New records of German Scelionidae (Hymenoptera: Platygastroidea) from the collection of the State Museum of Natural History Stuttgart

Jessica Awad‡, Cristina Vasiliţa§, Sophie Wenz¶, Hamdow Alkarrat¶, Olaf Zimmermann‡, Claus Zebitz§, Lars Krogmann‡

‡ State Museum of Natural History, Stuttgart, Germany
§ Alexandru Ioan Cuza University, Iasi, Romania
¶ Institute of Phytomedicine, University of Hohenheim, Stuttgart, Germany
¶ Center for Agricultural Technology Augustenberg, Karlsruhe, Germany

Corresponding author: Jessica Awad (jessica.awad@smns-bw.de)
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Abstract

Background

Scelionid wasps are arthropod egg parasitoids, many of which are relevant to global biosecurity. However, the scelionid fauna of Germany has not received much attention from professional taxonomists.

New information

Eleven species and four genera are recorded for the first time from Germany, including species of interest to agriculture and biological control. First genus records include Baryconus Förster, Macroteleia Westwood, Paratelenomus Dodd and Probaryconus.
Kieffer. First species records include *B. europaeus* (Kieffer), *Idris nigroclavatus* (Kieffer), *Idris semiflavus* (Kieffer), *M. bicolora* Kieffer, *M. pannonica* Szabo, *Paratelenomus saccharalis* (Dodd), *Trimorus varicornis* (Walker), *Trissolcus basalis* (Wollaston), *Trissolcus belenus* (Walker), *Trissolcus colemani* (Crawford) and *Trissolcus flavipes* (Thompson). COI barcodes are identified for the first time from *B. europaeus* and *M. bicolora*. Each species is illustrated and updated world distributions are provided. Implications for agriculture are discussed.

**Keywords**

parasitoid wasps; DNA barcoding; *Trissolcus*; *Paratelenomus*; dark taxa

**Introduction**

Platygastroidea is the third largest superfamily of Hymenoptera in terms of the number of described species, exceeded only by Ichneumonoidea and Chalcidoidea. The current number of valid species is ca. 6,500, with a worldwide estimate of about 10,000 (Hymenoptera Online 2020, Masner 1993, Johnson 2011). At the time of writing, the superfamily comprises two extant families, Scelionidae and Platygastridae (Talamas and Buffington 2015, Popovici et al. 2017).

In the 19th century, several notable experts published on German Platygastroidea. The earliest was Christian Gottfried Nees von Esenbeck, who described dozens of species in *Sparasion*, *Scelio*, *Platygaster* and *Teleas* (Nees von Esenbeck 1834). Julius Theodor Christian Ratzeburg described species of *Platygaster* and *Teleas* associated with forest pests (Ratzeburg 1852). Soon after, Arnold Förster published his "Hymenopterologische Studien", establishing 26 platygastroid genera, many of which remain valid today (Förster 1856). In the early 20th century, Jean-Jacques Kieffer described numerous genera and species from central Europe, including German material (Kieffer 1926).

Since Kieffer, there has not been much research on the Platygastroidea of Germany. The most recent catalogue of German insects (Dathe et al. 2001) lists 136 platygastroid species, including 56 Scelionidae. However, these numbers are certainly low. The section was based on a relatively short reference list and many common European taxa were not included. Thus, Platygastroidea has been identified as a priority for research within the German Barcode of Life III: Dark Taxa project (Hausmann et al. 2020). Dark taxa are insect groups, mainly in Hymenoptera and Diptera, which pose a taxonomic impediment to biodiversity studies. Such taxa are abundant and diverse in insect monitoring projects, but a lack of usable diagnostic literature makes species identification difficult to impossible.

Scelionid wasps parasitise the eggs of arthropods, including many invasive or noxious pest species (Austin et al. 2005). Thus, their accurate identification is critical to agricultural research, especially in the context of the global plant trade. For example, the brown marmorated stink bug, *Halyomorpha halys* Stål, 1855, is an invasive species in Europe and
North America. Its most effective natural enemy, *Trissolcus japonicus* (Ashmead, 1904), has been detected or established as an adventive species throughout the introduced range (Talamas et al. 2015, Abram et al. 2019, Stahl et al. 2019). Most recently, *T. japonicus* was detected in Germany (Dieckhoff et al. 2021). Similarly, *Paratelenomus saccharalis* (Dodd, 1914) has followed the kudzu bug, *Megacopta cribraria* (Fabricius, 1798), from the Palearctic into North America (Gardner et al. 2013).

