

On the taxonomy, diversity, and ecology of the *Amischa* THOMSON, 1858 species of the Palaearctic Region (Coleoptera: Staphylinidae: Aleocharinae)

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Abstract

Based on a revision of type material and additional material, the genus *Amischa* THOMSON, 1858 (Coleoptera: Staphylinidae) is represented in the Palaearctic Region by 16 species, i.e., little more than half the species number previously recorded from this region (30 species). Unlike many other genera of Athetini, the genus is characterised by several pronounced synapomorphies. The species are assigned to two species groups, the monotypical *A. puetzi* and the *A. analis* groups (15 species); three distinct lineages are identified within the *A. analis* group. Diagnoses and illustrations are provided for all the species recorded from the Palaearctic Region. Four species are described for the first time: *Amischa iberica* sp.n. (South Spain); *A. inexcisa* sp.n. (Hungary, Russia (Krasnodar), Georgia, Turkey); *A. discolor* sp.n. (Kyrgyzstan, Kazakhstan); *A. truncata* sp.n. (South Turkey). Nine new synonymies are proposed: *Amischa bifoveolata* (MANNERHEIM, 1830) = *A. filum* (MULSANT & REY, 1870) syn.n. = *A. minima* MULSANT & REY, 1873 syn.n. = *A. uhligi* PACE, 1987 syn.n.; *A. decipiens* (SHARP, 1869) = *A. simplex* BENICK, 1982 syn.n.; *A. kashmirica* CAMERON, 1939 = *A. sporadica* BENICK, 1967 syn.n.; *A. nigrofusca* (STEPHENS, 1832) = *A. jugorum* SCHEERPELTZ, 1956 syn.n.; *A. puetzi* ASSING, 2005 = *A. sichuanensis* PACE, 2011 syn.n.; *A. setifera* BENICK, 1982 = *A. andreasi* MUONA, 1990 syn.n. = *A. rougemonti* PACE, 1998 syn.n. Specimens previously reported as *A. filum* refer to four species, two of them newly described: *A. bifoveolata*, *A. kashmirica*, *A. inexcisa*, *A. truncata*. Eight species described in or previously placed in *Amischa* are transferred to *Atheta* THOMSON, 1858: *Atheta (Microdota) pioncolyata* (PACE, 1991) comb.n.; *Atheta (M.) nana* (PACE, 1998) comb.n.; *Atheta (Microdota?) phallosetigera* (PACE, 1986) comb.rev.; *Atheta coprophila* (PACE, 1991) comb.n.; *Atheta dhaulagiriensis* (PACE, 2015), a secondary junior homonym replaced with *Atheta dhaulagirica* nom.n.; *Atheta fraudulenta* PACE, 2006 comb.n.; *Atheta (Mocyta) sahlbergi* (EPPELSHEIM, 1893) comb.rev.; *Atheta niponensis* (SHARP, 1888) comb.rev. Lectotypes are designated for *Amischa strupii* SCHEERPELTZ, 1967, *Homalota filum* MULSANT & REY, 1870, and *H. leporina* FAUVEL, 1881. Based on extensive field studies using pitfall traps, soil extractions, and photo-electors, and conducted in Niedersachsen (North Germany) from 1981 to 2001, the sex ratios, life histories, seasonal density and epigeic activity dynamics, and parasitism of four species are assessed and discussed. *Amischa analis* (GRAVENHORST, 1802) is particularly remarkable in that this species is parthenogenetic and macropterous across most of its range, while scattered bisexual and brachypterous populations are confined to high-altitude habitats in the South Alps and mountain ranges in the northern Iberian Peninsula. *Amischa nigrofusca* (STEPHENS, 1832) and *A. decipiens* (SHARP, 1869) are regionally parthenogenetic, with males significantly rarer also in bisexual populations. A catalogue of the *Amischa* species represented in the Palaearctic Region is provided. Numerous new country records are reported. The distributions of four species are mapped.

Key words: Coleoptera, Staphylinidae, Aleocharinae, Athetini, *Amischa*, *Atheta*, taxonomy, new species, new synonymies, replacement name, new combinations, diagnoses, lectotype designations, Palaearctic Region, catalogue, diversity, natural history, parthenogenesis, wing dimorphism, sex ratio, seasonal densities, epigeic activity, oviposition, phenology, parasitism, distribution maps.

Introduction

Although *Amischa* THOMSON, 1858 includes only relatively few species, some of them very common, remarkably widespread, and encountered in practically every field study, the genus is not exactly popular among coleopterists, not even among aleocharine specialists. Not only are the representatives of this genus small and inconspicuous, but more importantly, they are

characterized by high interspecific uniformity of both external and sexual characters in combination with remarkable intraspecific variation. A reliable identification is even more impeded by the fact that males – which usually provide the most useful diagnostic characters in Aleocharinae – are often absent or very rare in the samples and, even if present, difficult to assign to the corresponding females. Unsurprisingly, these difficulties are reflected also in a taxonomic history of confusion and controversial views.

When THOMSON (1858) described the genus *Amischa*, he included only one species: *Homalota analis* (GRAVENHORST, 1802), type species by monotypy. SHARP (1869), however, assigned *H. analis* and other species currently placed in *Amischa* (including two newly described species) to *Homalota* MANNERHEIM, 1830, whereas MULSANT & REY (1873) treated *Amischa* as a distinct genus. GANGLBAUER (1895) subsequently regarded *Amischa* as a subgenus of *Atheta* THOMSON, 1858 and included three species from Central Europe, *A. analis* with nine junior synonyms, *A. cavifrons* (SHARP, 1895), and *A. soror* (KRAATZ, 1856). In their world catalogue, BERNHAUER & SCHEERPELTZ (1926) treated *Amischa* as a genus again and listed 27 valid species: nine Palaearctic (three of them also reported from North America), 13 Nearctic (three of them reported also from Europe), five Neotropical, two Oriental, and one Australian. By that time, the number of junior synonyms of *A. analis* had increased to 18.

Aside from some recent additions by Roberto Pace, the *Amischa* species of the Nearctic, Neotropical, Oriental, and Australian regions have received little attention since then. The same, however, does not apply to the Palaearctic fauna. PEYERIMHOFF (1938) provided a key to the eight Palaearctic species known to him and assigned one species to his newly erected subgenus *Metamischa* (now a junior synonym of *Microdota* MULSANT & REY, 1873). Several years later, the same author described a species from Morocco (PEYERIMHOFF 1949). In a small series of revisory contributions, STRAND (1951, 1968, 1971) laid out an extensive argumentation that *A. analis* was a parthenogenetic species, discussed the status of three names: *A. soror*, *A. cavifrons*, and *A. sarsi* MUNSTER, 1927, and illustrated their male sternites VIII and aedeagi for the first time. SCHEERPELTZ (1956, 1967) described two species from the Alps. In a synopsis treating the 16 Palaearctic species known to him, BENICK (1967) provided rough sketches of the genitalia and the tergites and sternite VIII, described a species from Italy, and discussed the issue of parthenogenesis in *A. analis* again. In contrast to STRAND (1951), he arrived at the conclusion that, at least in Central Europe, *A. analis* was not parthenogenetic. BENICK (1982) added two species from Mongolia.

In a synopsis of the Staphylinidae of Sweden, PALM (1968) recognized, illustrated, and keyed four species: *A. analis*, *A. cavifrons*, *A. sarsi*, and *A. decipiens* (SHARP, 1869). According to an overview by WILLIAMS (1969), the British *Amischa* fauna was represented by six species, *A. analis*, *A. cavifrons*, *A. soror*, *A. decipiens*, *A. forcipata* MULSANT & REY, 1873, and *A. simillima* (SHARP, 1869), with *A. sarsi* treated as a junior synonym of the latter. Based on dissections of approximately 850 specimens, this author proposed the hypothesis that *A. analis*, *A. soror*, and *A. decipiens* were parthenogenetic at least in Britain. In a comprehensive work on the Staphylinidae of Central Europe, BENICK & LOHSE (1974) keyed eight species. Their concept was largely identical to that of PALM (1968) and WILLIAMS (1969), except that they regarded *A. simillima* and *A. sarsi* as junior synonyms of *A. soror* and that they included three species absent from North Europe and Great Britain. In a supplement to this key, LOHSE (1989) revalidated *A. simillima* and stated that he was convinced that *A. analis* was parthenogenetic and that the same, at least regionally, applied to *A. soror*.

MUONA (1990) again addressed the North European *Amischa* species comprehensively. Based on a comprehensive revision of the type material, he changed and established numerous synonymies, described a new species from Finland, and provided a key to the five species recorded

from North Europe: *A. decipiens*, *A. andreasi* MUONA, 1990, *A. bifoveolata* (MANNERHEIM, 1830), *A. nigrofusca* (STEPHENS, 1832), and *A. analis*. He regarded neither *A. analis* nor *A. nigrofusca* (senior synonym of *A. soror*) as parthenogenetic.

The latest revisory approach was published by ÁDÁM (2010), who largely adopted the concept proposed by MUONA (1990), keyed the species recorded from the Carpathians, synonymized two names, and, like MUONA (1990), argued that *Amischa analis* was not parthenogenetic.

Other recent contributions to the Palaearctic *Amischa* fauna mainly added additional species, mostly from the East Palaearctic Region. In the past four decades, PACE (1986a, 1991, 1998, 2006, 2011, 2015) described 11 species from Nepal (6 spp.), China (4 spp.), and Bulgaria (1 sp.), and ASSING (2005b, 2019) added one species from China and one from Greece (island of Crete).

As a result of the previously established synonymies, numerous transfers from and into the genus, and additional descriptions of new taxa, the Palaearctic *Amischa* fauna was composed of 30 valid species by the end of 2019, ten of them distributed in the West Palaearctic (including Middle Asia), 16 in the East Palaearctic, and four of them with trans-Palaearctic areas (SCHÜLKE & SMETANA 2015, and updates up to the end of 2019). All 23 synonyms are attributed to only three widespread and common species: *A. analis* (15 synonyms), *A. bifoveolata* (three), and *A. nigrofusca* (five). On a worldwide scale, the genus is currently represented by 63 species, with nine (plus two adventive) species recorded from the Nearctic, 15 from the Neotropical, four (plus three adventive) from the Australian, one from the Oriental, and four from the Afrotropical regions (NEWTON 2019).

It is unclear how many of the species described from regions other than the Palaearctic in fact belong to *Amischa*, if any. A cursory scan of some recently described taxa for which illustrations of the genitalia have been published, suggests that at least some of them (e.g., *Amischa franzi* PACE, 2008 and *A. quitoensis* PACE, 2008 from South America, *A. papuensis* PACE, 2000 from Papua New Guinea) belong to other genera.

The focus of the present study is on the fauna of the Palaearctic, in particular the West Palaearctic Region. It can be inferred from the outline of the taxonomic history above that the current taxonomic and zoogeographic concept, especially of some common and widespread European species is confusing and partly implausible, mainly as a result of multiple name changes, often poor, misleading, and/or incorrect illustrations of the genitalia, and differing views on whether or not two of these species are parthenogenetic and consequently the question what species the males should be attributed to. Remarkably, the aedeagi of *A. analis*, *A. bifoveolata*, and *A. nigrofusca* illustrated by MUONA (1990) are indistinguishable, except for some minor details emphasized in the descriptive sections.

Based on a morphological and zoogeographic approach, the present study intends to clarify the specific identity of the males, the identity of various species described from the southern West Palaearctic Region which have not been subject to a modern revision, and the status of some taxa described from the East Palaearctic Region. Regarding the question of parthenogenesis and the resulting specific assignment of males, however, such an approach can only be preliminary. What would be badly needed to finally settle this issue is a molecular study, which would be feasible without great effort, since live material of the respective species should be accessible without great effort when looked for in habitats where they are common.

Regional parthenogenesis has been observed in at least four West Palaearctic species of Aleocharinae. In *Cousya nigrata* (FAIRMAIRE & LABOULBÈNE, 1865), *Parocysa rubicunda* (ERICHSON, 1837), and *Oxypoda lurida* WOLLASTON, 1857, all of them of the Oxypodini, males have been found only in the south of their respective ranges; they are absent in the north (ASSING

2018, 2021). The same probably applies to *Atheta (Mocyta) fungi* (GRAVENHORST, 1806), but this species has not been revised thoroughly in this respect.

Material and methods

The material treated in this study is deposited in the following public and private collections:

BMNH	Natural History Museum, London, UK (M. Barclay)
IRSNB	Institut Royal des Sciences Naturelles de Belgique, Bruxelles, Belgium (Y. Gérard)
MHNG	Muséum d'histoire naturelle de Genève, Switzerland (G. Cuccodoro)
MHNL	Musée d'histoire naturelle - Guimet, France (H. Labrique)
MNB	Museum für Naturkunde, Berlin, Germany (incl. coll. Schülke) (J. Frisch, M. Schülke)
MNHNP	Museum national d'histoire naturelle, Paris, France (A. Taghavian)
MZH	Finnish Museum of Natural History, Zoological Museum, Helsinki, Finland (J. Mattila)
NHMW	Naturhistorisches Museum Wien, Austria (H. Schillhammer)
NME	Naturkundemuseum Erfurt, Germany (M. Hartmann)
cAss	author's private collection
cFel	private collection Benedikt Feldmann, Münster, Germany
cStr	private collection Tim Struyve, Mechelen, Belgium

In all, more than 10,000 specimens of *Amischa* have been examined. To avoid long material lists, examined records of common species from within their known ranges are merely summarized or previously published records are referenced. Exact localities and other data are specified only for less common and less widespread species, for new country records, and for type material.

MORPHOLOGY AND ANATOMY: The morphological studies were conducted using Stemi SV 11 (Zeiss) and Discovery V12 (Zeiss) microscopes, and a Jenalab compound microscope (Carl Zeiss Jena). The images were created using digital cameras (Nikon Coolpix 995, AxioCam ERc 5s) and Picolay stacking software. The maps were created using MapCreator 2.0 (primap) software.

Body length was measured from the anterior margin of the labrum to the abdominal apex, the length of the forebody from the anterior margin of the labrum to the posterior margin of the elytra, elytral length at the suture from the apex of the scutellum to the posterior margin of the elytra, and the length of the aedeagus from the apex of the ventral process to the base of the aedeagal capsule. The “parameral” side (i.e., the side where the sperm duct enters) is referred to as the ventral, the opposite side as the dorsal aspect.

ECOLOGY: During a period of more than two decades (1981–2001), field studies were conducted on the staphylinid fauna of a variety of habitats, particularly *Calluna* heathlands on sandy soils, in Niedersachsen, North Germany. These studies yielded more than 100,000 adult Staphylinidae and more than 15,000 larvae. The localities where *Amischa* species were recorded are listed in Tab. 1. For more details on these sites and the methodology see ASSING (1988, 1992, 1993, 1994), HOFMEISTER et al. (2001), and MELBER et al. (1996).

In all the study sites pitfall traps were used to assess the species inventory and seasonal epigeic activity. The number of pitfall traps varied between three and 52 per year and site. For details regarding the type, construction, and maintenance of the pitfall traps see MELBER (1987). The traps remained installed throughout the year (i.e., also in winter) and were emptied at half-monthly intervals, in some sites at monthly intervals. In all, more than 700 one-year pitfall traps were installed and maintained.

In addition to pitfall trapping, soil extractions after KEMPSON et al. (1963) were conducted in several heathlands to assess the population densities of Staphylinidae. The samples were taken at half-monthly intervals throughout the year. In one locality, photo-eclectors were installed over a

period of three years to record emergence of adult beetles. For more information on the field methods used see ASSING (1993).

In order to assess oviposition periods (presence of eggs in the ovaries) and parasitism, the abdomina of several thousand specimens were dissected.

Tab. 1: Study plots where *Amischa* species were recorded. All sites are located in Niedersachsen, North Germany.

Site	Habitat	Study period	Methods
Helstorfer Reiterheide near Neustadt/Rbg.	<i>Calluna</i> heathland in succession to pine forest	1981–1991	pitfall traps, soil extractions
Helstorfer Reiterheide near Neustadt/Rbg.	pine forest	1987	pitfall traps
Lüneburger Heide, Niederhaverbeck	dry <i>Calluna</i> heathland	1983–1986	pitfall traps, soil extractions, photo-electors
Lüneburger Heide, Niederhaverbeck	sandy grassland	1986	pitfall traps, soil extractions
Lüneburger Heide, Schneverdingen	<i>Calluna</i> heathland, grassy dunes with sparse vegetation cover	1992–2001	pitfall traps
Lüneburger Heide, Haverbeck	<i>Calluna</i> heathland	1993–1999	pitfall traps
Glider airfield Scheuen near Celle	<i>Calluna</i> heathland	1984	pitfall traps, soil extractions
NSG “Heiliger Hain” near Gifhorn	dry <i>Calluna</i> heathland	1983–1987	pitfall traps, soil extractions
NSG “Heiliger Hain” near Gifhorn	sandy grassland	1986	pitfall traps, soil extractions
NSG “Heiliger Hain” near Gifhorn	sandy pine forest	1987	pitfall traps
Bokeler Heide SE Bokel	grassy <i>Calluna</i> heathland	1985–86	pitfall traps
Garlstedter Heide N Bremen	sandy heathland with old <i>Calluna</i>	1985	pitfall traps
NSG “Rössenbergheide-Külsenmoor” S Oerrel	transect from <i>Calluna</i> heathland to moist <i>Erica</i> heathland	1986–1987	pitfall traps
NSG “Rössenbergheide-Külsenmoor” S Oerrel	pine forest	1987	pitfall traps
Hümmling near Meppen	<i>Calluna</i> heathland	1986	pitfall traps
Hannover	floodplain meadows	1986/87	pitfall traps
Hannover	moist fallows/meadows	1986/87	pitfall traps
Hannover	sandy grassland	1986/87	pitfall traps
Hannover	urban lawns	1986–87, 1989	pitfall traps
Hannover	garden hedges/bushes	1986–87, 1989	pitfall traps
Bad Nenndorf	Garden	1987/88	pitfall traps
Öselberg near Wolfenbüttel	calcareous grassland	1999	pitfall traps
Wernershöhe near Hildesheim	calcareous field margin	1998	pitfall traps
Westerberg near Hedeper	xerothermous slope with short vegetation (grass, <i>Genista</i> , <i>Salvia</i> , etc.)	2001	pitfall traps
Ortsberg near Alfeld/Leine	xerothermous calcareous grassland with shrubs	1985–87	pitfall traps
Steinberg near Hildesheim	xerothermous slopes (grassland, shrubs, forests)	1996/97	pitfall traps

Düt near Hameln	xerothermous sandy Arrhenatheretum	1990	pitfall traps
Lehrte/Immensen	deciduous forest and forest margin	1989	pitfall traps
Immensen near Lehrte	sandy arable land	1989	pitfall traps

Results

Catalogue of the *Amischa* species of the Palaearctic Region

Species	Distribution
<i> analis</i> (GRAVENHORST, 1802) = <i> evanescens</i> (MANNERHEIM, 1830) = <i> boleti</i> (STEPHENS, 1832) = <i> foveolata</i> (STEPHENS, 1832) = <i> inquinula</i> (STEPHENS, 1832) = <i> littoralis</i> (STEPHENS, 1832) = <i> livipes</i> (STEPHENS, 1832) = <i> teres</i> (RUNDE, 1835) = <i> haemorrhoidalis</i> (HEER, 1839) = <i> nigriceps</i> (HEER, 1839) = <i> contemta</i> (HEER, 1841) = <i> fossigera</i> (MANNERHEIM, 1843) = <i> tantilla</i> (WOLLASTON, 1854) = <i> platycephala</i> THOMSON, 1860 = <i> scorsicornis</i> (HOCHHUTH, 1872)	trans-Palaearctic; adventive in North America and New Zealand
<i> bifoveolata</i> (MANNERHEIM, 1830) = <i> cavifrons</i> (SHARP, 1869) = <i> filum</i> (MULSANT & REY, 1870) syn.n. = <i> minima</i> MULSANT & REY, 1873 syn.n. = <i> vogti</i> BENICK, 1967 = <i> strupii</i> SCHEERPELTZ, 1967 = <i> uhligi</i> PACE, 1987 syn.n.	West Palaearctic; West and East Siberia? Russian Far East? North Korea?
<i> corsica</i> BENICK, 1967	France: Corsica; Italy: Sardinia, mainland
<i> cretica</i> ASSING, 2019	Greece: Crete
<i> decipiens</i> (SHARP, 1869) = <i> simplex</i> BENICK, 1982 syn.n.	Palaearctic Region eastwards to Japan; adventive in North America and New Zealand
<i> discolor</i> sp.n.	Kazakhstan; Kyrgyzstan
<i> forcipata</i> MULSANT & REY, 1873	West Palaearctic
<i> iberica</i> sp.n.	South Spain
<i> inexcisa</i> sp.n. = <i> filum</i> auctt., partim	Hungary; Russia (Krasnodar); Georgia; Turkey
<i> kashmirica</i> CAMERON, 1939 = <i> sporadica</i> BENICK, 1967 syn.n. = <i> filum</i> auctt., partim	southern Palaearctic Region from Southeast Europe eastwards to Kashmir
<i> leporina</i> (FAUVEL, 1881)	Italy: Sicily
<i> nigrofusca</i> (STEPHENS, 1832) = <i> apicalis</i> (STEPHENS, 1832) = <i> soror</i> (KRAATZ, 1856) = <i> simillima</i> (SHARP, 1869) = <i> arata</i> MULSANT & REY, 1873 = <i> sarsi</i> MUNSTER, 1927. = <i> jugorum</i> SCHEERPELTZ, 1956 syn.n.	West Palaearctic; Middle Asia; adventive in New Zealand
<i> otini</i> PEYERIMHOFF, 1949	Morocco
<i> puetzi</i> ASSING, 2005 = <i> sichuanensis</i> PACE, 2011 syn.n.	China: Sichuan

Species	Distribution
<i>setifera</i> BENICK, 1982 = <i>andreasi</i> MUONA, 1990 syn.n. = <i>rougemonti</i> PACE, 1998 syn.n.	Finland; Siberia; Mongolia; China; Russian Far East
<i>truncata</i> sp.n.	South Turkey

Genus *Amischa* THOMSON, 1858

DIAGNOSIS: Body small (length 1.7–3.0 mm) and somewhat parallel-sided, of yellowish to blackish colouration. Habitus as in Figs. 10–11, 151, 280. Head of trapeziform shape, dilated posteriorly. Ligula (Fig. 14) broad and apically convex, undivided. Labrum (Fig. 12) anteriorly concave, in the middle membranous. Maxilla as in Fig. 13. Abdomen densely punctate; segment VII longer than segment VI. Tergite VIII and sternite VIII with pronounced sexual dimorphism.

♂: tergite VIII weakly concave to deeply excised, antero-laterally with long processes; sternite VIII much longer than tergite VIII, posteriorly convex, truncate, or excised, and often with characteristic arrangement of long black setae; median lobe of aedeagus rather large in relation to body size, with bulbous capsule, pronounced crista apicalis, very long crista proximalis, and usually with distinct long sclerotized basal structures in internal sac; paramere (Figs. 123–124, 239, 245, 273) of very intricate structure, apical lobe short, broad, and flattened.

♀: tergite VIII posteriorly truncate, broadly concave, or with distinct median excision, antero-laterally with shorter processes than in male; sternite VIII slightly longer than tergite VIII, posteriorly broadly convex, in the middle sometimes weakly concave, with dense and short marginal setae; spermatheca with moderately to strongly enlarged distal portion, more or less straight median portion, and coiled proximal portion (usually 1–2 coils).

COMPARATIVE NOTES: Unlike many other genera of Athetini, *Amischa* is a well-defined genus whose monophyly is constituted by several pronounced synapomorphies, particularly a conspicuous head shape, a broad and apically unincised ligula, the modifications and sexual dimorphism of tergite VIII and sternite VIII, the morphology of the median lobe of the aedeagus (long crista proximalis), and the derived intricate structure of the paramere.

INTRASPECIFIC VARIATION AND IDENTIFICATION: *Amischa* species are generally highly variable not only in external characters (size, colouration, length of elytra, punctuation), but also in the primary and secondary characters, which nevertheless represent the most useful diagnostic characters. With few exceptions (e.g., males of *A. forcipata*), a reliable identification of *Amischa* species requires the dissection and examination of the shape and chaetotaxy of tergite and sternite VIII, as well as of the genitalia. External characters are generally too uniform and at the same time too variable, which is why they are not described in detail in the diagnoses of the species sections. A key to species would be of little use for the same reason and is consequently not provided. Owing to pronounced intraspecific variation combined with low interspecific variation, often with overlapping conditions, as well as the fact that up to four species may occur syntopically, identification of single females may prove difficult. This particularly applies to the species allied to *A. kashmirica*.

TAXONOMY: As a result of the present study, nine new synonymies are proposed, and four species are newly described. As many as eight species are excluded from the genus. Thus, *Amischa* is represented in the Palaearctic Region by only sixteen species, a reduction of nearly half of the “diversity” accepted prior to this study. The number of valid names strongly contrasts with the number of synonyms (31). Unsurprisingly, with one exception, all the synonyms refer to widespread species: *Amischa analis* (14), *A. nigrofusca* (6), *A. bifoveolata* (6), *A. setifera* (2), *A. decipiens* (1), *A. kashmirica* (1), *A. puetzi* (1).

Despite the present efforts in clarifying the identities and diversity of *Amischa* species distributed in the Palaearctic Region, several taxonomic problems remain and may have to be re-addressed in future studies, preferably including a DNA-based approach:

- (1) the issue of parthenogenesis and its consequences for the status of *A. analis*, *A. bifoveolata*, and *A. nigrofusca*;
- (2) the relation and evolution of brachypterous populations of *A. analis* in the Southern Alps and in mountainous regions of the northern Iberian Peninsula on the one hand and of macropterous parthenogenetic population elsewhere across the vast range of the species;
- (3) the status of Corsican, Sardinian, and mainland Italian populations tentatively attributed to *A. corsica* in the present study;
- (4) the intraspecific variation of the widespread *A. kashmirica* and its consequences for the status of the different populations.

INTRAGENERIC AFFILIATIONS: The species of the Palaearctic Region can be assigned to two species groups primarily distinguished by the morphology of the aedeagus and by the size of the spermatheca. The monotypical *A. puetzi* group is confined to China (Sichuan) and characterized by a more robust, not parallel-sided body, a small head (in relation to the body), the absence of a sexual dimorphism of the head, a median lobe of an aedeagus with a conspicuously long, slender, and apically acute ventral process of the aedeagus, a crista apicalis of highly derived shape, and the absence of long basal internal structures, by a paramere of different general structure, and by a larger spermatheca.

Among the species of the *A. analis* group, which includes the remaining 15 species, several distinct lineages can be distinguished. One of them includes five widespread species, three of them regionally parthenogenetic: *A. analis*, *A. bifoveolata*, *A. nigrofusca*, *A. setifera*, and probably also *A. forcipata*. They are characterized by an aedeagus of highly similar shape with a subapically angled and apically long and needle-shaped ventral process and very weakly sclerotized basal internal structures (exception: *A. forcipata*), a more or less pronounced sexual dimorphism of the head, a male sternite VIII with a medially very shallowly excised male sternite VIII, a female tergite VIII with a more or less deep median excision (exception: *A. forcipata*), and a relatively long proximal portion of the spermatheca (exception: *A. forcipata*). The *A. decipiens* lineage comprises three relatively small and often pale-coloured species (*A. decipiens*, *A. discolor*, *A. leporina*) with a very densely punctate abdomen, a posteriorly broadly and very shallowly excised male tergite VIII, a relatively small median lobe of the aedeagus with a distinctly sinuate or angled ventral process in lateral view and with weakly sclerotized basal internal structures, and with a posteriorly truncate to weakly and broadly excised female tergite VIII. A third lineage includes *A. kashmirica*, *A. corsica*, *A. cretica*, *A. inexcisa*, and *A. truncata*. They are characterized by posteriorly broadly excised male and female tergites VIII, a posteriorly often excised male sternite VIII, a relatively small aedeagus with a short ventral process and with distinctly sclerotized basal internal structures, and by a relatively small spermatheca. Closer affiliations of *A. iberica* and *A. otini* within the *A. analis* group are not evident.

PTEROPOLYMORPHISM: While most species appear to be always macropterous, at least three species (*A. analis*, *A. bifoveolata*, *A. setifera*) are subject to wing-dimorphism, the flightless morph having shorter elytra and hind wings of reduced length. Interestingly, wing-dimorphism in *A. analis* appears to be linked to the reproduction mode, with the brachypterous morph forming regionally confined bisexual populations with a balanced sex ratio in high-altitude habitats in the northern Iberian Peninsula and the South Alps, and with the remainder of the populations across the vast range parthenogenetic. For more details see the section on *A. analis*.

DISTRIBUTION AND DIVERSITY: Five of the Palaearctic *Amischa* species have trans-Palaearctic distributions, nine are confined to the West Palaearctic, one to Middle Asia, and one to the East Palaearctic Region. Three of the widespread species are adventive also in other zoogeographic regions (Nearctic and Australian regions). Several of the West Palaearctic species appear to have restricted distributions. The same may apply to a species currently known only from one locality in Sichuan (China), but too little is known about the East Palaearctic fauna to be sure. It is currently completely uncertain how many, or if any, of the non-Palaearctic *Amischa* species in fact belong to this genus.

PARTHENOGENESIS: Extensive field studies in North Germany, as well as additional observations, considerations, and conclusions suggest that, except for some scattered brachypterous populations in high-altitude habitats in the South Alps and in the northern Iberian Peninsula (Fig. 290), *Amischa analis* is parthenogenetic throughout its range and that at least two species (*A. nigrofusca*, *A. decipiens*) are regionally parthenogenetic. For details see the respective species sections.

