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A New Species of *Sympiesis* Förster, 1856 (Hymenoptera: Eulophinae) Parasitizing Lepidopteran Pest Feeding on *Dioscorea bulbifera* in Almora, Uttarakhand, India

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Abstract: In the present study, a new species of eulophid parasitoid i.e. *Sympiesis almorensis* (Hymenoptera: Eulophidae: Eulophinae) is described which was parasitizing to a larval host, most probably larval stage of a Lepidopteran insect.

Keywords: Eulophidae, Eulophinae, Hymenoptera, Parasitoid

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Introduction

Eulophids are primary parasitoids of insects and are important biological control agents for regulating insect pests. *Sympiesis* Förster, 1856 is a large genus in the subfamily Eulophinae and includes 119 species worldwide (Noyes, 1998). The species of *Sympiesis* are solitary or gregarious ectoparasitoids of lepidopteran larvae (Boucek, 1988). The subfamily eulophinae are frequently involved in biological control programs directed against dipteran and lepidopteran pests. During taxonomic studies, authors came across with a new species of the genus *Sympiesis* reared on a lepidopteran larva which was feeding inside the leaf of *Dioscorea bulbifera* (Dioscoreaceae). This

species (*Sympiesis almorensis* sp. nov.) was found near to *Sympiesis jeolikotensis* (Khan *et al.*, 2005) and *Sympiesis albiscapus* (Erdos, 1954) by using literature or key provided by Narendran (2011) and Zhu and Huang (2003), respectively which is discussed later under remarks.

Materials and Methods

The infested leaves of *Dioscorea bulbifera* L. (Plate A Fig. 1) were collected during the month of October, 2020 from Almora, Uttarakhand, India. Infested leaves were taken to the laboratory for rearing and kept in rearing jars covered with a muslin cloth. The rearing jars were daily observed



Plate A Fig. 1: Leaf blotches made on *Dioscorea bulbifera* by unknown lepidopteran larvae parasitized by *Sympiesis almorensis*.

carefully for the emergence of parasitoids. After the onset of emergence of parasitoids, all reared parasitoid specimens were collected from the rearing jars with the help of aspirator and preserved in 70% alcohol. For the observation of taxonomic characters, the procedure of permanent slide preparation was followed as prescribed by Noyes (1982). Olympus Magnus MSZ-TR (Binocular Stereo Microscope) was used to take various photographs and Olympus Trinocular Research Microscope Model- CX-31-Tr with drawing tube attachment was used for the drawing.

Results

Sympiesis almorensis sp. nov. (Plate B, C):

Material Examined:

Holotype 1♀ specimen mounted on a slide under coverslip (Sym001H). Paratype 1♀ in vial (Sym 001P) Almora, Uttarakhand, 29.593236° N, 79.6468772°E, ex. Lepidopteran larva (Gracillariidae ?) inside the leaf of *Dioscorea bulbifera* (Dioscoreaceae), October 2020, coll. Puja Pant.

Etymology:

The specific name is derived after the locality (Almora), from where the species was collected.

Description

Female (Plate B Fig. 1):

Body length about 3.6 mm; body colour brown; head brown metallic green reflection, ocelli yellowish, eyes yellow; antenna yellow except scape yellowish; thorax brown, metallic green reflection with coriaceously reticulate; legs yellow except midcoxa brown, hindcoxa and forecoxa brown at anterior; gaster brown, yellow in middle.

Head (Plate B Fig. 3; Plate C Fig. 1):

Wider than long in frontal aspect (0.80:0.65), densely setose, ocellar region punctulate, ocelli arranged in obtuse angled; eyes 2.2x as long as wide in anterior view (0.45:0.20); Post Ocellar Line (POL) 1.4x longer than Ocellar Ocular Line (OOL) (0.14:0.10), width of frons more than 4x of prominence between antennal toruli (0.40:0.10), eyes width 1.6x more than the length of malar space (0.20:0.12); antennal toruli located upper level of eyes margin; malar sulcus straight; mandibles hexadentate with 2 acute teeth.

