

RESEARCH PAPER

***Dolichogenidea maetoi* sp. nov. (Hymenoptera: Braconidae)  
from Japan, the first parasitoid wasp recorded  
from *Hyblaea fortissima* (Lepidoptera)**

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**Abstract.** A new species of Microgastrinae (Hymenoptera: Braconidae) from Japan, *Dolichogenidea maetoi* Fernandez-Triana & Shimizu sp. nov., is described, representing the first record of a braconid wasp parasitizing the lepidopteran family Hyblaeidae in the Palearctic Region (from *Hyblaea fortissima* Butler, 1881). The new species is fully illustrated, diagnosed and compared with all previously described species of the genus *Dolichogenidea* Viereck, 1911 in the Holarctic (154 species). Details on the wasp biology, including observed sex ratios, are provided.

**Key words.** Hymenoptera, Braconidae, *Dolichogenidea*, Microgastrinae, Lepidoptera, Hyblaeidae, *Hyblaea*, teak moths, new species, host, Japan, Palearctic Region

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### Introduction

The teak moths (Lepidoptera: Hyblaeidae) comprise a small group of tropical species (KIM & SOHN 2003). Their leaf-roller larvae feed mostly on plants of the families Bignoniaceae, Verbenaceae, Rhizophoraceae, and Myrtaceae (DUGDALE et al. 1998; Fig. 1). Less than 50 species within two genera (*Hyblaea* Fabricius, 1793 and *Torone* Walker, 1863) have been described, mostly from tropical and subtropical areas of the Old World (e.g., SCOBLE 1992, SHAFFER & NIELSEN 1996, KIM & SOHN 2003). According to KIM & SOHN (2003), the economic importance of Hyblaeidae has been rarely recognized, but *Hyblaea puera* (Cramer, 1777) has been considered a notorious pest of teak trees (*Tectona grandis* L.) in Southern Asia (BAKSHA & CAWLEY 1998).

The following three hyblaeid species have been recorded in Japan: *Hyblaea constellata* Guenée, 1857, *H. fortissima* Butler, 1881, and *H. puera* (KOMAI et al. 2010). Among the Japanese hyblaeids, only *H. fortissima* is known from the Palearctic Region and is restricted to Japan (except

Ryukyu Islands) and Korea (KIM & SOHN 2003). Larvae of this species feed on leaves of *Callicarpa mollis* Siebold et Zucc., *C. japonica* Thunb., and *C. dichotoma* (Lour.) K. Koch (Lamiaceae) (KOMAI et al. 2010). This species is univoltine: adults live from June to April, and larvae grow in a short period of time, from April to June (NISHIO 2003).

Only three species of Braconidae, from the Oriental and Oceanic Regions, were previously reported as parasitoids of Hyblaeidae. They all belong to the subfamily Microgastrinae: *Apanteles puera* Wilkinson, 1928 and *A. malevolus* Wilkinson, 1929 were reared from the teak defoliator, *Hyblaea puera* in India and Myamar; whereas *Dolichogenidea hyblaeae* (Wilkinson, 1928) was reported from *Hyblaea sanguinea* Gaede, 1917 and *H. puera* in southern China, Fiji, India, Indonesia, Samoa and Vietnam (references compiled by YU et al. 2016).

Here we describe a new species of *Dolichogenidea* from Japan which constitutes the first record of a Palearctic braconid wasp parasitizing Hyblaeidae. It also represents the first parasitoid ever reported from *Hyblaea fortissima*.



## Materials and methods

**Rearing methods.** Collected caterpillars were reared under 25°C, 16:8h (L:D). Twenty larvae were individually reared in plastic Petri dishes (90 mm in diameter, 30 mm in height) with host-plant leaves. We supplied fresh leaves and cleaned plastic Petri dishes every 1–3 days.

**Observation of morphology and figures treatment.** The new species was compared with all previously described species of Holarctic *Dolichogenidea* (154 species in total). Almost half of those species was represented by authenticated specimens in the Canadian National Collection of Insects and were examined for this paper. The remaining species were assessed based on their original descriptions and/or available revisions of regional faunas (e.g., TELENGA 1955; NIXON 1965, 1972, 1973, 1976; PAPP 1978, 1979, 1980; TOBIAS 1986; KOTENKO 2007; CHEN & SONG 2004; LIU et al. 2014).

Morphological terms and measurements of structures follow those used by MASON (1981), HUBER & SHARKEY (1993), WHITEFIELD (1997), KARLSSON & RONQUIST (2012), and FERNÁNDEZ-TRIANA et al. (2014). The abbreviations T1, T2, and T3 refer to metasomal mediotergites 1, 2, and 3; F2/3/14/15/16 refer to length of antennal flagellomeres 2, 3, 14, 15, and 16; and L and W refer to length and width respectively. The description of the new species contains some ratios commonly used in taxonomic studies of Microgasterinae, but raw measurements of morphological structures (in mm) are also provided as they allow for additional ratios to be explored in the future, if needed. When presenting raw measurements, the holotype value is given first, followed by the range of other specimens between parentheses.

In the species description, holotypes labels are detailed verbatim, with “/” separating the different lines of a label and “//” different labels.

Photos were taken with a Keyence VHX-1000 Digital Microscope, using a lens with a range of 10–130×. Multiple images were taken of a structure through the focal plane and then combined to produce a single in-focus image using the software associated with the Keyence System. Plates were prepared using Microsoft PowerPoint 2010.

The specimens are deposited in the following institutions:

CNC Canadian National Collection of Insects, Ontario, Canada;  
EUM Ehime University Museum, Matsuyama, Japan;

KPMNH Kanagawa Prefectural Museum of Natural History, Odawara, Japan;  
NIAES National Institute for Agro-Environmental Sciences, Tsukuba, Japan;  
NMPC National Museum, Praha, Czech Republic;  
NSMT National Museum of Nature and Science, Tsukuba;  
SEHU The Laboratory of Systematic Entomology, Hokkaido University, Sapporo, Japan.

