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New distributional record of the Eastern Death's-head Hawkmoth *Acherontia styx* (Sphingidae) from the Al Dhafra Region, United Arab Emirates

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Abstract
A new distributional record of the Eastern Death's-head Hawkmoth *Acherontia styx* (Westwood, 1847) (Lepidoptera: Sphingidae) is reported from the Al Dhafra Region, Abu Dhabi Emirate, United Arab Emirates. A single adult specimen was collected from Madinat Zayed (23.662680°N, 53.717522°E) using light trapping with a mercury vapour lamp and white sheet during nocturnal sampling. The specimen was identified based on diagnostic external morphological characters, including the characteristic skull-like thoracic pattern, yellow hindwings with distinct black postmedial bands, and wing patterning consistent with published taxonomic descriptions of the species. The voucher specimen is deposited in the Entomology Collection of Entomology Lab, Alphamed Pest Control Services, Lot-4, UAE. This record represents the first confirmed occurrence of *A. styx* from the western region of the United Arab Emirates, extending its known distribution within the Arabian Peninsula. Diagnostic comparisons with sympatric sphingid species, including *Hyles lineata* and *Daphnis nerii*, are provided. This finding highlights the importance of continued faunistic surveys in arid and agro-desert ecosystems of the UAE.

Keywords: *Acherontia styx*, sphingidae, new record, UAE, Al dhafra, distribution extension

Introduction

The family Sphingidae (Lepidoptera) comprises medium- to large-sized moths commonly known as hawkmoths, characterized by rapid and sustained flight, well-developed thoracic musculature, and an important ecological role as nocturnal and crepuscular pollinators. The family is widely distributed across tropical and temperate regions, with several species exhibiting migratory behavior (Kitching & Cadiou, 2000; Pittaway & Kitching, 2024) [9, 12].

The genus *Acherontia* Laspeyres, 1809 (death's-head hawkmoths) is readily distinguished by a characteristic skull-like marking on the dorsal thorax, robust and densely scaled body, and relatively narrow forewings. Members of the genus are also notable for their defensive behaviour, including audible squeaking sounds produced by expelling air through the pharynx when disturbed.

Three species are currently recognized within the genus: *Acherontia atropos* (Linnaeus, 1758), *Acherontia styx* (Westwood, 1847), and *Acherontia lachesis* (Fabricius, 1798), collectively distributed across Africa, Europe, and Asia (Pittaway & Kitching, 2024) [12]. Among these, *Acherontia styx* is primarily distributed across South and Southeast Asia, extending into parts of the Middle East, where it is considered locally migratory and occasionally recorded in arid and semi-arid environments (Holloway, 1987; Pittaway & Kitching, 2024) [8, 12].

Although *A. styx* has a broad Old-World distribution, confirmed voucher-based records from the western desert regions of the United Arab Emirates, particularly the Al Dhafra Region of Abu Dhabi Emirate, remain poorly documented in the scientific literature. Most available records from the region are based on scattered observations or photographic evidence lacking detailed morphological verification.

Biodiversity documentation in the United Arab Emirates remains incomplete despite rapid environmental change and ongoing habitat modification (Beshyah & Al-Hosani, 2016; Feulner, 2011) [3, 6]. Baseline arthropod inventories in the country have been largely derived from regional faunistic compilations (van Harten, 2008, 2009, 2010) [14, 15, 16], which continue to serve as primary references for desert insect diversity.

Lepidoptera records from neighboring regions also indicate that the fauna of the Arabian Peninsula remains incompletely resolved, particularly for migratory and nocturnal taxa (Larsen, 1984; Larsen, 2005; Abu-Dannoun & Husein, 2012) [1, 10, 11].

The present study reports a confirmed occurrence of *Acherontia styx* from the Al Dhafra Region, United Arab Emirates, based on morphological examination of a voucher specimen supported by photographic documentation. This record represents a distributional extension within the Arabian Peninsula and emphasizes the importance of continued faunistic surveys in arid desert ecosystems.

