



Research Article

Two new distributional and host records for *Spalangia* Latreille parasitizing *Drosophila* sp. on putrefied tender jack fruit (*Artocarpus heterophyllus*) from Kerala, India.

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ABSTRACT: The species *Spalangia impunctata* Howard is reported for the first time from India and *Spalangia simplex* Perkins reported for the first time from Kerala. Both the species are reared from the pupae of *Drosophila* sp. on putrefied tender Jack fruit, which form the first host records for the species. A checklist of the Indian species of *Spalangia* with host data is also provided.

KEY WORDS: Hymenoptera, Pteromalidae, *Spalangia impunctata*, *Spalangia simplex*, new records, new host records, *Drosophila*, Jack fruit, Kerala, India.

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INTRODUCTION

The family Pteromalidae (Chalcidoidea: Hymenoptera) includes economically important insect parasitoids helping for the biological control of pest insects and also for exerting control of non-pest insect species sufficient to prevent them becoming pests. Though Pteromalidae contains many beneficial parasitoids, there are a few reliable records of their successful utilization in biological control programmes. The greatest obstacle has been the generally poor taxonomic knowledge of the group and little knowledge on the biology and host-parasitoid associations. The knowledge on the taxonomy and biology of Pteromalidae from India is still in infantile stage. With a view to survey the Pteromalid parasitoids occurring in the agro ecosystems of Kerala and to observe their host-parasitoid associations, infested host materials are regularly being collected from the field and kept in the laboratory for rearing the parasitoids. In one such case specimens of *Spalangia* Latreille were emerged from the pupae of *Drosophila* sp. breeding in the decayed tender jack fruits (*Artocarpus heterophyllus*). The plant material was collected from Feroke Chungam of Calicut district, Kerala. On detailed studies, the emerged specimens were proved to belong to two species of *Spalangia* viz. *Spalangia simplex* Perkins and *Spalangia impunctata* Howard.

Spalangia Latreille belongs to the subfamily Spalanginae of Pteromalidae, members of which are mainly primary parasitoids of synanthropic and other flies and in some cases attack Lepidoptera or Hymenoptera hosts or rarely act as hyperparasitoids also. In different parts of the world, *Spalangia* species have been studied mostly in connection with their probable use as biological control agents. Though emphasis has been laid to understand the bionomics and biocontrol potential of *Spalangia* little attempts have been made to study the taxonomy of the genus till Boucek (1963) made a revision of the Holarctic fauna which included data on the known host-parasite relations of the species and description of new taxa. Later, Gibson (2009) made a revision of the new world Spalanginae which also included description of several new taxa and information on host-parasite relationships. From the Oriental Region nine species of *Spalangia* are known, out of which eight species are reported from India (Noyes, 2003, Boucek, 1963, Boucek et al, 1979, Farooqi and Subba Rao, 1986 and Sureshan and Narendran, 2003).

Spalangia impunctata Howard is a new world species described from Hawaii and reported from Neotropical countries. Gibson (2009) mentioned the probable occurrence of the species in the circumtropical regions of the

Table 1. Indian species of *Spalangia* Latreille

Species	Distribution	Recorded hosts from India and other host families recorded worldwide.
<i>Spalangia cameroni</i> Perkins, 1910	India: Delhi, Karnataka, Puducherry. Cosmopolitan	<i>Chrysomya aenea</i> Fab. (Diptera) Anthomyiidae, Calliphoridae, Chloropidae, Otitidae, Sarcophagidae, Syrphidae, Tephritidae (Diptera). Bombycidae (Lepidoptera).
<i>Spalangia endius</i> Walker, 1839	India: Delhi, Chandigarh, Maharashtra; Malaysia, Indonesia. Cosmopolitan.	<i>Musca</i> sp., <i>Chrysomya aenea</i> Fab. (Diptera) Anthomyiidae, Calliphoridae, Drosophilidae, Muscidae, Otitidae, Sarcophagidae, Tachnidae, Tephritidae (Diptera) Bombycidae, Pyralidae (Lepidoptera)
<i>Spalangia fuscipes</i> , Nees, 1834	India: Andhra Pradesh, Karnataka. Palaearctic, Nearctic and Oriental Region	Not known Chloropidae, Cecidomyiidae (Diptera)
<i>Spalangia gemina</i> Boucek, 1963	India: Karnataka, Kerala, Tamil Nadu, W.Bengal. Afrotropical, Australasian, Neotropical and Oriental Region.	<i>Adisura atkinsoni</i> Moore (Lepidoptera) Micropezidae, Muscidae, Tephritidae (Diptera). Noctuidae, Tortricidae (Lepidoptera)
<i>Spalangia nigroaenea</i> Curtis, 1839.	India: Delhi, Karnataka, Maharashtra, Puducherry, Cosmopolitan	<i>Chrysomya aenea</i> Fab. (Diptera); ex. poultry manure Muscidae, Sarcophagidae, Anthomyiidae, Calliphoridae (Diptera). Hyperparasitoid on Pyralidae (Lepidoptera). through Tachnidae (Diptera)
<i>Spalangia obscura</i> Boucek, 1963	India: Karnataka; Malaysia, Philippines	Tachnid in <i>Tirathaba mundella</i> Walker (Lepidoptera) (doubtful)
<i>Spalangia parfuscipes</i> Ahmad, 1998	India: Uttar Pradesh	Not known.
<i>Spalangia simplex</i> Perkins, 1910	India: Tamil Nadu, Uttar Pradesh, Kerala (new record) Australasian, Afrotropical, Neotropical and Oriental Regions.	<i>Drosophila</i> sp. on putrefied jack fruit (New record) Drosophilidae, Tephritidae (Diptera)
<i>Spalangia impunctata</i> Howard, 1897.	India: Kerala (new record) Circumtropical Regions.	<i>Drosophila</i> sp. on putrefied jack fruit (New record) Tachnidae, Drosophilidae, Tephritidae (Diptera) Curculionidae (Coleoptera) (doubtful).

