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## First record of an adventive hylaeine bee in Southeast Asia: The Australian *Hylaeus albonitens* (Cockerell) in Singapore (Hymenoptera: Colletidae)

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**Abstract.** Hylaeine bees are well known for their tendency to establish populations beyond their native ranges. Here we report the first record of the Australian bee *Hylaeus* (*Gnathoprosopis*) *albonitens* (Cockerell) from Singapore. This finding represents the first documented occurrence of an adventive hylaeine bee in Southeast Asia and extends the known introduced range of the species within the tropics.

### INTRODUCTION

Hylaeine bees (Hymenoptera: Colletidae) are well known for their propensity to occur outside their native ranges. Most species nest in narrow, pre-formed cavities in wood and other substrates, a life history trait that facilitates accidental human-mediated dispersal (Ascher, 2001; Ascher *et al.*, 2006; Gibbs & Dathe, 2017; Martins *et al.*, 2017; Montalva *et al.*, 2019; Michener, 2007). Consequently, numerous species of *Hylaeus* Fabricius have been reported as adventive across Europe, North America, South America, and on oceanic islands (*e.g.*, Donovan, 1983; Toro *et al.*, 1989; Ascher, 2001; Roig-Alsina, 2006; Sheffield *et al.*, 2011; Russo *et al.*, 2016; Martins *et al.*, 2017; Montalva *et al.*, 2019; Prendergast, 2020; Lugo *et al.*, 2022; Alvarez *et al.*, 2026). In parallel, rapidly expanding community-science platforms such as iNaturalist continue to document new occurrences and apparent range extensions of adventive hylaeine bees, including Australian taxa recorded outside their native ranges, for example *Hyleoides zonalis* Smith (iNaturalist, accessed 15 January 2026). Comparable reports from Asia, however, remain strikingly scarce, a disparity that may reflect incomplete documentation of regional bee faunas rather than true absence (Warrit *et al.*, 2023).

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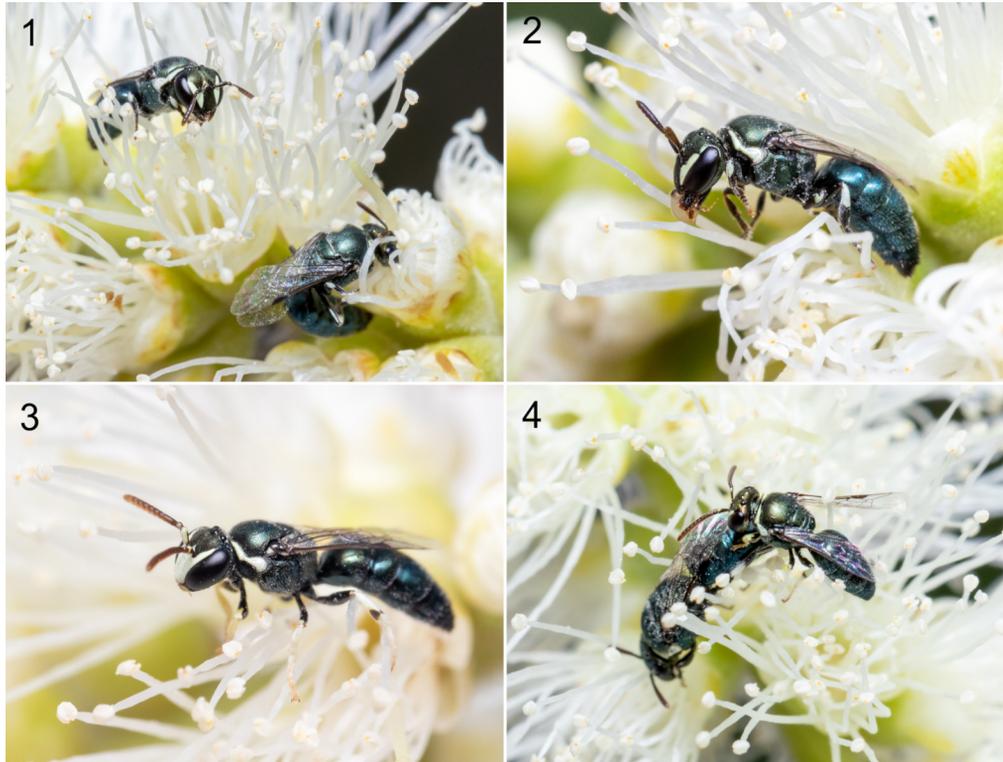
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Here, we document the Australian bee *Hylaeus (Gnathoprosopis) albonitens* (Cockerell, 1905) from Singapore (Figs. 1–4), representing the first confirmed introduction of an exotic species of *Hylaeus* into the country and, to our knowledge, the first record of an adventive hylaeine bee in Southeast Asia. The species is native to tropical and subtropical regions of mainland Australia (Houston, 1981) and has previously been recorded as adventive in Hawaii (Snelling, 2003) and New Caledonia (Zakardjian *et al.*, 2023). The occurrence of *H. albonitens* in Singapore extends this pattern of occurrence in tropical regions, consistent with climatic niche conservatism reported in many introduced taxa (Wiens & Graham, 2005).



