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North European gall-inducing *Euura* sawflies (Hymenoptera, Tenthredinidae, Nematinae)

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Abstract

The sawfly genus *Euura* of the tenthredinid subfamily Nematinae, in which species level taxonomy has long been regarded as controversial, is particularly species rich in northern parts of the Holarctic. Among a majority of species with more or less free-living larvae, a sizeable minority belongs to a monophyletic lineage whose larvae complete their whole development in galls. We present illustrated keys to the adults and galls of 66 gall-inducing *Euura* species that occur, or might occur, in northern Europe. The distribution of these species is briefly reviewed, with an emphasis on the fauna of Sweden, where 55 species are now definitely recorded, two of them for the first time (*E. bigallae*, *E. myrtilloidica*). The species-level taxonomy of gall-inducing *Euura* remains partly problematic. Nominal species described on the basis of experimentally tested or assumed host plant specificity, but which cannot be recognised using morphological or genetic characters, are treated as conspecific with currently indistinguishable segregates ("host-plant races") associated with other *Salix* species. 20 new synonymies are proposed (valid names in parentheses): *Eupontania acutifoliae baltica* Vikberg & Zinovjev, 2006 and *Pontania acutifoliae daphnoides* Zinovjev, 1993 (*Euura acutifoliae* (Zinovjev, 1985)), *Euura boreoalpina* Kopelke, 2001 (*Euura lanatae* Malaise, 1921), *Euura cinereae* Kopelke, 1996 preoccupied and *Euura lapponica* Kopelke, 1996 preoccupied (*Euura auritae* Kopelke 2000), *Euura gemmacinereae* Kopelke, 2001 and *E. nigritarsis* Cameron, 1885 (*Euura mucronata* (Hartig, 1837)), *Euura phylicifoliae* Kopelke, 2001 (*Euura myrsinifoliae* Kopelke, 2001), *Nematus westermanni* Boheman, 1852 nomen oblitum (*Euura scotaspis* (Förster, 1854) nomen protectum), *Nematus acerosus* Hartig, 1840 (*Euura saliciscinereae* (Retzius, 1783)), *Nematus alienatus* Förster, 1854 and *Phyllocolpa rolleri* Liston, 2005 (*Euura leucapsis* (Tischbein, 1846)), *Nematus angustus* Hartig, 1837 (*Euura atra* (Jurine, 1807)), *Nematus erythropygus* Förster, 1854 (*Euura leucosticta* (Hartig, 1837)), *Nematus impunctatus* Herrich-Schäffer, 1840 (*Euura amerinae* (Linnaeus, 1758)), *Pontania carinifrons* Benson, 1940 and *Phyllocolpa plicaglauca* Kopelke, 2007 (*Euura destricta* (MacGillivray, 1923)), *Pontania obscura* Kopelke, 2005 (*Euura bridgmanii* (Cameron, 1883)), *Pontania viminalis* var. *lugubris* Enslin, 1918 and *Eupontania collactanea rosmarinifoliae* Vikberg & Zinovjev, 2006 (*Euura collactanea* (Förster, 1854)). *Euura weiffenbachiella* nom. nov. is proposed as a replacement name for *Euura weiffenbachii* Ermolenko, 1988; preoccupied in *Euura* by *Pteronidea weiffenbachi* Lindqvist, 1958 (*Euura piliserra* (Thomson, 1863)). Lectotypes are designated for the following 9 taxa: *Euura insularis* Kincaid, 1900, *Euura lanatae* Malaise, 1921, *Euura lappo* Malaise, 1921, *Euura lappo* var. *hastatae* Malaise, 1921, *Nematus acerosus* Hartig, 1840, *Nematus leptocerus* Förster, 1854, *Nematus vallisnierii* Hartig, 1837, *Pontania megacephala* Rohwer, 1908, and *Pontania piliserra* var. *mascula* Enslin, 1915. Because of secondary homonymy within *Euura*, the valid name of the Nearctic species *E. arctica* MacGillivray, 1919 is *E. delicatula* (MacGillivray, 1919). The Nearctic *Euura megacephala* is removed from synonymy with the Holarctic *E. destricta* and treated as a valid species. 34 species names are newly combined with *Euura*.

Key words: revision, taxonomy, keys, Sweden, Holarctic, *Salix*, new synonyms, lectotypes, new name

Introduction

Unlike most other groups of insects, which tend to decrease in richness in regions closer to the poles, species diversity of Symphyta in the Holarctic reaches a peak in the North (Kouki *et al.* 1994). Compared to other families of Symphyta and even other tenthredinid subfamilies, this phenomenon of a reversed latitudinal gradient in species diversity is particularly striking in the Nematinae. Whereas Nematinae in Greece make up about 7% of the total, in Germany this is 35%, and in Finland 52% (Blank *et al.* 2012, also unpublished data). The highest number of nematine species in Europe probably occurs in the boreal forest zone. Reasons for this are not fully clear, but may be linked at least partly to the abundance and diversity in these regions of willow species, their most important hosts. The apparent correlation seems to have been remarked on for the first time by René Malaise (Malaise 1931a: 55). Bogacheva (1977) mentioned the important ecological role of Tenthredinidae in tundra ecosystems, which in the northern European context mainly refers to the biomass of immature stages of Nematinae. In turn, the gall-inducing Nematinae contribute significantly to the species richness of the subfamily in the cooler regions of Europe. Although estimates of the number of Nematinae species vary greatly, mostly because of different concepts of species limits, it seems realistic to represent the gall-makers as making up almost 17% of the Fennoscandian fauna (e.g. 36 gall-makers of a total of 218 Nematinae species recorded in Sweden by Taeger *et al.* 2006).

In the West Palaearctic, all gall-inducing *Euura* are attached to *Salix* species as larval hosts. Although at least five North American species of open gall-makers (formerly placed in *Phyllocolpa* and *Tubpontania*) are mono- or oligophagous on *Populus* species (Ross 1929; Zinovjev & Smith 1999, 2000; Bailey & Whitham 2003), occasional published statements that *Populus* spp. are used as hosts by some European species of stem-galling *Euura* remain unconfirmed (Kopelke 1999). Until lately (e.g. Taeger *et al.* 2010), the species of Nematinae whose larvae inhabit galls made on *Salix* were placed, depending on the views of different authors, in up to five genera: *Eupontania* Zinovjev, 1985; *Euura* Newman, 1837; *Phyllocolpa* Benson, 1960; *Pontania* Costa, 1852; and *Tubpontania* Vikberg, 2010. A redefinition of genera in the Nematinae, reflecting advances in the understanding of the phylogeny of the group, led to the placement by Prous *et al.* (2014) of all these gall-inducing species in *Euura*, together with a larger number of species whose larvae are mainly free-feeding. Although estimates of the number of species of gall-inducing *Euura* vary greatly according to different interpretations of species limits, the group is relatively species rich, for example making up approximately 17% of the Swedish Nematinae fauna (see above), or according to Coulianos & Holmåsen (1991), 39 gall-makers of more than 550 sawfly species known in Sweden at that time.

Only a few gall-inducing *Euura* species are of occasional, minor economic significance as pests of coppiced willows, e.g. *Euura subgemma* on basket willow, *Salix viminalis* (Tullgren 1919, Křístek 1972). However, populations of several *Euura* species attached to willows in semi-natural habitats often reach high levels, and may then be assumed to be of ecological significance because of their interactions with numerous other organisms (Kopelke 2003b). Furthermore, growth, seed production, and- in the case of at least one creeping *Salix* species in subarctic habits -even survival of ramets, can be negatively affected by sawfly gallers (Hakkarainen *et al.* 2005). On the other hand, the conspicuous galls of many species have long attracted the interest of naturalists. The first published mention and illustration of sawfly galls, caused by *E. proxima*, appeared as early as the 17th Century (Redi 1668). Leuwenhoeck (1701) studied galls of the same species and obtained important insights about their cause and development. However, these pioneering researchers frequently mistook parasitoids that emerged from the galls for the causative organism. Possibly the first to correctly identify the causative organism as a sawfly, based on the morphology of the larvae, was Réaumur (1737). Since then, many scientists have investigated gall-inducing sawflies not only in their own right, but increasingly also as model organisms to explore a wide range of ecological problems (e.g. Price 2003). The relative ease with which galls can be detected and censussed, during several weeks or even months of a season, makes them attractive for such studies. As a result, numerous publications on these sawflies exist: see, for example, literature cited by Kopelke (1999), and Roininen *et al.* (2005).

Gall induction as a taxonomic character

The highly conspicuous galls made by many *Euura* species represent a specialised behavioural and physiological adaptation of an assemblage of species that has been shown to be monophyletic (Nyman *et al.* 2000). However, a number of other lineages in the Nematinae have larval habits that resemble in certain respects those of the gallers. For example, first-instar larvae of the *Euura longiserra* group (formerly placed in *Amauronematus*) feed within rudimentary closed galls (often referred to as procecidia) on the leaves of *Salix* (Zinovjev & Vikberg 1998), and *Pristiphora monogyniae* (Hartig, 1840) causes open galls on *Prunus* species (Stritt 1943), very similar to those of the *Euura oblita* group. Early instar larvae of the *Euura viduata* group live between leaves of *Salix* which, after oviposition by the female, thicken and fail to separate from each other in the normal way (Zinovjev & Vikberg 1998). These could also be classified as galls. The formation of procecidia is not even confined to the Nematinae, but has also been observed in the Blennocampinae and Allantinae of the Tenthredinidae (Liston *et al.* 2007). Nyman *et al.* (2000) found strong phylogenic support for the hypothesis that the evolution of gall-types in the galler lineage covered here probably commenced with an ancestor that was a leaf-roller or folder (of which not all extant species produce procecidia), and culminated in the closed type of gall. *Euura atra*, although it unequivocally belongs taxonomically to the galler group, usually does not induce a gall: its larvae often simply tunnel along a shoot, which is not swollen (Wong *et al.* 1976).

Species or host plant races?

The interaction between a gall-inducing sawfly and its host plant is very close, because the insect needs to manipulate the morphological development of the plant so that a gall is formed in which its larva can develop. Unlike many other gall-inhabiting insects, in which the initiation and development of the gall is largely a response to the immature stages living in it, gall formation in *Euura* species results from the act of oviposition by the female sawfly, which includes injection of a secretion into the host which locally modifies its growth (Price & Roininen 1993). Accordingly, most recent taxonomists have considered gall-inducing sawfly species to be highly host specific.

Until a few decades ago, the species taxonomy of gall-inducing *Euura* was based mostly on morphological characters of adults (e.g. Benson 1958, Zhelochovtsev 1988). The morphological segregates treated as species often had rather wide host ranges that included a number of different *Salix* species; in some cases, the hosts of these sawfly segregates are not closely related to each other. A major paradigm shift is evident in the work of Kopelke (e.g. Kopelke 1986, 1990a, 1996, 2007a–c), who repeatedly stated that most of the morphological species recognised by previous taxonomists are really complexes of biological species, and that each of these sawfly species is usually strictly monophagous on a single *Salix* species. Kopelke supported his viewpoint with the results of oviposition trials involving a large number of willow and gall-maker taxa. Based mainly on these, he described many additional nominal species. In part, other taxonomists have agreed with his findings and have described additional segregates (galler–*Salix* host species combinations) as new species, e.g. in the *Euura dolichura* group (Vikberg & Zinovjev 2014). On the other hand, the taxonomy of some gallers has subsequently been discussed by other researchers who reached rather different conclusions to Kopelke. For example, six segregates in the bud-galling *mucronata* subgroup of the *E. amerinae* group, each of which was treated as a separate species by Kopelke (2001), were found by Nyman (2002) to probably represent a maximum of four distinct lineages. In many cases, it is still unclear whether the recently described nominal species should be considered to be separate species, or host plant races.

Species limits. As mentioned above, the acceptance of nominal taxa as valid species seems unproblematic when they are morphologically distinguishable from other forms. In most cases, these morphological species correlate well with biological characters, and often also display clear COI barcoding differences to their nearest neighbours. However, only about half of the nominal species recently recorded in northern Europe belong in this category. Of the remainder, the status as separate species of only a few taxa is supported by clear differences in behaviour (other than host plant species association), or by genetic differentiation. In the majority of other described taxa, only small morphological differences and their strict monophagy on single host plant species have been stated to distinguish them as separate species. However, in our opinion the supposed morphological differences mostly fall within the range of intraspecific variability, so that only their association with different hosts remain to distinguish these forms. Without other evidence, this does not seem to us to be sufficient reason to treat them as separate species. Recent studies have suggested that switches to new host species are a major driver of speciation of *Euura* gallers, and that many of these "fall somewhere between host races and fully independent species" (Leppänen 2014). When a *Euura* species undertakes a host shift, it will for a time necessarily be found both on the original host and the host that has been newly colonised. At some later point, the populations on each host may differentiate so far as to become separate species. However, at least during the initial phase of divergence, the populations should be regarded as conspecific, so that the species cannot be held to be strictly monophagous. Thus, the strict monophagy proposed by Kopelke as a main criterion for distinction of galler species is intrinsically flawed. We are left with the extremely difficult task of deciding whether a particular segregate (galler–*Salix* host species combination) has diverged so far from related segregates that it should be accorded species rank, or whether it is at some intermediate point on the way to becoming a species. Since host-associated differentiation is likely to be a continuous and ongoing process, governed partly by stochastic events, each individual case must be examined separately. In the future, DNA sequencing is likely to provide further data which could assist in such assessments, but such data are not at present available for many galler-host segregates.

Numerous galler segregates in northern Europe were not adequately taken into consideration in the studies by Kopelke. In some cases, where previously published host plant records of other authors did not fit Kopelke's concept of strict monophagy of galler species, he dismissed these records as having resulted from misidentification of the galler species or of the host (see, for example, under *Phyllocolpa nudipectus* in Kopelke 2007c). However, many such records have been made independently by several able and experienced specialists, and there seems no reason to doubt their accuracy. If all these segregates were accorded species status, then we would be faced by an unmanageable proliferation of species names, without any associated increase in our understanding of the taxonomy of the group.

In this work, we regard nominal taxa that cannot be reliably distinguished using one or more morphological, biological or genetic characters as conspecific. Although it is possible that some of the nominal taxa treated below as synonyms may again come to be regarded as valid species once more genetic data are available, we feel that our approach is at present the best practical compromise.

Species treated in this publication are those already recorded in Fennoscandia, or likely to occur there, with one further species (*E. kriechbaumeri*) included to enable identification of material from a wider area north of the Alps. Our aims are to enable the identification of adults and galls, to summarise the numerous taxonomic and nomenclatural changes made in other recent publications and which resulted from our studies, and to review the gall-maker fauna of northern Europe, with particular emphasis on the species occurring in Sweden.

Material and methods

We studied numerous primary and secondary type specimens of nominal species, series of specimens reared by J.-P. Kopelke (collected throughout northern and central Europe), E. Heibo (mainly from Norway), and A. Liston (mainly from Sweden), as well as many other reared / field-caught specimens in various public and private collections (see Acknowledgements). The names of collections referred to in the text are abbreviated as follows:

ANSP	Academy of Sciences, Philadelphia, Pennsylvania, USA
BMNH	The Natural History Museum, London, United Kingdom
CEH	Collection of Erik Heibo, Lierskogen, Norway
CNC	Canadian National Collection of Insects, Arachnids and Nematodes, Ottawa, Canada
ETH	Eidgenössische Technische Hochschule, Zurich, Switzerland

INHS	Illinois Natural History Survey, Champaign, USA
JLLP	Private collection of Jean Lacourt, Igé, France
MCMK	Castle Museum, Norwich, United Kingdom
MRSN	Museo Regionale di Scienze Naturale, Turin, Italy
MZH	Finnish Museum of Natural History, Helsinki, Finland
MZLU	Lunds universitet, Lund, Sweden
NMW	Naturhistorisches Museum Wien, Wien, Austria
NHRS	Naturhistoriska riksmuseet, Stockholm, Sweden
RFT	Runar Forsius Collection, Åbo Akademi, Turku, Finland
RNHL	Naturalis Biodiversity Center, Leiden, Netherlands
SDEI	Senckenberg Deutsches Entomologisches Institut, Müncheberg, Germany
SIZK	Schmalhausen Institute of Zoology, Kiev, Ukraine
SMF	Senckenberg Naturmuseum, Frankfurt am Main, Germany
USNM	National Museum of Natural History, Washington D.C., USA
ZIN	Russian Academy of Sciences, Zoological Institute, St. Petersburg, Russia
ZMHB	Naturkundemuseum, Berlin, Germany
ZMUC	Zoological Museum, University of Copenhagen, Copenhagen, Denmark
ZSM	Zoologische Staatssammlung, München, Germany

Detailed label data of specimens studied, except for types, are not presented here. Collection data of the photographed specimens is presented in an excel file available at figshare (https://doi.org/10.6084/m9.figshare.5132362) : Data of all Swedish specimens examined will be made available through Naturarv, the search portal for natural history collections in Sweden (www.naturarv.se).

Digital photos were taken with a Leica DFC295 camera attached to an Olympus SZX12 microscope for imaging of complete specimens or surface structures, or to an Olympus BX51 compound microscope for imaging of dissected genitalia. Composite images with an extended depth of field were created using the software CombineZ5. Contrast and brightness of images was adjusted using the software PhotoImpact XL (Ulead Systems Inc.).