world based on his tentative identification of material from Australia, India, Japan, Mauritius, Thailand and Borneo. The recorded hosts of the species include *Drosophila* sp. (from Hawaii), coffee bean weevil, *Araecerus fasciculatus* (De Geer) (doubtful) and *Dacus cucurbitae* Coquillett (Tephritidae) from India. In the present study the occurrence of the species in India is confirmed by rearing specimens from pupa of *Drosophila* sp. which also forms a new host record from the country. *Spalangia simplex* Perkins is described from Honolulu and reported from the Australasian, Afrotropical, Oriental and American Regions. Ahmad (1998) reported the species from Uttar Pradesh, India. The hosts of *S. simplex* have not been reported until Gibson (2009) mentioned it as *Drosophila* sp. (New world), and *Dacus dorsalis* Hendel (Tephritidae) (Malaya) and *Dacus* sp. (Australia). Here the species is reared from the pupa of *Drosophila* sp. which forms the first confirmed host record for the species. The species is also recorded for the first time from Kerala (Table 1).

MATERIALS AND METHODS

The putrefied tender jack fruits collected from the field were kept in wide mouthed glass jars covered with mulmul cloth for the emergence of the parastoids. The emerged insects were collected periodically and preserved for taxonomic identification. Few *Drosophila* pupae were cut open and observed under microscope to verify the occurrence of the adult *Spalangia* inside. Stereo zoom microscope model LEICA MZ 16 and the images were taken using LEICA M 205A model with DFC 500 model camera. The specimens of the present study are deposited in Zoological Survey of India, Western Ghat Regional Centre, Kozhikode (ZSIK). The morphology used in this paper generally follows that of Boucek (1988) except Meosoma and Metasoma are used for thorax and abdomen. The following abbreviations are used in the text: BMNH- The Natural History Museum, London, U.K.; BPBM- Bernice Bishop Museum, Honolulu, Hawaii; F1-F3 -Funicular segments 1 to 3; MV- Marginal vein; OOL- Ocellocular distance; PMV- Post marginal vein;

POL- Post-ocellar distance; QMBA- Queensland Museum, Australia; SMV- Submarginal vein; STV-Stigmal vein; T1-T3- Gastral tergites 1-3, ZSIK-Zoological Survey of India, Western Ghat Regional Centre, Calicut, Kerala.

RESULTS

Species records

1. *Spalangia impunctata* Howard, 1897.



Fig. 1. *Spalangia impunctata* Howard, Female



Fig. 2. *Spalangia impunctata* Howard, Male

Spalangia impunctata Howard, 1897: Journal *Linn.Society (Zool)*, 26: 140-141,

Holotype. Female. Grenada, Balthazar (BMNH).

Spalangia lanaiensis Ashmead, 1901. *Fauna Hawaiensis*, 1:325-326. Female, Male, Lanai,

Hawaii (BMNH), Syn.by Gibson,2009: 91.

Diagnosis: Female: Length 1.62mm. Body including coxae black, remainder of legs up to femora brownish black, bases and apices of tibia and all tarsi yellowish brown

