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Revision of the Holarctic species of *Dilyta* Förster (Hymenoptera: Figitidae: Charipinae) with descriptions of four new species from the eastern Palaearctic

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Abstract

The genus *Dilyta*, and the known species of this genus present in the Holarctic, *D. subclavata* Förster from Europe and *D. rathmanae* Menke and Evenhuis from USA, are redescribed. Four new species of *Dilyta* are described from the eastern Palaearctic region: *D. aleevae* **sp. n.** from Kazakhstan, *D. japonica* **sp. n.** from Japan, and *D. longinqua* **sp. n.** and *D. sinica* **sp. n.** from China. All six species have an ∩-shaped carina on the apex of the scutellum; this character differentiates these species from the Afrotropical species, which instead have two small symmetrical and parallel carinae. A key to the species of *Dilyta* in the Holarctic is provided. *Apocharips talitzkii* (Belizin) is synonymyzed with *D. subclavata*.

Key words: Hymenoptera, Figitidae, Charipinae, *Dilyta*, new species

Introduction

The Charipinae are a cosmopolitan subfamily of Figitidae (Hymenoptera: Cynipoidea), and when known, are hyperparasitoids through Hemiptera, attacking braconids in aphids and chalcidoids in psyllids, in contrast to most members of the Figitidae, which are primarily parasitoids of the larvae of Diptera: Cyclorrhapha (Ronquist 1999). A recent study of the phylogenetic relationships of the Charipinae (Paretas-Martínez *et al*. 2007*)* concluded that this subfamily should not be subdivided into tribes, even if two biological groups can be distinguished based on host use. The first group includes most species of the subfamily (belonging to *Alloxysta* and *Phaenoglyphis*) and are hyperparasitoids of Aphididae via Aphidiinae (Hymenoptera: Braconidae) and Aphelinidae (Hymenoptera: Chalcidoidea) (Fergusson 1986), while the second group (which includes *Dilyta*) are hyperparasitoids of Psyllidae via Encyrtidae (Hymenoptera: Chalcidoidea) (Menke and Evenhuis 1991).

Few species of *Dilyta* have been described in the last 150 years; we have focused on this genus as an object of study over the past few years. Material found in several collections worldwide has resulted in a significant increase of the number of species and the range of distribution of this genus. Until recently, *Dilyta* included only three species: *Dilyta subclavata* Förster from Europe, *D. africana* (Benoit) from D.R. Congo and *D. rathmanae* Menke & Evenhuis from USA. Paretas-Martínez *et al*. (2009) recently described four more species from Africa, *D. australafricana* Paretas-Martínez & Pujade-Villar from South Africa, *D. ghanana* Paretas-Martínez, Pujade-Villar & Melika from Ghana, *D. kenyana* Paretas-Martínez & Pujade-Villar from Kenya and *D. somaliana* Paretas-Martínez, Pujade-Villar & Evenhuis from Somalia. One more species is presently being described from the Oriental region (Ferrer-Suay *et al*. in press).

We describe herein four new species of *Dilyta* from the eastern Palaearctic region and give the first record of *D. subclavata* from the Nearctic region. These data significantly increases the number of species of *Dilyta* around the world and the distribution of this genus in the Holarctic region.

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Material and methods

The specimens used in this study were received on loan from and/or deposited in the following institutions: CNCI— Canadian National Collection of Insects, Ottawa, Canada (J. Huber and G. Gibson); MZLU—Museum of Zoology, Lund University, Lund, Sweden (R. Danielson); NHMW—Naturhistorisches Museum, Wien, Austria (D. Zimmermann); RMNH—National Museum of Natural History, Leiden, Netherlands (C. van Achterberg); SPL—Systematic Parasitoid Laboratory, Koszeg, Hungary (G. Melika); UB—Barcelona University, Barcelona, Spain (J. Pujade-Villar); USNM—United States National Museum of Natural History, Smithsonian Institution, Washington DC, USA (M. Buffington); ZIN—Zoological Institute of the Russian Academy of Sciences, Saint Petersburg, Russia. (Dr. S. Belokobylskij); ZMUN—Zoological Museum, University of Oslo, Oslo, Norway (G.E.E. Söli). In the studied material for each species, the depositaries are mentioned with acronyms before the labels of the specimens belonging to each institution. All labels are white if no colour is indicated after the label text.

Specimens were studied using light microscopy and environmental scanning electron microscopy. The field-emission gun environmental scanning electron microscope (FEI Quanta 200 ESEM) was used for high-resolution imaging without gold-coating of the specimens.

The morphological terms used in the descriptions are drawn from Gibson (1985), Ronquist and Nordlander (1989) and Ronquist (1994). The terms for sculpture follow Harris (1979). The following abbreviations are used: OOC (ocello-ocular distance), distance between the external margin of the lateral ocellus and the internal margin of the compound eye; F1–F11, first and following flagellomeres; T3–T4, third and fourth metasomal tergites. All measurements were made using SEM pictures and micrometer in light microscopy, using both techniques in each species.

Descriptions of the head, mesosoma, forewing and some antennal and metasomal characters (which are shared by all the species of the genus) are given in the redescription of the genus. Species descriptions include only characters from the antenna and metasoma, which are the parts of the body that offer the best diagnostic characters between the species of *Dilyta*.

Genus *Dilyta* Förster, 1869

Dilyta Förster, 1869: 340.

Dylita Förster, 1869: 338, misspelling.
Charips Haliday in Marshall, 1870.
Glyptoxysta Thomson, 1877.
Type species: *Dilyta subclavata* Förster, 1869. Synonyms in Menke & Evenhuis (1991): 152.

Redescription. Length: 0.8–2.0 mm.

Head (fig. 1A): Rounded in anterior view, eyes located at middle line of head, malar space subequal to OOC. Surface completely smooth, without any strigae, malar impression, epistomal sulcus or clypeo-pleurostomal lines. Clypeus almost straight, slightly projecting over mandibles, without marginal inflection. Setae sparse, concentrated principally below toruli.

Antennae (fig. 3, 4): Size of pedicel and flagellomeres variable among species. *Female*: 13-segmented, slightly clavate; two last segments (F10–F11) broadly jointed. *Male*: 14-segmented, slightly clavate or filiform; two last segments (F11-F12) broadly jointed.

