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New distributional record of Heterocera from Andaman and Nicobar Islands with six new additions to Indian Lepidoptera Fauna (Insecta: Lepidoptera)

B. Sumit Kumar Rao & Chandrakasan Sivaperuman

Abstract

This paper reports six species of Heterocera belonging to family Geometridae, Notodontidae, Euteliidae, and Noctuidae viz. *Probitia imprimata* (Walker, 1861), *Ruttellerona pseudocessaria* Holloway, 1994, *Amraica solivagaria* (Walker, 1866), *Phalera sundana* Holloway, 1982, *Paectes psaliphora* Hampson, 1912 and *Iambia lyricalis* Holloway, 1989. The species stated above have been collected from different islands of Andaman and Nicobar archipelago. Furthermore, the study reveals new contributions to India's Lepidoptera fauna. Microphotographs of Adult genitalia along with species diagnosis, habitat, and the new distributional data from these islands are provided.

Keywords: Insecta, Lepidoptera, biodiversity, distribution, new record, rare records, Andaman and Nicobar Islands, India.

Nuevo registro de distribución de Heterocera en las islas Andamán y Nicobar, con seis nuevas incorporaciones a la fauna de Lepidoptera de la India (Insecta: Lepidoptera)

Resumen

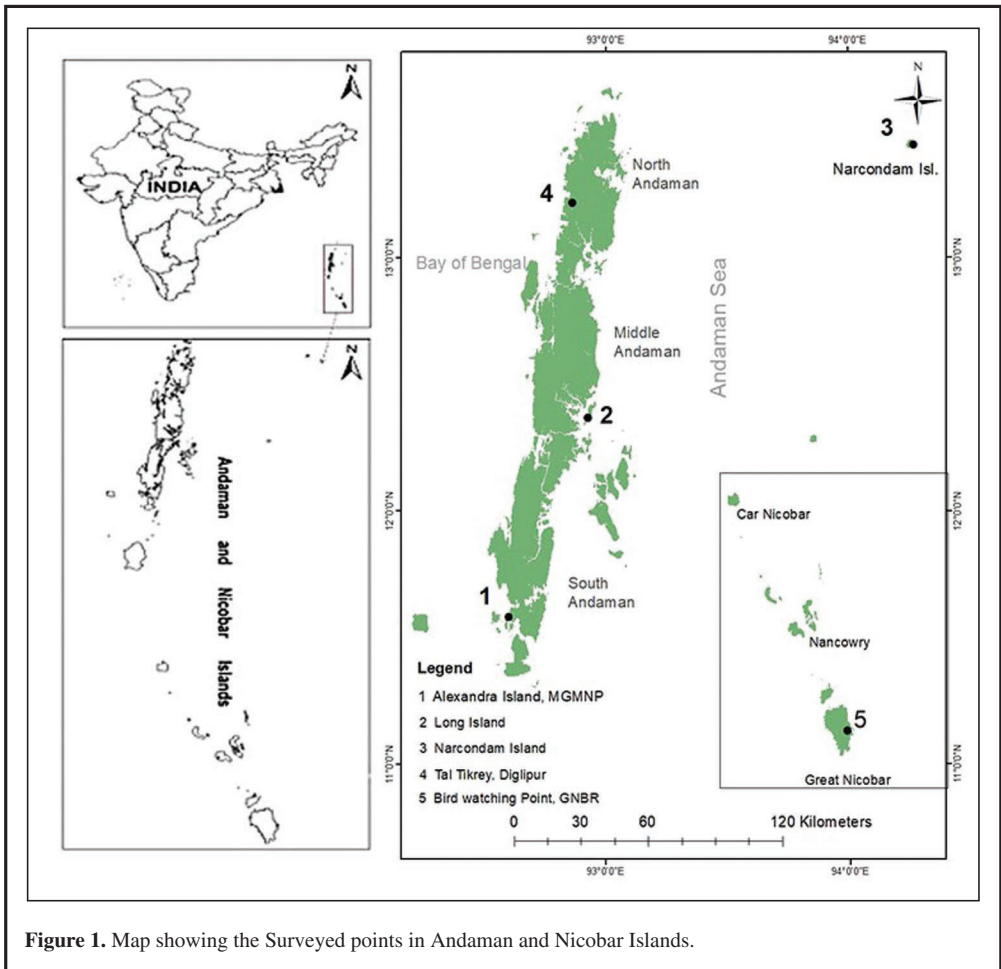
En este artículo se describen seis especies de Heterocera pertenecientes a la familia Geometridae, Notodontidae, Euteliidae y Noctuidae, a saber: *Probitia imprimata* (Walker, 1861), *Ruttellerona pseudocessaria* Holloway, 1994, *Amraica solivagaria* (Walker, 1866), *Phalera sundana* Holloway, 1982, *Paectes psaliphora* Hampson, 1912 e *Iambia lyricalis* Holloway, 1989. Las especies mencionadas, han sido recolectadas en diferentes islas del archipiélago de Andaman y Nicobar. Además, el estudio revela nuevas contribuciones a la fauna de Lepidoptera de la India. Se proporcionan microfotografías de la genitalia de los adultos junto con el diagnóstico de la especie, el hábitat y los nuevos datos de distribución de estas islas.

