J. Entomol. Res. Soc., 26(1): 53-61, 2024 *Research Article*
Doi: 10.51963/jers.v26i1.2512 *Online ISSN:2651-3579*

A New Species of the Genus *Solva* (Diptera: Xylomyidae) and First Report of *Solva javana* (Meijere, 1907) from the Tropical Forest of Andaman Island

Debdeep PRAMANIK[1a] Atanu NASKAR[1b] Dhriti BANERJEE[1c*]

Zoological Survey of India, M-Block, New Alipore, Kolkata-700053, INDIA
e-mails: adebdeep.005@gmail.com; batanu.diptera@gmail.com; cdiptera.zsi@gmail.com
ORCID IDs: [a]0000-0003-1788-1644; [b]0000-0003-0097-318X; [c]0000-0002-2054-0165
*Corresponding author

ABSTRACT

A new species of wood-soldier fly under the genus *Solva* Walker, 1859 (Diptera: Xylomyidae) (*Solva andamanensis* sp. n. Pramanik, Naskar & Banerjee) is described from the tropical forest of Andaman Island, India. Males can be distinguished from other species by a combination of characters, specifically the ochre yellow antenna; snow-white cylindrical palpi; yellow fore coxa, one antero-dorsal bristle in fore femur, black scutellum and black hind coxa. Male terminalia is illustrated here. Furthermore, *Solva javana* (Meijere, 1907) (Diptera: Xylomyidae) is reported for the first time from Andaman Island as well as India. The difference in habitus characters between these two species is also illustrated in this study.

Keywords: Stratiomyomorpha, Wood Soldier fly, phytosaprophagous fly, nutrient recycling, island ecosystem.

Pramanik, D., Naskar, A., & Banerjee, D. (2024). A new species of the genus *Solva* (Diptera: Xylomyidae) and first report of *Solva javana* (Meijere, 1907) from the tropical forest of Andaman Island. *Journal of the Entomological Research Society*, 26(1), 53-61.

Received: August 28, 2023 *Accepted: March 05, 2024*

INTRODUCTION

Xylomyidae, commonly known as the Wood-soldier flies, is one of the less-studied families within the order Diptera, with only 132 reported species belonging to 4 valid genera currently known in the world (Woodley, 2011). However, this number has notably increased to 143 species according to Fachin & de Assis-Pujol (2016). Morphologically, adult flies of this family are identified by the presence of an elongated discal cell and a closed M3 cell in the wing. The adult flies are mainly found in forested areas and immature stages are phyto-saprophagous, usually developing under the bark of fallen trees (Webb, 1984). Taxonomic studies of this family are very scarce and most of the literatures date back to the 20th century. Earlier, the wood-soldier flies were considered as a subfamily under the family Stratiomyidae. Later, these flies were recognised as a separate family of the infraorder Stratiomyomorpha, as a sister-group of Stratiomyidae (Woodley, 1989). The naming of the family was a subject of discussion for a long time as indicated in the works of Webb (1984) and Nagatomi (1993). Initially, the wood-soldier flies was referred as family 'Solvidae', however Nagatomi (1975) suggested that the name 'Xylomyidae' should be used instead of 'Solvidae' after the separation of *Xylomya* Rondani, 1861 from *Solva* Walker, 1859 as a distinct genus. Brunetti (1923) provided the taxonomic key for 18 species of the genus *Xylomya* from Oriental region of which five species were new to science that were duly described by him – *X. nigra*, *X. nigriventris, X. inconspicua, X. intermedia* and *X. similis*. However, those 18 species were later shifted under the genus *Solva*. Steyskal (1947) was probably the first to describe the two major genera - *Solva* and *Xylomya* in detail. In the Catalog of the Diptera of the Oriental region, Nagatomi (1975) stated that 46 species occur in the Oriental region, of which 13 species (12 species of *Solva* and one species of *Coenomyiodes*) are found in India. Later, Yang and Nagatomi (1993) published a detailed account about the Xylomyidae of China. They introduced 25 new species to science from China which made the total species count in China 35 belonging to 3 genera. Daniels (1976, 1989) was a stalwart in research about Xylomyidae from Oceania's biogeographic zone. He provided a detailed diagnosis and taxonomic key of six species of genus *Solva* found in Australia and Papua New Guinea (Daniels, 1976). In recent times, Krivosheina et al (2015) introduced a new species of *Solva* from Sumatra (*S. richterae*) by rearing larva found in decaying wood. Krivosheina (2016a) discussed about the larval and adult diagnostic features of four species of *Xylomya* from Russia. The larval ecology and morphological features of genus *Solva* have also been studied by Krivosheina (2016b) while studying the insect successional stages in a decomposing wood.

