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The rare beetle egg parasitoid *Platystasius transversus* (Thomson) (Hymenoptera: Platygastridae: Sceliotrachelinae), a new genus and species record for Germany

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Abstract. *Platystasius transversus* (Thomson) (Hymenoptera: Platygastridae) is a rarely collected egg parasitoid of *Leptura aurulenta* Fabricius (Coleoptera: Cerambycidae). Four female specimens were found in Germany, a new country record for the genus and species. Illustrations, DNA barcodes, and an updated distribution are provided. We review its taxonomic history, biology, and ecological associations.

Key words. DNA barcoding, faunistics, *Leptura aurulenta*, Palearctic, parasitoid wasps, Platygastroidea.

ZooBank registration. urn:lsid:zoobank.org:pub:74D15897-0737-4CD7-AC70-F3AB4F7DC85D

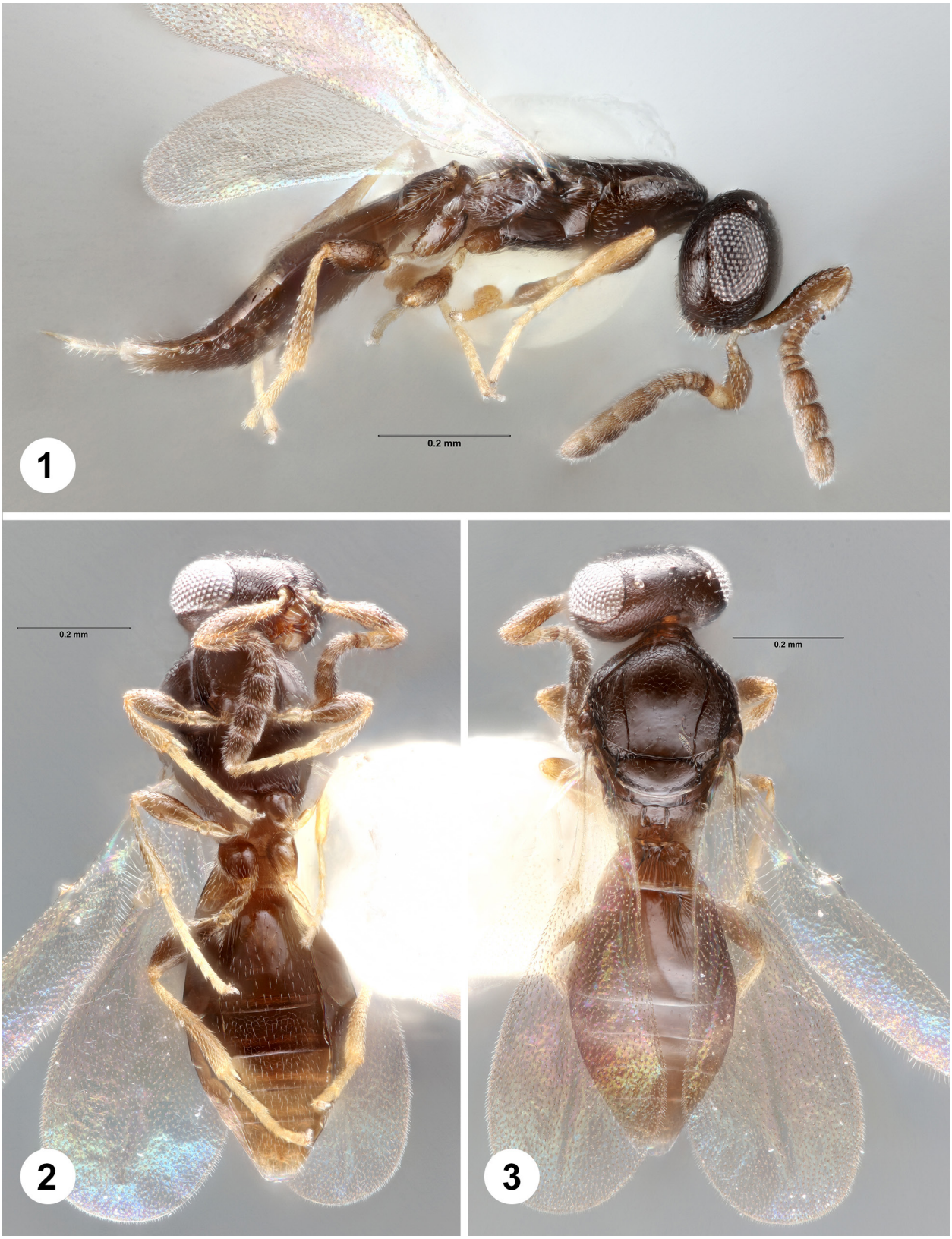
Introduction

The genus *Platystasius* was proposed by Nixon (1937) for the type species, *P. strangaliophagus* Nixon, which was reared from the eggs of *Leptura aurulenta* Fabricius, 1792 (syn. *Strangalia aurulenta*) (Coleoptera: Cerambycidae) in Ireland. Sundholm (1956) proposed the genus *Anopediella*, based on *Anopedias transversus* Thomson, 1859. Lubomír Masner noticed that *Anopediella* was congeneric with *Platystasius* and wrote a letter to Sundholm, who consulted with Nixon and quickly realized his mistake. The correction (Sundholm 1958) established *P. strangaliophagus* Nixon as a junior synonym of *P. transversus* (Thomson).

There are four valid species of *Platystasius* at the time of writing: three extant, and one fossil. *Platystasius othus* Nixon was reared from olive trees in Italy, possibly from bark beetle eggs (Nixon 1937). *Platystasius antennatus* Sundholm was described from Sweden with no host associations (Sundholm 1956). The fossil species, *P. gracilis* Kononova and Simutnik, was described from Upper Eocene Rovno amber and is very similar to *P. transversus,* from which it may be separated by the antennal shape and the color of the legs (Kononova and Simutnik 2013).

