ISRAEL JOURNAL OF ENTOMOLOGY, Vol. 51, pp. 77–84 (10 July 2021)

Two new species of the genus *Doratura* Sahlberg (Hemiptera: Cicadellidae: Deltocephalinae) from the Mediterranean Region

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ABSTRACT

Two new *Doratura* species, *D. butzele* n. sp. and *D. rikele* n. sp., are described from Italy. The genital morphology of both species is illustrated, their diagnoses are given, and data on their ecology, phenology and distribution are provided.

KEYWORDS: Auchenorrhyncha, Cicadomorpha, Chiasmini, leafhoppers, new species, taxonomy, ecology, Italy, Palearctic.

RIASSUNTO

Due nuove specie di *Doratura*, *D. butzele* n. sp. e *D. rikele* n. sp., sono descritte dall'Italia. Viene illustrata la morfologia genitale delle due specie, vengono fornite le loro diagnosi e vengono forniti dati sulla loro ecologia, fenologia e distribuzione.

PAROLE CHIAVE: Auchenorrhyncha, Cicadomorpha, Cicadellidi, Chiasmini, nuove specie, tassonomia, ecologia, Italia, Paleartico.

INTRODUCTION

The genus *Doratura* was established by J. Sahlberg, 1871, with *Athysanus stylatus* Boheman, 1847 as the type species. The genus belongs to the tribe Chiasmini Distant, 1908 (type genus: *Chiasmus* Mulsant & Rey, 1855) together with another 20 genera (Zahniser & Dietrich 2013, 2015). The *Doratura* species known to date are essentially restricted to the Palearctic Region. *Doratura stylata* (Boheman, 1847), widespread and generally common over nearly the whole Palaearctic, is the only species to occur in the Nearctic Region as well, where it is, however, apparently introduced (Hamilton 1983). Emeljanov (1964) established the subgenus *Doraturina* for species with an aedeagus covered by spines or denticles; species without such structures on their aedeagi belong to *Doratura* s. str. Like most members of the fulgoromorphan family Delphacidae, but a rather small number of cicadellids (e.g., many Chiasmini genera such as *Aconura*, *Athysanella*, *Chiasmus*, *Driotura* and *Doraturopsis*), the *Doratura* species are generally brachypterous (with strongly reduced hind wings), but macropterous specimens occasionally occur as well. Hostplants of apparently all *Doratura* species belong to the Poaceae (Nickel 2003; Zahniser & Dietrich 2015).

DOI: 10.5281/zenodo.5089704; ISSN (online) 2224-6304
Received: 18 June 2021 / Revised: 7 July 2021 / Accepted: 8 July 2021
urn:lsid:zoobank.org:pub:F0BB5812-D88A-4887-BE4B-00EEF1061692

MATERIALS AND METHODS

The material was collected by sweeping net and aspirator during many field trips during the last 25 years. The specimens were glued on platelets after extraction of their genitalia. The genitalia were mounted on the platelets together with the corresponding specimens. The measurements were done with an ocular micrometre mounted on a Zeiss stereomicroscope SV11. The locality numbers of the Italian collecting sites refer to the number system used by the authors elsewhere (Guglielmino *et al.* 2005; Guglielmino & Bückle 2008, 2015; Guglielmino *et al.* 2017).

The type material of the new species is deposited in the Department of Agricultural and Forestry Sciences, University of Tuscia, Viterbo, Italy (collection Guglielmino).

TAXONOMY

Genus *Doratura* Sahlberg, 1871

Doratura (Doratura) butzele n. sp.

(Figs 1–4)

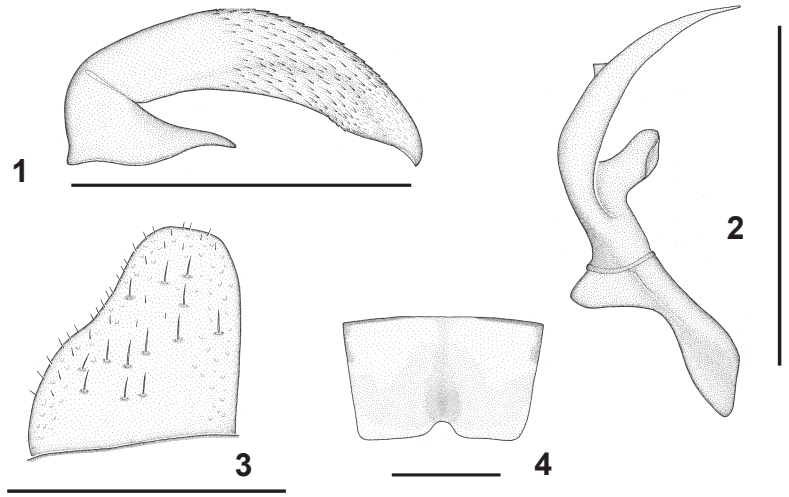
Doratura paludosa: sensu Graeffe, 1903: 50 (misidentification), nec Melichar, 1897.

