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Ramiplectrus catiensis, a new genus and a new species with branched male antennae and long metatibial spurs from Vietnam (Hymenoptera: Eulophidae)

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ABSTRACT

Ramiplectrus catiensis gen. et sp. n. is characterized by the unique combination of two long metatibial spurs and a short ramus on the two first funicular segments. Phylogenetic analysis of 28S rRNA sequences, along with the distinct morphological features, supports the classification of the new genus within the tribe Eulophini.

KEYWORDS: Biodiversity, Eulophinae, Eulophini, new genus, new species, identification key, parasitoid wasps, systematics, 28S rRNA, Southeast Asia, Vietnam.

TÓM TẮT

Một chi mới và một loài ong ký sinh mới *Ramiplectrus catiensis* được đặc trưng bởi sự kết hợp độc đáo của hai cựa xương chày dài và một nhánh ngắn trên hai đoạn râu đầu tiên. Phân tích phát sinh loài của trình tự 28S rRNA, cùng với các đặc điểm hình thái riêng biệt, hỗ trợ việc phân loại chi mới trong tông Eulophini.

TỪ KHÓA: Đa dạng sinh học, chi mới, loài mới, khóa nhận dạng, ong ký sinh, hệ thống học, Đông Nam Á, Việt Nam, Tỉnh Đồng Nai, Vườn quốc gia Cát Tiên.

INTRODUCTION

Historically, the subfamily Eulophinae Westwood included three tribes: Eulophini Westwood, 1829, Cirrospilini LaSalle, 2000 and Euplectrini Ashmead, 1904 (Gauthier *et al*. 2000). The last one was characterized by the presence of large metatibial spurs, with the longest spur typically being as long as the first two tarsomeres combined (Ashmead 1904; Ferrière 1941). The validity of Euplectrini as a distinct tribe was later supported by Bouček (1988), Wijesekara & Schauff (1994) and Hansson & Schmidt (2018). Wijesekara & Schauff (1997) recognized seven genera within Euplectrini: *Alveoplectrus* Wijesekara & Schauff, 1997, *Aroplectrus* Lin, 1963, *Euplectromorpha* Girault, 1913, *Euplectrus* Westwood, 1832, *Eurycephaloplectrus* Wijesekara & Schauff, 1997, *Metaplectrus* Ferrière, 1941 and *Platyplectrus* Ferrière, 1941.

However, in a phylogenetic analysis based on 28S rRNA sequences *Euplectrus* sp. was placed within the tribe Eulophini (Gauthier *et al.* 2000). This classification was

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further supported by Rasplus *et al*. (2020) through a phylogenomic analysis based on ultra-conserved elements (UCEs) which did not recover the tribe Euplectrini. Instead, the analysis placed the genera *Euplectrus* and *Platyplectrus*—both characterized by their long metatibial spurs—within Eulophini and, more precisely, among genera of the *Elachertus* Spinola, 1811 group.

The tribe Eulophini (subfamily Eulophinae) is primarily defined by the orientation of the propleural posterior margin, and by the orientation of the propleura that converge and cover the anterior part of the prosternum (Gauthier *et al*. 2000: 531, fig. 7A). The tribe includes several genera with branched male antennae, featuring two flagellomeres bearing either one branch (e.g. *Dicladocerus* Westwood, 1832) or three branches (*Necremnus* Thomson, 1878, *Sympiesis* Förster, 1856, *Pnigalio* Schrank, 1802, *Hemiptarsenus* Westwood, 1833, *Eulophus* Geoffroy, 1762 and *Elasmus* Westwood, 1833), but with short metatibial spurs.

The combination of the branched antenna and long metatibial spurs in males has not been previously found in any member of this tribe. This study provides a description of a new genus and a new species of Eulophinae, characterized by a short ramus on the first two funicular segments of the antenna and two long metatibial spurs in males, and explores the phylogenetic placement of the genus within the tribe Eulophini, subfamily Eulophinae.

MATERIALS AND METHODS

Morphological description

The material collected using a Malaise trap in Cát Tiên National Park, Southern Vietnam, in 2011, is deposited at the Steinhardt Museum of Natural History, Tel Aviv University, Israel (SMNHTAU).

