

Short Communication

First records of the genus *Holaptilon* (Mantodea: Gonypetidae: Gonypetinae) from Pakistan and Iraq based on citizen science observationsZohreh Mirzaee 

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Abstract. The dwarf mantid genus *Holaptilon* Beier, 1964, is a group of small, apterous, ground-dwelling mantids distributed across the Middle East, with species described mainly from Palestine, Jordan, Iran, and Turkey. The first records of *Holaptilon* from Pakistan and Iraq are here presented, based on verified citizen-science photographs. These observations expand the known distribution of the genus eastward and highlight the role of citizen science in documenting elusive mantid taxa.

Keywords: Faunistics, Distribution, Mantids, Range expansion, IUCN, Conservation

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Holaptilon Beier, 1964, comprises small-sized, apterous (wingless) mantids that inhabit rocky, semi-arid habitats and are often found under stones or in cultivated landscapes. The genus was originally established for *H. pusillum* from Jerusalem, Israel (Beier, 1964), and has since expanded to include several additional species from Iran, with a recent revision describing four new taxa and redefining its diversity (Mirzaee *et al.*, 2024). Despite this progress, records remain scarce, and much of the genus's distribution is poorly known due to its cryptic appearance, lifestyle and fragmented populations. Most species show restricted ranges in the Middle East, although *H. brevipugilis* Kolnegari, 2018 has a notably wider distribution spanning Iran and southeastern Turkey (Mirzaee *et al.*, 2024). Until now, no published records existed from Pakistan or Iraq. This study reports this genus for the first time from these countries.

Within the current taxonomic framework, the genus *Holaptilon* consists of six valid species (Mirzaee *et al.*, 2024). In terms of biogeography, *Holaptilon* is primarily distributed in the Middle East and portions of Western Asia, particularly regions characterized by arid and semi-arid ecosystems (Mirzaee *et al.*, 2024). Taxonomically, the genus is placed within the subtribe Gonypetyllina (Schwarz & Roy, 2019), a group that also contains the closely related genera *Armeniola* (Giglio-Tos, 1915) and *Gonypetyllis* (Wood-Mason, 1891). Taxonomically, the genus is classified within the subtribe Gonypetyllina (Schwarz & Roy, 2019), which also includes the closely related genera *Armeniola* (Giglio-Tos, 1915) and *Gonypetyllis* (Wood-Mason, 1891). *Holaptilon* is distinguished from these genera by its unique morphological trait: all known species are entirely apterous (wingless) in both sexes. This characteristic sets it apart from *Gonypetyllis*, which has winged males (Beier, 1930), and *Armeniola*, where females are brachypterous while males retain wings. However, recent observations suggest the possibility of entirely apterous specimens from India and Thailand; since these specimens have not been examined by mantid specialists, it remains uncertain whether they belong to *Gonypetyllis* or represent a different taxon (Shcherbakov, personal communication). Such variability could indicate intraspecific variation within populations, similar to what is observed in the species *Amantis nawai* Shiraki, 1908 within the family Gonypetidae. Therefore, while the complete absence of wings is a significant character for distinguishing *Holaptilon* from related genera, caution is warranted until further examination confirms the identity of the apterous specimens from India and Thailand. Additionally, *Holaptilon* exhibits distinctive morphological features involving the structure of the head and pronotum, particularly the shape and proportions of the pronotum relative to the head, which further aid in its identification.

Citizen-science platforms, particularly iNaturalist.org, were searched for photographs identifiable as *Holaptilon*. Records were screened for diagnostic morphological traits described in Mirzaee *et al.* (2024), including apterous body form, and characteristic habitus. The diagnosis was based on visible characteristics observed in the photographs, primarily focusing on the relationship between the Head Width (HW) and the Pronotum Width (PW), and the overall shape of the pronotum (Fig. 3). For measurement purposes, the Pronotum Width (PW) was

defined as the distance across the pronotum at its widest point between the lateral margins, while the Head Width (HW) was defined as the distance between the lateral margins of the eyes at the widest point.

