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First record of *Gymnetron tibiellum* Desbrochers des Loges, 1900 (Coleoptera, Curculionidae, Mecinini) from Poland

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Abstract: From several dozen *V. anagallis-aquatica* seed bags collected from a small astatic pond in Zalesie-Podlipie (Eastern Poland), one adult *Gymnetron tibiellum* was grown in laboratory conditions. The weevil was identified based on its morphology and mtCOI DNA sequence. This is the first record of *G. tibiellum* in Poland. The result of the revision of *G. veronicae* specimens published by Smreczyński & Cmoluch (1961) is also given.

Keywords: *Gymnetron tibiellum*, *Veronica anagallis-aquatica* L., first record, E Poland, DNA mtCOI

Introduction

The curculionid genus *Gymnetron* Schoenherr, 1825 consists of 70 Afrotropical species (Caldara 2003) and approximately 35 Palaearctic species (Caldara 2008, Alonso-Zarazaga *et al.* 2023); seven of the latter have been reported from Poland (Wanat & Mokrzycki 2018, Wanat & Ruta 2018). The Palaearctic *Gymnetron* species live on many plants from the genus *Veronica* L. (speedwells) (Plantaginaceae) in various types of habitats, both dry (roadsides, ruderal communities, edges of arable fields) and wet (banks of rivers, ponds, wetlands) (Burakowski *et al.* 1997, Caldara 2008, Benedikt *et al.* 2022).

G. tibiellum Desbrochers des Loges, 1900 (Fig. 1) is distributed from the Middle East, Anatolia and the Caucasus, through Crimea and south-eastern Europe (incl. the Balkans), to the Italian Peninsula. The northernmost localities of *G. tibiellum* hitherto reported are in Austria, Moravia (Czechia) and Slovakia (Caldara 2008, Benedikt *et al.* 2022, Alonso-Zarazaga *et al.* 2023) (Fig. 2).

Adults of *G. tibiellum* are morphologically very similar to *G. veronicae* (Germar, 1821), so it is very difficult to identify this species solely on the basis of the external morphology. The most conspicuous external character differentiating the two species is the shape of the rostrum: on *G. tibiellum* it is almost straight, though visibly shorter in the male than in the female, whereas in *G. veronicae* it is slightly curved, elongate, and almost the same length in both sexes. But the crucial diagnostic differences between *G. tibiellum* and *G. veronicae* are to be found 1) in the shape of the penis – the apex pointed; the aedeagal and tegminal apodemes elongated in *G. tibiellum* vs the apex rounded; the aedeagal and tegminal apodemes short in *G. veronicae* (Fig 3A–D); and 2) in the shape of the

spermatheca – with a short, slightly curved cornu and a short, narrow ramus in *G. tibiellum* vs an elongate, strongly curved cornu and massive ramus in *G. veronicae* (Caldara 2008).

Fig. 1. *Gymnetron tibiellum* Desbr., habitus, dorsal view (photo I. Toševski).

Fig. 2. Distribution of *Gymnetron tibiellum* Desbr.

