



Entomofauna

ZEITSCHRIFT FÜR ENTOMOLOGIE

Band 22, Heft 20: 405-412 ISSN 0250-4413 Anselden, 31. Dezember 2001

Review of the uncertain *Neuroterus* species described by HARTIG (Hymenoptera, Cynipidae)

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Abstract

Type material of the following species described by HARTIG 1840, 1841 is studied: *Neuroterus bipunctatus*, *N. brevicornis*, *N. defectus*, *N. fumipennis*, *N. inquilinus*, *N. nitens*, *N. parasiticus*, *N. politus*, *N. rubeculus* and *Spathogaster petioliventris*. Other closely related species, some described by HARTIG 1940, 1843, are also studied: *Andricus turionum*, *A. petioli* and *A. krajnovici* TAVARES, 1902. Lectotypes are designated for: *Spathogaster petioliventris*, *Neuroterus rubeculus*, *N. fumipennis* and *Andricus petioli*. The following new synonyms are established: *Neroterus bipunctatus* HARTIG, 1841 ♂ **syn. nov.**, *N. rubeculus* HARTIG, 1841 ♂ **syn. nov.**, *N. nitens* HARTIG, 1841 ♂ **syn. nov.**, *N. schlehtendali* MAYR, 1870 ♂ **syn. nov.**, *Spathogaster petioliventris* HARTIG, 1840 ♂♀ **syn. nov.** and *S. aprilinus* GIRAUD, 1859 ♂♀ **syn. nov.** = *Neuroterus politus* HARTIG, 1840; *Neuroterus tricolor ulysipponensis* TAVARES, 1928 ♂♀ **syn. nov.** = *N. tricolor* HARTIG, 1841; *Neuroterus defectus* HARTIG, 1840 ♂ **syn. nov.** = *N. numismalis* (FOURCROY, 1785); *Neuroterus parasiticus* HARTIG, 1841 ♂ **syn. nov.** and *Andricus trilineatus* var. *beirensis* TAVARES, 1902 ♂♀ **syn. nov.** = *Andricus quercusradicis* (FABRICIUS, 1798); *Neuroterus brevicornis* HARTIG, 1841 ♀ **syn. nov.** and *Andricus krajnovici* TAVARES, 1902 ♂ **syn. nov.** = *Andricus quercus-corticis* (LINNAEUS, 1761); *Andricus petioli* HARTIG, 1843 ♂♀ **syn. nov.** = *Saphonecrus connatus* (HARTIG, 1840).

Key words: Cynipidae, Hymenoptera, *Neuroterus*, lectotype designation, new synonymies, HARTIG, TAVARES.

Zusammenfassung

Typen-Material folgender, von HARTIG 1840, 1841 beschriebener Arten wird untersucht: *Neuroterus bipunctatus*, *N. brevicornis*, *N. defectus*, *N. fumipennis*, *N. inquilinus*, *N. nitiens*, *N. parasiticus*, *N. politus*, *N. rubeculus*, *Spathegaster petioliventrif*. Auch andere nahe verwandte Arten, einige beschrieben von HARTIG 1940, 1843, werden studiert: *Andricus turionum*, *A. petioli*, *A. krajnovici* TAVARES, 1902. Lectotypen werden designiert für: *Spathegaster petioliventrif*, *Neuroterus rubeculus*, *N. fumipennis*, *Andricus petioli*. Folgende neue Synonyme werden aufgestellt: *Neroterus bipunctatus* HARTIG, 1841 ♂ **syn. nov.**, *N. rubeculus* HARTIG, 1841 ♂ **syn. nov.**, *N. nitiens* HARTIG, 1841 ♂ **syn. nov.**, *N. schlehtendali* MAYR, 1870 ♂ **syn. nov.**, *Spathegaster petioliventrif* HARTIG, 1840 ♂♀ **syn. nov.** und *S. aprilinus* GIRAUD, 1859 ♂♀ **syn. nov.** = *Neuroterus politus* HARTIG, 1840; *Neuroterus tricolor ulysipponensis* TAVARES, 1928 ♂♀ **syn. nov.** = *N. tricolor* HARTIG, 1841; *Neuroterus defectus* HARTIG, 1840 ♂ **syn. nov.** = *N. numismalis* (FOURCROY, 1785); *Neuroterus parasiticus* HARTIG, 1841 ♂ **syn. nov.** und *Andricus trilineatus* var. *beirensis* TAVARES, 1902 ♂♀ **syn. nov.** = *Andricus quercusradicis* (FABRICIUS, 1798); *Neuroterus brevicornis* HARTIG, 1841 ♀ **syn. nov.** und *Andricus krajnovici* TAVARES, 1902 ♂ **syn. nov.** = *Andricus quercuscorticis* (LINNAEUS, 1761); *Andricus petioli* HARTIG, 1843 ♂♀ **syn. nov.** = *Saphonecrus connatus* (HARTIG, 1840).