Morphological description was done using a Leica M125 compound microscope. The specimen images were captured using a Leica Imaging System with a Z16 APO A microscope, and processed through focus stacking with Zerene Stacker (version 1.04, ©Zerene System, LLC).

Morphological terminology follows Gibson (1997) and Hansson *et al.* (2015). The following abbreviations are used: F1–F4 – 1st, 2nd, 3rd and 4th flagellomeres; SMV, MV, PMV, STV – submarginal, marginal, postmarginal and stigmal veins; POL – minimum distance between posterior ocelli, OOL – minimum distance between eye margin and adjacent posterior ocelli; TS1 – longest metatibial spur; TS2 – shortest metatibial spur; T1 – first hind tarsomere; T2 – second hind tarsomere.

DNA extraction and PCR

DNA was extracted from the gaster of the only paratype of *R. catiensis* sp. n. using the Monarch® Genomic DNA Purification Kit (#T3010S, New England Biolabs, Inc.) following the manufacturer's protocol. The COI gene was initially amplified using the primers LCO (Folmer *et al*. 1994) and MChaR1 (Fusu & Polaszek 2017). However, no visible band was detected on the agarose gel following PCR amplification. Consequently, the PCR product was subjected to a semi-nested

re-amplification using the same reverse primer (MChaR1) along with an internal forward primer, Euloph_COIF2 (5'-GGAAATCCTGGTTCTATAATTGG-3') resulting in a 192 bp COI fragment (excluding primers). The COI sequence was deposited in GenBank under accession number OQ622168. The D2–D3 region of the 28S rRNA gene was amplified using primers D23F (Park & Ó Foighil 2000) and D4B (5'-CCCCTATACCCAGTTCCGA-3'). Additionally, two others samples from the SMNHTAU collection, *Platyplectrus desertus* Yefremova, 2008 and *Euplectrus bicolor* (Swederus, 1795) were studied and sequenced for phylogenetic analysis. The 28S rRNA sequences were deposited in GenBank under accession numbers OQ629296–OQ629298 (Table 1, p. 16–17).

Phylogenetic analysis

The sequences were submitted to a blastn search (2.iii.2023; BLASTN 2.13.0+ Zhang *et al*. 2000) against the nucleotide database of the National Center for Biotechnology Information (NCBI). Since the initial blastn results placed the new 28S sequence within the Eulophini tribe, we retrieved all available 28S sequences of the tribe "Eu" = Eulophini+*Elasmus* following Gauthier *et al*. (2000). The data from Gauthier *et al*. (2000) provided a species-specific reliable foundation for the phylogenetic analysis. Additional 28S sequences of the Eulophini and Euplectrini genera were downloaded from GenBank, and a 28S sequence of *Elasmus* sp. was assembled from the data of Rasplus *et al*. (2020). Sequences from the Cirrospilini tribe were used as outgroups. A complete list of sequences used for the present phylogenetic analyses is provided in Table 1 (p. 16–17). The sequence alignment was performed using MAFFT 7.304 (Katoh & Standley 2013) with L-INS-i parameters.

Phylogenetic trees were reconstructed using the maximum likelihood (ML) criterion with PhyML 3.0 (Dereeper *et al*. 2008; Guindon *et al*. 2010) applying the GTR model, which was identified as the best-fit model using ModelFinder implemented in IQtree2 (Kalyaanamoorthy *et al*. 2017). Bootstrap percentages (BPs) were computed for each dataset based on 100 replicates.

TAXONOMY

Order Hymenoptera Linnaeus, 1758
Superfamily Chalcidoidea Latreille, 1817
Family Eulophidae Westwood, 1829
Subfamily Eulophinae Westwood, 1829
Genus ***Ramiplectrus*** gen. n.

Figs 1–7

LSID: urn:lsid:zoobank.org:act:5F14659B-75D2-4FA6-9199-3AF3B6B4D3C5.

Type species: *Ramiplectrus catiensis* sp. n.

Etymology: The genus name is derived from the Latin *ramus* (pl. *rami*), in reference to the branches on the male antenna, and *-plectrus*, a common ending for genera previously placed in Euplectrini.