The research on the family Xylomyidae in the Andaman and Nicobar Islands is lacking. The overall study on Diptera is also less from these bay islands in comparison with the mainland and no separate effort has been given to the family Xylomyidae. The Andaman and Nicobar Islands are known for their luxuriant and lush green tropical rainforest with its characteristic hot and humid tropical climate. The Middle and North Andaman Islands, from where the specimens were found are mainly composed of Moist Deciduous and Wet Evergreen forest types (FSI, 2019).

MATERIALS AND METHODS

The study is based on the collection done from 7th to 26th September 2022 in Andaman islands. Sampling was primarily done by sweep netting in the forested patches where there is above-ground litter layer and decaying wood. Collected specimens were preserved in 70% ethyl alcohol for further study. The genitalia was dissected from the specimens and cleared with water-diluted potassium hydroxide (KOH) pellets before being neutralized with acetic acid. A Leica EZ4 HD stereo microscope was used for the identification of the specimens. Images were taken with a Leica M205A stereo iso-microscope coupled with a LEICA DFC 500 camera and software Leica Application Suite LAS V3.6. The images were edited with Adobe Photoshop CC version 13.0.1. All measurements and incorporated scale bars of the images are in millimetres (mm) [1 mm = 0.001 m]. The field photographs were captured using a Nikon D7200 Digital SLR camera coupled with Nikkor 18 – 140 mm f/3.5 – 5.6 G ED VR lens.

Body length is measured from the base of the antennae to the tip of the abdominal segment and wing length from the wing base to the wing apex. Taxonomic descriptions and terminologies are based on the format of McAlpine (1981). The holotype and the paratypes are deposited in the National Zoological Collection of Diptera Section, Zoological Survey of India, Kolkata.

RESULTS

This article deals with 2 species of the genus *Solva* – *Solva andamanensis* sp. n. (Fig. 1) and *Solva javana* (Meijere, 1907) (Fig. 2). The following is a detailed taxonomic account of the 2 species.

Figure 1. Field photograph of *Solva andamanensis* sp. n.

Figure 2. Field photograph of *Solva javana* (Meijere, 1907).

Order Diptera Linnaeus, 1758

Family Xylomyidae Verrall, 1901

Genus *Solva* Walker, 1859

Solva andamanensis sp. n.

Materials examined: Holotype: ♂, Adult, Sabari Forest, Bakultala, North & Middle Andaman district, 12°29'41.7" N, 92°53'54.9" E, elevation: 27 m, 21.ix.2022, coll. by D. Pramanik. Paratypes: 4 ♂, Adult, Sabari Forest, Bakultala, North & Middle Andaman district, 12°29'41.7" N, 92°53'54.9" E, elevation: 27 m, 21.ix.2022, coll. by D. Pramanik; 1 ♂, Adult, Yeratta Forest, Bakultala, North & Middle Andaman district, 12°27'43.31" N, 92°54'2.59" E, elevation: 32 m, 20.ix.2022, coll. by D. Pramanik.

Diagnosis: Male individuals have ochre yellow antenna, snow-white palpi, black scutellum with golden-yellow hairs, yellow fore coxa, black hind coxa and brownish-yellow hind femur with a dark-brown ventral streak running along the tubercles.

Description

Body length: 5.0 – 5.5 mm, Wing length: 4.6 – 4.8 mm (Fig. 3a).