**Figures 1–4.** *Hylaeus (Gnathoprosopis) albonitens* (Cockerell) on the inflorescences of *Melaleuca cajuputi* Powell (Myrtaceae) in Singapore. **1.** Two females. **2.** A female concentrating nectar. **3.** A male. **4.** Male attempting to mate with a female. Photos: Zestin W.W. Soh.

#### MATERIAL AND METHODS

Observations of *Hylaeus (Gnathoprosopis) albonitens* in Singapore, a highly urbanised equatorial city-state in Southeast Asia (c. 1.3° N, 103.8° E), were obtained through opportunistic field observations conducted between September 2024 and December 2025, primarily along urban streetscapes and park connector corridors in the northern and northeastern parts of the island. Bees were observed visually and documented using photographs and video recordings captured with a smartphone (Google Pixel 8) or a DSLR camera (Canon 7D Mk II fitted with a Sigma 150 mm macro lens). Observation heights were typically between 1 and 1.8 m above ground. Counts represent the maximum number of individuals observed concurrently per sex during each observation event.

Voucher specimens were collected selectively using hand nets at the locality of the first Singapore record on 8 September 2024 to confirm identification. Collected

material was examined using standard stereomicroscopy, and identifications were based on published diagnostic characters and descriptions (Houston, 1981; Michener, 2007), with comparison to reference material and published images where available. Morphological terminology follows Michener (2007). Voucher specimens in the National University of Singapore Insect Diversity Laboratory (NUS-IDL), curated by J.S.A, will be deposited in the Lee Kong Chian Natural History Museum.

Geographic coordinates were recorded in the field using GPS-enabled devices or extracted from georeferenced photographs, and a map of confirmed records was produced using ArcGIS Pro (version 3.3.2). Supplementary behavioural observations, including nesting activity, are documented using video recordings (Video S1). Host trees (*Melaleuca cajuputi* Powell) were identified following Tee & Wee (2001). To further assess whether *H. albonitens* had previously been recorded from Asia, records on the community-science platform iNaturalist were reviewed globally (iNaturalist, accessed 11 December 2025); no observations from Asia were found.

#### SYSTEMATICS

*Hylaeus* (*Gnathoprosopis*) *albonitens* (Cockerell, 1905)  
(Figs. 1–4)

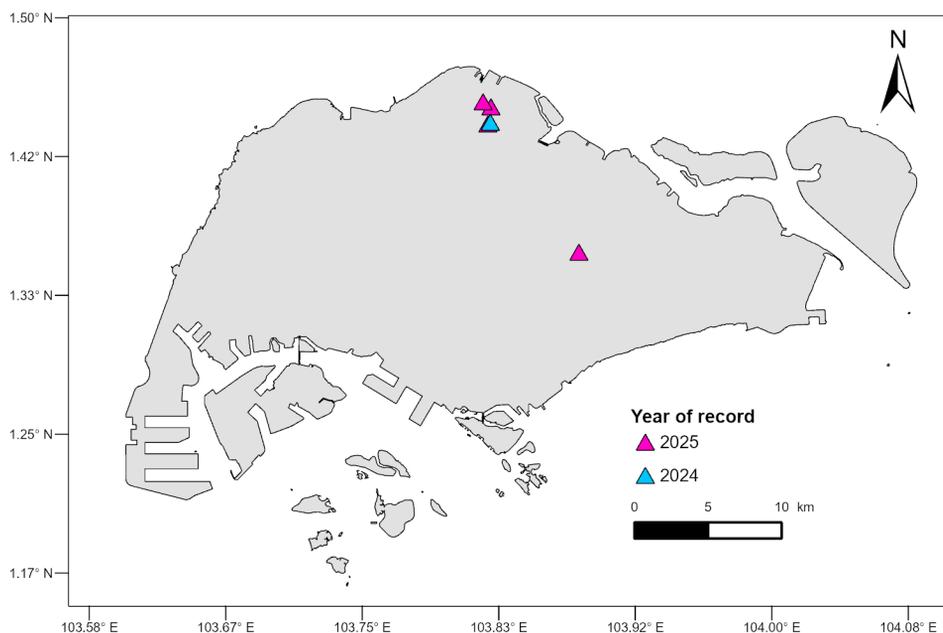
*Hylaeus albonitens* is distinguished within the subgenus *Gnathoprosopis* by a metallic blue integument, otherwise known only in *H. chromaticus* Cockerell (Houston, 1981). The Singaporean material matches *H. albonitens* in having white pronotal markings and white mandibles in males, and a metallic blue clypeus and supraclypeal area in females. In *H. chromaticus*, the pronotal tubercles and lateral edges of the pronotal collar in both sexes are bright yellow, the mandibles of males are black, and the clypeus and supraclypeal area of females are black and non-metallic (Houston, 1981). High-resolution images illustrating the habitus and diagnostic characters of both sexes of *H. albonitens* are available through the Pest and Disease Image Library (PaDIL) database (<https://www.padil.gov.au/pollinators/pest/138978>) providing a publicly accessible visual reference for future identifications; additional images along with maps of Australian occurrences of this species are available at the Atlas of Living Australia (<https://bie.ala.org.au/species/https://biodiversity.org.au/afd/taxa/adcffc13-4b4e-4f31-af60-9a55cbaac0c9#overview>).