The current work represents a first update to the German platygastroid fauna within the German Barcode of Life (GBOL) III initiative. As these findings occurred within the first several months of the project, further discoveries are expected over the next three years. Identification of Platygastriidae is still underway, as the state of taxonomic disarray in this group is more severe.

**Materials and methods**

We examined recent and historical collections of Scelionidae at the State Museum of Natural History Stuttgart (SMNS). Recent material was collected for earlier stages of the GBOL project or for long-term insect monitoring programmes, generally by Malaise trap. Recently-collected specimens were preserved in 96% ethanol. Specimens collected for the GBOL project had DNA extracted non-destructively with the DNeasy Blood & Tissue Extraction Kit from Qiagen following the updated protocol provided by Cruaud et al. (2019). COI barcodes were amplified by PCR with the LCO1490/HCO2198 primers (Folmer et al. 1994). Barcode sequences are available at GenBank accession numbers MW829349–MW829358.

Illustrations were created with a Keyence imaging system. Adobe Photoshop was used for image processing and plate construction.

**Taxon treatments**

*Baryconus europaeus* (Kieffer, 1908)

**Nomenclature**

*Hoploteleia europaea* Kieffer, 1908

*Hoploteleia graeffei* Kieffer, 1908

*Baryconus graeffei* (Kieffer): Kieffer, 1926

*Baryconus europaeus* (Kieffer): Bin, 1974

**Materials**

a. **scientificName:** *Baryconus europaeus* (Kieffer, 1908); **country:** Germany; **stateProvince:** Baden-Württemberg; **municipality:** Markgröningen; **locality:** Entomological Society of
Stuttgart property in the Rotenacker; verbatimLocality: EVS-Vereinsgrundstück am Rotenacker; verbatimElevation: 280 m; samplingProtocol: sweep net; year: 2009; month: 8; day: 4; individualCount: 3; sex: female; recordedBy: L. Krogmann; identifiedBy: Cristina Vasilita; type: PhysicalObject; bibliographicCitation: Baryconus europaeus (SMNS_Hym_Sce_001093, 1094, 1095); institutionCode: SMNS; basisOfRecord: PreservedSpecimen

b. scientificName: Baryconus europaeus (Kieffer, 1908); country: Germany; stateProvince: Baden-Württemberg; municipality: Tübingen; verbatimCoordinates: 48.504317°N, 8.9956°E; samplingProtocol: Malaise trap; year: 2014; month: 7; day: 17–31; individualCount: 1; sex: female; recordedBy: T. Kothe, M. Engelhardt, C. König; associatedSequences: GenBank: MW829358; identifiedBy: Cristina Vasilita; type: PhysicalObject; bibliographicCitation: Baryconus europaeus (SMNS_Hym_Sce_000715); institutionCode: SMNS; basisOfRecord: PreservedSpecimen

Distribution

Baryconus europaeus (Fig. 1) was described from Italy and has also been recorded from Croatia, Cyprus, France, India, Japan, Morocco, Portugal, Russia, Spain, Turkey and UAE (Popovici et al. 2013). It is expected in Romania (Spiridon et al. 2019). We here provide the first genus and species record for Germany and the first identified barcode for Baryconus europaeus. Identification is based on Popovici et al. (2013).

Idris nigroclavatus (Kieffer, 1908)

Nomenclature

Acolus nigroclavatus Kieffer, 1908
Acolus striativentris Kieffer, 1909

Acolus coxalis Kieffer, 1912

Idris coxalis (Kieffer): Szabo, 1965

Idris striativentris (Kieffer): Kozlov, 1978

Idris nigroclavatus (Kieffer): Huggert, 1979

Material

a. scientificName: Idris nigroclavatus (Kieffer, 1908); country: Germany; stateProvince: Baden-Württemberg; municipality: Markgröningen; locality: Rotenacker Forest east; samplingProtocol: sieve; year: 2019; month: 4; day: 2; habitat: maple, forest edge; individualCount: 2; sex: female; recordedBy: J. Reibnitz; identifiedBy: Cristina Vasilita; type: PhysicalObject; bibliographicCitation: Idris nigroclavatus (SMNS_Hym_Sce_001098, 1099); institutionCode: SMNS; basisOfRecord: PreservedSpecimen

Distribution

Idris nigroclavatus (Fig. 2) was described from Italy and has also been recorded from Austria, Bosnia and Herzegovina, Bulgaria, Croatia, France, Hungary, Spain and Sweden (Huggert 1979, Kononova and Kozlov 2001). We here provide the first species record for Germany. Identification is based on Huggert (1979).