Notation of wing veins and cells follows Prous *et al.* (2014). Terminology of body parts is after Viitasaari (2002), with terms for areas of the head after Vikberg (2003).

For barcoding of the mitochondrial COI gene, a single leg of an imago or larva was removed and submitted for processing at the Canadian Centre for DNA Barcoding (CCDB) in Guelph, Canada. The DNA extracts of specimens in the SDEI collection are also stored at the SDEI. DNA extraction, PCR amplification, and sequencing were conducted using standardised high-throughput protocols (Ivanova *et al.* 2006, DeWaard *et al.* 2008). The target region has a length of 658 bp, starting from the 5' end of the mitochondrial cytochrome c oxidase I (COI) gene and comprises the barcode region used as standard in the animal kingdom (Hebert *et al.* 2003). Sequence data can be obtained through BOLD (http://www.barcodinglife.com/) and include LIMS report, primer information, and access to trace files. Sequences were aligned using the BOLD Aligner. Sequence divergence statistics were calculated using the Kimura 2-parameter model. Genetic distances were calculated using analytical tools in BOLD and are given as maximum pairwise distances for intraspecific variation and as minimum pairwise distances for interspecific variation.

Additional genetic data required for the phylogenetic analysis were obtained as described by Nyman *et al.* (2006) and Leppänen *et al.* (2014). Only tissue from larvae was sequenced. Identification of these was based on the gall type and the identity of the host species. Two mitochondrial and one nuclear region were used in phylogenetic analyses. The mitochondrial regions used are fragments of cytochrome oxidase subunit I (COI, 810 bp) and cytochrome b (Cytb, 718 bp). The nuclear marker used is a fragment of sodium/potassium-transporting ATPase subunit alpha (NaK, 997 bp). Sequences newly reported here have been deposited in the GenBank (NCBI) database (accession numbers KY971774-KY971952). Some of the sequences analysed here are from Nyman *et al.* (2006, 2007, 2010, 2015) and Prous *et al.* (2014).

Sequence data were analysed using the maximum likelihood method (ML) with PhyML 3.0.1 (http://www.atgc-montpellier.fr/phyml/; Guindon and Gascuel 2003). In PhyML nearest neighbor interchanges (NNI) and subtree pruning and regrafting (SPR) were always used to estimate tree topologies (i.e. using the extensive tree search option). Robustness of reconstructed trees was estimated with 1000 bootstrap replicates. The General Time Reversible model of nucleotide substitution under discrete Gamma model of rate heterogeneity among sites with four rate categories (GTR+G4) was used to calculate maximum likelihood trees. Estimation of the proportion of invariable sites, as commonly used in phylogenetic likelihood analyses, was not applied, because the Gamma model already allows for sites that evolve very slowly (i.e. are effectively invariable). As described in the RAxML manual, combining Gamma model and proportion of invariable sites (G+I) is problematic for parameter estimation as they are interdependent (http://sco.h-its.org/exelixis/resource/download/NewManual.pdf).

Morphological definition of the group. Adult gall-makers key to *Euura* in Prous *et al.* (2014). Very similar to some gall-makers in external appearance are several species of the *Euura viduata* group (formerly placed in *Amauronematus* or *Brachycoluma*) as well as small, dark specimens of the *Euura reticulata* and *E. polaris* groups (part of the former *Pteronidea*; but placed by Lacourt (1998) in *Lindqvistia*). The gall-makers possess the following combination of characters, which helps to distinguish them from other lineages of *Euura* that do not make galls [character state of the latter in brackets]:

- Body length rarely more than 6 mm. [Body length often greater.]
- Head viewed frontally proportionately wider, compared to height: Fig. 2. [Head viewed frontally proportionately narrower, compared to height: Fig. 3.]
- Antennal hollow usually clearly defined, except in the *E. dolichura* group; in dorsal view with exterior margin at widest point separated from margin of eye by an area which is on a different plane to the adjacent surface of the hollow itself: Fig. 4. [Antennal hollow poorly defined; at its widest point reaching to the edge of the eye, so that no abrupt change in inclination of the surface is visible: Fig. 5.]
- Flagellomere 2 of female shorter than longest axis of eye, except in *E. oblita* group [Flagellomere 2 of female often longer than longest axis of eye.]
- Pterostigma often bicoloured, with apex dark and base pale: Fig. 6. [Pterostigma not clearly bicoloured, except in *E. scutellata* (with body length more than 6 mm), or if partly dark, then usually only at margins: Fig. 7.]
- Body colour of *most* species predominantly black (Figs 61, 79-80); pale body parts never green (if pale, then reddish, yellow, or white). [Body often extensively pale; sometimes with pale parts partly or wholly green (Fig. 9), at least while alive.]

If it is still not clear whether a female specimen is a gall-maker, examination of the lancet (saw) will usually make this clear (gall-makers: Figs 12–44. Other *Euura*: e.g. *E. viduata* Fig. 10*, E. reticulata* Fig. 11.)

Suitability of adult material for identification. Female adults generally possess a larger number of morphological characters useful for identification than males. While identification of females in several large complexes of species is possible, although often with considerable difficulty, males of these groups are effectively not identifiable at an equivalent level.

Identification of adults using morphological characters is easiest when the material has been prepared soon after it was caught, or emerged from reared samples. To ensure a natural appearance, the best way to kill specimens is to freeze them. Ethyl acetate is also a suitable killing agent, but only the minimum amount should be used, so that the specimens are not wetted. Major problems can be encountered in interpreting characters of specimens that have been stored for a longer time in alcohol, or in highly concentrated alcohol.

Geographic area covered. Included are all gall-inducing *Euura* species occurring in Ireland, Britain, northern Germany, Denmark, Norway, Sweden, Finland, north-western Russia, Estonia, Latvia, and Lithuania. Note that no gall-inducing *Euura* have yet been recorded on Iceland, the Faroes, the Svalbard archipelago, or Novaya Zemlya. The key can therefore be used to identify specimens not just from northern Europe, but also from the Central European lowlands. Beyond the scope of this work is the fauna of the Alps and Carpathians, where numerous additional nominal species occur. Furthermore, as a result of a trend towards extremely pale body colouration in southern European populations of many species, the key is generally unsuitable for identification of specimens from south of the Alps.

Taxonomy and nomenclature of host plants. The names of *Salix* species mostly follow Jonsell (2000), or Skvortsov (1999) if the species is not treated within the narrower geographic scope of the former work. The taxon widely called *S. fragilis* in recent times is here referred to as *S.* × *fragilis*, following Belyaeva (2009).

Measurement conventions. These mostly follow Vikberg & Zinovjev (2006), except for femur length: they included the trochantellus, which is excluded here. The length of the body was measured from the anterior frons to the apex of the abdomen, including valvula 3 of the female or hypopygium of the male. The head width was measured as the distance between the lateral margins of the compound eyes. The longest dimension (height) of the compound eye was measured along the facetted area. The length of a flagellomere was measured along the dorsal midline (the basal neck-like constriction was not included when flagellomere 1 was measured); the combined length of the flagellomeres is treated as the length of the flagellum. The maximum height of a flagellomere was measured in lateral view, perpendicular to the longitudinal axis of the flagellomere. The length of a metafemur was measured on the outer (anterior) side, excluding the trochantellus. The length of a metatibia was measured on the outer side as the maximum length. The length of a single metatarsomere was measured along its dorsal midline; tarsomere 5 to the level of its apical lateral parts, excluding the pretarsus. The combined length of the tarsomeres is treated as the length of the hind tarsus. The ovipositor sheath length was measured from the lower basal corner of valvifer 2 just basad of the joint with the lance, to the apex of valvula 3; the length of valvula 3 from the lower basal corner to apex, and the width as maximum basal or sub-basal width between the sides.

Results

Identification using COI 'barcode' sequences. In many cases, barcoding only allows the identification of the species group, or subgroup, to which a specimen belongs: see Fig. 1. For example, results for *Euura ischnocera*, *E. oblita*, *E. plicadaphnoides*, *E. plicaphylicifolia*, *E. polita*, and *E. prussica* (of the *E. oblita* group) cluster together within a single 'barcode index number' [BIN], i.e. with less than 2% divergence between the most dissimilar sequences. On the other hand, barcodes of some of the other species in the *oblita* group appear to be sufficiently distinctive to allow determination to species level, e.g. *E. acutiserra*, *E. destricta*, and *E. leucosticta*. A similar pattern is found within the *E. viminalis* group, where barcodes of the majority of nominal species share the same BIN, whereas the barcodes of *E. pedunculi*, *E. pustulator*, *E. vesicator*, and *E. viminalis* diverge significantly from this cluster, so that barcoding will allow their determination. Note, however, that the barcode data available for some species groups is at present inadequate and should be added to. It should also be kept in mind that, in both leaf- and bud-galling groups, several cases exist in which species sharing mitochondrial COI haplotypes can be separated using nuclear ITS2 sequences (Leppänen *et al.* 2014). The shared mitochondrial haplotypes imply that at least occasional hybridisation occurs (Patten *et al.* 2015).

Interpretation of some character states. *Body length.* This is measured from the front of the head, excluding antennae, to the tip of the abdomen (in females including valvulae 3, but excluding the cerci). Less so in adults collected in the field, but often in reared specimens, very small individuals occur: a phenomenon first noted by Zaddach (in Brischke 1883a: 173), in *E. vesicator* and *E. viminalis*. Inadequate nutrition is presumably the main cause, resulting from sub-optimal rearing conditions, or the collection of galls when the larvae were still very young. Such "dwarfs" may be only half as long as the average normal body length. At the same time, coloration can be affected; the small individuals often being darker, as also observed by Zaddach. Variation in the development of surface sculpture on the integument, and the relative proportions of some body parts (allometry), are also linked to differences in body size (Vikberg & Malinen 2012). Very small individuals occur in nearly all species, so that body length is not usually a reliable identification character at the lower extreme of the size range. However, size may be useful in recognising the identity of large specimens, and in one case even seems to be a reliable character for separation of all specimens, i.e. females of *E. laeta* and *E. subgemma*.

Coloration: general. [See also above, under Body length] Unnaturally high temperatures, or perhaps unusual patterns of temperature fluctuation, can lead to atypical coloration of adults. Particularly reared specimens can thus be significantly paler or darker than adults that have developed under natural conditions (Liston, personal observations). In several species, a cline in variability towards paler coloration in more southern populations is also evident, e.g. in *E. virilis*, and *E. viminalis*.

Colour of metatibia. Most species of the *E. oblita* group have a black fleck on the posterior surface of the metatibia at approx. 0.3–0.4 from the base (Fig. 82). Exceptions among the European species of this group are only those which have a generally paler leg colour, i.e. completely pale femora (Fig. 81). Other groups of gall-makers never have the metatibia clearly black-flecked, although in some specimens of the *E. amerinae* and *E. viminalis* groups, a very slight darkening can be detected.

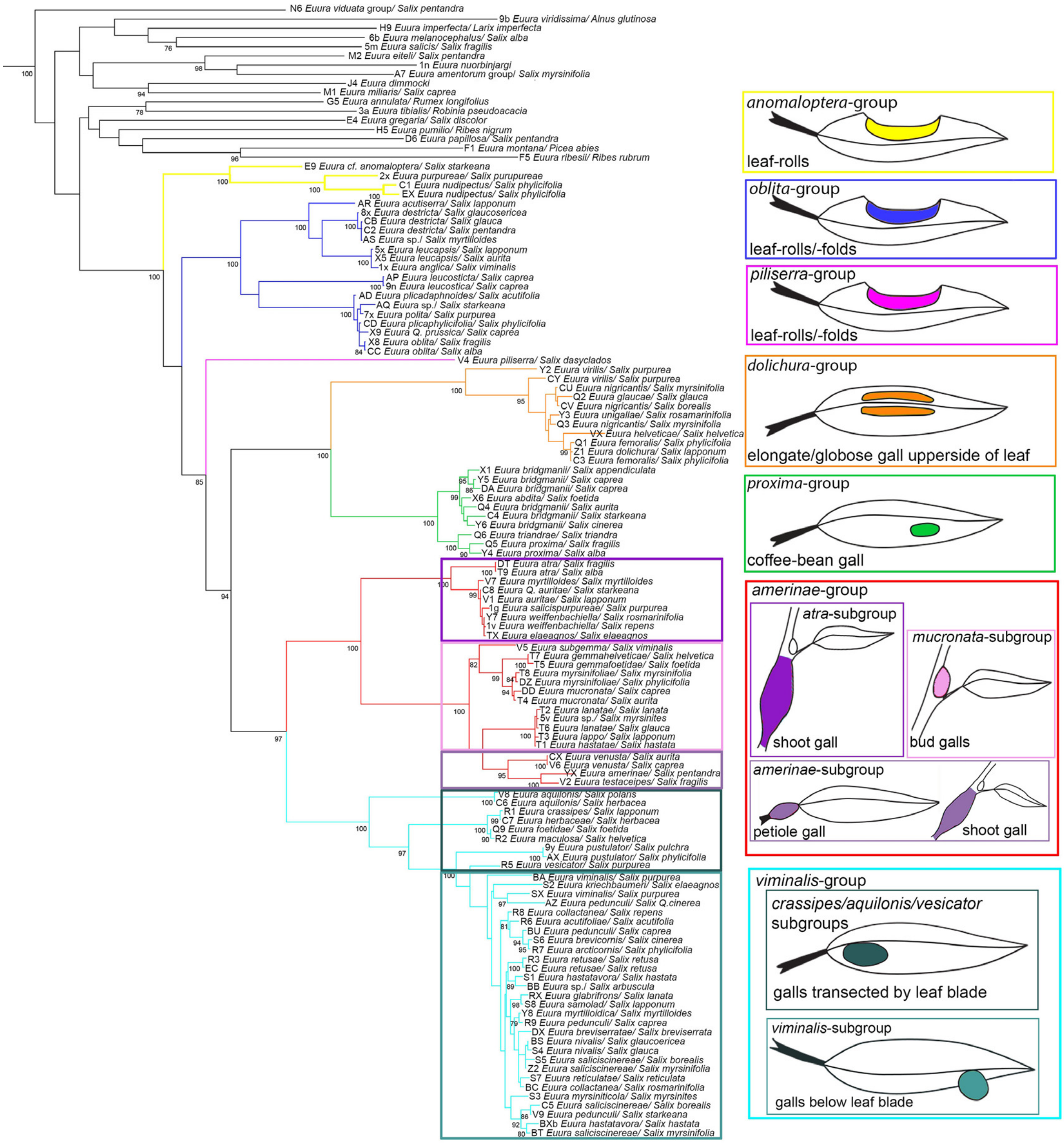
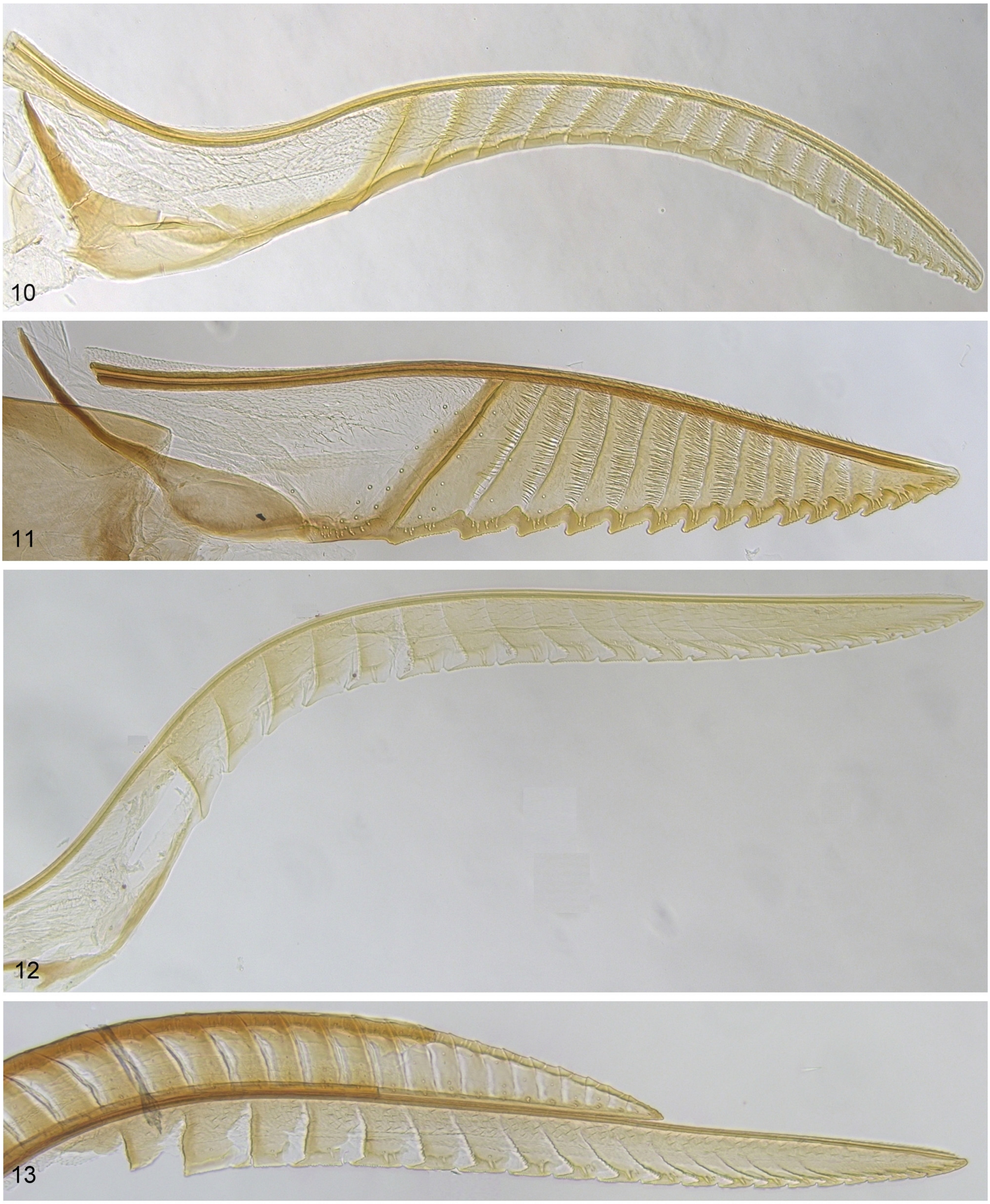


FIGURE 1. Phylogenetic tree for European gall-making *Euura* sawflies, based on two mitochondrial and one nuclear region. The mitochondrial regions used are fragments of cytochrome oxidase subunit I (COI, 810 bp) and cytochrome b (Cytb, 718 bp). The nuclear marker used is a fragment of sodium/potassium-transporting ATPase subunit alpha (NaK, 997 bp). The major gall types are plotted against the sawfly lineages. For clarity, the outgroup taxa *Nematus septentrionalis*, *N. carpini*, *N. tulunensis*, and *Mesoneura opaca* were excluded from the tree.