Diagnosis: ***Male***. Hind legs with two long metatibial spurs. TS1 2.25× as long as TS2 and 2.0× as long as T1. Antenna with four flagellomeres: F1 and F2 each bears a short branch, F3 and F4 unbranched. Mandibles small and without teeth. Pronotum large, 2.5× broader than long. Mid-lobe of mesoscutum with single pair of long setae. Scutellum rugose with two longitudinal grooves. Propodeum smooth with anteromedial cup (Fig. 5).

Female. Unknown.

Distribution: Vietnam.

Ramiplectrus catiensis sp. n.

Figs 1–7

LSID: urn:lsid:zoobank.org:act:0A872377-1B4F-468E-BDF9-B9F5FF0FC24E.

Etymology: The species name refers to the type locality "Cát Tiên National Park".

Diagnosis: ***Male.*** Antenna: branch on F1 1.2× as long as branch on F2 (Fig. 3). Hind leg: TS1 2.2× as long as TS2 and 2.0× as long as T1. Clypeus delimited by complete suture anteriorly and incomplete laterally (Fig. 4). Occiput with sharp occipital carina (Fig. 1). Vertex with numerous scattered setae between lateral ocelli. Axillae almost connected by narrow anteromedial axillary angles. Forewing without speculum, SMV with 3 long setae. Petiole short and smooth. Digiti in male genitalia bearing one digital spine.

Description. ***Male.*** Body length 1.45 mm, forewing length 1.25 mm.

Color (Figs 1, 2). Body mostly black. Head completely black, eyes grey, ocelli, mandibles, clypeus and antenna yellow. Mesosoma with brown tegulae. Gaster brown, with large yellow spot at base. Legs: fore and middle legs brownish, hind legs brown with yellow spurs.

Head. Eyes bare (Fig. 3). Clypeus with several setae, delimited by strong anterior suture that fades out laterally (Fig. 4). Mandibles small and without teeth (Fig. 4). Scrobal grooves sutured and joining below at ⅓ of eyes height. Malar sulcus present. Occipital carina present (Fig. 1). Antennae inserted at lower level of eyes. Vertex with numerous scattered setae between lateral ocelli. POL 1.7× as long as OOL. Antenna (Figs 3, 4). Scape 3.6× as long as wide. Pedicel 1.4× as long as wide (Fig. 4) and 1.3× shorter than F1. One anellus. Flagellomeres F1–F4: F1=F2=F3, F4 1.2× shorter than each of previous flagellomeres; F3 3.0× as long as wide, F4 2.0× as long as wide. F1 and F2 with branches, F3 and F4 unbranched. First branch (Fig. 4) as long as scape, second branch 1.2× shorter than scape. First branch 1.2× as long as second branch. Clava 2.6× as long as wide and 2.0× as long as F4.

Mesosoma. Pronotum large, 2.5× as broad as long. Propleura meet medially so that prosternum visible ventrally only partly (Fig. 4). Notauli complete. Mesoscutum covered by numerous setae, mid lobe of mesoscutum with one pair of long setae on posterior margin (Figs 1, 2) and one pair of long setae on two lateral lobes

Figs 1, **2.** *Ramiplectrus catiensis* sp. n., male holotype, habitus: (1) dorsal view; (2) lateral view.

Figs 3–7. *Ramiplectrus catiensis* sp. n., male holotype: (3) head and antenna, dorsolateral view; (4) head, frontal and propleura + prepectus + fore coxae, ventral view; (5) scutellum + propodeum and hind coxae, dorsal view; (6) metatibia with 2 spurs, lateral view; (7) gaster + genitalia, ventral view.

(=scapulae). Scutellum areolate rugose (Fig. 1), with two sublateral longitudinal grooves and two pairs of long setae. Axillae finely reticulate almost connected by narrow anteromedial axillary angles. Propodeum (Figs 1, 5) smooth and shiny, with median carina and narrow raised cup. Cup with acute sharp anterior projection. Callus of propodeum with 6 long setae in two rows: 2 in first and 4 in second. Forewing (Fig. 2) 2.75× as long as broad, speculum absent. SMV with 3 long setae, MV as long as SMV, PMV 1.7× as long as STV. Costal cell with two rows of setae on ventral surface (7 setae in each row) and 2 setae near MV. Legs: hind legs with two tibial spurs: TS1 2.25× as long as TS2 (Fig. 6), TS1 2.0× as long as T1 and reaching ⅔ of tarsus. TS2 equal to T1. T1 2.4 × as long as T2.