LSID: urn:lsid:zoobank.org:act:B89D6E2E-A8D7-49D1-AE48-0E9A6E6A884B.

Etymology: The species is named after a dear friend and colleague in Sicily. The species name is a noun in apposition.

Diagnosis: *Doratura butzele* n. sp. is closely related to *D. paludosa* Melichar, 1897, from which it differs above all by its aedeagus morphology. In *D. paludosa*, the aedeagus is slender in lateral view, widened only in its central portion, its ventral margin is more or less abruptly curved in the middle, its dorsal margin is proximally straight, curved in its distal portion; spinules are present over the whole surface up to the apex, only a short proximal sector remains devoid of them. In *D. butzele* n. sp., the aedeagus is distinctly stouter, rather evenly curved along the whole ventral margin, with its dorsal margin proximally curved, and spinules are present only in the central portion, with the apical portion always smooth and shiny. Slight differences may be observed also in the styles, which have their medial outlines more evenly curved in *D. paludosa*, while they are somewhat angular and more distinctly narrowed proximally in *D. butzele* n. sp. But the shape of styles is somewhat variable in both species, and therefore the mentioned differences are often not very evident. The sutural angles of the genital plates are generally more rounded in *D. butzele* n. sp., but also this character is variable and insufficient for a safe identification, which is possible only based on the aedeagus shape. The female pregenital sternite has a small, but distinct semicircular notch (in *D. paludosa* it is generally only shallow, indistinct, or completely lacking).

Description: *Measurements* (mm): Males: Total body length 3.00–3.35, width over wings 1.27–1.34, width of head including eyes 1.06–1.15, length of vertex 0.43–0.48,



Figs 1–4: *Doratura butzele* n. sp.: (1) aedeagus, lateral view; (2) left genital style, dorsal view; (3) left genital plate, ventral view; (4) female pregenital sternite. Scale bars 0.5 mm.

length of forewings from insertion point to apex 0.91–0.99, length of hind tibia 1.68–1.73. Females: Total body length 3.85–4.80, width over wings 1.25–1.39, width of head including eyes 1.12–1.23, length of vertex 0.45–0.53, length of forewings from insertion point to apex 0.88–1.01, length of hind tibia 1.68–1.95.

Male genitalia: Aedeagus shaft with ventral area in the middle elevated, crest-shaped, surface in great part covered by distinct spinules except for basal third and apical fifth, the latter areas shiny and without microsculpture; in lateral view (Fig. 1) stout, very slightly widening in its basal half, evenly narrowing in its distal half, with sharp or hook-shaped tip, and dorsal border basally distinctly concave, in its central region somewhat curved or almost straight, in its apical fifth slightly concave; in ventral view basally narrowed in apical direction, in the middle of its distal half distinctly widened, near tip strongly narrowing. Socle well developed, fold between shaft and socle oblique, with distinct angle to dorsal border of shaft. Styles (Fig. 2) rather short, evenly curved in their distal parts, with inner denticle distal of midlength, evenly narrowing from denticle to apex, slightly widened between denticle and base, distally of this widening narrowed. Genital plates (Fig. 3) with more or less rounded sutural angle, posterior margin obliquely running in laterocaudal direction until more or less indistinct exterior angle, lateral margin sinuate.

Female genitalia: Pregenital sternite (Fig. 4) with lateral margin slightly converging in caudal direction, obtuse posterior angles, straight or slightly concave hind margin and small, generally distinct, approximately semicircular notch in the middle of hind margin. Ovipositor in lateral view protruding beyond posterior angle of pygofer ¼–⅓ of its complete length from hind margin of pregenital sternite to ovipositor tip.