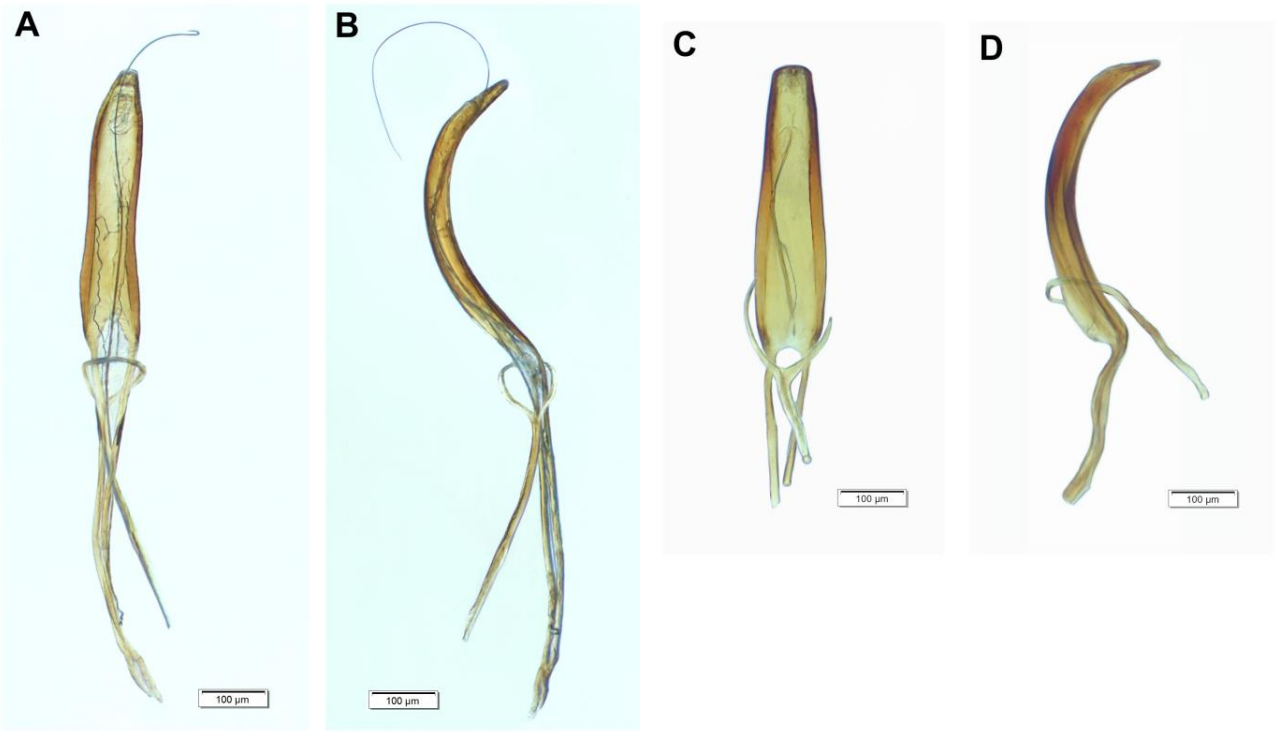

Fig. 3. Comparison of aedeagus shapes in *G. tibiellum* (**A**, **B**) and *G. veronicae* (**C**, **D**) (photo R. Gosik).

The biology and morphology of immatures of the two species are well known. Adults are active from mid-April, and oviposition takes place from early June to mid-August. The larvae develop in the seed capsules of water speedwell (*Veronica anagallis-aquatica* L.). Seed capsules attacked by larvae are readily detected by the dark colour of the frass deposited within them (Fig. 4A). Pupation also takes place in the seed capsules. The eclosed adults leave the capsules directly after pupation. Despite the similarities in their biology and habitat requirements, no competition has to date been found to occur between *G. tibiellum* and *G. veronicae* (Skuhrovec *et al.* 2022).

Material and Methods

On 2 September 2023, several dozen seed capsules of *V. anagallis-aquatica* were collected from a small astatic pond surrounded by arable fields in Zalesie–Podlipie (51.241986 22.849490) (near Lublin, eastern Poland). The material was treated in accordance with the method proposed by Toševski (in Skuhrovec *et al.* 2022), i.e. it was placed on wet tissue paper in Petri dishes (Fig. 4B) kept indoors. The level of moisture in the Petri dishes was checked daily and water was added if necessary. On 5 September 2023, a single freshly eclosed adult of *Gymnetron* sp. was collected and preserved in 99% alcohol. It was identified by Ivo Toševski based on its morphology, and the DNA mtCOI sequence provided confirmation. The specimen is deposited in the collection of the Institute for Plant Protection and Environment, Zemun, Serbia.