Figure 2. Idris nigroclavatus (Kieffer), female, SMNS_Hym_Sce_001098. A. Dorsal habitus; B. Lateral habitus; C. Head, frontal view. Scale bar = 100 μm.
**Idris semiflavus** (Kieffer, 1908)

**Nomenclature**

*Acolus semiflavus* Kieffer, 1908

**Idris semiflavus** (Kieffer): Huggert, 1979

**Materials**

a.  
   - **scientificName:** *Idris semiflavus* (Kieffer, 1908); **country:** Germany; **stateProvince:** Baden-Württemberg; **municipality:** Weil am Rhein; **verbatimCoordinates:** 47.579614°N, 7.606160°E; **samplingProtocol:** suction sampler; **year:** 2020; **month:** 7; **day:** 14; **habitat:** ruderal area dominated by *Ailanthus altissima*; **individualCount:** 1; **sex:** female; **recordedBy:** O. Zimmermann, S. Wenz, M. Renninger, A. Reißig; **associatedSequences:** Genbank: MZ334547; **identifiedBy:** Klaus Schrameyer; **type:** PhysicalObject; **bibliographicCitation:** *Idris semiflavus* (SMNS_Hym_Sce_001147); **institutionCode:** SMNS; **basisOfRecord:** PreservedSpecimen

b.  
   - **scientificName:** *Idris semiflavus* (Kieffer, 1908); **country:** Germany; **stateProvince:** Baden-Württemberg; **municipality:** Weil am Rhein; **verbatimCoordinates:** 47.586876°N, 7.619260°E; **samplingProtocol:** suction sampler; **year:** 2020; **month:** 7; **day:** 14; **habitat:** ruderal area dominated by *Paulownia* sp.; **individualCount:** 1; **sex:** female; **recordedBy:** O. Zimmermann, S. Wenz, M. Renninger, A. Reißig; **associatedSequences:** Genbank: MZ334548; **identifiedBy:** Klaus Schrameyer; **type:** PhysicalObject; **bibliographicCitation:** *Idris semiflavus* (SMNS_Hym_Sce_001148); **institutionCode:** SMNS; **basisOfRecord:** PreservedSpecimen

c.  
   - **scientificName:** *Idris semiflavus* (Kieffer, 1908); **country:** Germany; **stateProvince:** Baden-Württemberg; **municipality:** Konstanz; **samplingEffort:** suction sampler; **year:** 2020; **month:** 8; **day:** 7; **habitat:** ruderal area near apple production; **individualCount:** 1; **sex:** female; **recordedBy:** O. Zimmermann, M. Trautmann; **associatedSequences:** Genbank: MZ334549; **identifiedBy:** Klaus Schrameyer; **type:** Physical Object; **bibliographicCitation:** *Idris semiflavus* (SMNS_Hym_Sce_001149); **institutionCode:** SMNS; **basisOfRecord:** PreservedSpecimen

**Distribution**

*Idris semiflavus* (Fig. 3) was described from France and has been recorded from Egypt, Hungary, Italy, Mongolia, Spain and Switzerland (Huggert 1979). We here provide the first species record for Germany. Identification is based on Huggert (1979).

**Macroteleia bicolora** Kieffer, 1908

**Nomenclature**

*Macroteleia bicolora* Kieffer, 1908

*Macroteleia bicolor* (Kieffer): Kozlov, 1978
Material

a.  

**scientificName:** *Macroteleia bicolora* Kieffer, 1908;  
**country:** Germany;  
**stateProvince:** Baden-Württemberg;  
**municipality:** Emmendingen;  
**verbatimCoordinates:** 48.128533°N, 7.738301°E;  
**samplingProtocol:** Malaise trap;  
**year:** 2017;  
**month:** 8;  
**day:** 2–16;  
**individualCount:** 2;  
**sex:** female;  
**recordedBy:** Patricia Gut;  
**associatedSequences:** GenBank: MW829349, 829350;  
**identifiedBy:** Cristina Vasilita;  
**bibliographicCitation:** *Macroteleia bicolora* (SMNS_HYM_Sce_000729, 000731);  
**institutionCode:** SMNS;  
**basisOfRecord:** PreservedSpecimen

![Image](image-url)

**Figure 3.**  

*Iridis semiflavus* (Kieffer), female, SMNS_Hym_Sce_001149. **A.** Dorsal habitus; **B.** Lateral habitus; **C.** Head, frontal view; **D.** Clava and mandible. Scale bar = 100 μm.