Mesosoma (fig. 1B): Pronotum with setae only in anterior part; pronotal carinae long, clearly indicated, going from scutum to anterior part of pronotum. Mesoscutum smooth, shining, almost without setae. Mesopleuron smooth, without any longitudinal ridge in lower part. Scutellum smooth with scarce setae at posterior and lateral parts. Propodeum with two strong and broad carinae. **Apex of scutellum** (fig. 2): HOLARCTIC SPECIES: with an ∩-shaped carina. AFROTROPICAL SPECIES: with one carina at each side, both symmetrical and parallel, distance between them equivalent to distance between propodeal carinae.

Forewing (fig. 1C): Large, longer than body, covered with dense pubescence; marginal setae present and long. Veins brown. Radial cell small and completely open along anterior margin; R1 very short, barely reaching costal

margin; Rs short and almost straight, reaching wing margin; R1 and Rs not parallel; Cu1a, M+Cu1a, Rs+M and M veins absent.

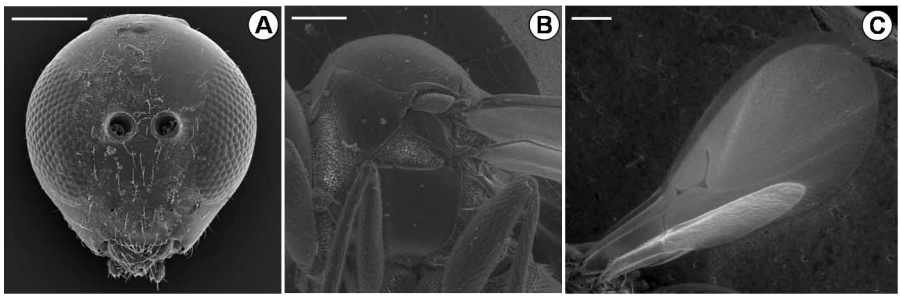

FIGURE 1. Genus *Dilyta*. A) Head, anterior view; B) Mesosoma of *Dilyta* in lateral view; C) Wings. Scale bar: 100 µm.

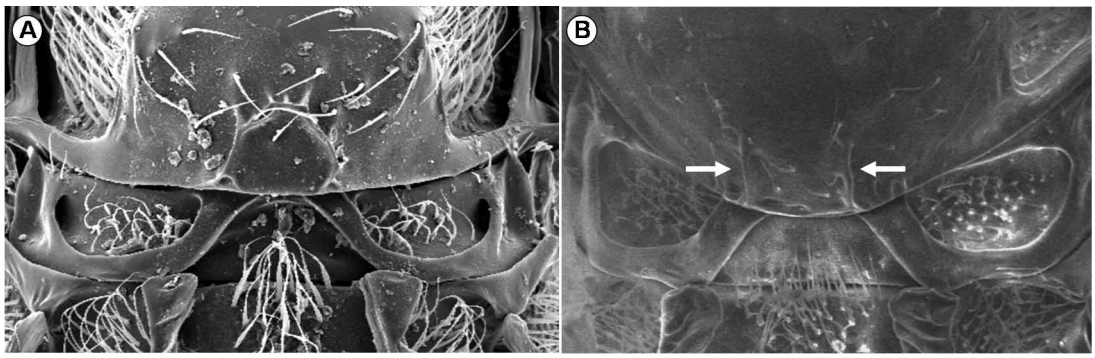

FIGURE 2. Apex of scutellum, posterior view. A) *Dilyta subclavata*, with an ∩-shaped carina (character present in all the Holarctic species of *Dilyta*); B) *Dilyta australafricana*, with two symmetrical carinae indicated by arrows (character present in all the Afrotropical species of *Dilyta*).

Metasoma (fig. 5): T3 and T4 fused into one large syntergum. Proximal part with a complete ring of setae. Distal half with or without punctures.

Biology. When known, the species of this genus are hyperparasitoids of Psyllidae via Encyrtidae (Hymenoptera: Chalcidoidea).

Distribution. Holarctic and Afrotropical regions.

Species of *Dilyta* present in the Holarctic

All redescriptions and new descriptions include only characters from the antenna and metasoma, which are the parts of the body that offer the best diagnostic characters between the species of *Dilyta*. Descriptions of the head, mesosoma, forewing and some antennal and metasomal characters (which are shared by all the species of the genus) are given in the redescription of the genus.

All species of *Dilyta* described here have an ∩-shaped carina on the apex of the scutellum (fig. 2A), which differentiates these from the Afrotropical species, which instead have two small symmetrical and parallel carinae (fig. 2B).

Dilyta aleevae Pujade-Villar & Paretas-Martínez n. sp.

Type material. ZIN: Holotype ♀: “Shchuchinsk, 15.IX, Kokchetavskaya oblast, M.Alejeva 1951” (in Russian), “Holotypus Dilyta aleevae m V. Belizin det.” (red), “Dilya sp. aff talitzkii Kovalev O. det.1985”, “Holotype *Dilyta aleevae* **sp. n.** Pujade-Villar & Paretas-Martínez” (red); paratypes 2♀ 2♂: same locality data than the holotype, “Paratypus Dilyta aleevae m V. Belizin det.” (red), “Paratype *Dilyta aleevae* **sp. n.** Pujade-Villar & Paretas-Martínez” (red).

Diagnosis. Similar to *D. rathmanae* in having distal area of metasoma smooth without punctures. Differs from *D. rathmanae* **n. sp.** in proportions of antennal segments (see key). All other Holarctic species of Dilyta have distal area of metasoma punctate.

Description. Length: Female: 1–1.2 mm. Male: 0.9–1.1 mm.

Colour. Head, mesosoma and metasoma dark brown. Antennae and legs yellow or dark yellow with apical part of antennae slightly brown.

Antennae (figs. 3C, 4C): *Female*. (with only 10 flagellomeres) F1 slightly shorter than pedicel, F1 longer than F2, F2 slightly longer than F3 and F4, F3 subequal to F4, F1 as long as F5, F6 longer than F5(Proportion F1–F6: 5.5:3.5:3:3:5.3:6.5), F7 longer than F6; F6–F10 wider than previous segments, antenna slightly clavate from F5; sensilla beginning on F6. *Male*. F1 longer than pedicel and slightly arched, F1 longer than F2 and F3, F2 subequal to F3, F3 shorter than F4, F1 as long as F4, F4 wider than F1; F4–F12 wider than previous segments, antenna slightly clavate from F4; sensilla beginning on F6.