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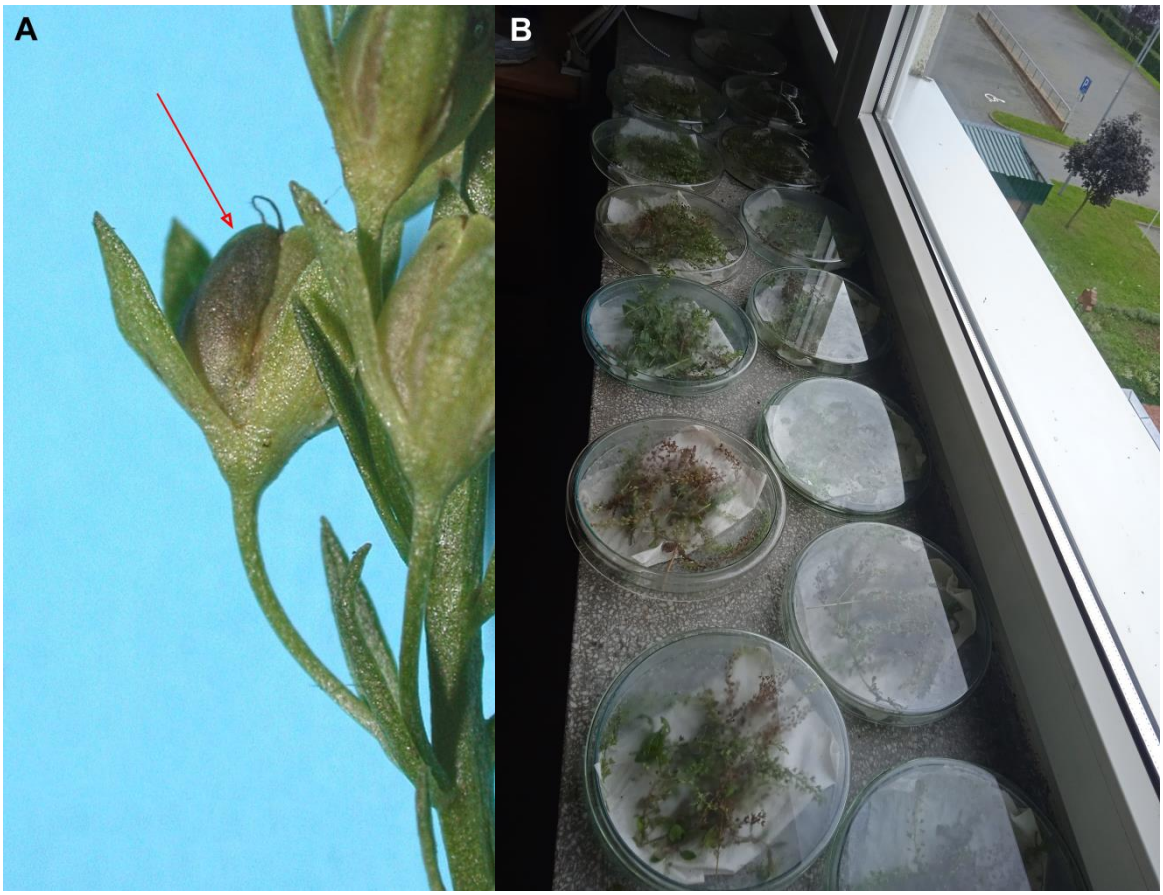

Fig. 4. **A**. A seed capsule of water speedwell attacked by a larva cf. *G. tibiellum* Desbr. (photo I. Toševski). **B**. Rearing *Gymnetron* species from water speedwell seed capsules (photo R. Gosik).

Molecular analysis

For molecular analysis, DNA was extracted from adult emerged from seed capsules of Veronica anagalis-aquatica The barcoding region of the mitochondrial cytochrome c oxidase subunit I gene (mtCOI) was used to confirm the identity of the emerged adult. Genomic DNA was extracted using the DNeasy® Blood & Tissue Kit (Qiagen Inc., Valencia, CA) following the manufacturer's instructions. The barcoding region was amplified in a were performed in a Mastercycler ep Gradient S (Eppendorf, Hamburg, Germany) using the primer pair LCO1490 (Folmer *et al.* 1994) and HCOd (Chetverikov *et al.* 2015). PCR reaction was carried out in a volume of 20 µl [1 µl of DNA, 11.8 µl of H2O, 2 µl of High Yield Reaction Buffer A (1 × 1.5 mM MgCl2), 1.8 µl of MgCl2 (2.25 mM), 1.2 µl of dNTP (0.6 mM), 1 µl of each primer of the pair LCO1490/HCOd (0.5 µM) and 0.2 µl of FastGene Taq DNA polymerase (0.0375U/µl) (NIPPON Genetics Europe, Dueren, Germany). The PCR protocol consisted of an initial denaturation at 95°C for 5 min, 35 cycles, each consisting of three steps, i.e., 1 min at 94°C, 1 min at 48°C and 1.5 min at 72°C, with a final extension step at 72°C for 7 min at the end of amplification protocol. After PCR amplification, the products were run on 1% agarose gel, stained with ethidium bromide and visualized under a UV transilluminator. The amplified product was sequenced using the Eurofins sequencing service (Eurofins Genomics-MWG, Germany). The sequence data were deposited in the NCBI GenBank database (www.ncbi.nlm.nih.gov) under accession number MK891708.