Distribution

*Macroteleia bicolora* (Fig. 4) was described from Italy and has also been recorded from Denmark, Kazakhstan, Russia, Ukraine and the United Kingdom (Kozlov 1987, Notton et al. 2014). We here provide the first genus and species record for Germany and the first identified barcode for *Macroteleia bicolora*. Identification is based on Kozlov (1987).
Macroteleia pannonica Szabo, 1966

Nomenclature

Macroteleia pannonica Szabo, 1966

Material

a. scientificName: Macroteleia pannonica Szabo, 1966; country: Germany; stateProvince: Hessen; municipality: Hersfeld-Rotenburg; locality: Rockensüß, Eschkopf; verbatimElevation: 339 m; samplingProtocol: Malaise trap; year: 2012; verbatimEventDate: 25 Jul.–15 Aug. 2012; individualCount: 1; sex: female; recordedBy: H.-J. Flügel; identifiedBy: Cristina Vasilita; bibliographicCitation: Macroteleia pannonica (SMNS_Hym_Sce_000159); institutionCode: SMNS; basisOfRecord: PreservedSpecimen

Distribution

Macroteleia pannonica (Fig. 5) was described from Hungary and has also been recorded from Romania (Fabritius and Popovici 2007, Kononova and Kozlov 2008). We here provide the first genus and species record for Germany. Identification is based on Kononova and Kozlov (2008).
Paratelenomus saccharalis (Dodd, 1914)

Nomenclature

Telenomus saccharalis Dodd, 1914

Liophanurus saccharalis (Dodd): Kieffer, 1926

Paratelenomus saccharalis (Dodd): Johnson, 1988

Materials

a. scientificName: Paratelenomus saccharalis (Dodd, 1914); country: Germany; stateProvince: Baden-Württemberg; municipality: Markgröningen; locality: Entomological Society of Stuttgart property in the Rotenacker; verbatimLocality: EVS-Vereinsgrundstück am Rotenacker; verbatimElevation: 280 m; samplingProtocol: sweep net; year: 2009; month: 8; day: 4; individualCount: 1; sex: male; recordedBy: L. Krogmann; identifiedBy: Cristina Vasiliita; bibliographicCitation: Paratelenomus saccharalis (SMNS_Hym_Sce_001096); institutionCode: SMNS

b. scientificName: Paratelenomus saccharalis (Dodd, 1914); country: Germany; stateProvince: Baden-Württemberg; municipality: Tübingen; locality: Wurmlingen, Gegental; verbatimElevation: 377 m; verbatimCoordinates: 48.513233°N, 8.991767°E; samplingProtocol: Malaise trap; year: 2014; month: 5; day: 13–23; individualCount: 1; sex: female; recordedBy: T. Kothe, M. Englehardt, Ch. König; associatedSequences: GenBank: MW829355; identifiedBy: Jessica Awad; bibliographicCitation: Paratelenomus saccharalis (SMNS_HYM_Pla_000305); institutionCode: SMNS

Figure 5. doi

Macroteleia pannonica Szabo, female, SMNS_Hym_Sce_000159. A. Ventral head; B. Lateral habitus; C. Dorsal habitus. Scale bar = 100 μm.
Distribution

*Paratelenomus saccharalis* (Fig. 6) was described from Indonesia and has also been recorded from Australia, Austria, Bangladesh, Benin, China, Ghana, India, Ivory Coast, Italy, Japan, Kenya, Malaysia, Moldova, Nigeria, Philippines, Romania, Rwanda, Somalia, South Africa, South Korea, Taiwan, Thailand, Uganda, USA, Zambia and Zimbabwe (Johnson 1996). We here provide the first genus and species record for Germany. Identification is based on Johnson (1996).

Figure 6. doi

*Paratelenomus saccharalis* (Dodd), female, SMNS_Hym_000305. A. Head, frontal view; B. Dorsal habitus; C. Lateral habitus. Scale bar = 100 μm.