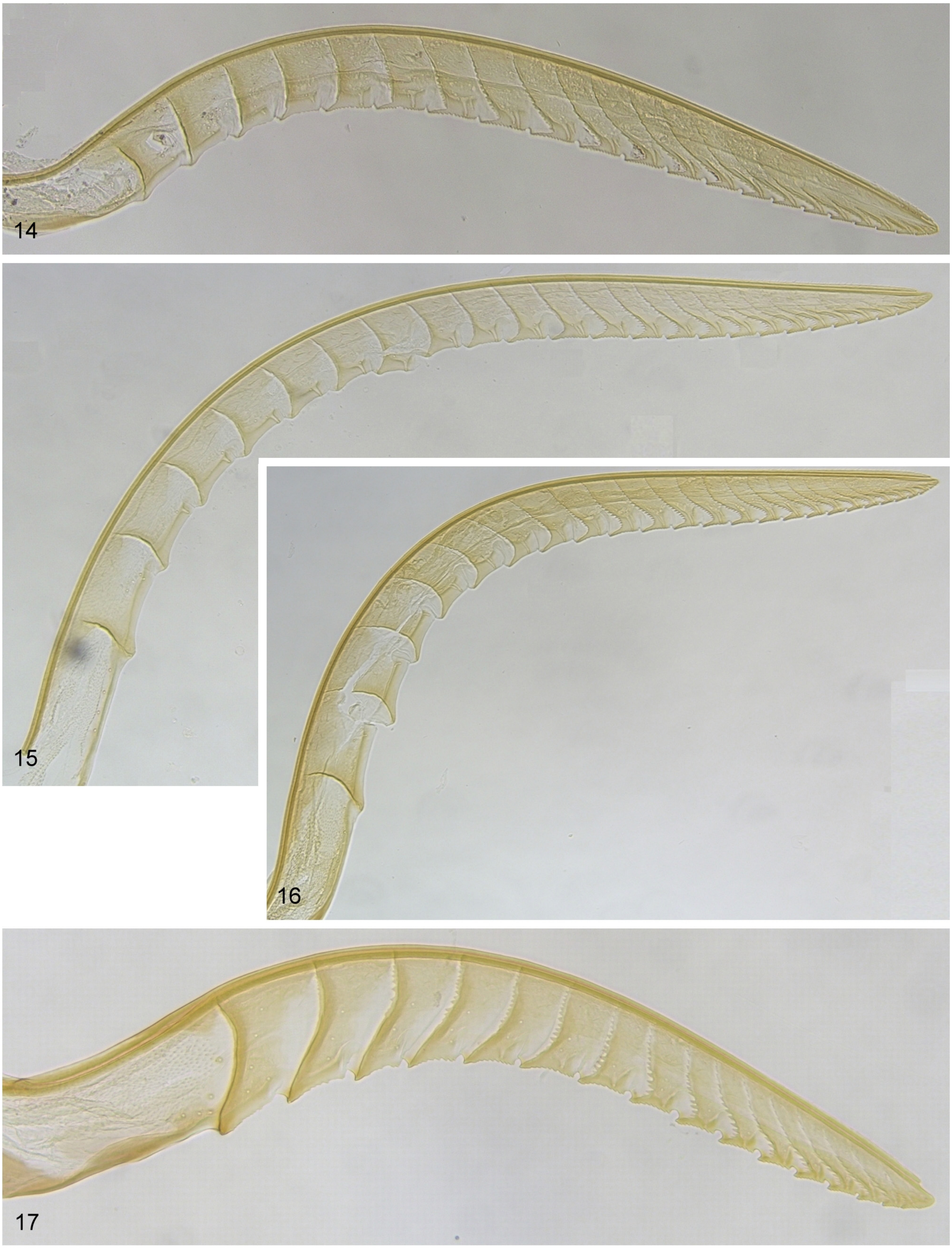
Gall position and morphology. The part of the plant which is galled is a stable biological character which is of high taxonomic value at the species group / subgroup level, and sometimes even at species level, e.g. *viminalis* group always in leaves, *atra* subgroup always in shoots; *E. laeta* in buds, but the morphologically similar *E. subgemma* below the bud. However, considerable intraspecific variability in gall shape can occur, resulting from several factors: see further under "Identification of galls".

Lancet. The shape of the entire lancet (saw) generally shows clear differences between the different species groups of gall-makers, but inside complexes of putative sibling species, variability is not usually sufficient to reliably distinguish the galler-host segregates. Notable exceptions are some species of the *mucronata* subgroup of the *amerinae* group. On the other hand, the differences in the degree of curvature of the lancet described by Kopelke (1996, 2006) as the main character separating several species of the *atra* subgroup of the *amerinae* group, were not detectable in the material which we examined. Particularly in the extremely long and narrow lancets of this subgroup, their flexibility permits considerable alteration in their curvature. In other words, the supposed differences probably mainly arise during preparation.

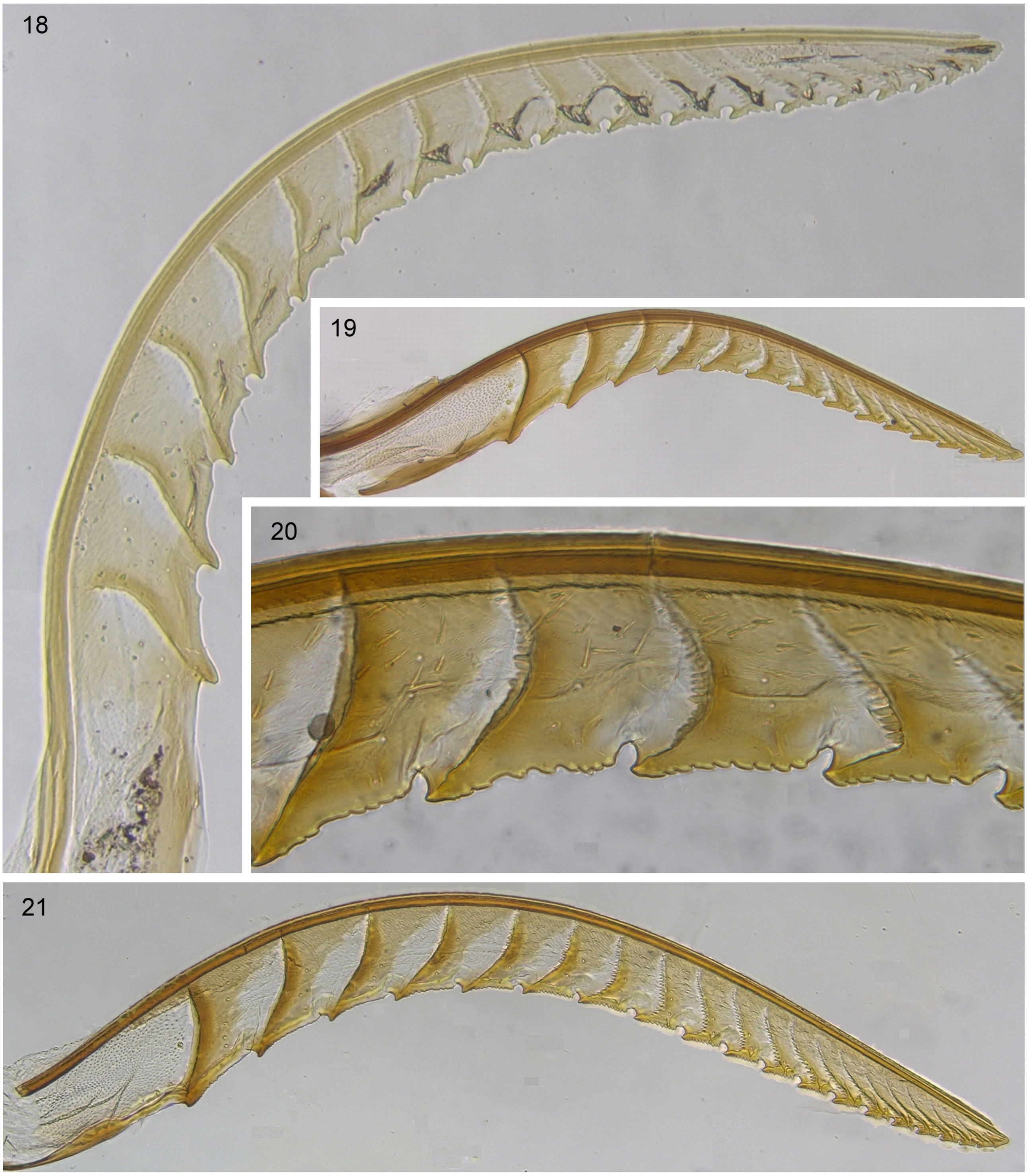
FIGURES 2–9. *Euura,* females**; 2** *erythropyga* (11264) face **3** *viduata* (31672) face **4** *plicadaphnoides* (31673) head dorsal **5** *viduata* (31672) head dorsal **6** *leucapsis* (21458) pterostigma 7 *viduata* (31672) pterostigma **8a** *venusta* (21216) ovipositor sheath **8b** *glabrifrons* (21437) **9** *bergmanni* (21407) habitus.



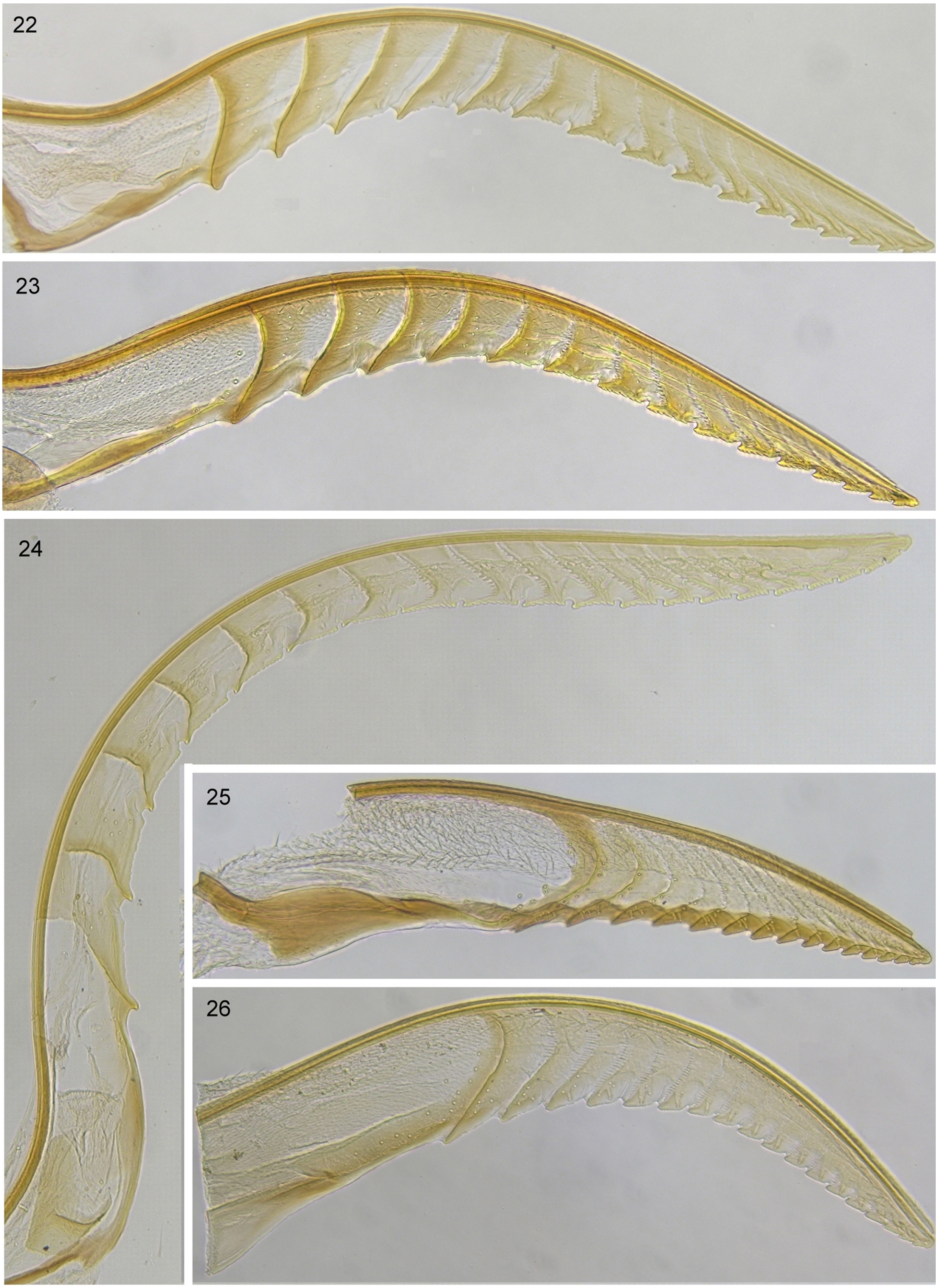
FIGURES 10–13. *Euura*, lancets; **10** *viduata* (31740) **11** *reticulata* (31741) **12** *amerinae* (31742) **13** *testaceipes* (21217)



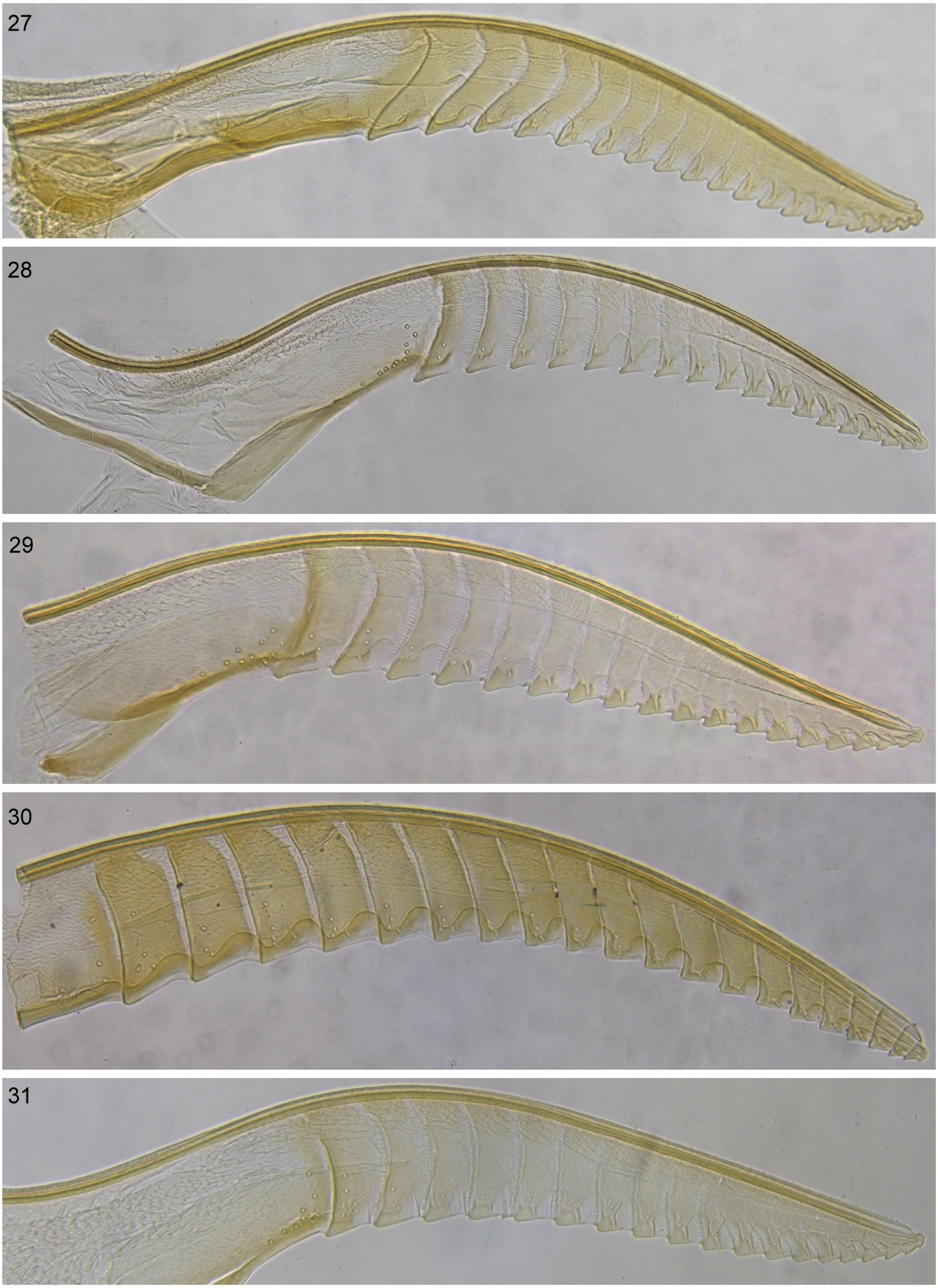
FIGURES 14–17. *Euura*, lancets; **14** *venusta* (31743) **15** *atra* (31744) **16** *auritae* (31745) **17** *hastatae* (31746)