Introduction

HARTIG (1840, 1841, 1843) described some species of *Neuroterus* HARTIG, 1840, *Spathegaster* HARTIG, 1840 and some related *Andricus* HARTIG, 1840 considered 'dubida species' by DALLA TORRE & KIEFFER (1910). The type species of *Neuroterus* genus, *N. politus* HARTIG, 1840, is one of these species. The problems are corrected, new synonyms are established and lectotypes are designated.

Material and Methods

All species described by HARTIG and dealt with in this work are deposited in Zoologische Staatssammlung München, Germany (ZSM). HARTIG's type specimens were taken from the original boxes by the ZSM curator and all species have a typical ground-label in the handwriting of HARTIG with the name of the genus and species (E. DILLER com. pers.). We also examined the type material of *Andricus krajnovici* TAVARES, deposited in the Naturhistorisches Museum Wien (NMW), some material collected for us from Spain and Andorra and material sent by Dr. FOLLIOU from France.

The specimens were studied with light microscope, some of them were observed with SEM microscope without coating and with very low voltage (500-600V).

Results

Neuroterus politus HARTIG, 1840

Neuroterus politus HARTIG, 1840, Z. Ent. Germar, 2: 193 (♂) (Type species *Neuroterus*).

Spathegaster petioliventrif HARTIG, 1840, Z. Ent. Germar, 2: 194 (♂♀) **syn. nov.**

Neuroterus bipunctatus HARTIG, 1841, Z. Ent. Germar, 3: 339 (♂) **syn. nov.**

Neuroterus rubeculus HARTIG, 1841, Z. Ent. Germar, 3: 339 (♂) **syn. nov.**

Neuroterus nitens HARTIG, 1841, Z. Ent. Germar, 3: 339 (♂) **syn. nov.**

Spathogaster aprilinus Giraud, 1859, Verh. K. K. Zool.-Bot. Ges. Wien, 9: 363 (♂♀) **syn. nov.**

Andricus burgundus: SCHLECHTENDAL 1870, Ent. Z. Stettin, 31: 382 (agamic ♀, not GIRAUD 1859).

Neuroterus schlechtendali MAYR, 1870, Mitteleur. Eichengallen, 7 (85): 28 (♂♀) **syn. nov.**

Type material examined:

Neuroterus politus. - Lectotype: ♂, according to the original red label designated by WELD in 1931, but published in WELD (1952); Paralectotypes: 3 ♂♂ (n. 1513, 1138, and yellow label), PUJADE-VILLAR det. '98 (white label). Lectotype and Paralectotypes in ZSM.

Spathogaster petioliventris. - Lectotype: ♀ (n° 190), present designation; Paralectotypes: 6 ♂♂, 6 ♀♀ (n° 189, 88, 50161, 175, white label and without label), PUJADE-VILLAR det. '99. Lectotype and Paralectotypes in ZSM.

Neuroterus bipunctatus. - Holotype: ♂ (with a brown label), captured in Germany according to the original description. Holotype in ZSM.

Neuroterus rubeculus. - Lectotype: ♂ (with a yellow label), designated here; Paralectotype: 1 ♂ (with a yellow label), PUJADE-VILLAR det. '99; material captured in Germany according to the original description. Lectotype and Paralectotypes in ZSM.

Neuroterus nitens. - Holotype: ♂ (n° 490), captured in Germany according to the original description. Holotype in ZSM.

According to ROHWER & FAGAN (1917) the typical species of the genus *Neuroterus* is *Neuroterus politus*, which was designed by BEUTENMÜLLER (1910). WELD (1952: 282) included the study of the type material in 1931 and designated the lectotype of *Neuroterus politus*, but he didn't synonymize this species with the agamic forms of *S. aprilinus* (known as *N. schlechtendali*) probably because he didn't know the European fauna. Subsequently, EADY & QUINLAN (1963: 39) considered *N. politus* as the sexual form of *N. numismalis* but they didn't study the type material. We examined the type material of *N. politus* and compared them with specimens of *N. schlechtendali* from France, Hungary, Spain, Andorra and Portugal, and we didn't see any difference between *N. schlechtendali* and *N. politus*, so we conclude that *N. schlechtendali* is in fact *N. politus*.