Identifying features (adapted from Houston, 1981): ♂: Body, head, thorax, propodeum, and metasoma metallic blue, distinguishing the species from all *Hylaeus* previously recorded from Singapore, which possess a black, non-metallic integument, with the sole exception of the metallic blue *Hylaeus* sp. aff. *jacobsoni* (Friese, 1914) (morphospecies cited in Ascher *et al.*, 2022). Images of this bee and other Singapore *Hylaeus* are available in a field guide (Soh & Ascher, 2020) and in the Biodiversity of Singapore platform (<https://singapore.biodiversity.online/species/A-Arth-Hexa-Hymenoptera-000063>).

Paraocular areas (upper and lower), labrum, mandibles (except brownish apices), scape (except dorsally), pronotal collar margin (except medially), pronotal tubercles, fore tibiae, mid tibiae, bases of hind tibiae, and all basitarsi white; males of *H. sp. aff. jacobsoni* differ by having entirely dark scapes, blue (not white) pronotal collar margins, pronotal lobes, and tibiae, and dark tarsi and mandibles. Antennal flagellum yellow-brown ventrally. Face white areas glossy with sparse fine punctures; frons and vertex dull with dense fine punctures and lineo-reticulation; scutum, scutellum, mesopleura, and metasomal terga similarly sculptured but with larger, sparser punctures. Propodeal enclosure shining, very coarsely areolate; remainder of propodeum dull, weakly punctate and lineo-reticulate. Third metasomal sternum with paired spines in larger males; spines often absent in smaller males.

♀: Coloration generally as male but darker; face metallic blue with paired lateral white marks; clypeus and supraclypeal area metallic blue; mandibles, labrum and

scapes entirely black. Legs black to dark brown with a white patch at base of each tibia. Lower face dull with strong lineo-reticulation and sparse fine punctures; remaining sculpture as in male. Females of *H. sp. aff. jacobsoni* lack white facial markings and have blue (not white) pronotal collar margins and lobes.



**Figure 5.** Localities of *Hylaesus (Gnathoprosopis) albonitens* recorded in Singapore. Blue symbols indicate records from 2024; pink symbols indicate records from 2025.

**NEW RECORDS:** Singapore: 10♀♀, Yishun, Canberra Canal (1.43725, 103.82819), 5 Sep 2024, M.W.S. Ong *obs.*; 6♀♀, same locality, 6 Sep 2024, M.W.S. Ong & Y.J. Lim *obs.*; 6♀♀, 3♂♂, same locality, 8 Sep 2024, M.W.S. Ong, Y.J. Lim & Z.W.W. Soh *leg.*; 8♀♀, Yishun, Canberra Canal (1.4371667, 103.8282222), 26 Jan 2025, M.W.S. Ong *obs.*; 6♀♀, 3♂♂, Yishun, Canberra Canal (1.436194, 103.826694), 30 Jan 2025, M.W.S. Ong *obs.*; 2♀♀, 1♂, same locality, 30 Jan 2025, M.W.S. Ong *obs.*; 4♀♀, Sembawang, Canberra Walk (1.446528, 103.828560), 3 May 2025, M.W.S. Ong *obs.*; 2♀♀, Sembawang, Bukit Canberra (1.4495278, 103.8237778), 7 Jun 2025, M.W.S. Ong *obs.*; 1♀, Hougang, Flower Road (1.359239, 103.882273), 17 Sep 2025, M.W.S. Ong *obs.*; 2♀♀, same locality, 26 Sep 2025, M.W.S. Ong *obs.*; 10♀♀, 1♂, same locality, 25 Oct 2025, M.W.S. Ong *obs.*; 5♀♀, 1♂ same locality, 12 Nov 2025, M.W.S. Ong *obs.*; 15♀♀, 2♂♂ same locality, 10 Dec 2025, M.W.S. Ong *obs.*