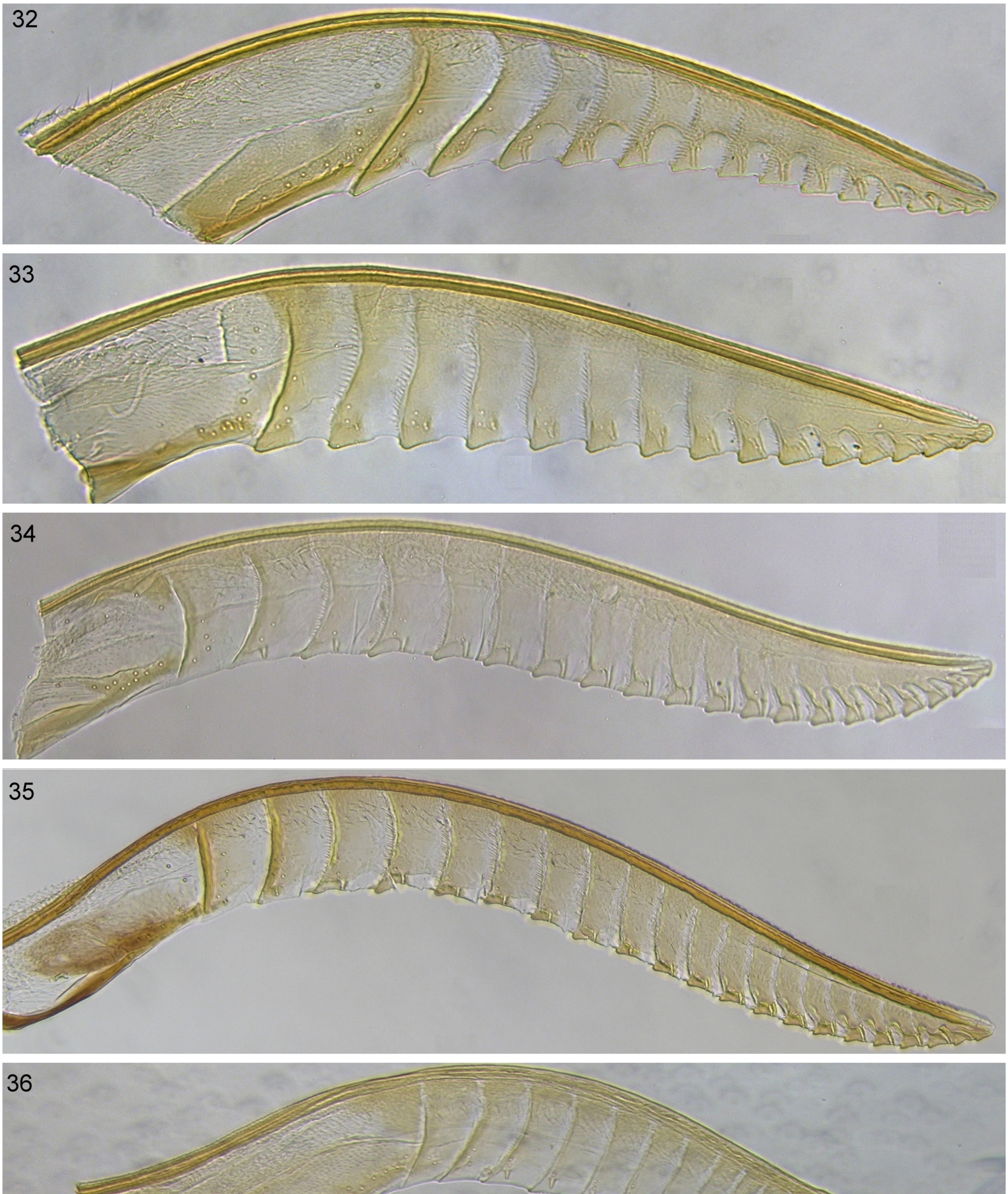
FIGURES 18–21. *Euura*, lancets; **18** *laeta* (31747) **19** *daphnoidica* (21445) **20** *daphnoidica* (21445) basal serrulae **21** *lanatae* (21439)



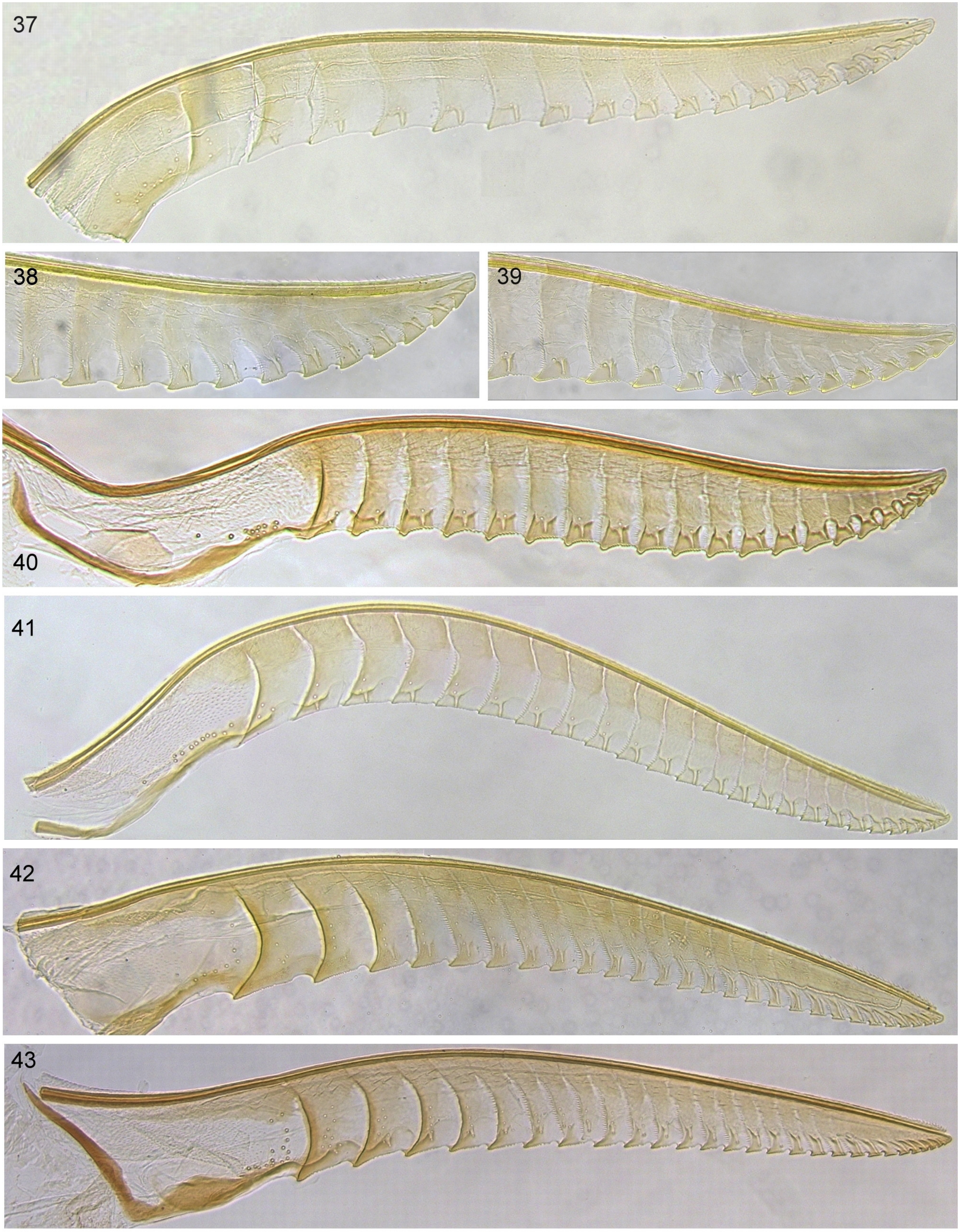
FIGURES 22–26. *Euura*, lancets; **22** *lappo* (31749) **23** *mucronata* (31716) **24** *subgemma* (31750) **25** *piliserra* (21452) **26** *leucosticta* (31751)



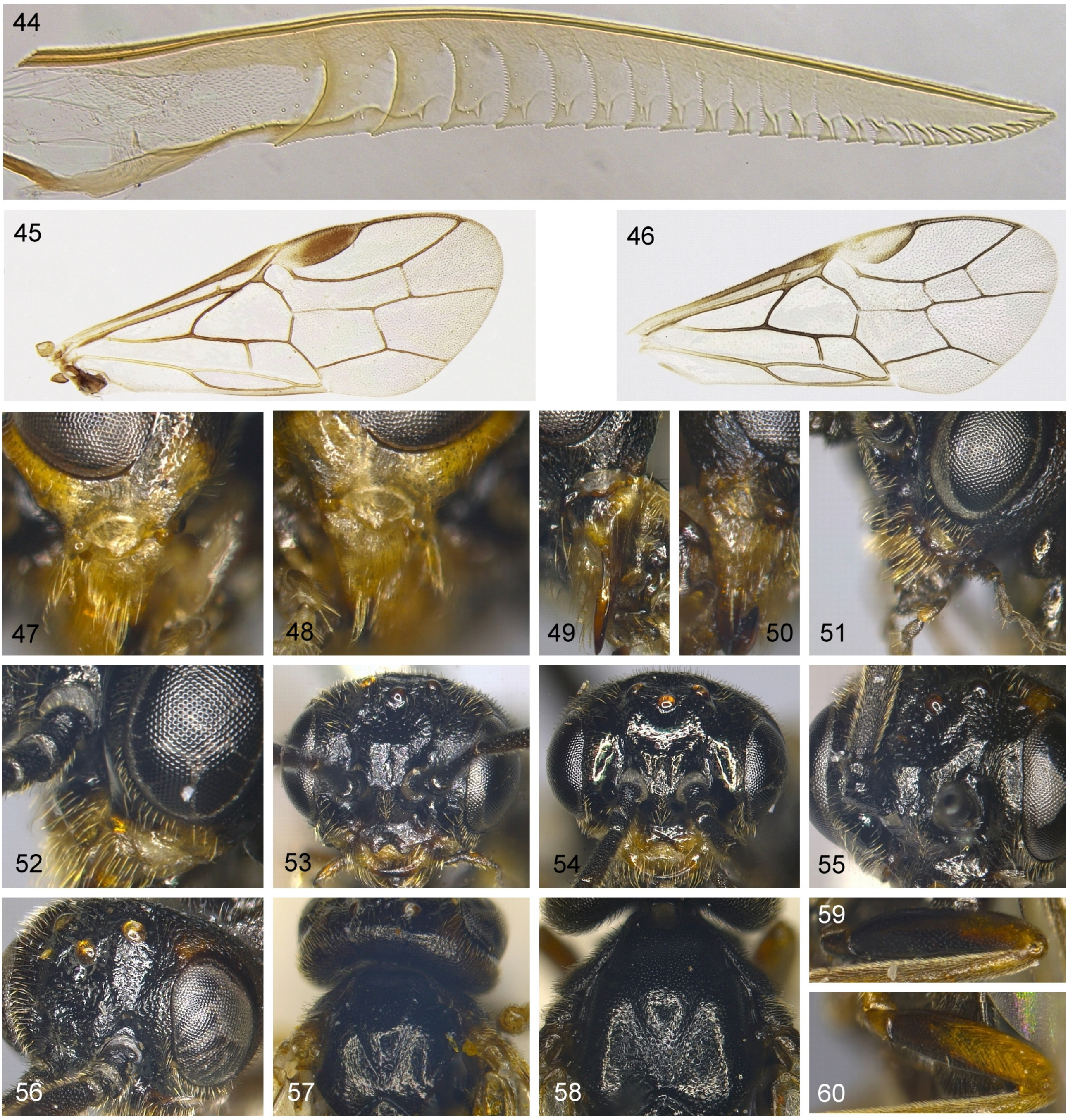
FIGURES 27–31. *Euura*, lancets; **27** *scotaspis* (31752) **28** *oblita* (31753) **29** *destricta* (31754) **30** *anglica* (31755) **31** *prussica* (31756)



FIGURES 32–36. *Euura*, lancets; 32 *leucapsis* (31757) **33** *acutiserra* (31758) **34** *anomaloptera* (31759) **35** *crassispina* (31709) **36** *cyrnea* (31760)



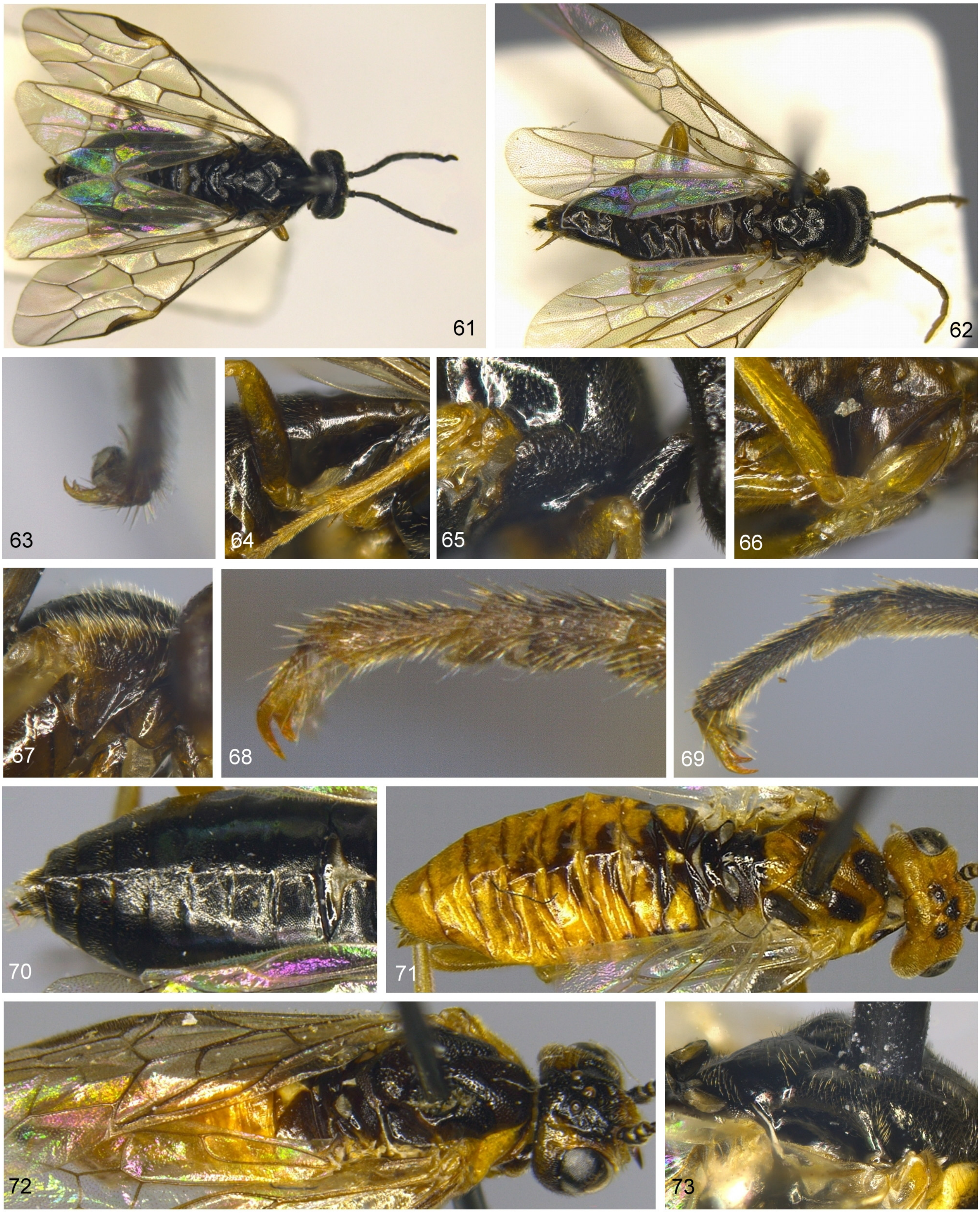
FIGURES 37–43. *Euura*, lancets; **37** *purpureae* (31761) **38** *nudipectus* HT (31762) **39** *nitidinota* (31763) **40** *nigricantis* (31764) **41** *bridgmanii* (31765) **42** *pustulator* (31766) **43** *crassipes* (31767)