Metasoma. Petiole transverse and smooth. Gaster 1.9× as long as its wide. Digitus with one digital spine (Fig. 7).

Holotype: ♂ **Vietnam:** *Dong Nai Province*: Cát Tiên National Park, 11°30′N 107°20′E, 12.xii.2011, Z. Yefremova, Malaise trap (SMNHTAU In.424207).

Paratype: 1♂, same data as holotype, GenBank OQ629297 (SMNHTAU). The gaster of the paratype has been removed for molecular analysis.

Distribution: Vietnam.

Host: Unknown.

DISCUSSION

Comments based on the morphological analysis

The new monotypic genus *Ramiplectrus* gen. n. is placed within the tribe Eulophini (Fig. 8) of the subfamily Eulophinae, as supported by molecular data, as well as by morphological evidence, particularly by the orientation of the propleura (Gauthier *et al*. 2000: 531, fig. 7A), meeting medially and covering the prosternum (Fig. 4) in most of the genera.

We propose the following identification keys for separating *Ramiplectrus* gen. n. from the seven previously known genera of Eulophinae with 1 or 2 long metatibial spurs and from the 10 previously known genera of Eulophinae with branched male antennal segments.

Key to the genera of Eulophinae with long metatibial spurs
(males are known for 6 genera)

1 Metatibia with one spur at apex 2
– Metatibia with two spurs at apex 3

2 Scutellum with two narrow sublateral grooves; TS1 1.1× as long as T1. Male known only for *M. thoseae* Ferrière, male antenna unbranched .... ***Metaplectrus***
– Scutellum with two broad crenulated grooves; TS1 1.3× as long as T1. Male unknown ..... ***Alveoplectrus***

3 Scutellum without lateral grooves 4
– Scutellum with lateral grooves 5

4 Propodeum with posteriorly diverging submedian carinae that originate separately from basal cup. Male unknown ..... ***Eurycephaloplectrus***
– Propodeum with distinct median carina. Male antenna without branches..... ..... ***Euplectrus***

5 Propodeum with strong median carina; mid lobe of mesoscutum with one pair of setae. Male antenna with or without branches 6
– Propodeum with different structure. Male antenna without branches 7

6 Male antenna without branches; digiti of genitalia with 2 spines. TS1 1.3–2.3× as long as TS2; pronotum 2.3–2.5× broader than long in dorsal view..... ..... ***Platyplectrus***
– Male antenna with two branches (Figs 1, 3); digiti of genitalia with 1 spine. TS1 2.25× as long as TS2; pronotum at least 2.5× broader than long in dorsal view. ..... ***Ramiplectrus*** gen. n.

7 Propodeum divided into more than four areas, with complete median carina and two short incomplete submedian carinae ..... ***Aroplectrus***
– Propodeum with two X- or H-shaped submedian carinae .....***Euplectromorpha***

Key to the genera of Eulophinae with branched male antennal segments

1 Male antenna: F1 and F2 with branch, F3 and F4 without branches; scutellum with two sublateral grooves 2
– Male antenna: F1, F2 and F3 with branch, F4 without branches; scutellum without sublateral grooves ..... ***Dahlbominus***, ***Elasmus***, ***Eulophus***, ***Hemiptarsenus***, ***Necremnus***, ***Notanisomorphella***, ***Microlycus***, ***Pnigalio***, ***Sympiesis***
2 Mesoscutum without complete notauli; metatibia without spurs; mandibles well developed; branches of male antenna 2.0× as long as antennal scape; propodeum with distinct plicae ..... ***Dicladocerus***
– Mesoscutum with complete notauli; metatibia with 2 long spurs; mandibles small without teeth; branches of male antenna as long as antennal scape; propodeum without plicae ..... ***Ramiplectrus*** gen. n.