Holotype: ♂ **Italy:** Puglia (Foggia), Gargano, road Cagnano – S. Giovanni Rotondo, 400 m before fork to S. Marco in Lamis, Bosco Quarto [41.7556°N 15.8161°E], ~650 m, 2.vi.2010, Guglielmino & Bückle (loc. 508), open area with *Asphodelus*, ferns inside a forest with *Quercus*, *Crataegus*.

Paratypes: Italy: 15♂ 6♀, same data as holotype; 4♂, Abruzzo (L'Aquila), between Secinaro and Molina Aterno [42.1538°N 13.7129°E], ~700 m, 15.viii.1998, Guglielmino & Bückle (loc. 15), meadows with *Acer* and *Quercus*; 4♂ 6♀, Abruzzo (Chieti), Road SS650 to Pescara, fork to Montemitro [41.8986°N 14.6393°E], ~100 m, 15.vii.1998, Guglielmino & Bückle (loc. 90), vegetation near Trigno river; 4♂, Molise (Isernia) Fiume Trigno near fork between Poggio Sannita and Bagnoli del Trigno [41.7347°N 14.4457°E], ~400 m, 23.viii.2006, Guglielmino & Bückle (loc. 309), river vegetation with *Populus nigra*, *Salix*, *Quercus*, *Inula*, *Artemisia*, *Phragmites*, Poaceae etc.; 23♂ 12♀, Puglia (Foggia), Gargano, Road SS528 (km 34.2) Monte S. Angelo – Vico, 1.2 km after fork to Carpino [41.7471°N 15.9889°E], ~700 m, 7.vi.2010, Guglielmino & Bückle (loc. 520), dry meadow bordered by *Quercus ilex* and oaks; 16♂ 5♀, Puglia (Bari), Gravina, Parco Nazionale Alta Murgia, Road SP35, 5 km south of junction to SP151 (Altamura–Ruvo) [40.9371°N 16.4475°E], ~400 m, 10.vi.2010, Guglielmino & Bückle (loc. 525), dry meadow with ruderal vegetation; 10♂ 7♀, Puglia (Taranto), Castellaneta, Bosco dei Terzi [40°41'26.6"N 16°57'22.9"E], 270 m, 19.vi.2011, Guglielmino & Bückle (loc. 551), open forest with *Quercus*, *Crataegus*, *Rubus*, Poaceae, Apiaceae, thistles, Asteraceae, Lamiaceae; 6♂ 6♀, Basilicata (Potenza), Monte Pollino, road to Colle d'Impiso 6 km from junction of road Viggianello – S. Severino [39.9558°N 16.1412°E], ~1250 m, 4.viii.2009, Guglielmino & Bückle (loc. 473), open pasture with *Juncus*, *Carex*, Poaceae etc.; 12♂ 6♀, Calabria (Cosenza), Monte Pollino, road from Civita to Colle Marcione, 2.2 km above fork from road to Frascineto [39.8267°N 16.3052°E], ~550 m, 10.viii.2009, Guglielmino & Bückle (loc. 485), arid area with tufts of Poaceae, *Juniperus*, *Pistacia lentiscus*, *Quercus ilex*, *Spartium*, *Helichrysum*; 5♂, Calabria (Cosenza), Monte Pollino, road from Morano–Mormanno, slope east of tunnel Campotenese [39.8870°N 16.0458°E], ~1050 m, 18.vi.2010, Guglielmino & Bückle (loc. 541), meadows with isolated pines, Poaceae, Fabaceae, Lamiaceae and less dry areas on the margin of mixed forest.

Distribution: *Doratura butzele* n. sp. was found in Italy in Veneto, Piedmont, Abruzzo, Molise, Apulia, Campania, Basilicata, Calabria and Sicily. Outside of Italy, the species occurs at least in Croatia (Istria), Bosnia and Herzegovina, Montenegro, and probably in Slovenia (Graefe, 1903, misidentified as *D. paludosa*). The species has been recently found also in Lower Austria (Gernot Kunz, pers. comm.), in a ground squirrel enclosure, possibly introduced.

Ecology: In Northern and Central Italy (Veneto, Piedmont, Abruzzo, Molise), the species was found only at low altitudes between the sea level and 700 m. In Calabria, it occurs at low altitudes, but also at moderately high altitudes up to 1400 m in the Mt Pollino region and up to 1800 m in the Sila mountains; in Sicily, the highest collection sites are on Mt Etna at 1450 m. The species is generally found in dry habitats as borders of lowland riverbeds, grasslands near the seashore, ruderal places, in the southern regions also on dry mountain slopes.

