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ORIGINAL ARTICLE

The first termitophilous ladybird beetle: *Scymnus* (*Pullus*) *tshunsii* sp. n. (Coleoptera: Coccinellidae) from *Microcerotermes* nests in Thailand

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Key words. New species, predators, Scymnini, taxonomy, termite

Abstract. Termite nests host diverse symbiotic arthropods (termitophiles), many of which exhibit specialized morphological and behavioral adaptations to life within termite colonies. While numerous beetle families include well-known termitophiles, an association with termites has not yet been recorded in the family Coccinellidae (ladybird beetles). Here, we report the discovery of *Scymnus* (*Pullus*) *tshunsii* Seki, Liang & Maruyama, sp. n., based on adults and larvae collected from nests of *Microcerotermes crassus* Snyder, 1934, in Chiang Mai and Nakhon Ratchasima, Thailand, with additional adults captured at light traps. Although the adult morphology is typical for free-living Scymnini, the larva exhibits a highly unusual, soft-bodied, glabrous body form closely resembling termite workers – an apparent case of convergent evolution also seen in termitophilous rove beetles, scarabs, and phorid flies. The stark contrast between adult and larval morphology suggests stage-specific adaptations, with larvae more intimately integrated into the termite nest environment. Collecting adults at light traps indicates nocturnal dispersal, likely to locate new host colonies. This discovery represents the first confirmed termitophilous ladybird beetle and indicates that termite nests may support previously unrecognized ecological associations within Coccinellidae.

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INTRODUCTION

Termite nests constitute some of the most stable and resource-rich microhabitats in tropical ecosystems (Noirot & Darlington, 2000; Rouland-Lefèvre, 2010). These enclosed, humid, and detritus-rich environments harbor a diverse assemblage of symbiotic arthropods – collectively known as termitophiles (Parmentier, 2019) – including flies, beetles, cockroaches, and even isopods and millipedes (Kistner, 1982; Disney & Kistner, 1997). Many termitophiles exhibit extraordinary morphological or behavioral adaptations, such as chemical mimicry, behavioral integration, or convergent termite-like body forms. Among insects, beetles (Coleoptera) are particularly well represented, with termitophilous species known in Staphylinidae, Scarabaeidae, Tenebrionidae, and other families (e.g., Seevers, 1957; Kistner, 1982; Tangelder & Krikken, 1982; Costa & Vanin 2010).

Despite the ecological versatility of the Coccinellidae (ladybird beetles), which includes predatory species as well as phytophagous and mycophagous lineages, no termitophilous species have previously been reported from the family. Most coccinellids are predators of aphids, scale insects, and other Hemiptera, and they play essential roles in biological pest control (Giorgi et al., 2009). Majerus (2016) cites an observation by J. Pasteels and includes a photograph of a ladybird larva feeding on a termite, but without supporting data or detailed documentation. In contrast, association of two ladybug species with ants have been well documented: *Diomus thoracicus* (Fabricius, 1801) inhabits nests of the invasive ant *Wasmannia auropunctata* (Roger, 1863) in French Guiana and preys on ant brood, demon-

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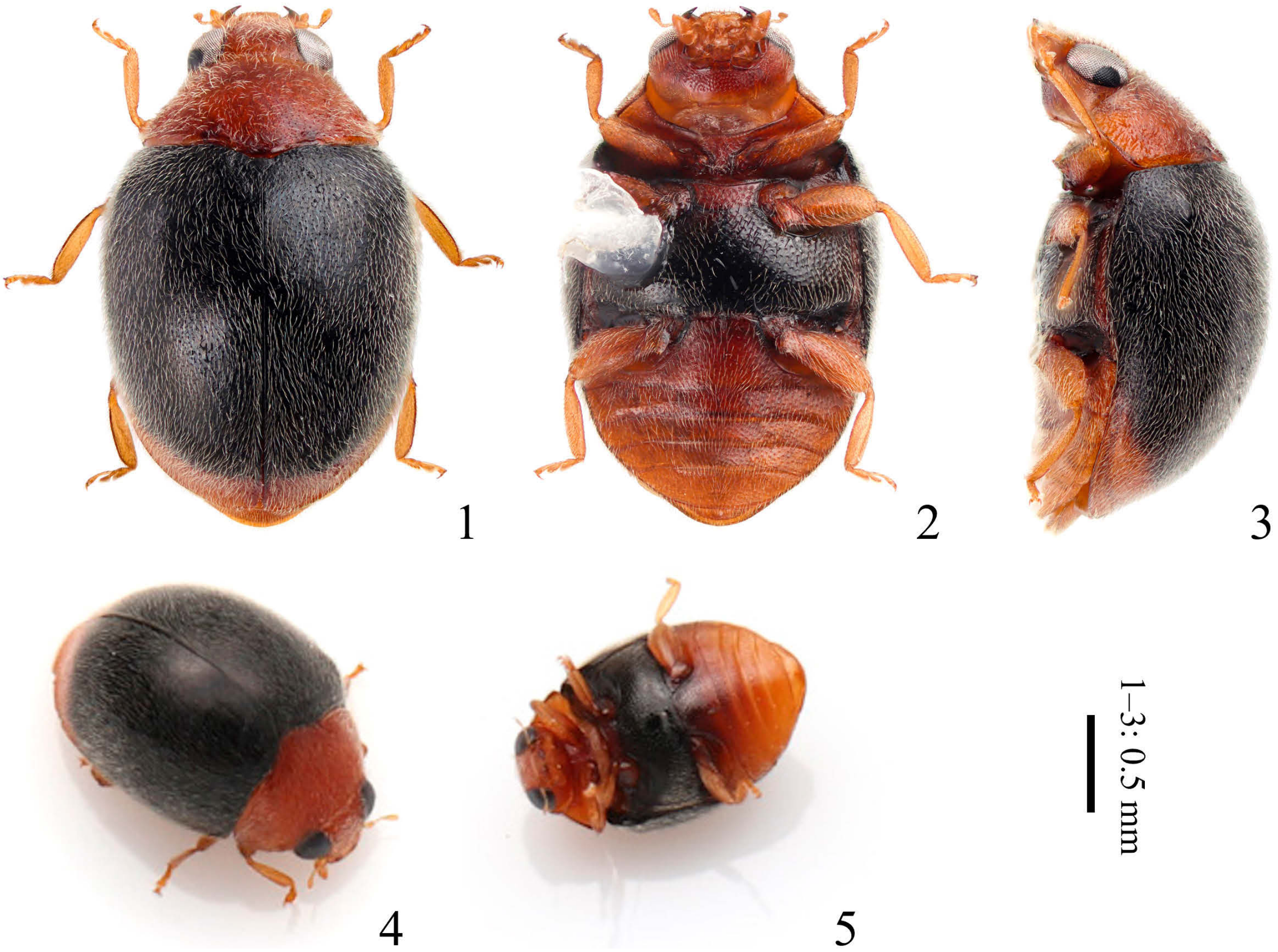


Figs 1–5. *Scymnus* (*Pullus*) *tshunsii* sp. n. 1 – dorsal view; 2 – ventral view; 3 – lateral view; 4 – alive, lateral view; 5 – alive, ventral view.