Palabras clave: Insecta, Lepidoptera, biodiversidad, distribución, nuevo registro, registros raros, Islas Andamán y Nicobar, India.

Introduction

The Andaman and Nicobar Archipelago consist of around 572 Oceanic Islands extending from 6° to 14° North latitudes and from 92° to 94° East longitudes and is situated in the Bay of Bengal. The northernmost Island (North Andaman) lies 285 km southwest from the mainland of Myanmar and the southernmost point, Great Nicobar lies 189 km northwest of the Sumatra coast (Ganeshaiah et al.

2019). The Andaman and Nicobar Islands are among the major biodiversity eco-regions (Indo-Burma and Sundaland hotspot) in the world (Wikramanayake et al. 2002; Krupnick & Kress., 2003). The insular nature, unique geographical setup, and physical isolation between Islands have contributed to the evolution of rich biological diversity in the region (Nayar, 1996). Like other archipelago, these tropical islands are characterized by high endemism and species diversity (Prasad et al. 2007). These islands are home to a diverse insect species. The islands' long isolation from the mainland India, as well as their pristine environment, create ideal conditions for the evolution of many locally evolved species. The Andaman and Nicobar Islands' proximity to different subregions of the oriental region has resulted in biota with Indo-Burmese and Indo-Malayan affinities, respectively (Mohanraj & Veenakumari, 2011).



Material and Method

The specimens included in the present study were collected from different Islands of Andaman and Nicobar archipelago (Figure 1) using traditional mercury vapor light traps. Adults were killed using

Ethyl acetate vapours and preserved further by standardized methods of Robinson et al. (1994). Dissections of the respective specimens (abdomen) were carried out to study Male and female genitalia, following the methodology of hashank & Benedek (2020) with little modification. After dissection and cleaning, genitalia were stained with Basic fuchsin for ten seconds. Photographs were acquired, using Leica M205FA Stereo zoom microscope and further processed in grey scale mode of Adobe Photoshop version CS6. All the materials examined in this study are deposited in the National Zoological Collection of Zoological Survey of India - Andaman and Nicobar Regional Centre.

Taxonomic Account

Family Geometridae Leach, 1815

Probithia Warren, 1894. *Novit. Zool.*, 1, 440

Type species: Type Species. *Hemerophila exclusa* Walker, 1860.

Type Locality: Hindostan (INDIA).

Probithia imprimata (Walker, 1861) (Figures 2, 8)

Acidalia imprimata Walker, 1861. *List Spec. Lepid. Insects Colln Br. Mus.*, 23, 771

Type Locality: SARAWAK.