**Statistical analysis.** Sex ratios of emerged parasitoids were compared with an equal ratio using binomial tests. This statistical analysis was conducted using R software (ver. 3.3.2; R DEVELOPMENT CORE TEAM 2016).

## Taxonomy

### *Dolichogenidea maetoi* Fernandez-Triana & Shimizu sp. nov. (Figs 2A–F)

**Type locality.** Japan, Fukui Prefecture, Echizen City, Mount Hinoyama, 35°51'N, 136°11'E; 169 m alt. (Fig. 1).

**Type material.** HOLOTYPE: ♀, “Japan: Fukui-pref. / Echizen-city, Mt. Hino- / yama, alt. 169m / N:35°51'43, E:136°11 / '30, 24.V.2017 emgd / K. Sakagami leg. // Host species: *Hyblaea / fortissimo* / (Hyblaeidae) / 14.v.2017, host Coll. / Host code: 6 // CNC923448 // HOLOTYPE / [Microgasterinae] / *Dolichogenidea maetoi* / Fernandez-Triana & Shimizu / Acta. Entomol. Mus. Natl. Pragae, 58: 167–175.” (CNC). PARATYPES: 121 ♀♀ 90 ♂♂ same data as holotype, but deposited in CNC, EUM, KPMNH, NIAES, NMPC, NSMT and SEHU.

**Diagnosis.** This species can be distinguished from all 154 previously described species of Holarctic *Dolichogenidea* by the unique combination of characters as follows: antennal flagellomeres, coxae and metafemur all dark brown to black; tegula and humeral complex dark brown; pterostigma brown with relatively large, pale spot at base; propodeal areola only defined by carinae on posterior half; T1 mostly sculptured on lateral margins and posterior half, and more or less parallel-sided to very slightly barrel-shaped; T2 broadly rectangular and partially sculptured, especially near margins; vein R1 longer than pterostigma; ovipositor sheaths clearly shorter than metatibia (around 0.8 times its length). Although there is no available key that covers all Holarctic *Dolichogenidea*, all previously described species differ from the diagnosis here provided for *D. maetoi* sp. nov. by at least one (usually more) characters. To facilitate future work on the genus we provide one-to-one comparisons

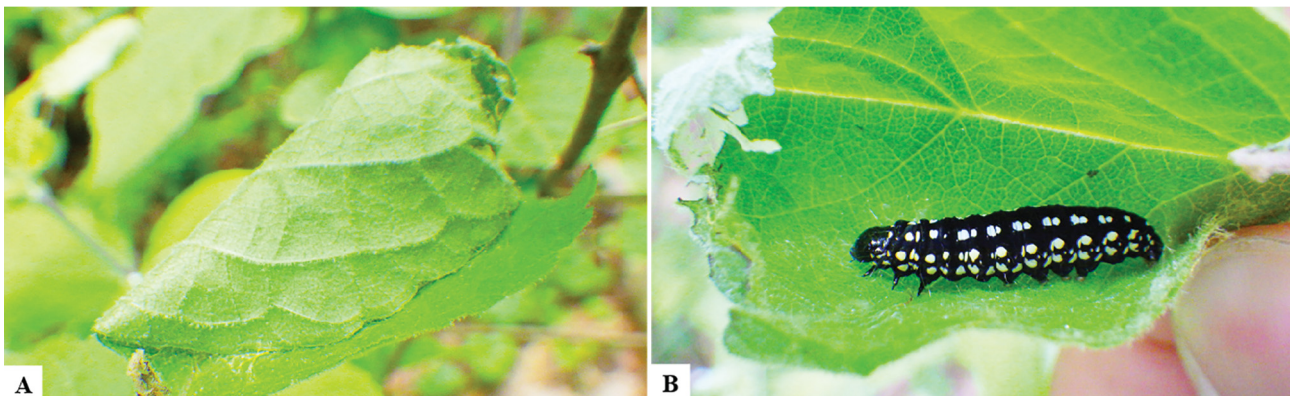


Fig. 1. Caterpillar of *Hyblaea fortissima* Butler, 1881, host of *Dolichogenidea maetoi* Fernandez-Triana & Shimizu sp. nov. A – leaf shelter; B – host caterpillar in the shelter.



of *Dolichogenidea maetoi* Fernandez-Triana & Shimizu sp. nov. with every other previously described species of *Dolichogenidea* in the Holarctic (see below).

There were four previously described species of *Dolichogenidea* in Japan; they differ from *D. maetoi* sp. nov. as follows: *Dolichogenidea asotae* (Watanabe, 1932)

has meso- and metafemora reddish-yellow, sternites and laterotergites 1–3 reddish-yellow, T2 mostly sculptured, and ovipositor sheath much shorter (approximately 0.5 times) than metatibia. *Dolichogenidea baoris* (Wilkinson, 1930) has pterostigma pale with thin brown margins, and it is a much smaller species (body length 1.5 mm).