Comments based on the molecular analysis

Based on our phylogenetic analysis, *Ramiplectrus catiensis* gen. et sp. n. is placed in the tribe Eulophini (subfamily Eulophinae) (Fig. 8). This allocation is also supported by the position of the propleural plates, which meet and cover the prosternum – a character typical for most genera in the tribe Eulophini. In the present 28S rRNA phylogenetic analysis, the tribe Eulophini is divided into two clades: Clade A includes *Ramiplectrus* gen. n., along with *Dicladocerus*, *Elachertus*, *Euplectrus*, *Hoplocrepis* Ashmead, 1890, *Hyssopus* Girault, 1916, *Miotropis* Thomson, 1878, *Paraolinx* Ashmead, 1894 and *Platyplectrus*, and Clade B that includes the genera *Sympiesis*, *Pnigalio*, *Hemiptarsenus*, *Eulophus* and *Elasmus*. The bootstrap support for the Clade A is 47, and for the Clade B is 29. These relatively low values are likely due to the limited number of variable positions in the D2 region of the 28S rRNA gene. As observed in previous studies (Gauthier *et al*. 2000; Rasplus *et al*. 2020), the tribe Euplectrini, represented here by *Euplectrus* sp. and *Platyplectrus* sp., forms a subclade within Clade A of Eulophini. These genera share two morphological features also found in *R. catiensis* sp. n.: long metatibial spurs and small mandibles. However, the 28S rRNA sequence of *R. catiensis* sp. n. is distinct and does not cluster directly with them.

Instead, *R. catiensis* sp. n. clusters with *Miotropis* sp., which is characterized by a large pronotum (2.0–2.5× as broad as long; 2.5× in *R. catiensis*), complete notauli, one pair of long setae on mesoscutal midlobe, mesoscutellum with two incomplete longitudinal grooves and a propodeum with a complete median carina. However, *Miotropis* spp. differ from *R. catiensis* sp. n. in having well-developed mandibles, unbranched male antennae, and in lacking long metatibial spurs. Male genitalia in *Miotropis simplex* Thomson, 1878 and *M. nigriceps* Suciu, 1980 have digiti bearing two spines (Suciu 1980). Examination of a male of *Miotropis unipuncta* (Nees, 1834)

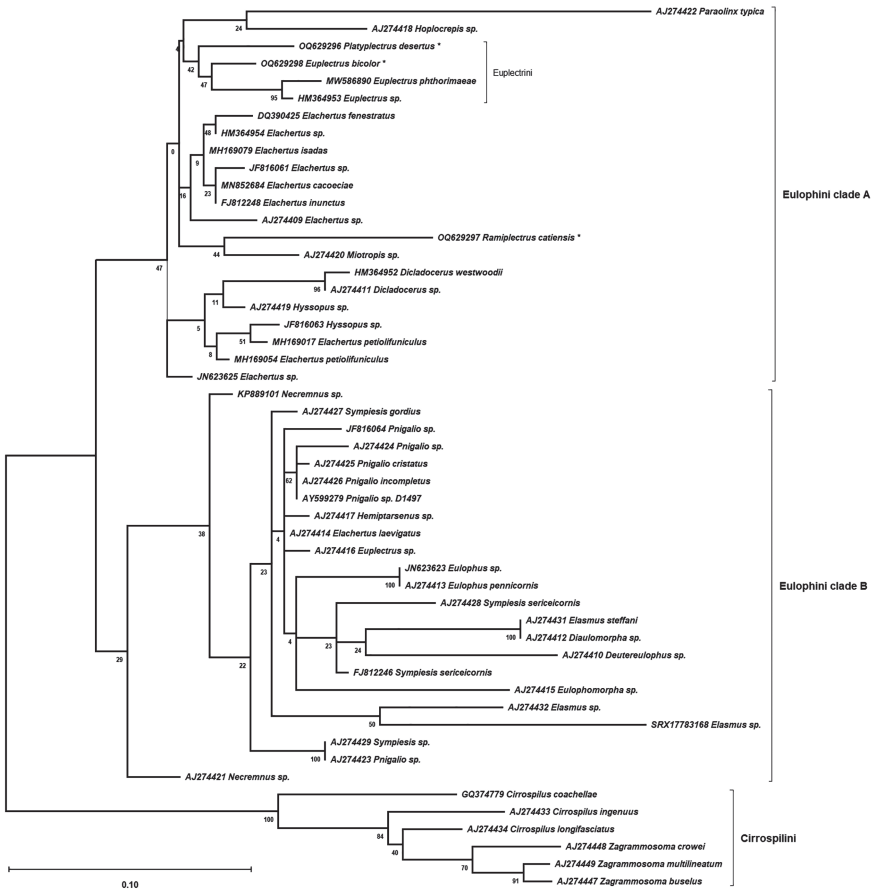

Fig. 8. The phylogenetic tree of Eulophini 28S rRNA sequences, 424 bp D2 region. The new sequences of *Ramiplectrus catiensis* gen. et sp. n., *Platyplectrus desertus* and *Euplectrus bicolor* are marked with asterisk (*). The phylogenetic tree was reconstructed using PhyML 3.0 under the maximum likelihood criterion. Cirrospilini sequences are used to root the tree. Bootstrap supports are given near the corresponding nodes.