Antennae (Plate B Fig. 13; Plate C Fig. 12):

Antennal formula 11142; scape cylindrical slightly more than 6x as long as wide (0.33:0.05), scape apex not touching to median ocelli, pedicel more than 1.6x as long as wide (0.08:0.05), funicle

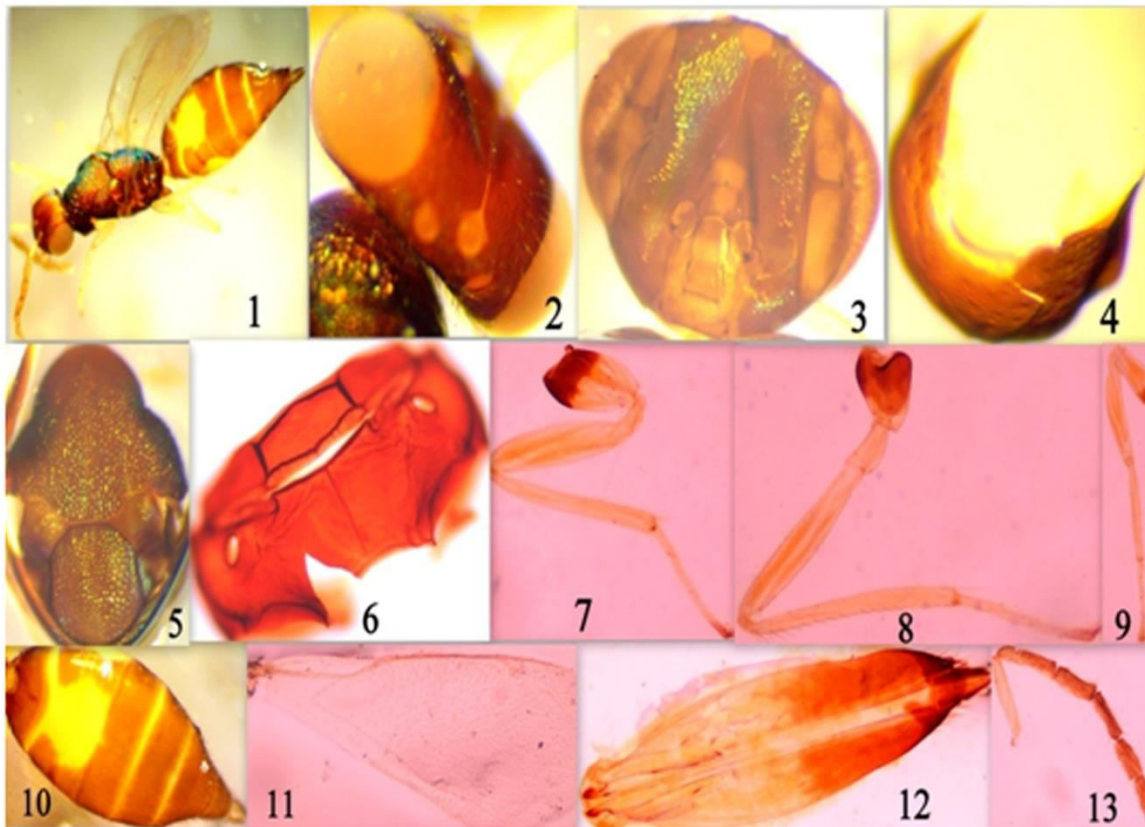


Plate B Figs. 1-13: *Sympiesis almorensis* (Fig. 1-13): 1- Female Habitus, 2-Head dorsal view, 3- Head anterior view, 4-Pronotum, 5- Thorax, 6-Propodeum, 7- Hind leg , 8- Mid leg , 9-Foreleg , 10- Abdomen, 11-Forewing, 12-Ovipositor, 13-Antenna.

segment 1 (FS1) 3.3x as long as wide (0.20:0.06), and 2.5x longer than pedicel (0.20: 0.08); funicle segment 2 (FS2) 3.1x as long as wide (0.19:0.06), funicle segment 3 (FS3) 3.3x as long as wide (0.20:0.06), funicle segment 4 (FS4) 2.4x as long as wide (0.17:0.07), club 2 segmented, more than 2.8x as long as wide (0.20:0.07), shorter than preceding two funicle segments combined.

Thorax (Plate B Fig. 5; Plate C Figs. 3, 6):

Notauli incomplete; pronotum, MLM and scutellum coriaceously reticulate, mid lobe of mesoscutum (MLM) having more than 13 setae, mesoscutum 1.4x as wide as long (0.70:0.50) and 1.7x longer than scutellum (0.70:0.40); scutellum having 3 pairs of setae, 1.1x as long as wide (0.40:0.35); dorsellum more than 2.4x as wide as

long (0.24:0.10); propodeal spiracles rounded and separated from the anterior margin of propodeum.