Metasoma: Distal half smooth, with few or no punctures.

Etymology. We want to respect the specific name handwritten by V. Belizin, which was never published. We suppose this name makes reference to the collector, M. Alejeva.

Biology. Unknown.

Distribution. Kokchetavskaya Region, Kazakhstan.

Dilyta japonica Paretas-Martínez & Ferrer-Suay n. sp.

Type material. CNCI: Holotype ♀: "C-449, JAPAN: Hokkaido, Horota 800m, 5.VII.1989, Sweep, M. J. Sharkey", "Holotype *Dilyta japonica* **sp. n.** Paretas-Martínez & Ferrer-Suay" (red); **UB**: paratype 1♀ with the same locality data as the holotype, "Paratype *Dilyta japonica* **sp. n.** Paretas-Martínez & Ferrer-Suay" (red).

Diagnosis. Similar to *D. longinqua* **n. sp.**, *D. sinica* **n. sp.** and *D. subclavata* in having distal area of metasoma punctate. Differs from these in proportions of antennal segments (see key). Differs from *D. aleevae* **n. sp.** and *D. rathmanae* these having distal area of metasoma smooth without punctures.

Description. Length: Female. 1.4–1.5 mm. Male. Unknown.

Colour. Head, mesosoma and metasoma dark brown. Antennae and legs yellow or dark yellow.

Antennae (fig. 3E): Female. F1 very long and thin, much longer than pedicel almost double, F1 longer than F2, F3, F4 and F5, F1 almost as long as F2, F3 and F4 together, F2 subequal to F3, F4 longert than F2 and F3, F5 longert than F4, F6 longer than F5, F6 subequal to F1, F7 longer than F6; F7–F11 wider than previous segments, antenna slightly clavate from F6, sensilla beginning on F6.

Metasoma: Distal part with a punctated area.

Etymology. Named after the country where this new species occurs, Japan.

Biology. Unknown.

Distribution. Hokkaido Island, Japan.

Dilyta longinqua Paretas-Martínez & Pujade-Villar n. sp.

Type material. ZIN: Holotype ♀: "Shaowu, Fukien, China, 10:XI.1945. M.Chao", "from Psyllidae on firmian" (in Russian), "Holotypus Dilyta longinqua V. Belizin det." (red), "Holotype *Dilyta longinqua* **sp. n.** Paretas-Martínez & Pujade-Villar" (red); paratypes 2♀ 2♂: same locality data than the holotype, "Paratypus Dilyta aleevae m V. Belizin det." (red), "Paratype *Dilyta longinqua* **sp. n.** Paretas-Martínez & Pujade-Villar" (red).

Diagnosis. Similar to *D. japonica* **n. sp.**, *D. sinica* **n. sp.** and *D. subclavata* in having distal area of metasoma punctate. Differs from these in proportions of antennal segments (see key). Differs from *D. aleevae* **n. sp.** and *D. rathmanae* these having distal area of metasoma smooth without punctures.

Description. Length: Female: 1.4–1.5 mm. Male: 1.3–1.8 mm.

Colour. Head, mesosoma and metasoma dark brown. Antennae and legs yellow or dark yellow with the apical part of antennae slightly brown.

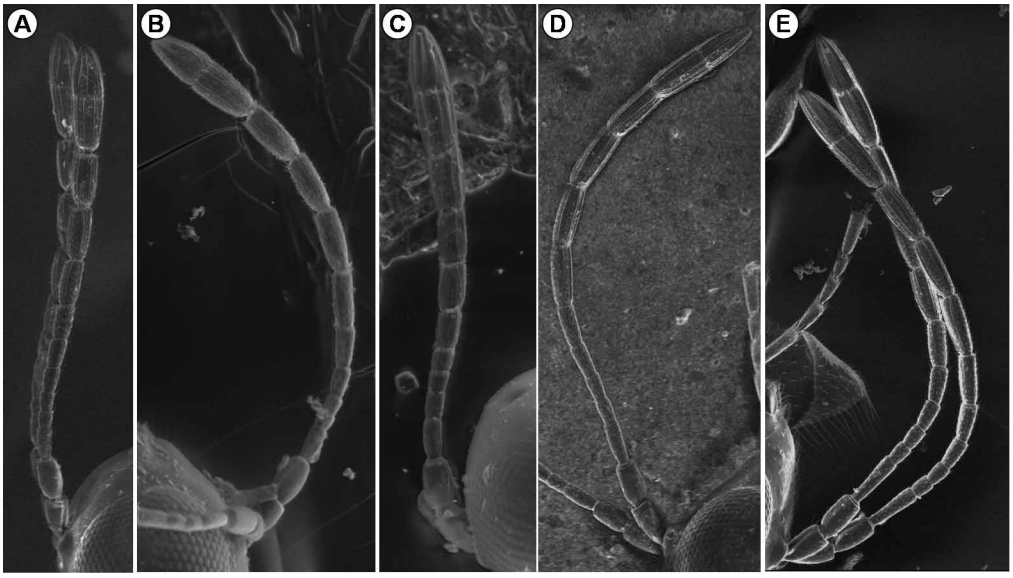

FIGURE 3. Female antenna. A) *D. rathmanae*; B) *D. subclavata*; C) *Dilyta aleevae*; D) *D. longinqua*; E) *D. japonica*.