Materials and Methods

1. Study area

The specimen was collected from Madinat Zayed, Al Dhafra Region, Abu Dhabi Emirate, United Arab Emirates (23.662680°N, 53.717522°E) Figure 1. The study area represents an agro-desert ecotone characterized by sparsely vegetated sandy desert habitat interspersed with irrigated agricultural patches, typical of western Abu Dhabi's arid landscape. The specimen was collected by the first author during nocturnal field surveys using a light trapping with a mercury vapour lamp and white sheet during nocturnal sampling. The insect fauna of the United Arab Emirates desert ecosystems has been previously documented through regional arthropod inventories (van Harten, 2008–2010) [14, 16], although detailed locality-based records for nocturnal Lepidoptera remain limited.

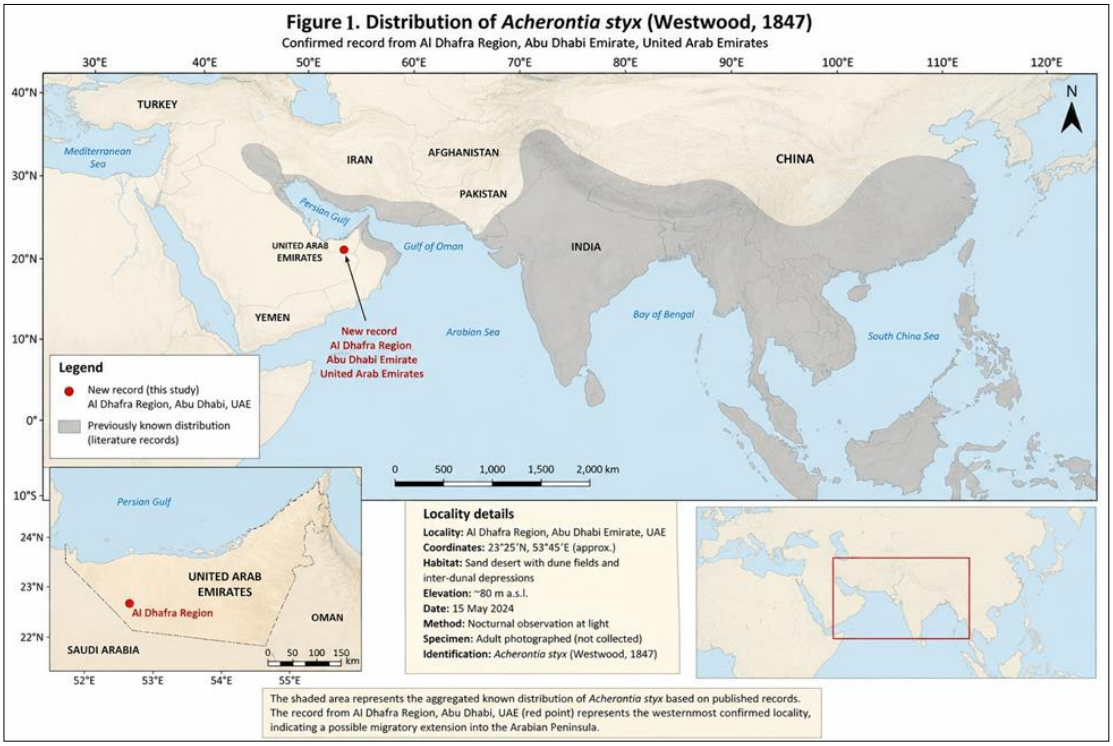

Fig 1: Distributional map showing the confirmed record of *Acherontia styx* in the Al Dhafra Region, Abu Dhabi Emirate, United Arab Emirates. The map highlights the new locality (red point) within the western desert zone of the UAE. Previously known distributional range of the species across South and Southeast Asia and parts of the Middle East is indicated in shaded grey (based on aggregated literature records). The Al Dhafra record lies at the westernmost edge of the currently recognized range of the species, suggesting a potential migratory extension into the Arabian Peninsula

2. Collection method

Adult moths were collected during nocturnal field surveys conducted under suitable weather conditions using standard light trapping techniques. A mercury vapour lamp (125–160 W) was operated in combination with a white collecting sheet to attract nocturnal Lepidoptera. Specimens were captured using entomological nets, euthanized using standard ethyl acetate vapour killing jars, and subsequently preserved as dry pinned specimens following conventional entomological procedures.