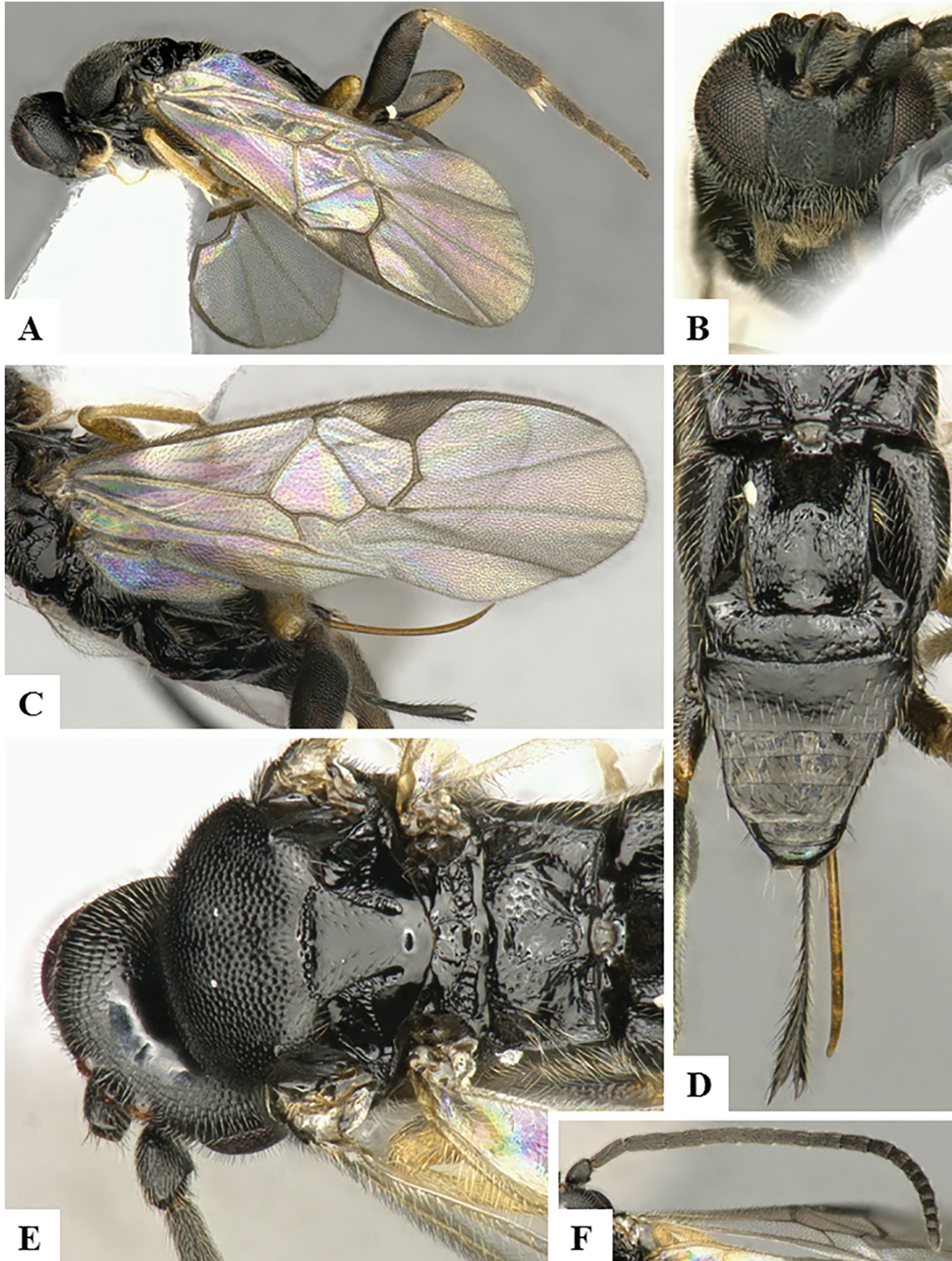


Fig. 2. Female paratype of *Dolichogenidea maetoi* Fernandez-Triana & Shimizu sp. nov. A – habitus, lateral; B – head, frontal; C – wings; D – metasoma, dorsal; E – mesosoma, dorsal; F – antenna.



*Dolichogenidea dilecta* (Haliday, 1834) has the propodeum mostly polished and without areola (only small rugae above nucha), T1 strongly narrowing towards posterior margin, T1 (basal half) and T2 (centrally) smooth, and mesofemur mostly yellow. *Dolichogenidea lacteicolor* (Viereck, 1911) has the propodeum with areola completely defined by carinae, including strong transverse carinae forking around spiracles, and T1 and T2 much more strongly sculptured (especially T2 which is strongly striated longitudinally).

**Description. Female.** Antennal flagellomeres, all coxae and metafemur dark brown to black; metatibia pale in anterior half, dark in posterior half; metatibial spurs yellow; tegula and humeral complex dark brown; pterostigma brown with relatively large pale spot at base; veins mostly brown; apical flagellomeres slightly longer than wide (1.1–1.2 times as long as wide); scutellar disc mostly smooth; polished area of lateral face of scutellar disc (lunules) approximately half the height of lateral face; propodeum mostly smooth, but with some punctures on anterior half, surrounding the areola; propodeum areola only defined by carinae posteriorly (anterior half defined by an impression); T1 more or less parallel-sided to very slightly barrel-shaped (i.e., slightly wider centrally as compared to narrower anterior and posterior margins – anterior and posterior margins of similar or very similar width); T1 mostly sculptured on lateral margins and posterior half; T1 1.55–1.70 times as long as wide at posterior margin; T2 partially sculptured, especially near margins; T2 relatively transverse and rectangular (T2 width at posterior margin 2.85–3.00 times its length medially); T3 longer than T2 (T3 L 1.25–1.38 times T2 L); pterostigma 2.35–2.50 times as long as wide; vein R1 longer than pterostigma (R1 L 1.10–1.20 times pterostigma L); ovipositor sheath slightly curved downwards, and slightly widening towards apex; ovipositor sheath clearly shorter than metatibia (ovipositor sheath 0.70–0.80 times metatibia length).

Body measurements (all in mm). Body L: 2.5 (2.4–2.6); forewing L: 2.7 (2.6–2.9); ovipositor sheath L: 0.64 (0.60–0.69); F2/3/14/15 L: 0.21/0.20/0.08/0.08 (0.22–0.24/0.21–0.23/0.09/0.09); metafemur L/W: 0.75/0.24 (0.71–0.84/0.23–0.26); metatibia L: 0.83 (0.83–0.99); metatibia inner/outer spur L: 0.20/0.15 (0.20–0.23/0.14–0.17); first segment of metatarsus L: 0.41 (0.40–0.45); T1 W at anterior margin/maximum W/W at posterior margin/L: 0.25/0.27/0.24/0.41 (0.26–0.28/0.29–0.30/0.27–0.28/0.42–0.44); T2 W at posterior margin: 0.39 (0.42–0.45); T2 L medially: 0.13 (0.14–0.16); T3 L medially: 0.18 (0.18–0.20); pterostigma L/W: 0.52/0.22 (0.58–0.62/0.23–0.25); vein R1 L: 0.62 (0.64–0.73).