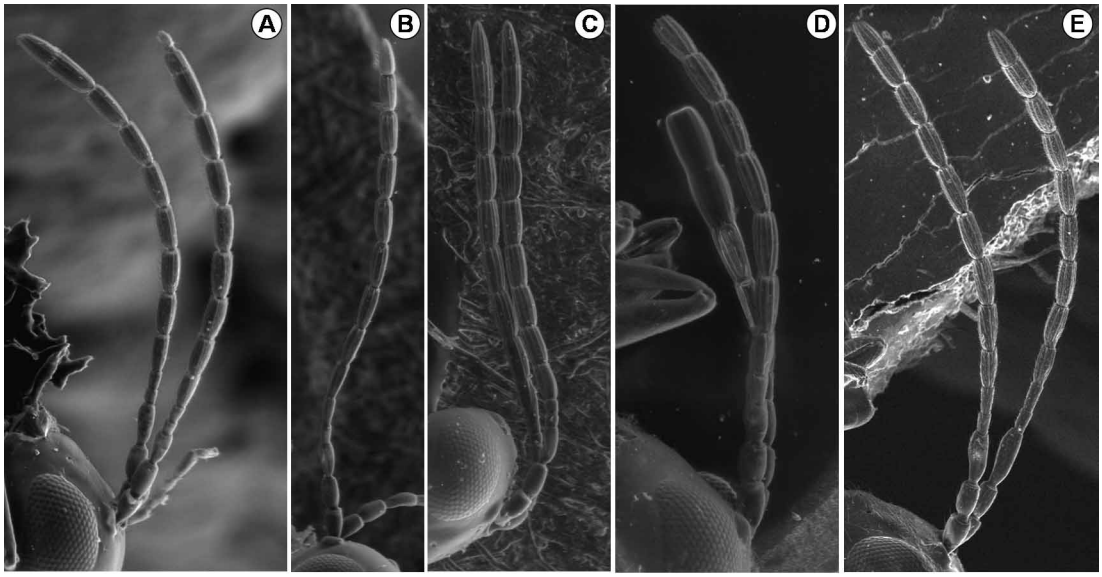

FIGURE 4. Male antenna. A) *D. rathmanae*; B) *D. subclavata*; C) *Dilyta aleevae*; D) *D. longinqua* (lost from F10); E) *D. sinica*.

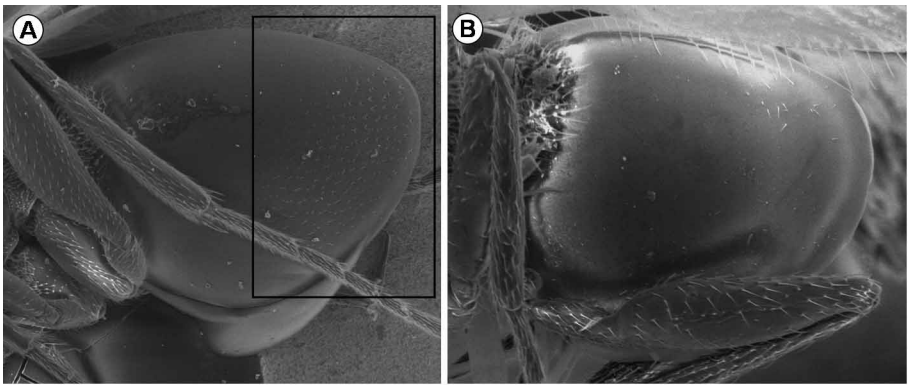

FIGURE 5. Metasoma, lateral view. A) *Dilyta subclavata*: distal part (delimited by a box) with a punctated area; B) *D. aleevae*: distal part without punctures.

Antennae (figs. 3D, 4D): *Female*. F1 subequal to pedicel or slightly longer, F2 shorter than F3, F3 shorter than F4, F4 shorter than F5, F1 subequal to F5; F6–F11 wider than previous segments, antenna slightly clavate from F6; sensilla beginning on F6. *Male*. F1 subequal to pedicel and slightly arched, F2 shorter than F1 and F3, F3 subequal to F1; F3–F12 wider than previous segments, antenna slightly clavate from F3; sensilla beginning on F3.

Metasoma: Distal half with a punctate area.

Etymology. We want to respect the specific name handwritten by V. Belizin, which was never published. We do not know its derivation.

Biology. According to the holotype label, the host is a Psyllidae on the plant *Firmiana simplex* (Sterculiaceae) (L.f.).

Distribution. Fujian Province, China.

Dilyta rathmanae Menke & Evenhuis

Dilyta rathmanae Menke & Evenhuis, 1991: 153.

Type material studied. USNM: 12 paratypes with the following labels: 2♀: "Washington: Chelan Co. 13Km N. Wenatchee. Nahahum Canyon nr. Wenatchee River (elev. 180m).Ex: *Cacopsylla alba* on *Salix exigua* Coll.R.J. Rathman" "Washington: Chelan Co., Wenatchee River 8-VIII-1986 R. Rathman on *Salix*" "James Entomol. coll. Voucher specimen 86-2-5" " Paratype Dilyta rathmani Menke & Evenhuis" (Yellow label). 1♀: "Washington: Chelan Co. 13Km N. Wenatchee. Nahahum Canyon nr. Wenatchee River (elev. 180m). Ex: *Cacopsylla alba* on *Salix exigua* Coll.R.J. Rathman" "Washington: Chelan Co., Wenatchee River 8-VIII-1986 R. Rathman on *Salix*" "James Entomol. coll. Voucher specimen 86-2-9" "Paratype Dilyta rathmani Menke & Evenhuis" (Yellow label). 1♀: "Washington: Chelan Co. 13Km N. Wenatchee. Nahahum Canyon nr. Wenatchee River (elev. 180m). Ex: *Cacopsylla alba* on *Salix exigua* Coll.R.J. Rathman" "Washington: Chelan Co., Wenatchee River 8-VIII-1986 R. Rathman on *Salix*" "James Entomol. coll. Voucher specimen 86-2-10" "#1 on slide" "Paratype Dilyta rathmani Menke & Evenhuis" (Yellow label). 1♀: "Washington: Chelan Co. 13 km N. Wenatchee. Nahahum Canyon nr. Wenatchee River (elev. 180m). Ex: *Cacopsylla alba* on *Salix exigua* Coll.R.J. Rathman." "Washington: Chelan Co., Wenatchee River 31-V-1986 R. Rathman on Salix exigua em. 18-VI-1986" " James Entomol. coll. Voucher specimen 86-2-11" "#4 on slide" " Paratype Dilyta rathmani Manke & Evenhuis" (Yellow label). 1♀: "Washington: Chelan Co. 13Km N. Wenatchee Nahahum Canyon nr. Wenatchee River (elev. 180m). Ex: *Cacopsylla alba* on *Salix exigua* Coll.R.J. Rathman" "Wenatcheevalley Washington VIII-19-1985 R.J. RATHMAN" "Paratype Dilyta rathmani Menke & Evenhuis" (Yellow label). 1♀: "Washington: Chelan Co. 6.6 km S. Cashmere Yaxon Canyon McManus Orchard (elev.242m) Beating tray sample from pear. Coll. G.S. Paulson" "Cashmere, WA Yaxon Canyon McManus Orchard Spec. ID: 7080 18 June 1987" "Beating Tray" "Coll. G.S. Paulson Ex: PEAR" "7080" "Paratype Dilyta rathmani Menke & Evenhuis" (Yellow label). 1♀: "8-VII-87 Dryden, WA. Spec. ID: 7109" "Coll. G.S. Paulson Ex: PEAR" "7109" "Paratype Dilyta rathmani Menke & Evenhuis" (Yellow label). 2♀, 1♂: "WASHINGTON: Chelan. Co.: Dryden 8-VII-1987 G.S. Paulson" "Paratype Dilyta rathmani Menke & Evenhuis" (Yellow label). 1♀: "WASHINGTON: Chelan. Co.: Dryden 8-VII-1987 G.S. Paulson" "Paratype Dilyta rathmani Menke & Evenhuis" (Yellow label) "♀ Det. Menke 198".