labelled “Batorliget, Hungary, 1959. vii, 11, Dr. Erdös, det, Erdös” (SMNHTAU), confirmed that its antenna is unbranched.

The clustering of *Ramiplectrus* gen. n. with *Miotropis* sp. is likely an inaccuracy of the phylogenetic analysis (possibly due to long branch attraction), similar to the observed grouping of *Hoplocrepis* with *Paraolinx*, which are morphologically very different. To test this, a short 28S rRNA fragment (~180 bp) from *Xanthellum* Erdös & Novicky, 1951 (Rasplus *et al*., 2020, SRX8128990) was included in our analysis. In this reduced dataset, *Xanthellum* sp. clustered with *Hoplocrepis* sp., which is more congruent with morphology (topology not shown).

Our new species presents a unique combination of morphological characters – two notably long metatibial spurs and a branched male antennae. The distinct 28S rRNA sequence confirms the novelty of *Ramiplectrus catiensis* gen. et sp. n. among already sequenced genera.

Table 1. List of sequences used for the present phylogenetic reconstruction based on 28S ribosomal RNA. The table also lists additional genera of the tribe Eulophini that possess tibial spurs (TS) or branched male antennae (BrA), and with no previously published 28S rRNA sequences.

Accession #	Genus / species	Country	Reference	Tribe	TS	BrA
Not available	*Alveoplectrus* sp.	Neotropics	Wijesekara & Schauff 1997	Eulophini	1 long	No
Not available	*Aroplectrus* sp.	Taiwan	present study	Eulophini	Yes	No
GQ374779	*Cirrospilus coachellae*	unknown	Heraty *et al*. 2011	Cirrospilini	No	No
AJ274433	*C. ingenuus*	Israel	Gauthier *et al*. 2000	Cirrospilini	No	No
AJ274434	*C. longifasciatus*	Yemen	Gauthier *et al*. 2000	Cirrospilini	No	No
Not available	*Dahlbominus* sp.	Italy	present study	Eulophini	No	Yes
AJ274410	*Deutereulophus* sp.	Costa Rica	Gauthier *et al*. 2000	Eulophini	No	No
AJ274412	*Diaulomorpha* sp.	Australia	Gauthier *et al*. 2000	Eulophini	No	No
AJ274411	*Dicladocerus* sp.	USA	Gauthier *et al*. 2000	Eulophini	No	Yes
HM364952	*D. westwoodii*	Italy	Burks *et al*. 2011	Eulophini	No	Yes
MN852684	*Elachertus cacoeciae*	Canada	Nisole *et al*., unpubl.	Eulophini	No	No
DQ390425	*E. fenestratus*	China	Shao *et al*., unpubl.	Eulophini	No	No
FJ812248	*E. inunctus*	Italy	Gebiola *et al*. 2009	Eulophini	No	No
MH169079	*E. isadas*	China	Shao, unpublished	Eulophini	No	No
AJ274414	*E. laevigatus*	Costa Rica	Gauthier *et al*. 2000	Eulophini	No	No
MH169017	*E. petiolifuniculus*	China	Shao, unpubl.	Eulophini	No	No
MH169054	*E. petiolifuniculus*	China	Shao, unpubl.	Eulophini	No	No
AJ274409	*Elachertus* sp.	Costa Rica	Gauthier *et al*. 2000	Eulophini	No	No
JF816061	*Elachertus* sp.	Ukraine	Gumovsky 2011	Eulophini	No	No
JN623625	*Elachertus* sp.	Thailand	Munro *et al*. 2011	Eulophini	No	No
HM364954	*Elachertus* sp. D1580	unknown	Burks *et al*. 2011	Eulophini	No	No
AJ274432	*Elasmus* sp.	Brazil	Gauthier *et al*. 2000	Eulophini	No	Yes
SRX17783168	*Elasmus* sp.	Brunei	Rasplus *et al*. 2020	Eulophini	No	Yes
AJ274431	*Elasmus steffani*	Italy	Gauthier *et al*. 2000	Eulophini	No	Yes
AJ274415	*Eulophomorpha* sp.	Indonesia	Gauthier *et al*. 2000	Eulophini	No	No