**Male.** As female but T2 more subtriangular, and overall body sculpture less marked.

**Etymology.** The species is named to honour Professor Kaoru Maeto, a great Japanese braconid researcher, and the professor at the laboratory the second (KS) and third (SS) authors of this paper are connected with.

**Biology.** The type series was reared from larvae of *Hyblaea fortissima* on its host plants (*Callicarpa mollis* and *C. japonica*) (Fig. 1). Nine out of 20 host larvae we studied were parasitized by *D. maetoi* sp. nov.; parasitism rate was 45%.

The number of wasps emerged from a single host larva was  $27.6 \pm 2.7$  (mean  $\pm$  SE; range 14–40;  $n = 9$ ). The female sex ratio was 0.65; significantly female-biased (binomial test,  $P < 0.05$ ). However, the female sex ratio varied between different host larvae, ranging from 0.14 to 0.88. In six out of nine host larvae there was a significantly biased female sex ratio, whereas one host larva was male biased and the sex ratio was not biased in two larvae.

The sex ratio of parasitoid wasps is sometimes influenced by various factors, such as parental age (UÇKAN & GÜLEL 2002, GÜNDÜZ & GÜLEL 2005), host body size (CHARNOV et al. 1981, SANTOLAMAZZA-CARBONE et al. 2007), and host age (CHARNOV et al. 1981).

**Distribution.** Japan (Fukui Prefecture).

### Comparison with all described Holarctic *Dolichogenidea* species

Here we provide individual comparison of *Dolichogenidea maetoi* Fernandez-Triana & Shimizu sp. nov. with all previously described species of Holarctic *Dolichogenidea* (arranged in alphabetical order).

- D. absona** (Muesebeck, 1965): Pterostigma brown; propodeum mostly polished and without areola (only small rugae above nucha); ovipositor sheath longer (at least 1.5 times) than metatibia.
- D. acrobasis** (Muesebeck, 1921): Tegula and humeral complex yellow; propodeum with areola completely defined by carinae, including strong transverse carinae forking around spiracles; T1 with strong longitudinal sulcus which has strong transverse striae; T2 strongly sculptured, especially on posterior margin.
- D. agilla** (Nixon, 1972): Wings slightly infumated; propodeum without defined areola but with posterior 1/3–1/2 rugose; hypopygium mostly inflexible, without pleats.
- D. alaria** (Kotenko, 1986): Propodeum mostly polished and without areola (only small rugae above nucha).
- D. albipennis** (Nees, 1834): Meso- and metafemora yellow-orange; propodeum mostly polished and without areola (only small rugae above nucha).
- D. alutacea** (Balevski, 1980): Scutellar disc punctate; body length 1.8–2.0 mm.
- D. anarsiae** (Faure & Alabouvette, 1924): Tegula light yellow; pterostigma pale with narrow brown markings; propodeum with areola completely defined by carinae, including strong transverse carinae forking around spiracles; ovipositor sheath longer (at least 1.3 times) than metatibia.
- D. annularis** (Haliday, 1834): Forewing veins mostly transparent; T1 narrowing towards posterior margin; T2 subquadrate; metatibial spurs white.
- D. appellator** (Telenga, 1949): Tegula and humeral complex yellow; propodeum mostly polished and without areola (only small rugae above nucha); T1 and T2 mostly smooth.
- D. artissima** (Papp, 1971): T1 narrowing towards posterior margin; T2 strongly sculptured and trapezoidal; meso- and metafemora mostly yellow; ovipositor sheath much shorter (less than 0.5 times) than metatibia.