Biology: The species was collected from the beginning of June until the end of October. Probably it has two generations (there may be one generation in the mountain regions only) and hibernates in the egg stage.

Doratura (Doratura) rikele n. sp.

(Figs 5–8)

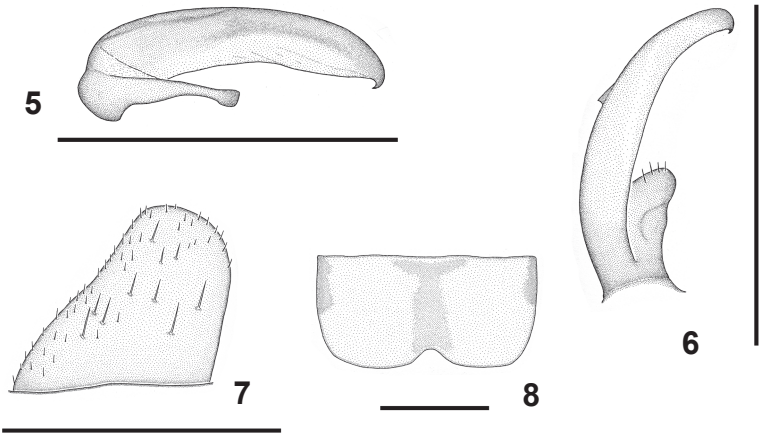
LSID: urn:lsid:zoobank.org:act:CF468D3C-B11E-4461-B823-5465FFE747BA.

Etymology: The species is named after a historic personage living about a century ago in the Swabian village of Bonlanden. The species name is a noun in apposition.

Diagnosis: *Doratura rikele* n. sp. is related to *D. heterophyla* Horváth, 1903 and *D. kusnezovi* Vilbaste, 1961. It shares with these species a median notch on the hind margin of the pregenital segment in females, a smooth and shiny aedeagus without spinules or teeth and above all a stout stylus shape with only a slightly narrowing apical portion. From both taxa the new species differs in having the rounded (not angular) notch on the hind margin of the female pregenital segment, by the shape of the aedeagus which is of equal width along almost all its length (not distinctly narrowing in its apical half), by the view almost evenly curved in dorsal and rather short styli (in both other species the styli are long, in the basal third distinctly bent, in the apical portion nearly straight) and the shorter genital plates (very long in the other taxa). In addition, the new species is distinguished from *D. heterophyla* in being smaller and in having shorter wings, and from *D. kusnezovi* by the hook-shaped stylus tip.

Description: *Measurements* (mm): Males: Total body length 3.05–3.40, width over wings 1.31–1.46, width of head including eyes 1.13–1.21, length of vertex 0.48–0.52, length of forewings from insertion point to apex 1.02–1.17, length of hind tibia 1.79–1.97. Females: Total body length 4.35–4.60, width over wings 1.40–1.54, width of head including eyes 1.25–1.31, length of vertex 0.52–0.55, length of forewings from insertion point to apex 1.09–1.21, length of hind tibia 1.82–2.06.

Male genitalia: Aedeagus shaft in lateral view (Fig. 5) stout, along almost its whole length of approximately equal width, only near apex ventrally rounded narrowing, with short hook-shaped tip, dorsally in the middle slightly concave, ventrally slightly convex, basal part low; in ventral view basally strongly narrowed, centrally almost parallel, in apical fourth evenly rounded, basal part obtusely carinate; fold between shaft and base slightly oblique, shaft smooth and shiny without spinules or teeth;



Figs 5–8: *Doratura rikele* n. sp.: (5) aedeagus, lateral view; (6) left genital style, dorsal view, (7) left genital plate, ventral view; (8) female pregenital sternite. Scale bars 0.5 mm.

socle in lateral view very flat, in ventral view strongly, almost angularly protruding near base. Styles (Fig. 6) in dorsal view almost evenly curved, somewhat more distinctly apically of inner denticle, stout and wide, only moderately narrowing towards the tip; in median view straight and evenly wide with hook shaped apex; denticle about at mid-length. Genital plates (Fig. 7) with rounded sutural angle, posterior margin obliquely running in laterocaudal direction until rather indistinct exterior angle, lateral margin sinuate.

Female genitalia: Pregenital sternite (Fig. 8) with lateral margins parallel in their basal half, then slightly converging in caudal direction towards the rounded posterior angles; hind margin straight with distinct notch in the middle. Ovipositor in lateral view protruding beyond posterior angle of pygofer about ⅓ of its length from hind margin of pregenital segment to ovipositor tip.