ECOLOGY: In the course of extensive field studies, approximately 8,300 adult specimens of five *Amischa* species (*A. analis*, *A. bifoveolata*, *A. nigrofusca*, *A. decipiens*, *A. forcipata*) were examined. The majority of specimens belonged to *A. analis*, which alone accounted for 5,610 specimens (67.5 %). The other species were significantly less common in the samples, with *A. bifoveolata* representing 18.5 %, *A. nigrofusca* 11 %, *A. decipiens* 3 %, and *A. forcipata* only 0.3 % of the total material (Tab. 2).

In many sample plots, especially in sandy *Calluna* heathlands and grasslands, *A. analis*, *A. bifoveolata*, *A. nigrofusca*, and *A. decipiens* occurred syntopically, whereas *A. forcipata* was found only in warmer habitats such as urban lawns and xerothermous slopes.

Regarding their life histories, seasonal density, and seasonal epigeic activity dynamics, at least the four more common species are very similar. They generally reproduce in spring and summer and finish their pre-imaginal development in summer and autumn. Densities are highest from autumn to early spring and lowest in late spring and early summer, whereas epigeic activity is low during the cold seasons and very high in spring. In fact, relative epigeic activity is even higher in spring than suggested in Figs. 3, 5, 7–8, since this is the time when densities have already decreased significantly. The opposite applies to the relative activity in the cold seasons.

Tab. 2: Number of adult specimens recorded in the study sites in Niedersachsen, North Germany. For *A. bifoveolata* and *A. decipiens*, the proportion of males is given in parentheses (nr: not recorded). *Amischa analis* and *A. nigrofusca* are exclusively represented by females. In *A. forcipata*, the sex ratio is approximately balanced.

Site	<i>analis</i>	<i>nigrofusca</i>	<i>bifoveolata</i>	<i>decipiens</i>	<i>forcipata</i>
Soil extractions					
Helstorfer Reiterheide: heathland	789	378	373 (0.23)	16 (0.13)	
Lüneburger Heide, Niederhaverbeck: heathland	289	58	79 (0.4)	8 (0)	
Lüneburger Heide, Niederhaverbeck: heathland: grassland	538	5	3 (0)		
Scheuen: heathland	50	54	25 (0.28)	8 (0.13)	
Heiliger Hain: heathland	379	85	329 (0.24)	23 (0.17)	
Heiliger Hain: grassland	361	7	27 (0.44)	2 (0.5)	
Photo-eclectors					
Lüneburger Heide, Niederhaverbeck: heathland	175	31	59 (0.22)	14 (0.43)	

Pitfall traps					
Helstorfer Reiterheide: heathland	132	30	87 (0.38)	16 (0.5)	
Helstorfer Reiterheide: pine forest	1	2	13 (0.54)	5 (0)	
Lüneburger Heide, Niederhaverbeck: heathland	50	10	10 (0.54)	2 (0)	
Lüneburger Heide, Niederhaverbeck: grassland	177		5 (0)		
Lüneburger Heide, Schneverdingen: heathland	724	127	341 (0.23)	58 (0.57)	
Lüneburger Heide, Haverbeck: heathland	230	2	9 (0.11)	1 (0)	
Scheuen: heathland	6				
Heiliger Hain: heathland	262	12	89 (0.29)		
Heiliger Hain: grassland	87		14 (0.21)		
Heiliger Hain: pine forest	1	1	1 (0)		
Bokeler Heide: grassy heathland	182	3	15 (0.13)	1 (1)	
Garlstedter Heide: heathland			1 (0)		
Rössenbergheide: heathland	11	3	17 (0.32)		
Rössenbergheide: pine forest	3		4 (0)		
Hümmling: heathland	15		4 (0.25)		
Hannover: floodplain meadows	123	8		21 (nr)	1
Hannover: moist fallows/grassland	255	7	1 (nr)	10 (nr)	1
Hannover: sandy grassland	108	1	3 (nr)		
Hannover: urban lawns	442	3	2 (nr)		19
Hannover: garden hedges/bushes	44	5	3 (nr)		1
Bad Nenndorf: garden	20		1 (0)		
Öselberg: calcareous grassland	5		1 (0)	2 (0.5)	
Wernershöhe: calcareous field margin	14	4			
Westerberg: xerothermous slope		2		23 (0.22)	
Ortsberg: xerothermous calcareous grassland		3			
Steinberg: xerothermous slopes	29	5		3 (1)	1
Düt: xerothermous slopes	45	7			1
Lehrte/Immensen: forest and forest margin	16	4	5 (0.20)	1 (0)	
Immensen: sandy arable land	47	42	26 (0.40)	34 (0.29)	
Total (grand total: 8305)	5610 (0)	899 (0)	1534 (0.26)	238 (0.29)	24

The *Amischa* species of the Palaearctic Region

Amischa analis group

Amischa analis (GRAVENHORST, 1802)

(Figs. 1–3, 9, 10–56, 290)

- Aleochara analis* GRAVENHORST, 1802: 76.
Bolitochara evanescens MANNERHEIM, 1830: 81.
Aleochara boleti STEPHENS, 1832: 129.
Aleochara foveolata STEPHENS, 1832: 128.
Aleochara inquinula STEPHENS, 1832: 128.
Aleochara littoralis STEPHENS, 1832: 139.
Aleochara livipes STEPHENS, 1832: 131.
Bolitochara teres RUNDE, 1835: 39.
Homalota haemorrhoidalis HEER, 1839: 332.
Homalota nigriceps HEER, 1839: 333.

Homalota contemta HEER, 1841: 593.

Homalota fossigera MANNERHEIM, 1843: 77.

Homalota tantilla WOLLASTON, 1854: 353.

Amischa platycephala THOMSON, 1860: 294.

Homalota scorsicornis HOCHHUTH, 1872: 108.

MATERIAL EXAMINED: Brachypterous bisexual morph: **SPAIN: Cataluña:** 2 ♂♂, Sierra del Cadi, Col de Pal, 2000 m, 31.III.1998, leg. Assing (cAss). **Burgos:** 2 ♀♀, Sierra de la Demanda, Sierra de Neila, Campino, 1500–1900 m, 25.V.1994, leg. Schülke & Grünberg (cAss). **Cantabria:** 1 ♂, 2 ♀♀, Reinoso, Tres Mares, Cornon, 2000–2150 m, 4.VI.1991, leg. Wunderle (cAss). **ANDORRA:** 3 ♂♂, 3 ♀♀, Puerto de Envalira, 2200–2300 m, 30.V.1994, leg. Schülke & Grünberg (cAss). **ITALY: Trentino-Alto Adige:** 7 ♂♂, 9 ♀♀, ca. 8 km ENE Arco, Monte Stivo, 45°55'N 10°58'E, 2000–2050 m, 30.V.2004, leg. Assing (cAss). **Veneto:** 1 ♀, Monte Baldo near Malcesine, 1700–1800 m, 24.V.1995, leg. Schülke & Grünberg (cAss). **Lombardia:** 1 ♂, ca. 2 km NNE Passo Croce Domini, 45°55'N 10°26'E, 1800 m, 28.VII.2000, leg. Assing (cAss); 1 ♂, ca. 15 km SSE Morbegno, Monte Ponteranica, 46°02'N 9°36'E, 2015 m, 31.V.2004, leg. Assing (cAss). **Valle d'Aosta:** 1 ♀, Valpelline, Deré la Vieille, 45°50'N 7°19'E, 2100 m, 23.IX.2002, leg. Meybohm (cAss).

Macropterous parthenogenetic morph: **BOSNIA-HERZEGOVINA:** 1 ♀, Sarajevo env., Bosha spring, 7.V.1990, leg. Wunderle (cAss); 1 ♀, Bjelasnica Planina, 1800 m, 8.V.1990, leg. Wunderle (cAss). **TAJIKISTAN:** 1 ♀, Hissar Alai, road to Ansob Pass, km 55, 2000 m, snowfield, 27.VI.1990, leg. Schülke & Wrase (MNB). **RUSSIA: Primorskiy Krai:** 1 ♀, Lazovski Reserve, Kordon Benevka, 7–11.V.1997, leg. Sundukov (MNB); 10 ♀♀, Lazovski Reserve, Lazo, Lazovka Valley, 4.–8.IV.1997, leg. Sundukov (MNB, cAss); 6 ♀♀, same data, but 4–8.VI.1997 (MNB, cAss). **JAPAN:** 5 ♀♀, Hokkaido, Sapporo env., Nopporo Virgin Forest, 28.IV.2007, leg. Lackner (cAss).

In addition, numerous records of the parthenogenetic morph from the following countries and regions were examined: Iceland, Portugal (incl. Madeira and Azores) (ASSING & SCHÜLKE 2006), Spain, France (incl. Corsica), Germany, Austria, Czechia, Slovakia, Italy, Romania, Greece (ASSING 2006a), Georgia, and Armenia (ASSING & SCHÜLKE 2019).

DIAGNOSIS: Usually parthenogenetic and macropterous species with regionally brachypterous bisexual populations in the South Alps and the northern Iberian Peninsula. Habitus of macropterous and brachypterous morph as in Fig. 10 and Fig. 11, respectively. Brachypterous morph with short elytra (approximately 0.7 times as long as pronotum), with partly or completely reduced hind wings, and on average of smaller body size and of paler colouration than macropterous morph.

♂: median dorsal portion of head depressed (Fig. 11), rarely shallowly impressed; tergite VIII (Figs. 24–26) transverse with broad and shallow posterior excision; sternite VIII (Figs. 27–31) weakly oblong, posterior margin truncate to indistinctly concave in the middle, with six stout black setae of somewhat variable length, the lateral setae usually longer than the median ones; median lobe of aedeagus (Figs. 19–22) approximately 0.45 mm long, of similar shape as in *A. bifoveolata*; internal structures (Fig. 23) long, weakly curved, weakly sclerotized, and with median tooth much closer to base than to apex.

♀: posterior margin of tergite VIII with relatively shallow median excision (Figs. 46–56); posterior margin of sternite VIII weakly to distinctly concave, with moderately short and relatively pale marginal setae (Figs. 15–18); spermatheca (Figs. 32–45) rather long (maximal extension usually 0.25–0.30 mm); distal portion relatively long, weakly and smoothly dilated apically; apical cuticular invagination directed vertically or slightly to the right.

COMPARATIVE NOTES: In external and the female sexual characters, particularly the shape of the female tergite VIII, *A. analis* is most similar to *A. bifoveolata*, from which this species is best distinguished by a usually smaller and shallower posterior excision of the female tergite VIII and by the shape of the spermatheca. In *A. bifoveolata*, the distal portion of the spermatheca is abruptly dilated in its apical half and less strongly bent to the right. Males of *A. analis* are distinguished from males of *A. bifoveolata* by an on average less impressed head, shorter elytra, strongly reduced hind wings, longer basal internal structures of the aedeagus, and particularly by

a broadly and much more shallowly excised male tergite VIII and by a less distinctly excised posterior margin of the male sternite VIII with fewer long black setae.

DISTRIBUTION: Based on the examined material, the distribution ranges from the Atlantic Islands in the west to Japan in the east. According to SCHÜLKE & SMETANA (2015), *A. analis* has also been reported from Middle Asia, Siberia, and the Middle East. It is not listed for Japan in this catalogue, but NEWTON (2019) reports it from Hokkaido. The presence in Hokkaido is confirmed by the material listed above. *Amischa analis* is adventive in North America and New Zealand (KLIMASZEWSKI et al. 2013, LESCHEN & NEWTON 2015). The above material from Bosnia-Herzegovina and Tajikistan represents the first records from these countries.

INTRASPECIFIC VARIATION AND PARTHENOGENESIS: In most of its vast range, *A. analis* is macropterous and evidently parthenogenetic (confirmed records of males unknown). Bisexual and at the same time brachypterous populations are confined to high-altitude habitats in the South Alps and in mountain ranges of the northern Iberian Peninsula (Pyrenees and southern outliers, Picos de Europa, Sierra de la Demanda) (Fig. 290). These populations were first assumed to represent a distinct species, but a comparison revealed that the female sexual characters are identical to those of macropterous *A. analis*. The conclusion that they are conspecific is not only based on morphological, but also on zoogeographic evidence. If the brachypterous populations represented a distinct species, the distribution pattern would be difficult to explain and seem rather implausible. Thus, *A. analis* represents a remarkable example of different modes of reproduction combined with a wing dimorphism, a phenomenon unknown in other Staphylinidae.

Regarding the question of whether macropterous *A. analis* are parthenogenetic or not, the following arguments support the conclusions proposed by WILLIAMS (1969) and LOHSE (1989) rather than those of BENICK (1967), MUONA (1990), and ADÁM (2010). First, based on the shape and chaetotaxy of tergite VIII and sternite VIII, as well as on the shape of the aedeagus, there was only one morphologically distinct type of male present in the samples from North Germany, aside from the clearly identifiable males of *A. decipiens* and *A. forcipata*. This observation suggests that only one of the three remaining species is represented by both males and females. Second, the presence number of males in the samples corresponds to neither the females of *A. analis* nor to those of *A. nigrofusca* in the samples from North Germany, but to those of *A. bifoveolata* (Tab. 2). Third, in samples from other regions with exclusively *A. analis* females, males were absent. And finally, in samples from South Europe with larger numbers (>100 specimens) of both males and females, only females of *A. bifoveolata* were found. These observations suggest that *A. analis* is in fact parthenogenetic, except in restricted montane habitats in the South Alps and the northern Iberian Peninsula (Fig. 290). Assuming the above argumentation to be correct, the illustrations of male *Amischa analis* in MUONA (1990) would refer to *A. bifoveolata*.

NATURAL HISTORY: In most regions of the West Palaearctic, *A. analis* is the most common representative of the genus. It is eurytopic in various unforested habitats (Tab. 2). The highest densities were observed in grasslands on sandy soils, with maximal densities of several hundred adult individuals per square meter (Fig. 2). In forests, this species was found nearly exclusively in the cold seasons from autumn to early spring, suggesting that parts of the populations hibernate in these habitats.

Dissection of the ovaries of numerous females revealed that oviposition takes place from early April to mid-August. Larvae tentatively assigned to this species were found in soil extractions from the second half of May to the first half of October. Teneral adults were observed in pitfall trap catches from June through November. These findings suggest that the reproduction period and pre-imaginal development last from early spring to autumn.

Adult densities were lowest from the second half of May through August, after which time they significantly increased as a result of the emergence of the new generation. They stay high until spring (April/May), when they begin decreasing again (Figs. 1–2). Epigeic activity, by contrast, is maximal from mid-April through September, i.e., during the reproduction period in the warmer seasons. It significantly decreases during autumn (October through November) and is minimal during the winter months (Fig. 3). Flying activity as recorded by photo-electors is highest in spring (Fig. 9).

Numerous dissected specimens were infested with nematodes, some also with Nematomorpha or with fungi.

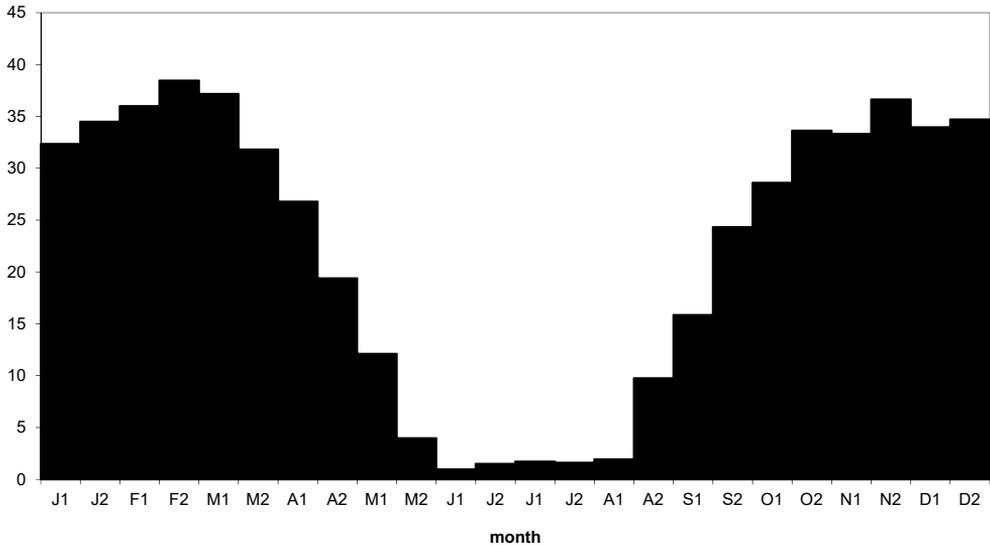


Fig. 1: Seasonal density (adults/m²) of *Amischa analis* in *Calluna* heathlands in North Germany (moving averages; all studied sites pooled). The months are given in half-monthly intervals (F1 = first half of February, F2 = second half of February, etc.).

Amischa bifoveolata (MANNERHEIM, 1830)

(Figs. 4–5, 9, 57–88)

Bolitochara bifoveolata MANNERHEIM, 1830: 79.

Homalota cavifrons SHARP, 1869: 177.

Homalota filum MULSANT & REY, 1870: 105 **syn.n.**

Amischa minima MULSANT & REY, 1873: 179 **syn.n.**

Amischa strupii SCHEERPELTZ, 1967: 13 ff.

Amischa vogti BENICK, 1967: 24.

Amischa uhligi PACE, 1987: 280 **syn.n.**

TYPE MATERIAL EXAMINED: *Homalota cavifrons*: **Lectotype** ♂: “♂ / *H. cavifrons* ♂ type D.S. / D. Sharp Coll. B.M.1932-116. / Lectotype *Amischa cavifrons* det. S.A. Williams 1968 / Lectotype / Standing in Sharp Coll. as *cavifrons*. / *Amischa bifoveolata* (Mannerheim) det. V. Assing 2020” (BMNH). **Paralectotype** ♀ [dissected prior to present study]: “Scotland, Dumfriesshire, Thornhill (Belkine), 4 mls N.W. Dumfries, 21.iii.1868 D. Sharp / Standing in Sharp Coll. as *cavifrons*. / Sharp Coll. B.M.1932-116. / Paralectotype *Amischa cavifrons* det. S.A. Williams 1968” (BMNH).

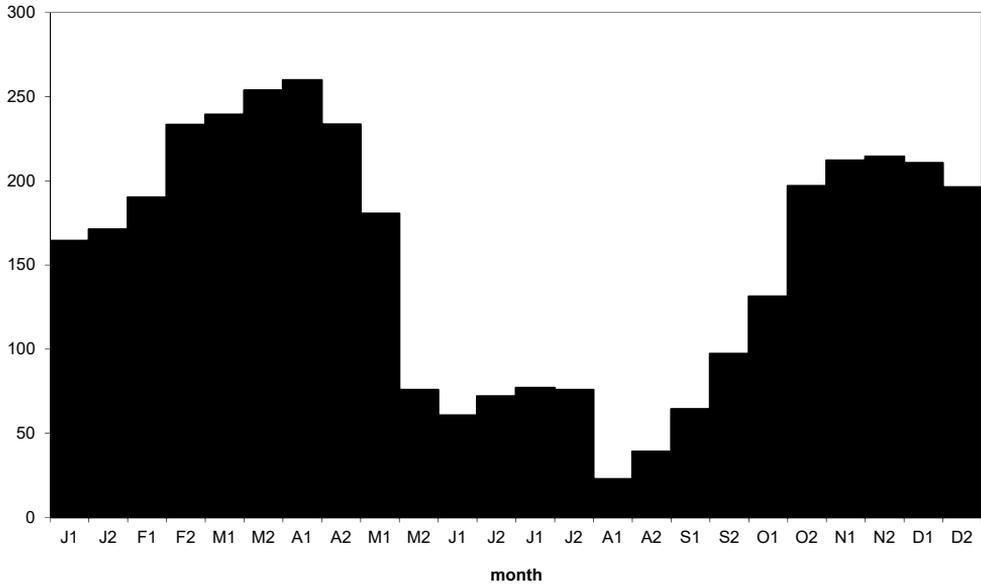


Fig. 2: Seasonal density (adults/m²) of *Amischa analis* in sandy grasslands and grassy heathlands in North Germany (moving averages; all studied sites pooled). For additional explanations see Fig. 1.

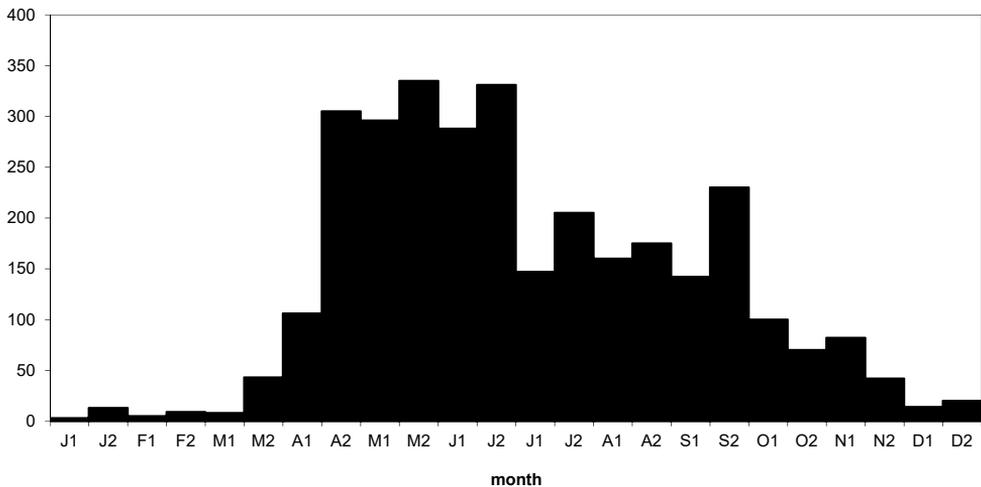


Fig. 3: Seasonal epigeic activity of *Amischa analis* based on all-year pitfall trap studies in various habitats in North Germany (results of all studied sites pooled). For additional explanations see Fig. 1.

Homalota filum: **Lectotype** ♂, present designation [dissected prior to present study]: “♂ / Paralectotypus ♂ *Homalota filum* Mulsant et Rey, V.I. Gusarov det. 1999 / *Amischa analis* (Grav.) ♂, V.I. Gusarov det. 1999 / Coll. C. Rey, 1894, Muséum de Lyon / Lectotypus ♂ *Homalota filum* Mulsant & Rey, desig. V. Assing 2013 / *Amischa bifoveolata* (Mannerheim), det. V. Assing 2013” (MHNL). **Paralectotypes**: 1 ♂: same labels as lectotype, but “Paralectotypus ♂ *Homalota filum* Mulsant & Rey, desig. V. Assing 2013” (MHNL); 1 ♂: “♂ / Lectotypus ♂ *Homalota filum* Mulsant et Rey, V.I. Gusarov des. 1999 / *Amischa filum* Muls.Rey ♂, V.I. Gusarov det. 1999 / Coll. C. Rey, 1894, Muséum de Lyon” (MHNL); 2 ♀♀: “♀ / Paralectotypus ♀ *Homalota filum* Mulsant et Rey, V.I.

Gusarov des. 1999 / *Amischa corsica* G. Benick ♀, V.I. Gusarov det. 1999 / Coll. C. Rey, 1894, Muséum de Lyon" (MHNL).

Amischa minima: **Syntype** ♀ [dissected prior to present study]: "♀ / *minima*, Muona vid. / Lectotypus ♀ *Amischa minima* Mulsant et Rey, V.I. Gusarov des. 1999 / *Amischa minima* Muls. Rey ♀, V.I. Gusarov det. 1999 / Coll. C. Rey, 1894, Muséum de Lyon" (MHNL).

Amischa strupii: **Lectotype** ♂, present designation: "♂ / Col. Lauteret, Dauph. Strupi / ex coll. Scheerpeltz / Typus *Amischa Strupii* O. Scheerpeltz / I. Tir. Brixen, Plose, 17.6.55 Peez / von Dr. G. Benick vorgelegt 16.2.66 / *Amischa bifoveolata* (Mann.), det.: Ádám, 2009. / Lectotypus ♂ *Amischa strupii* Scheerpeltz, desig. V. Assing 2020 / *Amischa bifoveolata* (Mannerheim), det. V. Assing 2020" (NHMW). **Paralectotypes**: 1 ♂, 2 ♀♀: "Col. Lauteret, Dauph. Strupi / ex coll. Scheerpeltz / (Co-)Typus *Amischa Strupii* O. Scheerpeltz / *Amischa bifoveolata* (Mann.), det.: Ádám, 2009. / Paralectotypus *Amischa strupii* Scheerpeltz, desig. V. Assing 2020 / *Amischa bifoveolata* (Mannerheim), det. V. Assing 2020" (NHMW).

Amischa uhligi: **Holotype** ♀: "Bulgarien, Stara Planina, leg. Hieke/Uhlig / 5 km W v. Schipka-Pass, 1300 m, 13./14.9.1977 / Holotypus *Amischa uhligi* mihi, det. R. Pace 1982 / *Amischa uhligi* n. sp., det. R. Pace 1982" (MNB).

ADDITIONAL MATERIAL EXAMINED: **ALBANIA**: 3 ♀♀, 3 km SE Elbasan, Mali i Shpatit, 41°3'N 20°13'E, 1500 m, beech forest margin, sifted, 22.V.2010, leg. Assing (cAss); 2 ♂♂, 1 ♀, Librazhd, 25 km ESE Elbasan, Mali i Polisit, 41°4'N 20°22'E, 1700 m, grassy calcareous dolina, near snowfield, under stones and sifted, 23.V.2010, leg. Assing (cAss). **GEORGIA**: 1 ♂, Svaneti, Ushguli, Zagaro Pass, 42°55'N 43°3'E, 2400 m, 28.VI.2017, leg. Brachat & Meybohm (cAss). **RUSSIA**: 1 ♀, W-Caucasus, 15 km ENE Krasnaya Polyana, near Pscashkha Pass, 43°44'N 40°23'E, 2015 m, below snowfield, grass sifted, 16.VII.2011, leg. Assing (cAss).

In addition, numerous records from the following countries were examined: Germany, Austria, Czechia, Italy, Bulgaria, Greece (ASSING & WUNDERLE 2001: as *A. strupii*), Turkey (ASSING 2007a, 2009, 2013), and Armenia (ASSING & SCHÜLKE 2019).

COMMENT: *Homalota cavifrons* was originally described based on an unspecified number of syntypes from "the hilly districts of Scotland, in the neighbourhood of Edinburgh, and near Thornhill" (SHARP 1869). WILLIAMS (1969) designated a lectotype.

The original description of *Homalota filum* is based on an unspecified number of syntypes from "La Provence" (MULSANT & REY 1870), that of *Amischa minima* on an unspecified number of syntypes from "les environs de Paris et de Lyon" (MULSANT & REY 1873). The type specimens in the Rey collection had been examined and, without exception, dissected by V. Gusarov earlier, as can be inferred from the lectotype, paralectotype, and identification labels attached to the pins. A lectotype designation had been published neither for *A. filum* nor for *A. minima*. All the type specimens have a vial filled with what appears to be glycerine attached to them, which contained the genitalia and the abdominal segments VIII–X. However, these structures had evidently been exposed to a chemical that has caused them to bleach considerably, in some cases literally to vanish. The latter unfortunately applies also to the specimens labelled by Gusarov as lectotypes of *A. filum* and *A. minima*. Despite a careful search, neither the genitalia nor the sclerites of the abdominal segments VIII–X were found in the respective vials.

The identification labels attached to the syntypes of *A. filum* by V. Gusarov suggest that the type series is composed of two species. The aedeagi of the other two male syntypes, which had been identified as *Amischa analis* (GRAVENHORST 1802) by V. Gusarov are extremely bleached, but still visible. One of these males is designated as the lectotype; it is conspecific with *A. bifoveolata*.

A similar problem was encountered with the sole syntype of *A. minima*. Neither the spermatheca nor the sclerites of the abdominal segments VIII–X were found in the vial attached to the pin. Externally, the specimen is identical to the morph of *A. bifoveolata* with short elytra. Hence the synonymy proposed above.

The original description of *Amischa strupii* is based on an unspecified number of syntypes from various localities in the South and West Alps (SCHEERPELTZ 1967). The name was synonymized with *A. bifoveolata* by ÁDÁM (2010), who states that “the male and female sexual characters of *Amischa strupii* are in good agreement with those of *Amischa bifoveolata*”. An examination of four syntypes, one of which is here designated as the lectotype, confirmed the previously established synonymy. The aedeagus and the posterior portion of the male sternite VIII of the lectotype are illustrated in Figs. 38–39, 55.

In the original description of *A. uhligi*, which is based on a unique female from “Bulgaria, Stara Planina, 5 km a ovest del Passo Šipka”, PACE (1987) states that the species is incapable of flight. An examination of the holotype revealed that it does have hind wings and that it is conspecific with *A. bifoveolata*. The spermatheca is malformed.

DIAGNOSIS: Regionally wing-dimorphic bisexual species. Reliably identified only based on the primary and secondary sexual characters.

♂: head extensively and more or less distinctly impressed; posterior margin of tergite VIII with moderately broad and moderately deep posterior excision (Figs. 64–68); sternite VIII (Figs. 69, 82–88) much longer than tergite VIII and distinctly oblong, posterior margin with 6–10, mostly 8 long black setae; median lobe of aedeagus (Figs. 57–62) 0.45–0.52 mm long; ventral process subapically angled in lateral view and apically very acute; basal internal structures weakly sclerotized, relatively short, weakly curved, and with median tooth close to middle.

♀: posterior margin of tergite VIII (Figs. 76–80) with distinct posterior excision of variable size and depth; sternite VIII (Fig. 81) with usually rather short marginal setae at posterior margin; spermatheca (Figs. 70–75) of moderate size, maximal extension usually between 0.24 and 0.28 mm, distal portion abruptly dilated in apical half, apical cuticular invagination usually directed vertically or to the left.

