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Research Paper

Zaommomentedon indicus sp. nov. : A new species of the atypical entedonine (Hymenoptera: Eulophidae) parasitizing leaf-miner on the ornamental plant *Euonymus japonicus* (Celastrales: Celastraceae) from northern India

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ABSTRACT
Zaommomentedon indicus sp. nov. attacking leaf-miner on an ornamental plant Euonymus japonicus (Celastrales: Celastraceae) is newly described with illustrations from Uttarakhand, northern India.

KEYWORDS
Eulophidae, Euonymus japonicus , Hymenoptera, Leaf-miner , Zaommomentedon

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I. INTRODUCTION

Eulophidae (Hymenoptera: Chalcidoidea) is one of the largest families of parasitic wasps containing more than 5300 described species in over 324 extant genera. Of the megadiverse family, subfamily Entedoninae is represented by 93 genera and 2196 species worldwide and the Indian fauna is represented by 27 genera and 122 species (Noyes,2019).

The entedonine genera of *Platocharis* Kerrich, *Schizocharis* Kerrich and *Zaommomentedon* Girault are rather similar in general appearance and mostly misidentified for one another. However *Zaommomentedon* can be easily segregated from their allied genera based on the difference in the sculpture of the median propodeum. While *Platocharis* and *Schizocharis* both possess two broadly separated and divergent posteriorly carinae on the propodeum, members of *Zaommomentedon* are found to lack such propodeal carinae (Gumosky, 2007).

Girault (1915) established the genus *Zaommomentedon* (Eulophidae: Entedoninae) with type species *Z. mandibularis* Girault. The genus is currently represented by six species worldwide, of which five have been identified from various regions of the world viz.*Z. brevipetiolatus* Kamijo (Australia, Israel ,Japan, Taiwan, Thailand), *Z. mandibularis* Girault (Australia), *Z. milletiae* (Kerrich) (Congo), *Z. nepticulae* (Hedqvist) (Sri Lanka), *Z. newbyi* (Kerrich) (Nigeria)(Girault, 1915; Kerrich, 1969; Hedqvist, 1976; Kamijo, 1990; Noyes, 2020) and only one species, *Z. giraulti* Jamali & Zeya reported from India (Jamali & Zeya, 2021).

The leaf mining tendency has been instigate by a group of over 10,000 species of holometabolous insects, organize in four orders viz., Diptera, Coleoptera, Hymenoptera, and Lepidoptera (Connor and Taverner, 1997). Eulophid wasps are the most common parasitoids recorded on leaf miners worldwide (Minkenberg & van Lenteren, 1986; Murphy & LaSalle, 1999; Mekhlif & Abdul, 2002; Reina & LaSalle, 2003; Chen et al., 2003; Tran, 2009).The success of the biological control programs utilizing leafminer parasitoids largely depends on their correct identification and knowledge of their biology.

Here a new species of *Zaommomentedon* Girault is described which were found to parasitize an leaf-miners on the ornamental plant *Euonymus japonicus* Thunb. from Uttarakhand, northern India.

II. MATERIALS AND METHODS

Leaf-miner infested leaves of *E .japonicus* (Figure 1) were collected during the month of June 2020 from Almora (29.593236ºN79.6468772ºE) Uttarakhand, India and brought to the systematic laboratory for rearing. The infested leaves were placed in rearing glass jars covered with muslin cloth. The rearing jars were daily observed carefully for the emergence of parasitoids. After the onset of emergence of parasitoids, all reared

parasitoid specimens were collected from the rearing jars using a manually operated aspirator and then preserved in 70% alcohol. For the observation of taxonomic characters, standard procedure given by Noyes (1982) was followed for preparing permanent slides of the parasitoid specimen. Olympus Magnus MSZ-TR (Binocular Stereo Microscope) was used to take various morphological photographs and Olympus Trinocular Research Microscope Model-CX-31-Tr assembled with drawing tube attachment was used for the line diagrams. Used morphological terms and abbreviations adopted from Gibson (1997).

Abbreviations used in text are: POL= postocellar length; OOL=oculoocellar length; Fx= funicles, x being the funicular segment number; SMV= submarginal vein; MLM= midlobe of mesoscutum; MV= marginal vein; PMV= postmarginal vein; STV= stigmal vein; sp. nov. =new species. All measurements used are in millimeters (mm).