In Pakistan, several observations of *Holaptilon* were documented from Islamabad. A male specimen was photographed on 6 June 2025 (iNaturalist: 290029828; 33.757°N, 73.124°E), while a nymph was recorded earlier from the same region on 15 May 2025 (iNaturalist: 277997986; 33.651°N, 73.011°E). In addition, two females were observed in August 2024: (iNaturalist: 238952180, 33.611°N, 73.005°E; iNaturalist: 238903721; 33.703°N, 73.068°E) (Fig. 1). Together, these photographs provide the first confirmed records of the genus *Holaptilon* in Pakistan (Fig. 2A). In Iraq, two observations of *Holaptilon* were documented. A female was recorded from Zurbatiyah, Badra, Wasit Governorate, on May 2025 (iNaturalist: 284510716; 33.271°N, 46.036°E), and another female was documented from Darbandikhan, Sulaymaniyah Governorate, on May 2022 (iNaturalist: 132014053; 35.213°N, 45.623°E) (Fig. 1). These represent the first published records of *Holaptilon* for Iraq (Fig. 2B). In *Holaptilon*, the pronotum is almost completely oval, short and compact, only slightly constricted before the base, and overall flat. In contrast, *Gonypetyllis* possesses a distinctly rectangular pronotum. Moreover, Beier's (1930) account of *Gonypetyllis* (*Haldwania*) *liliputana* notes that males are fully winged, whereas in *Holaptilon* both sexes are entirely wingless.

Separation from early instars of *Elaea* is also possible through pronotum structure. In *Elaea*, the pronotum is strongly and broadly dilated in the supracoxal area, often leaf-shaped, unlike the compact oval form in *Holaptilon*. Head proportions provide another clear distinction: in *Holaptilon*, the head is thick and broad, wider than the pronotum, whereas in *Elaea* and *Gonypetyllis*, the pronotum is proportionally longer than the head. Based on this combination of traits, an oval, compact pronotum, absence of wings in both sexes, and a head broader than the pronotum, the photographed specimens, especially the males, can be confidently assigned to *Holaptilon*.

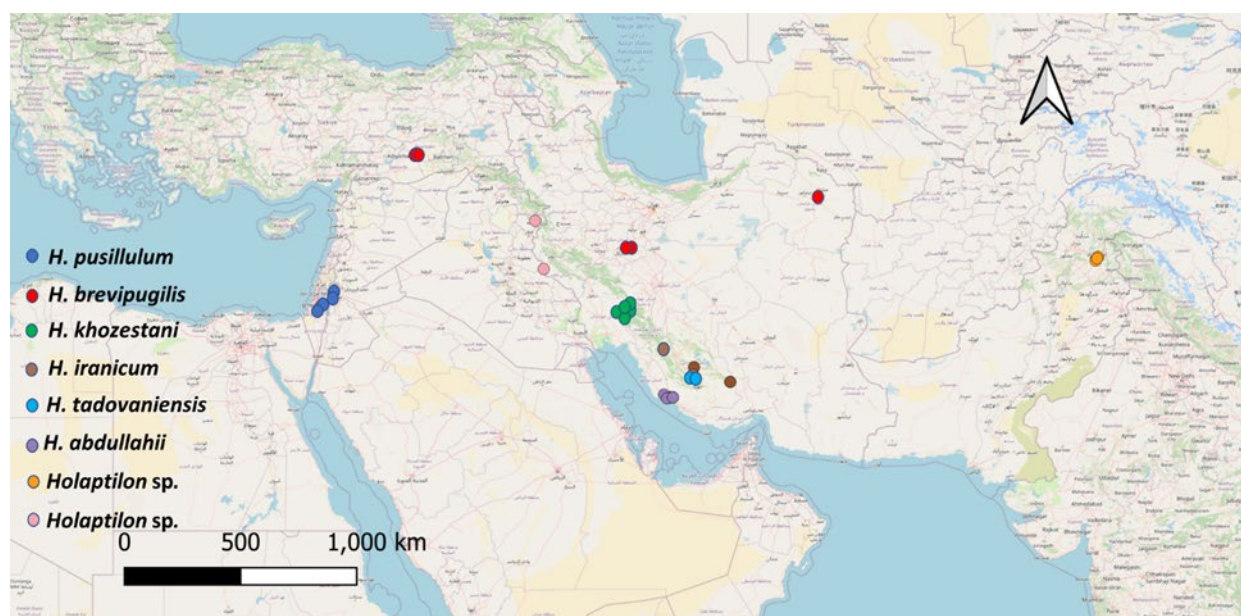


Fig. 1. Updated distribution map of the genus *Holaptilon* in the Middle East and South Asia. Colored circles represent currently recognized species based on Mirzaee *et al.* (2024), while orange colored circles indicate new citizen-science records from Pakistan and pink colored circles indicate new records from Iraq documented in this study.