**Probaryconus** Kieffer, 1908

Nomenclature

*Procacus* Kieffer, 1910

*Neurocacus* Kieffer, 1913

*Amblyconus* Kieffer, 1913

*Urundia* Risbec, 1957

Material

| scientificName: Probaryconus Kieffer, 1908; country: Germany; stateProvince: Baden-Württemberg; municipality: Tübingen; locality: Wurmlingen, Gegental; verbatimElevation: 377 m; verbatimCoordinates: 48°30.794'N, 8°59.506'E; samplingProtocol: Malaise trap; year: 2014; month: 5; day: 13–23; individualCount: 2; sex: female; recordedBy: T. Kothe, M. Englehardt, Ch. König; identifiedBy: Cristina Vasilita; bibliographicCitation: Probaryconus sp. (SMNS_Hym_Sce_000344, 000345); institutionCode: SMNS |
Distribution

*Probaryconus* (Fig. 7) was described from France and has also been recorded from Australia, Azerbaijan, Belize, Benin, Botswana, Brazil, Bulgaria, Colombia, Costa Rica, Dominica, Dominican Republic, Ecuador, Egypt, France, French Guiana, Ghana, Hungary, India, Indonesia, Ivory Coast, Kenya, Kyrgyzstan, Jamaica, Madagascar, Malaysia, Mexico, Moldova, New Caledonia, Nigeria, Panama, Papua New Guinea, Paraguay, Peru, Puerto Rico, Romania, Slovakia, South Africa, Thailand, Trinidad and Tobago, Turkey, Ukraine, USA, Venezuela and the Virgin Islands (Hymenoptera Online 2020, Kieffer 1926, Kozlov 1987). We here provide the first genus record for Germany. Identification is based on Kozlov (1987) and Talamas et al. (2011).

![Figure 7.](image)

*Probaryconus* Kieffer, female, SMNS_Hym_Sce_000344. **A.** Dorsal habitus; **B.** Lateral habitus. Scale bar = 100 μm.

**Trimorus varicornis** (Walker, 1836)

**Nomenclature**

*Teleas varicornis* Walker, 1836

*Teleas metabus* Walker, 1836

*Prosacantha minor* Thomson, 1859

*Prosacantha grandis* Thomson, 1859

*Prosacantha variicornis* (Walker): Marshall, 1873

*Prosacantha metabus* (Walker): Marshall, 1873
Prosacantha varicornis (Walker): Walker, 1874
Prosacantha spinosa Szepligeti, 1901
Pentacantha variicornis (Walker): Kieffer, 1908
Pentacantha minor (Thomson): Kieffer, 1908
Pentacantha grandis (Thomson): Kieffer, 1908
Pentacantha rufimanus Kieffer, 1908
Pentacantha varicornis (Walker): Kieffer, 1913
Hoplogryon metabus (Walker): Kieffer, 1926
Propentacantha varicornis (Walker): Kieffer, 1926
Propentacantha minor (Thomson): Kieffer, 1926
Propentacantha grandis (Thomson): Kieffer, 1926
Propentacantha spinosa (Szepligeti): Kieffer, 1926
Propentacantha rufimanus (Kieffer): Kieffer, 1926
Trisacantha varicornis (Walker): Szabo, 1957
Trimorus grandis (Thomson): Sundholm, 1967
Trimorus minor (Thomson): Sundholm, 1967

Figure 8. doi
Trimorus varicornis (Walker), female, SMNS_Hym_Sce_001100. A. Head, frontal view; B. Dorsal habitus; C. Lateral habitus. Scale bar = 100 μm.
Material

- scientificName: *Trimorus varicornis* (Walker, 1836); country: Germany; stateProvince: Baden-Württemberg; municipality: Klettgau; locality: Jestett; verbatimLocality: Flachshof BF1N; year: 1996; month: 6; day: 3; individualCount: 1; sex: female; recordedBy: M. Hermann; identifiedBy: Cristina Vasilita; bibliographicCitation: *Trimorus varicornis* (SMNS_Hym_Sce_001100); institutionCode: SMNS

Distribution

*Trimorus varicornis* (Fig. 8) was described from Ireland and has also been recorded from Bulgaria, Croatia, Denmark, Finland, France, Italy, Romania, Russia, Sweden, Switzerland, Ukraine and the United Kingdom (Fabritius and Popovici 2007, Hymenoptera Online 2020, Kononova and Kozlov 2001). We here provide the first species record for Germany. Identification is based on Kozlov (1987).