- D. asotae** (Watanabe, 1932): Meso- and metafemora reddish-yellow; sternites and laterotergites 1–3 reddish-yellow; T2 mostly sculptured; ovipositor sheath much shorter (approximately 0.5 times) than metatibia.
- D. ate** (Nixon, 1973): Pterostigma brown; propodeum mostly polished and without areola (only small rugae above nucha); T1 narrowing towards posterior margin.
- D. azovica** (Kotenko, 1986): Pterostigma brown; propodeum mostly polished and without areola (only small rugae above nucha); T1 and T2 mostly smooth; ovipositor sheath slightly longer than metatibia.
- D. banksi** (Viereck, 1911): Head elongated; T1 and T2 mostly smooth; ovipositor sheath much longer (at least 1.5 times) than metatibia.
- D. baoris** (Wilkinson, 1930): Pterostigma pale with narrow brown margins; body length 1.5 mm.
- D. benevolens** (Papp, 1973): Mesofemur yellow; T1 parallel-sided; T2 smooth.
- D. benkevitchi** (Kotenko, 1986): Propodeum mostly polished and without areola (only small rugae above nucha); ovipositor sheath much longer (at least 1.5 times) than metatibia.
- D. betheli** (Viereck, 1911): Propodeum mostly sculptured (rugulose), T1 with strong longitudinal sulcus which has strong transverse striae; T2 strongly sculptured and trapezoidal; ovipositor sheath much longer (at least 1.5 times) than metatibia.
- D. bicolor** Song & Chen, 2004: T3 bicoloured (basal half reddish-brown, apical half reddish-yellow).
- D. bilecikensis** Inanç & Cetin Erdogan, 2004: Pterostigma brown; ovipositor sheath more or less straight.
- D. borysthenica** (Kotenko, 1986): Flagellomere 14 length 1.5 times its width; propodeum smooth and shiny; ovipositor sheath much longer (1.6–1.8 times) than metatibia.
- D. bres** (Nixon, 1973): Propodeum mostly polished and without areola (only small rugae above nucha); hypopygium very short and inflexible, evenly sclerotized. This species is probably better placed within *Pholetesor*.
- D. breviventris** (Ratzeburg, 1848): Propodeum mostly polished and without areola (only small rugae above nucha); T1 and T2 mostly smooth; meso- and metafemora mostly yellow.
- D. britannica** (Wilkinson, 1941): Propodeum mostly polished and without areola (only small rugae above nucha); T1 and T2 mostly smooth.
- D. bushnelli** (Muesebeck, 1933): T2 mostly sculptured with longitudinal striae; metatibial spurs white; ovipositor sheath slightly longer (1.1–1.2 times) than metatibia.
- D. cacoeciae** (Riley, 1881): Forewing veins mostly transparent; ovipositor sheath much shorter (approximately 0.5 times) than metatibia.
- D. californica** (Muesebeck, 1921): Pterostigma brown; T1 and T2 strongly sculptured with strong longitudinal striae; ovipositor sheath much longer (at least 1.5 times) than metatibia.
- D. candidata** (Haliday, 1834): Pterostigma brown; propodeum mostly polished and without areola (only small rugae above nucha); T1 and T2 mostly smooth.
- D. cauda** Song & Chen, 2004: Ovipositor sheath much longer (approximately 1.6 times) than metatibia.
- D. celsa** (Papp, 1975): Flagellomere 14 length 1.5 times its width; ovipositor sheath much longer (approximately 1.5 times) than metatibia.
- D. cerialis** (Nixon, 1976): Pterostigma brown; propodeum with areola completely defined by carinae, including strong transverse carinae forking around spiracles; T1 very strongly rugulose.
- D. cheles** (Nixon, 1972): Pterostigma with two pale spots (at base and apex); flagellomeres pale ventrally, with apical flagellomeres also pale dorsally.
- D. cinerosa** (Papp, 1971): Propodeum mostly polished and without areola (only small rugae above nucha); T1 widening towards posterior margin, its length 1.1 times its width at posterior margin.
- D. claniae** (You & Zhou, 1990): Ovipositor sheath longer (approximately 1.2 times) than metatibia.
- D. clavata** (Provancher, 1881): Forewing veins mostly transparent; tegula yellow, humeral complex partially yellow/partially brown; T2 mostly sculptured with strong longitudinal striae; ovipositor sheath slightly longer than metatibia.
- D. colchica** (Tobias, 1976): Flagellomeres 14 and 15 subcubic; pterostigma pale (opaque yellow); all legs (except for coxae) reddish-yellow; T1 length approximately 1.2 times its width at posterior margin.
- D. coleophorae** (Wilkinson, 1938): Pterostigma brown; propodeum with areola completely defined by carinae, including strong transverse carinae forking around spiracles; T2 mostly smooth.
- D. coniferae** (Haliday, 1834): Pterostigma entirely light (transparent); propodeum mostly polished and without areola (only small rugae above nucha); T1 strongly narrowing towards posterior margin.
- D. coniferoides** (Papp, 1972): Ovipositor sheath much shorter (less than 0.5 times) than metatibia. Probably this species is better placed within *Pholetesor*.
- D. contergita** Song & Chen, 2004: Pterostigma brown; legs mostly yellow-brown; ovipositor sheath longer than metatibia and first segment of metatarsus.
- D. corvina** (Reinhard, 1880): Pterostigma brown; propodeum mostly polished and without areola (only small rugae above nucha); T1 and T2 mostly smooth.
- D. credne** (Nixon, 1973): Antenna short, with flagellomeres 14 and 15 cubic; pterostigma brown; propodeum mostly polished and without areola (only small rugae above nucha); T1 narrowing towards posterior margin; T2 subtriangular (trapezoidal).
- D. cultriformis** Song & Chen, 2004: Propodeum mostly smooth, with only a small trace of posterior areola carinae near nucha; ovipositor sheath wide; metasoma decurving 60° from mesosoma.
- D. cytherea** (Nixon, 1972): T1 clearly (although slightly) narrowing towards posterior margin from half-length of tergite; T2 subtrapezoidal; ovipositor sheath much longer (1.6–1.7 times) than metatibia.
- D. decora** (Haliday, 1834): Pterostigma brown; propodeum mostly polished and without areola (only small rugae