Head: 2.4 – 2.6 mm in width at its maximum extent (Fig. 3b); ocellar triangle black with golden yellow hairs (Fig. 3c); eyes black; frons 0.2 mm in width, black with dense golden yellow pile in two sides leaving a small black and bare streak in the middle (Fig. 3b). Antennal scape, pedicel and flagellum all ochre yellow; scape and pedicel with minute shining silvery hairs intermixed with few black hairs(Fig. 3d); 1st flagellar segment visibly larger than the rest (almost double in length than that of 2nd or 3rd segment). Face black with very fine whitish pollinosity; palpi snow white with small shining silver hairs (Fig. 3e); labella of same colour as of antenna with shining silver hairs intermixed with very few black hairs (Fig. 3e). From lateral view, eyes covering

almost entire length and width of the head leaving no such conspicuous genal and post genal region (Fig. 3f) however, yellow and silver hairs present in post genal region.

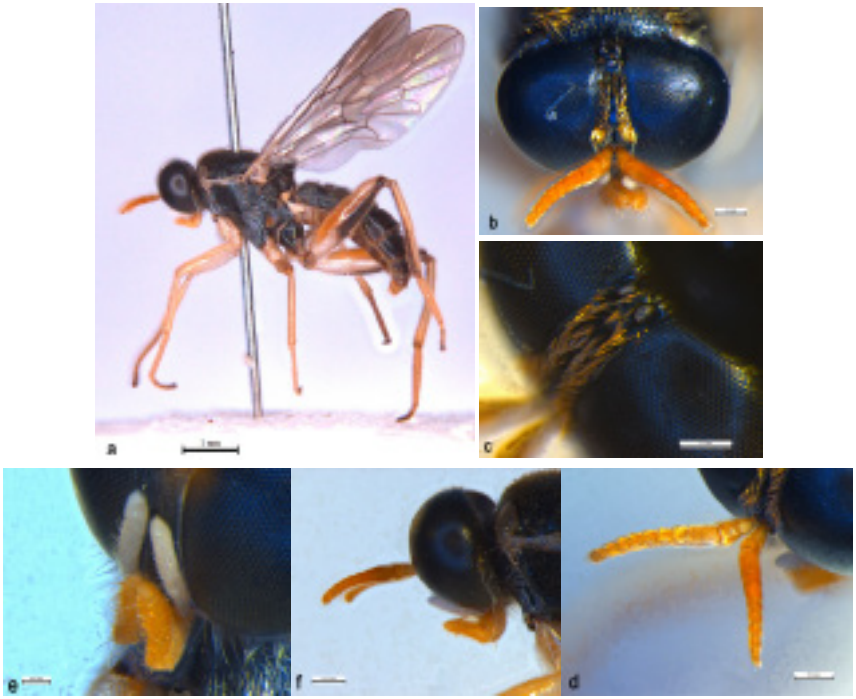

Figure 3. Morphology of *Solva andamanensis* sp. n. a) habitus, b) head (front view), c) ocelli, d) antenna, e) palpi and labia, f) head (side view).

Thorax: Entire scutum and scutellum black with golden yellow hairs (Fig. 4a). Humeral callus, notopleural stripe and base of wing pale yellow (Fig. 4b). Pleural region black with dense snow-white hairs which is very much conspicuous in sternopleuron (Fig. 4b). The snow-white pubescence also further extends to the coxae. Halteres light yellow.

Wing: Pale brownish, tip little darker, more specifically, in the region where Radial (R1, R2+3, R4 and R5) veins are meeting with the wing margin (Fig. 4c). Entire dorsal surface covered with microtrichia. The second veinlet originating from discal cell (vein M2) incomplete i.e. not reaching wing margin. Basal portion of vein A1 has short spine-like hairs. Branching point of R2+3 from R1,curved and dull coloured than rest of the vein. This makes the origin of vein R2+3 to appear somewhat broken (however, in reality, it is not broken).

Abdomen: Six tergites (T1 – T6) visible dorsally (Fig. 4d); all tergites black with light yellow pubescence throughout the length. Pubescence little denser towards the lateral sides. T1 with a membranous semi-circular spot at base, generally pale yellow to brownish. Arch of the semi-circular spot is almost touching the hind margin of T1.