*Trissolcus basalis* (Wollaston, 1858)

Nomenclature

*Telenomus basalis* Wollaston, 1858

*Telenomus maderensis* Wollaston, 1858

*Telenomus megacephalus* Ashmead, 1894

*Telenomus megalococephalus* Schulz, 1906

*Telenomus piceipes* Dodd, 1920

*Liophanurus megacephalus* (Ashmead): Kieffer, 1926

*Microphanurus africanus* Fouts, 1934

*Microphanurus basalis* (Wollaston): Nixon, 1935

*Microphanurus sulmo* Nixon, 1938

*Asolcus basalis* (Wollaston): Delucchi, 1961

*Trissolcus maderensis* (Wollaston): Masner, 1965

*Trissolcus piceipes* (Dodd): Masner, 1965

*Trissolcus sulmo* (Nixon): Masner, 1965

*Asolcus sulmo* (Nixon): Voegele, 1969

*Trissolcus africanus* (Fouts): Bin, 1974
Asolcus lodosi Szabo, 1981

Trissolcus megacephalus (Ashmead): Johnson, 1983

Trissolcus lodosi (Szabo): Kononova, 2014

Material

a. scientificName: *Trissolcus basalis* (Wollaston, 1858); country: Germany; stateProvince: Baden-Württemberg; municipality: Freiburg; locality: Emmendingen; verbatimCoordinates: 48.128533°N, 7.738301°E; samplingProtocol: Malaise trap; year: 2017; month: 10; day: 11–25; individualCount: 2; sex: female; recordedBy: Patricia Gut; associatedSequences: GenBank: MW829356, MW829357; identifiedBy: Cristina Vasilita; bibliographicCitation: *Trissolcus basalis* (SMNS_Hym_Sce_000805, 000806); institutionCode: SMNS

Distribution

*Trissolcus basalis* (Fig. 9) was described from Portugal and has also been recorded from Australia, Brazil, China, Cyprus, France, Hungary, Iran, Israel, Italy, Jordan, Montenegro, Montserrat, South Africa, Spain, Tonga, Turkey, USA, Vanuatu and Zimbabwe Talamas et al. (2017). We here provide the first species record for Germany. Identification is based on Talamas et al. (2017).
**Trissolcus belenus (Walker, 1836)**

**Nomenclature**

*Telenomus belenus* Walker, 1836

*Telenomus arminon* Walker, 1836

*Telenomus nigrita* Thomson, 1860

*Telenomus frontalis* Thomson, 1860

*Telenomus grandis* Thomson, 1860

*Telenomus nigripes* Thomson, 1860

*Telenomus ovulorum* Thomson, 1860

*Teleas pentatomae* Rondani, 1877

*Telenomus nigritus* Thomson: Dalla Torre, 1898

*Telenomus pentatomae* (Rondani): Dalla Torre, 1898

*Allophanurus arminon* (Walker): Kieffer, 1912

*Aphanurus belenus* (Walker): Kieffer, 1912

*Aphanurus frontalis* (Thomson): Kieffer, 1912

*Aphanurus grandis* (Thomson): Kieffer, 1912

*Aphanurus nigrita* (Thomson): Kieffer, 1912

*Aphanurus nigripes* (Thomson): Kieffer, 1912

*Liophanurus pentatomae* (Rondani): Kieffer, 1912

*Allophanurus arminon* (Walker): Kieffer, 1926

*Microphanurus belenus* (Walker): Kieffer, 1926

*Microphanurus frontalis* (Thomson): Kieffer, 1926

*Microphanurus grandis* (Thomson): Kieffer, 1926

*Microphanurus nigripes* (Thomson): Kieffer, 1926

*Microphanurus nigritus* (Thomson): Kieffer, 1926

*Asolcus grandis* (Thomson): Masner, 1959
Trissolcus grandis (Thomson): Viktorov, 1967

Asolcus nixomartini Javahery, 1968

Asolcus silwoodensis Javahery, 1968

Trissolcus pentatomae (Rondani): Bin, 1974

Trissolcus belenus (Walker): Fergusson, 1978

Trissolcus nigripes (Thomson): Fergusson, 1978

Trissolcus nixomartini (Javahery): Fergusson, 1978

Trissolcus silwoodensis (Javahery): Fergusson, 1978

Trissolcus arminon (Walker): Fergusson, 1983

Trissolcus ovulorum (Thomson): Tortorici et al., 2019

Figure 10. Trissolcus belenus (Walker), female. A. Lateral habitus, SMNS_Hym_Sce_000719 (scale bar = 100 μm); B. Dorsal habitus, SMNS_Hym_Sce_000719 (scale bar = 200 μm); C. Head, frontal view, SMNS_Hym_Sce_000719 (scale bar = 200 μm); D. Preserved host material (scale bar = 500 μm).