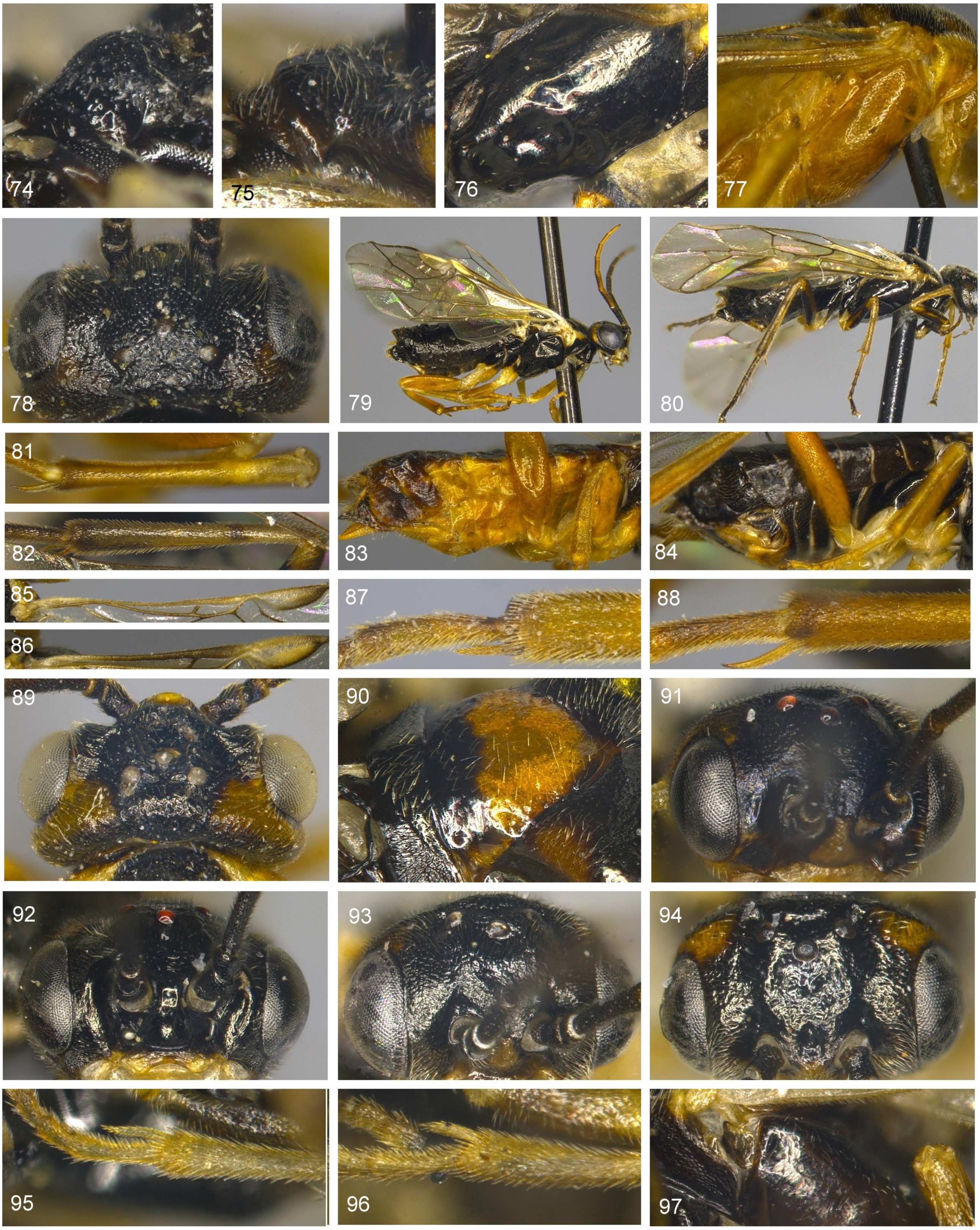
FIGURES 44–60. *Euura*, females; **44** *reticulatae* (31768) lancet **45** *mucronata* (15410) fore wing **46** *erythropyga* (19179) fore wing **47** *amerinae* (19137) left mandible **48** *amerinae* (19137) right mandible **49** *purpureae* (21438) left mandible **50** *purpureae* (21438) right mandible **51** *salicispurpureae* (17950) lower head **52** *lanatae* (21441) lower head **53** *salicispurpureae* (17950) face **54** *lanatae* (21441) face **55** *weiffenbachiella* (31735) upper head **56** *myrtilloides* (3718) HT upper head **57** *auritae* (21444) thorax **58** *myrtilloides* (3718) HT ♂ thorax **59** *weiffenbachiella* (31735) femur **60** *auritae* (21444) femur.

The annuli of the lancet are counted from the base towards the tip of the lancet starting with annulus 1. The number of annuli on the lamnium exhibits considerable variability in some species groups / species, e.g. ranging from 22–27 in *E. crassipes* and 26–30 in *E. herbaceae* (Vikberg 2003: 142). In other species this character is more stable, e.g. in *E. anglica.*

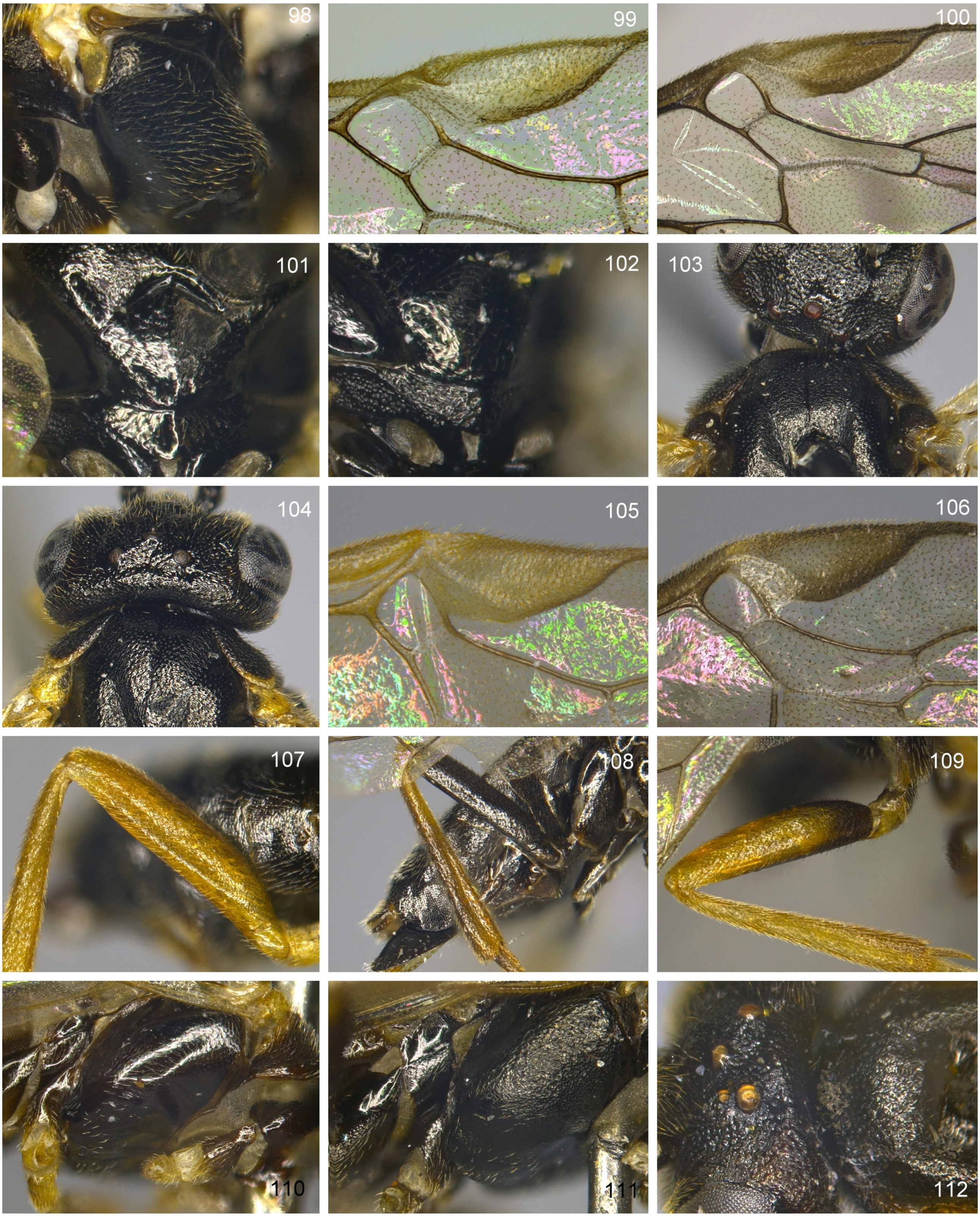
Kopelke (e.g. Kopelke 2007a) made frequent reference to the distribution of ctenidia on the lancet: in particular, on which annular suture the first ctenidia occurred. This character is indeed useful for separating taxa in which there is a substantial difference, but normally varies within a segregate and is linked to variability in the number of annuli, so that a difference in distribution of only one or two annular sutures should not be accorded undue significance.



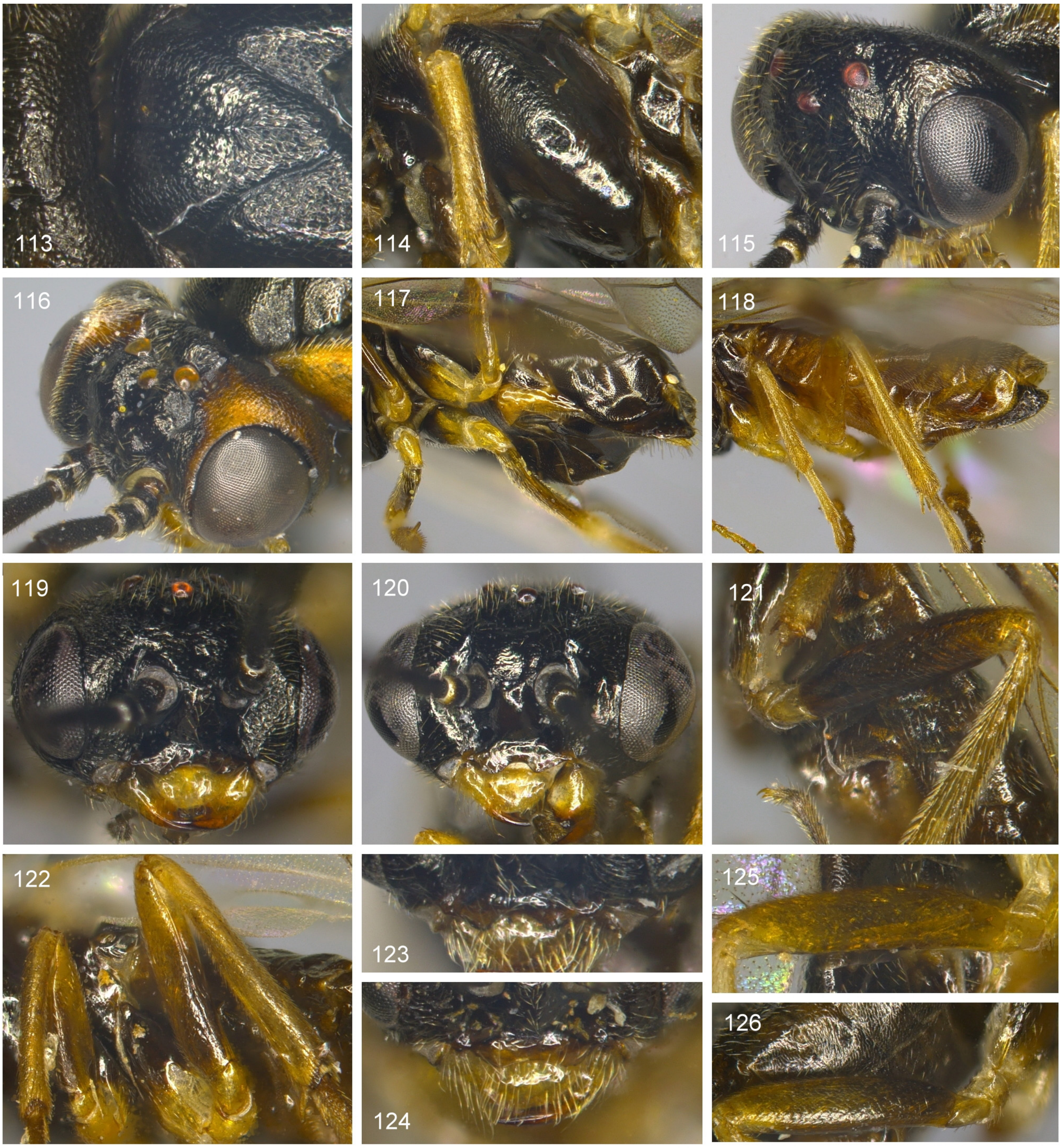
FIGURES 61–73. *Euura*, females; **61** *weiffenbachiella* (21443) habitus **62** *auritae* (21444) habitus **63** *amerinae* (17943) claw **64** *venusta* (21216) coxa femur **65** *venusta* (21216) pronotum **66** *testaceipes* (17968) coxa femur **67** *testaceipes* (17968) pronotum **68** *prussica* (11336) metatarsus **69** *acutifoliae* (21448) metatarsus **70** *leucosticta* (21449) abdomen **71** *oblita* (21450) habitus **72** *piliserra* (21223) habitus **73** *plicadaphnoides* (11262) mesoscutellum.



FIGURES 74–97. *Euura*, females; **74** *scotaspis* (21453) mesoscutellum **75** *piliserra* (21452) mesoscutellum **76** *plicadaphnoides* (11262) mesopleuron **77** *piliserra* (21446) mesopleuron **78** *cyrnea* (21498) head **79** *leucosticta* (21218) habitus **80** *destricta* (5032) habitus **81** *leucosticta* (21218) metatibia **82** *destricta* (5032) metatibia **83** *scotaspis* (21453) abdomen **84** *leucosticta* (11264) abdomen **85** *scotaspis* (21453) costa **86** *leucosticta* (11264) costa **87** *scotaspis* (21453) metatibial spurs **88** *leucosticta* (11264) metatibial spurs **89** *scotaspis* (21453) head **90** *oblita* (21454) mesoscutellum **91** *ischnocera* (5029) face **92** *carinifrons* (5032) face **93** *leucapsis* NT (21458) face **94** *anglica* (21457) upper head **95** *ischnocera* (5029) protibial spur **96** *anglica* (21457) protibial spur **97** *plicadaphnoides* HT (21253) mesepisternum

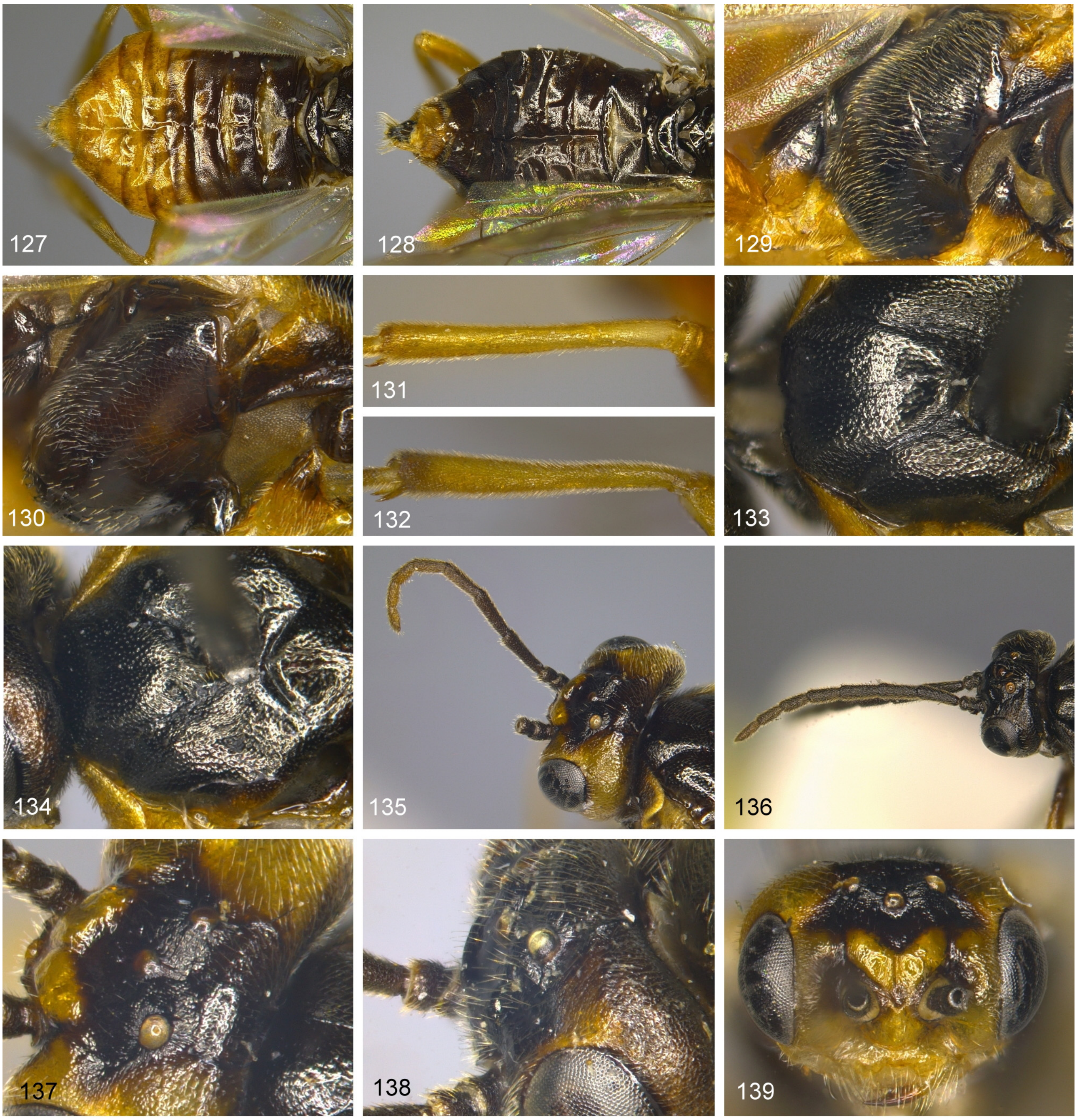


FIGURES 98–112. *Euura*, females; **98** *leucapsis* (21461) mesepisternum **99** *ischnocera* (5029) pterostigma **100** *plicadaphnoides* (11262) pterostigma **101** *leucapsis* (21463) mesoscutellar appendage **102** *acutiserra* (21462) mesoscutellar appendage **103** *anomaloptera* (11383) thorax **104** *cyrnea* (17974) thorax **105** *anomaloptera* (11383) pterostigma **106** *cyrnea* (17974) pterostigma **107** *anomaloptera* (11383) metafemur **108** *crassispina* (20501) metafemur **109** *anomaloptera* (20531) metafemur **110** *purpureae* (11579) mesepisternum **111** *nudipectus* (19193) mesepisternum **112** *nudipectus* (21466) mesoscutum