COMPARATIVE NOTES: *Amischa bifoveolata* females are distinguished from those of the similar, sympatric, and common *A. analis* and *A. nigrofusca* by the shape of the posterior excision of the female tergite VIII, a usually denser fringe of setae at the posterior margin of the female sternite VIII, and above all by the shape of the distal portion of the spermatheca. In *A. analis*, the latter is gradually dilated apically and has the cuticular invagination directed vertically or to the right. In *A. nigrofusca*, it is more strongly dilated apically, more strongly angled, and it has the apical cuticular invagination directed vertically or to the right. Males of *A. bifoveolata* are distinguished from those of *A. analis* by usually longer elytra, mostly fully developed hind wings, a deeper and narrower posterior excision of the male tergite VIII, a medially more distinctly excised male sternite VIII with mostly more than six black setae, an on average larger aedeagus with shorter basal internal structures with a median tooth in different position. They differ from (very rarely found) males of *A. nigrofusca* by a narrower posterior excision of the male tergite VIII, a posteriorly less distinctly excised male sternite VIII with more than four black setae, and by an aedeagus with shorter basal internal structures with a median tooth in different position.

INTRASPECIFIC VARIATION AND WING DIMORPHISM: Like most other *Amischa* species, *A. bifoveolata* is rather variable in characters such as body size, colouration, shapes of male and female tergite VIII, and size of the median lobe of the aedeagus. Populations with elytra and hind wings of reduced length were observed in mountain ranges of the southern Balkans (Albania, Greece).

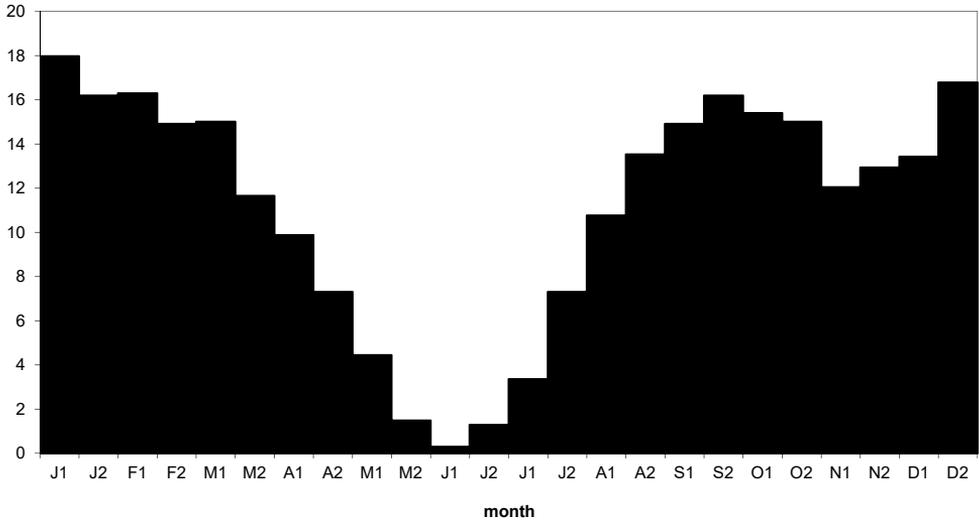


Fig. 4: Seasonal density (adults/m²) of *Amischa bifoveolata* in *Calluna* heathlands and sandy grasslands in North Germany (moving averages; all studied sites pooled). For additional explanations see Fig. 1.

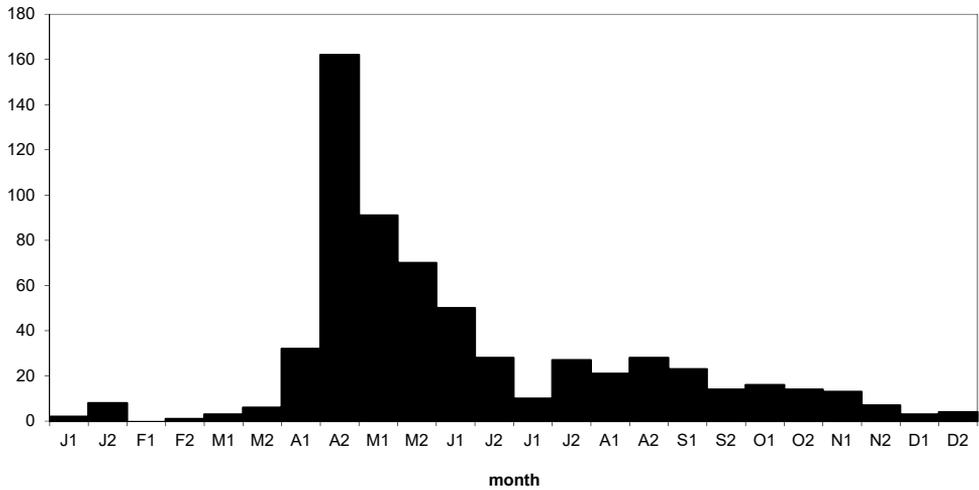


Fig. 5: Seasonal epigeic activity of *Amischa bifoveolata* based on all-year pitfall trap studies in various habitats in North Germany (results of all studied sites pooled). For additional explanations see Fig. 1.

DISTRIBUTION: Confirmed records were seen from the West Palaearctic Region from North Spain in the west eastwards to the Caucasus Region. According to SCHÜLKE & SMETANA (2015), the species has also been reported from the East Palaearctic (West and East Siberia, Russian Far East, North Korea), but these records require confirmation. The additional material listed above includes the first records from Albania, Georgia, and the Russian South European territory. LESCHEN & NEWTON (2015) report the species as adventive from New Zealand.

SEX RATIO: Unlike *A. analis*, *A. bifoveolata* is concluded to be represented by both males and females, though males are generally significantly rarer than females. For a detailed discussion of the assignment of males to *A. bifoveolata* see the section on *A. analis*. In the extensive field studies conducted in North Germany, approximately one-fourth (26 %) of all specimens were males (Tab. 2). However, the proportion of males was significantly higher in some samples from Greece.

NATURAL HISTORY: In general, *A. bifoveolata* is ecologically similar to the often syntopic *A. analis* and *A. nigrofusca*. In the sampled localities in North Germany, it was often found together with these species, but mostly absent especially in xerothermous habitats. The greatest numbers were observed in heathlands, sandy grasslands, and sandy arable land.

Eggs were found in the ovaries of dissected females in spring and teneral adults were observed in autumn, suggesting that the reproductive period is similar to that of *A. analis* and *A. nigrofusca*.

Densities are lowest during the period from May through June (Fig. 4). They increase until September and stay high until March, then decrease again. The seasonal epigeic activity (Fig. 5) is nearly identical to that of *A. nigrofusca*. The same applies to dispersal by flight, as recorded by photo-electors (Fig. 9).

Amischa nigrofusca (STEPHENS, 1832)

(Figs. 6–7, 9, 89–111)

Aleochara nigrofusca STEPHENS, 1832: 129.

Aleochara apicalis STEPHENS, 1832: 130.

Homalota soror KRAATZ, 1856: 257.

Homalota simillima SHARP, 1869: 177 f.

Amischa arata MULSANT & REY, 1873: 177.

Amischa sarsi MUNSTER, 1927: 287.

Amischa jugorum SCHEERPELTZ, 1956: 528 ff. **syn.n.**

TYPE MATERIAL EXAMINED: *Homalota simillima*: **Lectotype** ♂: “♂ / Scotland, Gribton Bridge on Cairn water 5 mls N.W. Dumfries, 30.IV.1868, D. Sharp. / *H. simillima* ♂ type D.S. / D. Sharp Coll. B.M.1932-116. / Lectotype *Amischa simillima* det. S.A. Williams 1968 / Lectotype / Standing in Sharp Coll. as *simillima* / *Amischa nigrofusca* (Stephens) det. V. Assing 2020” (BMNH). **Paralectotypes:** 1 ♂ [dissected prior to present study]: “same data as lectotype / Paralectotype *Amischa simillima* det. S.A. Williams 1968 / Paralectotype / Standing in Sharp Coll. as *simillima* / D. Sharp Coll. B.M.1932-116.” (BMNH); 1 ♀ [dissected prior to present study]: “Scotland, Gribton Bridge on Cairn water 5 mls N.W. Dumfries, 30.IV.1868, D. Sharp. / *simillima* / Sharp Coll. / D. Sharp Coll. B.M.1932-116. / *simillima* Shp, Gribton Bridge, Scotland. 30.4.68, C.M.F. von Hayek / Standing in Sharp Coll. as *simillima* / Paralectotype *Amischa simillima* det. S.A. Williams 1968 / Paralectotype” (BMNH); 1 ♀ [dissected and completely dismembered prior to present study; some body parts missing]: “*simillima* Shp, Gribton Bridge, Scotland. 30.4.68, C.M.F. von Hayek / Sharp Coll. / D. Sharp Coll. B.M.1932-116. / Standing in Sharp Coll. as *simillima* / Paralectotype *Amischa simillima* det. S.A. Williams 1968 / Paralectotype” (BMNH); 1 ♀ [antennae and abdomen missing]: “*simillima* / Scotia / *Homalota simillima* Sharp. / Sharp Coll. 1905-313. / Standing in Sharp Coll. as *simillima* / Paralectotype” (BMNH).

Amischa jugorum: **Holotype** ♀: “D15/5? / Alpes du Dauphiné, Massif du Pelvoux, leg. Prof. Dr. Janetschek / Vorfeld des Glacier de la Pilatte, ca. 2100 m, 8.1951 / ex coll. Scheerpeltz / Typus *Amischa jugorum* O. Scheerpeltz / *Amischa analis* (Grav), det.: Ádám, 2009. / *Amischa nigrofusca* (Stephens) det. V. Assing 2011” (NHMW).

ADDITIONAL MATERIAL EXAMINED: **PORTUGAL:** 2 ♀♀, Bragança env., light trap, 3.VI.1986, leg. Hozmann (cAss). **SPAIN:** 2 ♀♀, 40 km N Barcelona, Sierra de Montseny, 1400 m, 19.III.1994, leg. Assing (cAss); 2 ♀♀, Galicia, Lugo, Montforte de Lemos, 11.–18.VII.2001, leg. Valcárcel (MNB, cAss). **FRANCE:** 1 ♂, 1 ♀, Aude, Belvis, 42.845°N 2.113°E, 995 m, flight interception trap, 13–14.VI.2017, leg. Bouget (cFel). **HUNGARY:** 1 ♀, Bugac Puszta, grassland, pitfall trap, 31.III.1982, leg. Gallé (cAss); 1 ♀ [communicated by B. Feldmann], Tiszacsege, car-net, 13.VII.2001, leg. Renner (cFel); 2 ♀♀ [communicated by B. Feldmann], Drávaszabolcs, car-net, 22.VII.2001, leg. Renner (cFel). **TURKEY:** 1 ♂, Samsun, 40 km W Samsun, 41°16'25"N 35°51'46"E, 890 m, beech forest, litter sifted, 21.VII.2008, leg. Assing (cAss); 1 ♂, Burdur, 17 km SE Burdur, N Çeltikçi geçidi,

37°36'N 30°24'E, 1260 m, oak litter and moss sifted, 16.II.2011, leg. Schülke (cAss). **RUSSIA:** 1 ♀, Krasnodar Region, S Krymsk, 44°54'N 37°59'E, 12.VI.2019, leg. Enushchenko (cAss).

In addition, numerous records from the following countries were examined: France, Sweden, Germany, Czechia, Italy, Greece, Turkey (ASSING 2009, 2013), and Kazakhstan (MNB, cAss).

COMMENT: *Homalota simillima* was originally described based on an unspecified number of syntypes found “on the banks of the Nith, and its tributary Cairn Water, under stones” (SHARP 1869). WILLIAMS (1969) designated a lectotype.

The original description of *A. jugorum* is based on a single “♀ (Typus)” collected “im Vorfeld des Glacier de la Pilatte in 2100 m Höhe im August 1951” (SCHEERPELTZ 1956). The holotype was studied by ÁDÁM (2010), who placed *A. jugorum* in synonymy with *A. analis*. An examination of the holotype, however, revealed that the spermatheca is that of *A. nigrofusca*.

DIAGNOSIS: Reliably distinguished from its congeners only by the shape of the female primary and secondary sexual characters.

♂: head dorsally depressed to shallowly impressed in the middle; tergite VIII (Figs. 93–94) with broadly V-shaped and rather deep posterior excision; sternite VIII (Figs. 95–96) posteriorly broadly excised and with four stout black setae; median lobe of aedeagus approximately 0.45 mm long and shaped as in Figs. 89–91; basal internal structures long, weakly sclerotized, weakly curved, and with median tooth much closer to base than to apex.

♀: posterior margin of tergite VIII with broad and rather deep median excision (Figs. 97–102); posterior margin of sternite VIII usually weakly concave in the middle (Fig. 103); spermatheca (Figs. 104–111) moderately long (maximal extension 0.24–0.28 mm); distal portion strongly angled, abruptly and usually strongly dilated apically; apical cuticular invagination usually directed vertically or to the right.

COMPARATIVE NOTES: In external and the male and female sexual characters, particularly the shape of the female tergite VIII and the aedeagus, *A. nigrofusca* is most similar to *A. bifoveolata*, from which this species is reliably distinguished by a broader posterior excision of the male tergite VIII, the shape and chaetotaxy of the male sternite VIII, the shape of the ventral process of the aedeagus (less sinuate in lateral view and apically less slender in ventral view), a usually deeper and especially broader posterior excision of the female tergite VIII and by the shape of the proximal portion of the spermatheca (*A. bifoveolata*: proximal portion less strongly angled and less strongly dilated apically; apical cuticular invagination usually directed vertically or to the left).

DISTRIBUTION: The distribution ranges from Northwest Africa, Madeira, and Portugal in the west across most of the West Palaearctic Region eastwards to Middle Asia (Kazakhstan). The additional material above includes the first records from Portugal, Spain, Hungary, and the Russian South European territory. LESCHEN & NEWTON (2015) report the species as adventive in New Zealand.

PARTHENOGENESIS: This species has been assumed to be at least regionally parthenogenetic (LOHSE 1989). The present study, particularly extensive field studies in North Germany, support this hypothesis, and confirmed records of males of *A. nigrofusca* are unknown from Central and South Europe. However, an examination of the type material of *A. simillima* (see above) revealed that the type series is composed of both males and females, and that the females in the type series are indistinguishable from females of *A. nigrofusca* from Central and the southern West Palaearctic Region. Similarly, the type material of *A. sarsi* from Norway, a junior synonym of *A. simillima* (and *A. nigrofusca*), is composed of both males and females, and MUONA (1990) states that he examined 53 males without, however, mentioning their respective localities. And finally, three males were also found in Southwest France and in Turkey (see material examined).

The available evidence therefore suggests that *A. nigrofusca* is represented by both sexes in the north, northwest, west, and south of its range (Scandinavia, Great Britain, South France, Turkey), with males much rarer than females, but parthenogenetic in Central Europe, a phenomenon unknown from other European Aleocharinae.

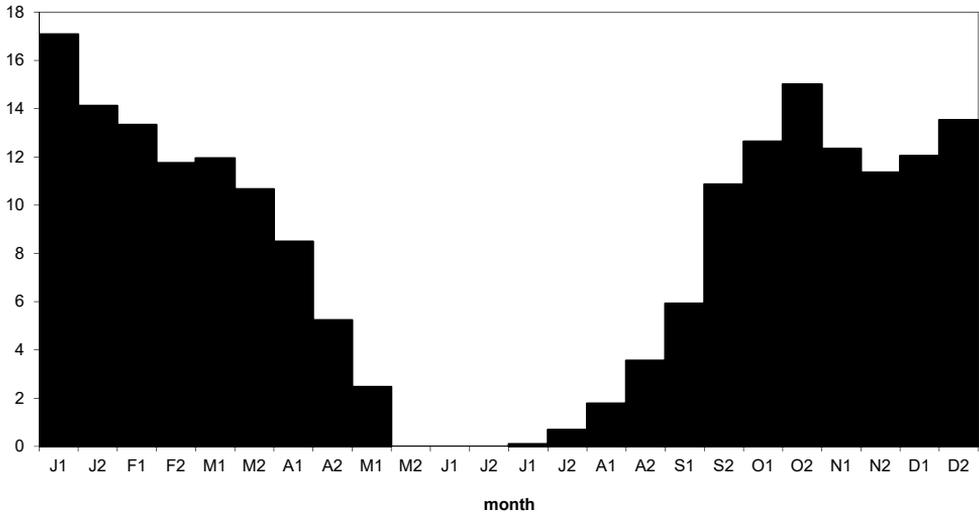


Fig. 6: Seasonal density (adults/m²) of *Amischa nigrofusca* in *Calluna* heathlands and sandy grasslands in North Germany (moving averages; all studied sites pooled). For additional explanations see Fig. 1.

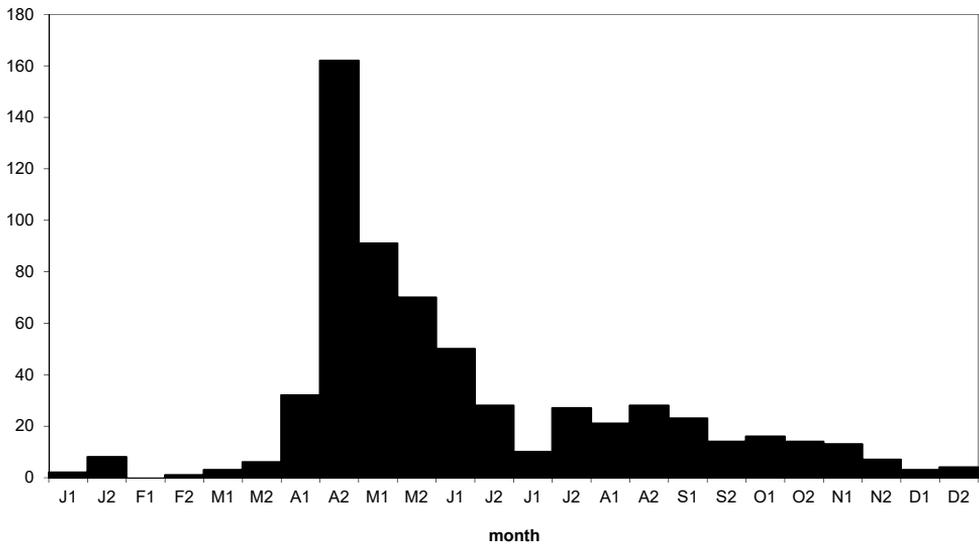


Fig. 7: Seasonal epigeic activity of *Amischa nigrofusca* based on all-year pitfall trap studies in various habitats in North Germany (results of all studied sites pooled). For additional explanations see Fig. 1.

NATURAL HISTORY: Although significantly rarer than *A. analis*, *A. nigrofusca* was also found in various unforested habitats. In the field studies conducted in North Germany, it was most frequent in localities with sandy soils, particularly some heathlands (Tab. 1). Like *A. analis*, it was recorded from forests practically exclusively in the colder seasons and not during the reproduction period.

Eggs were found in the ovaries of dissected females in spring and teneral adults were observed from July from September, suggesting that the reproductive period is similar to that of *A. analis*.

In general, the densities dynamics in the course of the year (Fig. 6) are similar to those of *A. analis* and *A. bifoveolata*. They are very low from May through August, then increase significantly to reach a maximum during the period from the end of September to the February and subsequently decreasing again. Epigeic activity (Fig. 7) is highest in spring, low in summer and autumn, and minimal in winter. The species was recorded with photo-electors only in spring, suggesting that this is the period during which dispersal by flight occurs.

Amischa forcipata MULSANT & REY, 1873

(Figs. 112–125)

Amischa forcipata MULSANT & REY, 1873: 178.

MATERIAL EXAMINED: **MOROCCO:** 1 ♂, 1 ♀, Ouarzazate Prov., Qued Drag near Tin-Zoulin vill., 30°30'N 6°6'W, 27.VI.2010, leg. Anichtchenko (cAss); 1 ♂, Ar Rif, Chefchaouen env., 35°12'N 5°19'W, 270 m, 3.VI.2007, leg. Hlaváč (cAss). **TUNISIA:** see ASSING (2005c). **PORTUGAL (mainland):** 1 ♂, 1 ♀, Braganca distr., Serra de Bornes, 41°47'N 7°1'W, 830 m, stream valley with *Rubus*, 21.III.2002, leg. Meybohm (cAss); 3 ♀♀, Serra de Montezinho, Rio Sabor, 41°54'N 6°48'E, 970 m, meadow margin, 21.III.2002, leg. Meybohm (cAss). **Azores:** 5 ♂♂, 12 ♀♀, Santa Maria, Barreiro da Faneca, 37°0'N 25°7'W 220 m, old dung heap sifted, 19.VII.2013, leg. Assing (cAss); 1 ♀, Santa Maria, Maia, 36°57'N 25°1'W, 20 m, bank of stream below waterfall, 21.VII.2013, leg. Assing (cAss). **SPAIN:** several records (ASSING 2007b) (cAss). **NETHERLANDS:** one record (cAss). **GERMANY:** numerous records (cAss). **AUSTRIA:** several records (cAss). **ITALY:** two records (cAss). **HUNGARY:** several records (cAss, cFel). **GREECE:** several records from the mainland, Pelopónnisos, Corfu, and from Crete (cAss). **TURKEY:** numerous records (ASSING 2007a, 2009, 2013). **ARMENIA:** see ASSING & SCHÜLKE (2019). **GEORGIA:** 1 ♀, Adjara, Danisparauli, 41°39'N 42°28'E, 1560 m, 21.VI.2017, leg. Brachat & Meybohm (cAss).

DIAGNOSIS: Macropterous and relatively large species of blackish colouration.

♂: median dorsal portion of head depressed or shallowly impressed; tergite VIII (Fig. 121) of highly distinctive shape, posterior margin with deep U-shaped posterior median excision; sternite VIII (Fig. 122) oblong, posterior margin convex, near posterior margin with usually six moderately long and relatively fine dark setae; median lobe of aedeagus (Figs. 117–120) 0.45–0.50 mm long; ventral process moderately long, weakly sinuate in lateral view, apically acute and not incised in ventral view; basal internal structures distinctly sclerotized, rather strongly curved apically and basally; paramere as in Figs. 123–124.

♀: posterior margin of tergite VIII truncate or very weakly concave only in the middle (Figs. 112–113; sternite VIII (Fig. 125) weakly oblong, posterior margin broadly convex, often weakly concave in the middle; spermatheca (Figs. 114–116) relatively small, maximal extension approximately 0.2 mm, distal portion abruptly dilated in apical half, apical cuticular invagination usually directed vertically or to the left.

COMPARATIVE NOTES: *Amischa forcipata* is one of the most easily identified species. It is characterised particularly by the shapes of the male and female tergites VIII, and by the shape of the median lobe of the aedeagus.

SEX RATIO: Based on the material studied, the sex ratio is balanced.

DISTRIBUTION AND NATURAL HISTORY: The distribution ranges from the Azores and Northwest Africa (Morocco, Tunisia) in the west across South and Central Europe eastwards to Turkey and the Caucasus Region (Armenia, Georgia). The material listed above includes the first records from Morocco, the Azores, mainland Portugal, and Georgia.

A very rare species in Central Europe until a few decades ago (BENICK & LOHSE 1974), *A. forcipata* has become significantly more common in this region. It is usually found in moist habitats in more southern regions and in microclimatically warm habitats (urban habitats, xerothermous slopes) in the north of its range (Tab. 2).

Amischa setifera BENICK, 1982

(Figs. 126–138)

Amischa setifera BENICK, 1982: 111 f.

Amischa andreasi MUONA, 1990: 20 **syn.n.**

Amischa rougemonti PACE, 1998: 429 **syn.n.**

TYPE MATERIAL EXAMINED: *Amischa setifera*: **Paratypes:** 2 ♂♂, 1 ♀: “MONGOLIA, Archangaj aimak, Changaj Gebirge, zwischen Somon Ichtamir und Somon Čuluut, 20 km W von Ichtamir, 2150 m, Exp. Dr. Z. Kaszab, 1966 / Nr. 544, 19.VI.1966 / *Amischa setifera* Bck., G. Benick det. / Paratypus” (MHNG).

Amischa andreasi: **Holotype** ♂: “Finland Ks 736 : 61, Kuusamo, 12.8.1983, Muona leg. / Holotype *Amischa andreasi* n.sp. ♂, Muona des. 1989 / <http://id.luomus.fi/GAC.24436>, Finland Ks Kuusamo, ykj: 736:361, 12.VIII.1983, Muona, Jyrki leg. / *Amischa setifera* Benick, det. V. Assing 2020” (MZH).

ADDITIONAL MATERIAL EXAMINED: **CHINA:** 1 ♂, 1 ♀, S-Gansu, mountains SE Longnan, 33°11'N 105°14'E, 2060 m, nest of *Formica* sp., 7.VIII.2012, leg. Assing (cAss); 1 ♂, same data, but sifted (cAss); 1 ♀, S-Gansu, N Chengxian, W-Qinling Shan, 34°8'N 105°47'E, 1750 m, moist valley with stream and ponds, meadow with *Artemisia*, 28.VII.2012, leg. Schülke (MNB); 1 ♂, Shaanxi, Qinling Shan, 47 km S Xi'an, 33°51'N 108°47'E, 2300–2500 m, sifted, 26.–30.VIII.1995, leg. Schülke (cAss); 1 ♀, Jilin, Chang Bai Shan, 42°2'N 128°3'E, 2200 m, 7.VI.2004, leg. Cooter (cAss); 2 ♀♀, Qinghai, 27 km SSW Ledu, Laji Shan, pass road, 36°16'N 102°16'E, *Coptoformica* nest sifted, 13.VII.2011, leg. Schülke (MNB, cAss). **RUSSIA:** 4 ♂♂, 1 ♀, Primorskiy Kray, Lazovski Reserve, Lazo, Lazovka Valley, 4–5.IV.1997, leg. Sundukov (MNB, cAss); 1 ♂, Primorskiy Kray, Lazovski Reserve, Kordon Amerika, 24.–27.IV.1997, leg. Sundukov (MNB); 1 ♀, Lazovski Reserve, Kordon Amerika, 24–28.IV.1998, leg. Sundukov (MNB).

COMMENT: The original description of *A. setifera* is based on seven type specimens from “Mongolia, Archangaj aimak: Changaj Gebirge, zwischen Somon Ichtamir und Somon Čuluut, ca 20 km W von Somon Ichtamir, 3 km S vom Tal des Flusses Chanuj gol” (BENICK 1982).

The original description of *A. andreasi* is based on a unique male holotype from “NE Finland, Kuusamo at the Arctic Circle” (MUONA 1990). The species was subsequently reported from West- and East Siberia, and the Russian Far East by LOBKOVÁ & SEMENOV (2014). An examination of the holotype revealed that the aedeagus and the male sexual characters are identical to those of *A. setifera*.

Amischa rougemonti was described based on a male holotype and a female paratype from “China, Shanxi, Wutaishan” and a male paratype from “China, Gansu, Yonghai” (PACE 1998). The genitalia illustrated by PACE (1998: figs. 125–128) and those of the additional material from China listed above are identical to those of *A. setifera*, suggesting that the type material of *A. rougemonti* is conspecific with that of *A. setifera*. Hence the synonymy proposed above.

DIAGNOSIS: Wing-dimorphic species of brown to black colouration.

♂: head dorsally flattened, without distinct impression; tergite VIII (Figs. 130–131) transverse, posterior margin broadly and weakly concave; sternite VIII (Fig. 132) approximately as long as broad, near posterior margin with 6–8 widely spaced, long and moderately stout dark setae; median lobe of aedeagus (Figs. 126–129) 0.45–0.50 mm long, of similar general morphology as

that of *A. bifoveolata*; basal internal structures rather long, moderately curved, and weakly sclerotized.

♀: tergite VIII (Figs. 133–135) weakly transverse, posterior margin usually with, rarely without, small and shallow concavity in the middle; sternite VIII (Fig. 136) approximately as long as broad or weakly oblong, posterior margin convex; spermatheca (Figs. 137–138) of similar shape as that of *A. bifoveolata*.

INTRASPECIFIC VARIATION: Except for the female from Jilin, all the specimens seen from China have shorter elytra and hind wings of reduced length (slightly protruding from under the elytra).

COMPARATIVE NOTES: Based on the similar primary sexual characters, *A. setifera* is undoubtedly closely allied to *A. bifoveolata*, from which it is distinguished by the shallower posterior excision of the male tergite VIII, a less oblong male sternite VIII with a different chaetotaxy, a median lobe of the aedeagus of slightly different shape, and a smaller and shallower posterior excision of the female tergite VIII.

DISTRIBUTION: The currently known distribution includes Finland, Mongolia, West- and East Siberia (Jamal Peninsula, Taimyr Peninsula, Turuchansk env.), the Russian Far East (Kamchatka, Primorskiy Krai), and the Chinese provinces of Gansu, Shaanxi, Shanxi, Qinghai, and Jilin. The additional material from Gansu collected by the author was sifted from litter and a nest of *Formica* sp. The altitudes of the Chinese records range from 2060 to approximately 2400 m.

Amischa decipiens (SHARP, 1869)

(Figs. 8–9, 139–150)

Homalota decipiens SHARP, 1869: 179.

Amischa simplex BENICK, 1982: 112 **syn.n.**

TYPE MATERIAL EXAMINED: **Lectotype** ♀: “Lectotype / Hammersmith. / *H. decipiens* ♀, Type. D.S. / ♀ / Lectotype *Amischa decipiens* Sharp, det. S.A. Williams 1968 / Standing in Sharp Coll. as *decipiens*. / D. Sharp Coll., B.M. 1932-116.” (BMNH). **Paralectotypes:** 1 ♀: “Paralectotype / *decipiens* Shp, Charlton pit 1864, C.M.F. von Hayek / Sharp Coll. / Paralectotype *Amischa decipiens* Sharp, det. S.A. Williams 1968 / Standing in Sharp Coll. as *decipiens*. / D. Sharp Coll., B.M. 1932-116.” (BMNH); 1 ♀: “*decipiens* / Power. Chatham / W.A. Power. B.M. 1896-69 / Standing in Power Coll. as *decipiens*. / Paralectotype” (BMNH).