Material examined: INDIA, Andaman and Nicobar Islands, Alexandra Island, Mahatma Gandhi Marine National Park, 11.584N, 92.601E, 8 m, 1 ♂, 19-VII-2019, Coll. B. Sumit Kumar Rao, Reg. No. ZSI/ANRC/T/13481; Andaman and Nicobar Islands, Long Island, 11.584N, 92.601E, 50 m, 1 ♂, 5-VIII-2019, Coll. B. Sumit Kumar Rao, Reg. No. ZSI/ANRC/T/13737.

Diagnosis: *Probithia imprimata* (Walker, 1861) appears similar to *P. exclusa* (Walker, 1860), but differs externally without a strong dark brown irregular band distal to the postmedial over the dorsal half of the hindwings as in *P. exclusa* and ventrally by more prominent medial and terminal markings in Fore and hindwings. Male genitalia of both species show few similarities, but *P. imprimata* differ by less setation on the lobe of the dorsal arm and comparatively long and narrow saccus. Whereas, in *P. exclusa* have dense setae on the dorsal lobe and short and stout Saccus.

Distribution: Borneo, Peninsular Malaysia, Sumatra (Holloway, 1993), India - Andaman and Nicobar Islands (Present study).

Remarks: The genus *Probithia* Warren, 1894 is represented by only six species throughout world (Parsons et al. 1999). Out of which only *P. exclusa* (Walker, 1860) is reported from India from North Himalayas and from Andaman and Nicobar. *P. imprimata* was found considerably rare in insular habitat. Both individuals were collected from under story foliage of lowland primary forest during Monsoon season. New record for India.

Ruttellerona Warren, 1894

Ruttellerona Warren, 1894. *Trans. R. Ent. Soc. Lond.*, 1894, 220

Type Species: *Boarmia cessoria* Walker, 1860 by subsequent designation by Prout, 1928.

Type Locality: CEYLON (Sri Lanka).

Ruttellerona pseudocecessaria Holloway, 1994. (Figures 3, 9)

Ruttellerona pseudocecessaria Holloway, 1994. *Malay. Nat. J.*, 47, 224

Type Locality: SARAWAK.

Material examined: INDIA, Andaman and Nicobar Islands, Narcondam Island, 13.454N, 94.271E, 25 m, 3 ♂♂, 14-V-2020, Coll. G. Gokulakrishnan, Reg. No. ZSI/ANRC/T/13739, 13740, 13741; Andaman and Nicobar Islands, Narcondam Island, 13.454N, 94.271E, 25 m, 5 ♂♂, 16-XI-2020, Coll. Dr. Naveen Kumar Nigam and Apurba Kumar Das, Reg. No. ZSI/ANRC/T/13907, 13908, 13909; 13910, 13911.

Diagnosis: *Ruttellerona pseudocecessaria* Holloway, 1994 is closely similar to *R. palliostaria*

externally but, the males differ by latter by comparatively more fasciated appearance and less irrorated fore wings and hindwing postmedial. *R. pseudocessaria* shows a significant difference in the male genitalia from its Indian Congeners in uncus with lateral horns; costal end projection of the transverse sclerotized band on the valve and a broadly and obliquely spined lobe at the saccular end (Holloway, 1994).

Distribution: Oriental tropics east to Seram (Holloway, 1993), Sri Lanka, Taiwan (India - Andaman and Nicobar Islands (Present study).

Remarks: The genus *Ruttellerona* Swinhoe, 1894 is presently known by only eleven species and two subspecies in this globe (Parsons et al. 1999). Kirti et al. (2019) listed only two species of this genus from India, namely *Ruttellerona cessaria* (Walker, 1890) and *R. pallicostaria* (Moore, 1868) in their consolidated checklist of Indian Geometridae. This species is fairly common in the lowland Semi-evergreen forest of Narcondam Island and adults were observed from May-November, with higher abundance in post monsoon. **New Record to India.**

Amraica Moore, 1888

Amraica Moore, 1888, In Hewitson & Moore. *Descr. New Ind. Lep. Coll. Atkinson*, (3), 245

Type Species: *Amraica fortissima* Moore, 1888.