- above nucha); T1 and T2 mostly smooth; meso- and metafemora mostly yellow.
- D. dilecta*** (Haliday, 1834): Propodeum mostly polished and without areola (only small rugae above nucha); T1 strongly narrowing towards posterior margin; T1 (basal half) and T2 (centrally) smooth; mesofemur mostly yellow.
- D. dolichocephala*** (Muesebeck, 1921): Forewing veins mostly transparent; T2 mostly smooth; ovipositor sheath slightly longer (around 1.2 times) than metatibia.
- D. drusilla*** (Nixon, 1972): Forewing veins mostly transparent; anteromesoscutum highly polished; ovipositor sheath slightly longer (around 1.2 times) than metatibia.
- D. eleagnellae*** (Tobias, 1976): Tegula yellow; ovipositor sheath slightly longer than metatibia.
- D. emarginata*** (Nees, 1834): This species looks very similar to *D. maetoi* Fernandez-Triana & Shimizu sp. nov. The propodeum and T2 are mostly sculptured, whereas in *D. maetoi* the propodeum is only sculptured around the areola, and T2 is only sculptured around margins. T1 is slightly thicker in *D. emarginata* (T1 length 1.4 times its width at posterior margin, whereas in *D. maetoi* is 1.5–1.7 times). *D. emarginata* is a solitary parasitoid whereas *D. maetoi* is gregarious.
- D. ensiformis*** (Ratzeburg, 1844): Pterostigma brown; T2 mostly rugulose and dull.
- D. erasmi*** (Nixon, 1972): Wings slightly infumated; propodeum mostly polished and without areola (only small rugae above nucha); ovipositor sheath falcate.
- D. erevanica*** (Tobias, 1976): T1 almost entirely smooth and shiny.
- D. evonymellae*** (Bouché, 1834): T1 length approximately 1.3 times its width at posterior margin; ovipositor sheath longer than metatibia and first segment of metatarsus.
- D. faucula*** (Nixon, 1972): Propodeum mostly polished and without areola (only small rugae above nucha); meso- and metafemora mostly yellow.
- D. flavostriata*** (Papp, 1977): Mesosternum with a yellow longitudinal band; T1 evenly narrowing from anterior to posterior margin.
- D. frustrata*** (Papp, 1975): Flagellomere 14 subcubic; propodeum mostly polished and without areola (only small rugae above nucha); T1 evenly narrowing from anterior to posterior margin.
- D. furtim*** (Papp, 1977): Head behind eyes strongly constricted; forewing with veins r and 2RS not meeting in a sharp angle; legs mostly pale coloured. [Still, based on description alone, it looks somehow similar to *D. maetoi*].
- D. gagates*** (Nees, 1834): Pterostigma brown; wings slightly infumated; propodeum mostly polished and without areola (only small rugae above nucha).
- D. gallicola*** (Giraud, 1869): Forewing vein R1 much shorter than pterostigma length; T1 length 1.25 times its width at posterior margin; ovipositor sheath straight and relatively broad.
- D. glabra*** (Papp, 1978): Maxillary palps distinctly elongated; pterostigma brown; propodeum mostly polished and without areola (only small rugae above nucha); T2 mostly smooth; ovipositor sheath much longer (at least 1.5 times) than metatibia.
- D. gobustanica*** (Kotenko, 1986): Forewing vein R1 much shorter than pterostigma length; pterostigma yellow with brown margins; ovipositor sheath much shorter (approximately 0.6 times) than metatibia. This species is probably better placed within *Pholetesor*.
- D. golovushkini*** (Kotenko, 1992): Flagellomeres 14 and 15 subcubic; forewing vein R1 shorter than pterostigma length; ovipositor sheath straight and longer than metatibia. [A translation of the original Russian description is necessary to be able to provide more accurate details].
- D. graciliariae*** (Wilkinson, 1940): Propodeum mostly polished and without areola (only small rugae above nucha); T1 and T2 mostly to entirely smooth; ovipositor sheath much shorter (approximately 0.6 times) than metatibia.
- D. gratus*** (Kotenko, 1986): Wings infumated; mesonotum slightly narrower than head; T1 widening towards posterior margin; body length 2.0–2.1 mm.
- D. halidayi*** (Marshall, 1872): Propodeum mostly polished and without areola (only small rugae above nucha); T1 and T2 mostly to entirely smooth; ovipositor sheath longer (at least 1.2 times) than metatibia.
- D. helleni*** (Nixon, 1972): Flagellomeres 14 and 15 cubic; ovipositor sheath much shorter than metatibia, and broader at apex (almost like spoon-shaped).
- D. hemerobiellcida*** (Fischer, 1966): Flagellomere 15 length 2.0 times its width; pterostigma pellucid (light brown); T1 length 2.0 times its width at anterior margin and 3.0 times its width at posterior margin; T2 strongly sculptured.
- D. heterusiae*** (Wilkinson, 1928): Wings slightly infumated; propodeum with areola completely defined by carinae, including strong transverse carinae forking around spiracles; most legs (including metafemur) reddish-yellow.
- D. homoeosomae*** (Muesebeck, 1933): T1 mostly and T2 entirely smooth; T2 subtriangular; ovipositor sheath longer (around 1.3 times) than metatibia.
- D. immissa*** (Papp, 1977): Flagellomere 15 subcubic; legs bright reddish-yellow; ovipositor sheath longer than metatibia and first segment of metatarsus.
- D. imperator*** (Wilkinson, 1939): Pterostigma brown; propodeum strongly rugose on apical 0.6; ovipositor sheath much shorter than metatibia (approximately 0.5 times).
- D. impura*** (Nees, 1834): Flagellomeres 14 and 15 cubic to subcubic; hypopygium strongly sclerotized, without visible folds; ovipositor sheath much shorter (approximately 0.6 times) than metatibia.
- D. infima*** (Haliday, 1834): Propodeum mostly polished and without areola (only small rugae above nucha); ovipositor sheath much shorter (approximately 0.5 times) than metatibia.
- D. interpolata*** (Papp, 1975): Flagellomeres 14 length 1.4–1.5 times its width; ovipositor sheath much longer (1.5–1.6 times) than metatibia.
- D. iranica*** (Telenga, 1955): Forewing vein R1 much shorter than pterostigma length; T1 widening towards posterior margin.