FIGURE 1: Leaf-miner infested leaf of *Euonymus japonicus*

III. RESULTS

***Zaommomentedon* Girault, 1915**

Zaommomentedon Girault, 1915: 187. Type species: *Zaommomentedon mandibularis* Girault, 1915, by original designation.

Visnuella Hedqvist, 1976: 5l. Type species: *Visnuella nepticulae* Hedqvist, 1976, by original designation. Synonymized by Kamijo, 1990: 816.

Diagnosis: Members can be easily separated from other congeneric Entedontinae by the combination of following characters: head broader than mesosoma; mandible hexadentate; eye largely pubescent, covering almost complete height of head; funicle three segmented, clava two segmented with a long terminal spine; pronotum carinate; notauli well developed; mesoscutum and scutellum with conspicuous median groove; propodeum smooth without median carina; PMV relatively longer than STV; gaster short and ovate.

Distribution. India: Andhra Pradesh; Uttarakhand (new report). *Elsewhere:* Australia; Congo; Israel; Japan; Nigeria; Sri Lanka; Taiwan; Thailand (Noyes 2019; Jamali & Zeya, 2021).

***Zaommomentedon indicus* sp. nov.**

(Figs 2-11; Figs 12-23)

Type material: Holotype ♀,1 specimen mounted on a slide under coverslip (Hym.Eulo,008). Paratype 2♀ in vial (Hym.Eulo,008) Almora, Uttarakhand, 29.593236^0 N,79.6468772^{0}E, *ex.* leaf-miners on *Euonymus japonicus*,15.vi.2020, coll. Puja Pant and Sandeep Kumar

Description : Holotype ♀, Body length 1.86 mm; fore wing length 1.21 mm.

Body colouration (Fig.2) **:** Body colour brown with golden reflection; ocelli yellow, eyes brown; antenna brown except scape white; all legs whitish except all coxae brown; petiole dark brown, gaster brown.

Head (Fig.3,12,15) **:** 1.3× as wide as high in frontal view (0.50:0.38), antennal torulus located just above lower eye margin; scrobe short, shallow, eye 2.1× as high as wide; malar space 0.1× of eye height; in dorsal view ocelli arranged in obtuse angle; POL 1.2× OOL; head with distinct occipital suture beyond ocelli;

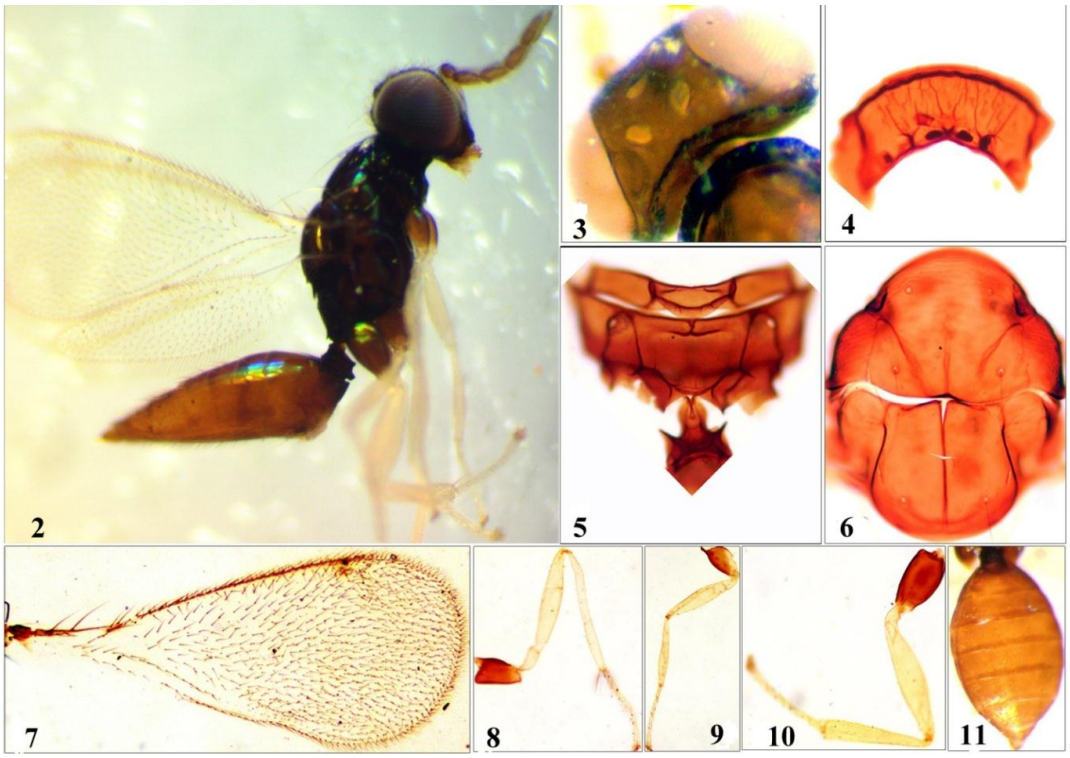
mandible hexadentate with two exterior acute teeth; antennal formula 11132; scape more than 4× as long as wide, not reaching median ocellus; pedicel 1.3× as long as wide, pedicel + flagellum 0.56× head width; F1 1.9× as long as wide and 1.4× as long as pedicel; F2 2× as long as wide; F3 1.8× as long as wide, clava 2 segmented, more than 3.5× as long as wide, shorter than length of preceding 3 funicular segments combined.