Type Locality: Darjeeling, INDIA.

Amraica solivagaria (Walker, 1866) (Figures 4, 10)

Boarmia solivagaria Walker, 1866. *List Specimens Lepid. Insects Colln. Br. Mus.*, 35, 1586

Type Locality: JAVA.

Material examined: INDIA, Andaman and Nicobar Islands, Narcondam Island, 13.454N, 94.271E, 25 m, 1 ♂, 22-XI-2020, Coll. Dr. Naveen Kumar Nigam and Apurba Kumar Das, Reg. No. ZSI/ANRC/T/13918.

Diagnosis: *Amraica solivagaria* (Walker, 1866) is different from its other two Indian congeners in the male genitalia by having asymmetrical saccular processes.

Distribution: China (Yunnan), Thailand, Philippines, Malaysia, Brunei, Indonesia (Jiang et al. 2012), India - Andaman and Nicobar Islands (Present study)

Remarks: Only two species of the genus *Amraica* were previously reported from India, namely *Amraica ferrolavata* (Walker, 1863) and *Amraica recursaria* (Walker, 1860) (Kirti et al. 2019). *Amraica solivagaria* (Walker, 1866) is a **new record for India.**

Family Notodontidae Stephens, 1829

Phalera Hübner, [1819]

Phalera Hübner, [1819] 1816. *Verz. bek. Schmett.* (10), 147

Type Species: *Phalaena Noctua bucephala* Linnaeus, 1758

Phalera sundana Holloway, 1982 (Figures 5, 13)

Phalera sundana Holloway, 1982. In Barlow. 1982. *An Introduction to the Moths of South East Asia*: 201

Type Locality: MALAYSIA.

Material examined: INDIA, Andaman and Nicobar Islands, Tal Tikrey, Diglipur, 13.219N, 94.860E, 59 m, 10-III-2019, Coll. B. Sumit Kumar Rao, 1 ♀, Reg. No. ZSI/ANRC/T/7838.

Diagnosis: *Phalera sundana* Holloway, 1982 appears similar to *P. grotei* Moore, 1859 but can be distinguished externally by broader forewings which are less apically produced, the paler grey patch at the tornus with two black dots each.

Distribution: Malaya, Sumatra, Java, Bali, Borneo, Mindanao (Holloway, 1982), India - Andaman and Nicobar Islands (Present study).

Remarks: Chandra et al. (2018) listed a total of ten species under the genus *Phalera* in their catalogue of Indian Notodontidae. A single specimen of *P. sundana* was collected during the summer season from secondary forest edge. **New Record to India.**

Family Euteliidae Grote, 1882

Paectes Hübner, 1818

Paectes Hübner, 1818. *Zutr. Samml. Exot. Schmett.*, 1, 21

Type Species. *Paectes pygmaea* Hübner, 1818.

Type Locality: aus Georgien in Florida, USA.

Paectes psaliphora Hampson, 1912 (Figures 6, 11, 14)

Paectes psaliphora Hampson, 1912. *Cat. Lepid. Phalaenae Br. Mus.*, 11, 110

Type Locality: PAPUA NEW GUINEA.

Material examined: INDIA, Andaman and Nicobar Islands, Narcondam Island, 13.454 N, 94.271E, 25 m, 1 ♀, 16-XI-2020, Coll. Dr. Naveen Kumar Nigam and Apurba Kumar Das, Reg. No. ZSI/ANRC/T/13730; Andaman and Nicobar Islands, Narcondam Island, 13.454N, 94.271E, 25 m, 1 ♂, 16-XI-2020, Coll. Dr. Naveen Kumar Nigam and Apurba Kumar Das, Reg. No. ZSI/ANRC/T/13731; Andaman and Nicobar Islands, Narcondam Island, 13.454N, 94.271E, 25 m, 1 ♂, 9-XI-2020, Coll. Dr. Naveen Kumar Nigam and Apurba Kumar Das, Reg. No. ZSI/ANRC/T/13732.