Diagnosis. Similar to *D. aleevae* **n. sp.** in having distal area of metasoma smooth without punctures. Differs from *D. aleevae* **n. sp.** in proportions of antennal segments (see key). All other Holarctic species of Dilyta have distal area of metasoma punctate.

Redescription. Length: 0.9–1.2 mm.

Colour: Black except antenna and legs yellow, apical half of flagellum and mid and hindlegs sometimes suffused with brown.

Antennae (figs. 3A, 4A): *Female*. F1 shorter than pedicel, F1 almost double length of F2, F3 and F4, F2 and F3 subequal to F4 but sometimes F2 seems slightly shorter than F3 and F4, F5 longer than F4, F5 shorter than F1, F6 longer than F5 (Proportions F1–F6: 5.5:3:3.5:3.7:4.7:6.5), F7 longer than F6; F7–F11 wider than previous segments, antenna slightly clavate from F6; sensilla beginning on F6. *Male*. F1 as long as pedicel and slightly arched, F1 longer than F2 and F3, F2 slightly shorter than F3, F4 longer than F3, F1 subequal to F4, F4 thiner than F1; F4–F12 wider than previous segments, antenna slightly clavate from F4; sensilla beginning on F4.

Metasoma: Distal half smooth, without punctures (a few scattered pits are present in most specimens of *D. rathmanae* but they are very shallow and barely visible even in photomicrographs (Menke & Evenhuis 1991)).

Biology. Hyperparasitoid of psyllids through an encyrtid, *Trechnites* sp (Hymenoptera: Chalcidoidea: Encyrtidae). Reared from *Cacopsylla alba* (Crawford) (Hemiptera: Psyllidae) on *Salix exigua* L. (Salicaceae) and *C. pyricola* (Förster) (Hemiptera: Psyllidae) on pear orchards (Menke & Evenhuis 1991).

Distribution. USA (Washington State).

Dilyta sinica Ferrer-Suay & Paretas-Martínez n. sp.

Type material. UB: Holotype ♂: "CHINA, Beijing Prov., Mentougou Dist., 130 Km NW., of Beijing, 28.VII.02. leg. George Melika." "Liyan Ling (Linshan mnt.), 1749 m a.s.l.; 40º00.279'; 115º30.758 sweep. on alpine mead.", "Holotype *Dilyta sinica* **sp. n.** Ferrer-Suay & Paretas-Martínez" (red); paratype 1♂: "CHINA, Beijing, 130 Km N of Liyan Ling (Linshan moun.) leg. H. Baur." "40ª00.279' 115º30.758' sweeping 2002. Vill. 04", "Paratype *Dilyta sinica* **sp. n.** Ferrer-Suay & Paretas-Martínez" (red); **SPL**: paratypes 2♂, one with the same data as the holotype and one with the same data of the UB paratype, both "Paratype *Dilyta sinica* **sp. n.** Ferrer-Suay & Paretas-Martínez" (red).

Diagnosis. Similar to *D. japonica* **n. sp.**, *D. longinqua* **n. sp.** and *D. subclavata* in having distal area of metasoma punctate. Differs from these in proportions of antennal segments (see key). Differs from *D. aleevae* **n. sp.** and *D. rathmanae* these having distal area of metasoma smooth without punctures.

Description. Length: Female unknown. Male 1.2–1.5 mm.

Colour. Head, mesosoma and metasoma dark brown. Antennae and legs yellow or dark yellow.

Antennae (fig. 4E): *Male*. F1 very long, wide and arched, F1 much longer than pedicel (almost double), F1 longer than F2 and F3 together, F2 slightly shorter or subequal to F3, F4 longer than F2 and F3, F4–F12 wider than previous segments, antenna slightly clavate from F4, sensilla beginning on F4.

Metasoma: Distal half with punctate area.

Etymology. Named after the country where this new species occurs, China.

Biology. Unknown.

Distribution. Beijing Province, China.

Dilyta subclavata Förster

Dilyta subclavata Förster, 1869: 338.
Charips microcera Haliday in Marshall, 1870: 181. Synonymyzed by Quinlan & Evenhuis (1980: 429).
Glyptoxysta heterocera Thomson, 1877: 814. Synonymyzed by Hellén (1958: 64); Menke & Evenhuis (1991:152) mentioned that this synonymy was made by Hellén (1963), but it was actually Hellén (1958).
Glyptoxysta talitzkii Belizin 1966: 7. *Apocharips talitzkii* after Menke & Evenhuis (1991: 149). NEW SYNONYMY.