ADDITIONAL MATERIAL EXAMINED: **PORTUGAL:** several records from Madeira (cAss). **SPAIN:** 1 ♂, 1 ♀, Murcia, Jumilla, Publación, VIII–IX.2014, leg. Lencina (cAss); 1 ♀, Aragón, Huesca, Ainsa, 24.VII.1998, leg. Esser (cAss). **NETHERLANDS:** one record (cAss). **GERMANY:** numerous records (cAss). **AUSTRIA:** one record (cAss). **ITALY:** several records (cAss). **CZECHIA:** several records (cAss). **HUNGARY:** two records (cAss, cFel). **ROMANIA:** 1 ♀, Suceava, Ciurmarna Pass, 47°45'N 25°38'E, 1100 m, 19.VII.2014, leg. Meybohm (cAss). **GREECE:** several records from the mainland, Pelopónnisos, and Corfu (MNB, cAss). **ARMENIA:** see ASSING & SCHÜLKE (2019). **JAPAN:** 2 ♀ ♀, Hokkaido, Sapporo env., Nopporo Virgin Forest, X.2008, leg. Lackner (cAss); 1 ♀, same data, but 28.IV.2007 (cAss).

COMMENT: The original description of *Homalota decipiens* is based on an unspecified number of syntypes from “Chatham, Weymouth, Southend, Hammersmith, Charlton” (SHARP 1869). WILLIAMS (1969) designated the lectotype.

The original description of *Amischa simplex* is based on two females, one (holotype) from “Zuchuj Gobi, 10 km N von Chatanchajrchan Gebirge” and one (paratype) from “Jarantaj in Chovd aimak”. According to BENICK (1982), the paratype is deposited in the Benick collection. However, this paratype was not found in the collections of the MHNG, where the Benick collection is housed (Cuccodoro, e-mail 14.IX.2020). Neither the description nor the illustrations of the spermatheca and the female tergite VIII provided by BENICK (1982) produce any evidence that *A. simplex* should be specifically distinct from *A. decipiens*. Moreover, *A. decipiens* has

already been recorded from Mongolia (SCHÜLKE & SMETANA 2015). Therefore, there is little doubt that the type material of *A. simplex* is in fact conspecific with *A. decipiens*.

DIAGNOSIS: Macropterous and often pale-coloured species; pronotum, elytra, and abdominal apex often yellowish to pale-brown.

♂: median dorsal portion of head depressed or indistinctly impressed; posterior margin of tergite VIII broadly concave in the middle (Fig. 142); sternite VIII (Fig. 143) weakly oblong, posterior margin convex, near posterior margin with six to eight widely spaced moderately long and rather fine dark setae; median lobe of aedeagus (Figs. 139–141) 0.35–0.40 mm long; ventral process short, angled in basal half in lateral view; basal internal structures long, rather stout, weakly curved, and weakly sclerotized.

♀: posterior margin of tergite VIII broadly and very weakly concave (Figs. 148–149); sternite VIII of similar shape as that of male (Fig. 150); spermatheca (Figs. 144–147) relatively small, maximal extension 0.20–0.25 mm, distal portion weakly dilated in apical half.

COMPARATIVE NOTES: This species is distinguished from its congeners particularly by the shape of the median lobe of the aedeagus, as well as by the shapes of the male and female tergite VIII.

SEX RATIO: According to WILLIAMS (1969), this species is parthenogenetic in Great Britain, whereas MUONA (1990) states males are not uncommon in Finland and that they have also been recorded from Norway. In North Germany, males are present, but rarer than females, representing 29 % in a total of 238 specimens examined (Tab. 2).

DISTRIBUTION: The vast distribution ranges from the Atlantic Islands (Madeira, Canary Islands) and Northwest Africa (Morocco) in the west across Europe, the Middle East, and Middle Asia eastwards to Japan (SCHÜLKE & SMETANA 2015; material examined). The species has been recorded as adventive in North America and New Zealand (LESCHEN & NEWTON 2015, NEWTON 2019). A revision of previous records from Turkey (ASSING 2007a) revealed that they refer to other species, e.g., *A. inexcisa*. The above specimens from Spain, Romania, Iraq, Kazakhstan, Kyrgyzstan, and Japan represent new country records.

NATURAL HISTORY: In North Germany, the habitat requirements appear to be similar to those of the often syntopic *A. analis*, *A. bifoveolata*, and *A. nigrofusca*, though *A. decipiens* was rarer in the samples than these species (Tab. 2). The seasonal epigeic activity was highest in April and decreased from May to June (Fig. 8). Eggs were found in the ovaries from late winter to autumn and teneral adults were found from summer to autumn. Maximal emergence was recorded with photo-electors in April (Fig. 9).

Amischa discolor sp.n.

(Figs. 151–161)

TYPE MATERIAL: Holotype ♂: “KYRGYZSTAN: Batken, E Sovetsky 1410 m, (Katrang-Too Mtr.), N40°07'19" E071°22'59", 20.06.2012, leg. J. Frisch / Holotypus ♂ *Amischa discolor* sp.n., det. V. Assing 2020” (MNB).

Paratypes: 2 exs., Kyrgyzstan, Batken, Isfana–Isfara, Ozgorush, Lyailek River, 39°47'N 70°4'E, 1340 m, 22.VI.2012, leg. Frisch (MNB); 2 ♀♀: “Kyrgysistan, 1620 m, S-shore lake Issyk-Kul, 13 km N Ak-Sai vill., Hetzel leg., VII.1999, ca. 42°13'N, 76°49'E” (cFel, cAss); 4 ♀♀: “Kasachstan (SO), Dzungarskij Alatau, Mt. Toksanbaj, 1500 m, Koksū, riv. Koksū, 3.07.1993, leg. R. Predel” (cAss).

ADDITIONAL MATERIAL: 1 ♀: “IRAQ, Misan, Azair-Qalat, from detritus, 14.XII.1977 / No. 335, Topál & Zilahy” (cAss).

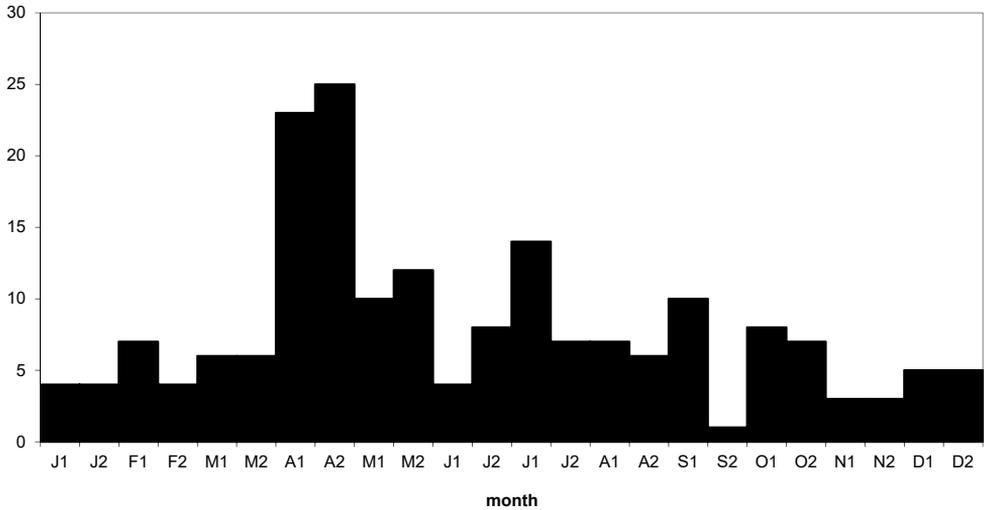


Fig. 8: Seasonal epigeic activity of *Amischa decipiens* based on all-year pitfall trap studies in various habitats in North Germany (results of all studied sites pooled). For additional explanations see Fig. 1.

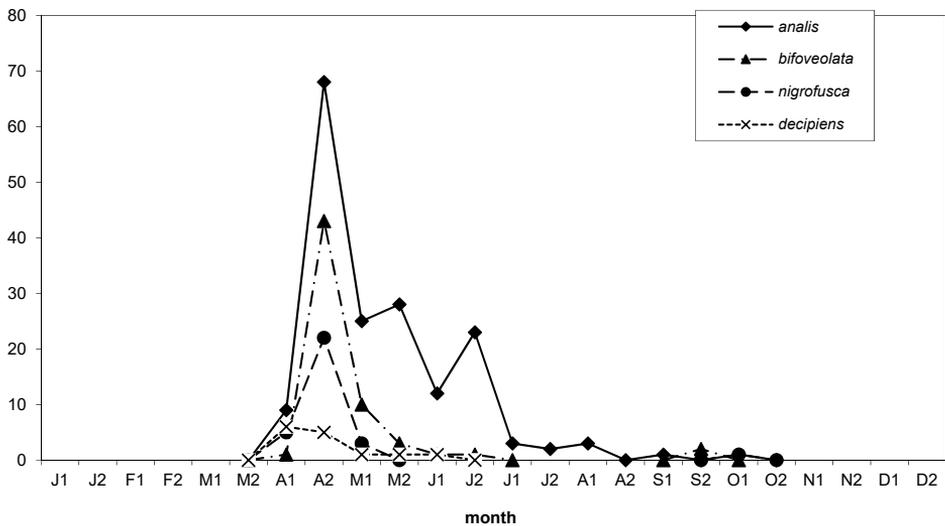


Fig. 9: Photo-elector emergence of *Amischa* spp. in a *Calluna* heathland (results of two consecutive years pooled). For additional explanations see Fig. 1.

DESCRIPTION: Small macropterous species, body length 1.9–2.4 mm; length of forebody 0.9–1.1 mm. Habitus as in Fig. 151. Head blackish; pronotum and elytra yellow to yellowish-brown, strongly contrasting with the much darker head; abdomen yellow to yellowish-brown with most of tergite VI and the anterior portion of tergite VII darker. Whole abdomen densely punctate and with distinct microsculpture.

♂: tergite VIII (Fig. 154) transverse, posterior margin broadly and shallowly concave; sternite VIII (Fig. 155) weakly oblong, much longer than tergite VIII, posteriorly broadly convex and with a transverse series of eight long dark setae; median lobe of aedeagus (Figs. 152–153) 0.4 mm long, with distinctly sinuate ventral process in lateral view and with rather long, apically rather strongly curved, and weakly sclerotized basal internal structures.

♀: tergite VIII (Fig. 160) weakly transverse, posterior margin broadly and shallowly excised; sternite VIII (Fig. 161) approximately as long as broad, posterior margin convex; spermatheca (Figs. 156–159) small, maximal extension 0.21–0.24 mm, and with weakly dilated distal portion.

INTRASPECIFIC VARIATION: The female from Iraq resembles the material from Kazakhstan and Kyrgyzstan in external characters (except that the head is not as dark) and in the shapes of tergite and sternite VIII. However, since the distal portion of the spermatheca is of somewhat different shape, it is not included in the type series.

COMPARATIVE NOTES: This species is characterized particularly by its colouration and the primary sexual characters. It differs from the similar and evidently closely allied *A. decipiens* by the shape of the ventral process of the aedeagus (in weakly sinuate, not angled, in lateral view) and by a slightly larger spermatheca with a differently shaped distal portion.

DISTRIBUTION AND NATURAL HISTORY: At present, *A. discolor* is reliably known only from four localities in Middle Asia (Kyrgyzstan, Kazakhstan). The specimens were collected at altitudes of 1340–1620 m.

ETYMOLOGY: The specific epithet (Latin, adjective: colourful) alludes to the colouration of the body.

Amischa kashmirica CAMERON, 1939

(Figs. 162–198, 291)

Amischa kashmirica CAMERON, 1939: 275.

Amischa sporadica BENICK, 1967: 23 f. **syn.n.**

Amischa filum auctt., partim.

TYPE MATERIAL EXAMINED: *A. kashmirica*: **Syntypes:** 1 ♂ [dissected by R. Pace]: “Lectotype / Kashmir, Gulmarg, vi–vii-31, Dr. Cameron / *A. kashmirica* Cam Type / M. Cameron Bequest. B.M. 1955-147. / *Amischa kashmirica* Cam., det. R. Pace 1983, Lectoholotypus [sic]” (BMNH); 1 ♂ [dissected by R. Pace]: “Kashmir, Gulmarg, vi–vii-31, Dr. Cameron / M. Cameron Bequest. B.M. 1955-147. / Syntype / *Amischa kashmirica* Cam., det. R. Pace 1983” (BMNH); 1 ♂: “Kashmir, Gulmarg, vi–vii-31, Dr. Cameron / *kashmirica* Cam. / Syntype / *Amischa kashmirica* Cam., det. R. Pace 1983” (BMNH); 1 ♀ [spermatheca missing]: “Kashmir, Gulmarg, vi–vii-31, Dr. Cameron / Syntype / *Amischa kashmirica* Cam., det. R. Pace 1983” (BMNH).

Amischa sporadica: **Holotype** ♂: “Lenkoran, Leder (Reitter). / *Amischa sporadica* Typus G. Bck. / Coll. G. Benick / *Amischa kashmirica* Cameron, det. V. Assing 2020” (MHNG). **Paratypes:** 1 ♀: same data as holotype, but “*Amischa sporadica* ♀ Allotypus” (MHNG); 1 ♀: same data as holotype, but “*Amischa sporadica* ♀ Paratypus” (MHNG); 1 ♂, 1 ♀: “Lenkoran, Leder (Reitter)” (MHNG); 1 ♀ [spermatheca missing]: “Mostar, Herzegovina / *Amischa sporadica* Typus G. Bck. / Coll. G. Benick” (MHNG); 1 ♂: “Mostar, Herzegovina / Coll. G. Benick” (MHNG); 1 ♂: “Mostar, Blato 5 08” (MHNG).

ADDITIONAL MATERIAL EXAMINED: **GREECE:** 1 ♀, Ipiros, Metsovo, 1620 m, 28.IV.1973, leg. Löbl (MHNG); 2 ♂♂, N Kavala, Lydia/Krinides env., 41°0–1'N 24°16–18'E, car-net, 2.V.2019, leg. Schülke (MNB, cAss); 1 ♂, Peloponnisos, S Diakopto, road to Kalavrita, 38°8–10'N 22°13–14'E, 500 m, car-net, 13.IV.2018, leg. Schülke (MNB). **Corfu:** 5 ♂♂, 3 ♀♀, Kílada Ropa, 39°40–41'N 19°47–48'E, 70 m, forest track, car-net, 2.VI.2017, leg. Schülke & Assing (cAss); 2 ♂♂, NW Zigos, 39°44'N 19°48'E, 280–310 m, stream valley with diverse vegetation (deciduous forest, arable land, fallows, etc.), car-net, 4.VI.2017, leg. Schülke & Assing (cAss). **Lesbos:** 1 ♂, SW Kalloni, 39°12'18"N 26°10'39"E, 2 m, river bank, flood debris sifted and collected from soil (gravel), 19.III.2016, leg. Assing & Hetzel (cAss); 1 ♂, Megalolimni, 39°6'20"N 26°19'47"E, 24.III.2005, leg. Lompe & Meybohm (cAss). **TURKEY: Isparta:** 2 ♂♂, 3 ♀♀, Kovada Gölü, 37°37'43"N 30°52'10"E, 910 m, lakeshore, 15.IV.2008, leg. Brachat & Meybohm (cAss); 7 ♂♂, 3 ♀♀, 10 km SE Sütçüler, 37°24'55"N 31°2'21"E, 1520 m,

calcareous slope, grass and moss sifted, 26.IV.2011, leg. Assing (cAss, cFel). **Antalya:** 1 ♂, Manavgat env., Kızılot, 0–50 m, oaks and bushes, litter sifted, 4.I.1991, leg. Assing (cAss). **Erzurum:** 1 ♂, Azort, 12.V.1967, leg. Besuchet (MHNG). **Mersin:** 1 ♂, 1 ex., Camlıyayla, IV.1976, leg. Schubert (NHMW, cAss); 2 ♂♂, 2 ♀♀, Mersin, N Silifke, 1 km NW Kirobaşı, 36°44'2"N 33°51'16"E, 1390 m, 19.IV.2005, leg. Brachat & Meybohm (cAss). **RUSSIA:** 5 ♂♂, 2 ♀♀, Krasnodar, Krymsk, Adagum River, 44°54'N 38°0'E, 60 m, flooded *Salix* thicket, 2.VI.2018, leg. Enushchenko (cAss). **IRAN:** 1 ♀, Mazandaran, Dasht e Naz Wildlife Refuge, 36.70°N 53.20°E, 10 m, oak trap, X.2015, leg. Barimani (cAss).

COMMENT: *Amischa kashmirica* was originally described based on an unspecified number of syntypes from “Kashmir : Gulmarg” (CAMERON 1939). The specimens were studied by R. Pace, who attached the label “lectoholotype” to one of them, but never published a lectotype designation. The species was subsequently reported from “Kashmir, Yusmarg” by PACE (1986b).

The original description of *Amischa sporadica* is based on nine type specimens, five (including the holotype) from “Lenkoran, Leder (Reitter)” and four from “Mostar, Hercegowina”, all of them deposited in coll. Benick (BENICK 1967). The specimens are partly in poor condition, and some of the paratypes do not bear type labels.

An examination of the above type material revealed that *A. sporadica* is conspecific with *A. kashmirica* and partly with the previous interpretation of *A. filum*.

DIAGNOSIS: Macropterous species of variable, mostly brownish colouration.

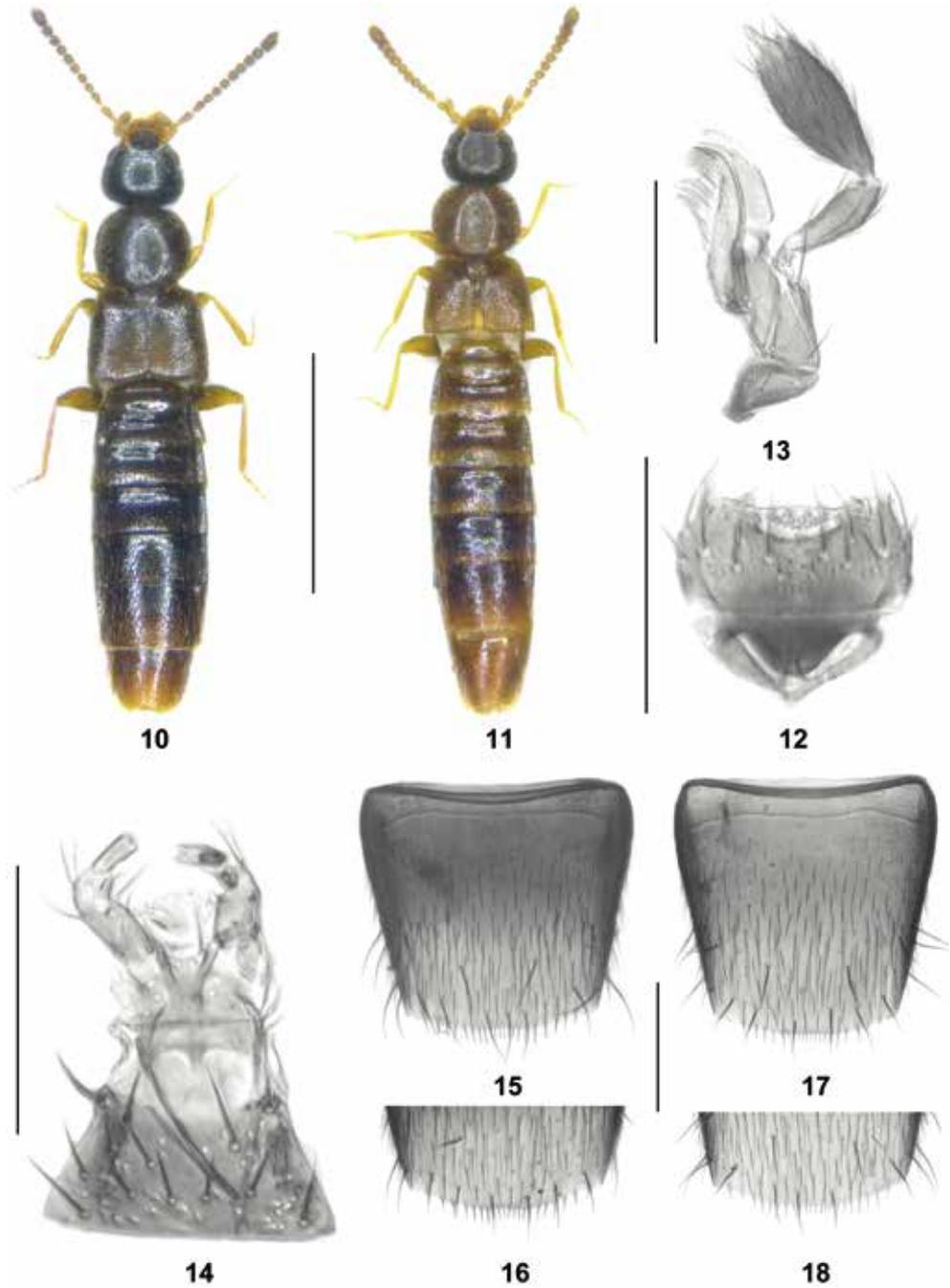
♂: median dorsal portion of head depressed or indistinctly impressed; posterior margin of tergite VIII with pronounced posterior excision of very variable depth and size, postero-lateral portions of tergite of darker colouration than remainder of tergite (Figs. 168–170, 179–181); sternite VIII (Figs. 171, 182–185) oblong, posteriorly with more or less pronounced broad posterior excision of variable depth and with 2–4 long and stout black setae; median lobe of aedeagus (Figs. 162–167) 0.36–0.41 mm long; ventral process short, sinuate in lateral view and with V-shaped incision of variable depth in ventral view (Figs. 177–178); basal internal structure strongly sclerotized and strongly curved apically and basally (Figs. 172–176).

♀: posterior margin of tergite VIII (Figs. 186, 194–198) broadly and shallowly to moderately deeply excised (but much less so than in male); sternite VIII (Fig. 187) approximately as long as broad or weakly oblong, posterior margin broadly convex; spermatheca (Figs. 188–193) of variable size and shape, maximal extension 0.16–0.21 mm, distal portion more or less distinctly dilated in apical half.

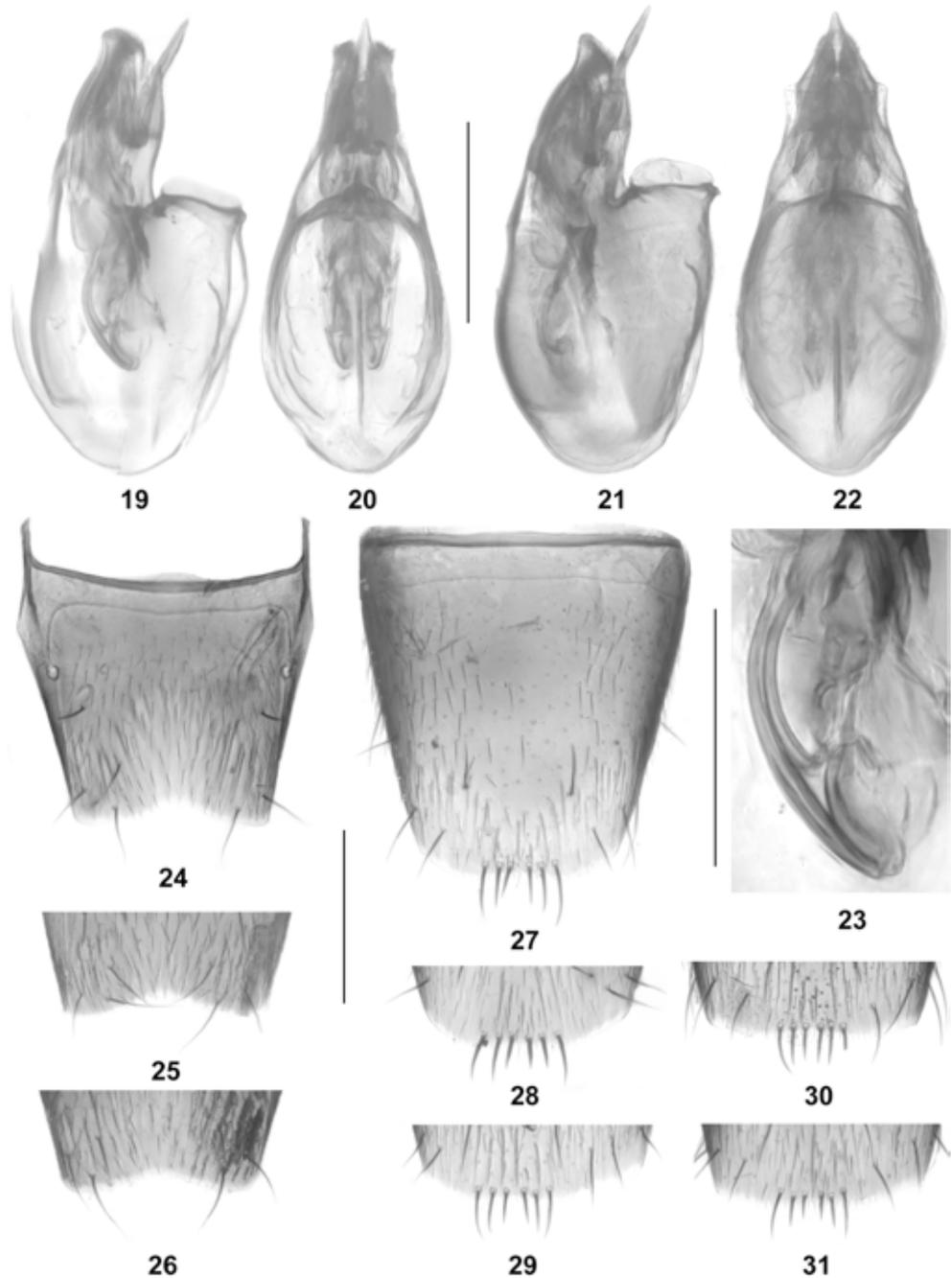
For additional illustrations of the external and sexual characters see ASSING (2011) (as *A. filum*).

DISTRIBUTION AND NATURAL HISTORY: The confirmed distribution ranges from the Balkans, Turkey, and the Caucasus Region eastwards to the West Himalaya (Kashmir) (Fig. 291). The material listed above includes the first records from Greece, Turkey, and the Russian South European territory. The specimens from Corfu were reported as *Amischa* sp. by ASSING et al. (2018), those from Lesbos and Turkey as *Amischa filum* by ASSING (2005a, 2016) and ASSING (2006b, 2009, 2011, 2013), respectively. Several previous records of *Amischa filum* from Turkey (ASSING 2006b, 2009, 2011, 2013) refer to the similar newly described *A. truncata* and *A. inexcisa*. The record from Iran is based exclusively on a single female and consequently requires confirmation.

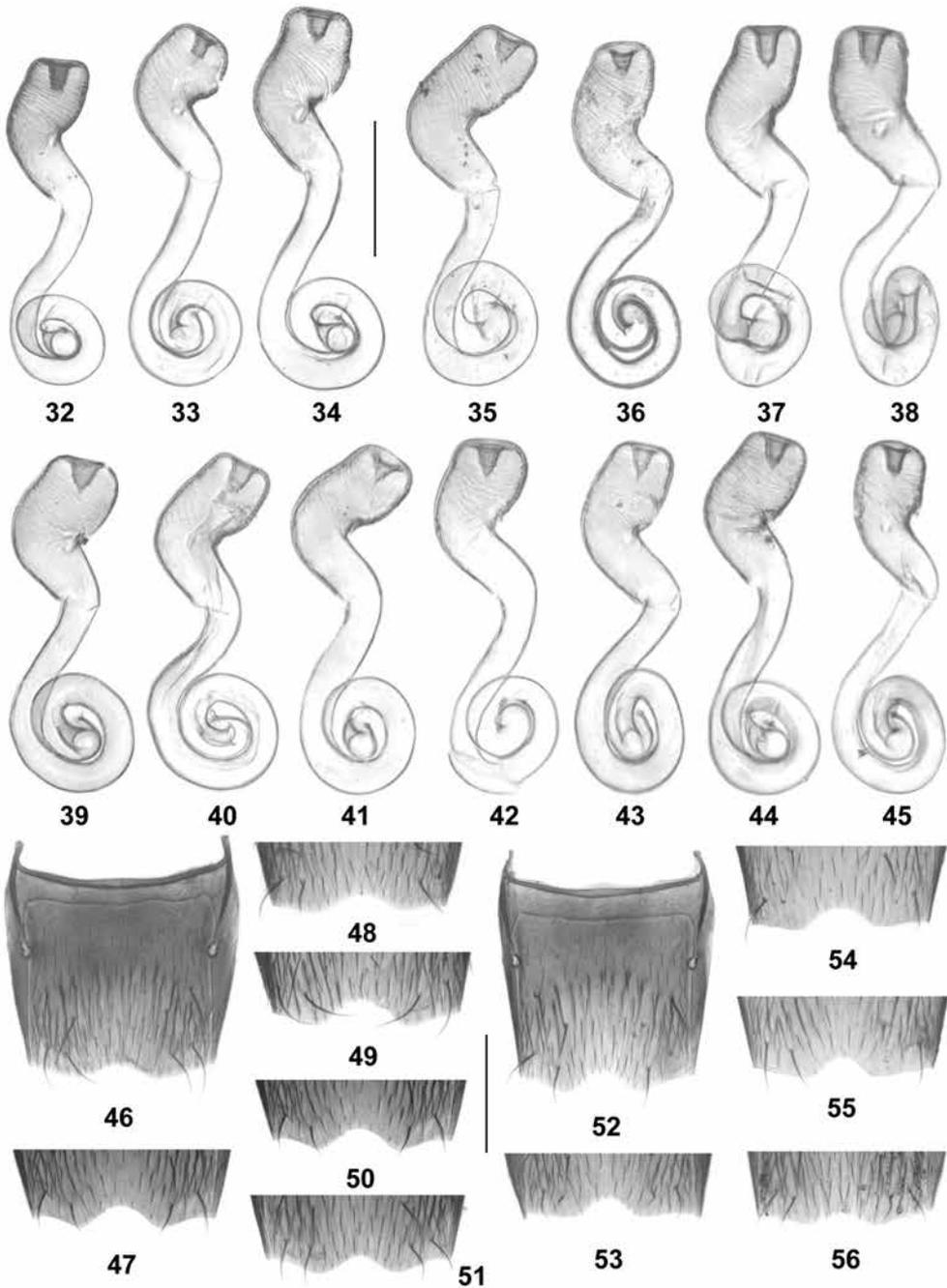
The examined material was collected in various, mostly moist habitats: on river banks and lake shores, in moist grasslands (pastures and meadows), in a flooded willow thicket near a river, in mixed forests, and on calcareous slopes, partly together with other *Amischa* species (*A. inexcisa*). Several specimens were caught with car-nets in April and May. The altitudes range from near sea-level to 2680 m.