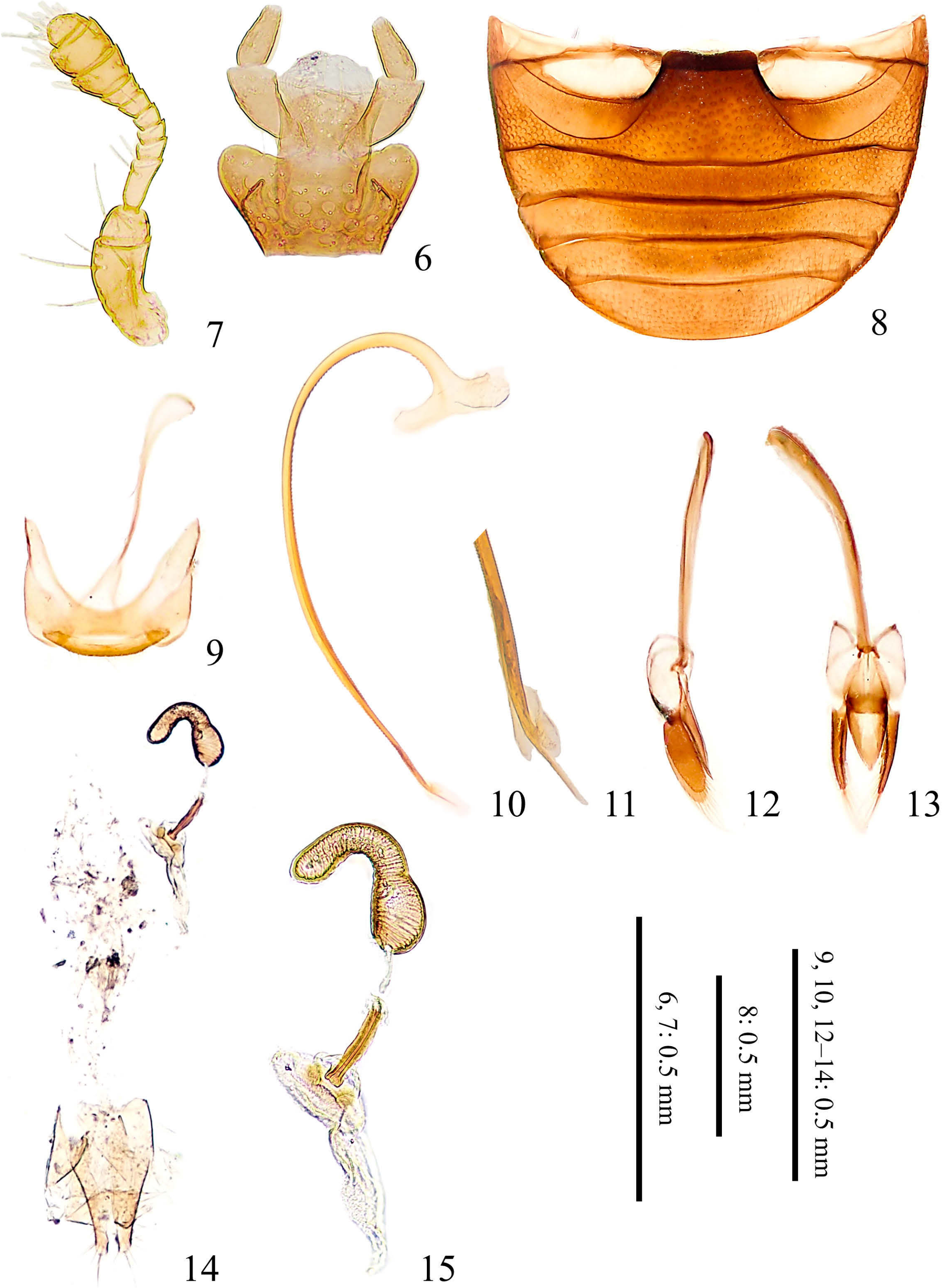
strating both myrmecophily and myrmecophagy (Vantaux et al., 2010), and *Horniolus fortunatus* (Lewis, 1896) lives inside ant nests and feeds on root mealybugs (Yoshitomi, 2023). In addition, several other ladybird species have been reported in association with ants, but most of these records are based on occasional observations, single collections, or indirect evidence, and their ecological status remains uncertain. Such cases have been summarized by Vantaux et al. (2012) and reviewed by Majerus (2016), but few have been supported by repeated observations demonstrating stable myrmecophily.

During recent entomological surveys conducted in Chiang Mai and Nakhon Ratchasima, Thailand, we discovered both adult and larval stages of a previously undescribed *Scymnus* species residing in termite nests. Most specimens of both immature stages and adults were collected from the nests of *Microcerotermes crassus* Snyder, 1934. The adult morphology is generally consistent with other Scymnini species, whereas the larva exhibits a particularly striking morphology: soft-bodied, pale, and plump, with a remarkable resemblance to termite workers in both texture and overall appearance.

Here, we describe a new species of *Scymnus* that is the first confirmed termitophilous species within the family Coccinellidae. The concurrent discovery of both adult and larval stages provides a rare opportunity to examine differences in morphology and ecological adaptation between developmental stages in a beetle associated with social insects. This finding significantly expands the known ecological range of ladybird beetles and highlights the hidden biodiversity present in social insect nests – a habitat that is still underexplored, even in well-studied insect groups.