Diagnosis: *P. psaliphora* is similar to *P. cristatrix* (Guenée, 1852) and *P. kebeae* (Bethune-Baker, 1906) in external morphology but differs with former by having more darker dorsum and slightly convex basal pale mark, rather than concave, directed at the dorsum as in *P. cicatrix*. *P. psaliphora* differs with latter by sub-basal streak, which is not broadly connected to the median curved line, as in *P. kebeae*.

Distribution: Sundaland, Sulawesi, New Guinea to Solomons (Holloway, 1985), India - Andaman and Nicobar Islands (Present study).

Remarks: Only three species of the genus *Paectes* are represented from India, viz. *Paectes subapicalis* (Walker, [1858] 1857) from North India, *Paectes taminata* (Warren, 1914) from Assam, *Paectes cristatrix* (Guenée, 1852) from Western Ghats. Holloway (1985) provided detailed geography of the *Paectes* complex and provided a possible explanation with reference to the evolution of this group. Four Representatives of *Paectes psaliphora* Hampson, 1912 were observed from low land semi-evergreen Forest of Narcondam islands. **New Record to India.**

Family Noctuidae Latreille, 1809

Iambia Walker, 1863

Iambia Walker, 1863. *List Spec. Lepid. Insects Colln. Br. Mus.*, 27, 109

Type Species. *Iambia inferalis* Walker, 1863.

Type Locality: SOUTH AFRICA, Port Natal.

Iambia lyricalis Holloway, 1989 (Figures 7, 12, 15)

Iambia lyricalis Holloway, 1989. *Malay. Nat. J.*, 42(2-3), 110

Type Locality: SARAWAK.

Material examined: INDIA, Andaman and Nicobar Islands, Bird watching Point, Great Nicobar Biosphere Reserve, 06.999N, 93.879E, 136 m, 3 ♂♂, 15-XI-2018, Coll. K. C. Gopi and Party, Reg. No. ZSI/ANRC/T/13487, 13490, 13491; Andaman and Nicobar Islands, Bird watching Point, Great Nicobar Biosphere Reserve, 06.999N, 93.879E, 136 m, 3 ♀♀, 15-XI-2018 Coll. K. C. Gopi and Party, Reg. No. ZSI/ANRC/T/13488;13489;13492.

Diagnosis: *Iambia lyricalis* Holloway, 1989 is mostly similar to *I. harmonica* Hampson from the Northeast Himalaya in the reticulated Pattern of forewings but differs by the darker submarginal band. The male genitalia of both species show a significant difference. The valve in *I. harmonica* is less strongly produced apically, marginally excavate, and with the harpe slenderer and with stronger curvature at the apex. The aedeagus vesica is larger, more massively and extensively spined than in the Bornean species (Holloway, 1989).

Distribution: Malaysia, Sumatra, Borneo (Holloway, 1989), India - Andaman and Nicobar Islands (Present study).

Remarks: Poole (1989) listed, 22 species in the genus *Iambaia*, out of which five species were observed from the Indian mainland, viz. *Iambia anormalis* (Hampson, 1907) from Andhra Pradesh, *Iambia harmonica* (Hampson, 1902) from Mizoram, Sikkim and Meghalaya, *Iambia nocturna* (Hampson, 1902) from Madras, *Iambia rufescens* (Hampson, 1894) from Ganjam, *Iambia transversa* (Moore, 1882) from Darjeeling. *I. lyricalis* is observed only in the month of November at an Elevation of 136 m from the Primary Evergreen Forest of Great Nicobar Biosphere Reserve. *Iambia lyricalis* Holloway, 1989, adds up to the Indian fauna as a **New Record**.