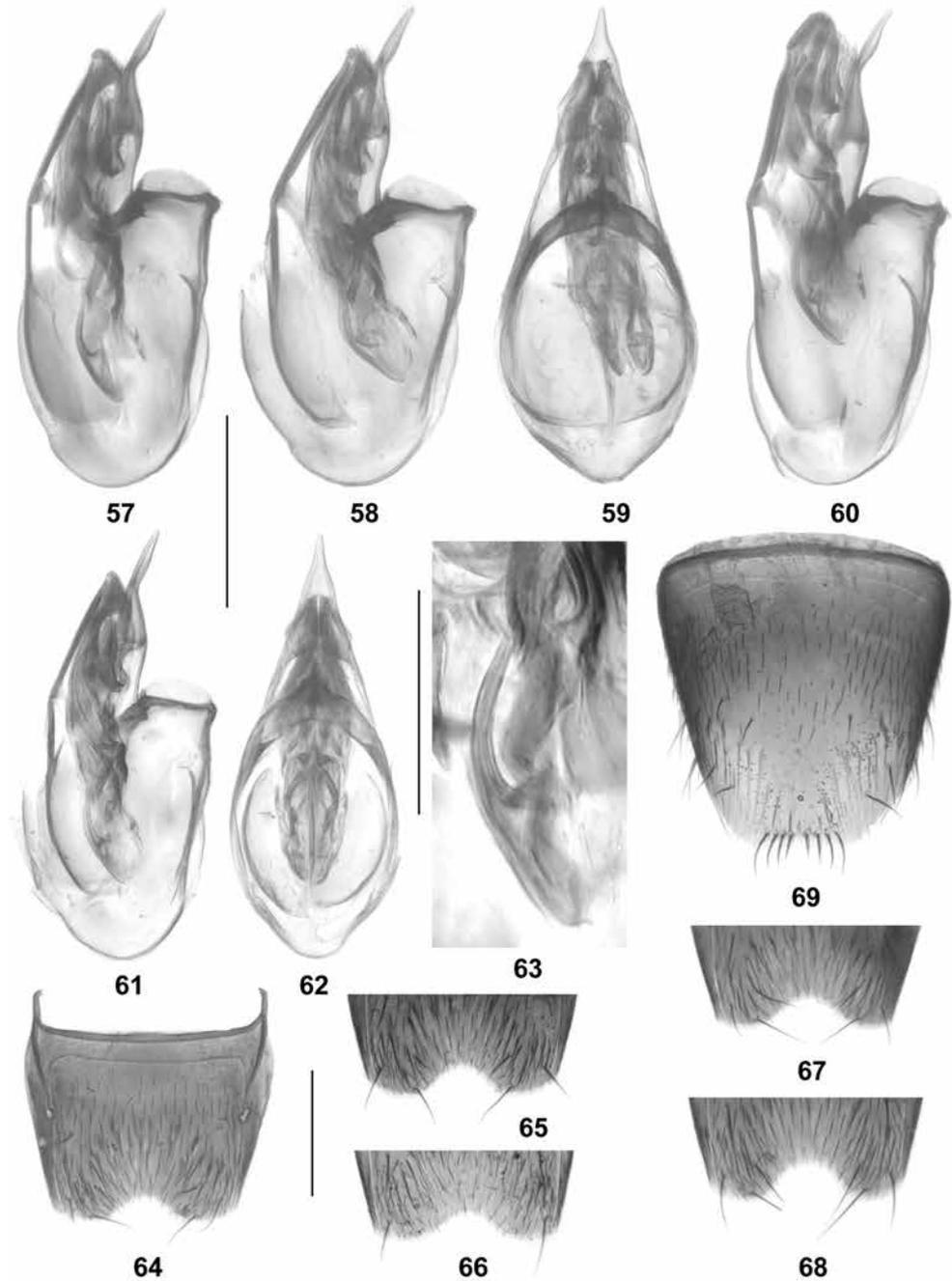
Figs. 10–18: *Amischa analis* (11, 17–18: brachypterous morph from North Italy); 10–11) habitus; 12) labrum; 13) maxilla; 14) labium; 15, 17) female sternite VIII; 16, 18) posterior portion of female sternite VIII. Scale bars: 10–11: 1.0 mm; 15–18: 0.2 mm; 12–14: 0.1 mm.



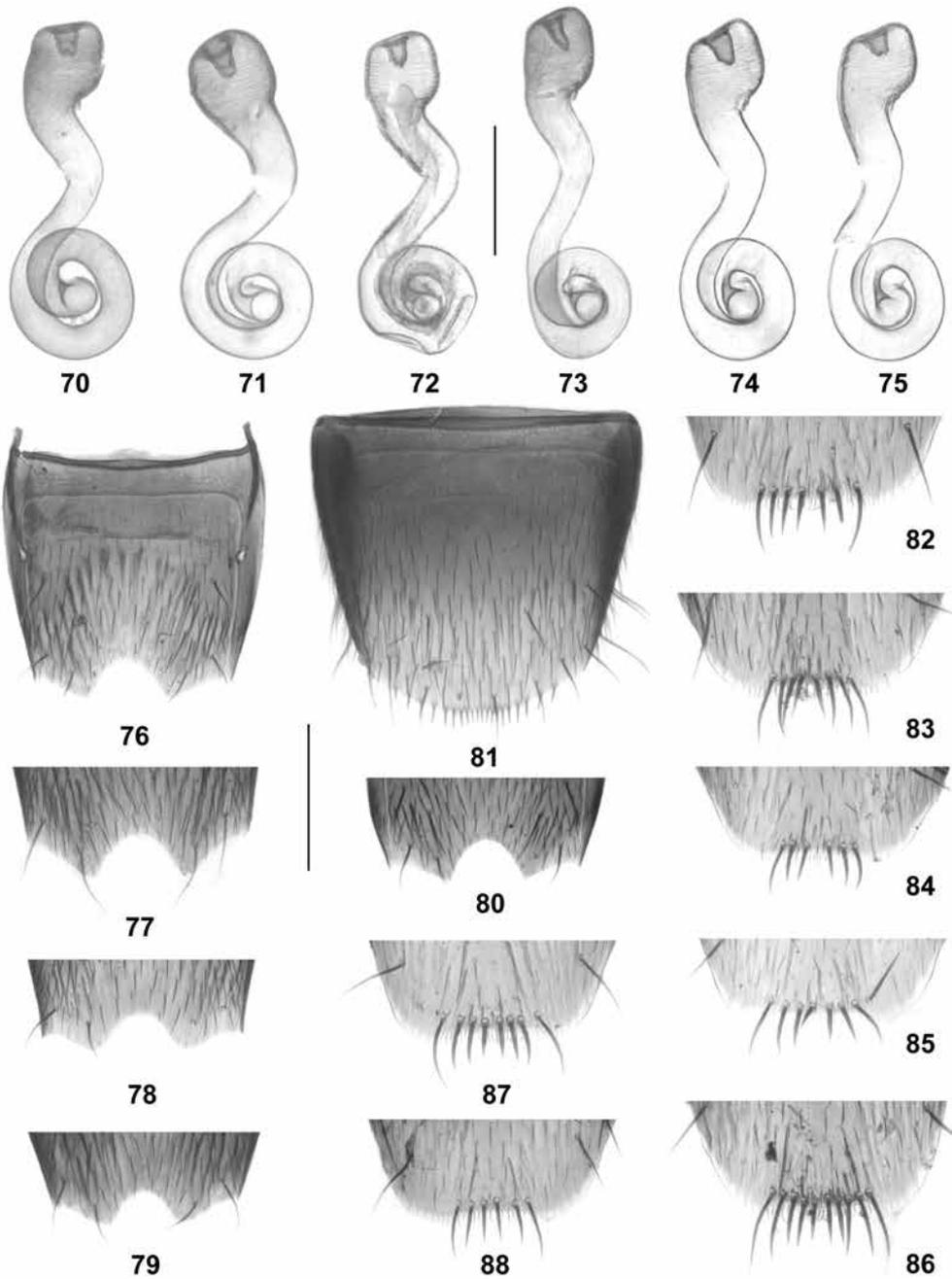
Figs. 19–31: *Amischa analis*, brachypterous morph (19–20, 23–24, 27–28: North Spain; 21–22, 25–26, 29–31: North Italy); 19–22) median lobe of aedeagus in lateral and in ventral view; 23) basal internal structures of aedeagus; 24–26) (posterior portion of) male tergite VIII; 27–31) (posterior portion of) male sternite VIII. Scale bars: 19–22, 24–31: 0.2 mm; 23: 0.1 mm.



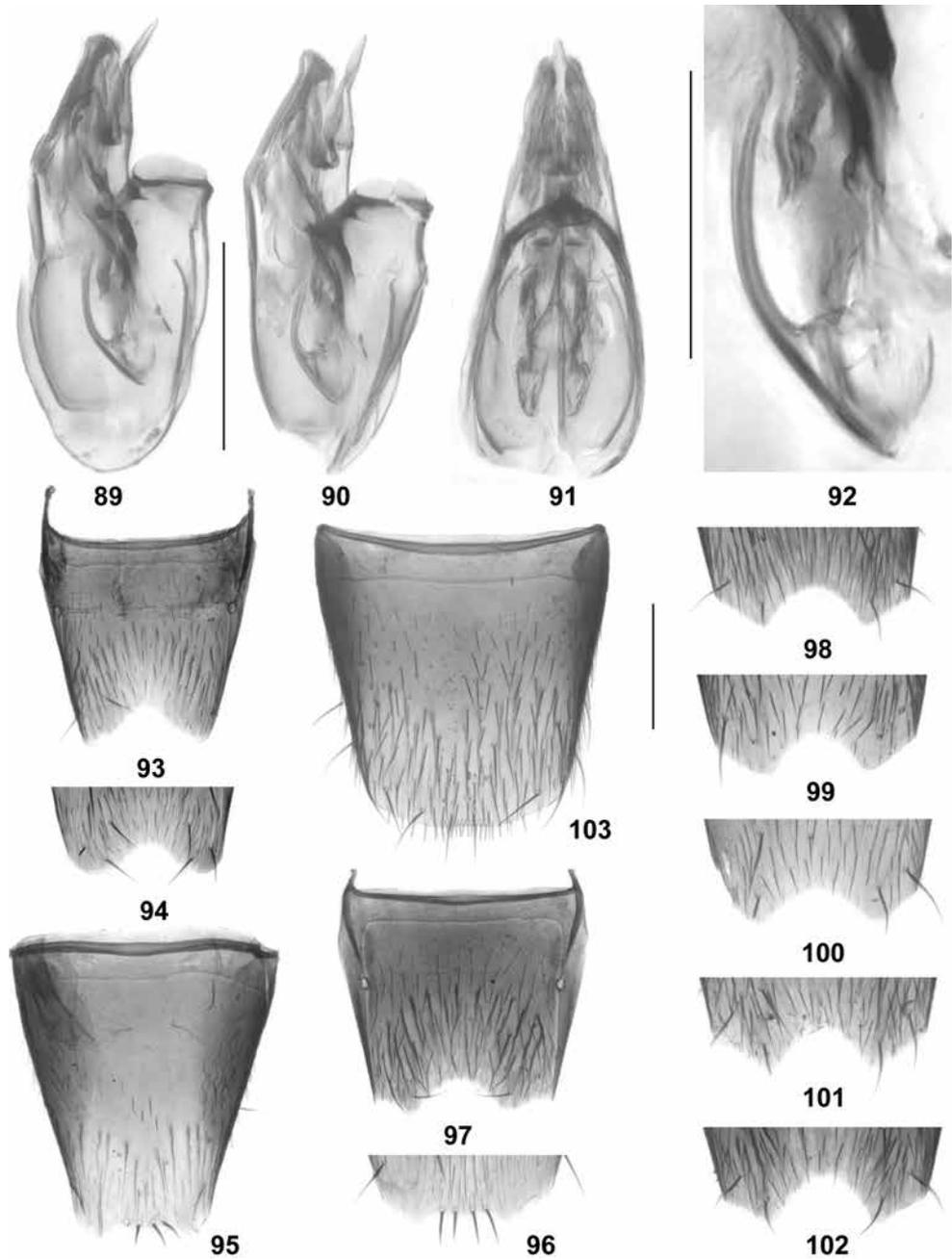
Figs. 32–56: *Amischa analis*, macropterous morph (32–38, 46–51) from Armenia (32–33, 46–47), Germany (34–35, 48–50), Italy (36, 51), and Japan (37–38), and brachypterous morph (39–45, 52–56) from the Iberian Peninsula (39–41, 55–56) and North Italy (42–45, 52–54); 32–45) spermatheca; 46–56) (posterior portion of) female tergite VIII. Scale bars: 46–56: 0.2 mm; 32–45: 0.1 mm.



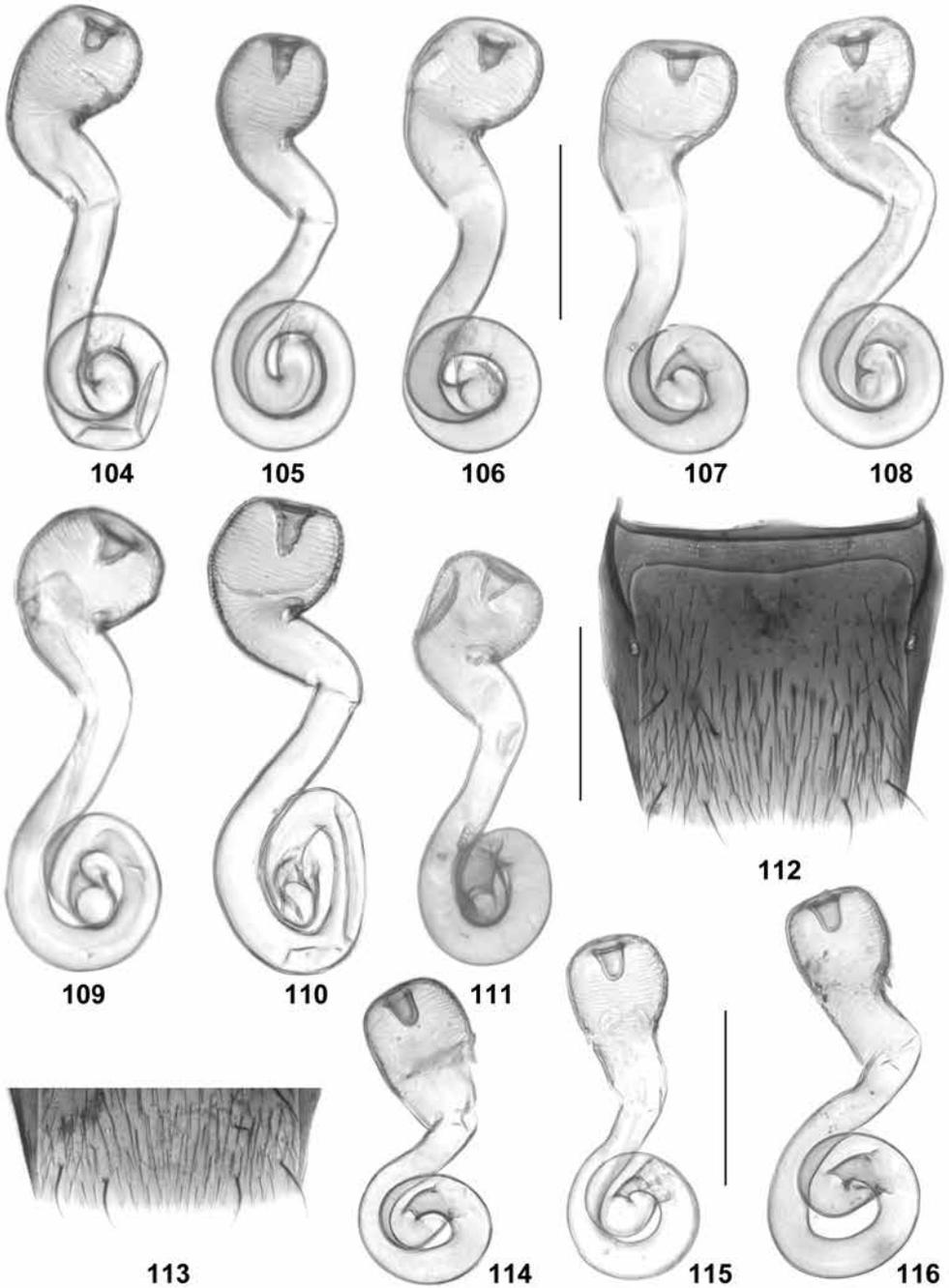
Figs. 57–69: *Amischa bifoventolata* (57, 68: Turkey; 58–59, 66: lectotype of *A. strupii*; 60: brachypterous morph from Greece; 61–62: lectotype of *A. cavifrons*; 63–65: Germany; 67, 69: Armenia); 57–62) median lobe of aedeagus in lateral and in ventral view; 63) internal structures of aedeagus; 64–68) (posterior portion of) male tergite VIII; 69) male sternite VIII. Scale bars: 57–62, 64–69: 0.2 mm; 63: 0.1 mm.



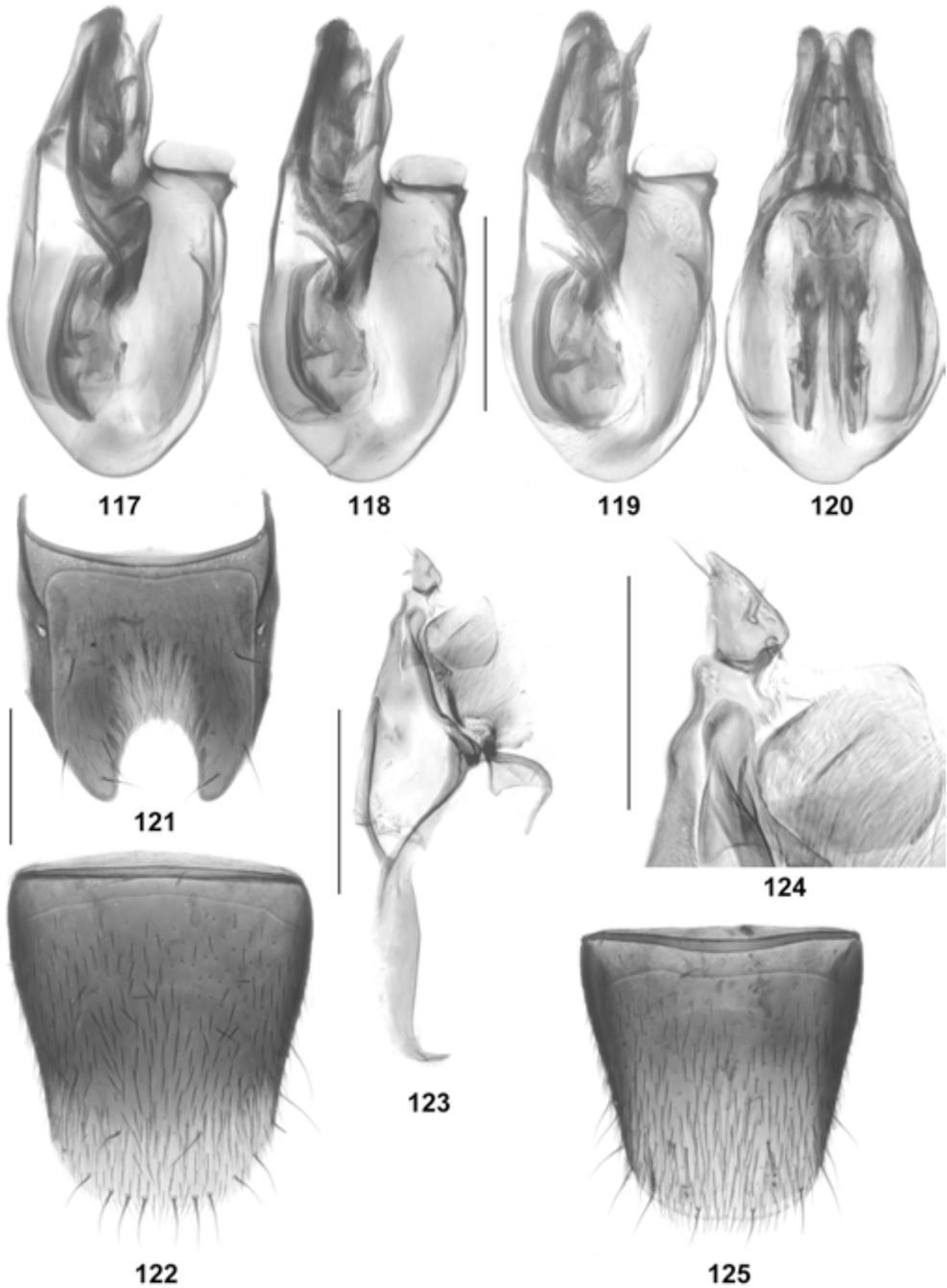
Figs. 70–88: *Amischa bifoveolata* (70, 76: Albania; 71, 78: Armenia; 72, 77, 83–86: Germany; 73: Russia; 74–75, 79–81, 88: brachypterous morph from Greece; 82: Turkey, 87: Italy); 70–75) spermatheca; 76–80) (posterior portion of) female tergite VIII; 81) female sternite VIII. 82–88) posterior portion of male sternite VIII. Scale bars: 76–88: 0.2 mm; 70–75: 0.1 mm.



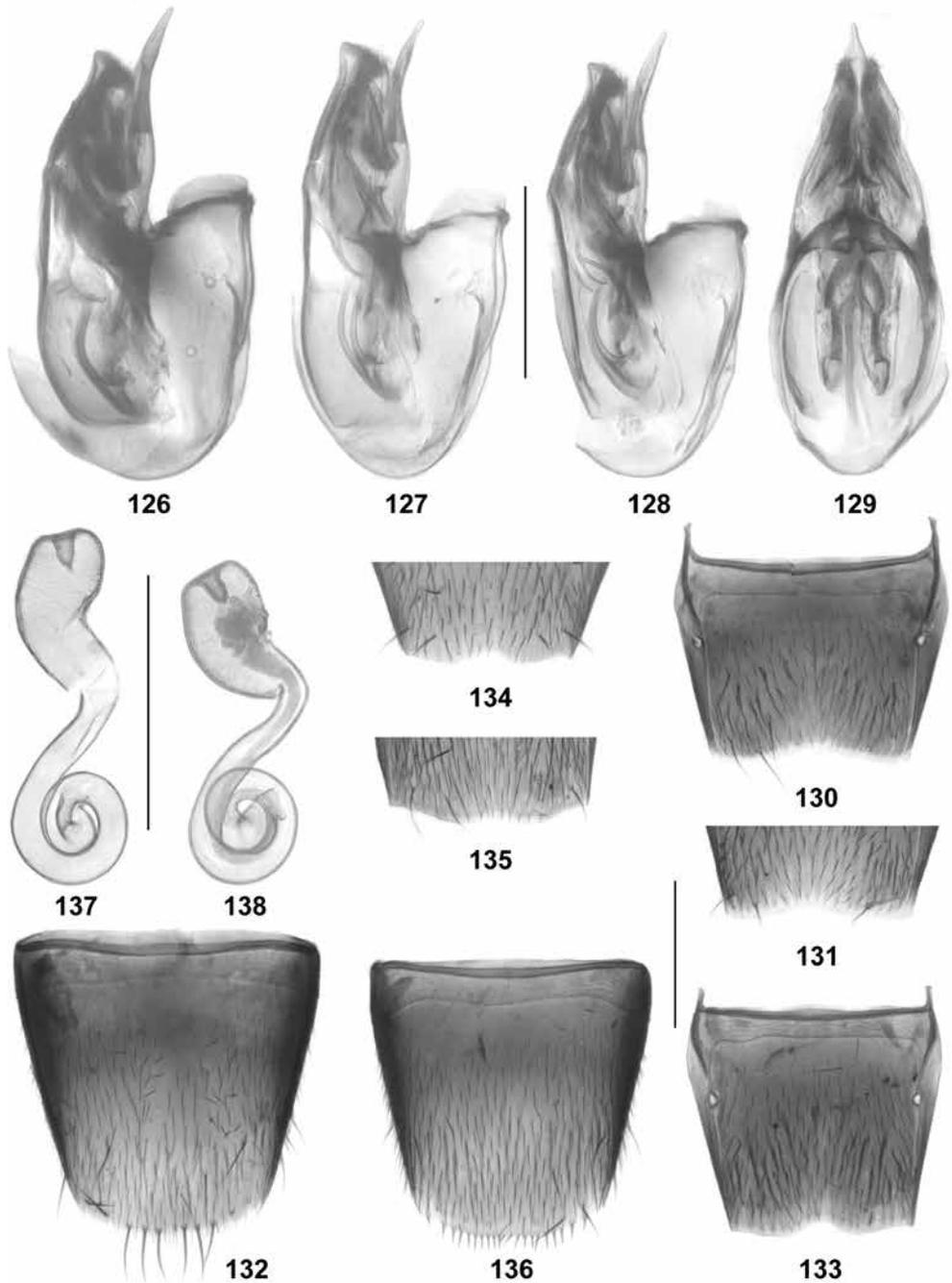
Figs. 89–103: *Amischa nigrofusca* (89, 92, 94, 96–97, 103: Turkey; 90–91, 93, 95: lectotype of *A. simillima*; 98: Spain; 99: Portugal; 100: West Caucasus; 101–102: Germany); 89–91) median lobe of aedeagus in lateral and in ventral view; 92) internal structures of aedeagus; 93–94) (posterior portion of) male tergite VIII; 95–96) (posterior portion) of male sternite VIII; 97–102) (posterior portion of) female sternite VIII; 103) female sternite VIII. Scale bars: 89–91, 93–103: 0.2 mm; 92: 0.1 mm.



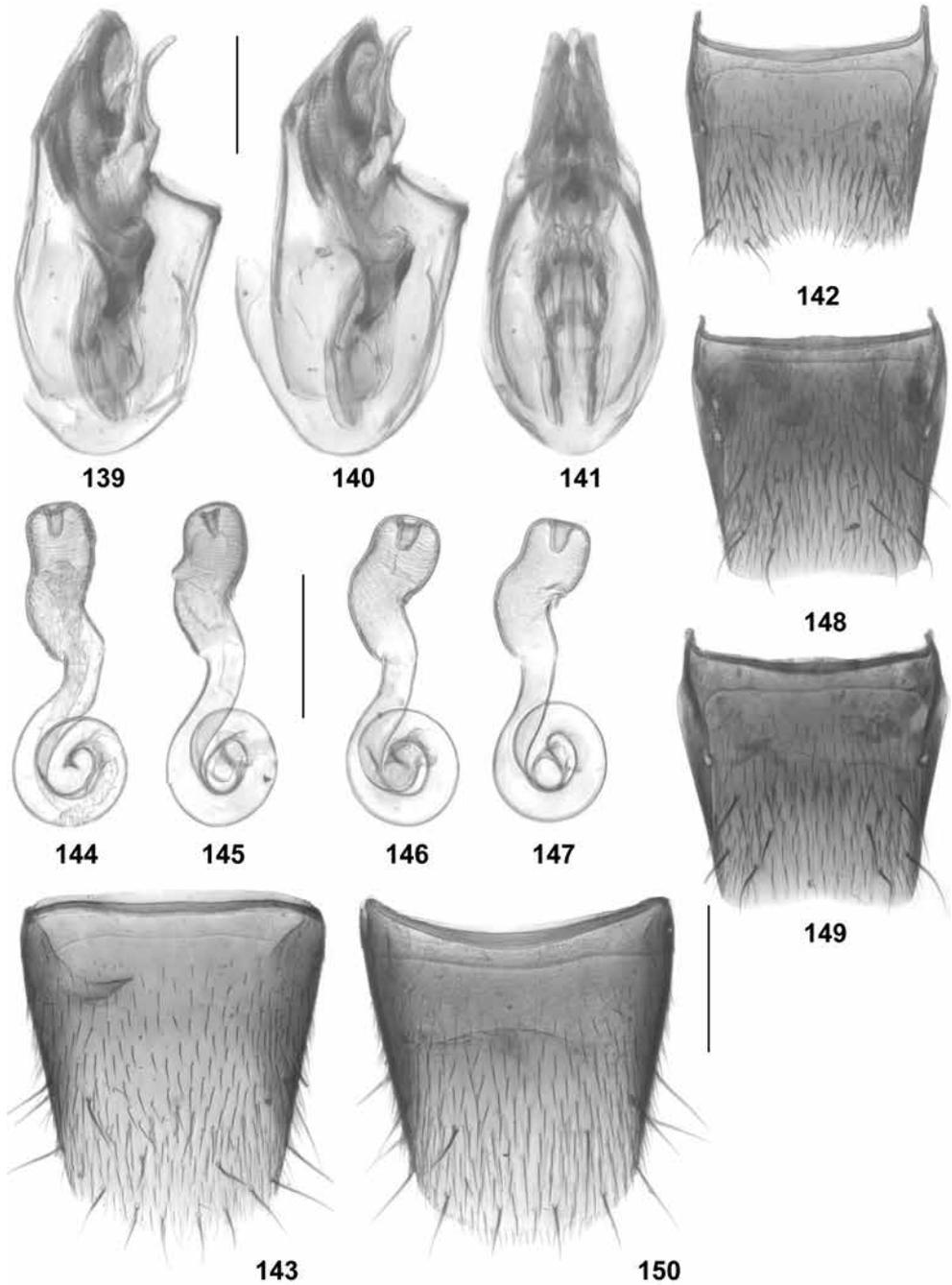
Figs. 104–116: *Amischa nigrofusca* (104: Portugal; 105: Spain; 106–109: North Germany; 110: West Caucasus; 111: Turkey) and *A. forcipata* (112–116); 104–111, 114–116) spermatheca; 112–113) (posterior portion of) female tergite VIII. Scale bars: 112–113 0.2 mm; 104–111, 114–116: 0.1 mm.