Type material studied. *D. subclavata*: **NHMW**: one pin with 2♀: "Först.", "Collect. G Mayr", "Dil. subclavata Förster, Type", "Dilyta subclavata Frst.", "Dilyta subclavata Förster 2♀♀ det. H.H.Evenhuis 1976" (orange), "das rechte Weibchen ware alb Lektotypus zu wählen H.H.Evenhuis" (orange). Comments: the original type material of *D. subclavata* consisted in two pins with two specimens each. However, the two specimens on one of the pins do not belong to *D. subclavata* but to *Alloxysta* sp. Thus, we have removed this pin from the type series. ***Glyptoxysta heterocera***: **EMLU**: 1♀: "Weld 1931" (Red label) "heterocera" "1969 100" "1984 329" "Lectotype" "Lectotype Glyptoxysta heterocera det. N.D.M.Fergusson, 1984" "ZML 2006 219"; 1 ♀: "Rsiö" "1969 101" "1984 330" "Para- Lecto- Type" (Blue label) "Paralectotype of Glyptoxysta heterocera det. N.D.M.Fergusson, 1984" "ZML. 2006 220". ***Glyptoxysta talitzkii***: **ZIN**: 1♂: "Kishinev MSSR, 8.VI.57. Talickij" (in Russian), "Ps. pyri N1052", "Holotypus ♂ Dilyta talitzkii m V.Belizin det" (red).

Diagnosis. Similar to *D. japonica* **n. sp.**, *D. longinqua* **n. sp.** and *D. sinica* **n. sp.** in having distal area of metasoma punctate. Differs from these in proportions of antennal segments (see key). Differs from *D. aleevae* **n. sp.** and *D. rathmanae* these having distal area of metasoma smooth without punctures.

Redescription. Length: 1.2–1.5 mm.

Colour: Head, mesosoma and metasoma dark brown. Antennae and legs yellow.

Antennae (figs. 3B, 4B): *Female*. F1 slightly shorter or subequal than pedicel, F2 subequal to F3, F4 slightly shorter than F1 but longer than F2 and F3, F1 subequal to F5, F6 longer than F5; F6–F11 wider than previous segments, antenna slightly clavate from F6; sensilla beginning on F6–F7. *Male*. F1 slightly longer than pedicel, sometimes slightly arched, F2 shorter than F1 and F3, F3 shorter than F1, F1 subequal to F4; F4–F12 wider than previous segments, antenna slightly clavate from F4; sensilla beginning on F4.

Metasoma: Distal half with a punctate area.

Biology. Hyperparasitoid of psyllids through Encyrtidae (Chalcidoidea). Reared from *Psylla pyri* (L.) and *Psyllopsis fraxini* (L.) (Menke & Evenhuis 1991). According to label data, the specimens from Netherlands were collected on *Fraxinus excelsior* L. (Oleaceae) but lacking host data.

Distribution. Europe. Cited for the first time in this study from Norway, Sweden, Netherlands and USA (Alaska).

Additional material studied

Dilyta subclavata: 40 ♂ and 79 ♀ with the following labels. *WESTERN PALAEARCTIC*. *SCANDINAVIA* (besides of the detailed labels, each of these specimens has a label stating "Dilyta subclavata Förster Ferrer-Suay det. 2010"): **ZMUN**: 6♂ 8♀: "NORWAY, EIS 28, AK OSLO, Östensjövannet Manglerud. Aug. 1996, MT L.O. Hanson & M. Falck". 6♀: "NORWAY EIS 165, FV ALTA: Mattisdalen (S) 23 June–4 Aug. 1996, MT L.O. Hansen & H. Rinden". 1♀: "NORWAY, EIS 35, BV, ROLLAG: Traensaga MT, July 1994 Leg. Björn A. Sagvolde". **SPL**: 4 ♀: "NORWAY, FINNMARK, Vassbotndalen Nat. Res., nr. Talvik (from E6, Alta) 01.08.999. G. Melika" "4239". 4♀: NORWAY, FINNMARK, Vassbotndalen Nat res., nr. Talvik (from E6, Alta) 02.08.999. G. Melika" "4242". 2♀: NORWAY, FINNMARK, Vassbotndalen Nat res., nr. Talvik (from E6, Alta) 02.08.999. G. Melika" "4248". 1♀: NORWAY, FINNMARK 10 km S of Alta on E6 31.07.999 sweeping leg. G. Melika" "4238". 1♀: NORWAY, TROMS, Strömsör, 20 Km WN of Altevatnet, PT. 18.07.999. G. Melika" "4209". 8♂ 4♀: "NORWAY, FINNMARK Blaerefjellet, 20 km S of Alta nr. Road 93, sweeping 21.07.999. G. Melika" "4219". 1♂: "NORWAY, FINNMARK, Vassbotndalen Nat. Res., nr. Talvik (from E6, Alta) 02.08.999. G. Melika" "4248". 2♂ 1♀: "NORWAY, FINNMARK, Gargia, 25 km S of Alta 22.07.999. sweeping leg. G. Melika" "4224". 2♂: "NORWAY, FINNMARK, Gargia, 25 km S of Alta 20.07.999. sweeping leg. G. Melika" "4217". 1♂ 8♀: "NORWAY, FINNMARK, 883 Road, nr. Lierbotn 31.17.999. sweeping leg. G. Melika" "4235". 7♂: "NORWAY, FINNMARK, GARGIA, 25 km S of Alta 20.07.999. sweeping leg. G. Melika" "4216". 5♂ 5♀: "NORWAY, TROMS, 20 km S of Setermoen, along E6 Road, sweeping, 15.07.999, leg. G. Melika" "4198". 1♂ 2♀: "SWEDEN, Norrbottens. Län, Abisko National Park 14.07.999, PT leg. G. Melika" "4194". 1♂ 2♀: "SWEDEN, Norrbottens Län, Abisko National Park 11.07.999, sweeping leg. G. Melika" "4189". 2♀: SWEDEN, Norrbottens, Län, Abisko National Park 12.07.999, sweeping leg. G. Melika" "4192". 1♀: SWEDEN, Norrbottens, Lan, Nat. Park, 09.08.999, sweeping leg. G. Melika" "4255". **UB**: 2♀: "NORWAY, FINNMARK, 883 Road, nr. Lierbotn 31.17.999. sweeping leg. G. Melika" "4235". 2♂: "NORWAY, FINNMARK, GARGIA, 25 km S of Alta 20.07.999. sweeping leg. G. Melika" "4216". 1♂: "SWEDEN, Norrbottens Län, Abisko National Park 15.07.999, sweeping leg. G. Melika" "4197". 1♀: SWEDEN, Norrbottens, Län, Abisko National Park 12.07.999, sweeping leg. G. Melika" "4192". *NETHERLANDS*: **RMNH**: 1♀: "Langbroek (u.), Netherlands, 10-6-1976, leg. H.H. Evenhuis" "on leaf of Fraxinus excelsior" "Dilyta subclavata Förster det. H.H. Evenhuis, 1976" "Dilyta subclavata Förster compared with lectotype H.H. Evenhuis, 1976." (Orange label) "Museum Leiden the Netherland" (Green label). 1♀: "Loc. Sweden, Date. 26.6.1977, Meth. Swept, leg. H.J. Uluf" "Dilyta sp." "Museum Leiden the Netherlands" (Green label) "Dilyta subclavata Förster Ferrer-Suay det. 2010". 1♀: "FR 32b, leg. M. Boness, Germany 1978" Hitdorf 2-3-1974 "Flugss-gemist" Rhein" "Dilyta subclavata Förster, det. H.H. Evenhuis 1978" "Museum Leiden the Netherland" (Green label). 1♀: "Lienden (Gld.), Schuilenburg, Netherlands, leg. H.J. Ulug." "in Malaise Irap, Sept. 1977" "Dilyta subclavata Förster, dt. H.H. Evenhuis, 1977" "Museum Leiden the Netherland" (Green label). 1♀: Netherlands Lanfbroek Swept: 17-b-1980. Lef. H.f.Uluf" "On Fraxinus excelsior" "Dilyta subclavata Förster, det. H.H. Evenhuis, 1984" "Museum Leiden the Netherland" (Green label). 1♀: "FR 33b, leg. M. Boness, 1975" "Dilyta subclavata Förster, det. H.H. Evenhuis, 1984" "Museum Leiden the Netherland" (Green label). 1♂ 1♀: "Langbroek Netherlands 10-6-1976 leg. H.H. Evenhuis" "collected from leaf of Fraxinus excelsior" "Dilyta subclavata Förster det. H.H. Evenhuis 1979". 1♀ 1♂: "Langbroek (u.) Netherlands 10-6-1976 leg. H.H. Evenhuis" "collected from leaf of