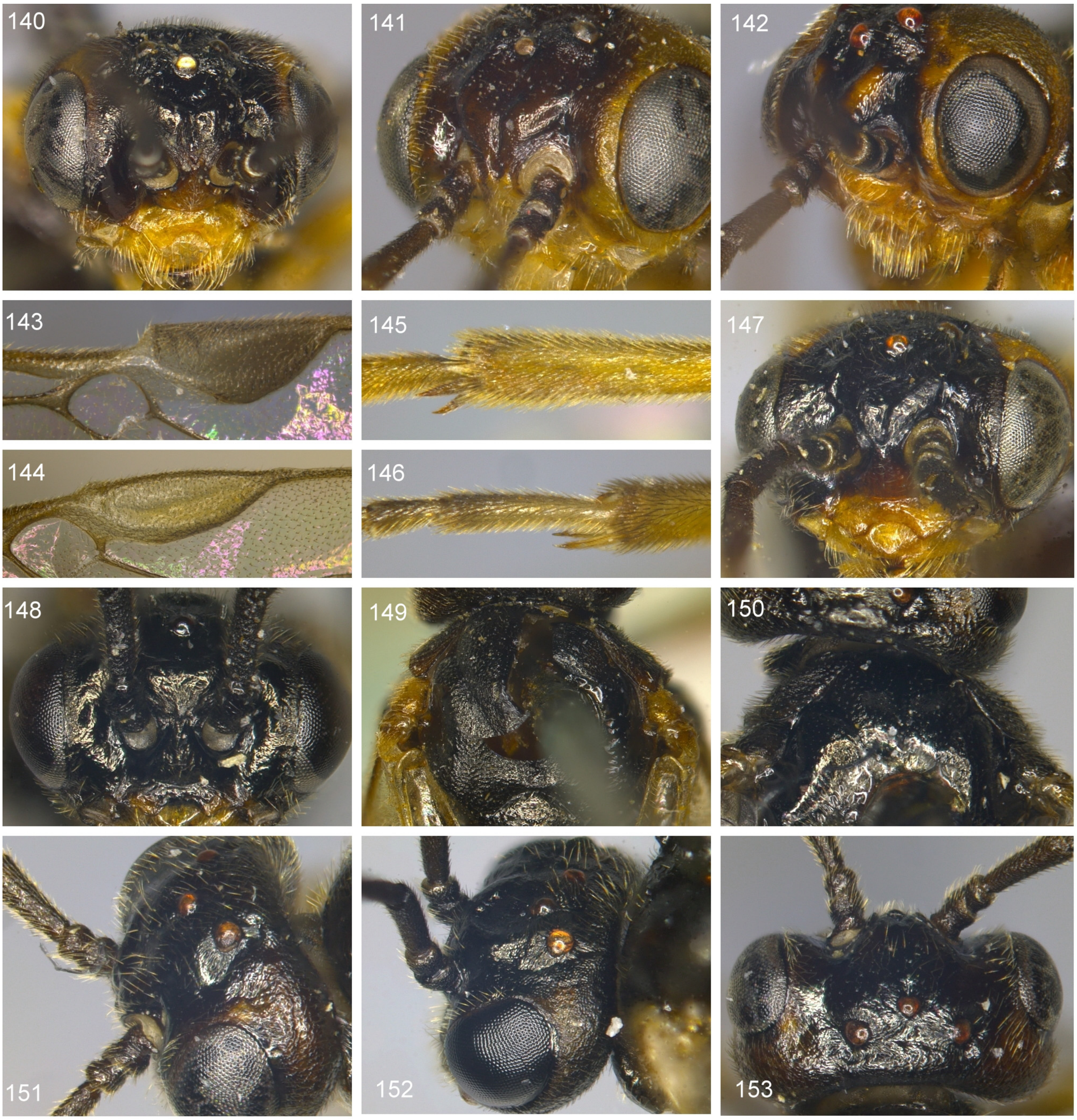
FIGURES 113–126. *Euura*, females; **113** *nitidinota* (21467) mesoscutum **114** *nitidinota* (21467) mesepisternum **115** *proxima* (21468) upper head **116** *acutifoliae* (21451) upper head **117** *proxima* (21468) abdomen **118** *viminalis* (21469) abdomen **119** *dolichura* (4997) face **120** *bridgmanii* (21464) face **121** *nigricantis* (19122) metafemur **122** *virilis* (21470) metafemur **123** *nigricantis* (19122) clypeus **124** *virilis* (21470) clypeus **125** *proxima* (21468) metafemur **126** *bridgmanii* (21464) metafemur

Larval morphology. In some cases, the larvae possess diagnostic characters that are much clearer than those found in adults. A striking example is *E. herbaceae* and *E. aquilonis*, where morphological identification of adults can be very difficult, but larvae differ in the number of dorsal annulets on the abdominal segments, as well as colour pattern (Vikberg 2003). The larvae of most of the taxonomically problematic segregates in the *ischnocera* complex have not been studied in detail, and might repay close examination.

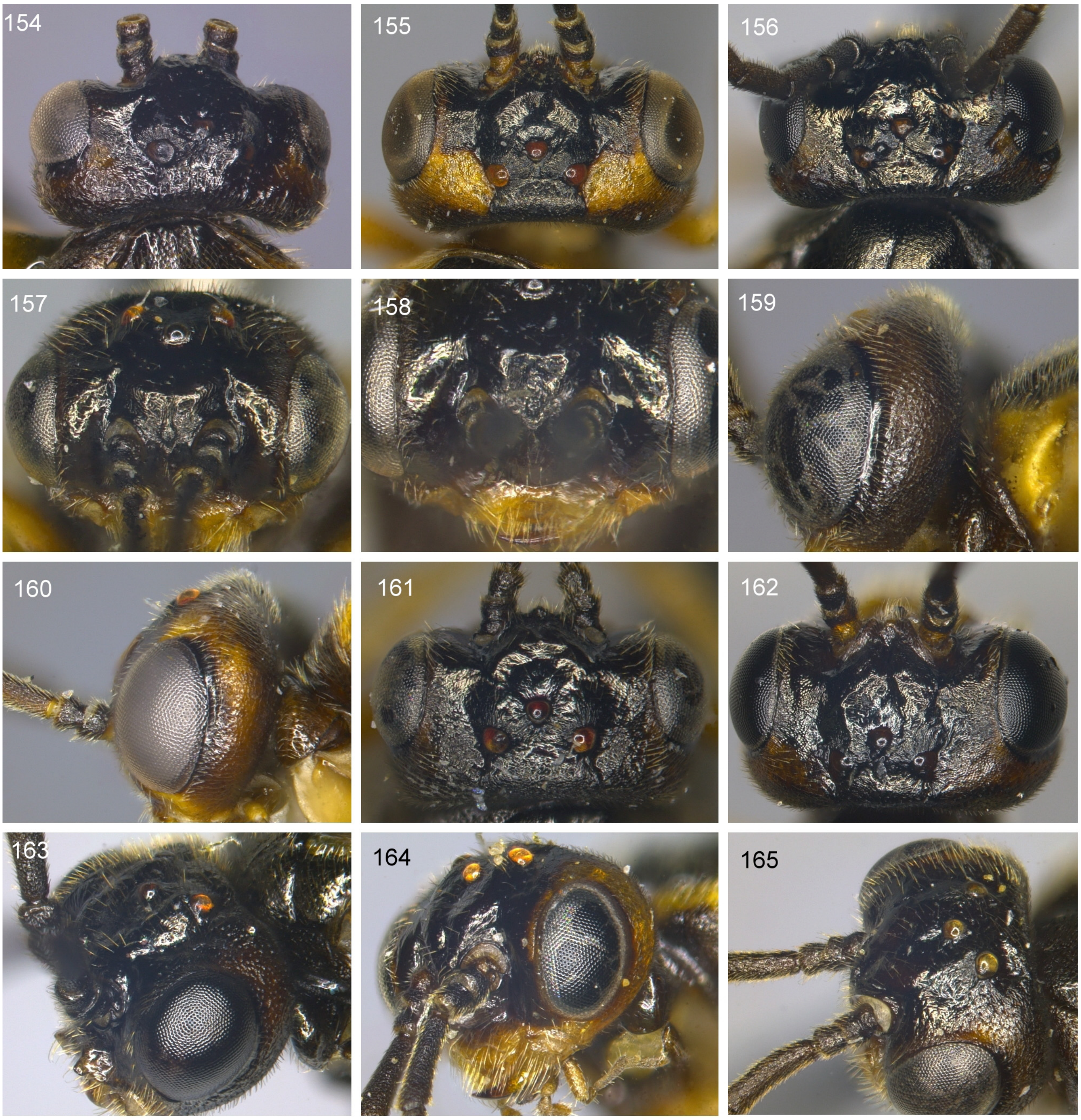


FIGURES 127–139. *Euura*, females; **127** *pustulator* (21471) abdomen **128** *acutifoliae* (17973) abdomen **129** *vesicator* (21484) mesepisternum **130** *viminalis* (21469) mesepisternum **131** *pustulator* (21485) metatibia **132** *vesicator* (21484) metatibia **133** *pustulator* (21485) mesoscutum **134** *vesicator* (21484) mesoscutum **135** *brevicornis* (21486) antenna **136** *myrsiniticola* HT (3733) antenna **137** *brevicornis* (21486) frons **138** *saliciscinereae* (21487) frons **139** *brevicornis* (21486) face

Morphometry. To try and distinguish nominal taxa which morphologically appear to be very similar, some previous studies have made use of morphometry. An early example involving length of the ovipositor sheath / metatibia, or part of the metatarsus, was applied to the *proxima* species group by Benson (1941). Later studies, such as Zinovjev (1993a, b) refined the methodology. Vikberg & Malinen (2012) found that the length of the lancet (alternatively, the ovipositor sheath) is more stable than most other body parts, such as the legs, among conspecific specimens of different body size. They plotted results for three different indices on scatter diagrams for some species in the *dolichura* group: ovipositor sheath / hind tarsus; ovipositor sheath / head width; and length of lamnium of lancet / head width. In all three cases indices tended to be higher in smaller specimens. In this particular case, the first of these indices seemed to yield the most informative results, i.e. the least overlap between *a priori* segregates. A theoretical problem with this method is the difficulty of knowing whether differences in index between samples are the result only of genetic segregation driven by host specialisation, or whether a geographic component is involved. In the latter case, differences may only reflect intraspecific variability between populations. In practice, because a certain degree of overlap of indices of different taxa often occurs, identification of single specimens may often not be possible. Measurement error of body parts can be a serious problem, especially when it is difficult to locate the point from which it is to be measured, e.g. the base of ovipositor valvifer 2 (often covered by the hypopygium), or the point where valvifer 2 abuts valvula 3. In the indices proposed by Benson (1941) for the *proxima* group, measurement error can easily be of a magnitude approaching the supposed



FIGURES 140–153. *Euura*, females; **140** *saliciscinereae* (21487) face **141** *brevicornis* (20684) face **142** *arcticornis* (21489) face **143** *brevicornis* (20684) pterostigma **144** *arcticornis* (21489) pterostigma **145** *myrsiniticola* (21128) metatibial spurs **146** *glabrifrons* (21490) metatibial spurs **147** *lapponica* Malaise LT (54793) face **148** *myrsiniticola* (21128) face **149** *crassipes* LT (31769) thorax **150** *myrsiniticola* (21128) thorax **151** *crassipes* (83520) upper head **152** *aquilonis* (21143) upper head **153** *crassipes* (83520) upper head.

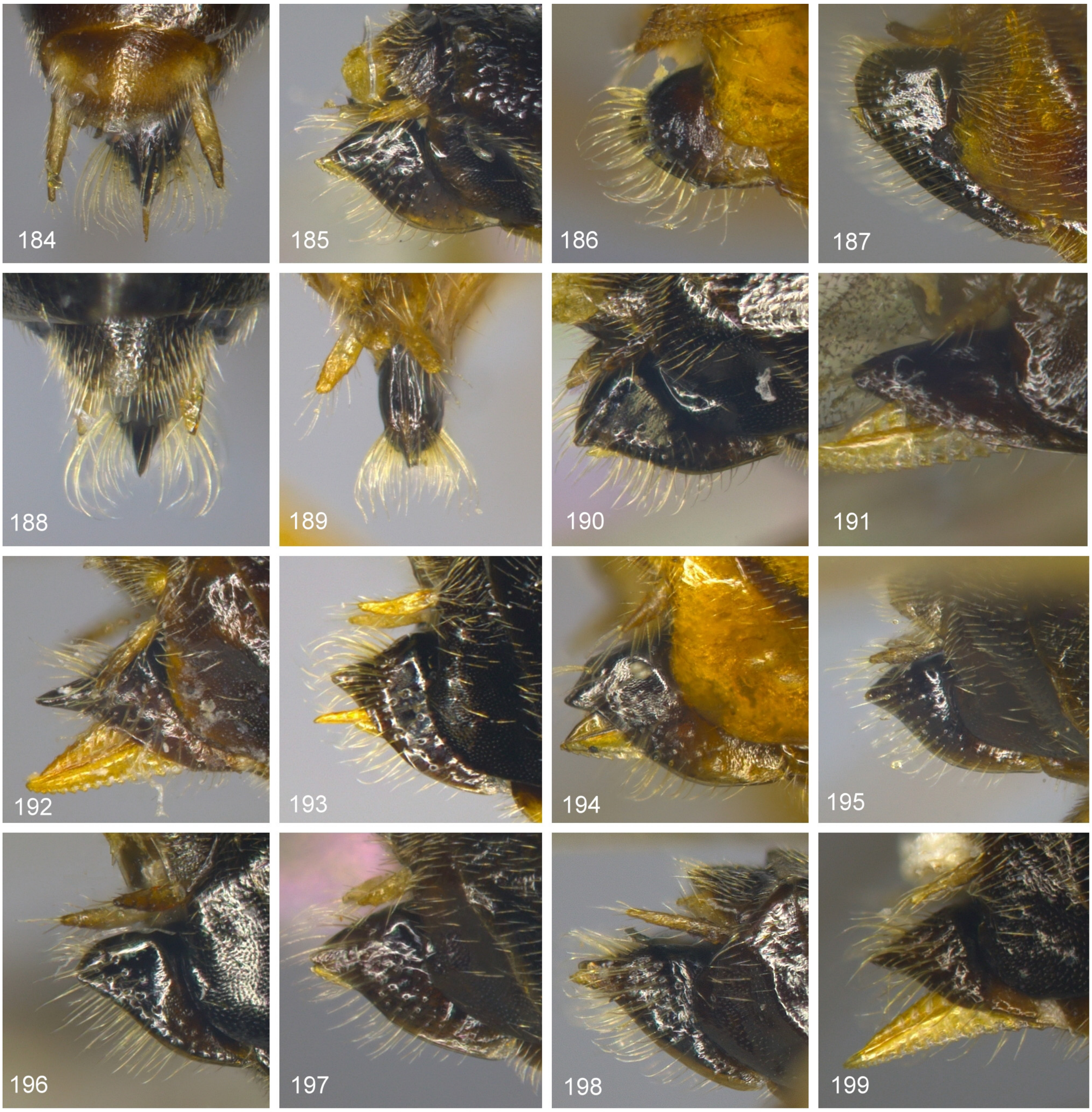


FIGURES 154–165. *Euura*, females; **154** *arbusculae* HT (21285) upper head **155** *viminalis* (17496) upper head **156** *glabrifrons* (21490) upper head **157** *myrtilloidica* (11086) face **158** *pedunculi* (83524) face **159** *myrtilloidica* (83525) upper head **160** *viminalis* (3739) upper head **161** *myrtilloidica* (11086) upper head **162** *viminalis* (21469) upper head **163** *reticulatae* (83523) orbits **164** *collactanea* (83536) orbits **165** *hastatavora* HT (83522) upper head.

difference between the two species. The index 'length of lamnium / head width' (Vikberg & Malinen 2012) is much less prone to measurement error, but requires the lancet to be routinely exposed during preparation, or subsequent dissection of the specimen. Both of these techniques are likely to cause distortion or damage to valvulae 3 and their setae, the appearance of which is important for the identification of many gall-makers.