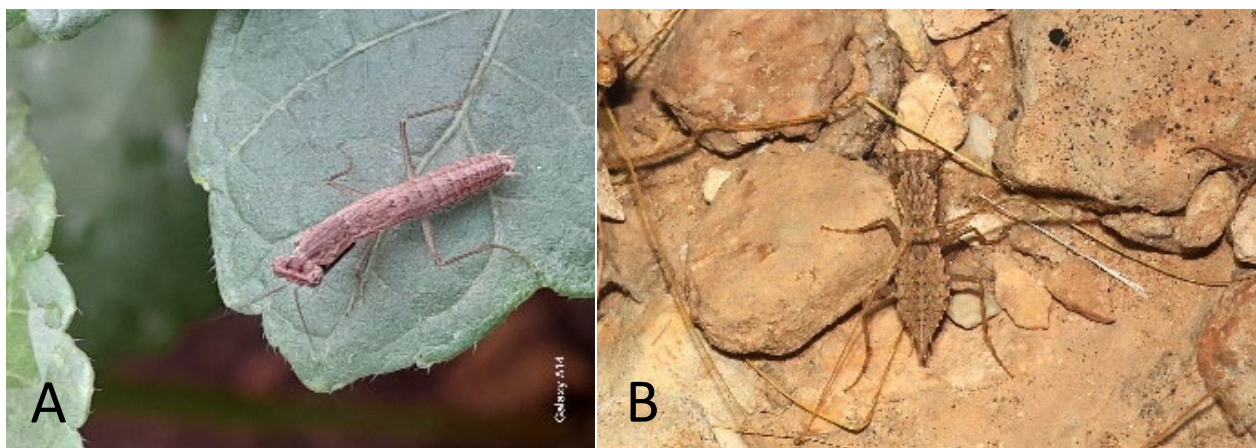


Fig. 2. Photographs of *Holaptilon*: a) specimen from Pakistan (photo credit: Iqra Munawar); b) specimen from Iraq (photo credit: Christian Langner).

Distinguishing species within groups that present complex taxonomic relationships is often difficult, particularly within the Gonypetid assemblage. In this case, the author was able to separate the genus *Holaptilon* from other Gonypetid genera by relying on several distinctive morphological traits. In Pakistan, the Gonypetid genus *Gonypetyllis* Wood-Mason, 1891 closely resembles *Holaptilon*, while in Iraq the genus *Elaea* Stal, 1877 occurs, whose early instars may show slight external similarity to *Holaptilon*. This makes careful comparative examination essential. The new records of *Holaptilon* from Pakistan and Iraq substantially extend the known range of this enigmatic mantid genus, previously documented from Israel, Jordan, Iran, and Turkey (Beier, 1964; Abu-Dannoun & Katbeh-Bader, 2007; Handal *et al.*, 2018; Kolnegari & Vafaie, 2018; Yilmaz & Sevgili, 2023; Mirzaee *et al.*, 2024) (Fig. 1). The Iraqi records bridge an important distribution gap between Iran and the Levant, while the Islamabad records mark a significant eastward extension into South Asia. The occurrence of multiple life stages and sexes in Pakistan (nymph, male, females) suggests the possible presence of a stable local population rather than isolated or accidental records.