Forewings (Plate B Fig. 11; Plate C Fig. 7):

More than 2.5x as long as wide (2.35:0.92), more than 1.3x longer than hind wing length (2.35:1.78), submarginal vein (SMV) with 7 dorsal setae, marginal vein (MV) 1.2x longer than SMV (0.83:0.65); postmarginal vein (PMV) 3.4x longer than stigma vein (STV) (0.41:0.12), cubital vein straight, speculum broad and closed by cubital setae, costal cell (CC) 8x as long as wide (0.80:0.10) and setae present only in upper half.

Hindwings (Plate C Fig. 8):

More than 4x as long as wide (1.78:0.40) with subacute apex; wing length 12.7x longer than the

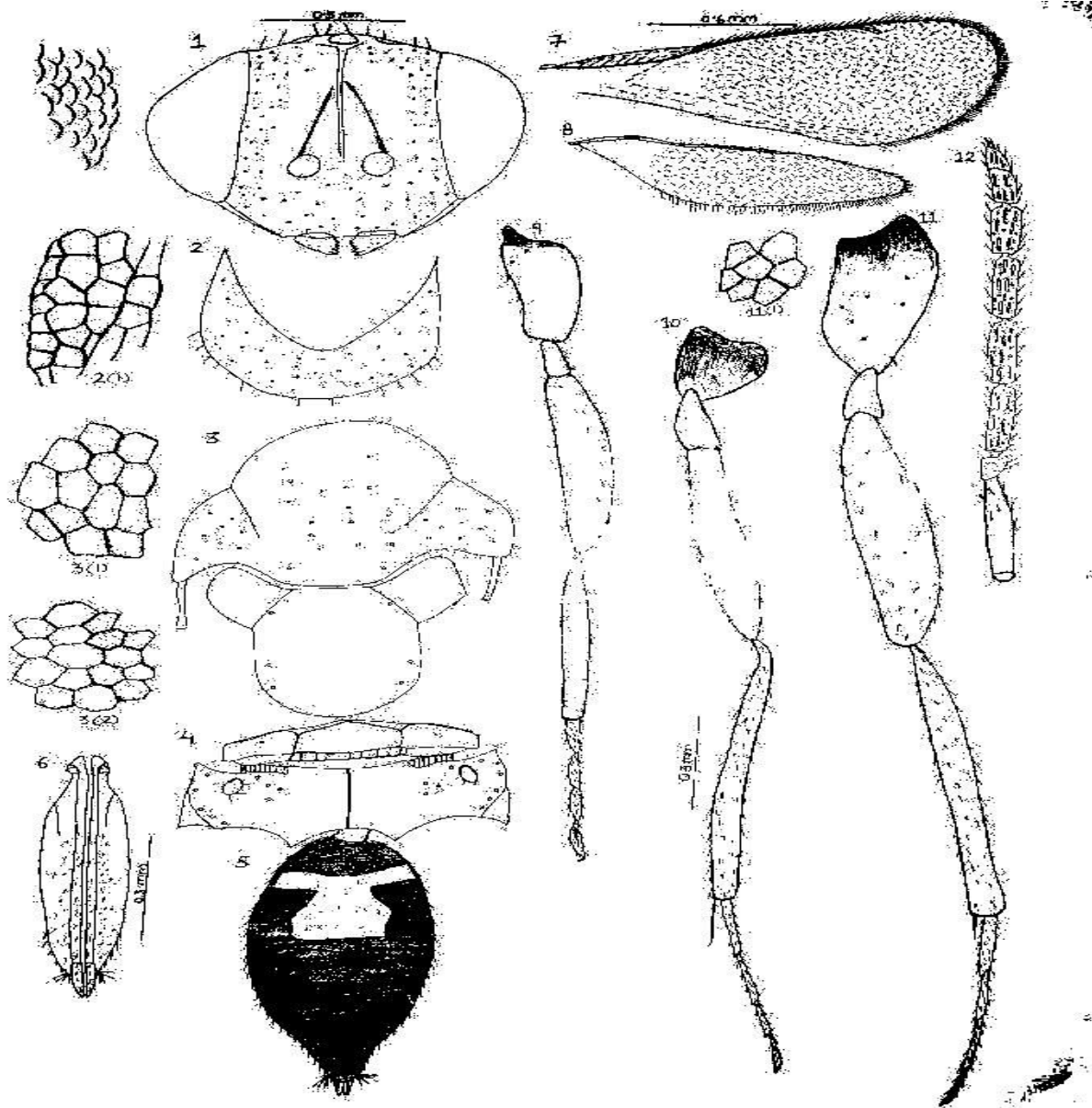


Plate C Figs. 1-12: *Sympiesis almorensis* (Figs. 1-12): 1- Head, 2-Pronotum, 3-Thorax, 4-Propodeum, 5-Gaster, 6-Ovipositor, 7-Forewing, 8-Hind wing, 9-Fore leg, 10-Mid leg, 11-Hind leg, 12-Antenna.

length of vein (1.78:0.14).