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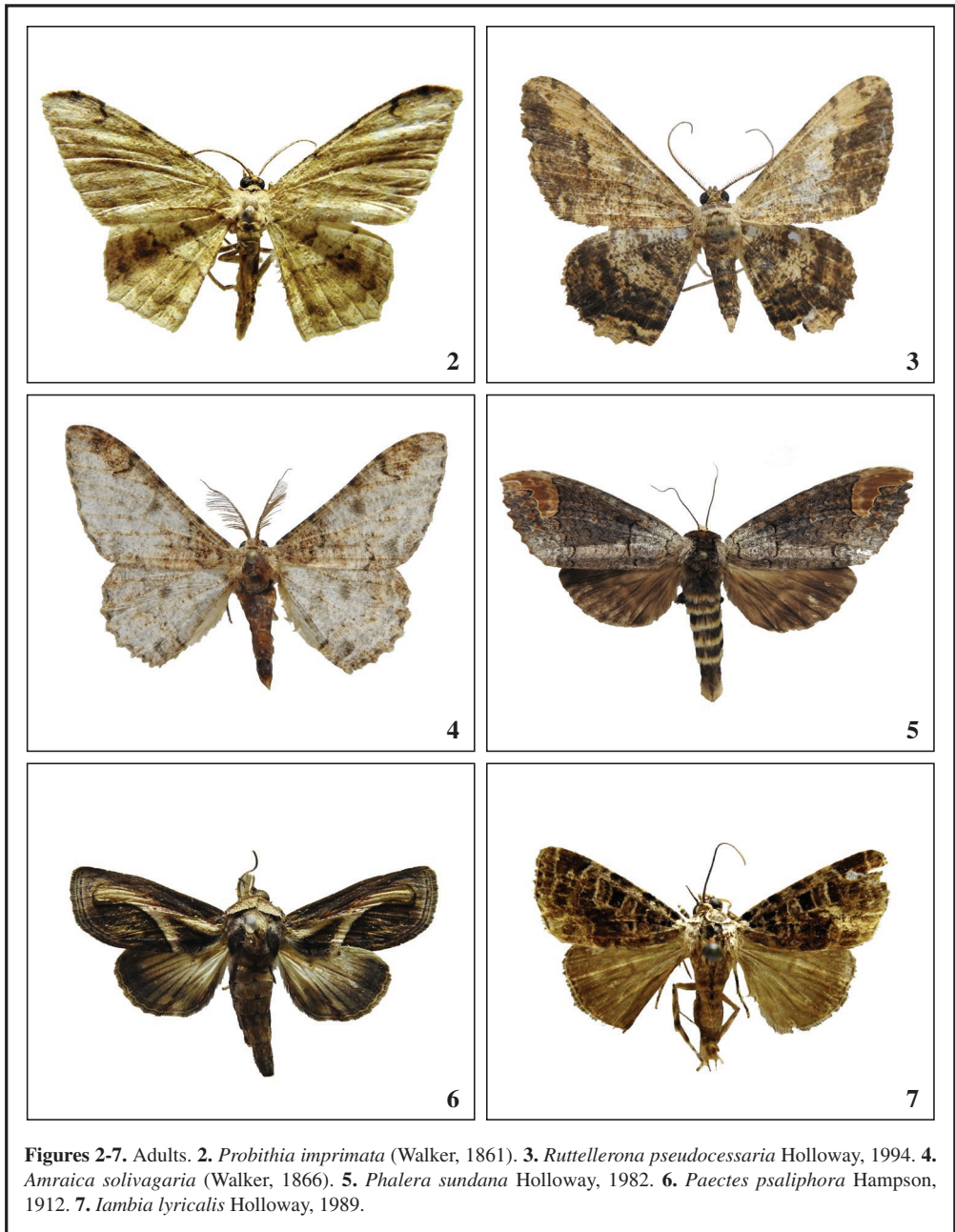
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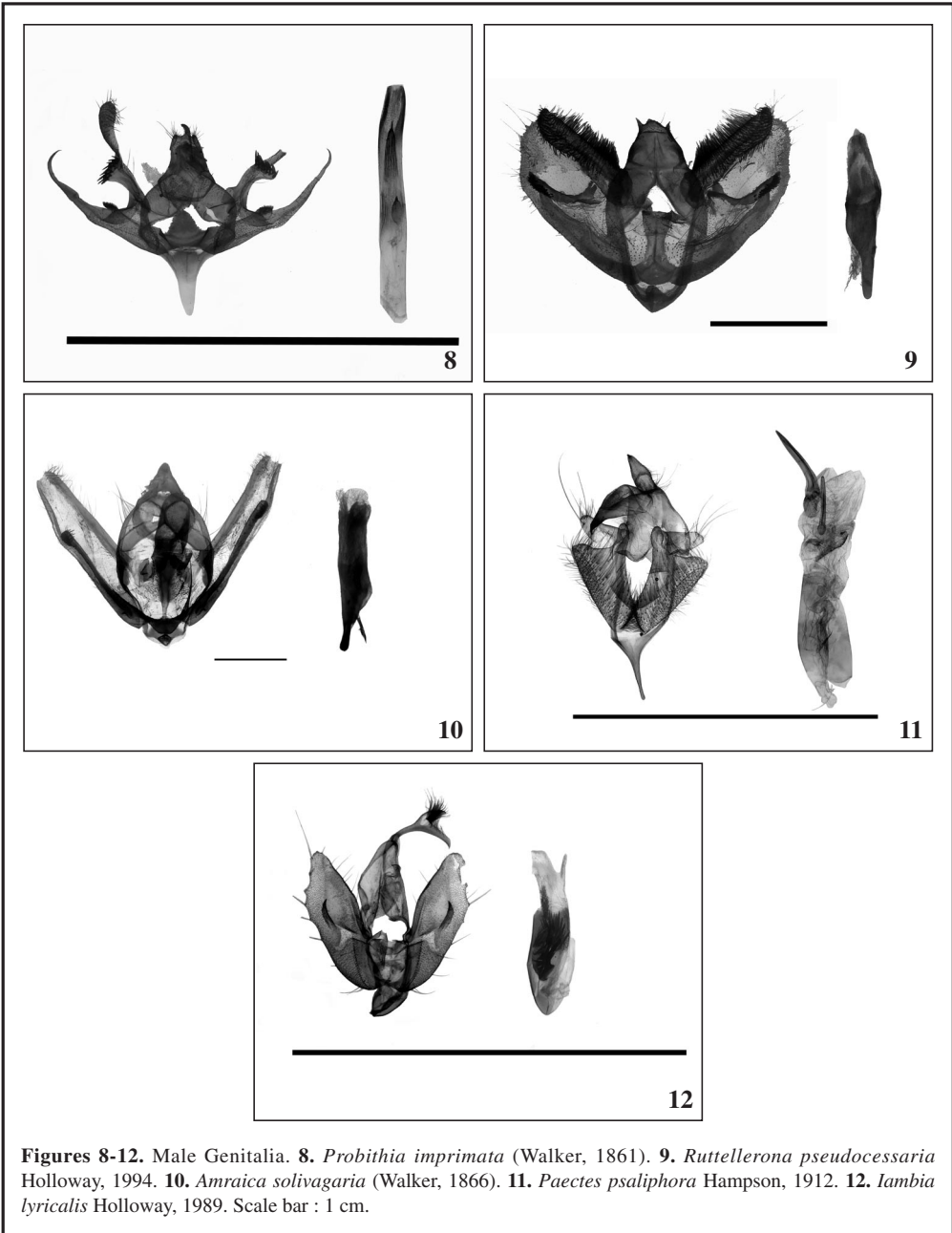
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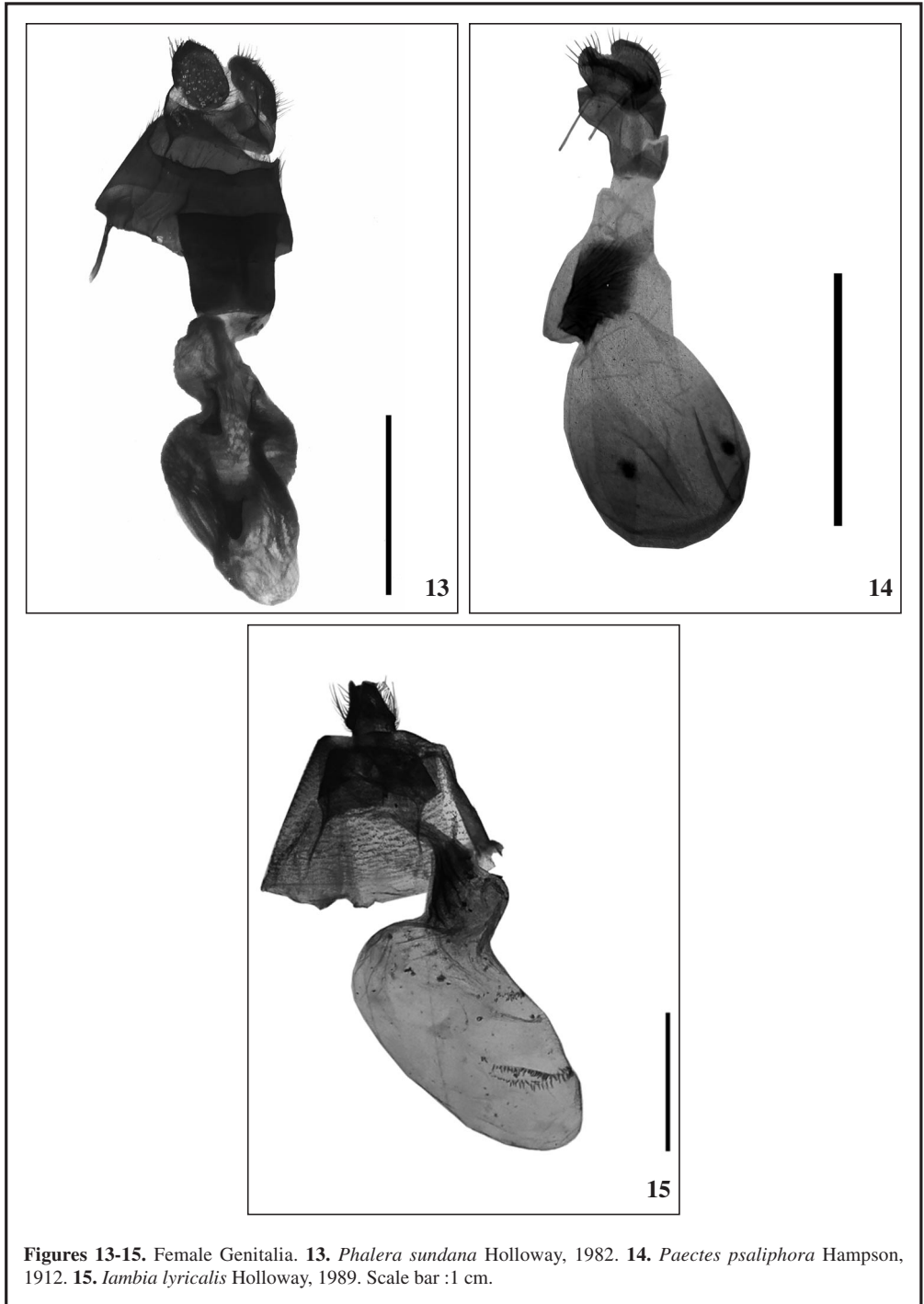
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Figures 8-12. Male Genitalia. **8.** *Probithia imprimata* (Walker, 1861). **9.** *Ruttellerona pseudocessaria* Holloway, 1994. **10.** *Amraica solivagaria* (Walker, 1866). **11.** *Paectes psaliphora* Hampson, 1912. **12.** *Iambia lyricalis* Holloway, 1989. Scale bar : 1 cm.



Figures 13-15. Female Genitalia. **13.** *Phalera sundana* Holloway, 1982. **14.** *Paectes psaliphora* Hampson, 1912. **15.** *Iambia lyricalis* Holloway, 1989. Scale bar :1 cm.