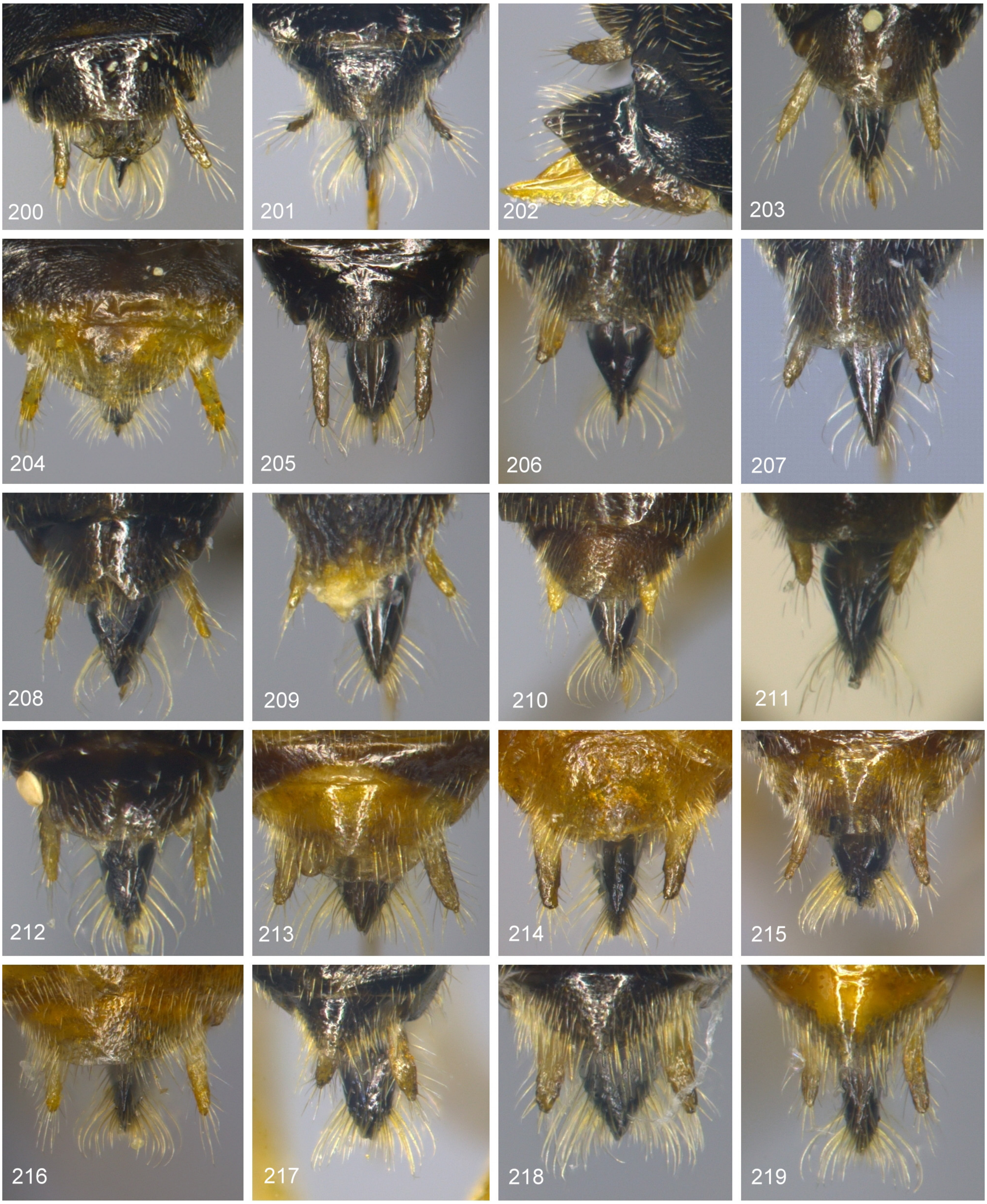
Penis valve. The shape of the penis valve is rather uniform throughout the gall-inducing *Euura* species (Figs 280–301), but can sometimes be used to place a specimen in the correct species group and, more rarely, to distinguish species. The extremely small differences illustrated and described by Kopelke in some groups of segregates fall well within the range of variability observed in specimens reared from the same host species.

FIGURES 166–183. *Euura*, females; **166** *reticulatae* (83523) upper head **167** *hastatavora* (83522) mesepisternum **168** *reticulatae* (83523) mesepisternum **169** *hastatavora* (83522) face **170** *samolad* (83537) face **171** *nivalis* (21252) face **172** *acutifoliae* (21451) face **173** *mucronata* (31716) valvula 3 lateral **174** *nivalis* (21252) valvula 3 **175** *lanatae* (21439) valvula 3 **176** *lappo* (21440) valvula 3 **177** *amerinae* (17943) valvula 3 **178** *atra* (17945) valvula 3 **179** *auritae* HT (3715) valvula 3 **180** *salicispurpureae* (17950) valvula 3 **181** *testaceipes* (17968) valvula 3 **182** *venusta* (11384) valvula 3 **183** *daphnoidica* (21445) valvula 3.

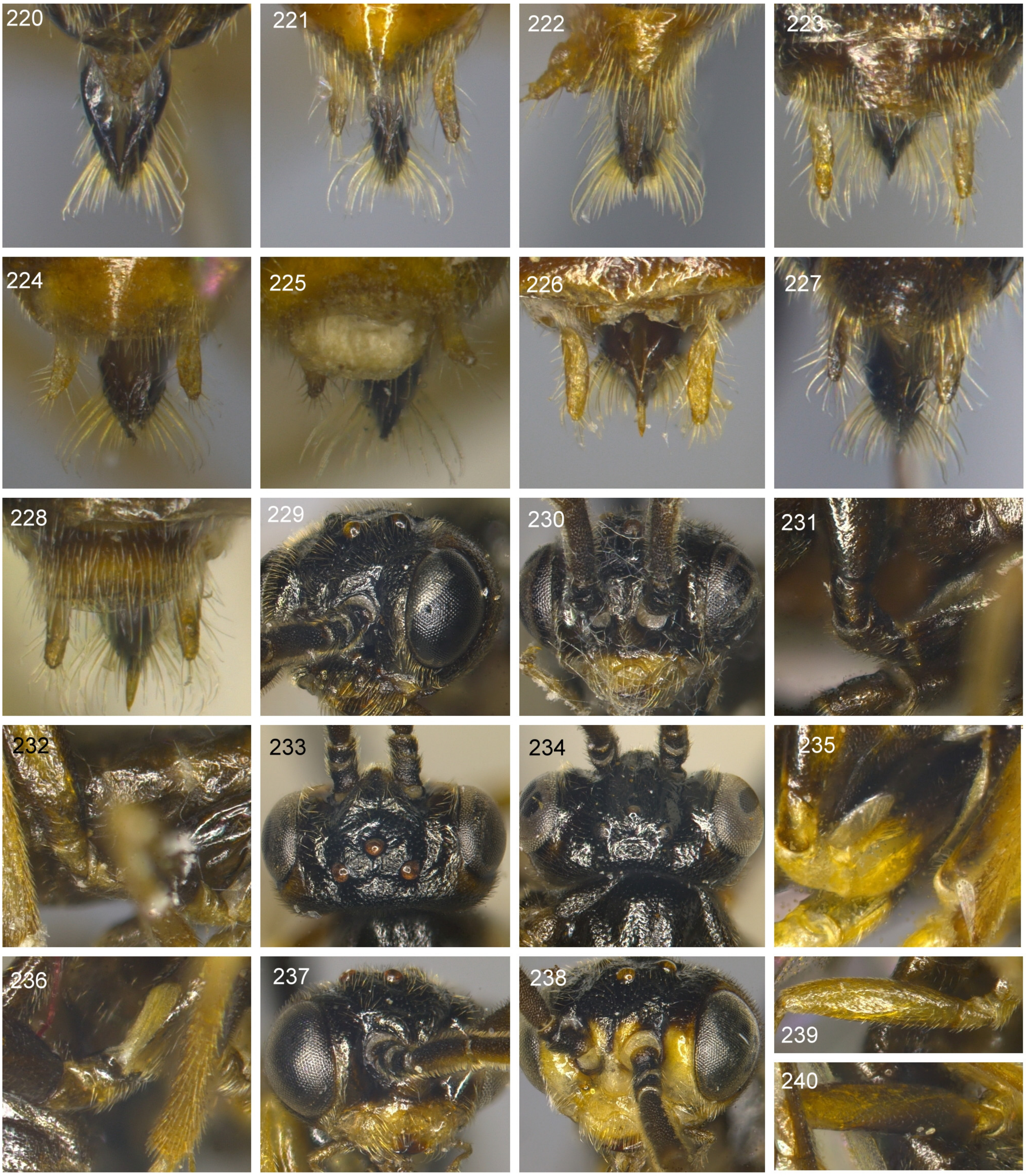


FIGURES 184–199. *Euura*, females; **184** *subgemma* (21212) valvula 3 **185** *prussica* (11336) valvula 3 lateral **186** *piliserra* (21446) valvula 3 lateral **187** *acutifoliae* (21447) valvula 3 lateral **188** *leucosticta* (21449) valvula 3 **189** *piliserra* (21452) valvula 3 **190** *plicadaphnoides* (11262) valvula 3 lateral **191** *purpureae* (11579) valvula 3 lateral **192** *scotaspis* (21453) valvula 3 lateral **193** *leucosticta* (21218) valvula 3 lateral **194** *oblita* (21454) valvula 3 lateral **195** *ischnocera* (19180) valvula 3 lateral **196** *destricta* (5032) valvula 3 lateral **197** *plicalapponum* HT (21230) valvula 3 lateral **198** *anglica* (21457) valvula 3 lateral **199** *leucapsis* (21461) valvula 3 lateral.

Vikberg & Malinen (2012) described and illustrated examples of intraspecific variability in the penis valves of some species in the *dolichura* group. Even the left and right penis valves of the same specimen can differ to an extent at least as great as differences which Kopelke held to be species-characteristic. Figs 297–301 show intraspecific variability in the penis valves of *E. lanatae*, including the left and right valves of a single specimen (Figs 300, 301). Variability is most obvious in the distal area of the paravalva at the base of the valvispina, as in the latter case, but extends to the general proportions of the valve (compare Figs 298 and 299).

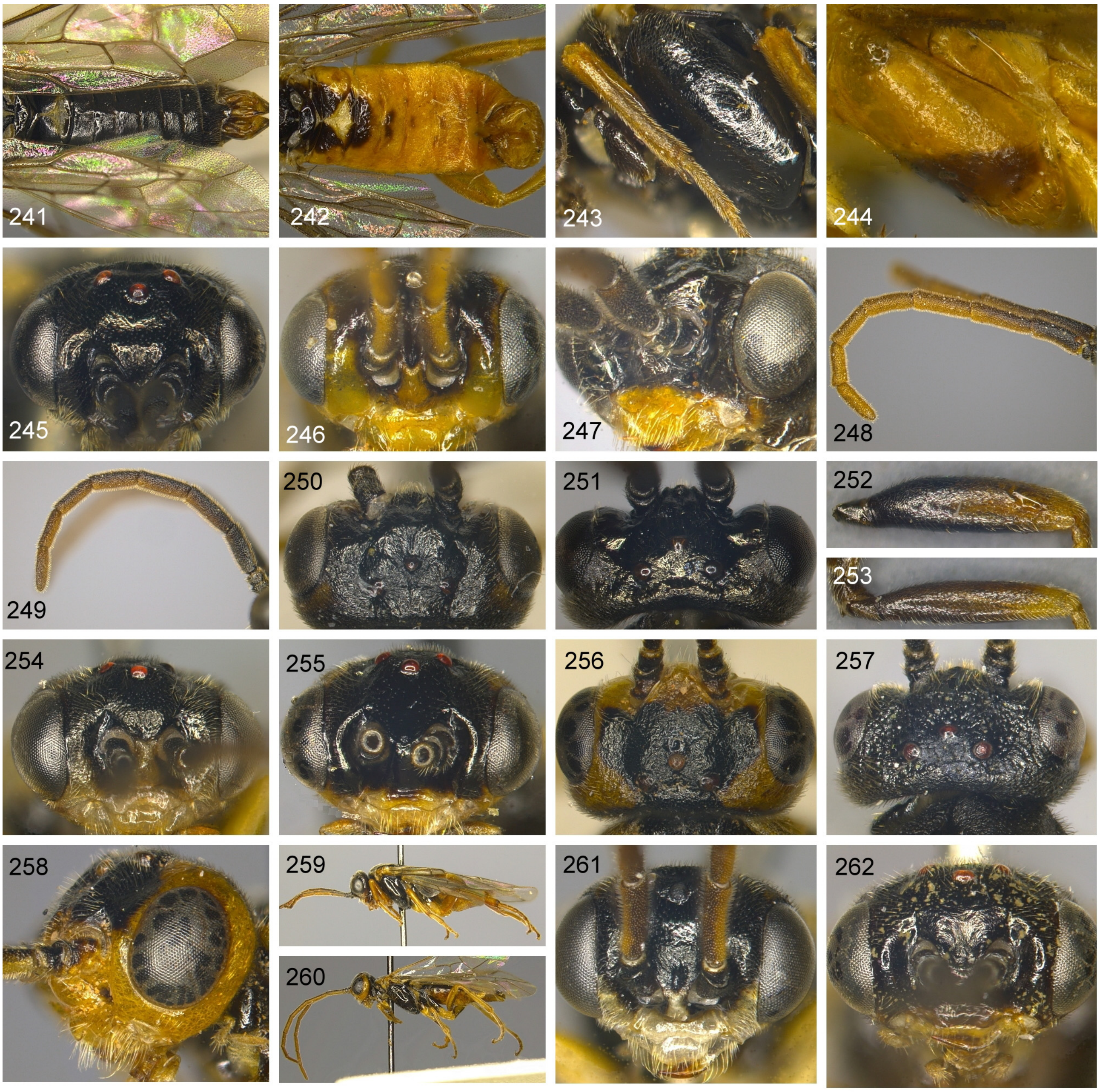


FIGURES 200–219. *Euura*, females; **200** *leucapsis* (21463) valvula 3 **201** *acutiserra* (20462) valvula 3 **202** *acutiserra* (21462) valvula 3 lateral **203** *bridgmanii* (21464) valvula 3 **204** *polaris* (20523) valvula 3 **205** *dolichura* (4997) valvula 3 **206** *anomaloptera* (11383) valvula 3 **207** *crassispina* (21436) valvula 3 **208** *cyrnea* (17974) valvula 3 **209** *purpureae* (21024) valvula 3 **210** *nudipectus* (21466) valvula 3 **211** *nitidinota* (21467) valvula 3 **212** *proxima* (21468) valvula 3 **213** *nivalis* HT (21252) valvula 3 **214** *vesicator* (21484) valvula 3 **215** *viminalis* (21469) valvula 3 **216** *pustulator* (21485) valvula 3 **217** *myrsiniticola* (21128) valvula 3 **218** *glabrifrons* (21490) valvula 3 **219** *crassipes* (83520) valvula 3.



FIGURES 220–228. *Euura*, females; **220** *aquilonis* (21144) valvula 3 **221** *crassipes* (83520) valvula 3 **222** *herbaceae* (83521) valvula 3 **223** *pedunculi* (18861) valvula 3 **224** *hastatavora* HT (83522) valvula 3 **225** *myrtilloidica* (83525) valvula 3 **226** *kriechbaumeri* (83526) valvula 3 **227** *reticulatae* (83523) valvula 3 **228** *collactanea* (83536) valvula 3.