Accession #	Genus / species	Country	Reference	Tribe	TS	BrA
AJ274413	*Eulophus pennicornis*	UK	Gauthier *et al*. 2000	Eulophini	No	Yes
JN623623	*Eulophus* sp. D1619	Russia	Munro *et al*. 2011	Eulophini	No	Yes
Not available	*Euplectromorpha* sp.	Kenya	present study	Eulophini	Yes	No
OQ629298	***Euplectrus bicolor***	**Vietnam**	**present study**	**Eulophini**	**Yes**	**No**
MW586890	*E. phthorimaeae*	Holland	Woelke, unpubl.	Eulophini	Yes	No
AJ274416	*Euplectrus* sp.	Costa Rica	Gauthier *et al*. 2000	Eulophini	Yes	No
HM364953	*Euplectrus* sp.	unknown	Burks *et al*. 2011	Eulophini	Yes	No
Not available	*Eurycephaloplectrus* sp.	Columbia	Wijesekara & Schauff 1997	Eulophini	Yes	No
AJ274417	*Hemiptarsenus* sp.	UK	Gauthier *et al*. 2000	Eulophini	No	Yes
AJ274418	*Hoplocrepis* sp.	Costa Rica	Gauthier *et al*. 2000	Eulophini	No	No
AJ274419	*Hyssopus* sp.	USA	Gauthier *et al*. 2000	Eulophini	No	No
JF816063	*Hyssopus* sp.	Germany	Gumovsky 2011	Eulophini	No	No
Not available	*Metaplectrus* sp.	Israel	present study	Eulophini	1 long	No
AJ274420	*Miotropis* sp.	UK	Gauthier *et al*. 2000	Eulophini	No	No
AJ274421	*Necremnus* sp.	UK	Gauthier *et al*. 2000	Eulophini	No	Yes
KP889101	*Necremnus* sp.	Tunisia	Asma, unpubl.	Eulophini	No	Yes
AJ274422	*Paraolinx typic*a	USA	Gauthier *et al*. 2000	Eulophini	No	No
OQ629296	***Platyplectrus desertus***	**Israel**	**present study**	**Eulophini**	**Yes**	**No**
JF816064	*Pnigalio* sp.	Germany	Gumovsky 2011	Eulophini	No	Yes
AY599279	*Pnigalio* sp. D1497	unknown	Gillespie *et al*. 2005	Eulophini	No	Yes
AJ274423	*Pnigalio* sp. 1	Spain	Gauthier *et al*. 2000	Eulophini	No	Yes
AJ274424	*Pnigalio* sp. 2	France	Gauthier *et al*. 2000	Eulophini	No	Yes
OQ629297	***Ramiplectrus catiensis***	**Vietnam**	**present study**	**Eulophini**	**Yes**	**Yes**
AJ274425	*Ratzeburgiola cristata*	Tunisia	Gauthier *et al*. 2000	Eulophini	No	yes
AJ274426	*R. incompleta*	Israel	Gauthier *et al*. 2000	Eulophini	No	Yes
AJ274427	*Sympiesis gordius*	France	Gauthier *et al*. 2000	Eulophini	No	Yes
AJ274428	*S. sericeicornis*	UK	Gauthier *et al*. 2000	Eulophini	No	No
FJ812246	*S. sericeicornis*	Italy	Gebiola *et al*. 2009	Eulophini	No	No
AJ274429	*Sympiesis* sp.	France	Gauthier *et al*. 2000	Eulophini	No	Yes
AJ274447	*Zagrammosoma buselus*	Galapagos I.	Gauthier *et al*. 2000	Cirrospilini	No	No
AJ274448	*Z. crowei*	Yemen	Gauthier *et al*. 2000	Cirrospilini	No	No
AJ274449	*Z. multilineatum*	USA	Gauthier *et al*. 2000	Cirrospilini	No	No

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