Forelegs (Plate B Fig. 9; Plate C Fig. 9):

Coxa 2.2x as long as wide (0.33:0.15), 2x longer than fore trochanter; femur more than 5.5x as long as wide (0.55:0.10), 1.03 longer to tibia in length (0.55:0.53); tibia more than 10.6x as long as wide (0.53:0.05), tibia 1.2x longer than length of tarsus (0.53:0.44).

Midlegs (Plate B Fig. 8; Plate C Fig. 10):

Coxa equal to its length and width(0.20:0.20), equal to mid trochanter; femur 6.2x as long as wide (0.62:0.10), tibia more than 11.4x as long as wide (0.80:0.07), 1.2x longer than femur in length (0.80:0.62), midtibia 1.4x longer than length of tarsus (0.80:0.55), First tarsal segment (TS1) 1.2x longer than midtibial spur length (0.18:0.15).

Hindlegs (Plate B Fig. 7; Plate C Fig. 11):

Coxa about 2.4x as long as wide (0.48:0.20), 3x

longer than hind trochanter; femur 4.3x as long as wide (0.74:0.17), tibia more than 12.1x as long as wide (0.85:0.07), 1.1x longer than femur in length (0.85:0.74), hind tibia 1.9x longer than tarsal length (0.85:0.43), TS1 2.3x longer than hind tibial spur length (0.19: 0.08).

Gaster (Plate B Fig. 10; Plate C Figs. 5, 6):

More than 1.8x as long as wide (1.76:0.94), gaster surface hairy; metasoma 1.4x longer than mesosoma (1.95:1.32); first valvifer triangular; second valvifer curved; third valvulae 5.2x as long

as wide (0.26:0.05), outer plates of ovipositor 1.05x longer than the length of second valvifer (1.63:1.54).

Remarks: This species (*Sympiesis almorensis*) resembles more with an Indian species, *Sympiesis jeolikotensis* by following the available key to Indian species of *Sympiesis* provided by Narendran (2011) and species description given by Khan *et al.* (2005). There are various key characters mentioned in Table 1, which clearly show that it is different from *Sympiesis jeolikotensis*.

Table 1: Key characters different in *Sympiesis almorensis* as compared with *Sympiesis jeolikotensis*

<i>Sympiesis almorensis</i> sp.nov.	<i>Sympiesis jeolikotensis</i> Khan <i>et al.</i> , 2005
FS1 to FS3 almost subequal in size	FS1 not equal to FS2 and FS3
Malar sulcus (MS) present	MS absent
Mesosutum and Scutellum coriaceously reticulate	Fine reticulate sculpture with hexagonal cells
Side lobe of mesoscutum (SLM) with numerous setae, MLM having more than 13 setae	SLM with 3 small setae, MLM having 13 setae
Entire surface of pronotum heavily setose and posterior region of pronotum having more than 4 pairs of setae	Pronotum surface not heavily setose and posterior region having 4 pairs of setae
Reticulate sculpture absent on dorsellum	Reticulate sculpture present on dorsellum
Median propodeal carina strong and straight	Propodeum with weak irregular median carina present
Propodeal spiracles separated from a little distance from anterior margin	The distance of propodeal spiracles from anterior margin is large.
Costal cell broad and hair on costal cell present only in upper half	Costal cell narrow with three rows of setae
Cubital vein almost straight; basal vein with a row of 5 setae	Cubital vein slightly sinuate, basal vein with a row of 7 setae
Eyes yellow in colour	Eyes black in colour
Second valvifer not exactly U shaped	Second valvifer U shaped
Legs yellow, mid coxae brown, hind coxae brown at anterior half and fore coxae slightly brown at anterior.	Legs uniformly pale yellow except coxae of foreleg infuscated basally
Gaster brown and yellow in middle (encompassing the major portion of 2 nd and 3 rd gastral tergites) dorsally	Gaster is shagreen

This new species has been registered with the ZooBank : <http://zoobank.org/NomenclaturalActs/519ad73b-70f5-45c0-8df5-e6a99b5a9977>

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