Nevertheless, caution is required in interpreting these data. Identification of *Holaptilon* at the species level is extremely challenging. Diagnostic characters rely heavily on fine-scale morphology, particularly male genitalia, which cannot be assessed from photographs alone. Recent integrative revisions (Mirzaee *et al.*, 2024) have also shown that external morphology is often insufficient to distinguish species, making molecular evidence essential. Future research should therefore combine careful morphological examination of collected voucher specimens with DNA analyses, including mitochondrial and nuclear gene markers, to resolve species boundaries and confirm whether these new populations belong to the widespread *H. brevipugilis* or to other, possibly undescribed taxa. From a conservation perspective, *Holaptilon* species are small, wingless, and ground-dwelling, with patchy and often fragile populations restricted to semi-arid habitats. Their inconspicuous nature and fragmented ranges make them vulnerable to habitat loss, land-use changes, and environmental pressures (Mirzaee *et al.*, 2024). Despite this, virtually nothing is known about their population sizes, ecological roles, or conservation status. The new records from Iraq and Pakistan highlight the urgency of assessing the conservation situation of *Holaptilon* species more broadly. The new records from Margalla Hills (Islamabad, Pakistan), which possess a subtropical to semi-arid climate (Hussain & Lee, 2009), and Sulaymaniyah (Iraq), with its semi-arid, continental climate (Ahmed, 2016), both closely match the genus's known environmental preferences (Mirzaee *et al.*, 2024).

In these habitats, specimens were found beneath stones, or running on the ground between stones amidst rocky outcrops, or in cultivated areas. This paper therefore, suggests that future studies should prioritize field collection of specimens from new and known localities for morphological and genetic identification. Comprehensive surveys across arid and semi-arid habitats of the Middle East and South Asia are essential to establish the true distribution patterns of *Holaptilon* and to better understand its ecological requirements. The use of integrative taxonomy, combining morphological, molecular, and ecological data, will be crucial to clarify species boundaries within the genus and resolve any taxonomic ambiguities.