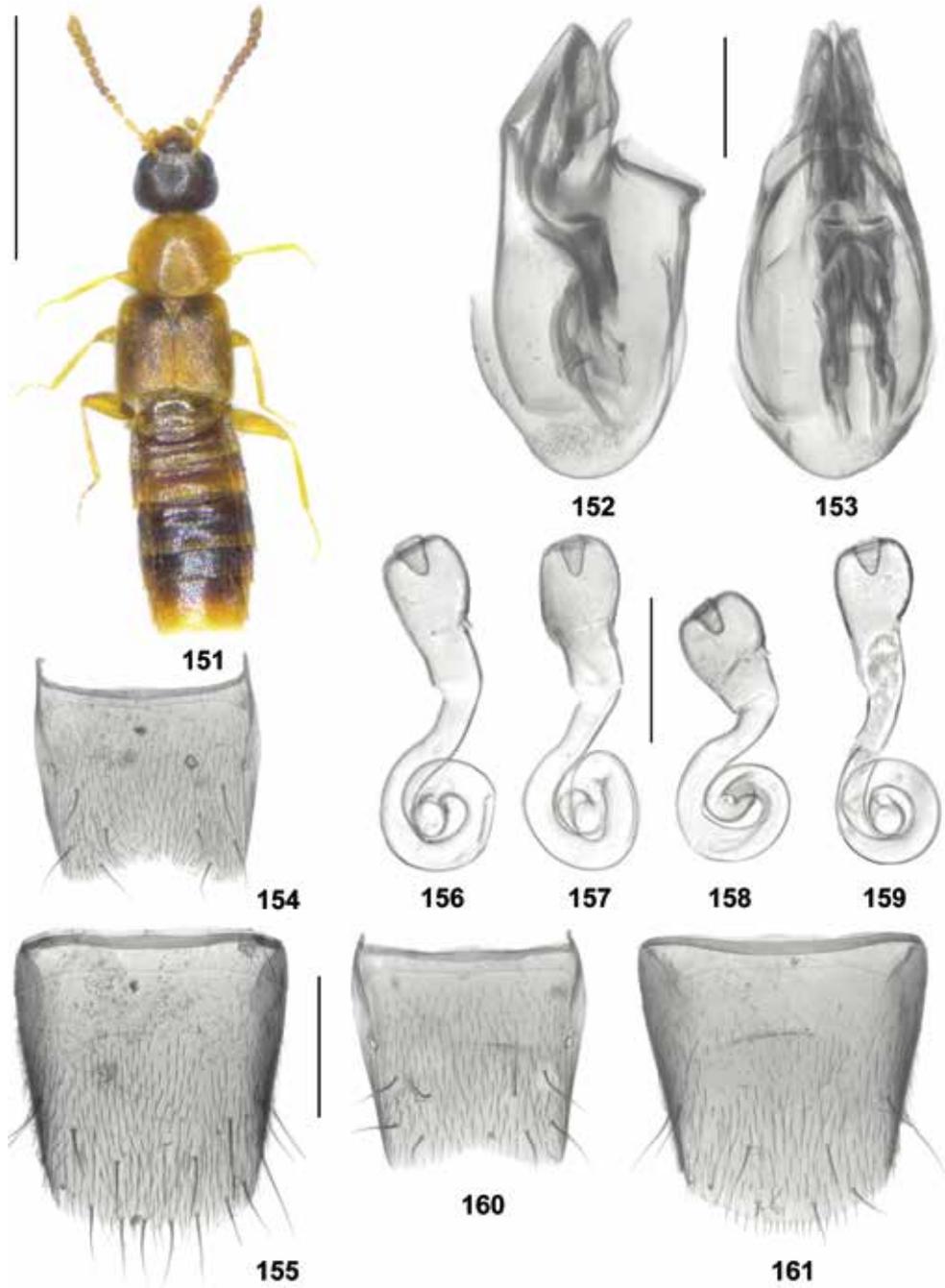
Figs. 117–125: *Amischa forcipata*; 117–120) median lobe of aedeagus in lateral and in ventral view; 121) male tergite VIII; 122) male sternite VIII; 123) paramere; 124) apical portion of paramere; 125) female sternite VIII. Scale bars: 117–123, 125: 0.2 mm; 124: 0.1 mm.



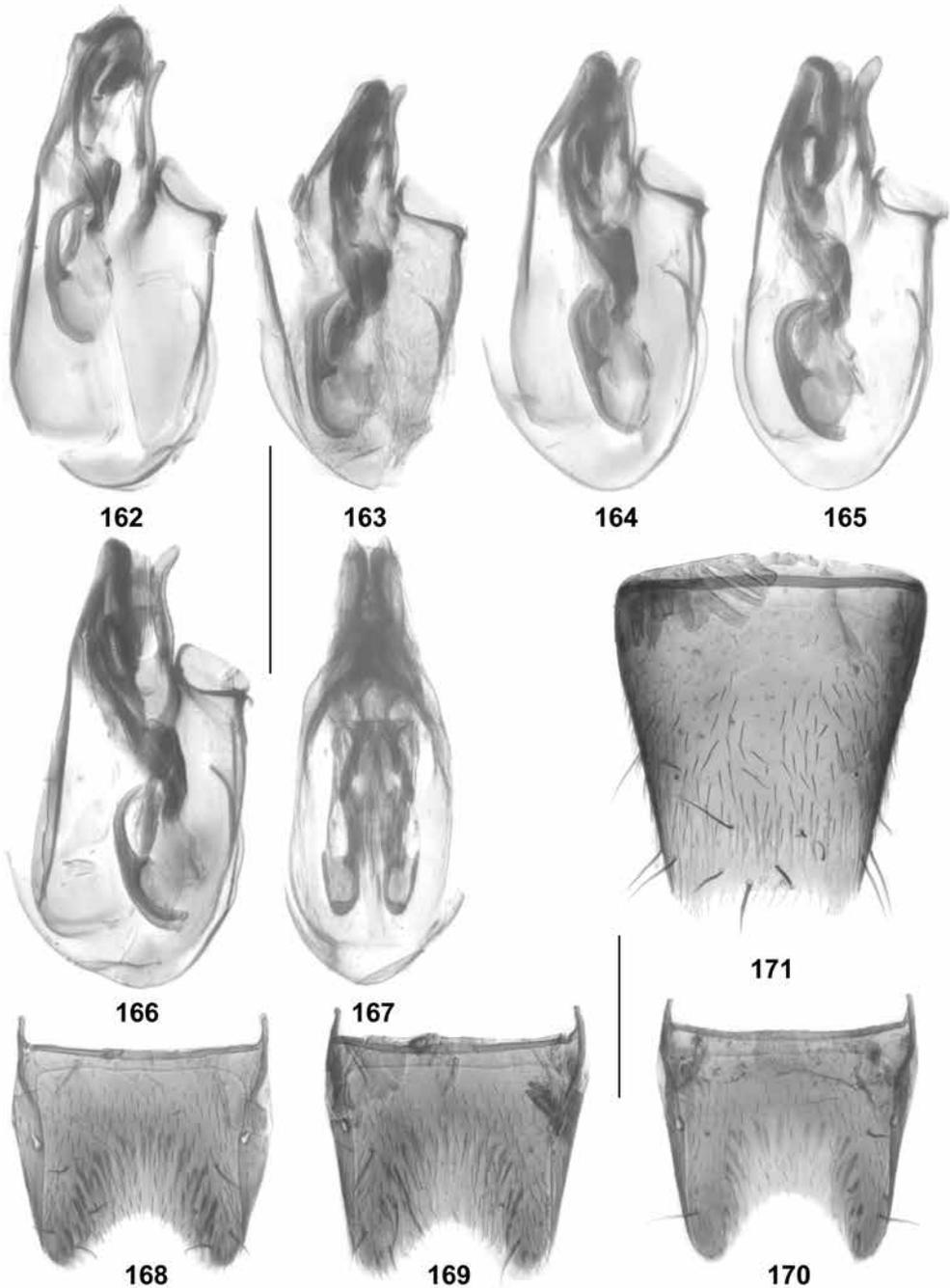
Figs. 126–138: *Amischa setifera* (126, 135, 137: Gansu; 127, 130, 132–133, 136, 138: Russian Far East; 128–129, 131, 134: paratypes); 126–129) median lobe of aedeagus in lateral and in ventral view; 130–131) (posterior portion of) male tergite VIII; 132) male sternite VIII; 133–135) (posterior portion of) female tergite VIII; 136) female sternite VIII; 137–138) spermatheca. Scale bar: 0.2 mm.



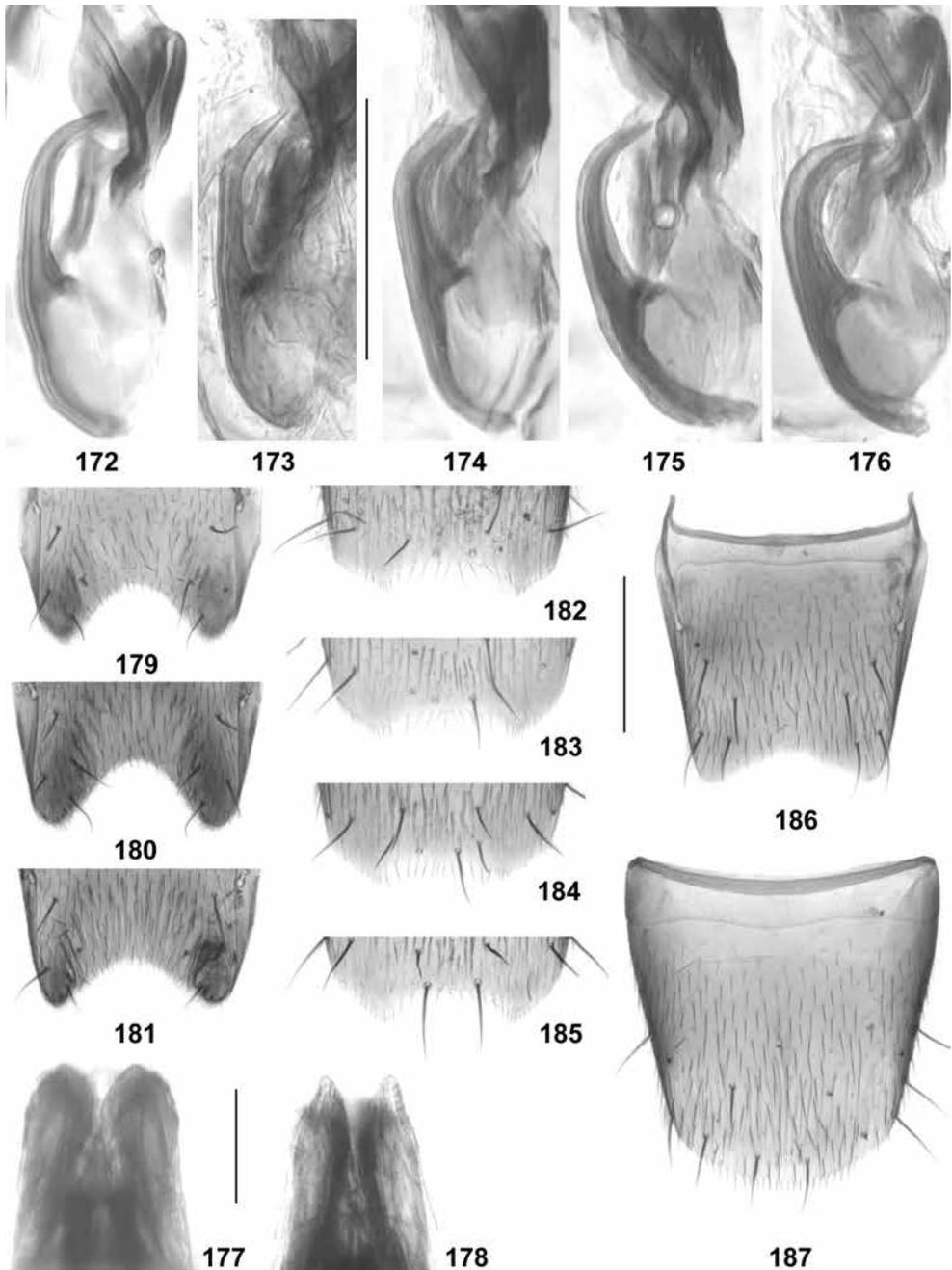
Figs. 139–150: *Amischa decipiens* (139–145, 148, 150: North Germany; 146–147, 149: Japan); 139–141) median lobe of aedeagus in lateral and in ventral view; 142) male tergite VIII; 143) male sternite VIII; 144–147) spermatheca; 148–149) female tergite VIII; 150) female sternite VIII. Scale bars: 142–143, 148–150: 0.2 mm; 139–141, 144–147: 0.1 mm.



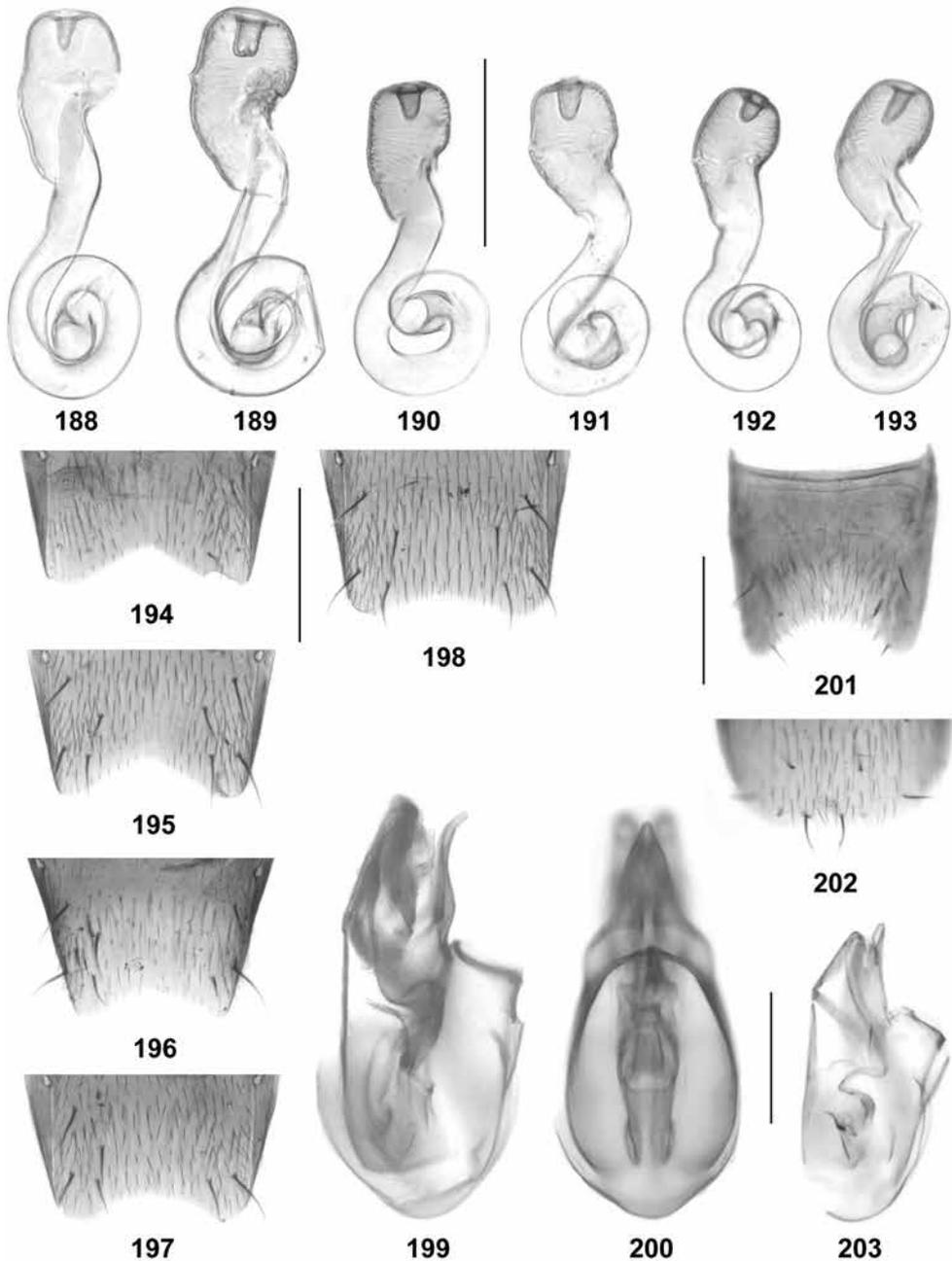
Figs. 151–161: *Amischa discolor* (151, 156–158, 160–161: Kazakhstan; 152–155, 159: Kyrgyzstan); 151) habitus; 152–153) median lobe of aedeagus in lateral and in ventral view; 154) male tergite VIII; 155) male sternite VIII; 156–159) spermatheca; 160) female tergite VIII; 161) female sternite VIII. Scale bars: 151: 1.0 mm; 154–155, 160–161: 0.2 mm; 152–153, 156–159: 0.1 mm.



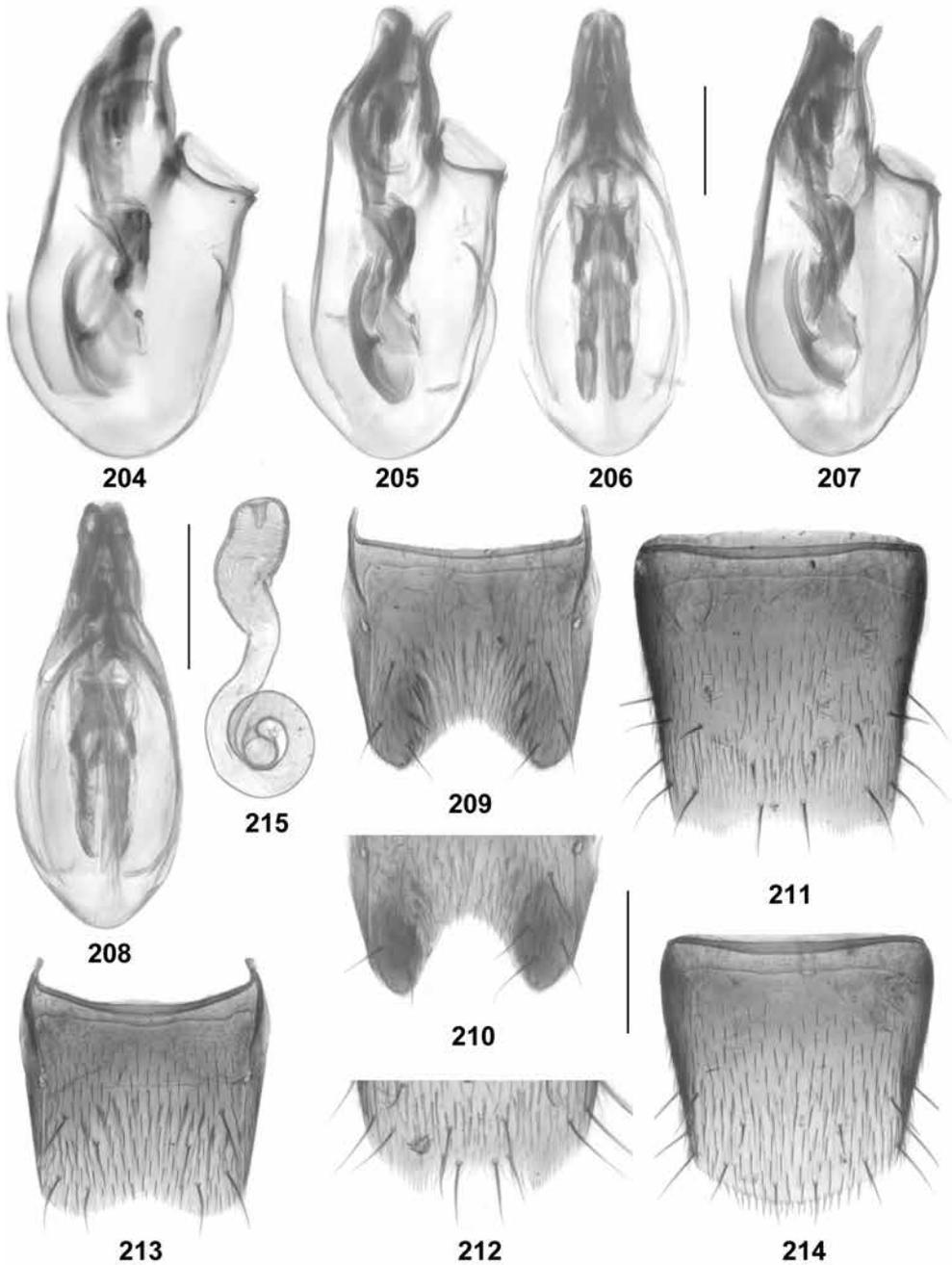
Figs. 162–171: *Amischa kashmirica* (162, 168–169, 171: syntypes of *A. kashmirica*; 163: paratype of *A. sporadica*; 164: Krasnodar; 165: Lesbos; 166–167: Corfu; 170: holotype of *A. sporadica*); 162–167) median lobe of aedeagus in lateral and in ventral view; 168–170) male tergite VIII; 171) male sternite VIII. Scale bars: 0.2 mm.



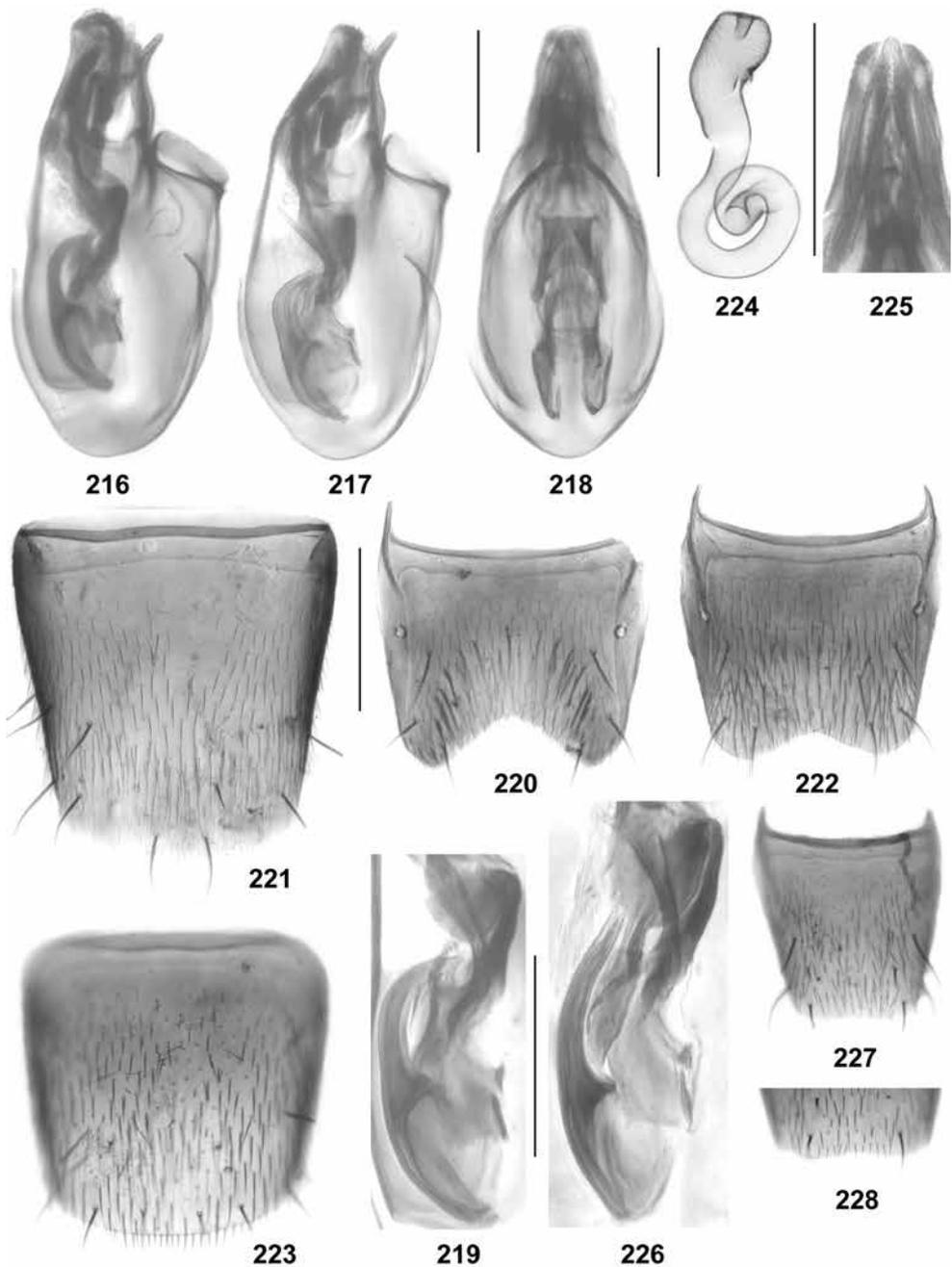
Figs. 172–187: *Amischa kashmirica* (172, 182: syntype of *A. kashmirica*; 173: paratype of *A. sporadica*; 174, 177, 179–180, 183–184, 186–187: Krasnodar; 175, 178, 181, 185: Corfu; 176: Lesbos); 172–176) internal structures of aedeagus; 177–178: apex of median lobe of aedeagus in ventral view; 179–181) posterior portion of male tergite VIII; 182–185) apical portion of male sternite VIII; 186) female tergite VIII; 187) female sternite VIII. Scale bars: 179–187: 0.2 mm; 172–176: 0.1 mm; 177–178: 0.05 mm.



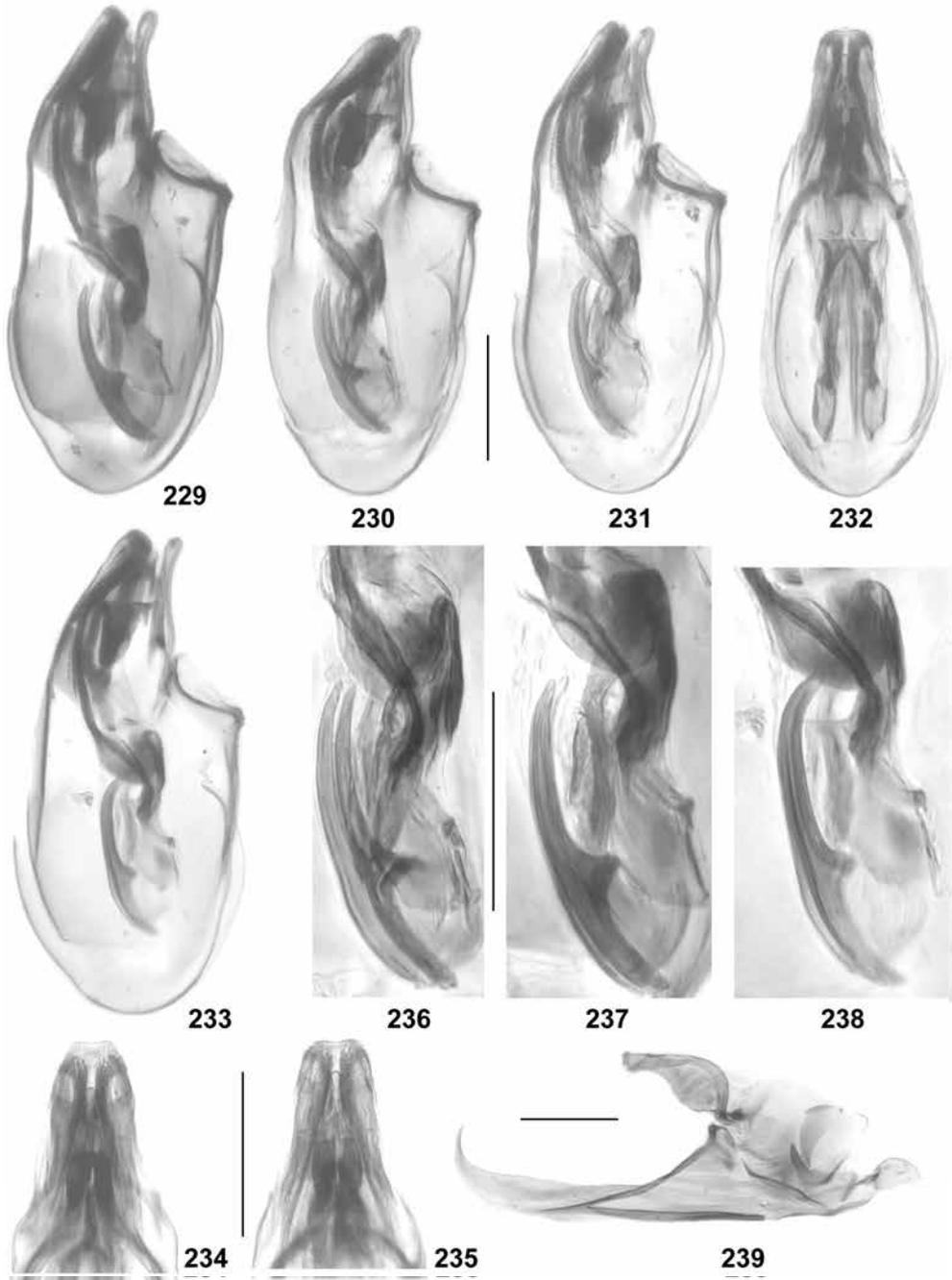
Figs. 188–203: *Amischa kashmirica* (188–198; 188, 196–197: paratypes of *A. sporadica*; 189, 195: Krasnodar; 190–192, 198: Corfu; 193: Turkey; 194: syntype of *A. kashmirica*, *A. otini*, holotype (199–202), and *A. leporina*, lectotype (203); 188–193) spermatheca; 194–198) posterior portion of female tergite VIII; 199–200, 203) aedeagus in lateral and in ventral view; 201) male tergite VIII; 202) posterior portion of male sternite VIII. Scale bars: 194–198, 201–202: 0.2 mm; 188–193, 199–200, 203: 0.1 mm.