Platystasius othus has a humped process on metasomal tergite 1 (T1), and T2 is covered in striate-reticulate sculpture. *Platystasius transversus* and *P. antennatus* both have T1 flattened (Fig. 1), and T2 striate anteriorly and smooth in posterior third (Fig. 3). In *P. transversus*, the posterior half of the mesoscutum is depressed (Fig. 1), while in *P. antennatus*, the mesoscutum is not depressed. There are also some minor male antennal differences described, but the utility of these characters is questionable.

The genus *Platystasius* is morphologically well-defined and was keyed, diagnosed, and illustrated by Masner and Huggert (1989). Keys to Palearctic species can be found in Sundholm (1958) and in Kozlov (1988). Prior to our study, no DNA barcodes have been provided for identification of any *Platystasius* species (Ratnasingham and Hebert 2007; Federhen 2012).



Figures 1–3. Adult female habitus of *Platystasius transversus*. **1)** Lateral habitus, SMNS_Hym_Pla_000352. **2)** Ventral habitus, SMNS_Hym_Pla_000800. **3)** Dorsal habitus, SMNS_Hym_Pla_000800.

Materials and Methods

Material was collected by Malaise trap as part of the German Barcode of Life project. All specimens are deposited in the State Museum of Natural History Stuttgart (SMNS). The DNeasy Blood & Tissue Kit (QIAGEN, Hilden, Germany) was used for non-destructive extraction of DNA, following the manufacturer's protocol with a few changes as in Cruaud et al. (2019). Barcodes were obtained with the LCO1490/HCO2198 primers (Folmer et al. 1994) in a 25 µl PCR reaction. Assembled sequences were uploaded to GenBank (accession numbers: OK001959–OK001961). Barcodes were compared to existing GenBank sequences using BLAST with default parameters (NCBI Resource Coordinators 2018).

In addition to using all available keys (Sundholm 1958; Kozlov 1988; Masner and Huggert 1989), we compared specimens to the type of *Anopediella janssoni* Sundholm, a junior synonym of *P. transversus*. Unfortunately, due to pandemic travel restrictions and museum closures, we were not able to reference primary type material in Stockholm and London.

Images (Fig. 1–3) were produced with a Macropod® photography system with a Canon EOS 6D Mark II camera, EF 70–200mm lens, and 20X M Plan APO Mitutoyo objective lens. Microphotography software included EOS 6D Mark II camera utility and Helicon Focus Pro 6.8.0. Adobe Photoshop was used for addition of scale bars, post processing, and plate construction.