Materials

a. scientificName: Trissolcus belenus (Walker, 1836); country: Germany; stateProvince: Baden-Württemberg; municipality: Hartheim Breisach; samplingProtocol: reared; year: 1971; month: 6; day: 14; habitat: ex. Heteroptera Eier [from Heteroptera eggs]; individualCount: 12; sex: female; recordedBy: Gauss; identifiedBy: Cristina Vasilita; institutionCode: SMNS

b. scientificName: Trissolcus belenus (Walker, 1836); country: Germany; stateProvince: Baden-Württemberg; municipality: Tübingen; verbatimCoordinates: 48.504317°N,
Trissolcus belenus (Fig. 10) was described from the UK and has also been recorded from China, France, Iran, Italy, Morocco, Portugal, Russia, Sweden, Switzerland and Tanzania (Tortorici et al. 2019). We here provide the first species record for Germany. Identification is based on Tortorici et al. 2019.

Trissolcus colemani (Crawford, 1912)

Nomenclature

Telenomus colemani Crawford, 1912

Microphanurus djadetshko Ryakhovskii, 1959

Microphanurus pseudoturesis Ryakhovskii, 1959

Microphanurus rossicus Ryakhovskii, 1959

Asolcus nigribasalis Voegele, 1962

Asolcus djadetshko (Ryakhovskii): Viktorov, 1964

Asolcus pseudoturesis (Ryakhovskii): Viktorov, 1964

Asolcus bennisi Voegele, 1964

Trissolcus djadetshko (Ryakhovskii): Viktorov, 1967

Trissolcus pseudoturesis (Ryakhovskii): Viktorov, 1967

Trissolcus waloffae Javahery, 1968

Trissolcus bennisi (Voegele): Kozlov & Le, 1977

Trissolcus nigribasalis (Voegele): Kozlov & Le, 1977

Trissolcus crypticus Clarke, 1993

Materials

a. scientificName: Trissolcus colemani (Crawford, 1912); country: Germany; stateProvince: Baden-Württemberg; locality: Bopserwald; samplingProtocol: reared; year: 1932; month:
7; day: 12; habitat: aus Wanzeneiern [from bug eggs]; individualCount: 7; sex: 1 male, 6 females; recordedBy: Fischer; identifiedBy: Cristina Vasilita; institutionCode: SMNS

b. scientificName: *Trissolcus colemani* (Crawford, 1912); country: Germany; stateProvince: Baden-Württemberg; municipality: Bahlingen; verbatimCoordinates: 48.128533°N, 7.738301°E; samplingProtocol: Malaise trap; year: 2017; month: 9; day: 13–27; individualCount: 2; sex: female; recordedBy: Patricia Gut; associatedSequences: GenBank: MW829352, MW829351; identifiedBy: Cristina Vasilita; bibliographicCitation: *Trissolcus colemani* (SMNS_Hym_Sce_000796, 000797); institutionCode: SMNS
c. scientificName: *Trissolcus colemani* (Crawford, 1912); country: Germany; stateProvince: Baden-Württemberg; municipality: Tübingen; locality: Steinenberg; verbatimElevation: 460–490 m; year: 2019; month: 7; day: 1–2; individualCount: 1; sex: male; recordedBy: University of Hohenheim insect summer course; identifiedBy: Cristina Vasilita; bibliographicCitation: *Trissolcus belenus* (SMNS_Hym_Sce_001097); institutionCode: SMNS

**Distribution**

*Trissolcus colemani* (Fig. 11) was described from India and has also been recorded from China, France, Greece, India, Iran, Italy, Morocco, Pakistan, Russia, Sweden, Ukraine and the United Kingdom (Tortorici et al. 2019). We here provide the first species record for Germany. Identification is based on Tortorici et al. (2019).

![Image of Trissolcus colemani](image_url)

**Trissolcus flavipes** (Thompson, 1860)

**Nomenclature**

*Telenomus flavipes* Thomson, 1860
Aphanurus flavipes (Thomson): Kieffer, 1912

Microphanurus flavipes (Thomson): Kieffer, 1926

Trissolcus circus Kozlov & Le, 1976

Trissolcus crassus Kononova, 2014

Materials

a. scientificName: Trissolcus flavipes (Thompson, 1860); country: Germany; stateProvince: Hessen; municipality: Vogelsbergkreis; locality: Ober-Moos; verbatimLocality: Windwurfläche, SNR 5121a; verbatimElevation: 473 m; samplingProtocol: Malaise trap; year: 2012; verbatimEventDate: 29 May–18 Jun. 2012; individualCount: 2; sex: female; recordedBy: H.-J. Flügel; identifiedBy: Cristina Vasilita; bibliographicCitation: Trissolcus flavipes (SMNS_Hym_Sce_000188, 000190); institutionCode: SMNS