WEIDNER (1960: 523) commented that in a previous paper (WEIDNER, 1952) he considered *S. petioliventris* as the sexual form of *S. aprilinus* as KIEFFER (1887-1901: 665) suspected, however none of them studied the material. This denomination (*S. petioliventris*) has been used later by IONESCU (1973) and AMBRUS (1974). After examining the type material we can say that these authors were right, so the sexual forms of *S. petioliventris* and *S. aprilinus* are the same.

SCHLECHTENDAL (1884) was the first author who suspected, through observations, that *S. aprilinus* ♂♀ and *N. schlechtendali* ♂ were related forms. A large number of authors have discussed this possibility (ROSS 1938), but FOLLIOT (1964) was the first author who proved it through experimentation.

The type material of *Neuroterus bipunctatus* has exactly the same characters than *S. aprilinus* unisexual form.

According to these comments, comparing type material and due to the 15th article of the International Zoological Nomenclature Code, we conclude that *S. petioliventris* **syn. nov.**, *S. aprilinus* **syn. nov.**, *N. schlechtendali* **syn. nov.**, and *N. bipunctatus* **syn. nov.** are new synonyms of *Neuroterus politus*.

The type material of *Neuroterus rubeculus* and *N. nitens* is lighter in coloration than mentioned in the original description, but all the other described characters are coincident and therefore we accept this material as the type material. After the study of this type material we can say that these specimens have also the same characters than the unisexual form of *N. politus*. Together with *N. nitens* holotype there is a male of *Neuroterus anthracinus* which doesn't belong to the typical series of this species, therefore it has been separated from the type material. So, according to our comparison of the type material of *Neuroterus rubeculus* and *N. nitens* with the type material of *N. politus* we conclude that *N. rubeculus* syn. nov. and *N. nitens* syn. nov. are new synonyms of *Neuroterus politus*.

***Neuroterus tricolor* (HARTIG, 1841)**

Neuroterus fumipennis HARTIG, 1841, Z. Ent. Germar, 3: 339 (♂).

Spathegaster tricolor HARTIG, 1841, Z. Ent. Germar, 3: 341 (♂♀).

Spathegaster varius SCHENCK, 1863, Jahrb. Verh. Nassau, 17-18: 206, 209, 231 (♂♀).

Neuroterus tricolor ulysipponensis TAVARES, 1928, Brotéria, Sér. Zool., 26: 131 (♂♀) syn. nov.

Type material examined:

Neuroterus fumipennis. - Lectotype: ♂, present designation; Paralectotype: 1 ♂. Collected in May in Germany according to the original description. Lectotype and Paralectotype in ZSM.

KIERYCH (1979) preferred the denomination of *fumipennis* instead of *tricolor*, due to the priority of the pages in which these species are described; however the Nomenclature Code doesn't give priority due to page inside the same paper. DALLA TORRE & KIEFFER (1910) named this species *N. tricolor*. For us the first revisors are DALLA TORRE & KIEFFER (1910) and according to the International Zoological Nomenclature Code (article 24.2.1) the right name of this species is *N. tricolor*.

TAVARES (1928) described the subspecies *Neuroterus tricolor ulysipponensis* based on a chromatical variation with regard to the typical forms. At the same time he also proposed the existence of two consecutive sexual generations. We doubt the presence of this reproductive pattern in *N. tricolor*, so we consider the subspecies of TAVARES collected in the proximity of Lisboa (Portugal) as a chromatic variation of the nominal form such as it is commented in PUJADE-VILLAR (1991). Unfortunately the type material of this subspecies was burnt in the fire of the Museum of Lisboa.

***Neuroterus numismalis* (FOURCROY, 1785)**

Cynips numismalis FOURCROY, 1785, Ent. Paris. p. 384 (♂).

Cynips numismatis [sic!] OLIVIER, 1790, Enc. méth., 5: 787 (♂♀).

Neuroterus reaumurii HARTIG, 1840, Z. Ent. Germar, 2: 192 (♂♀).

Neuroterus defectus HARTIG, 1840, Z. Ent. Germar, 2: 193 (♂) syn. nov.

Cynips quercustiarum CURTIS, 1843, Grad. Chron., p.42 (♀).

Neuroterus nigricornis SCHENCK, 1863, Jahrb. Ver. Nassau, 17/18: 190, 193, 255 (♂♀).

Cynips vesicatrix SCHLECHTENDAL, 1870, Ent. Zeit. Stettin, 31: 397 (♀).