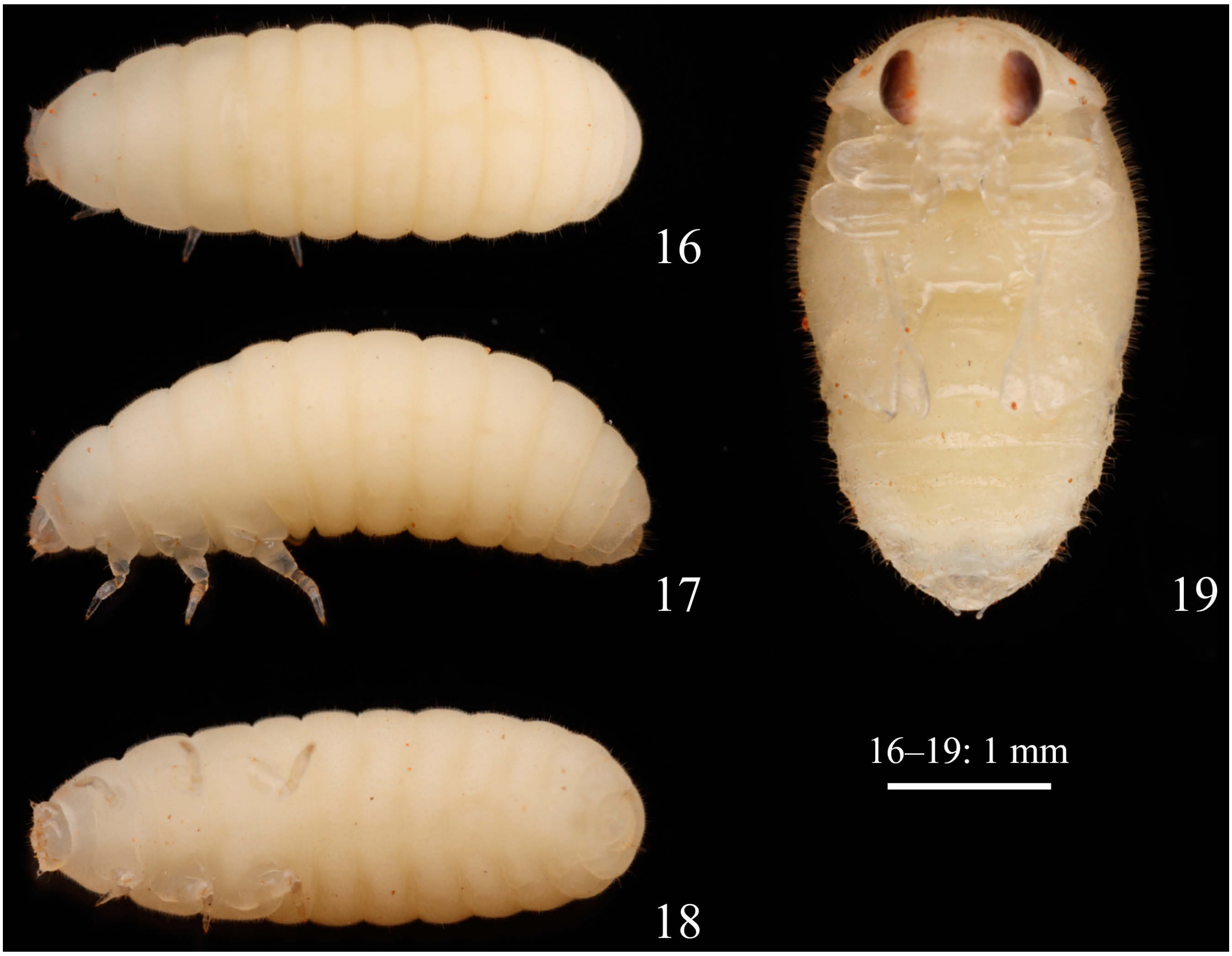
MATERIAL AND METHODS

The type series was collected from Doi Suthep National Park, and Sakaerat Biosphere Reserve (Environmental Research Station), Thailand. The adult specimens are preserved as dried specimens, and the larval specimens are in 80% ethanol. Material studied by the authors is deposited at the Department of National Parks, Wildlife and Plant Conservation, Thailand (DNP), the Kyushu University Museum in Fukuoka, Japan (KUM), National Museum of Natural Science, Taiwan (NMNS), and Queen Sirikit Botanic Garden, Thailand (QSBG). Male and female genitalia were dissected, cleaned by boiling in a 10% KOH solution for several minutes at 65°C, and the external morphology was observed using a dissecting stereomicroscope (Nikon SMZ 1500). Measurements were made using an ocular micrometer: TL = total length, length from apical margin of clypeus to apex of elytra, TW = total width, width across both elytra at widest part, TH = height measured across the highest point of the elytra, HW = head width in frontal view, PL = pronotal length, from middle of anterior margin to base of pronotum, PW = pronotal width at widest part, EL = elytral length, from apex to base including scutellar shield, EW = elytral width, equal to TW.



Figs 6–15. *Scymnus* (*Pullus*) *tshunsii* sp. n. 6 – labium; 7 – antenna; 8 – abdomen; 9 – abdominal segments IX and X; 10 – penis; 11 – penis apex; 12 – tegmen, lateral view; 13 – tegmen, ventral view; 14 – female terminalia and genital track; 15 – spermatheca.

Images of adults were mainly captured using a Laowa 25 mm macro lens mounted on a Canon EOS 9000D digital camera. The resulting image data were combined using Combine ZP (Alan Hadley), processed in Adobe Photoshop Lightroom (Adobe Systems) and GIMP 2.10.38, and arranged as figures. For scanning electron microscopy (SEM), larval specimens were dried using Hexamethyldisilazene (Nation, 1983) and mounted on a SEM stub and examined as sputter-coated specimens using a JCM-6000PLUS (JEOL). Maps were generated using QGIS (Quantum GIS, version 3.34.15, QGIS Development Team), an open-source geographic information system. Geographic coordinates recorded during field surveys were plotted onto base maps, and relevant distributional data were visualized to illustrate species occurrences and sampling localities. Morphological terminology follows Ślipiński (2007), Celli et al. (2021) and Poorani (2023). The generic names *Scymnus* Kugelann, 1794 and *Sasajiscymnus* Vandenberg, 2004 are abbreviated as *S.* and *Sa.*, respectively.



Figs 16–19. *Scymnus* (*Pullus*) *tshunsii* sp. n. 16 – larva, dorsal view; 17 – larva, lateral view; 18 – larva, ventral view; 19 – pupa, ventral view.