Hind margins of T2 – T4 (not T1) pale yellow; T6 smaller in length (almost half) than the preceding segments. Sternites brownish yellow to deep brown with pale yellow pubescence (Fig. 4e).

Legs: Foreleg (Fig. 4f) – All segments yellow with shining snow-white pubescence from coxa to femur that is continuous with thorax pleurites; pubescence of tibia and tarsus appears light brownish when viewed at a certain angle. Femur with one antero-dorsal bristle located right at the middle of the femur. Claws dark brown. Midleg (Fig. 5a) – same as foreleg, only lacking the antero-dorsal bristle in femur. Hindleg (Fig. 5b) – Coxa black, barring a small yellowish region in posterior-distal portion just before the articulation with the trochanter. Femur brownish-yellow with pale-yellow pubescence. Presence of black small tubercles (teeth) on ventral side of the femur. A dark brown streak present on the ventral side along the tubercles covering about 2/3rd the length of the femur. Tibia brownish yellow (except the antero-ventral side) with pale yellow pubescence; antero-ventral region of tibia dark brown, more prominent in the distal half. Basitarsusyellow with shining pale-yellow pubescence; distal tarsal segments and claws dark brown.

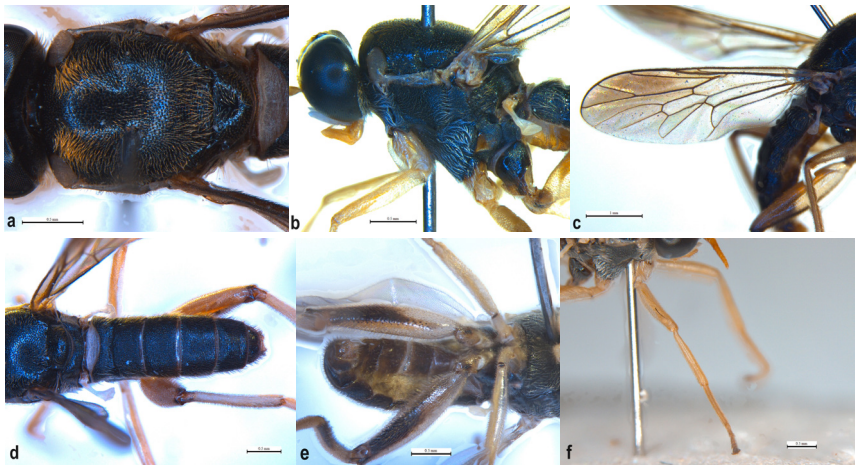

Figure 4. Morphology of *Solva andamanensis* sp. n. a) thorax (dorsal view), b) thorax (side view), c) Wing, d) abdominal tergites, e) abdominal sternites, f) fore leg.

Male terminalia: The ventral and dorsal view of the male terminalia of *Solva andamanensis* sp. n. is given (Fig. 5c and Fig. 5d respectively).

Comparative Notes: The proposed species has similarity with four species of the Oriental realm - *Solva javana* (Meijere, 1907), *Solva completa* (Meijere, 1914), *Solva nigroscutata* Meijere, 1916 and *Solva richterae* Krivosheina, 2015. These species have black streak like marking in the ventral side of hind femur like the *S. andamanensis* sp. n. But, they differ from *S. andamanensis* sp. n. in the following characteristics:- Wings of *S. andamanensis* sp. n. have brownish infuscation in the tip (Fig.4c), while *Solva javana* has comparatively clear wings (Meijere, 1907) (Fig.6c).

Solva completa has distinct palpi with gradually enlarging diameter from the base onwards (Meijere, 1914) but *S. andamanensis* sp. n. has cylindrical palpi with almost the same diameter.

The first 3 antennal segments of *Solva nigroscutata* are yellow-red and the rest of the antennae are mostly black-brown (Meijere, 1916), while the antennal scape, pedicel and flagellum of *S. andamanensis* sp. n. are all ochre yellow and 1st segment of the flagellum is visibly larger than the rest.

The scutellum of the newly described *Solva richterae* is pale yellow (Krivosheina et al, 2015) but it is black in the case of *S. andamanensis* sp. n.