Spathegaster vesicatrix: MAYR 1871, Mitteleur. Eichengallen, 17 (♂♀♀).

Neuroterus vesicatrix: MAYR 1882, Eur. Arten gallenbew. Cynip., 39, 42 (♂♀).

Type material examined:

Neuroterus defectus. - Holotype: ♀, collected in Germany, according to the original description. Holotype in ZSM.

Neuroterus numismalis. - The type material is lost but, the description of the species (FOURCROY 1785) is very clear.

We examined the type material of *N. defectus* and compared it with specimens of *N. numismalis* from many countries of Europe, and we didn't see any difference between the unisexual forms of *N. defectus* and *N. numismalis*, so we conclude that *N. defectus* is in fact *N. numismalis*.

***Andricus quercusradicis* (FABRICIUS, 1798)**

Cynips quercusradicis FABRICIUS, 1798, Ent. syst. Suppl., p. 213 (♂).

Andricus trilineatus HARTIG, 1840, Z. Ent. Germar, 2: 191 (♀).

Andricus noduli HARTIG, 1840, Z. Ent. Germar, 2: 191 (♀♂).

Cynips radicis: HARTIG 1841, Z. Ent. Germar, 3: 335 (♂♂) (unjustified emendation).

Neuroterus parasiticus HARTIG, 1841, Z. Ent. Germar, 3: 340 (♂) **syn. nov.**

Andricus trilineatus var. *beirensis* TAVARES, 1902, Brotéria, 1: 105 (♂♀♂) **syn. nov.**

Type material examined:

Neuroterus parasiticus. - Holotype: ♂ (n°1270), reared from *Andricus globuli* ♂ galls in Germany according to the original description. Holotype in ZSM. The type material of *Neuroterus parasiticus* is not well preserved. The adult has no antennae and legs. This specimen has the relation OOL compared with lateral ocellus width slightly bigger than in the typical bisexual form that FOLLIOT (1964) corroborated. This FOLLIOT's material is deposited in our University.

TAVARES (1902) described a new sexual variety because the specimens collected in Portugal had 16 segments in the male antennae and chromatic variations in both sexes regarding the typical form. DALLA TORRE & KIEFFER (1910) considered these specimens as a new subspecies, but there are many varieties in *Andricus* defined by this kind of morphological characters, therefore this differences do not justify this subspecies in *Andricus*.

Andricus turionum (HARTIG, 1840: 189) and *Andricus petioli* (HARTIG, 1843: 407) were considered by KIEFFER (1897-1901) and MAYR (1870-1871) respectively as synonymic names of the sexual form of *A. quercusradicis*, but in DALLA TORRE & KIEFFER (1910) these conclusions were refused. The type material of *A. turionum* has been revised and we conclude that this species belongs to the '*callidoma*' group; therefore DALLA TORRE & KIEFFER (1910) were right. The type material of *A. petioli* has also been revised here and we conclude that it is not a valid species (see above).

***Andricus quercuscorticis* (LINNAEUS, 1761)**

Cynips quercuscorticis LINNAEUS, 1761, Faun. Suec., ed. 2: p. 387 (♂).

Neuroterus brevicornis HARTIG, 1841, Z. Ent. Germar, 3: 339 (♀) **syn. nov.**

Andricus gemmatus ADLER, 1881, Z. wiss. Zool., 35: 174 (♂♀♂).

Cynips corticis: HARTIG 1840, Z. Ent. Germar, 2: 191 (♀♂) (unjustified emendation).

Andricus krajnovici TAVARES, 1902, Ann. Sci. Nat. Porto, 7: 36 (♂♂) **syn. nov.**

Type material examined:

Neuroterus brevicornis. - Holotype: ♀, captured in Germany according to the original description. Holotype in ZSM.

Andricus krajnovici. - Lectotype: ♂, "Port. Coll. G. Mayr", "Typ. Tavares 902", "*A. krajnovici* det. Tav., Type", "*Andricus krajnovici* Tavares, lectotype desing. G. Melika

1998", "*Andricus quercuscorticis* ♂ Pujade det. '99", Lectotype in NMW. Additional material: Several agamic females collected in Barcelona, Santa Fe del Montseny (Spain) (see PUJADE-VILLAR 1991); Anyós, Les Escaldes, La Massana and Sispony (Andorra) (see PUJADE-VILLAR 1994).

The type material of *Neuroterus brevicornis* has been compared with experimental material of *A. quercuscorticis* sexual form loaned from Dr. FOLLIOT (University of Rennes). Despite of the similarities of other sexual forms in this group, HARTIG's material is morphologically close to *A. quercuscorticis* (= *gemmatus* ADLER, 1881). For this reason the name of *Andricus quercuscorticis* sexual form should be named *A. quercuscorticis* (= *brevicornis* HARTIG).