- D. jaroshevskyi* (Tobias, 1976): Flagellomeres 15 cubic; propodeum slightly sculptured in lower half [apparently without defined areola, but the descriptions consulted (PAPP 1981, TOBIAS 1986) are not clear about that].
- D. jilinensis* Chen & Song, 2004: Pterostigma brown; propodeum mostly smooth, with only a small trace of posterior areola carinae near nucha.
- D. lacticolor* (Viereck, 1911): Propodeum with areola completely defined by carinae, including strong transverse carinae forking around spiracles; T1 and T2 much more strongly sculptured (especially T2, which is strongly striated longitudinally).
- D. lactipennis* (Curtis, 1830): Flagellomeres 14 and 15 subcubic; pterostigma brown to light brown; forewing vein R1 shorter than pterostigma; veins mostly milky-white; T1 subquadrate, its length 1.3 times its width at posterior margin.
- D. laevigata* (Ratzeburg, 1848): Meso- and metafemora mostly to entirely yellow; ovipositor sheath longer (around 1.3 times) than metatibia.
- D. laevigatoides* (Nixon, 1972): Flagellomeres 14 and 15 cubic; ovipositor sheath longer (around 1.2 times) than metatibia.
- D. laevissima* (Ratzeburg, 1848): Propodeum mostly polished and without areola (only small rugae above nucha); T1 narrowing towards posterior margin; T2 subtriangular; T1 and T2 smooth.
- D. laspeyresiae* (Viereck, 1913): T1 and T2 much more strongly sculptured (especially T2 which is strongly striated longitudinally); ovipositor sheath much shorter (approximately 0.5 times) than metatibia.
- D. lemariiei* (Nixon, 1961): Propodeum mostly polished and without areola (only small rugae above nucha); T1 and T2 smooth; meso- and metafemora yellow.
- D. levifida* (Kotenko, 1992): T1 subquadrate, its length 1.2–1.3 times its width at posterior margin; ovipositor sheath more or less straight ventrally, slightly widening towards apex dorsally.
- D. lineipes* (Wesmael, 1837): Propodeum mostly polished and without areola (only small rugae above nucha); T1 and T2 smooth; meso- and metafemur yellow.
- D. litae* (Nixon, 1972): T1 and T2 smooth.
- D. longicalcar* (Thomson, 1895): Pterostigma brown; T1 narrowing towards posterior margin; T1 and T2 smooth; ovipositor sheath much shorter than metatibia.
- D. longicauda* (Wesmael, 1837): Pterostigma brown; propodeum mostly polished and without areola (only small rugae above nucha); T1 and T2 smooth; ovipositor sheath much longer than metatibia.
- D. longipalpis* (Reinhard, 1880): Maxillary palps distinctly elongated; pterostigma brown; propodeum mostly polished and without areola (only small rugae above nucha); T1 narrowing towards posterior margin; T2 smooth; ovipositor sheath much longer than metatibia.
- D. luctifica* (Papp, 1971): Pterostigma brown; propodeum mostly polished and without areola (only small rugae above nucha); T2 smooth.
- D. marica* (Nixon, 1972): Labial palpus elongated; wings slightly infumated; veins transparent; ovipositor sheath longer (around 1.2 times) than metatibia.
- D. marokkana* (Fahringer, 1936): Pterostigma light brown; legs mostly yellow. See PAPP (1981) for difficulties in recognizing this species.
- D. melanopa* (Viereck, 1917): Pterostigma brown.
- D. miantonomoi* (Viereck, 1917): Pterostigma brown.
- D. midas* (Nixon, 1972): Pterostigma brown; veins mostly milky-white; anteromesoscutum shiny, with very weak punctures; propodeum mostly polished and without areola (only small rugae above nucha); T1 and T2 shiny and smooth.
- D. mimi* (Papp, 1974): Legs reddish-yellow; tegula reddish-yellow; T1 subquadrate, its length 1.0 times its width at posterior margin; ovipositor sheath broadening towards apex.
- D. mira* (Papp, 1977): Flagellomeres 14 and 15 lengths 2.0 times their respective widths; T1 length 2.0 times its width at posterior margin.
- D. murinanae* (Čapek & Zwölfer, 1957): Pterostigma brown; propodeum mostly polished and without areola (only small rugae above nucha); T1 narrowing towards posterior margin; T2 smooth.
- D. mycale* (Nixon, 1972): T1 narrowing towards posterior margin; T2 smooth.
- D. nixosiris* (Papp, 1976): Pterostigma brown; propodeum mostly polished and without areola (only small rugae above nucha); T2 smooth.
- D. oblicarina* Chen & Song, 2004: Metacoxa with several oblique carinae on the outer-upper area.
- D. obstans* (Papp, 1971): Vein R1 as long as pterostigma; T2 smooth.
- D. oehlkei* (Papp, 1982): Ovipositor sheath longer than metatibia; vein R1 short (2.0 times as long as its distance to end of vein 3RSb).
- D. oidaematophori* (Muesebeck, 1929): Pterostigma very broad.
- D. pallidalata* (Tobias, 1964): Pterostigma light yellow, almost transparent; most veins transparent; tegula and humeral complex yellow; propodeum with complete areola, including transverse carinae; T2 mostly smooth.
- D. palpator* (Tobias, 1960): Maxillary palps distinctly elongated; antenna relatively short (shorter than body length).
- D. paralechiaae* (Muesebeck, 1932): Tegula yellow; T1 narrowing towards posterior margin; ovipositor sheath longer than metatibia.
- D. paranthrenea* (You & Dang, 1987): Ovipositor sheath longer than metatibia (at least 1.4 times).
- D. phaloniae* (Wilkinson, 1940): Wing veins mostly transparent; T1 and T2 mostly smooth; ovipositor sheath longer than metatibia (around 1.5 times).
- D. phaola* (Nixon, 1972): Pterostigma brown; propodeum mostly shining and smooth; T1 narrowing towards posterior margin; T2 smooth.
- D. phthorimaeae* (Muesebeck, 1921): Scape yellow, flagellomeres light brown; legs almost entirely yellow (metacoxa partially brown); pterostigma brown; T3 brown centrally, yellow laterally.