TAXONOMY

Scymnus (*Pullus*) *tshunsii* Seki, Liang & Maruyama sp. n.

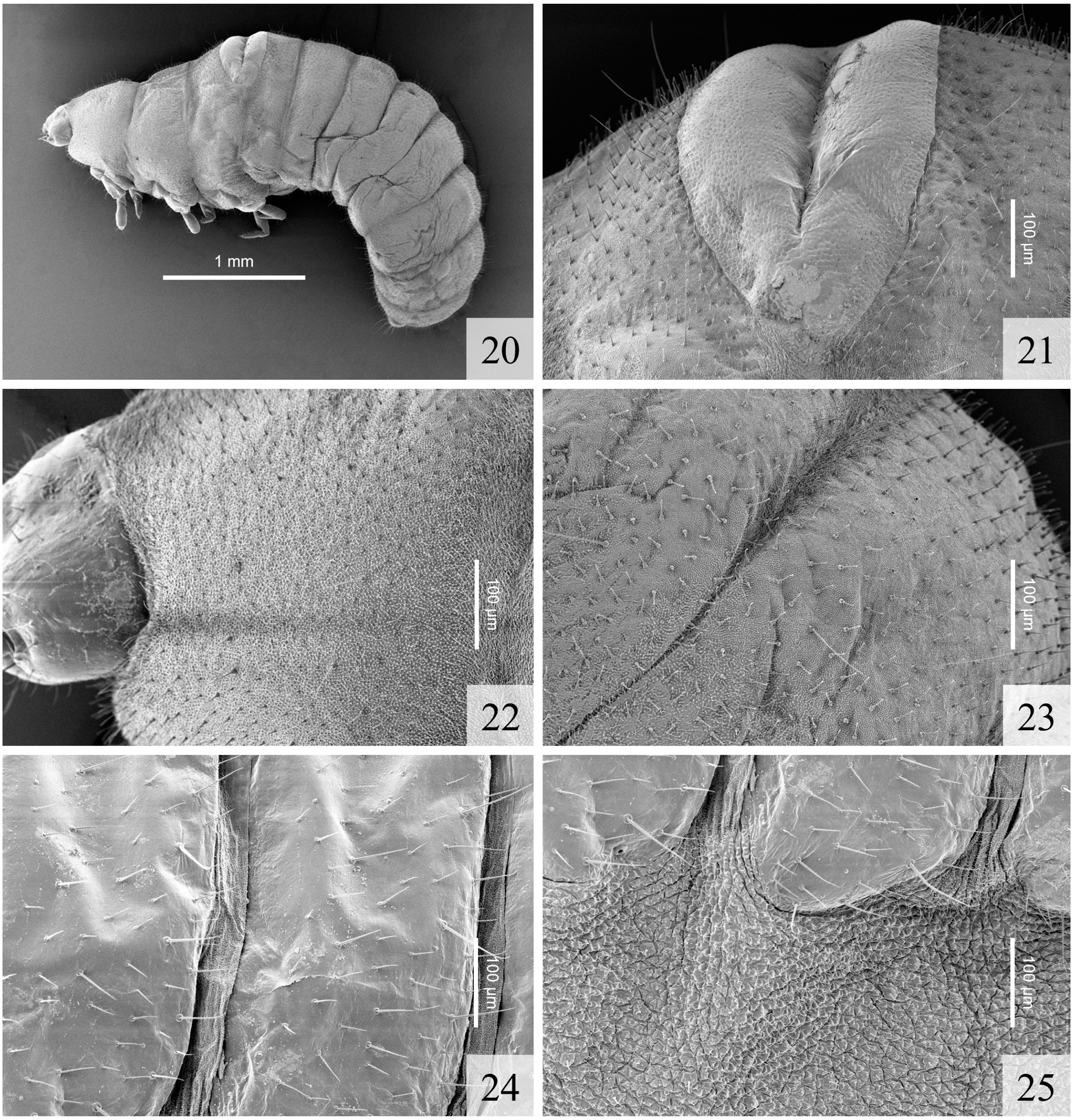
Figs 1–23, 26, 32–34

ZooBank taxon LSID:
BFCAA38C-FAAF-41B9-ACB3-57260D23CFA3

Diagnosis. *Scymnus* (*Pullus*) *tshunsii* sp. n. is similar in external coloration to many species of Scymnini (e.g., Sasaji, 1971; Chen et al., 2015a, b; Wang & Chen, 2022), but can be readily distinguished by the structure of the genitalia. This species is placed in the subgenus *Pullus* Mulsant, 1846 based on the combination of the following characters: antennae composed of 11 antennomeres, prosternal process with well-developed lateral carinae, abdominal postcoxal lines recurved and complete, and female genitalia with a distinct infundibulum (Chen et al., 2015a). Chen et al. (l.c.) divided the subgenus *Scymnus* (*Pullus*) from mainland China and Taiwan into *S. hingstoni*, *S. subvillosus*, *S. impexus*, *S. perdere*, and *S. sodalis* groups. The new species lacks a prominent dorsal keel on the penis guide of the tegmen, and the penis capsule is of normal size with both inner and outer arm, corresponding to the situation found in the *S. impexus*, *S. perdere*, and *S. sodalis* groups. However, the tip of the penis has a slightly more complex structure, with a sharply pointed apex and a distinct fleshy area just before the tip that is absent from all species of the above species groups.

Description. TL, 2.49–2.69 mm; TW, 1.75–1.97 mm; TH, 1.26–1.40 mm; TL/TW, 1.36–1.43; PL/PW, 0.53–0.60; EL/EW, 1.05–1.09; HW/PW, 0.57–0.63; PW/EW, 0.72–0.76.

