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FIRST RECORD OF BITING MIDGE *DASYHELEA GOTHLANDICA* STRANDBERG & JOHANSON IN CROATIA (DIPTERA: CERATOPOGONIDAE)

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The biting midge, *Dasyhelea gothlandica* Strandberg & Johanson, 2015, described from Sweden is recorded for the first time in Croatia. Total of 17 specimens were collected at four locations in Plitvice Lakes National Park. These records contribute to data on the biting midges of Croatia, and in addition extend our knowledge on the distribution and ecology of this species.

Keywords: subgenus *Dicryptoscena*, karst environment, DNA barcoding, Plitvice Lakes NP, emergence trap

Rumišek, M., Szadziewski, R. & Ivković, M.: Prvi nalaz komarčića *Dasyhelea gothlandica* Strandberg & Johanson u Hrvatskoj (Diptera: Ceratopogonidae). Nat. Croat., Vol. 35, No. 2, _____, 2026, Zagreb.

Vrsta opisana u Švedskoj, komarčić *Dasyhelea gothlandica* Strandberg & Johanson, 2015 zabilježena je po prvi puta u Hrvatskoj. Ukupno 17 jedinki je sakupljeno na četiri lokacije unutar Nacionalnog parka Plitvička jezera. Ovi nalazi doprinose ukupnoj raznolikosti komarčića u Hrvatskoj, ali i doprinose saznanju o rasprostranjenosti i ekologiji same vrste.

Ključne riječi: podrod *Dicryptoscena*, krš, DNA barkodiranje, NP Plitvička Jezera, emergencijske klopke

INTRODUCTION

The biting midges are a family of small nematoceran flies that are best known by the females that feed on blood or hemolymph (DOMINIAK, 2012). *Dasyhelea* Kieffer is the sole extant genus of the tribe Dasyheleini within the subfamily Forcipomyiinae, with 639 currently described species (BORKENT *et al.*, 2025) while around 65 species occur in Europe (DOMINIAK, 2012). What makes the genus *Dasyhelea* exceptional among biting midges is that females have reduced mandibles and maxillae that lack teeth, so the adults feed on honeydew and nectar as sources of energy (DOMINIAK, 2012).

Dasyhelea gothlandica Strandberg & Johanson, 2015 was described from the Gothland island in Sweden (STRANDBERG & JOHANSON, 2015) and has since been recorded only with the

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help of COI sequences when investigating the diet of fish in the river Durance in France (CORSE *et al.*, 2017). In the present paper, it is recorded from Croatia for the first time, combining morphological and molecular methods.

MATERIALS AND METHODS

The species was collected in Plitvice Lakes National Park, located in the karst region of the west Dinaric Mountains in Croatia. The Plitvice Lakes system consists of 16 oligotrophic, dimictic, and fluvial lakes divided by tufa barriers, which are natural barrage lake outlets. The system is supplied with water from the Matica Stream, which is formed by the merging of two small rivers (Crna rijeka and Bijela rijeka) and ends with the formation of the Korana River after the last lake, Novakovića Brod.

Part of the specimens were collected in an emergence trap set-up (Fig. 1.) at tufa barrier Labudovac and at tufa barrier Novakovića brod. Six pyramid-type emergence traps (P1-P6) were operated from February 2007 to February 2009 at tufa barrier Novakovića Brod, while at tufa barrier Labudovac it continued till the end of 2022. Traps were sited to ensure representative sampling of emergence from all microhabitats present at each site. Each trap was a 50 cm tall, four sided pyramid with a base of 45×45 cm, fastened to the streambed to allow the free movement of larvae in and out of the sampling area. The side frames of the traps were covered with 1-mm mesh netting (IVKOVIĆ *et al.*, 2013). A part of the specimens were collected with a sweep net at Lake Kozjak, and Korana River in Korana village and stored in 96% ethanol.



Fig. 1. Emergence traps at the tufa barrier Novakovića Brod.

Specimens collected with a sweep net were barcoded. The DNA barcoding work was conducted in the Center for Integrative Biodiversity Discovery in the Museum für Naturkunde Berlin. The process involves extracting DNA using alkaline buffer (HotSHOT), PCR using “tagged” primers that are suitable for sequencing using Nanopore sequencing, and sequencing the generated amplicons using Oxford Nanopore sequencing technologies MinION (*et al.*, 2021). Specimen COI -5P sequences are stored in the Biodiversity of Life

Database (BOLD) with Process ID CROBM002-26 to CROBM005-26. TaxonID tree was built in BOLD using default Kimura 2 Parameter distance model for nucleotide differences.

Multifocal image of the genitalia was created by CombineZP software (HADLEY, 2010).

Material examined: Korana River, Korana village, 44°55'33.8"N, 15°37'06.9"E, 400 m a.s.l.: 10.VI.2025 (1 ♀ [CROBM002-26] i 1 ♂ [CROBM003-26]); Lake Kozjak, Plitvice Lakes, 44°52'59"N, 15°36'52"E, 540 m a.s.l.: 10.VI.2025 (2 ♂ [CROBM004-26, CROBM005-26]; Tufa barrier Novakovića brod, Plitvice Lakes, 44°54'07"N, 15°36'38"E, 504 m a.s.l.: VI. 2007, 5 ♂, P5 moss; VII. 2007, 1 ♂, P5 moss; VIII. 2007, 1 ♂, P6 tufa with detritus; X. 2007, 1 ♂, P6 tufa with detritus; VI. 2008, 2 ♂, P2 pebbles; Tufa barrier Labudovac, Plitvice Lakes, 44°52'17"N, 15°35'59"E, 630 m a.s.l.: VI. 2008, 2 ♂, P5 moss; VI. 2021, 1 ♂, P5 moss.

