band at back of the head (on occiput) (erect forked

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scales pale on central part of occiput in *infirmatus*); (2) pedicel of antenna entirely dark (distinctly yellow on outer surface in *infirmatus*); (3) scutum with pale patch of supraalar scales (absent in *infirmatus*); (4) postpronotum with a patch of pale scales on dorsal area (with narrow dark scales on dorsal area in *infirmatus*); (5) subspiracular scales absent (present in *infirmatus*); (6) abdominal sterna with basal pale bands (sterna pale-scaled, occasionally speckled with a few dark scales, in *infirmatus*); (7) abdominal sterna IV–VII with small tufts of outstanding dark scales (clearly visible in the lateral and ventral views of the abdomen shown in figure 8 of Jangir & Prasad 2024 (absent in *infirmatus*); (8) tip of abdomen pointed (blunt in *infirmatus*); (9) tarsi with pale bands (absent in *infirmatus*). For some unfathomable reason, Jangir & Prasad (2024) state in their description of the species that the "Tarsomeres are without pale bands however, on the hindleg, 1st and 2nd tarsi [i.e. tarsomeres] have pale bands on the base and apex while only 1st tarsi of the midleg have pale bands on the base and apex (Figure 6)." The legs shown in their figure 6 are exactly as described by Barraud (1934): "fore tarsi black; mid-tarsi with rather narrow basal and apical white rings, latter continuous with basal white ring on segment 2, otherwise black, hind tarsi with small dorsal white mark at base of segment 1, a fairly broad white ring over joint between 1 and 2, otherwise black." Presumably, Jangir & Prasad (2024) ran their specimen through the keys they cited without bothering to check the specimen against published descriptions of *Ae. infirmatus*, nor did they dissect and examine the male genitalia of the specimen shown in their figure 2.

Aedes feegradei is widely distributed in the Oriental Region. It has been found in Cambodia, India, Japan, Myanmar, Nepal and Thailand (Maquart *et al*. 2021; Tyagi *et al*. 2015; Wilkerson *et al*. 2021). *Aedes feegradei* was first recorded in eastern India (Odisha State, formerly Orissa State) by Rajavel *et al*. (2005), who collected larvae from tree holes in association with 15 other species, including *Ae. albopictus*. "Larvae were reared to adults and identification, in most cases, was based on adult characters with associated larval and pupal skins." The collections reported by Jangir & Prasad (2024) were made in Rajasthan State in western India; thus, *Ae. feegradei* is likely to occur throughout the country south of Nepal.

The two papers by Jangir & Prasad (2024) are examples of flawed research methods, producing erroneous results, attributed to a lack of knowledge and misunderstanding of taxonomic resources and mosquito fauna. This is worrisome because it is at least partially attributable to the worldwide decline in mosquito taxonomic training and expertise that has historically contributed substantially to matters of human health. It is concerning that these errors were not noticed and corrected during the editorial and peer-review process. Clearly, editors, reviewers and publishers must pay closer attention to the quality of science and subject matter to avoid the proliferation of erroneous and misleading information.

There is no denying that mosquito identification is becoming increasingly dependent on DNA sequencing, with particular use of the barcoding region of the mitochondrial *COI* gene and the ITS2 locus of ribosomal DNA. Unfortunately, many DNA sequences in public databases are derived from misidentified mosquitoes, compromising the utility of DNA sequencing for mosquito identification. The causes of the misidentifications of mosquito species with referenced sequences in public databases are myriad, but are rooted in the need for morphological certainty of identification of specimens used to generate sequences. Too frequently, the investigators generating and contributing sequences to public databases have insufficient taxonomic training, fail to confirm identifications using multiple life stages of link-reared specimens and do not understand the limitations of existing morphology-based identification. Even when care is taken to identify specimens using link-reared life stages (as in Talaga *et al*. 2025), generated sequences do not always resolve species identity. Nevertheless, DNA sequence analysis, used in combination with other methods, can often be useful for confirming identifications, and may have aided Jangir & Prasad (2023, 2024) to correctly identify their specimens, given that multiple nucleotide sequences for *Ae. infirmatus*, including the 18S and 28S ribosomal RNA genes and the *COI* gene, are available for comparison.

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