DNA-sequence of the mtCOI gene:

1 ggagcttgat caggtatagt aggaacatct ataagaatta tcattcgcac agaattagga

61 aacccgggaa aattcattgg taacgaccaa atttacaatt caattgtaac agctcatgct

121 tttatcataa ttttttttat agttatacct attataattg ggggttttgg gaattgatta

181 atccctttaa tattaggggc acccgatata gctttccctc gattaaataa tataagattc

241 tgacttcttc ccccatcttt aactttatta ttaataagaa gagttatcga taaaggagta

301 ggaacaggat gaactgtcta tccaccttta tcaactaata ttgctcatgc aggagcttca

361 gttgacttag caatttttag tttacatata gctggagttt catctatttt aggagcaata

421 aattttatct caacaatttt aaatataaaa atagatgaaa taaaacttga tcgtatacct

481 ctttttattt gatcagtaaa aatcacagca attttattac ttttatcttt gccggtttta

541 gcaggagcta ttactatgct attaacagat cgtaatatta atacatcttt ttttgaccca

601 gcaggagggg gggacccaat tttataccaa catttattt

Results and Discussion

The successful breeding of a specimen of *G. tibiellum* from a seed capsule clearly demonstrates that this was not an accidental introduction of a single individual, but that reproduction and development actually occurred in Poland. According to Ivo Toševski, many more *Gymnetron* adults are usually obtained from seeds in the laboratory than are scooped up from the seed collection site. This highlights the very secretive lifestyle of these weevils and may also indicate that their numbers and actual occurrence have been underestimated.

During previous research (in June and July 2023), several hundred specimens of *G. villosulum* Gyll. but only 3 specimens of *G. veronicae* were obtained from seeds collected in Zalesie-Podlipie. This may indicate that both *G. tibiellum* and *G. veronicae* are in fact rare here. Moreover, because *G. tibiellum* closely resembles the more common *G. veronicae*, it is highly probable that some specimens were mislabelled and that the distribution of *G. tibiellum* was erroneously identified. For example, all the specimens from Bulgaria identified as *G. veronicae* by Smreczyński & Cmoluch (1961) turned out to be *G. tibiellum*, so these records should be treated as the first of this species from Bulgaria. Furthermore, data on the distribution of this species are based mainly on the reviews of archival materials rather than on new records. For example, Yunakov *et al.* (2018) reports the occurrence of *G. tibiellum* in Ukraine based on the work of Caldara (2008), which is again based on specimens found in Crimea by Strejček in 1983. With the exception of Italy, Serbia, the Czech Republic and Slovakia, all records of *G. tibiellum* localities are probably from the 20th century. This makes it difficult to precisely determine the direction and pace of migration of *G. tibiellum*.

Up to now, the locality of *G. tibiellum* closest to Zalesie-Podlipie was Nový Zámok in Slovakia (Benedikt *et al.* 2022), almost 600 km away in a straight line. Therefore, it seems that, unlike *G. rotundicolle* (Wanat & Ruta 2018), *G. tibiellum* probably did not migrate into east part Poland via the Moravian Gate. However, it cannot be ruled out that due to the high similarity to *G. veronicae*, some specimens of *G. tibiellum* have been incorrectly identified and its distribution in Poland and in Ukraine is underestimated and that it is expanding its range from the south-east. Therefore, a revision of all *G. veronicae* specimens in collections will be welcomed. On the other hand, *G. tibiellum* is capable of active flight, which makes it easier for it to spread freely. It will be possible to precisely determine the direction of migration of *G. tibiellum* once new locations are found. Because *Veronica anagallis-aquatica* is native and widely distributed in the Palaearctic (also common in Poland), the expansion of *G. tibiellum* is probably not associated with changes in the host plant's distribution. Moreover, this speedwell is neither an ornamental nor an

agricultural plant, so it is not intentionally spread or transmitted by humans; the accidental introduction of the insect along with its host plant is therefore unlikely. Wanat & Mokrzycki (2005, 2018) observed that the vast majority of the over 30 species of weevils found in Poland for the first time in the 21st century, including *G. tibiellum*, turned up in anthropogenic biotopes, though rarely as a result of direct human participation. Besides *G. rotundicolle* Gyllenhal, 1838 (Wanat & Ruta 2018), *G. tibiellum* is another southern species that is expanding its range northwards. Hence, the reasons for this presence, as for that of *G. rotundicolle*, should probably be sought in climate changes, especially the declining frequency of regularly recurring long-lasting cold winters and the synanthropization of plant species (Tokarska–Guzik *et al.* 2012).