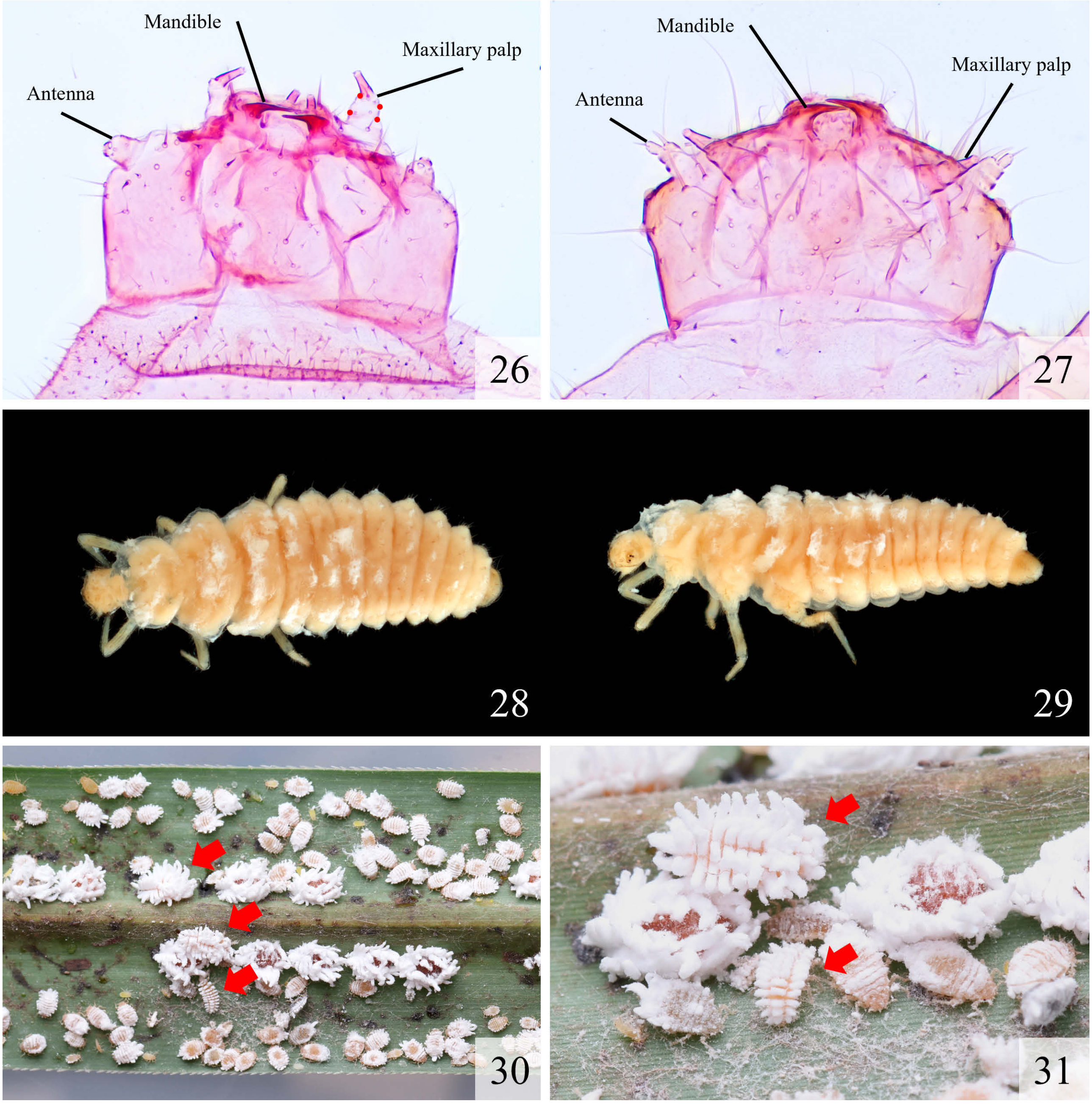
Body (Figs 1–5) oval, dorsally convex, densely covered with silvery-white pubescence. Head, antennae, and mouthparts yellowish brown; apex of mandibles dark brown. Pronotum yellowish brown to reddish brown. Scutellar shield black. Elytra (Figs 1–4) black, with narrowly yellowish brown lateral margins near the apices. Prothoracic hypomera and prosternum (Fig. 3) yellowish brown to dark brown. Mesoventrite dark reddish brown; metaventrite and elytral epipleura (Fig. 3) black. Legs (Figs 1–5) yellowish brown. Eyes (Fig. 2) large, composed of fine facets; interocular distance about 0.42× as wide as head. Mentum (Fig. 6) with large and distinct punctures. Antennae (Fig. 7) short, shorter than between eyes, 11-segmented, with apical three segments forming a distinct club. Punctures on head and pronotum fine and dense. Punctures on elytral surface somewhat coarser, irregularly distributed, and larger than those on the pronotum.



Figs 20–25. Surface structures of the larva of *Scymnus* (*Pullus*) *tshunsii* sp. n. and the worker of *Microcerotermes crassus* Snyder, 1934. 20–23 – *Scymnus* (*Pullus*) *tshunsii* sp. n. (20 – ventral view; 21 – dorsal metanotum to abdominal segment 1 (S1) junction; 22 – antero-lateral part of the prothorax; 23 – posterior dorsal part of the abdomen); 24–25 – worker of *Microcerotermes crassus* Snyder, 1934, lateral view.

Prosternal intercoxal process (Fig. 4) broad; carinae moderately separated, distinctly divergent posteriorly. Abdomen (Fig. 8) yellowish brown. Abdominal postcoxal lines (Fig. 8) complete or slightly interrupted medially, strongly arcuate, reaching about one-fifth length of ventrite 1. Area enclosed by lines irregularly punctate with fine, inconspicuous punctures; surface broadly smooth along the lines. Punctures on median part of ventrite 1 dense and evenly distributed. Wings well developed.

Male terminalia and genitalia. Abdominal segments: Tergite IX (Fig. 9) long, slightly curved, sternite IX (Fig. 9) thick and short. Spiculum gastrale of sternite IX (Fig. 9) broadened at both base and apex. Tergite X (Fig. 12) transverse, apex slightly curved. Penis (Figs 10–11) robust, penis capsule with distinct inner and outer arms. Penis apex slender, with membranous lobes on each side near tip (Fig. 11). Penis guide of tegmen (Figs 12–13) subtriangular in lateral view, apex acute, shorter than parameres. In ventral view, penis guide thick, symmetrical, widest at base, gradually narrowing toward apex. Parameres (Figs 12–13) thick, apices bearing several setae.



Figs 26–31. Comparison of larval and pupal morphology of termitophilous *Scymnus* (*Pullus*) *tshunsii* sp. n. and free-living *Sasajiscymnus kurohime* (Miyatake, 1959). 26 – head of *Scymnus* (*Pullus*) *tshunsii* sp. n.; 27–31 – *Sasajiscymnus kurohime* (Miyatake, 1959): 27 – head; 28 – dorsal view; 29 – lateral view; 30–31 – living larvae (red arrow) and pupa on Poaceae.