All records were of bees foraging from cultivated, native flowering *Melaleuca cajuputi* (Myrtaceae) Powell trees occurring along urban streetscapes and urban park connectors. Counts from observations reflect the maximum number of concurrent individuals observed per sex, typically at heights of 1–1.8 m above ground. All observation events were supported by photographs and/or videos. Pairs attempting to mate were observed on 10 September 2024 (Fig. 4). On 3 May 2025, a female was recorded completing a nest in a small cavity, presumed to be beetle-bored, in the trunk of a live *M. cajuputi* tree (Video S1).

**REMARKS:** The absence of *H. albonitens* from extensive bee surveys conducted across Singapore, including sampling of *Melaleuca cajuputi* and other Myrtaceae (Ascher *et al.*, 2022), suggests recent arrival. Observations of mating behaviour and nest construction,

however, indicate that the species is likely establishing locally, with potential for further spread across Southeast Asia, warranting attention in future surveys.

To date, records of *H. albonitens* in Singapore are concentrated in the northern and northeastern part of the island (Fig. 5), exclusively on trees along open, exposed urban streetscapes and park connector corridors rather than within parks. Whether this pattern reflects habitat association or uneven survey effort remains unclear and will require broader monitoring to resolve. Nonetheless, the clustering of early records in highly modified urban environments is consistent with passive introduction via materials or live plant shipments, particularly given Singapore's role as a major international shipping hub (Yeo & Chia, 2010).

The occurrence of *H. albonitens* in Singapore is consistent with its known adventive distribution in other tropical regions (Snelling, 2003; Zakardjian *et al.*, 2023) and aligns with broader patterns of climatic niche conservatism (Wiens & Graham, 2005). However, a record from the Mediterranean-climate region south of Perth, Western Australia (iNaturalist observation 199956711; observed 19 Jan 2022), raises the possibility of either transient establishment outside the typical climatic envelope or a broader realised climatic niche.

The ecological implications of introductions of non-native solitary bees remain poorly understood, although concerns have been raised regarding potential competition with native species for floral resources and nesting sites, as well as disruption of pollination networks (Groom *et al.*, 2014; Russo, 2016). In Singapore, competitive interactions may plausibly arise through shared nesting substrates. Small cavities in wood are exploited by native solitary bees, including *Hylaeus* (*Nesoprosopis*) *penangensis* (Cockerell), which has been recorded nesting in *Melaleuca cajuputi* (Soh & Ascher, 2020), the same substrate utilised by *H. albonitens* in Singapore (Video S1). Notably, the video (00:09–00:13) documents a *Hylaeus* (*Nesoprosopis*) sp. actively searching for nest sites on the same *M. cajuputi* tree where *H. albonitens* had completed nest construction, indicating spatial overlap in nesting activity. By contrast, floral visitation records from Australia and Hawaii indicate that *H. albonitens* exhibits a broad dietary range rather than narrow specialisation on Myrtaceae (Houston, 1981; Snelling, 2003), suggesting that additional floral associations in Singapore may emerge with increased sampling.

Citizen science platforms such as iNaturalist have proven valuable for the early detection and documentation of adventive bee species elsewhere (Ruiz *et al.*, 2020; Alvarez *et al.*, 2026) and unpublished continental-level range extensions for several hylaeine species, including at least two of Australian origin, are already evident on the platform. Continued engagement by citizen scientists may therefore play an important role in detecting additional occurrences and tracking the potential future spread of *H. albonitens* in the region.

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#### SUPPLEMENTAL MATERIAL

**Video S1.** Video clip documenting nest construction by *Hylaeus albonitens* in a small cavity on *Melaleuca cajuputi* in Singapore. Recorded on 3 May 2025. Video credit: Melissa W.S. Ong. Also available via Zenodo: <https://doi.org/10.5281/zenodo.17971480>.

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A Journal of Bee Biology, Ecology, Evolution, & Systematics

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