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References

Alonso–Zarazaga MA, Barrios H, Borovec R, Bouchard P, Caldara R, Colonnelli E, Gültekin L, Hlaváč P, Korotyaev B, Lyal CHC, Machado A, Meregalli M, Pierotti H, Ren L, Sánchez–Ruiz M, Sforzi A, Silfverberg H, Skuhrovec J, Trýzna M, Velázquez de Castro AJ, Yunakov NN. 2023. Cooperative Catalogue of Palaearctic Coleoptera Curculionoidea, 2nd edition. Sociedad Entomológica Aragonesa, *Monografias electrónicas SEA,* 14, 780 pp. Available online: www.sea–entomologia.org (accessed on 10 November 2023).

Benedikt S, Borovec R, Krátký J, Schön K, Skuhrovec J, Stejskal R. 2022. Komentovaný seznam nosatcovitých brouků (Coleoptera: Curculionoidea bez Scolytinae a Platypodinae) České republiky a Slovenska. 2. díl. Nový seznam. Komentáře k Brentidae: Apioninae a Curculionidae: Cossoninae, Entiminae, Lixinae, Mesoptiliinae, Molytinae. Dodatkové komentáře k 1. dílu. Annotated checklist of weevils (Coleoptera: Curculionoidea except for Scolytinae and Platypodinae) of the Czech Republic and Slovakia. Part 2. New checklist. Comments on Brentidae: Apioninae and Curculionidae: Cossoninae, Entiminae, Lixinae, Mesoptiliinae, Molytinae. Supplementary comments on Part 1. *Klapalekiana* 58: 205–567.

Burakowski B, Mroczkowski M, Stefańska J. 1997. Chrząszcze – Coleoptera. Ryjkowcowate prócz ryjkowców – Curculionioidea prócz Curculionidae. Katalog Fauny Polski, XXIII, 21, Warszawa.

Caldara R (2003) Revisione dei *Gymnetron* della Regione Afrotropicale (Coleoptera Curculionidae). *Memorie della Societa Entomologica Italiana*, 82: 87–272.

Caldara R (2008) Revisione delle specie paleartiche del genere *Gymnetron* (Insecta, Coleoptera: Curculionidae). *Aldrovandia*, 4: 27–104.

Chetverikov PE, Cvrković T, Makunin A, Sukhareva S, Vidović B, Petanović R. (2015) Basal divergence of Eriophyoidea (Acariformes, Eupodina) inferred from combined partial COI and 28S gene sequences and CLSM genital anatomy. *Experimental and Applied Acarology*, 67: 219–245. https://doi.org/10.1007/s10493-015-9945-9

Folmer O, Black M, Hoeh W, Lutz R, Vrijenhoek R. (1994) DNA primers for amplification of mitochondrial cytochrome C oxidase subunit I from diverse metazoan

invertebrates. *Molecular Marine Biology and Biotechnology*, 3: 294–299.

Skuhrovec J, Gosik R, Caldara R, Toševski I, Batyra A. 2022. Description of immature stages of *Gymnetron* species (Coleoptera, Curculionidae, Curculioninae), with particular emphasis on the diagnostic morphological characters at the generic and specific levels. *ZooKeys*, 1090: 45–84 doi: 10.3897/zookeys.1090.78741

Smreczyński S, Cmoluch Z. 1961. Materiały do znajomości ryjkowców (Coleoptera, Curculionidae) Bułgarii. Polskie Pismo Entomologiczne, 31: 223–253.

Tokarska–Guzik B, Dajdok Z, Zając M, Zając A, Urbisz A, Danielewicz W, Hołdyński C. 2012. Rośliny obcego pochodzenia w Polsce ze szczególnym uwzględnieniem gatunków inwazyjnych. Generalna Dyrekcja Ochrony Środowiska, Warszawa, 1–197.

Wanat M, Mokrzycki T. 2005. A new checklist of the weevils of Poland (*Coleoptera: Curculionoidea*). *Genus*, 16(1): 69–117.

Wanat M**,** Mokrzycki T. 2018. The checklist of the weevils (Coleoptera: Curculionidae) of Poland revisited. *Annales Zoologici,* 68(1): 1–48.

Wanat M, Ruta R. 2018. Dwa gatunki ryjkowcowatych (Coleoptera, Curculionidae) nowe dla fauny Polski. *Wiadomości Entomologiczne*, 37(3): 169–179.

Yunakov N, Nazarenko V, Filimonov R, Volovnik S. 2018. A survey of the weevils of Ukraine (Coleoptera: Curculionoidea). *Zootaxa*, 4404(1): 1–494. DOI: 10.11646/zootaxa.4404.1.1

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