Female genitalia. Coxites (Fig. 14) elongate, apices bearing several stout setae. Styli distinct, with several long setae at apex. Spermatheca (Figs 14–15) C-shaped, strongly curved at middle. Infundibulum (Figs 14–15) sclerotized, elongate.

Fourth instar larva (Figs 16–18, 20–23, 26, 33–34): Length 3.8–4.0 mm; width 1.4 mm. Body elongate, cylindrical and tapered; surface with fine circular irregularities and dense microsetae; color white (Figs 16–18). **Head** white, sparsely covered with setae, lacking long setae, with only single stemma just behind antenna (Figs 17, 20, 26). **Antenna** with three antennomeres, very short and without long setae (Fig. 26). **Mandible** with single apical tooth, strongly curved with sharply pointed apex (Fig. 26). **Maxillary palp** with three palpomeres (Fig. 26). **Thorax** Pronotum milky white, with dense microsetae, U-shaped towards anterior margin (Figs 16–17). Mesonotum milky white, with dense microsetae (Figs 16–17). Metanotum milky white, with dense microsetae; dorsal surface with transverse gland opening-like structure (Fig. 21) at junction with abdominal segment 1 (S1); its surface finely punctate and glabrous (Figs 20–21). **Legs** milky white, short, with fine setae (Figs 17–18). **Abdomen** white, with nine segments (Figs 16–18, 20). Segments S1–S8 with microsetae; each segment with pair of long setae on central part of dorsal and ventral surfaces; with pair of anterolateral spiracles

Figs 32–37. Habitat of *Scymnus* (*Pullus*) *tshunsii* sp. n. 32–34 – *Scymnus* (*Pullus*) *tshunsii* sp. n. (32 – adult; 33–34 – larvae); 35 – soldier of *Microcerotermes crassus* Snyder, 1934; 36 – forest environment; 37 – mound of *Microcerotermes crassus* Snyder, 1934.

similar to those of mesothorax (Figs 16–18, 20, 22–23). Segment S9 with approximately 10 setae.

Pupa (Fig. 19): Length 3.7 mm; width 2.2 mm. Body white, glabrous, and entirely exposed (without larval exuviae).

Type material. Holotype: THAILAND: NAKHON RATCHASIMA: 1♂, Udom Sap, Wang Nam Khiao District, Sakerat Biosphere Reserve (el. 530 m), [14.49°N, 101.92°E], (UV-LED), 30.vi.–3.vii.2024, S. Kakizoe leg. (DNP). **Paratypes:** CHIANG MAI: 1♂, 1♀, 3 exs., 2 exs. (pupa), 1 ex. (larva), Mueang Chiang Mai District, Doi Suthep National Park, near View Point [18°47′30.5″N, 98°55′59.2″E], 4.xi.2022, C.-I Chiu, W.-R. Liang & Y.-Z. Huang leg. (KUM, QSBG, NMNS). NAKHON RATCHASIMA: 1♀, 1 ex., Udom Sap, Wang Nam Khiao District, Sakaerat Silvicultural Research Station (alt. 530–540 m) [14.506°N, 101.906°E], 2.vii.2024, M. Maruyama leg. (KUM); 1 ex. (larva), same locality, altitude, coordinate and date but S. Kakizoe leg. (KUM); 3♂, 5♀, 4 exs., Udom Sap, Wang Nam Khiao District, Sakerat Biosphere Reserve (el. 530 m) [14.49°N, 101.92°E], (UV-LED), 30.vi.–3.vii.2024, S. Kakizoe leg. (KUM, DNP); 2♂, 1♀, 1 ex. (larva), same locality but (alt. 485–535 m) [14.50°N, 101.91°E], 1.vii.2024, M. Maruyama leg. (KUM); 1 ex., same locality, altitude, coordinate and date but T. Hashizume leg. (KUM); 1 ex. (larva), same locality, altitude and coordinate but 2.vii.2024, R. Seki leg. (KUM); 1 ex., 3 exs. (larva), same locality, altitude, coordinate and date but T. Shimada leg. (KUM); 1 ex. (larva), same locality and collector but 3.vii.2024 (KUM).

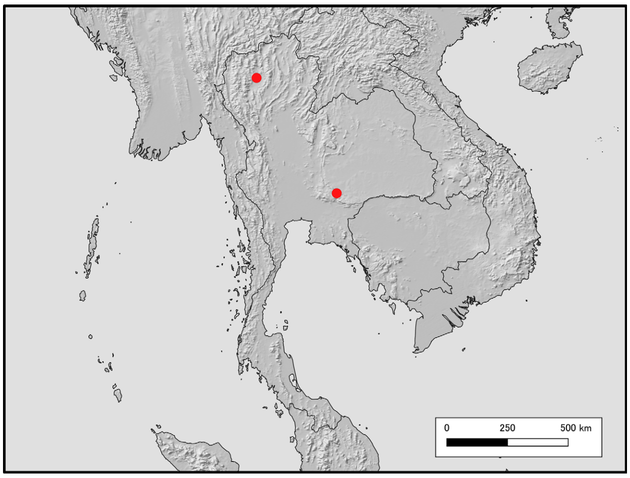


Fig. 38. Distribution map of *Scymnus* (*Pullus*) *tshunsii* sp. n. (red point).

Type locality. Thailand, Nakhon Ratchasima.

Etymology. The species is named after Tshun-Sî, the son of Wei-Ren Liang, the second author. His name, meaning "sowing in spring," reflects the hope for the flourishing of future studies on termitophily in Thailand following this groundbreaking discovery.

Distribution. Thailand (Chiang Mai, Nakhon Ratchasima) (Fig. 38).

Biology. This species was collected from the nests of the termite *Microcerotermes crassus* Snyder, 1934 in Thailand (Figs 36–37). Both adults and immature stages (larvae and pupae) were repeatedly found inside termite nests at multiple localities in Chiang Mai and Nakhon Ratchasima, indicating a consistent association with the host termite rather than an incidental occurrence.

In Chiang Mai, prepupal larvae were collected directly from within a termite nest and successfully reared to adulthood under laboratory conditions. This rearing experiment provides unequivocal evidence that the larvae and adults described here are conspecific.

Although several adult specimens were also collected at light traps outside termite nests, no larvae or pupae were ever found outside the nests. The adults collected at light are therefore interpreted as dispersing individuals, likely engaged in nocturnal flight to locate new host colonies. Further details on ecology and in-nest behavior are provided in the Discussion section.