Andricus krajnovici was described from specimens of Portugal. NIEVES-ALDREY (1983) emphasized the morphological and gall characters to differentiate this species from *A. quercuscorticis*. PUJADE-VILLAR (1991) mentioned that adult differences are not significant because they are included in the variability of the agamic form of this species. After studying material from Spain and Andorra published by PUJADE-VILLAR (1994) now we have come to the conclusion that *A. krajnovici* is a new synonym of *Andricus quercuscorticis* ♂. The type material of *A. krajnovici* was recently found by Dr. MELIKA in NMW and after studying it we synonymize this TAVARES species with *A. quercuscorticis* (LINNAEUS) agamic form.

***Neuroterus inquilinus* HARTIG, 1840 'incertae sedis'**

Neuroterus inquilinus HARTIG, 1840, Z. Ent. Germar, 2: 192 (♂).

Type material:

Destroyed. label data: "aus kleinen gesammelten Beifängen, ostria ??". According to the original description the type material is only a female. The curator of the ZSM, E. DILLER, sent us three pins. One of them with an *Andricus curvator* ♀, the other one with a *Neuroterus* nr *quercusbaccarum* ♀, but none of them can be the type specimen. On the third pin are only three partial legs; probably this is the type material. According to the label written by HARTIG this specimen was probably a female of *Neuroterus anthracinus* ♂. Characters from the description of *N. inquilinus* fit well with *N. anthracinus* ♂.

HARTIG (1840) wrote that *N. inquilinus* was reared from a *Cynips quercusfolli* ♂ gall, but this is quite unlikely. Probably there was a connected *Neuroterus anthracinus* ♂ gall that passed unnoticed.

***Saphonecrus connatus* (HARTIG, 1840)**

Synergus connatus HARTIG, 1840, Z. Ent. Germar, 2: 198.

Sapholitus connatus: MAYR 1872, Ver. Ges. Wien, 22: 722.

Saphonecrus connatus: DALLA TORRE & KIEFFER 1910, Das Tierreich, 24: 606.

Saphonecrus connatus luteipes TAVARES, 1920, Mem. Soc. Port. Sci. Nat., 4: 58.

Andricus petioli HARTIG, 1843, Z. Ent. Germar, 4: 407 (♂♀) syn. nov.

Type material examined:

Andricus petioli. - Lectotype: ♀, present designation; Paralectotypes: 1 ♂; with a squared label and handwritten number "20". Obtained from petiols of *Quercus robur* and *Q. petraea* in Germany according to the original description; 2 ♀♀ (= *S. aprilinus*). Lecto- and Paralectotypes in ZSM.

Andricus petioli HARTIG was considered by KIEFFER (1897-1901) and MAYR (1870-1871) as a synonymic name of the sexual form of *A. quercusradicis* probably because the galls were placed in petioles of *Quercus* and for the small size of the adults (σ : 0,6 mm, φ : 1 mm). Later KIEFFER (1910) revised this conclusion. According to the study of the typical series (1 σ , 1 φ) the specimens are inquiline cynipids that belong to *Saphonecrus connatus*. They probably have grown up from a gall of unknown origin (probably caused by *Andricus testaceipes* HARTIG, 1840 or *A. trilineatus* HARTIG, 1840). Mixed with these specimens we also have two females of the bisexual generation of *S. aprilinus*.

Acknowledgements

We are very grateful to Dr. R. FOLLIOT (Université de Rennes, France) for sending us the specimens of *Andricus quercuscorticis*, to Dr. G. MELIKA (Systematic Parasitoid Laboratory, Hungary) and David BELLIDO (Universitat de Barcelona, Spain) for comments on this manuscript and finally to Dr. Axel BACHMANN (Universidad de Buenos Aires, Brazil) for his help with the Nomenclature Code. We also thank E. DILLER (curator of ZSM) and Dr. S. SCHOEDL (curator of NMW) to send us the material mentioned in this study.

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 Maximilian SCHWARZ, Konsulent für Wissenschaft der O.Ö. Landesregierung,
 Eibenweg 6, A-4052 Anselden

Redaktion: Erich DILLER (ZSM), Münchhausenstrasse 21, D-81247 München, Tel.(089)8107-159
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Jahr/Year: 2001

Band/Volume: [0022](#)

Autor(en)/Author(s): Ros-Farre Palmira, Pujade-Villar Juli

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