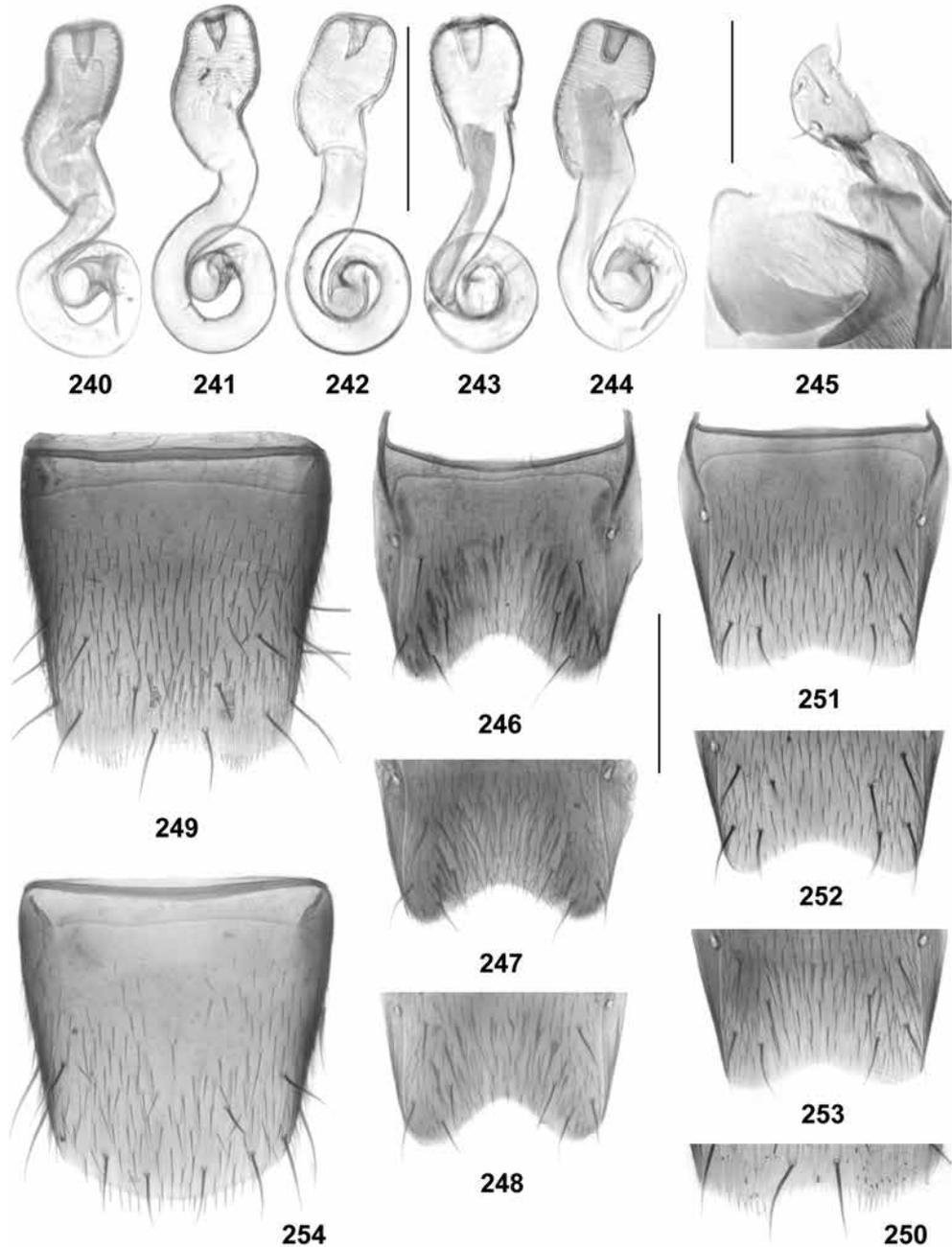
Figs. 204–215: *Amischa corsica* (204: paratype; 205–206, 209, 211, 213–215: Sardinia; 207–208, 210, 212: Toscana); 204–208) median lobe of aedeagus in lateral and in ventral view; 209–210) (posterior portion of) male tergite VIII; 211–212) (posterior portion of) male sternite VIII; 213) female tergite VIII; 214) female sternite VIII; 215) spermatheca. Scale bars: 209–214: 0.2 mm; 204–208, 215: 0.1 mm.



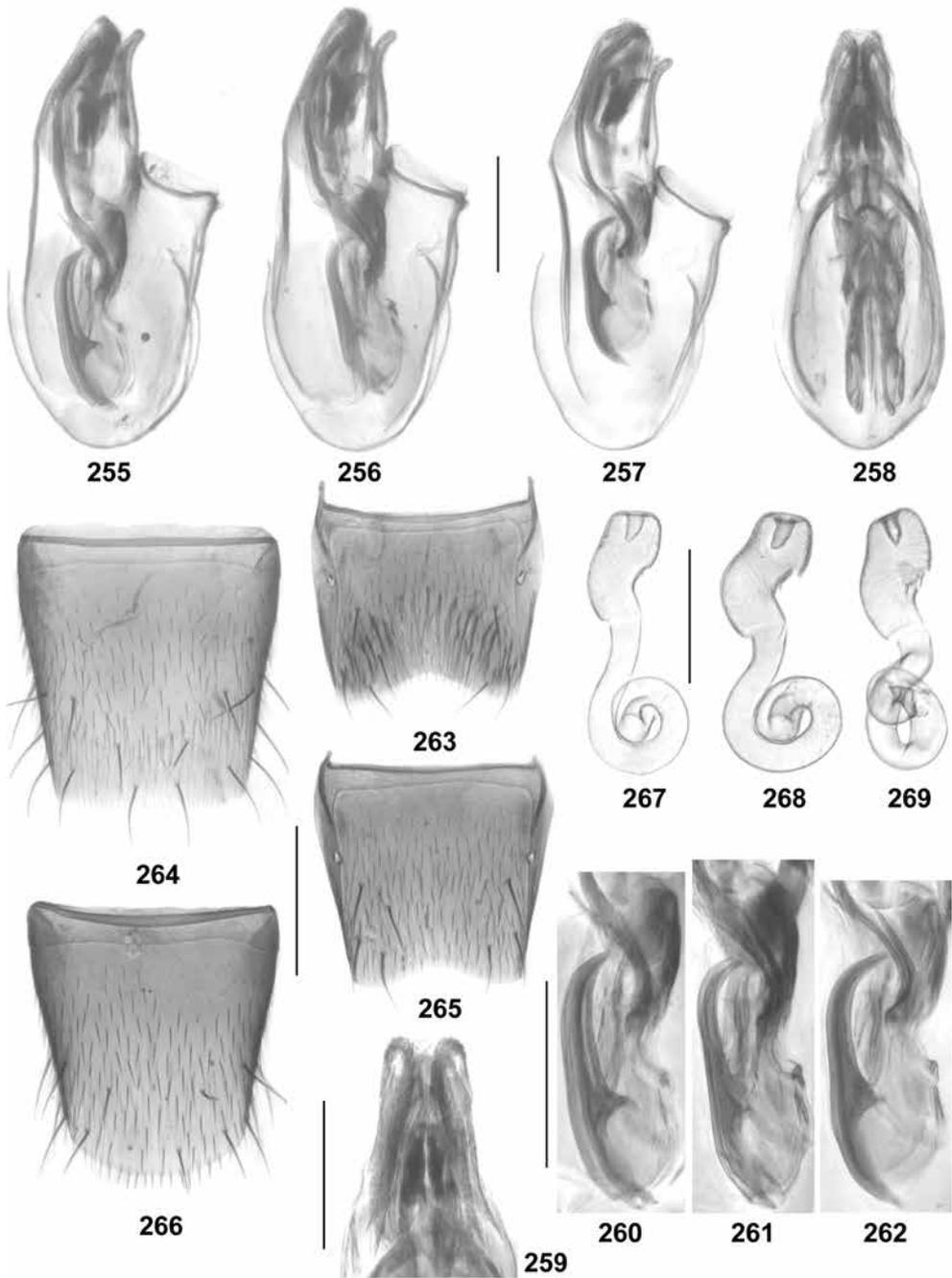
Figs. 216–228: *Amischa cretica* (216–224), *A. corsica* from Sardinia (225–226), and *A. leporina* (227–228); 216–218) median lobe of aedeagus in lateral and in ventral view; 219, 226) internal structures of aedeagus; 220, 227) male tergite VIII; 221) male sternite VIII; 222, 228) female tergite VIII; 223) female sternite VIII; 224) spermatheca; 225) apex of median lobe of aedeagus. Scale bars: 220–223, 227–228: 0.2 mm; 216–219, 224–226: 0.1 mm.



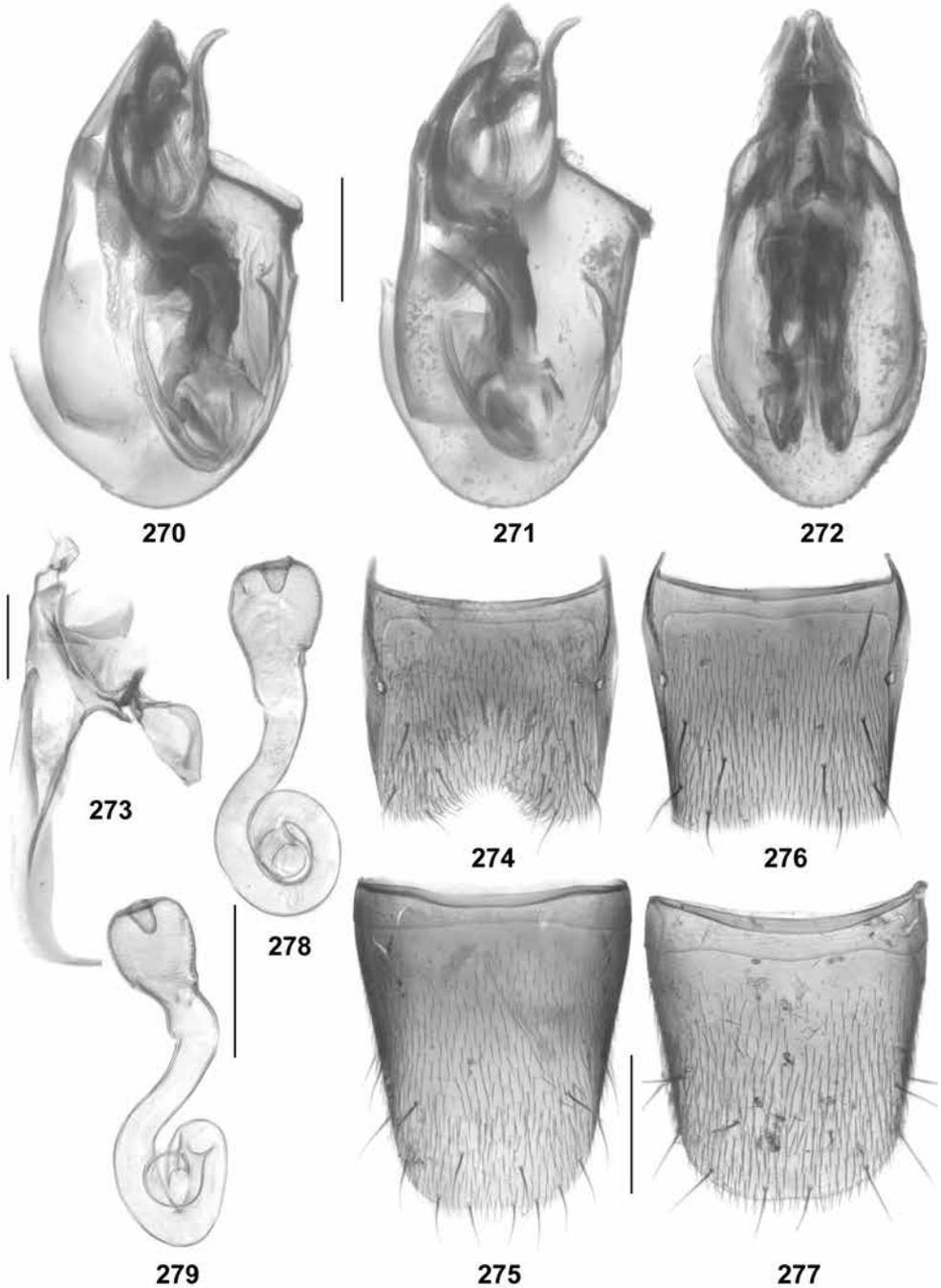
Figs. 229–239: *Amischa inexcisa* (229, 231–232, 235, 237: Turkey; 230, 234, 236, 239: Hungary; 233, 238: Krasnodar); 229–233) median lobe of aedeagus in lateral and in ventral view; 234–235) apex of median lobe; 236–238) internal structures of aedeagus; 239) paramere. Scale bars: 0.1 mm.



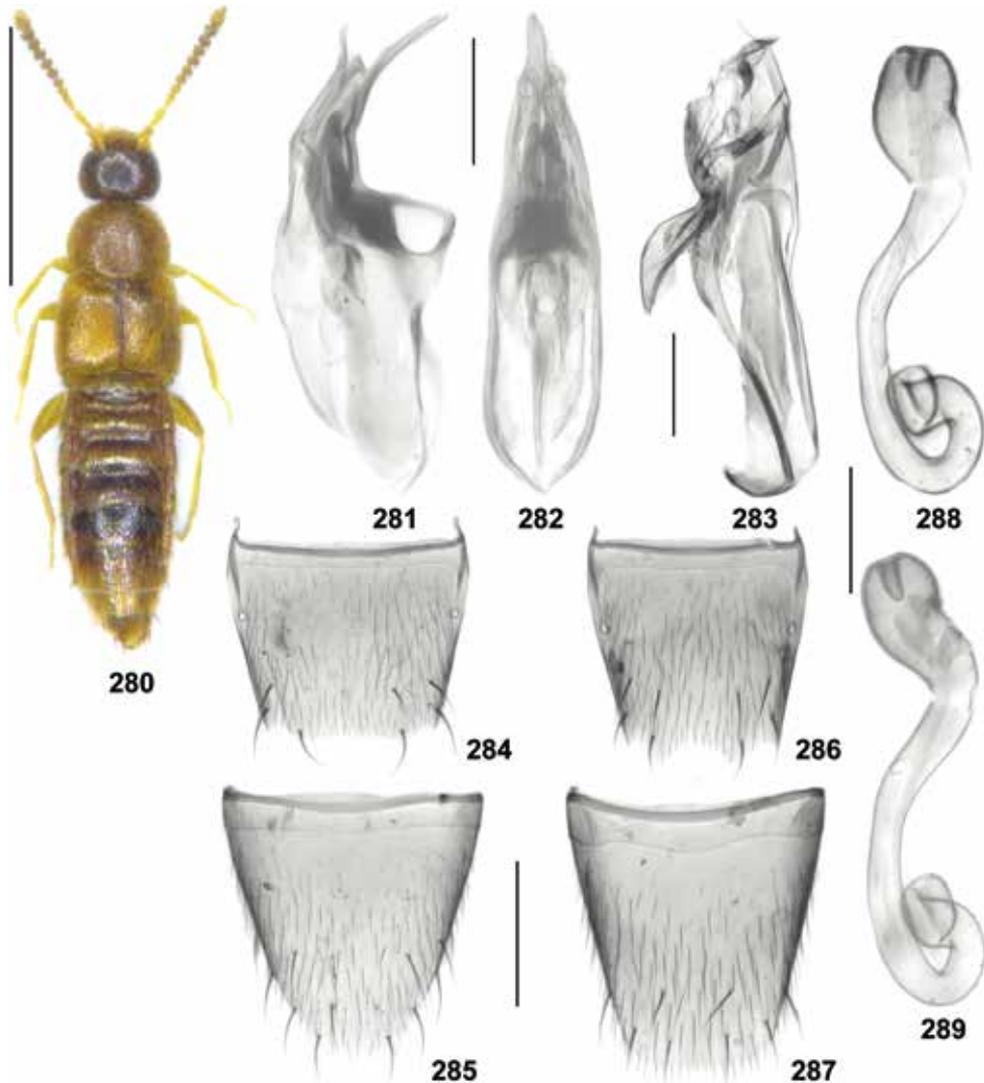
Figs. 240–254: *Amischa inexcisa* (240–241, 246–247, 249, 253: Turkey; 242–243, 245, 250: Hungary; 244, 248, 251–252, 254: Krasnodar); 240–244) spermatheca; 245) apical portion of paramere; 246–248) (posterior portion of) male tergite VIII; 249–250) (posterior portion of) male sternite VIII; 251–253) (posterior portion of) female tergite VIII; 254) female sternite VIII. Scale bars: 246–254: 0.2 mm; 240–245: 0.1 mm.



Figs. 255–269: *Amischa truncata*; 255–258) median lobe of aedeagus in lateral and in ventral view; 259) apical portion of median lobe; 260–262) internal structures of aedeagus; 263) male tergite VIII; 264) male sternite VIII; 265) female tergite VIII; 266) female sternite VIII; 267–269) spermatheca. Scale bars: 263–266: 0.2 mm; 255–262, 267–269: 0.1 mm.



Figs. 270–279: *Amischa iberica*; 270–272) median lobe of aedeagus in lateral and in ventral view; 273) paramere; 274) male tergite VIII; 275) male sternite VIII; 276) female tergite VIII; 277) female sternite VIII; 278–279) spermatheca. Scale bars: 274–277: 0.2 mm; 270–273, 278–279: 0.1 mm.



Figs. 280–289: *Amischa puetzi*; 280) habitus; 281–282) median lobe of aedeagus in lateral and in ventral view; 283) paramere; 284) male tergite VIII; 285) male sternite VIII; 286) female tergite VIII; 287) female sternite VIII; 288–289) spermatheca. Scale bars: 280: 1.0 mm; 284–287: 0.2 mm; 281–283, 288–289: 0.1 mm.

INTRASPECIFIC VARIATION: The aedeagus is rather variable in size. The median lobe of the male type material of *A. sporadica* from Lenkoran is at the low end (0.36 mm) of the range, whereas that of males seen from Turkey is up to 0.41 mm long. The median lobe of the male paratype from Mostar is of intermediate size (0.38 mm). Similarly, the posterior excisions of the male tergite and sternite VIII, as well as that of the female tergite VIII are of remarkably variable breadth and depth. Finally, the spermatheca is remarkably variable both in size and shape. However, the extremes appear to be connected by intermediate conditions.

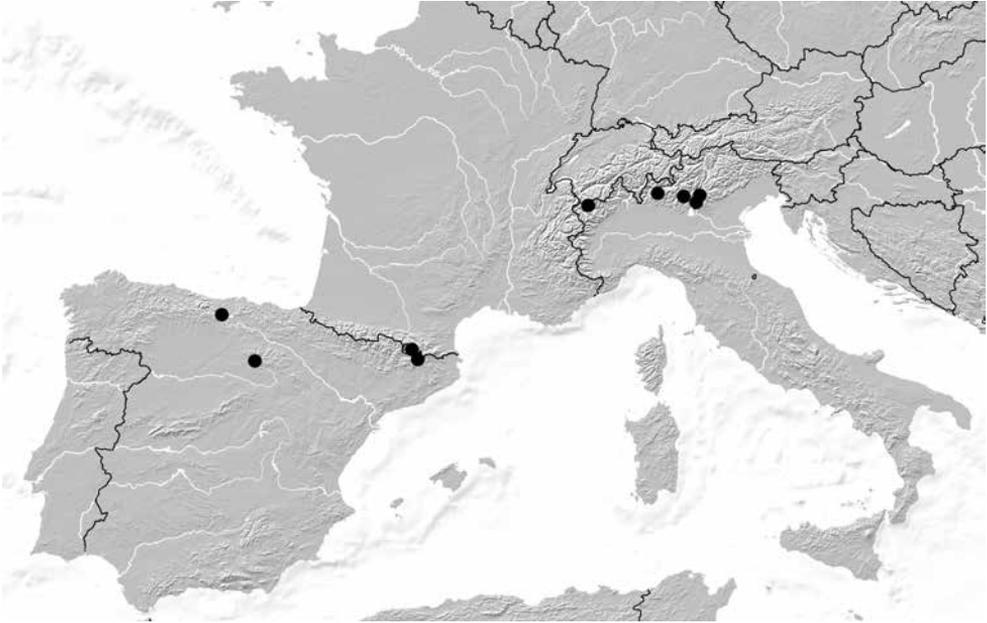


Fig. 290: Distribution of the bisexual brachypterous morph of *Amischa analis*.

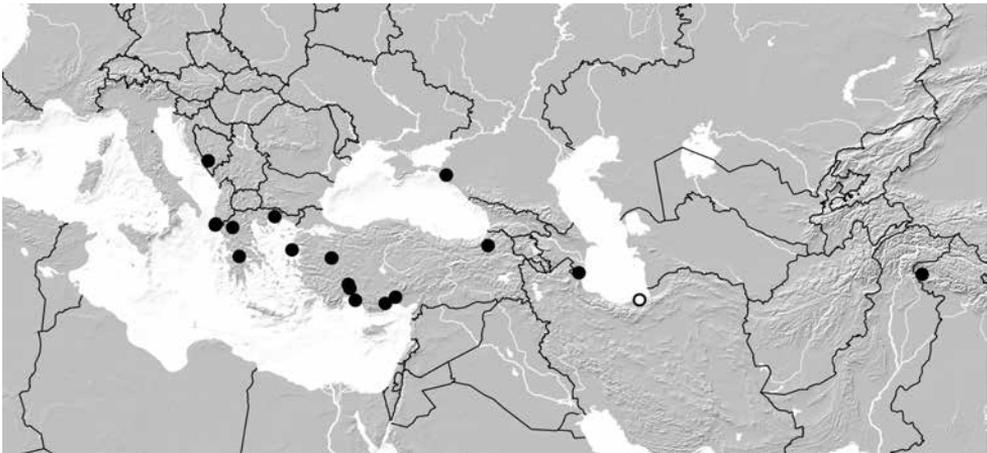


Fig. 291: Distribution of *Amischa kashmirica*. White circle: female-based record from Iran.

COMPARATIVE NOTES: This species is best identified based on the male sexual characters, the shape of the male tergite VIII and sternite VIII, a relatively short ventral process of the aedeagus with a V-shaped apical incision (ventral view), and strongly curved basal internal structures. Nevertheless, based on the extent of the variation, particularly that of the spermatheca, the possibility that the present concept of *A. kashmirica* includes more than one species cannot be ruled out with certainty.

***Amischa corsica* (FAUVEL, 1881)**
(Figs. 204–215, 225–226)

Amischa corsica BENICK, 1967: 24.

TYPE MATERIAL EXAMINED: **Holotype** ♂: “Porto, Corsica, 6.–24.9.1955, Dr. G. Benick / *Amischa corsica* ♂ Typus Bck. / Coll. G. Benick / *Amischa filum* (Mulsant & Rey), det. V. Assing 2012” (MHNG). **Paratypes**: 1 ♀: same data as holotype, but “*Amischa corsica* ♀ Allotypus” (MHNG); 2 ♂♂, 4 ♀♀: same data as holotype, two specimens labelled “*Amischa corsica* Paratypus G. Bck.” and four specimens without type labels (MHNG); 1 ♀: “Rom, Umg., Italia” (MHNG).

ADDITIONAL MATERIAL EXAMINED: **ITALY: Toscana**: 1 ♂, Vinci env., Stabbia, 43°46'N 10°50'E, 55 m, 15.X.2007, leg. Meybohm (cAss). **Sardegna**: 1 ♂, 1 ♀, Giara Pauli Maiori, 39°45'N 8°58'E, 580 m, 29.III.2014, leg. Meybohm (cAss).

COMMENT: The original description of *Amischa corsica* is based on “10 Exemplare”, among them the male holotype and a female allotype, from “Porto, Corsica 6.–24.9.55” and an additional female paratype from “Rom, Umg.” (BENICK 1967).

DIAGNOSIS: Macropterous species of usually dark colouration.

♂: median dorsal portion of head depressed to shallowly impressed; tergite VIII (Figs. 209–210) transverse, posterior margin strongly excised, postero-lateral portion somewhat darkened; sternite VIII weakly oblong, posterior margin distinctly excised in the middle (Figs. 211–212); median lobe of aedeagus (Figs. 204–208) 0.40–0.43 mm long; ventral process sinuate in lateral view, apically acute or narrowly incised in ventral view (Fig. 225); basal internal structures strongly sclerotized and weakly curved (Fig. 226).

♀: tergite VIII transverse, posterior margin shallowly excised (Fig. 213); sternite VIII weakly oblong, posterior margin convex and with short and moderately stout marginal setae (Fig. 214); spermatheca as in Fig. 215, with maximal extension approximately 0.2 mm and of similar shape as that of *A. decipiens*.

INTRASPECIFIC VARIATION: The males from Sardinia and Toscana resemble the type material in the shape of the median lobe of the aedeagus (lateral view), including the basal internal structures, as well as in the shape and chaetotaxy of the male sternite VIII. On the other hand, the male from Toscana differs by a posteriorly more deeply excised male tergite VIII (Fig. 210) and the shape of the crista apicalis (Fig. 207), and the male from Sardinia is distinguished by an apically simply acute (not incised) ventral process in ventral view (Fig. 225). More material is needed to decide if these differences should be attributed to inter- or intraspecific variation.

COMPARATIVE NOTES: This species is distinguished from the similar and evidently closely allied *A. kashmirica* by darker average colouration of the body, an aedeagus with a more slender ventral process (lateral view) and weakly curved basal internal structures, and by a slightly larger spermatheca.

DISTRIBUTION: The distribution includes Corsica, Sardinia, and mainland Italy. The altitudes range from near sea-level to 580 m.

***Amischa cretica* ASSING, 2019**
(Figs. 216–224)

Amischa cretica ASSING, 2019: 242 f.

TYPE MATERIAL EXAMINED: See ASSING (2019).

DIAGNOSIS: Macropterous species of dark-brown to black colouration.

♂: median dorsal portion of head depressed to shallowly impressed; tergite VIII transverse, posterior margin strongly excised, postero-lateral portion not distinctly darkened (Fig. 220); sternite VIII weakly oblong, posterior margin smoothly convex (Fig. 221); median lobe of aedeagus (Figs. 216–218) approximately 0.35 mm long; ventral process sinuate in lateral view, narrow and apically not incised in ventral view; basal internal structures strongly curved (Fig. 219).

♀: tergite VIII weakly transverse, posterior margin distinctly, obtusely excised (Fig. 222); sternite VIII approximately as long as broad, posterior margin convex and with dense short marginal setae (Fig. 223); spermatheca as in Fig. 224, with maximal extension approximately 0.2 mm.

COMPARATIVE NOTES: *Amischa cretica* is distinguished from the evidently closely allied *A. kashmirica* by darker average colouration, uniformly pale-coloured male tergite VIII (postero-lateral portions not infuscate), a posteriorly convex (not excised) male sternite VIII, an apically acute (not incised) ventral process of the aedeagus, and a posteriorly more deeply excised female tergite VIII. It differs from *A. corsica* by a smaller aedeagus, the absence of a posterior excision of the male sternite VIII, and a smaller aedeagus with strongly curved basal internal structures.

DISTRIBUTION AND NATURAL HISTORY: *Amischa cretica* is endemic to the Greek island Crete. For details on the habitats see ASSING (2019).

***Amischa inexcisa* sp.n.**

(Figs. 229–254, 292)

Amischa filum auctt., partim.

TYPE MATERIAL EXAMINED: **Holotype** ♂: “TR [1] – Kastamonu, 45 km NW Kastamonu, 41°42'05"N, 33°28'17"E 1090 m, calcareous slope, 22.III.2010, V. Assing / Holotypus ♂ *Amischa inexcisa* sp. n., det. V. Assing 2020” (cAss). **Paratypes**: 2 ♀♀: same data as holotype (cAss); 1 ♂ [in poor condition; forebody missing], 1 ♀: “TR [8] – Samsun, 9 km WNW Bafra, 55 m, 41°35'23"N, 35°50'12"E, mixed deciduous forest, 30.III.2009, V. Assing” (cAss); 1 ♂: “TR – Muğla, 8, 1740 m, 60 km NE Fethiye, Girdev Gölü, meadow, 36°41'41"N, 29°38'23"E, 3.X.2002, V. Assing” (cAss); 1 ♀: “TR – SE Ankara, N-Elma Dağı, 1300 m, hollow *Salix* base, 31.X.1995, leg. S. Vit” (cAss); 1 ♂, 2 ♀♀: “RUSSIA – Krasnodar, Krymsk, Adagum River, 44°53'33"N, 37°59'33"E, 64 m, flooded *Salix* thick., 2.VI.2018, Enushchenko” (cAss); 3 ♂♂, 4 ♀♀: “Ostungarn, Tiszacsege, 13.VII.2001, AK, leg. K. Renner” (cFel, cAss); 1 ♀: “Georgia, ca. 150 km SEE Tbilisi, Vashlovani N.R., 4-5.05.2018, 41°6'41"N, 46°38'47"E, at light, V. Vahrushev & D. Volkov” (cAss).

DESCRIPTION: Body length 2.0–2.5 mm; length of forebody 1.0–1.1 mm. Colouration: body blackish with the pronotum and elytra sometimes more or less distinctly paler. Abdomen, including posterior tergites, densely and finely punctate.