Mesosoma (Fig.4,5,6,16,17,18,19): Pronotum 3.1× wide of its median length, having strong carina at posterior margin, with a row of six long setae, surface coarsely reticulate, lateral panel of pronotum with cross carina; notauli reaching to the posterior mesoscutal bristle; MLM with two pair of setae, and deep median groove on the posterior half, anteriorly faint, median groove of mesoscutum extending posterior 1/3rd , mesoscutal dorsum faintly sculptured,1.6× as wide as long, and 1.1× as long as scutellum; scutellum 1.1× as broad as long, with a single pair of setae on posterior half and conspicuous median groove ending well before the posterior margin ; dorsellum more than 3.7× as wide as long; propodeum 3.5× as long as dorsellum, with a small inverted T – shaped carinula anteriorly.

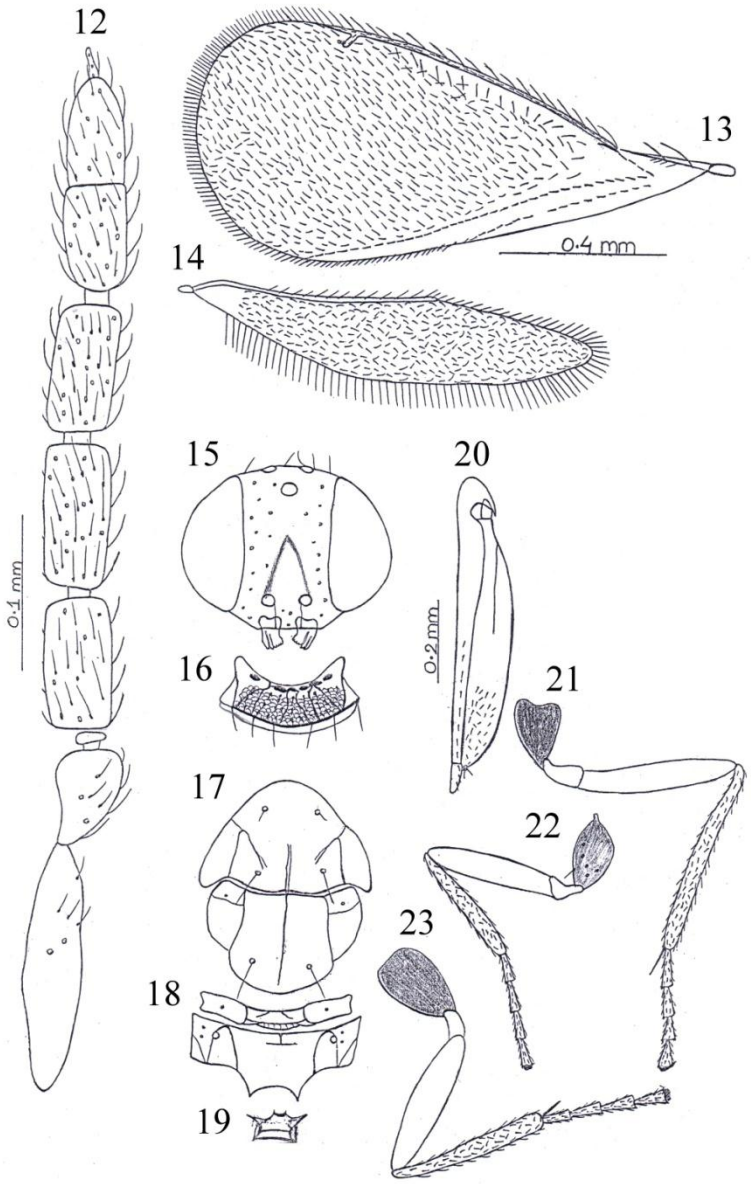
Wings (Fig.7,13,14): Length of fore wing 2.2× its width, more than 1.29× as long as hind wing; parastigma plus MV1.2 × longer than breadth of wing, SMV with two dorsal setae, MV 2.8×as long as SMV; PMV 1.5× longer than STV, speculum closed by cubital setae; hind wing more than 4.7× as long as wide with blunt apex.