Remarks. In this study, the larval morphology of *Scymnus tshunsii* sp. n. (Figs 16–18) was compared with that of *Sasajiscymnus kurohime* (Miyatake, 1959). As seen in *Sa. kurohime*, most species of the tribe Scymnini are typically covered with thick waxy secretions (Figs 28–31). In contrast, the larva of *S. tshunsii* sp. n. exhibits a highly specialized feature that entirely lacks such secretions and waxy glands. Furthermore, the pupa (Fig. 19) is distinctive in being completely exposed, lacking the cover by larval exuviae typically encrusted with waxy secretions. In addition, the larval segments of *S. tshunsii* sp. n. (Figs 16–18, 20–23) are not markedly protuberant, and the body setae are extremely fine. The dorsal junction between the metanotum and the abdominal segment 1 (S1) possesses a unique surface structure (Figs 20–21). These atypical morphological features are likely associated with the specialized life history of this species inhabiting termite nests.

DISCUSSION

The discovery of *Scymnus* (*Pullus*) *tshunsii* sp. n. within termite nests provides the first evidence of termitophily in the family Coccinellidae, suggesting that termite colonies can also act as specialized habitats for certain ladybird beetles. During our survey in Thailand, all immature stages of this new species, including larvae, prepupae and pupae, were collected from deep within the nests of *Microcerotermes crassus*, no occurrences were recorded in nests of other termite genera or in the substrates surrounding the nests (Figs 32–38). Hence, the association with *Microcerotermes crassus* does not seem coincidental and reflects a stable and ecologically significant relationship. Termitophilous insects are frequently known to exhibit high host specificity, particularly those adapted to the complex social structures and chemical environments of specific termite taxa. In this case, the exclusive association with *M. crassus* may reflect a narrow host range.

The biology and feeding habits of *S. tshunsii* remain uncertain. The larvae we collected in Chiang Mai were found in an almost abandoned nest, inhabited by only a few termites, and all larvae had already entered the prepupal stage. Therefore, we had no opportunity to observe their feeding behavior or potential interaction with termites. The family Coccinellidae exhibits a wide range of feeding habits, including predation, phytophagy, and mycophagy, and some species utilize alternative food resources such as pollen (Giorgi et al., 2009). Species of the tribe Scymnini, like other coccinellids, are predatory, feeding on aphids, scale insects, and other soft-bodied hemipterans (Pang & Gordon, 1986; Sasaji, 1998; Peng et al., 2023). Such prey are absent within termite nests. One possibility is that *S. tshunsii* preys directly upon the termite brood – particularly the soft and pale termite larvae, which are abundant and nutritionally valuable. Adult beetles are roughly the same size as the tunnels in *M. crassus* nests, suggesting they can move freely through the galleries without physical restrictions. Although direct evidence of feeding has not been observed, it is reasonable to infer that both larval and adult stages may exploit resources within the nest, either as active predators or opportunistic scavengers.

Particularly noteworthy is the morphology of the larva. Larvae of Coccinellidae typically possess tubercles, setae, and sclerotized body parts adapted for exposed or plant-associated lifestyles. In Scymnini, they are often covered with white waxy secretions (Figs 30–31), the larva of *S. tshunsii* neither secretes wax nor bears any long or projecting setae, and has a glabrous, soft, and plump body that closely resembles the abdomen of a termite worker (Figs 16–18, 20, 33–34).

In comparison with free-living larvae of Scymnini (Figs 28–29), the larva of *S. tshunsii* shows a markedly inflated and smooth body surface (Figs 16–18, 20, 33–34). Typical free-living Scymnini larvae possess strongly uneven integuments with prominent tubercles and are usually covered by thick waxy secretions (Figs 30, 31), whereas such structures are entirely absent in the present species.

Scanning electron microscope observations further revealed that, despite the overall termite-like external appearance, the fine microstructure of the larval cuticle does not closely resemble that of termite workers (Figs 20–25). However, the length of several prominent macrosetae closely matches those observed in termite larvae. Furthermore, the dorsal junction between the metanotum and the abdominal segment 1 (S1) exhibits a surface structure markedly different from the surrounding integument (Figs 20–21). Although the function of this structure remains unclear, its morphology suggests it may act as a secretory gland, potentially producing semiochemicals to deter termite attacks or provide chemical camouflage to facilitate integration within the nest. These traits likely represent specializations for life inside termite colonies (Figs 22–25). Furthermore, the stemmata (larval eyes) of *S. tshunsii* appear to be significantly reduced or simplified compared to those of free-living Scymnini (Figs 16–18, 26–29). Such visual reduction is a common trait among cavernicolous or nidicolous insects, reflecting an evolutionary response to the permanently dark environment of the termite nest.

Taken together, these larval traits, previously unrecorded among Coccinellidae, indicate a striking case of morphological convergence with other termite-associated insects. Similar body forms are known from termitophilous adults in several unrelated insect groups, including beetles (Staphylinidae: Corotocicini: Carabidae: *Neoglyptus punctulatus* (Chaudoir, 1862); Scarabaeidae: *Scarabaeinus termitophilus* Silvestri) and phorid flies (Phoridae: Termitoxeniinae) (Kistner, 1982; Disney & Kistner, 1997). The lack of external spines or pigmentation may function to reduce detection by host termites or facilitate physical and behavioral integration within the colony.

The mandibles of the larva are nevertheless well developed and robust, indicating that trophallaxis is unlikely to represent the primary feeding strategy (Figs 26–27). Instead, the larva may prey directly on termite brood, especially the soft-bodied termite larvae. In addition, the antennae of the larva are extremely short and appear reduced (Figs 26–27). This reduction may represent an adaptation to the confined nest environment, either by minimizing mechanical damage or by reducing the likelihood of attack by host termite workers.

It is worth noting that Majerus (2016) illustrated another ladybird larva feeding on termites, which likewise lacked hairs or cuticular projections and superficially resembles the larva of *S. tshunsii*. Although the larva illustrated by Majerus (2016) clearly represents a different species and its biology remains undocumented, this similarity suggests that termite-associated larval morphologies may have evolved independently more than once within Coccinellidae.