♂: median dorsal portion of head depressed to shallowly impressed; tergite VIII (Figs. 246–248) transverse with moderately deep concave posterior excision, postero-lateral portions not, or only very weakly infuscate; sternite VIII (Figs. 249–250) oblong, posterior margin with moderately broad, concave posterior excision, on either side of this excision with dense setae; median lobe of aedeagus (Figs. 229–233) approximately 0.4 mm long; ventral process very weakly sinuate (nearly straight) in lateral view, apically truncate to weakly concave in ventral view (Figs. 234–235); pair of basal internal structures (Figs. 236–238) very weakly curved, median tooth much closer to base than to apex.

♀: tergite VIII (Figs. 251–253) weakly transverse, posterior excision distinct, but shallower than in male; sternite VIII (Fig. 254) weakly oblong, posterior margin weakly convex and with rather sparse marginal setae; spermatheca of somewhat variable shape (Figs. 240–244), maximal extension 0.17–0.21 mm.

COMPARATIVE NOTES: *Amischa inexcisa* is distinguished from the similar, closely allied, and sympatric *A. kashmirica* and *A. truncata* by an apically less distinctly curved ventral process

(lateral view) and weakly curved basal internal structures of the aedeagus, and additionally as follows:

from *A. kashmirica* by darker average colouration, slightly larger average body size, a shallower posterior excision of the male tergite VIII, a narrower and concave posterior excision of the male sternite VIII with denser marginal setae on either side, an aedeagus with an apically unincised ventral process and with the median tooth of the basal internal spines in different position (approximately in the middle in *A. kashmirica*), and a female sternite VIII with sparser and longer marginal setae at the posterior margin;

from *A. truncata* by a posteriorly more deeply excised male tergite VIII, a posteriorly excised male sternite VIII, a larger aedeagus, and a posteriorly more deeply excised female tergite VIII.

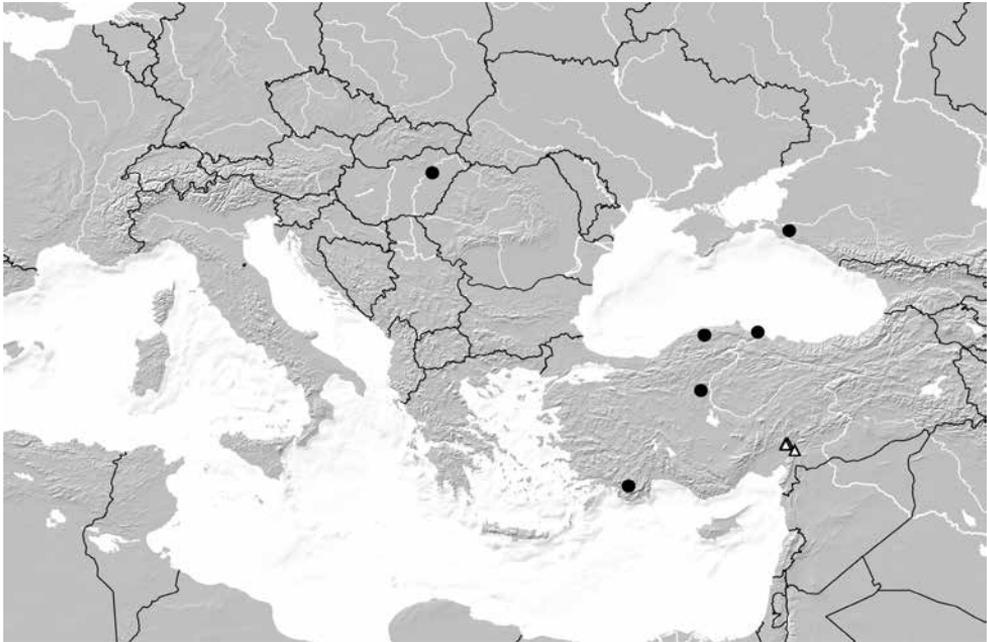


Fig. 292: Distributions of *Amischa inexcisa* (black circles) and *Amischa truncata* (white triangles).

DISTRIBUTION AND NATURAL HISTORY: The species is known from four localities in Turkey, one in Russia (Krasnodar), one in Georgia, and one in Hungary (Fig. 292). The material from Turkey was recorded as *A. filum* by ASSING (2006b, 2011). The record from Hungary suggests that previous records of *A. filum* from the south of Central Europe may refer to this species, too.

The specimens from Turkey and Russia were collected under stones in a calcareous slope and in a moist meadow, and sifted from litter in a mixed forest with predominant oak, in a flooded willow thicket near a river, and from a hollow willow trunk, those from Hungary were caught with a car-net, and the female from Georgia at light. The altitudes range from approximately 50 to 1740 m. The material from Russia (Krasnodar) was collected together with *A. kashmirica*.

ETYMOLOGY: The specific epithet (Latin, adjective) alludes to the absence of an apical excision of the ventral process of the aedeagus (lateral view).

***Amischa truncata* sp.n.**
(Figs. 255–269, 292)

Amischa filum auctt., partim.

TYPE MATERIAL EXAMINED: **Holotype** ♂: “TR [43] – Osmaniye [recte: Kahramanmaraş], 10 km N Andırın, → Çökak, 37°39'19N, 36°20'51E, 1150 m, 1./2.V.2005, Brachat & Meybohm / Holotypus ♂ *Amischa truncata* sp. n., det. V. Assing 2020” (cAss). **Paratypes**: 4 ♂♂, 6 ♀♀: same data as holotype (cAss); 1 ♂: “TR [45] – Osmaniye [recte: Kahramanmaraş], 12.5 km NE Andırın, → Geben, 37°39'14N, 36°26'27E, 1500 m, 3.V.2005, Brachat & Meybohm” (cAss); 1 ♀: “TR – Kahramanmaraş, 60 km W K. Maraş, N Andırın, 1120 m, [28], 37°36'43N, 36°20'31E, 26.III.2005, V. Assing” (cAss); 1 ♀: “TR. – Kahramanmaraş [39], 34 km SW Kahramanmaraş, 37°22'57N, 36°40'42E, 1070 m, oak, shrubs, grass, 12.IV.2004, leg. V. Assing” (cAss).

DESCRIPTION: Body length 2.0–2.4 mm; length of forebody 0.9–1.1 mm. Colouration: body blackish-brown to blackish with the elytra mostly somewhat paler. Abdomen, including posterior tergites, densely and finely punctate. Elytra of variable length, but hind wings always fully developed.

♂: median dorsal portion of head depressed to shallowly impressed; tergite VIII (Fig. 263) transverse with moderately deep concave posterior excision, postero-lateral portions not infuscate; sternite VIII (Fig. 264) oblong, posterior margin truncate to weakly convex, without posterior excision; median lobe of aedeagus (Figs. 255–258) approximately 0.38 mm long; ventral process weakly sinuate in lateral view, apically distinctly curved (lateral view) and truncate to weakly concave in ventral view (Fig. 259); pair of basal internal structures (Figs. 260–262) apically distinctly curved, median tooth closer to base than to apex.

♀: tergite VIII (Fig. 265) nearly as long as broad, posterior margin shallowly concave; sternite VIII (Fig. 266) weakly oblong, posterior margin convex; spermatheca (Figs. 267–269) with maximal extension 0.18–0.20 mm.

COMPARATIVE NOTES: *Amischa truncata* is distinguished from the closely allied *A. kashmirica* by darker colouration, a shallower posterior excision of the male tergite VIII, a truncate posterior margin of the male sternite VIII, an apically unincised (ventral view) and more strongly curved (lateral view) ventral process of the aedeagus, and a shallower posterior excision of the female tergite VIII. For differences distinguishing the species from the geographically close and closely allied *A. inexcisa* see the comparative notes in the section above.

DISTRIBUTION AND NATURAL HISTORY: *Amischa truncata* is currently known only from three localities in Kahramanmaraş Province, central southern Anatolia (Fig. 292). The material from the type locality and its vicinity was reported as *A. filum* by ASSING (2006b), the female from the locality to the southwest of Kahramanmaraş as *A. decipiens*. The specimens were collected at altitudes of 1070–1500 m.

ETYMOLOGY: The specific epithet (Latin, adjective) alludes to the truncate posterior margin of the male sternite VIII.

***Amischa otini* (FAUVEL, 1881)**
(Figs. 199–202)

Amischa otini PEYERIMHOFF, 1949: 256.

TYPE MATERIAL EXAMINED: **Holotype** ♂: “Moy.-Atlas, Alt. 2000 / Aguelmane de Sidi Ali / 14.5.39 Otin leg. / *Amischa Otini* Peyerimhoff Type unique / *Amischa otini* Peyerimhoff det. V. Assing 2011” (MNHN).

COMMENT: *Amischa otini* was described based on “un spécimen” from “Moyen-Atlas, aux bords de l’Arguelmane Sidi-Ali, vers 2.000 m” (PEYERIMHOFF 1949). The holotype, a male, was located in the Peyerimhoff collection of the MNHN.

DIAGNOSIS: Small, possibly brachypterous species; length of forebody 0.85 mm. Elytra barely 0.7 times as long as pronotum.

♂: tergite VIII (Fig. 201) transverse, with deeply and broadly concave posterior margin, postero-lateral portions not infusate; sternite VIII oblong, posterior margin convex, chaetotaxy without evident modifications (Fig. 202); median lobe of aedeagus (Figs. 199–200) 0.4 mm long; ventral process sinuate in lateral view and apically acute in ventral view; basal internal structures thin, long, weakly curved, and weakly sclerotized.

♀: unknown.

COMPARATIVE NOTES: This species is distinguished from the similar *A. decipiens* by shorter elytra, a deeper posterior excision of the male tergite VIII, and a sinuate (not angled) ventral process of the aedeagus in lateral view.

DISTRIBUTION: *Amischa otini* has been recorded only from the type locality in Morocco.

Amischa leporina (FAUVEL, 1881)

(Figs. 203, 227–228)

Homalota leporina FAUVEL, 1881: 65.

TYPE MATERIAL EXAMINED: **Lectotype** ♂, present designation: “Mt. Pellegrino (Sicile) pierres l’hiru [?] / près *talpa*, probablement n. sp. près *simillima* / *leporina* Fvl. / Coll. R. I. Sc. N. B. / Lectotypus ♂ *Homalota leporina* Fauvel, desig. V. Assing 2016 / *Amischa leporina* (Fauvel), det. V. Assing 2016” (IRSNB). **Paralectotypes**: 1 ♂ [without head and pronotum], 3 ♀ ♀ [1 teneral]: same data as lectotype (IRSNB).

COMMENT: The original description is based on an unspecified number of syntypes from “Sicile Près de Palermo” collected by Enrico Ragusa (FAUVEL 1881). Six pins, one of them without specimen and the remainder with two males and three females attached to them, with labels indicating “Mt. Pellagrino”, a mountain near Palermo, were located in the Fauvel collection. The male syntype in better condition is designated as the lectotype. An additional non-type specimen in poor condition (apex of abdomen missing) labeled “Corse” and identified by Fauvel as *leporina* was found in the Fauvel collection. Numerous additional syntypes from Monte Pellegrino (leg. Ragusa) (RAGUSA 1881) should be in the Ragusa collection, but according to HORN et al. (1990), it is unclear where exactly the Coleoptera of this collection are deposited.

DIAGNOSIS: Small macropterous species, body length 1.7–1.9 mm; length of forebody 0.75–0.85 mm. Pronotum and elytra pale-brown. Forebody matt. Abdomen densely punctate.

♂: tergite VIII not transverse, approximately as long as broad, posterior margin truncate (Fig. 227); sternite VIII weakly oblong, posterior margin distinctly convex, chaetotaxy without evident modifications; median lobe of aedeagus (Fig. 203) small, approximately 0.3 mm long; ventral process rather short, straight in basal three-fourths in lateral view; basal internal structures very short and weakly sclerotized.

♀: tergite VIII approximately as long as broad, posterior margin very weakly concave in the middle (Fig. 228); sternite VIII approximately as long as broad, posterior margin weakly concave in the middle and with relatively stout marginal setae; spermatheca small, < 0.2 mm long, and with weakly dilated distal portion.

COMPARATIVE NOTES: This species is distinguished from its congeners particularly by the shapes of the male tergite and sternite VIII, a small aedeagus, and the shape of the female tergite VIII, from most species also by pale-coloured pronotum and elytra.

DISTRIBUTION: At present, *A. leporina* is reliably known only from Sicily.

***Amischa iberica* sp.n.**

(Figs. 270–279)

TYPE MATERIAL EXAMINED: **Holotype** ♂: “E – Andalucía [14a], 20 km N Tarifa, 100 m, 36°09'25"N, 5°38'06"W reservoir, flood debris, 29.XII.2009, Assing / Holotypus ♂ *Amischa iberica* sp. n., det. V. Assing 2020” (cAss). **Paratypes**: 1 ♂, 4 ♀♀: same data as holotype (cAss); 56 ♂♂, 93 ♀♀: “E–Andalucía, 22 km SW Sevilla, Las Colinas, 37°14'N, 6°09'W, 30 m, car-net, 4.V.2009, leg. T. Struyve” (cAss, cStr, MNB); 14 exs.: “E, Andalucía, Huelva env. Parc Nac. de Doñana – Las Salinas, 4-V-2009, car net, leg. Struyve” (cFel); 5 ♂♂, 6 ♀♀: “E – Murcia, Cieza, Rambla del Judío, 38°21'N, 1°27'W, 355 m, at light, 4.VII.2009, leg. Lencina & Albert” (cAss).

DESCRIPTION: Body length 2.1–2.8 mm; length of forebody 1.0–1.2 mm. Colouration highly variable: head brown to black; pronotum dark-yellow to blackish; elytra yellow to blackish; abdomen brown to black with the apex (segments VIII–X and posterior portion of segment VII) and the posterior margins of the anterior tergites paler; legs yellow to pale-brown; antennae yellowish-brown to dark-brown with the basal 2–3 antennomeres yellowish to reddish. Abdomen, including posterior tergites, densely and finely punctate.

♂: median dorsal portion of head depressed to shallowly impressed; tergite VIII (Fig. 274) with broad posterior excision of variable depth and width, margin of this excision with fringe of dense and long setae; sternite VIII (Fig. 275) much longer than tergite VIII, posterior margin broadly convex to nearly truncate; median lobe of aedeagus (Figs. 270–272) approximately 0.4 mm long; ventral process basally straight and apically distinctly curved in lateral view, apically acute and not incised in ventral view; basal internal structures weakly sclerotized and weakly curved; paramere as in Fig. 273.

♀: tergite VIII (Fig. 276) with very small and very shallow posterior excision, depth and breadth of this excision somewhat variable; sternite VIII (Fig. 277) longer than tergite VIII and with broadly convex posterior margin; spermatheca as in Figs. 278–279; maximal extension 0.22–0.25 mm.

COMPARATIVE NOTES: This species is reliably distinguished from all other congeners particularly by the shape of the median lobe of the aedeagus (shape of ventral process in lateral view).

DISTRIBUTION AND NATURAL HISTORY: The specimens were collected in three localities in Andalucía and one in Murcia, South Spain, partly by sifting flood debris at the margin of a reservoir, partly with a car-net, and partly at a light trap. The altitudes range from 30 to approximately 350 m. In all localities, the species was collected together with *A. forcipata*. Since numerous specimens were collected on the wing, it can be assumed that the species may be more widespread at least in the Iberian Peninsula, possibly also in Northwest Africa.

ETYMOLOGY: The specific epithet (adjective) alludes to the fact that this species is currently known only from the south of the Iberian Peninsula.

Amischa puetzi* group**Amischa puetzi* ASSING, 2005**

(Figs. 280–289)

Amischa puetzi ASSING, 2005b: 34 ff.*Amischa sichuanensis* PACE, 2011: 159 f. **syn.n.**

TYPE MATERIAL EXAMINED: See ASSING (2005b).

COMMENT: The original description of *A. sichuanensis* is based on a unique female from “China: W-Sichuan, Ya’an Prefecture, Tianquan Co., Jiajin Shan, below Labahe nr. Station, 54 km W Ya’an” (PACE 2011). The type locality is identical with that of *A. puetzi*, and even the date

and the collector are the same. The illustrations of the habitus and the spermatheca (PACE 2011: figs. 4, 40) do not provide any evidence that the specimen might represent a distinct species. In consequence, there is no doubt that the holotype of *A. sichuanensis* is conspecific with *A. puetzi*. Hence the synonymy proposed above.

DIAGNOSIS: Macropterous species of robust habitus; body not parallel-sided, broadest at the elytra (Fig. 280). Colouration usually brownish, with the head at least slightly darker than pronotum and elytra.

♂: head neither depressed nor impressed; tergite VIII (Fig. 284) weakly transverse, posterior margin truncate in the middle; sternite VIII (Fig. 285) with strongly convex posterior margin, chaetotaxy unmodified; median lobe of aedeagus (Figs. 281–282) with conspicuously long, slender and acute ventral process and with crista apicalis of highly distinctive shape; internal sac without basal structures; paramere (Fig. 283) of distinctive structure.

♀: tergite VIII (Fig. 286) approximately as long as broad, posterior margin with nearly semi-circular median excision; sternite VIII (Fig. 287) weakly oblong, posterior margin weakly convex; spermatheca (Figs. 288–289) significantly longer than in other Palaearctic representatives of the genus, maximal extension approximately 0.35 mm, with long proximal portion.

For additional illustrations of the sexual characters see ASSING (2005b: figs. 47–53).

COMPARATIVE NOTES: This species is easily identified based on the shapes of tergite VIII and sternite VIII, and above all the highly distinctive shapes of the median lobe of the aedeagus and of the spermatheca.

DISTRIBUTION: This species is currently known only from the type locality in Sichuan.

Species excluded from *Amischa*

Atheta coprophila (PACE, 1991) comb.n.

Amischa coprophila PACE, 1991: 130.

COMMENT: The original description by PACE (1991) is based on a unique female from Nepal (Lake Phewa near Pokhara). Based on the illustrations of the habitus, the female tergite VIII, and the spermatheca, this species is excluded from *Amischa* and transferred to *Atheta* (incertae sedis).

Atheta dhaulagirica nom.n.

Amischa dhaulagiriensis PACE, 2015: 206 f. (junior homonym of *Atheta (Dimetrota) dhaulagiriensis* PACE, 2013)

TYPE MATERIAL EXAMINED: **Holotype** ♀ [dissected prior to present study; head and pronotum deformed]: “NEPAL SW Dhaulagiri, NW Dhorpatan, 31–3200 m, 28°30'47"N, 83°01'59"E, 21.IX.2012, leg. J. Schmidt / collection Naturkundemuseum Erfurt / Holotypus *Amischa dhaulagiriensis* mihi, det. R. Pace 2015 / *Amischa dhaulagiriensis* n. sp., det. R. Pace 2015 / *Atheta dhaulagirica* nom. n., det. V. Assing 2020” (NME).

COMMENT: The original description is based on a unique female from “Nepal, SW Dhaulagiri, NW Dhorpatan” (PACE 2015). An examination of the deformed holotype revealed that it does not belong to *Amischa*, but to *Atheta*. *Atheta dhaulagiriensis* (PACE, 2015) is preoccupied by *Atheta (Dimetrota) dhaulagiriensis* PACE, 2013, which is why the name is here replaced with the nomen novum *Atheta dhaulagirica*.

***Atheta fraudulentata* PACE, 2006 comb.n.**

Amischa fraudulentata PACE, 2006: 359.

TYPE MATERIAL EXAMINED: **Holotype** ♂ [dissected prior to present study]: “NEPAL Prov. Karnali, Humla 6 km NW Simikot, Dandaphaya–Kermi 2300 m – 2800 m, 19.06.2001, leg. A. Kopetz KL/HF / Holotypus *Amischa fraudulentata* mihi, det. R. Pace 2003 / *Amischa fraudulentata* n. sp., det. R. Pace 2003 / *Atheta fraudulentata* (Pace), det. V. Assing 2020” (NME).

COMMENT: The original description is based on a unique male from “Nepal, Prov. Karnali, Distr. Humla, 6 km NWE Simikot, Dandahaya–Kermi” deposited in Naturkundemuseum Erfurt (PACE 2006). An examination of the holotype revealed that it belongs to *Atheta*; in external characters it resembles species of the subgenus *Mocyta* MULSANT & REY, 1874.

***Atheta niponensis* (SHARP, 1888) comb.rev.**

Homalota niponensis SHARP, 1888: 292 f.

Atheta (Philhygra) niponensis: BERNHAUER & SCHEERPELTZ (1926).

Amischa niponensis: SAWADA (1977).

Amischa niponensis: SCHÜLKE & SMETANA (2015).

TYPE MATERIAL EXAMINED: **Syntypes**: 1 ♂ [dissected by M. Maruyama]: “Nagasaki. 13.II.–21.IV.81. / Japan. G. Lewis. 1910-320 / *Homalota niponensis* / Lectotype *Homalota niponensis* Sharp, 1888, des. Maruyama 2011” (BMNH); 1 ♂ [dissected by Sawada; strongly damaged and practically embedded in glue]: “Type / Nagasaki. 13.II.–21.IV.81. / Japan. G. Lewis. / *Homalota niponensis* Type D.S. / Sharp Coll. 1905-313 / Paralectotype *Homalota niponensis* Sharp, 1888, des. Maruyama 2011” (BMNH).

COMMENT: The original description is based on “two examples” from “Nagasaki” (SHARP 1888). The species was subsequently transferred to *Atheta* subgenus *Philhygra* MULSANT & REY, 1873 by BERNHAUER & SCHEERPELTZ (1926), and eventually to *Amischa* by SAWADA (1977), who stated that the “species must be placed in *Amischa* without doubt as the glossa is broadly produced as in *A. analis* (GRAV.) of Europe”. Both syntypes were subsequently studied by M. Maruyama, who attached a lectotype label to the syntype, which he had dissected, but he never published a lectotype designation.

An examination of the syntypes revealed that the species does not share the characters constituting *Amischa* (mouthparts and aedeagal morphology, and modifications of male tergite and sternite VIII); it does not even have the head shape so typical of this genus. Instead, it appears to belong to *Atheta* sensu lato.

***Atheta (Microdota) nana* (PACE, 1998) comb.n.**

Amischa nana PACE, 1998: 429 f.

TYPE MATERIAL EXAMINED: **Holotype** ♀ [dissected prior to present study]: “CHINA Yunnan, Xishuangbanna, 24.I.1993, G. de Rougemont / Holotypus *Amischa nana* mihi, det. R. Pace 1995 / *Amischa nana* sp. n., det. R. Pace 1995 / *Atheta nana* (Pace), det. V. Assing 2020” (MHNG).

COMMENT: The original description is based on a unique female from “China, Yunnan, Xishuangbanna, Sanchahe, elephant res.” (PACE 1998). Based on the external and sexual characters of the holotype, the species belongs to *Atheta* (subg. *Microdota*).

***Atheta (Microdota?) phallossetigera* PACE, 1986 comb.rev.**

Atheta (Microdota) phallossetigera PACE, 1986a: 92.

TYPE MATERIAL EXAMINED: **Holotype** ♂ [dissected prior to present study]: “Barahbise geg. Ting-Sang-La [on path down to Barahbise (according to handwritten field notes of H. Franz)], Nepal, lg. H. Franz / [underside of same label:] Pa13 [sift in degraded forest, 6.VIII.1970] / Holotypus *Atheta phallossetigera* m., det. R. Pace 1983 / *Atheta*

(*Microdota phallosotigera* n. sp., det. R. Pace 1983 / *Atheta phallosotigera* Pace, det. V. Assing 2020" (NHMW). **Paratype** ♀: same data as holotype (NHMW).

COMMENT: PACE (1986a) originally described this species in *Atheta* and subsequently transferred it to *Amischa* (PACE 1990). An examination of the type material revealed that it clearly does not belong to *Amischa*, but most likely to *Atheta*.

***Atheta (Microdota) pioncolyata* (PACE, 1991) comb.n.**

Amischa pioncolyata PACE, 1991: 130.

TYPE MATERIAL EXAMINED: **Holotype** ♀ [dissected prior to present study]: "NEPAL (Prov. Bagmati), Chaubas, 2600 m, 5.IV.81, Löbl & Smetana / Holotypus *Amischa pioncolyata* m., det. R. Pace 1988 / *Amischa pioncolyata* sp. n., det. R. Pace 1988 / *Atheta pioncolyata* (Pace), det. V. Assing 2020" (MHNG). **Paratype** ♀: same data as holotype (MHNG).

COMMENT: The original description is based on three females from "Nepal, prov. Bagmati, Chaubas, 2600 m" (PACE 1991). An examination of the holotype and a paratype revealed that the species clearly belongs to *Atheta*, not to *Amischa*.

***Atheta (Mocyta) sahlbergi* (EPELSHEIM, 1893) comb.rev.**

Atheta (Metaxya) sahlbergi EPELSHEIM, 1893: 32 f.

Amischa sahlbergi: BERNHAUER & SCHEERPELTZ (1926: 594).

TYPE MATERIAL EXAMINED: **Syntype** ♀ [dissected prior to present study]: "Ost-Sibirien. Quellgebiet des Irkut. Leder 1891. / *Sahlbergi* Epp. / c. Epplish. Steind. d. / Typus / vidit R. Pace 1982 / *Atheta (Mocyta) sahlbergi* (Epp.), J. Muona det. 1986" (NHMW).

COMMENT: The original description specifies neither the number of syntypes nor the exact locality. However, since it includes a short description of an unnamed variety (based on a single specimen), it can be inferred that EPELSHEIM (1893) had at least two specimens before him. Only one female was found in the Eppelsheim collection at the NHMW. It had been studied by Pace, who evidently dissected it, and by Muona, who correctly identified it as a representative of the subgenus *Mocyta* of the genus *Atheta*. Unfortunately, the spermatheca is mounted in Canada balsam, deformed, and filled with air. The species is characterised by a densely punctate pronotum and relatively short and densely punctate elytra.

Zusammenfassung

Nach der Revision von Typen und der Untersuchung umfangreichen weiteren Materials ist die Gattung *Amischa* THOMSON, 1858 in der Paläarktis mit lediglich 16 Arten vertreten, d.h., es verbleiben nur etwas mehr als die Hälfte der zuvor für die Region festgestellten Diversität (30 Arten). Im Gegensatz zu vielen anderen Gattungen der Athetini ist *Amischa* durch eine Reihe von auffälligen Synapomorphien charakterisiert. Die Arten werden zwei Artengruppen zugeordnet, der monotypischen *A. puetzi*- und der *A. analis*-Gruppe (15 Arten); innerhalb der *A. analis*-Gruppe werden mehrere phylogenetische Linien unterschieden. Diagnosen aller Arten werden durch zahlreiche Abbildungen ergänzt, auch um der teilweise erheblichen intraspezifischen Variabilität Rechnung zu tragen. Vier Arten werden erstmals beschrieben: *Amischa iberica* sp.n. (Südspanien); *A. inexcisa* sp.n. (Ungarn, Russland (Krasnodar), Georgien, Türkei); *A. discolor* sp.n. (Kirgisistan, Kasachstan); *A. truncata* sp.n. (Südtürkei). Neun Arten werden synonymisiert: *Amischa bifoveolata* (MANNERHEIM, 1830) = *A. filum* (MULSANT & REY, 1870) syn.n. = *A. minima* MULSANT & REY, 1873 syn.n. = *A. uhligi* PACE, 1987 syn.n.; *A. decipiens* (SHARP, 1869) = *A. simplex* BENICK, 1982 syn.n.; *A. kashmirica* CAMERON, 1939 = *A. sporadica* BENICK, 1967 syn.n.; *A. nigrofusca* (STEPHENS, 1832) = *A. jugorum* SCHEERPELTZ, 1956 syn.n.; *A. puetzi*

ASSING, 2005 = *A. sichuanensis* PACE, 2011 syn.n.; *A. setifera* BENICK, 1982 = *A. andreasii* MUONA, 1990 syn.n. = *A. rougemonti* PACE, 1998 syn.n. Acht Arten werden in die Gattung *Atheta* THOMSON, 1858 transferiert: *Atheta (Microdota) pioncolyata* (PACE, 1991) comb.n.; *Atheta (Microdota) nana* (PACE, 1998) comb.n.; *Atheta (Microdota?) phallosetigera* (PACE, 1986) comb.rev.; *Atheta coprophila* (PACE, 1991) comb.n.; *Atheta dhaulagiriensis* (PACE, 2015), ein sekundäres jüngerer Homonym ersetzt durch *Atheta dhaulagirica* nom.n.; *Atheta fraudulenta* PACE, 2006 comb.n.; *Atheta (Mocyta) sahlbergi* (EPELSHEIM, 1893) comb.rev.; *Atheta niponensis* (SHARP, 1888) comb.rev. Für *Homalota filum* MULSANT & REY, 1870, *Amischa strupii* SCHEERPELTZ, 1967 und *Homalota leporina* FAUVEL, 1881 werden Lektotypen designiert. Die Ergebnisse umfangreicher, mit Bodenfallen, Bodenextraktionen und Photoelektroden auf zahlreichen Untersuchungsflächen Niedersachsens (Norddeutschland) im Zeitraum von 1981 bis 2001 durchgeführter Freilanduntersuchungen werden hinsichtlich der Geschlechterverhältnisse, Parasitismus und Reproduktionszyklen sowie der saisonalen Dichten- und Aktivitätsdynamik von vier *Amischa*-Arten ausgewertet. Die enorm weit verbreitete und häufige Art *Amischa analis* (GRAVENHORST, 1802) ist fast durchweg parthenogenetisch. Ausnahmen bilden offenbar lediglich einige isolierte brachyptere Populationen in den höheren Lagen der Südalpen und der Gebirge der nördlichen Iberischen Halbinsel mit ausgeglichenerem Geschlechterverhältnis. Auch *Amischa nigrofusca* und *A. decipiens* sind regional parthenogenetisch, wobei Männchen auch in zweigeschlechtlichen Populationen deutlich seltener sind. Ein Katalog der in der Paläarktis vertretenen *Amischa*-Arten ist inkludiert. Die Verbreitungsgebiete von vier Arten werden anhand von Karten illustriert.

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