From the species of the Australian zoogeographical realm as described by Daniels (1976), our proposed new species has similarities with *Solva laeta* Daniels, 1977 i.e. they both have the black streak-like marking in ventral side of the hind femur. But, they differ in the following cases:

The scutellum of *Solva laeta* is yellow (black in the case of *Solva andamanensis* sp. n.).

The wings of *Solva laeta* are hyaline (dark brownish infuscation in the wing tip for *Solva andamanensis* sp. n.).

Etymology: The species' name is based on the location from where it is collected i.e. Andaman Island.

Figure 5. Morphology of *Solva andamanensis* sp. n. a) mid leg, b) hind leg, c) male genitalia (ventral view), d) male genitalia (dorsal view).

Solva javana (Meijere, 1907)

Distribution: This species is reported to occur in Java Island.

Materials examined: 1 ♂, Adult, Sabari Forest, Bakultala, North & Middle Andaman district, 12°29'41.7" N, 92°53'54.9" E, elevation: 27 m, 21.09.2022, coll. by D. Pramanik.

Diagnosis: This species is described by Meijere (1907). Body length: 6.0 – 6.4 mm, Wing length: 5.0 – 5.2 mm (Fig. 6a). From our study we found it to be very similar to the previously described *Solva andamanensis* sp. n. except for 3 key differences:-

The 2nd to 8th segment of the antennal flagellum is black; the basal margin of those segments is narrowly yellowish (giving a ring-like appearance) (Fig. 6b); however, the antennal flagellum is completely ochre yellow in *Solva andamanensis* sp. n. (Fig. 3d). Fore femur in *Solva javana* lacks the antero-dorsal bristle.

Wing of *Solva javana* is comparatively less infuscated (Fig. 6c), whereas, in the case of *Solva andamanensis*, it has a distinguishing dark-brownish infuscation at the tip of the wing where the Radial veins are joining the wing margin.

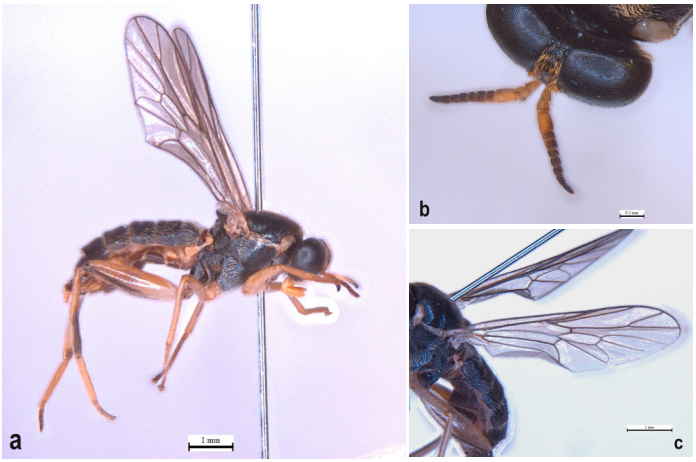

Figure 6. Morphology of *Solva javana* (Meijere, 1907). a) habitus, b) antenna, c) wing.

CONCLUSIONS

The description of a new species of *Solva* and discovery of *Solva javana* from Andaman Islands increases the species count of genus *Solva* in India from 12 to 14. The first report of *Solva javana* from Andaman Island also extends the range of this particular species which was previously reported only from Java Island. The Wood soldier flies are phyto-saprophagous in nature, in larval stages they consume dead plant materials (Webb, 1984). As the tropical forests have a carbon-rich litter layer and are a major pool of terrestrial carbon (Lalnunzira, Brearley & Tripathi, 2019), this type of habitat is apt for breeding of wood soldier flies. So, adequate survey is needed in the tropical forests of India especially in Andaman and Nicobar Islands to properly explore the Xylomyidae family.

ACKNOWLEDGEMENTS

The authors are grateful to Mr. Koustav Mukherjee, JRF, Zoological Survey of India, for assisting in the collection of specimens and taking field photographs. The authors are also thankful to Dr. C. Sivaperuman, Scientist – E & Officer-in-Charge, Andaman and Nicobar Regional Centre, ZSI for providing with essential facilities and necessary permits for conducting the survey.