b. scientificName: Trissolcus flavipes (Thompson, 1860); country: Germany; stateProvince: Mecklenburg-Vorpommern; municipality: Insel Rügen; locality: Kniepow; verbatimElevation: 50 m; samplingProtocol: Malaise trap; year: 2014; month: 8; day: 3–9; individualCount: 1; sex: female; recordedBy: F. Koch; identifiedBy: Cristina Vasilita; bibliographicCitation: Trissolcus flavipes (SMNS_Hym_Sce_000236); institutionCode: SMNS

Distribution

Trissolcus flavipes (Fig. 12) was described from Sweden and has also been recorded from Austria, Denmark, France, Hungary, Japan, Moldova, Romania, Russia, Sweden, Thailand, Ukraine and the United Kingdom (Talamas et al. 2017). We here provide the first species record for Germany. Identification is based on Talamas et al. (2017).

Figure 12. doi

Trissolcus flavipes (Thompson), female, SMNS_Hym_Sce_000188. A. Dorsal habitus; B. Lateral habitus; C. Head, frontal view. Scale bar = 100 μm.
Discussion

Of the two families of Platygastroidea, Scelionidae is better resolved. High-quality revisions and keys are available for many genera of Scelionidae, due to careful attention from professional taxonomists, as well as data regarding ecological and biological aspects. Platygasteridae has been somewhat more neglected and, in large genera, such as Platygastrus Latreille and Synopeas Förster, better diagnostic tools are needed for accurate species identification. This is the case with some genera of Scelionidae as well, such as Gryon Haliday and Telenomus Haliday. For example, one-hundred-year-old specimens of Telenomus still remain unidentified in the collection of SMNS. As taxonomic issues are resolved, it will become possible to accurately identify material for barcode reference libraries.

_Baryconus europaeus_ and _Macroteleia bicolora_ are here barcoded for the first time. A comparison with existing records in BOLD Systems (https://www.boldsystems.org/) showed no matches to identified material. For the _M. bicolora_ sequences, the highest match (93.62%) was to unidentified specimens from Gabon. The _B. europaeus_ sequence was most similar (97.63%) to unidentified specimens from South Africa. As expected, all _Trissolcus_ sequences matched well (at least 99%) with appropriately identified material.

Based on preliminary data, several species of _Probaryconus_ are found in Germany, but their nomenclature is uncertain, due to the aforementioned taxonomic impediment. Historical _Trissolcus_ specimens remained unidentified in the SMNS collection for 50 to almost 100 years. The oldest of these, _T. colemani_, was reared from hemipteran eggs in 1932 (Fig. 11). A series of _T. belenus_ from 1971 are preserved along with host material (Fig. 10). It is no surprise that these specimens were never identified, since _T. belenus_ was largely overlooked for nearly two centuries before it was properly examined and keyed by Tortorici et al. (2019).

In addition to the newly-recorded species, _Trissolcus_ species already known from Germany, such as _T. cultratus_ (Mayr), _T. semistriatus_ (Nees von Esenbeck) and _T. scutellaris_ (Thomson), have been repeatedly detected at various locations in Baden-Württemberg. The last checklist of German Scelionidae (Dathe et al. 2001) also includes _T. choaspes_ (Nixon), _T. discolor_ (Ratzeburg) and _T. rufiventris_ (Mayr). _Trissolcus choaspes_ is now a junior synonym of _T. scutellaris_ (Thomson) (Talamas et al. 2017). The taxonomic status of _Trissolcus discolor_ is unverifiable, as there is no known type material and some authors even debate whether _T. discolor_ should be placed in _Telenomus_ rather than _Trissolcus_ (Kononova 2014). As for _T. rufiventris_, it was not found, which we think is an intriguing matter considering the number of _Trissolcus_ specimens examined by C.V. at SMNS.

Our results emphasise that much remains to be discovered regarding parasitoid ecosystem services in Germany. Many of the newly-recorded species parasitise the eggs of stink bugs which pose a threat to vegetable and fruit production. As wasp species differ in their host preference and biological control efficacy, accurate identification is an important factor in agroecological studies (Scaccini et al. 2020). The effect of the scelionid species...
assemblage on local pest populations merits further attention, especially in the context of organic or sustainable food systems.

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