Examined specimens are deposited in University of Zagreb, Faculty of Science, Department of Biology.

RESULTS AND DISCUSSION

The present observation of *Dasyhelea gothlandica* (Fig. 2.) is the first record for Croatia and the third report of this species in Europe (STRANDBERG & JOHANSON, 2015; CORSE *et al.*, 2017) (Fig. 3.). All four sequenced specimens, together with results from Sweden and France, constitute BIN BOLD:ACX2332, which, in addition to morphological similarity, also supports the identification affiliation to the same species with the max p-distance within the BIN 2.25% (18th of March 2026). (Fig. 4.).



Fig. 2. Ventral aspect of male genitalia.
Scale bar = 50 µm.

In previous records (STRANDBERG & JOHANSON, 2015; CORSE *et al.*, 2017), the species has been recorded in aquatic ecosystems in karst environments on carbonate substrate, from just a few meters above sea level up to an elevation of 630 m. Waters on carbonate substrates have a high buffer capacity due to the presence of bicarbonate ions (BROZINČEVIĆ *et al.*, 2023). Although these records come from only three localities, the consistent association with carbonate substrates leads us to hypothesise that *D. gothlandica* may be sensitive to changes in water pH. This remains untested, however, as distributional data alone cannot establish such a relationship; direct measurements of water chemistry across its range would be needed to confirm it.



Fig. 3. Records of *Dasyhelea gothlandica* in Europe; D - Durance river, France, G - Gothland island, Sweden, P - Plitvice Lakes NP, Croatia.

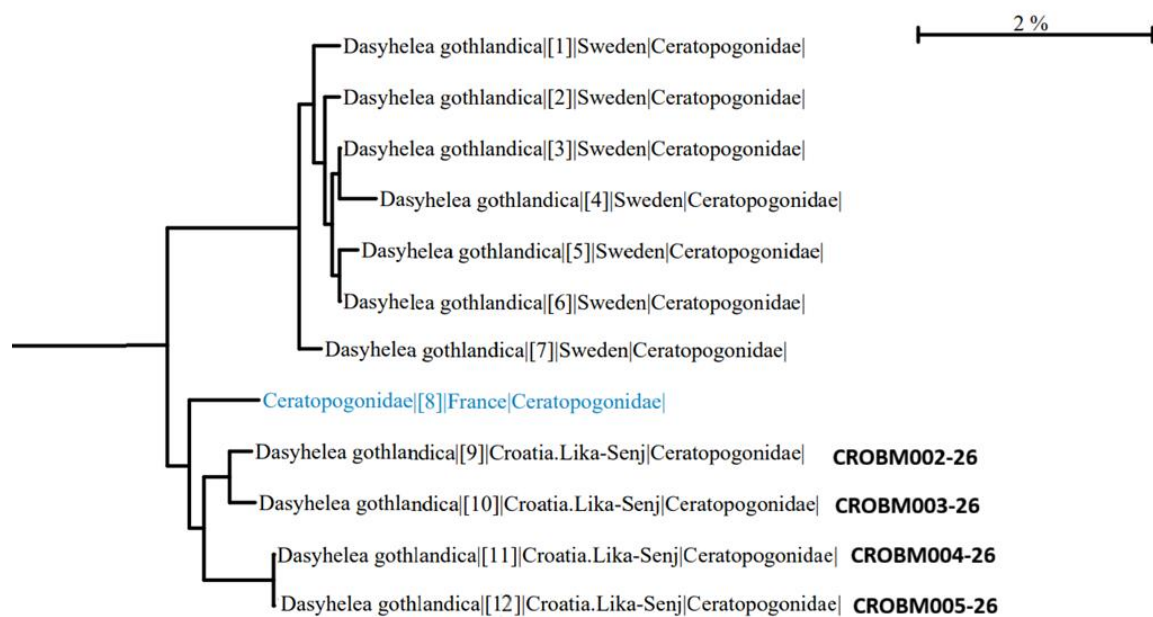


Fig. 4. TaxonID tree built in BOLD using Kimura 2 Parameter distance model for nucleotide differences within Sweden, France and Croatian sequences.

In samples collected with emergence traps, nine out of 13 individuals were associated with moss, which may suggest a preference for this microhabitat, although the small sample size limits the strength of this inference. The intricate, tangled structure of moss can act as a filter, capturing suspended organic matter (detritus) from the current and providing a nutrient-rich substrate for algae (SUREN, 1991). According to SZADZIEWSKI *et al.* (1997), *Dasyhelea* larvae feed on filamentous and other algae, including diatoms, as well as on decaying plant debris. Moss may therefore offer a favourable microhabitat by serving both as a food source and as refuge from predators, which is potentially advantageous given that the larvae are not very agile (DOMINIAK, 2012).

Four *Dasyhelea* species are now known in Croatia. Previously known were only *Dasyhelea flavifrons* (Guérin, 1833), *Dasyhelea bilineata* Goetghebuer, 1920 and *Dasyhelea modesta* (Winnertz, 1852), widely distributed European species of *Dasyhelea* (DOMINIAK, 2012; RADOŠEVIĆ, 2024). Although only four species have been recorded so far, it is assumed, with the currently collected and unprocessed material, that the diversity of this genus is much greater in Croatia.

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