Fraxinus excelsior" "Dilyta subclavata Förster det. H.H. Evenhuis 1976". *NEARCTIC*. *ALASKA, USA*: **CNCI**: 10♀: "C-555 USA: Alaska, Cautwell Denali Hmy R+8 Mi85-130, 24.VII.1984 Taiga-Tundra, 2300-3000' S. & J. Peck" "Dilyta subclavata Förster Ferrer-Suay det. 2010". **UB**: 6♀ 1♂ with the same labels than the specimens deposited in CNCI.

Glyptoxysta talitzkii: **ZIN**: 1♀: "Kishinev MSSR, 30.VII.66. Talickij" (in Russian), "P. pyri 71 (11.VII)", "30VII", "Dilyta talitzkii ♀ V. Belizin det."; 1♀: "Ruseshti village, Kotovskij County of MSSR, 18.VI.75. V.Lazarev" (in Russian), "ex *Psylla crataegi* in pear orchard" (in Russian), "Dilyta talitzkii Bel. Kovalev det. 76"; **RMNH**: 1♂: "ex Psylla pyri 21 X 1987 La Barthelasse AVIGNON (Vaucluse) E. ARMAND Leg.", "♂", "Dilyta talitzkii (Belizin) det. H.H:Evenhuis 1988", "Museum Leiden the Netherland" (green); 1♀: "Kishinev MSSR, 26.VII.66. Talickij" (in Russian), "P. pyri 71 (11.VIII)", "Dilyta talitzkii V. Belizin det", "♀", "Museum Leiden the Netherland" (green).

Key to females of Holarctic species of *Dilyta*

1. Metasoma with distinct, visible punctation on distal half (fig. 5A) 2
- Metasoma without punctures, or at most with very few scattered punctures and not clearly visible on distal half (fig. 5B)…....4
2. F1 very long, thin, almost twice as long as pedicel; F1 longer than F2–F5, F1 nearly as long as F2+F3+F4 combined (fig. 3E) . . . . . *D. japonica* **n. sp.**
- F1 similar in length to pedicel, F1 shorter or subequal to F2 and F3 combined. 3
3. F1 slightly shorter or subequal than pedicel, F2 subequal to F3, F4 slightly shorter than F1 but longer than F2 or F3, F1 subequal to F5, F6 longer than F5 (fig. 3B) . . . . . *D. subclavata*
- F1 subequal to pedicel or slightly longer, F2 shorter than F3, F3 shorter than F4, F4 shorter than F5, F1 subequal to F5 (fig. 3D). . . . . *D. longinqua* **n. sp.**
4. F1 almost double length of F2, F3 or F4; F2 or F3 subequal to F4 but sometimes F2 seems slightly shorter than F3 or F4; F5 longer than F4; F5 longer than F4 but shorter than F1; F7–F11 wider than previous flagellomeres, antenna slightly clavate from F6 (fig. 3A) . . . . . *D. rathmanae*
- F1 longer than F2; F2 slightly longer than F3 or F4; F3 subequal to F4; F5 longer than F4 but as long as F1; F6–F10 wider than previous flagellomeres, antenna slightly clavate from F5 (female antenna with only 10 flagellomeres) (fig. 3C) . . . . . *D. aleevae* **n. sp.**

Key to males of Holarctic species of *Dilyta*

1. Metasoma with distinct, visible punctation on distal half (fig. 5A) 2
- Metasoma without punctures, or at most with very few scattered punctures and not clearly visible on distal half (fig. 5B) . . . 4
2. F1 very long, wide, arched, almost twice as long as pedicel; F1 longer than F2+F3 combined (fig. 4E) . . . . . *D. sinica* **n. sp.**
- F1 subequal or slightly longer than pedicel and slightly curved; F1 shorter or subequal to F2+F3 combined 3
3. F1 slightly longer than pedicel; F2 or F3 each shorter than F1; F1 subequal to F4; F4–F12 wider than previous flagellomeres, antenna slightly clavate from F4; sensilla beginning on F4 (fig. 4B). . . . . *D. subclavata*
- F1 subequal to pedicel, F2 shorter than F1 or F3, F3 subequal to F1; F3–F12 wider than previous flagellomeres, antenna slightly clavate from F3; sensilla beginning on F3 (fig. 4D) . . . . . *D. longinqua* **n. sp.**
4. F1 as long as pedicel; F2 slightly shorter than F3; F4 as long as F1 but thiner; sensilla beginning on F4 (fig. 4A) . . . . . *D. rathmanae*
- F1 longer than pedicel; F2 subequal to F3; F4 as long as F1 but wider; sensilla beginning on F6 (fig. 4C) . . . *D. aleevae* **n. sp.**

Discussion and conclusions

Historically, one of the diagnostic characters assigned to *Dilyta* was the ∩-shaped carina on the apex of the scutellum (Menke & Evenhuis 1991) (fig. 2A), but Paretas-Martínez *et al*. (2009) showed that this character is lacking in the Afrotropical species, which instead have only two small lateral symmetrical carinae (fig. 2B), not meeting dorsally and thus not ∩-shaped.