3. Identification

Specimen identification was performed based on external morphological characters using standard taxonomic keys and authoritative literature (Bell & Scott, 1976; Abrera, 1986; Pittaway & Kitching, 2024) [4, 12]. Diagnostic features included wing patterning, thoracic coloration, and the characteristic skull-like marking on the mesothorax. Identification was further confirmed through comparison with published descriptions and high-resolution photographic references of *Acherontia styx*.

Results

1. Taxonomic account

Order: Lepidoptera
Family: Sphingidae
Genus: *Acherontia* Laspeyres, 1809
Species: *Acherontia styx* (Westwood, 1847)

2. Material examined

1 ♀ adult (sex not dissected due to external examination only), United Arab Emirates, Abu Dhabi Emirate, Al Dhafra Region, Madinat Zayed (23.662493°N, 53.718816°E), collected at light trap, nocturnal sampling, 14/04/2025, leg. Dr. S. Vijayan, deposited in Entomology Lab, Alphamed Pest Control Service, Lot-4, voucher code – SV1.

3. Morphological description

Family-level diagnosis (Sphingidae):

Adults medium to large moths with strong thoracic musculature, narrow forewings, and reduced hindwings relative to forewings (Abrera, 1986) [4].

Species description (*Acherontia styx*): Body length approximately 44 mm (Figures 2 & 3).

Figure 2. Dorsal habitus of adult *Acherontia styx* showing key morphological features.

Fig 3: Ventral habitus of adult *Acherontia styx* showing diagnostic morphological features

Fig 4: *Acherontia styx*: (A) dorsal view showing greyish-black ground coloration with grey-blue segmental bands and stripes; vertex down (I); (B) ventral view showing muted yellow tones (II), narrowing towards the posterior region, with yellow to dark blackish transverse bands (III). Scale bars: A & B = 2 mm.

Head: Head dark brown to black. Antennae slender, pale brown, gradually tapering apically. Proboscis short, robust, dark brown, strongly sclerotized, coiled; approximately 9 mm in length (Figure 5).

Thorax: Dorsum bluish grey with a diffuse skull-like marking. Lateral regions with black longitudinal lines and whitish-blue suffusion. Two small dark spots present within thoracic pattern (Figure 4).

Abdomen: Ground coloration yellowish with greyish-black transverse bands and bluish-grey markings on each segment (Figure 4).

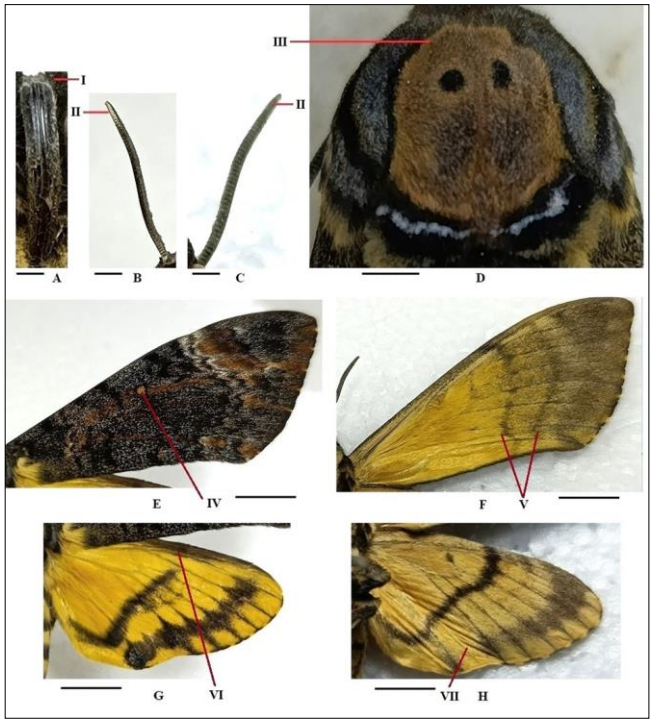

Fig 5: Morphological characteristics of *Acherontia styx*. (A) Proboscis; (B–C) antennae; (D) thoracic skull-like marking; (E) forewing dorsal view showing discal spot; (F) forewing ventral view; (G) hindwing dorsal view with yellow ground color and black bands; (H) hindwing ventral view. Roman numerals (I–VII) indicate diagnostic features: I, proboscis structure; II, antenna morphology; III, thoracic marking; IV, discal spot; V, wing coloration; VI, medial bands; VII, transverse banding pattern. Scale bars: A–C = 0.5 mm; D = 1 mm; E–H = 2 mm.