- D. piliventris*** (Tobias, 1966): Wings infumated; T1 narrowing towards posterior margin and more than 2.0 times as long as wide at posterior margin; T2 subtriangular.
- D. praetor*** (Marshall, 1885): Pterostigma brown; ovipositor sheath much shorter than metatibia.
- D. princeps*** (Wilkinson, 1941): Pterostigma brown, wing veins mostly transparent; propodeum mostly polished and without areola (only small rugae above nucha); T1 and T2 mostly smooth.
- D. probata*** (Papp, 1973): Vein R1 shorter than pterostigma; ovipositor sheath much shorter than metatibia; wing veins mostly transparent.
- D. propinqua*** (Papp, 1975): Flagellomeres 14 and 15 square; ovipositor sheath with dorsal notch apically; metafemur relatively short and thick as compared with *D. maetoi* Fernandez-Triana & Shimizu sp. nov.
- D. pterophori*** (Muesebeck, 1926): Vein R1 as long as pterostigma; pterostigma brown; metatibia and metafemur mostly yellow; T2 smooth.
- D. pulchra*** (Telenga, 1955): Mesosoma, metasoma and legs reddish-yellow to yellow; vein R1 shorter than pterostigma.
- D. punctiger*** (Wesmael, 1837): Tegula and humeral complex yellow; legs (excluding metacoxa) mostly yellow; T3 centrally brown, laterally yellow.
- D. purda*** (Papp, 1977): Ovipositor sheath longer than metatibia (1.2 times); and T1 more quadrate and shorter.
- D. reicharti*** (Papp, 1974): Eyes slightly convergent below; scutoscuteellar sulcus deep and wide; metafemur relatively short and thick (less than 2.7 times as long as its maximum width); legs mostly whitish-yellow; T1 subquadrate.
- D. renata*** (Kotenko, 1986): Vein R1 shorter than pterostigma; propodeum mostly polished and without areola (only small rugae above nucha); ovipositor sheath much shorter than metatibia; T1 and T2 mostly smooth.
- D. renaulti*** (Mason, 1974): Tegula yellow; ovipositor sheath longer than metatibia.
- D. rufescentis*** Chen & Song, 2004: Anteromesoscutum with wide reddish bands along the notauli area (notauli not defined).
- D. sagus*** (Kotenko, 1986): Antenna reddish-brown or reddish-yellow; pterostigma light yellow; propodeum mostly polished and without areola (only small rugae above nucha); ovipositor sheath longer than metatibia.
- D. scabipuncta*** Chen & Song, 2004: Anteromesoscutum with rather coarse and deep punctures; pterostigma dark reddish-brown.
- D. seriphia*** (Nixon, 1972): Pterostigma brown; T2 smooth.
- D. sicaria*** (Marshall, 1885): Pterostigma brown; propodeum mostly polished and without areola (only small rugae above nucha); T1 and T2 mostly smooth.
- D. simulata*** (Papp, 1974): Flagellomeres 14 and 15 square to slightly elongate; all legs (except for black coxae) bright reddish-yellow; ovipositor sheath longer than metatibia.
- D. singularis*** Yang & You, 2002: The original description could not be checked for this paper.
- D. sisenna*** (Nixon, 1972): Propodeum mostly polished and without areola (only small rugae above nucha); very broad pterostigma with very small (almost indistinguishable) pale spot at base.
- D. soikai*** (Nixon, 1972): Flagellomeres 14 and 15 square to slightly elongate; anteromesoscutum with rather coarse and deep punctures; veins mostly transparent.
- D. solenobiae*** (Walley, 1935): All legs (except for coxae) yellow.
- D. sophiae*** (Papp, 1972): Ovipositor sheath much shorter (approximately 0.5 times) than metatibia, and broader at apex (almost like spoon-shaped).
- D. spanis*** Chen & Song, 2004: Ovipositor sheath longer than metatibia (around 1.2 times); propodeum with complete areola.
- D. stantoni*** (Ashmead, 1904): Scape yellow, flagellomeres light brown; anteromesoscutum with rather coarse and deep punctures; pro- and mesocoxae, metafemur and metatibia yellow; propodeum with complete areola, including transverse carinae.
- D. subemarginata*** (Abdinbekova, 1969): T1 narrowing towards apex and with scattered small punctures; T2 almost to entirely smooth.
- D. szalayii*** (Papp, 1977): Anteromesoscutum with rather coarse and deep punctures; T1 narrowing towards posterior margin and almost 2.0 times as long as wide posteriorly; legs mostly yellowish.
- D. szelenyii*** (Papp, 1972): Propodeum mostly polished and without areola (only small rugae above nucha); T1 narrowing towards apex; T2 smooth; very short ovipositor sheath.
- D. thujae*** (Muesebeck, 1935): T2 strongly sculptured (mostly longitudinal striae); smaller size, 1.8–2.0 mm.
- D. tischeriae*** (Viereck, 1912): Propodeum areola complete and with strong transverse carinae; pterostigma brown.
- D. tobiasi*** (Balevski, 1980): T1 narrowing towards apex and 2.0 times as long as wide; legs yellowish-brown.
- D. trachala*** (Nixon, 1965): Pterostigma brown, without pale spot at base; preapical flagellomeres square; T1 shiny and weakly sculptured; ovipositor sheath as long as metatibia.
- D. turcmenica*** (Tobias, 1967): Vein R1 much shorter than pterostigma; pterostigma pale with thin brown margins; most veins transparent; propodeum mostly polished and without areola (only small rugae above nucha); T2 transverse and smooth.
- D. turionellae*** (Nixon, 1971): Ovipositor sheath longer than metatibia (1.5 times); T2 with posterior margin sinuate.
- D. turkmena*** (Telenga, 1955): Legs reddish; antenna moniliform, shorter than body; propodeum smooth; pterostigma yellow to transparent.
- D. ultima*** (Kotenko, 1986): Ovipositor sheath longer than metatibia (original description does not provide details but states that it is “noticeably longer”); propodeum areola open anteriorly but with transverse carinae; T1 less than 1.5 times as long as wide.
- D. ulior*** (Reinhard, 1880): Antenna light brown; propodeum with complete areola, including transverse



carinae; T2 smooth; legs mostly yellow.

- D. varifemur** (Abdinbekova, 1969): Flagellomeres 14 and 15 square to slightly elongate; metafemur brown, legs brown to yellow-brown. No further details available to properly assess this species.
- D. victor** (Wilkinson, 1941): Pterostigma entirely brown; T1 mostly smooth; ovipositor sheath longer than metatibia (more than 1.5 times).
- D. victoriata** (Kotenko, 1986): Ovipositor sheath longer than metatibia (1.6–1.7 times); scutellar disc punctate.
- D. zerafai** Papp, 2015: Pterostigma entirely brown; propodeum mostly polished and without areola (only small rugae above nucha); T1 more quadrate, shorter and mostly polished; T2 smooth, rather transverse and with posterior margin sinuate.

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