This study, together with the other recent studies done with the genus *Dilyta* (Paretas-Martínez *et al*. 2009; Ferrer-Suay *et al*. in press), show that there is little interspecific morphological variability within the genus. The best characters to differentiate the species of *Dilyta* are the apex of scutellum (fig. 2), the punctation on distal half of metasoma (fig. 5) and the proportions of flagellomeres in females (fig. 3) and males (fig. 4).

The four new species of *Dilyta* from the eastern Palaearctic described here, and the new record of *D. subclavata* from Alaska, considerably increase the distribution data of the genus in the Northern hemisphere. The genus is Holarctic. All these species have the aforementioned ∩-shaped carina. Thus, it seems that this character is shared by all non-African *Dilyta*.

In this work we synonymyze *Glyptoxysta talitzkii* Belizin with *D. subclavata*. The type species of *Glyptoxysyta*, *G. heterocera* Thomson, 1877, was already synonymyzed with *Dilyta subclavata* by Hellén (1958), but *G. talitzkii* was transferred to the genus *Apocharips* by Menke & Evenhuis (1991) based on Belizin's description of the abdomen. However, Menke & Evenhuis (1991) never saw the Belizin type specimens. We examined Belizin's material and it belongs in *Dilyta*. The metasoma of this species is composed of a syntergum, the apex of the scutellum has an ∩-shaped carina, and the radial cell of the forewing is small and open, with R1 and Rs not reaching the wing margin and not parallel. All these characters show that this species really belongs to *Dilyta* and not *Apocharips*, which lacks a syntergum on the metasoma, has an M-shaped carina on the apex of the scutellum, and has a small radial cell open but with R1 and Rs reaching the wing margin and parallel. *Glyptoxysta talitzkii* has the same punctate area on the distal part of the metasoma and the same proportions of the flagellomeres of the antenna as *D. subclavata*, and we consider them conspeficic.

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References

Belizin, V.I. (1966) Parasitic Cynipids in the Moldavian SSR. *Trudy Moldavskogo Nauchno-Issledovatelskogo Instituta Sadovodstva, Vinogradarstva i Vinodelija*, 13, 3–14 (in Russian).

Fergusson, N.D.M. (1986) Hymenoptera Cynipoidea. Charipidae, Ibaliidae & Figitidae. *Handbooks for the Identification of Brritish Insects*, 8(1c), 1–55.

Ferrer-Suay, M., Paretas-Martínez, J., Selfa, J. & Pujade-Villar, J. (in press) First record of the genus *Dilyta* in Asia, with description of a new species *Dilyta orientalis* (Hymenoptera: Cynipoidea: Figitidae: Charipinae). *Zoological Studies*.

Förster, A. (1869) Ueber die Gallwespen. *Verhandllungen der Kaiserlich-Kongiglichen Zoologish-Botanischen Gesellschaft in Wien*, 19, 327–370.

Gibson, G.A.P. (1985) Some pro- and mesothoracic characters important for phylogenetic analysis of Hymenoptera, with a review of terms used for structures. *Canadian Entomologist*, 117, 1395–1443.

Harris, R.A. (1979) A glossary of surface sculpturing. *State of California, Department of Food and Agriculture, Occasional Papers in Entomology*, 28, 1–31.

Hellén, W. (1958) Was ist *Dilyta subclavata* Först. (Hym., Cyn.)? *Notulae Entomologicae*, 38, 64.

Marshall, T.A. (1870) On some British Cynipidae. *Entomologist's Monthly Magazine*, 6, 178–181.

Menke, A.S. & Evenhuis, H.H. (1991) North American Charipidae, key to genera, nomenclature, species checklist and a new species of *Dilyta* Förster (Hymenoptera, Cynipoidea). *Proceedings of the Entomological Society of Washington*, 93(1), 136–158.

Paretas-Martínez, J., Arnedo, M.A., Melika, G., Selfa, J., Seco-Fernández, M.V., Fülöp, D. & Pujade-Villar, J. (2007) Phylogeny of the parasitic wasp subfamily Charipinae (Hymenoptera, Cynipoidea, Figitidae). *Zoologica Scripta*, 36, 153–172.

Paretas-Martínez, J, Melika, G. & Pujade-Villar, J. (2009) Description of four new species of *Dilyta* Förster (Hymenoptera: Figitidae: Charipinae) from the Afrotropical region. *African Entomology*, 17 (2), 207–214.

Quinlan, J. & Evenhuis, H.H. (1980) Status of the subfamily names Charipinae and Alloxystinae (Hymenoptera: Cynipidae). *Systematic Entomology*, 5, 427–430.

Ronquist, F. (1994) Evolution of parasitism among closely related species: Phylogenetic relationships and the origin of inquilinism in gall wasps (Hymenoptera, Cynipidae). *Evolution*, 48, 241–266.

Ronquist, F. (1999) Phylogeny, classification and evolution of the Cynipoidea. *Zoologica Scripta*, 28, 139–164.

Ronquist, F. & Nordlander, G. (1989) Skeletal morphology of an archaic cynipoid, *Ibalia rufipes* (Hymenoptera, Ibaliidae). *Entomologica Scandinavica Supplements*, 33, 1–60.

Thomson, C.G. (1877) Ofversikt af Sveriges Cynips-arter. *Opuscula Entomologica*, 8, 778–820.