Results

Materials examined. GERMANY • 1 ♀; Baden-Württemberg, Tübingen, Hirschau, Taubenloch; alt. 408 m; 48.503966° N, 9.011266° E; 13–23 May 2014; T. Kothe, M. Engelhardt, D. Bartsch leg.; Malaise trap; SMNS_Hym_Pla_000853 • 1 ♀; Baden-Württemberg, Tübingen, Hirschau, Oberes Tal; alt. 368 m; 48.505033° N, 8.993467° E; 23 May–6 Jul. 2014; T. Kothe, M. Engelhardt, D. Bartsch leg.; Malaise trap; GenBank OK001959; SMNS_Hym_Pla_000352 • 1 ♀; Baden-Württemberg, Stuttgart, Espan; 48.813611° N, 9.250278° E; 1–14 Jun. 2014; F. Woog leg.; Malaise trap; GenBank OK001960; SMNS_Hym_Pla000766 • 1 ♀; Mecklenburg-Vorpommern, Insel Rügen, Kniepow; alt. 50 m; 54.350436° N, 13.354879° E; 17–23 May 2015; F. Koch leg.; Malaise trap; GenBank OK001961; SMNS_Hym_Pla_000800.

Distribution. *Platystasius* is known to occur in Canada, Central Australia, Europe, and Northern Africa (Masner and Huggert 1989). However, no species have been described from outside of Europe. *Platystasius transversus* has been previously recorded from the Czech Republic, Ireland, Moldova, Morocco, Sweden, and the UK (Masner 1956; Kozlov 1988; Mitroiu and Johnson 2021). It is here reported for the first time from Germany.

Barcode data. The closest match to the German specimens (93.3% identical) was collected in Halifax, Nova Scotia, Canada (BOLD record HPPPK892-13, museum ID BIOUG07671-E04). The record is identified as Platygastridae and does not have an image. Another high match (92.5% identical) was collected in Bruce Peninsula National Park, Ontario, Canada (BOLD record CNBPF162-12, museum ID BIOUG04347-D10). The record is identified as Platygastrinae and the specimen image is recognizable as *Platystasius*. These results confirm that our barcodes are the first obtained for *P. transversus* and the first identified for *Platystasius*. They also suggest that there are undescribed species of *Platystasius* in Canada.

Discussion

Much confusion has resulted from historical over-reliance on simple measurements and the proportions of the antennomeres. In his correction, Sundholm (1958) noted "there is always some difference of the size among these parasitic wasps owing to the supply of nourishment". More recent evidence supports the existence of allometric scaling in the antennomeres of micro-Hymenoptera (Johnson et al. 1987; Goltz et al. 2020). Contemporary workers are discouraged from describing new species based solely upon antennal measurements. However, many historical platygastrid species remain to be re-examined in light of modern knowledge.

Platystasius transversus and *P. antennatus* are morphologically similar. They are differentiated by the presence of a depression on the posterior mesoscutum, but this is not necessarily a discrete character. Additionally, the descriptions of the male antenna contrast "apparently triangular" with "subtriangular" and "a little broader than long" with "1.5 times as broad as long". Thus, it is possible that they are the same species. If so, the specimens found in Germany are still correctly identified as *P. transversus*, as *P. antennatus* would be a junior synonym. Molecular data from *P. antennatus* would help to confirm its status.

The host specificity of *P. transversus* is unknown. The only known host species, *L. aurulenta*, is found in Germany, but it is possible that the wasp also attacks other beetle eggs under tree bark. The flattened shape of the wasp reflects the flattened shape of the eggs, and probably also facilitates its movement beneath the bark.

Both *P. transversus* and *L. aurulenta* have been described as rare or uncommon (Masner 1956; Smets et al. 2013; Ruchin and Egorov 2018). The parasitoid is certainly rarely found in Malaise trap samples. The authors examined thousands of wasps from dozens of traps, and only found four female specimens and not a single male specimen. These wasps may spend most of their lives on or under tree bark, making them difficult to collect by flight interception. Other collection methods, such as sweep net or pan trap, might yield better results. Rearing from host eggs would be the ideal collection method for future researchers, helping to elucidate the role of this species in the ecosystem.

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