REFERENCES

Brunetti, E. (1923). Second revision of the Oriental Stratiomyidae. *Records of the Zoological Survey of India*, 25(1), 45-180.

Daniels, G. (1976). The Xylomyidae (Diptera) of Australia and Papua New Guinea. J*ournal of Australian Entomological Society*, 15, 453–460.

Daniels, G. (1989). Family Xylomyidae. In Evenhuis, N.L. (Ed.). *Catalog of the Diptera of the Australian and Oceanian Regions.* (86th ed., pp. 300). Bishop Museum Special Publication (Bishop Museum Press and E. J. Brill.).

Fachin, D. A. & De Assis-Pujol, C. V. (2016). Family Xylomyidae. *Zootaxa,* 4122(1), 342-345.

Forest Survey of India. (2019). India State of Forest Report 2019. (Volume – II). Published by Ministry of Environment, Forest and Climate Change. (ISBN: 978-81-941018-0-2).

Krivosheina, N.P., Krivosheina, M.G., & Kompantzev, A.V. (2015). A new oriental species of the genus *Solva* Walker, 1859 (Diptera, Xylomyidae) with data on the larval morphology. *Entomological Review*, 95(9), 1292-1298.

Krivosheina, N.P. (2016a). Xylobiont flies of the genus Xylomya Rondani, 1861 (Diptera, Xylomyidae) from Russia. *Entomological Review*, 96, 240-254.

Krivosheina, N.P. (2016b). Necrosaprophagous insects in xylophilous communities: Larvae of the genus *Solva* (Diptera, Xylomyidae). *Entomological Review*, 96, 375-387.

Lalnunzira, C., Brearley, F. Q., & Tripathi, S. K. 2019. Root growth dynamics during recovery of tropical mountain forest in North-east India. *Journal of Mountain Science*, 16(10), 2335-2347.

Meijere, J.C.H. de. (1907). Studien uber Sudostasiatische Dipteren I. *Tijdschrift voor entomologie*, 50, 196-264.

Meijere, J.C.H.de. (1914). Studien uber sudostasiatische Dipteren. VIII. *Tijdschrift voor entomologie*, 56 (Suppl.), 1-99**.**

Meijere, J.C.H.de. (1916). Studien über südostasiatische Dipteren X. Dipteren von Sumatra. *Tijdschrift voor Entomologie*, 58 (Suppl.), 64-97.

Nagatomi, A. (1975). Family Solvidae (Xylomyidae). In Delfinado, M.D. & Hardy, D.E. (Eds.) *A Catalog of the Diptera of the Oriental Region, Suborder Brachycera through Division Aschiza, Suborder Cyclorrhapha* (Vol. II, pp. 10-13). University Press of Hawaii, Honolulu.

Nagatomi, A. (1993). Taxonomic notes on Xylomyidae (Diptera). *South Pacific Study*, 14(1), 85-93.

Steyskal, G.C. (1947). A revision of the Nearctic species of Xylomyia and *Solva* (Diptera, Erinnidae). *Michigan Academy of Science, Arts and Letters,* 31, 181-190.

Webb, D.W. (1984). A revision of the Nearctic species of the family Solvidae (Insecta: Diptera). *Transactions of the American Entomological Society*, 110, 245-293.

Woodley, N.E. (1989). Phylogeny and classification of the “orthorrhaphous” Brachycera. In McAlpine, J.F., Peterson, B.V., Shewell, G.E., Teskey, H.J., Vockeroth, J.R. & Wood, D.M. (Eds.), *Manual of Neartic Diptera*. (Vol. 3, pp. 1371–1395). Research Branch Monograph 32, Agriculture Canada, Ottawa.

Woodley, N.E. (2011). A Catalog of the World Xylomyidae (Insecta: Diptera). *Myia*, 12, 417-453.

Yang, D. & Nagatomi, A. (1993). The Xylomyidae of China (Diptera). *South Pacific Study*, 14 (1), 1–84.