except last tarsal segments and whole fore tibia brownish black. Wings hyaline, veins pale brown. Head smooth with scattered fine piliferous punctures; scrobal depression delineated by moderately reticulate scrobes on either sides of smooth and shiny interantennal region, the reticulate sculpture extending laterally into inner half of parascrobal regions above torulus. Head in front view oblong, 1.2x as long as broad, in dorsal view 1.9x as wide as long and in lateral view 2.3x as long as thick. POL 1.9x OOL. Antennal scape reticulately granulated, only slightly longer than following 5 segments combined; pedicel 2 x as long as apical width, as long as F1-F3, F1 almost as long as wide, F2 transverse, other funicular segments strongly transverse, clava slightly longer than 3 preceding segments combined and 1.9x as long as broad. Pronotal collar without sub apical cross line, 1.4x as broad as long. Mesoscutal median lobe with transverse band of alutaceous sculpture, otherwise smooth and shiny. Scutellum flat, almost completely smooth, sublaterally with traces of effaced frenal cross line. Propodeum almost completely smooth, no median carina, median area with two small finely crenulated groove anteriorly forming a "Y" shaped smooth area, posteriorly join to form one median groove not touching hind margin, plicae indistinct, post spiracular sulcus shallow, not distinct; callus finely sculptured. Forewing narrow, hyaline, marginal ciliation fully twice as long as STV, basal part almost bare except for 4 setae on cubital fold; STV slightly longer than PMV; SMV 1.5x MV. Gastral petiole 1.5x as long as broad, distinctly punctate reticulate (meshes small), T2 and T3 sub equal; hind margin of T2 hardly emarginate.

Male: Length 1.3mm. Resembles female but differs from it in having antenna with F1 longer than broad, pedicel distinctly shorter than three following segments combined; clava distinctly shorter than three preceding segments combined.

Material examined: 1 Female, 1 Male, India: Kerala, Calicut District, Feroke Chungam, 11.1850 N 75. 8452 E, 12-xii.2013, coll. Raseena, ex. *Drosophila* pupae on putrefied tender jack fruit, Reg.No. ZSI/WGRS/IR/INV/3224..

Distribution: India: Kerala (new record); probably Circumtropical (Gibson,2009).

Remarks: This species belongs to the *drosophilae* group of *Spalangia*. The mesopleuron of *S. impunctata* Howard is only quite finely sculptured and shiny. Females closely resembles *S. drosophilae* Ashmead except for the propodeal sculpture. Males are readily differentiated from males of all other *drosophilae* group species by the flagellar structure (Gibson,2009). The species is reported for the first

time from India with a new host record from the region. Like many other *Spalangia* species this species also probably reached different parts of the world through introduction by man along with the host infected plant material.

2. *Spalangia simplex* Perkins, 1910. (Fig. 3)



Fig. 3. *Spalangia simplex* Perkins

Spalangia simplex Perkins, 1910. *Fauna Hawaiiensis*, 2: 657. Male, Female. Syntypes

Oahu, Honolulu.(BPBM).

Spalangia parasitica Girault, 1915: *Mem. Queensland Mus.* 3:346. Female, Syntypes:

Queensland: Australia. (QMBA). Syn. by Boucek, 1988:342.

Diagnosis: Female: Length 1.4-2.0 mm. Black, legs dark with knees and apex of tibiae narrowly and distinctly yellowish and basal 4 tarsal segments yellow. Head in anterior view 1.1-1.2x as long as wide and in dorsal view about 1.7-1.8x as wide as long. Antennae with pedicel about 2.1-2.3x as long as apical width, F1 slightly longer than wide and subsequent segments quadrate of slightly transverse basally and increasingly and distinctly transverse apically, clava about 2.1-2.5x as long as wide. Pronotum with distinct crenulated cross-line posteriorly, otherwise smooth and shiny. Mesoscutal median lobe with single median puncture posterior to transverse row of setiferous punctures. Propodeum with distinct post-spiracular sulcus, plical region

with very narrowly “V” like paramedian crenulated furrow delineating median carina. Gaster with petiole 1.8-2x as long as medial width, distinctly microreticulate between longitudinal carinae and with 2-5 long setae laterally.

Material examined: 6 Female, 3 Male, India: Kerala, Calicut District, Feroke Chungam, 12- 31 xii.2013, coll. Raseena, ex. *Drosophila* pupae on putrified tender jack fruit. Reg.No. ZSI/WGRS/IR/INV/3225.

Distribution: India: Kerala (new record), Tamil Nadu, Uttar Pradesh; Australasian, Afrotropical and Oriental regions, Central America, West Indies and South America.

Biology: This is the first confirmed report of the host of *S. simplex* Perkins. According to Gibson (2009), the hosts of *S. simplex* have not previously been reported but apparently include Drosophilidae and there is one new world record indicating the hosts as Tephritidae and another female from Australia emerged from *Dacus* sp. This is the first confirmed host record for the species.

Remarks: *Spalangia simplex* is distinguished by a combination of three characters such as the scutellum with a complete crenulated frenal line, the pronotum lacks sculpture except for a distinct crenulated cross-line posteriorly and the mesoscutal median lobe has a unique single median puncture posterior to a transverse row of punctures. Though *S. simplex* is distributed in the Australasian, Afrotropical, Oriental and American regions, only very few records are available from India. The species is reported here for the first time from Kerala.

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