Holotype: ♂ **Italy:** Calabria (Crotone), north of Petilia, near little road to Pagliarelle [39°07'33.3"N 16°47'03.6"E], 509 m, 6.vii.2011, Guglielmino & Bückle (loc. 590), very dry area with Poaceae, *Hyparrhenia*, *Artemisia campestris*, *Juncus*, *Helichrysum*, thistles.

Paratypes: Italy: 28♂ 18♀, same data as holotype; 1♂ 2♀, Calabria (Crotone), road from Cerenzìa to Caccuri [39°14'21.3"N 16°47'09.9"E], 570 m, 5.vii.2011, Guglielmino & Bückle (loc. 586), open pine forest with *Cistus*, Poaceae, *Hyparrhenia* and slightly humid areas with *Urtica*, *Juncus*, *Rubus*, *Clematis*; 11♂ 7♀, Calabria (Crotone), road from Caccuri to S. Rania [39°12'17.6"N 16°46'15.1"E], 581 m, 5.vii.2011, Guglielmino & Bückle (loc. 587) dry or moderately dry ruderal vegetation on road edges with Poaceae, *Brachypodium*, *Rubus*, *Inula*, *Cistus*, *Artemisia campestris*.

Distribution: *Doratura rikele* n. sp. is known until now only from a restricted area in southern Italy: Calabria, hillsides between the Sila Mountains and the Ionian Sea (provinces of Crotone and Catanzaro) and one locality in the Monte Pollino area (Province of Cosenza).

Ecology: We found the species on rather arid hillsides between 500 and 600 m, along fields with mixed ruderal vegetation, on argillous *Hyparrhenia* biotopes and in a dry *Pinus* forest with undergrowth of *Cistus* and sparse Poaceae.

Biology: The species was collected between end of May and the beginning of September; probably it is bivoltine.

DISCUSSION

The two new species may be attributed to two different species groups. *Doratura paludosa* group consists of *D. butzele* n. sp., *D. paludosa*, and *D. iblea* D'Urso, 1983. These species have stout and equally curved styles, and the surface of their aedeagus is covered with fine and evenly distributed spinules. Differences are found only in details of the aedeagus shape and the distribution of its spinules. The pregenital sternite in females is straight or somewhat concave, with slight specific differences in the shape of the median portion of the hind margin. The species group is restricted to the Apennine Peninsula and the westernmost Balkan Region.

Doratura heterophyla species-group includes, besides *D. rikele* n. sp., also *D. heterophyla* and *D. kusnezovi*. This group is not as clearly defined as the *D. paludosa* group. Its members display distinct differences in the morphology of their male

genital apparatus. A common character is the completely smooth and shiny aedeagus, and the shape of the highly derived genital styles with a robust, indistinctly tapering apical portion. *Doratura rikele* and *D. heterophyla* share the hook-shaped apex of the styles. The females of all three species have a median notch on the hind margin of the pregenital sternite. The *D. heterophyla* species-group is distributed from the Mediterranean Region to Central Asia. All other *Doratura* species known to date belong to other species groups or are apparently isolated within the genus.

The distribution patterns of *D. butzele* n. sp. and *D. rikele* n. sp. are quite interesting. *Doratura butzele* n. sp. has, according to our current knowledge, a circumadriatic distribution with records from Montenegro, Bosnia and Herzegovina, Croatia (Istria) to northern Italy (Lake of Garda) and along the eastern (Adriatic) side of the Apennine Peninsula until Apulia, Calabria and north-eastern Sicily. Such a distribution pattern is apparently unique within Auchenorrhyncha.

Doratura rikele n. sp. occupies a very small area, a lowland hillside region in north-eastern Calabria, which cannot be explained by geomorphological features. Possibly, the ancestor of *D. rikele* n. sp. came from the other side of the Mediterranean (Ionian Sea) from the Balkan Region, and rapidly evolved its special features in its new area of distribution.

ACKNOWLEDGEMENTS

We are very grateful for the loan of material to Roberta Salmaso (Museo Civico di Storia Naturale, Verona), Igor Malenovský (Moravian Museum, Brno) and Vera D'Urso (Department of Biological, Geological and Environmental Sciences, University of Catania). Herbert Nickel (Göttingen, Germany) and an anonymous referee are thanked for their comments on an earlier draft of the manuscript.

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