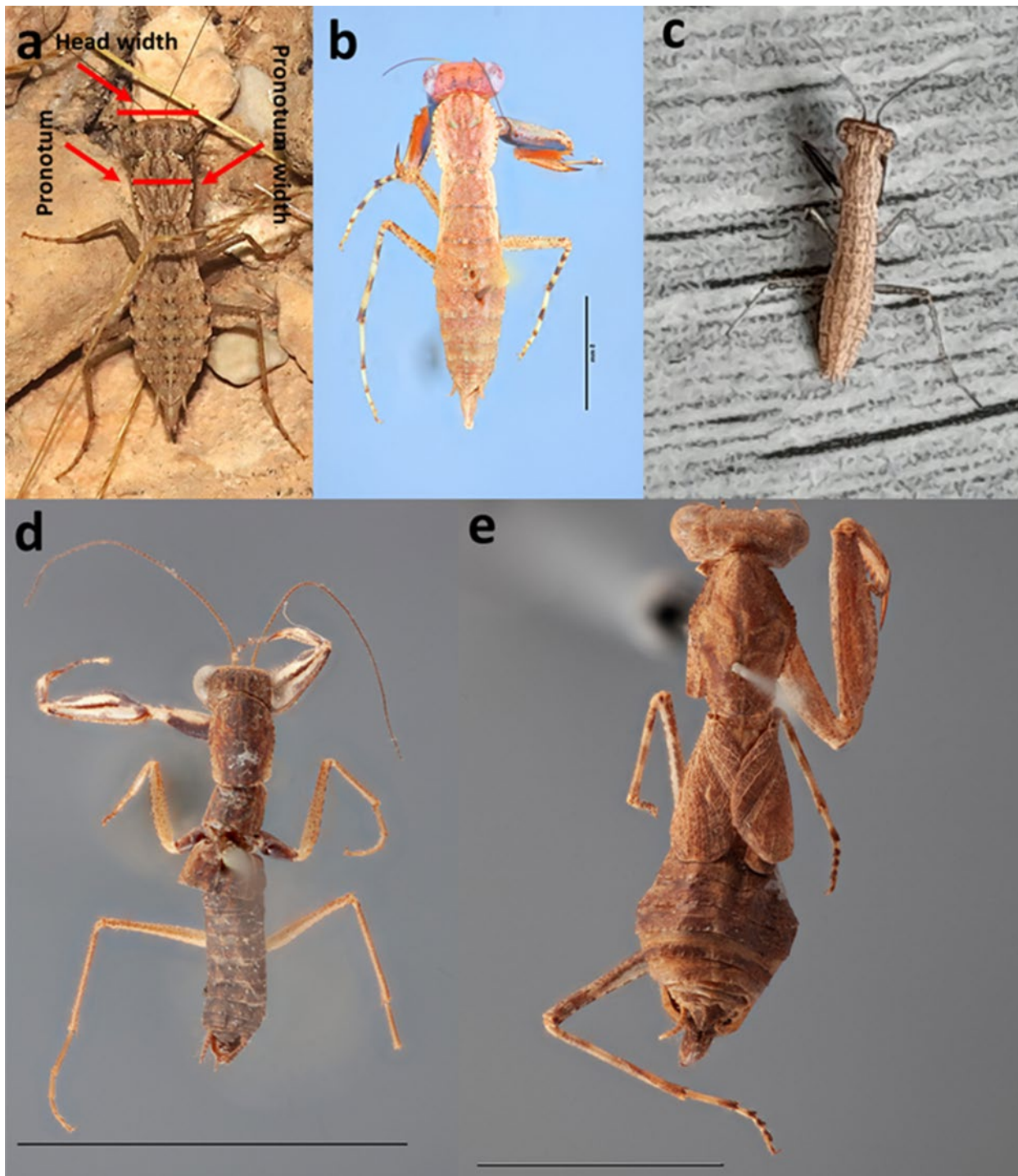


Fig. 3. Pronotum shape and the relative width of the head in compare to pronotum width in Gonypetyllina Schwarz & Roy, 2019. a) *Holaptilon* sp. from Iraq, b) *Holaptilon iranica* Mirzaee and Sadeghi, 2024 from Iran, c) *Holaptilon* sp. from Pakistan, d) *Gonypetyllis liliputana* Beier, 1930 scale bar: 10mm, e) *Armeniola laevis* Giglio-Tos, 1915 scale bar: 10mm. Photo credits: a) Christian Langner, b) Zohreh Mirzaee, c) Iqra Munawar, d and e) <https://ento360.com>

Additionally, assessments of the conservation status of *Holaptilon* using IUCN criteria, such as Extent of Occurrence (EOO) and Area of Occupancy (AOO), are necessary to identify potential threats and prioritize protection efforts for these elusive taxa. Continued integration of citizen-science data with traditional field surveys offers a cost-effective and valuable approach to monitoring the presence and abundance of rare and cryptic species like *Holaptilon*, thereby supporting ongoing conservation and research initiatives. Together, these steps will not only clarify the taxonomy of *Holaptilon* but also provide the foundation for conservation planning of this overlooked genus.

Author's Contributions

The author confirms sole responsibility for the following: conceptualization, methodology, formal analysis, investigation, draft preparation, final review and edit, visualization, supervision, project administration and funding acquisition.

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Data Availability Statement

The data supporting the findings of this study are available within the text of the manuscript.

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Ethics Approval

Insects were used in this study. All applicable international, national, and institutional guide lines for the care and use of animals were followed. This article does not contain any studies with human participants performed by any of the authors.

Conflict of Interest

The authors declare no conflict of interest.

Generative AI statement

The authors declare that no Gen AI was used in the creation of this manuscript.

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Short Communication

اولین گزارش جنس *Holaptilon* (Mantodea: Gonypetidae: Gonypetinae) از پاکستان و عراق بر اساس مشاهدات علمی شهروندی

زهرة میرزایی 

موسسه حشره‌شناسی آلمان سنکنبرگ، مونشبرگ ۱۵۳۷۴، آلمان

چکیده: جنس شیخک کوتوله *Holaptilon* Beier, 1964، گروهی از شیخک‌های کوچک، بی‌بال و زمین‌زی است که در سراسر خاورمیانه پراکنده شده‌اند و گونه‌های توصیف‌شده عمدتاً از فلسطین، اردن، ایران و ترکیه هستند. اولین گزارش‌های مربوط به *Holaptilon* از پاکستان و عراق در اینجا ارائه شده است که بر اساس عکس‌های تأیید شده توسط شهروندان ارائه شده است. این مشاهدات، پراکندگی شناخته‌شده این جنس را به سمت شرق گسترش می‌دهد و نقش علوم شهروندی را در مستندسازی گونه‌های نادر شیخک، برجسته می‌کند.

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