Forewings: Forewing length approximately 52 mm. Wings narrow and elongate. Ground coloration dark brown to blackish with yellow-brown streaking. Discal area with orange spot. Ventral surface with two medial fasciae (Figure 5).

Hindwings: Bright yellow with prominent black postmedial band not reaching costa. Submarginal maculate band present (Figure 5). Wingspan approximately 90–130 mm (Bell & Scott, 1976).

Diagnosis

Acherontia styx is distinguished from congeners by the following combination of characters:
Thoracic skull marking less defined than in *A. atropos*. Bluish-white suffusion on metanotum (absent in *A. atropos*). Orange discal spot-on forewing (white in *A. atropos*). Two medial fasciae on ventral forewing (usually one in *A. atropos*). Hindwings yellow with black postmedial band. Abdomen with alternating yellow and black banding pattern. Reduced contrast in wing pattern compared to *A. atropos*. Field observation also noted audible defensive squeaking when disturbed.

Discussion

Distributional significance

Acherontia styx is widely distributed across South and Southeast Asia, extending westwards into parts of the Middle East. However, confirmed voucher- or photograph-

based records from the western desert regions of the United Arab Emirates remain scarce. The present record from Madinat Zayed represents a confirmed occurrence from the Al Dhafra Region, extending the known distribution of the species within the Arabian Peninsula. This locality represents one of the westernmost verified records of the species in the region (Figure 1). Given the migratory nature of sphingid moths, the occurrence of *A. styx* in this hyper-arid environment is most plausibly interpreted as a vagrant individual originating from populations in South Asia or adjacent regions, potentially transported via seasonal atmospheric currents. Recent studies have emphasized that insect biodiversity in arid ecosystems of the UAE remains under-sampled, particularly for nocturnal taxa such as Sphingidae (El-Sheikh *et al*., 2019; Hassan & Sharif, 2023) [5, 7]. Similarly, agro-desert habitats in Abu Dhabi Emirate support diverse but insufficiently documented insect assemblages (Al Dhaheri & Fadli, 2021) [2].

Habitat notes

The study area is characterized by an agro-desert ecotone comprising sandy desert habitats interspersed with irrigated agricultural patches. Vegetation is dominated by xerophytic and halophytic flora such as *Haloxylon* spp. and *Calligonum* spp., with seasonal herbaceous growth following rainfall. The extreme aridity, high summer temperatures, and strong nocturnal cooling suggest that the species does not maintain a permanent breeding population in the region.

Comparative remarks

Within the UAE fauna, *A. styx* can be distinguished from sympatric sphingids such as *Hyles lineata* and *Daphnis nerii* by its thoracic skull pattern, hindwing coloration, and forewing fasciae. Compared to *A. atropos*, it exhibits smaller size, reduced contrast in wing markings, and narrower thoracic patterning. *A. lachesis* is larger and exhibits more extensive pale abdominal scaling.

Conclusion

This study documents a confirmed occurrence of *Acherontia styx* (Westwood, 1847) from the Madinat Zayed, Al Dhafra Region of Abu Dhabi Emirate, United Arab Emirates. The record extends the known distribution of the species within the Arabian Peninsula and highlights the presence of under-documented lepidopteran diversity in desert ecosystems. Continued systematic surveys are required to better understand the occurrence and dispersal dynamics of migratory sphingid species in the region.

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Author Contributions

First Author: field collection, taxonomic identification, specimen photography, and manuscript drafting. Second Author: supervision of the study and provision of academic guidance and motivation. Third Author: supervision.

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