Interestingly, several mature adult specimens were also captured in light traps located outside of termite nests. This indicates that adults are capable of active nocturnal flight and may disperse at night, potentially to locate new host colonies. Although it is possible that adults might opportunistically feed on aphid honeydew, pollen or other external resources during this phase, the discovery of sexually mature individuals within the termite nests suggests prolonged residency within the colony. In coccinellids, newly emerged adults typically exhibit soft and unpigmented genitalia; therefore, the fully sclerotized genitalia observed in nest-dwelling specimens provide morphological evidence that these individuals had resided in the nest long enough to reach full maturity.

Overall, *S. tshunsii* provides a well-documented example of termitophily in Coccinellidae, characterized by pronounced larval adaptations to the termite nest environment combined with largely unchanged adult morphology. This species therefore offers a concrete basis for future comparative studies on the evolution of social-insect associations within ladybird beetles, rather than a generalized model of termite symbiosis. Further work focusing on feeding behavior, development, and interactions with host termites will be necessary to clarify the ecological role of this species within termite colonies.

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REFERENCES

Celli N.G.R., Almeida L.M., Daniel S.B. & Camila F.C. 2021: The way to maturity: taxonomic study on immatures of Southern Brazilian Coccinellini (Coleoptera: Coccinellidae) species important in biological control. — *Zoologia* **38**: e64154, 18 pp.

Chen X.-S., Huo L.-Z., Wang X.-M. & Ren S.-X. 2015a: The subgenus *Pullus* of *Scymnus* from China (Coleoptera, Coccinellidae). Part I. The *hingstoni* and *subvillosus* groups. — *Ann. Zool.* **65**: 187–237.

Chen X.-S., Huo L.-Z., Wang X.-M., Canepari C.-D. & Ren S.-X. 2015b: The subgenus *Pullus* of *Scymnus* from China (Coleoptera, Coccinellidae). Part II. The *Impexus* groups. — *Ann. Zool.* **65**: 295–408.

Costa C. & Vanin S.A. 2010: Coleoptera Larval fauna associated with termite nests (Isoptera) with emphasis on the “Bioluminescent Termite Nests” from Central Brazil. — *Psyche* **2010**: 723947, 12 pp.

Disney R.H.L. & Kistner D.H. 1997: Revision of the Oriental Termitoxeniinae (Diptera: Phoridae). — *Sociobiology* **29**: 3–118.

Giorgi J.A., Vandenberg N.J., McHugh J.V., Forrester J.A., Ślipiński S.A., Miller K.B., Shapiro L.O. & Whiting M.F. 2009: The evolution of food preferences in Coccinellidae. — *Biol. Contr.* **51**: 215–231.

Kistner D.H. 1982: The social insects' bestiary. In Hermann H.R. (ed.): *Social Insects, Vol. 3*. Academic Press, New York, pp. 1–244.

Majerus M.E.N. 2016: Myrmecophilous ladybirds. In Roy H.E. & Brown P.M.J. (eds): *A Natural History of Ladybird Beetles*. Cambridge University Press, New York, pp. 197–205.

Nation J.L. 1983: A new method using hexamethyldisilazane for preparation of soft insect tissues for scanning electron microscopy. — *Stain Technology* **58**: 347–351.

Noirot C. & Darlington J.P.E.C. 2000: Termite nests: Architecture, regulation and defence. In Abe T., Bignell D.E. & Higashi M. (eds): *Termites: Evolution, Sociality, Symbiosis and Ecology*. Kluwer Academic Publishers, Dordrecht, pp. 121–139.

Pang X.-F. & Gordon R.D. 1986: The Scymnini (Coleoptera: Coccinellidae) of China. — *Coleopt. Bull.* **40**: 157–199.

Parmentier T. 2019: Guests of social insects. In Starr C. (ed.): *Encyclopedia of Social Insects*. Springer, Cham, pp. 1–15.

Peng F., Poorani J., Booth R.G., Wang X.-M., Chen X.-S. & Anuradha C. 2023: *Slipinskiscymnus* gen. nov., a new ladybird genus of Scymnini (Coleoptera, Coccinellidae) and notes on the taxonomic status of *Keiscymnus* Sasaji. — *Zootaxa* **5325**: 97–115.

Poorani J. 2023: An illustrated guide to lady beetles (Coleoptera: Coccinellidae) of the Indian Subcontinent. Part 1. Tribe Coccinellini. — *Zootaxa* **5332**: 1–307.

Rouland-Lefèvre C. 2010: Termites as pests of agriculture. In Bignell D.E., Roisin Y. & Lo N. (eds): *Biology of Termites: A Modern Synthesis.* Springer, Dordrecht, pp. 499–517.

Sasaji H. 1971: *Fauna Japonica. Coccinellidae (Insecta: Coleoptera)*. Academic Press of Japan, Tokyo, 340 pp., 16 pl.

Sasaji H. 1998: *Natural History of the Ladybirds*. University of Tokyo Press, Tokyo, 251 pp. [in Japanese].

Seevers C.H. 1957: *A Monograph on the Termitophilous Staphylinidae (Coleoptera)*. Fieldiana Zoology 40, Natural History Museum, Chicago, 334 pp.

Ślipiński A. 2007: *Australian Ladybird Beetles (Coleoptera: Coccinellidae). Their Biology and Classification*. Australian Biological Resources Study, Canberra, 286 pp.

Snyder T.E. 1934: New termites from India. — *Indian Forest Rec. (Entomol.)* **20**(11): 1–28.

Tangelder I.R.M. & Krikken J. 1982: Termitophilous scarabs of the tribe Corythoderini: A taxonomic review (Coleoptera: Aphodiidae). — *Zool. Verhandel.* **194**: 1–114.

Vanteaux A., Roux O., Magro A., Ghomsi N.T., Gordon R.D., Dejean A. & Orivel J. 2010: Host-specific myrmecophily and myrmecophagy in the tropical coccinellid *Diomus thoracicus* in French Guiana. — *Biotropica* **42**: 622–629.

Vanteaux A., Roux O., Magro A. & Orivel J. 2012: Evolutionary perspectives on myrmecophily in ladybirds. — *Psyche* **2012**: 1–7.

Wang X.-M. & Chen X.-S. 2022: *Illustrated Handbook of Ladybird Beetles in China*. Straits Publishing House, Fuzhou, 528 pp. [in Chinese].

Yoshitomi H. 2023: Myrmecophily of *Horniolus fortunatus* (Coleoptera: Coccinellidae). — *Entomol. Sci.* **26**: e12543, 3 pp.

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