Legs (Fig.8,9,10,21,22,23) : Fore leg: coxa 1.9× as long as wide, 2.1×as long as fore trochanter, femur 5× as long as wide, tibia 7.5× as long as wide, 1.1× as long as combined length of tarsomeres; Mid leg: coxa 1.4× as long as wide, 1.6× as long as mid trochanter, femur 5.2× as long as wide, tibia 9 × as long as wide, 1.2× as long as femur, 1.5× as long as combined lengths of tarsomeres, mid basitarsus 1.2× as long as midtibial spur; Hind leg: coxa about 1.3× as long as wide, 1.8× as long as hind trochanter, femur 5.1× as long as wide, tibia 7.6× as long as wide, 1.1× as long as femur, tibia 1.3× as long as combined length of tarsomeres, hind basitarsus 1.4×as long as hind tibial spur.

Metasoma (Fig.11,20) : 1.7× as long as wide, 1.1 × as long as mesosoma in dorsal view; petiole transverse, 1.7× wide as long, anterolateral corners protruded as teeth like projection; first valvifer triangular; anterior margin of basal part of second valvifer curved , second valvifer 1.1× as long as outer plate of ovipositor,9.5 × longer than third valvula ; third valvula 2.4× as long as wide.



FIGURES 2–11: Zaommomentedon indicus sp. nov. Holotype ♀: 2- habitus lateral view , 3 - head dorsal view, 4- pronotum, dorsal view, 5- dorsellum, propodeum with petiole dorsal view, 6 - mesoscutum and scutellum , 7- fore wing, 8- mid leg , 9- fore leg, 10- hind leg, 11 - metasoma dorsal view



FIGURES 12-23 : *Zaommomentedon indicus* sp. nov. Holotype ♀: 12- antenna, 13-fore wing, 14- hind wing, 15- head frontal view, 16- pronotum, 17- mesoscutum and scutellum,18- dorsellum and propodeum,19- petiole,20- female genitalia, 21- mid leg,22- fore leg, 23- hind leg

Distribution: India: Uttarakhand
Etymology: Species named after India, the country where the holotype was collected.
Remarks: This new species, *Z.indicus* sp. nov. is closely resembles to *Z.giraulti* Jamali & Zeya in having: antenna with scape white, head in frontal view 1.3× as wide as high, MV+ parastigma distinctly longer than width of fore wing, SMV with two dorsal setae. However it distinctly differs from *Z.giraulti* in having: scape 4× as long as broad (*vs.* scape 5.4× as long as broad); mesosoma 1.8× as long as broad (*vs.* mesosoma 2.14× as long as broad); propodeum 3.5× as long as dorsellum (*vs.* propodeum 3× as long as dorsellum); PMV 1.5× as long as STV (*vs*. PMV 2× as long as STV); petiole 1.7× as broad as long (*vs.* petiole 0.7× as broad as long).
It also shows some similarities with *Z. brevipetiolatus* Kamijo in having MV+ parastigma distinctly longer than wing width; petiole transverse having teeth like projection at antero-lateral corners, while it is differ from *Z.brevipetiolatus* in having: scutellum slightly broader than long, without longitudinal sculpture (*vs.*scutellum slightly longer than broad, with longitudinal sculpture); malar space 0.1× height of eye (*vs.* malar space 0.2×

height of eye); pedicel 1.3×as long as broad (*vs.* pedicel 1.6×as long as broad); mesoscutum without a fovea outside anterior bristle (*vs.*mesoscutum with a fovea outside anterior bristle).

IV. CONCLUSION

Zaommomentedon indicus sp. nov. is newly described from Uttarakhand, India. This forms the second only report of the genus from India and the first report from northern India with Palearctic affinities. The taxonomy and host record of such group of parasitoids have not been fully exploited throughout India and a study on the same would be useful in suppression of leaf miner pest without the use of synthetic chemicals.

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