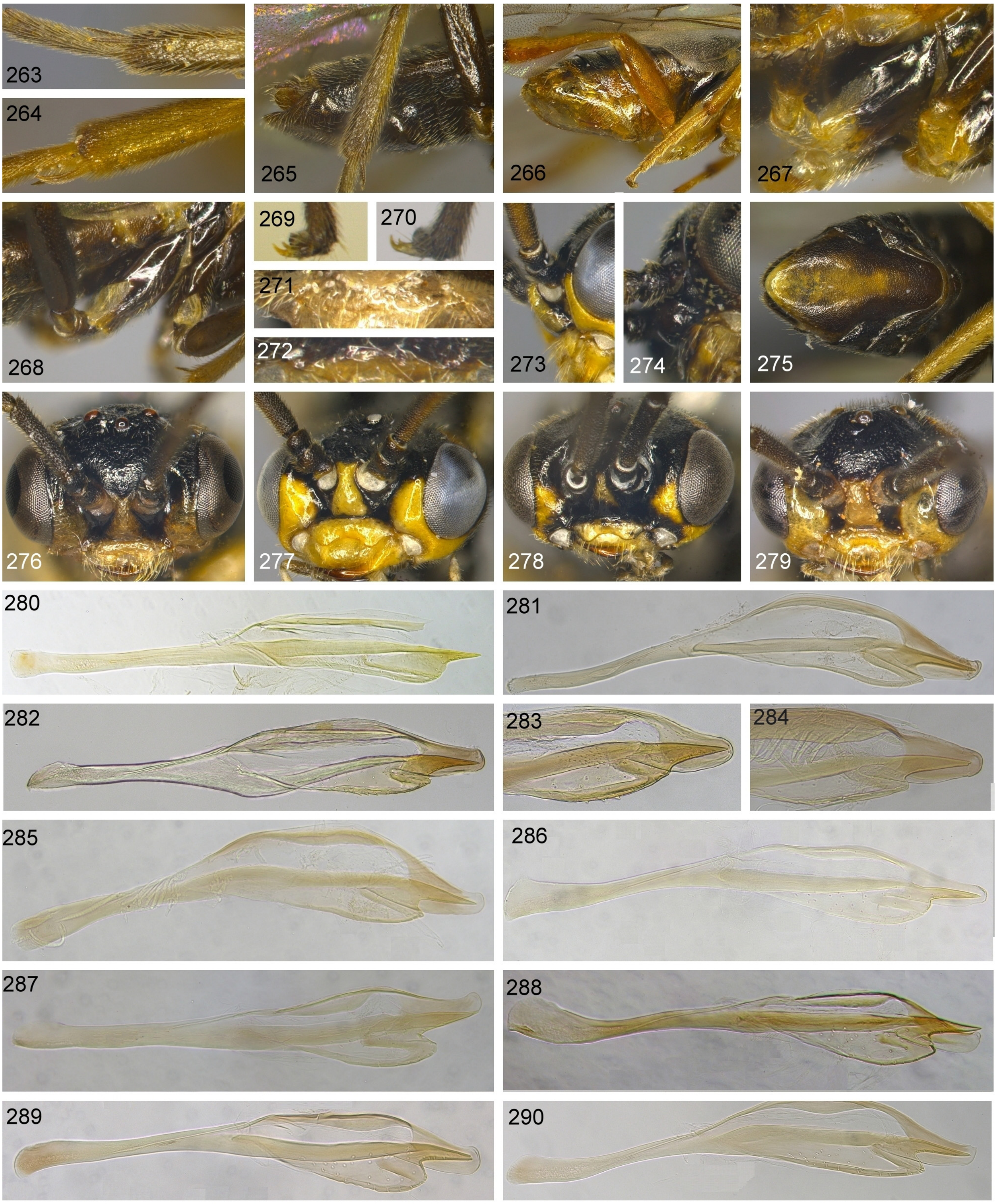
FIGURES 229–240. *Euura*, males; **229** *weiffenbachiella* (31613) face **230** *venusta* (31614) face **231** *weiffenbachiella* (31613) leg colour **232** *venusta* (31614) leg colour **233** *hastatae* (31616) head **234** *lanatae* (31618) head **235** *daphnoidica* (31619) metacoxa, trochanter **236** *hastatae* (31616) metacoxa, trochanter **237** *venusta* (31621) face **238** *daphnoidica* (31619) face **239** *testaceipes* (31622) metafemur **240** *venusta* (31625) metafemur.



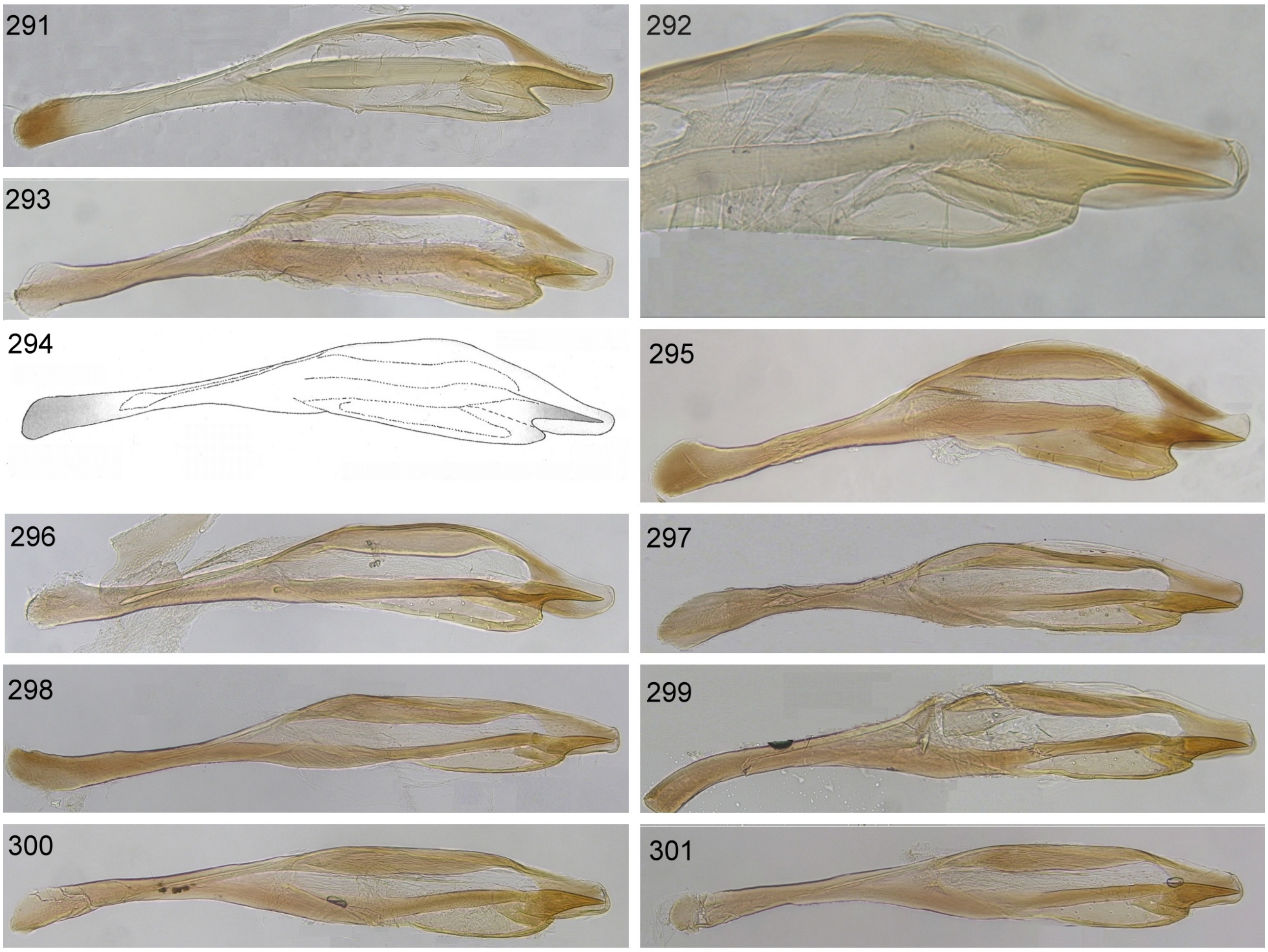
FIGURES 241–262. *Euura*, males; **241** *pustulator* (31627) terga **242** *piliserra* (31630) terga **243** *pustulator* (31627) mesepisternum **244** *piliserra* (31630) mesepisternum **245** *vesicator* (80052) face **246** *arcticornis* (31632) face **247** *myrtilloidica* (31637) face **248** *brevicornis* (31636) antenna **249** *myrtilloidica* (31637) antenna **250** *varia* (31639) head **251** *glabrifrons* (31629) head **252** *crassipes* (31641) metafemur **253** *collactanea* (31643) metafemur **254** *leucosticta* (31644) face **255** *carinifrons* (31645) face **256** *oblita* (31646) head **257** *anomaloptera* (31647) head **258** *oblita* (31646) head **259** *leucosticta* (31654) habitus **260** *oblita* (31646) habitus **261** *leucapsis* (31655) face **262** *proxima* (31657) face.

Ovipositor sheath. The shape of the ovipositor sheath and the arrangement of setae on the sheath can become significantly distorted when specimens are removed from alcohol and mounted. In severe cases, the sheath can be so badly distorted that the specimen appears to belong to a different species group, i.e. in lateral view it assumes a shape that is normally characteristic of the *Euura oblita* group. If such distortion is suspected, it is best to examine the lancet itself.

Wing venation. The absence (Fig. 45) or presence (Fig. 46) of vein 2r-m is an easily seen character that has long been used to separate the *amerinae* group (*Euura* s. str.) from all other gall-maker groups. However, although we have never seen a specimen of the *amerinae* group in which this vein is present, it can be absent in one or both wings of specimens of all other groups. In 293 specimens of the *viminalis, dolichura*, and *oblita* groups collected as



FIGURES 263–290. *Euura*, males; **263** *nigricantis* (31658) metatibial spurs **264** *leucosticta* (31644) metatibial spurs **265** *nigricantis* (31658) subgenital plate **266** *leucosticta* (31654) subgenital plate **267** *anglica* (31659) metacoxa **268** *nigricantis* (31658) metacoxa **269** *dolichura* (31660) claw **270** *glaucae* (31661) claw **271** *anglica* (19174) clypeus **272** *virilis* (31662) clypeus **273** *plicadaphnoides* (31665) supraclypeal area **274** *proxima* (31657) supraclypeal area **275** *plicadaphnoides* (31665) subgenital plate **276** *prussica* (31666) face **277** *plicadaphnoides* (31665) face **278** *plicalapponum* (31667) face **279** *polita* (31668) face **280** *piliserra* (31770) penis valve **281** *scotaspis* (31771) penis valve **282** *vesicator* (80052) penis valve **283** *brevicornis* (31728) penis valve **284** *arcticornis* LT (21292) penis valve **285** *destricta* (31771) penis valve **286** *anomaloptera* (31772) penis valve **287** *nudipectus* (31773) penis valve **288** *cyrnea* (31774) penis valve **289** *purpureae* (EXNR131874) penis valve **290** *leucapsis* (EXNR132178) penis valve.



FIGURES 291–301. *Euura*, males, penis valves; **291** *anglica* (31775) **292** *acutiserra* (31776) **293** *ischnocera* (31727) **294** *prussica* after Fig. 11d by Kopelke (2007a) **295** *plicalapponum* (31726) **296** *polita* (31732) **297** *lanatae* (19144) **298** *lanatae* (31618) **299** *boreoalpina* (31736) **300** *boreoalpina* (31737) left **301** *boreoalpina* (31737) right.

adults in the field, 2r-m was absent in both wings in 8 specimens (2.7%) and absent in one wing in 17 specimens (5.8%). Two further specimens had an additional (fourth) cubital cross-vein in one wing. In some series of reared specimens, the proportion of specimens with atypical venation was much higher, e.g. in 46 *E. glabrifrons* reared from galls collected in Norway, 2r-m was absent in both wings in 9 specimens (19.6%), and in one wing in 13 specimens (28.3%). The difference between the apparent frequencies of abnormality under natural and artificial conditions tempts us to suggest that the venation anomalies are the result of environmental stress during development, resulting for example from suboptimal rearing conditions. If so, the phenomenon might be an example of fluctuating asymmetry (Møller & Swaddle 1997). For the purpose of identification, specimens in which 2r-m is absent in only one wing can safely be treated as if this vein were present in both. In the rather small percentage of specimens where it is atypically absent in both, the user of the key should consider this possibility if the specimen runs to a couplet where other characters no longer fit.

Key to females

1 a Vein 2r-m in fore wing absent in both fore wings (cells 1Rs and 2Rs fused) (Fig. 45).
b Cerci in dorsal view always reaching at least 0.75 of length of visible part of ovipositor sheath (Figs 173, 175–184) .
c Cerci at least 6× as long as medial width (Figs 173, 175–184).
d Valvula 3 shorter than valvifer 2 (Fig 8a).
e In lateral view both mandibles similar (more or less gradually tapering to apex) (Figs 47, 48).. 2
\- aa Vein 2r-m usually present at least in one fore wing (cells 1Rs and 2Rs not fused) (Fig. 46).

bb Cerci in dorsal view reaching 0.5–1.0 of length of visible part of ovipositor sheath (Figs 200–219).
cc Cerci often less than 5× as long as medial width (Figs 200–219).
dd Valvula 3 longer (Figs 8b, 118) or shorter (Fig. 8a) than valvifer 2.
ee In lateral view both mandibles similar (more or less gradually tapering to apex) (Figs 47, 48), or right mandible gradually tapering, left one with swollen base and thin, blade-like apex (Figs 49, 50). 16

2(1) a Valvulae 3 in dorsal view subtriangular (Figs 175, 178–180). 3
- aa Valvulae 3 in dorsal view basally subparallel with abruptly tapering apex (Figs 177, 181–182), or bulbous basally and tapering sinuously to acute apical flange (Fig. 183). 8

3(2) a Malar space entirely black (Fig. 51).
b Some basal setae on valvula 3 in dorsal view as long as apical, so that edge of fringe formed on each side is approximately parallel to edge of valvula 3 (Figs 178–180).
c Lower face, including antennal hollows, dull with sculpture (Fig. 53).
d Ovipositor sheath as long or longer than tibia 3.
e Lancet with 23–24 serrulae, height / length ratio smaller; annulus 1 much longer than high (Figs 15–16) 4
- aa Malar space at least partly pale (Fig. 52).
bb Basal setae on valvula 3 in dorsal view longer than apical ones, so that these form a nearly straight-edged fringe orientated at right angles to valvula 3 longitudinal axis (Fig. 175).
cc Lower face, particularly antennal hollows, nearly unsculptured (shiny) between the setae (Fig. 54).
dd Ovipositor sheath shorter than tibia 3.
ee Lancet with about 20 serrulae, height / length ratio larger; medial length of annulus 1 about equal to height (Fig. 21) . . . . *E. lanatae*

4(3) a Cerci do not project beyond tip of valvula 3 (Figs 178, 179).
b Outside edge of valvula 3 in dorsal view straight, at least basally (Figs 178, 179). 5
- aa Cerci project beyond tip of valvula 3 (Fig. 180).
bb Outside edge of valvula 3 in dorsal view slightly and evenly curved along whole length (Fig. 180).
[cc Ctenidia present on lancet from annular suture 8.]. . . . . *E. salicispurpureae*

5(4) a Ctenidia present on lancet from annular suture 5, 6 or 7 (Fig. 16). 6
- aa Ctenidia present on lancet from annular suture 11 or 12 (Fig. 15). . . . . *E. atra*

6(5) a Frontal pit more elongate, connected to frontal basin by medially interrupted anterior frontal ridge (Fig. 55).
b Tegula yellow (Fig. 57), dark brown, or black. 7
- aa Frontal pit nearly circular, separated from frontal basin by fully developed anterior frontal ridge (Fig. 56).
bb Tegula dark brown or black (Fig. 58). . . . . *E. myrtilloides*

7(6) a Metafemur with approx. basal 0.66 black: never pale to base (Fig. 59).
b Body proportionately broad in relation to its length (Fig. 61).. . . . . *E. weiffenbachiella*
- aa Metafemur with approx. basal 0.33 black: sometimes partly pale to base (Fig. 60).
bb Body *usually* proportionately narrower in relation to its length (Fig. 62).. . . . . *E. auritae*

8(2) a Valvulae 3 in dorsal view basally subparallel and tapering more gently to median flange (Figs 177, 181–182). 9
- aa Valvulae 3 in dorsal view basally bulbous and tapering abruptly to median flange (Figs 183–184). 11

9(8) a Setae on valvula 3 in dorsal view strongly curved (Figs 181–182).
b Inner tooth on metatarsal claw much longer than basal width (Fig. 69).
c Annular sutures 2–4 of lancet nearly perpendicular to aulax (Figs 13–14). 10
- aa Setae on valvula 3 in dorsal view nearly straight (Fig. 177).
bb Inner tooth on metatarsal claw about as long as basal width (Fig. 63).
cc Annular sutures 2–4 of lancet oblique to aulax (Fig. 12). . . . . *E. amerinae*

10(9) a Valvulae 3 in dorsal view more gently tapered, with long apical flange; setae hardly reaching past apex of sheath (Fig. 182).
b Coxae (mainly) (Fig. 64), supraclypeal area, and pronotum black (except at most for narrow posterior corner) (Fig. 65).
c Metafemur lined with black (Fig. 64).
d Basal serrulae of lancet slightly concave, with protruding postcalcar (Fig. 14). . . . . *E. venusta*
- aa Valvulae 3 in dorsal view more abruptly tapered, with short apical flange; setae reaching considerably further than apex of sheath (Fig. 181).
bb Apical half of coxae (at least) (Fig. 66), supraclypeal area, and most of pronotum pale (Fig. 67).
cc Metafemur usually entirely pale (Fig. 66).
dd Basal serrulae of lancet completely flat (Fig. 13). . . . . *E. testaceipes*

11(8) a Valvulae 3 not projecting nearly as far as tips of cerci (Figs 176, 183).
b Body always less than 5mm.
c Lancet as in Figs 17, 19, 22. 12
\- aa Valvulae 3 in dorsal view projecting as far as (or nearly to) tips of cerci (Fig. 184).
bb Body length sometimes more than 5mm.
cc Lancet as in Fig. 18 or 24. 15

12(11) a Serrula 4 with denticles; postcalcar on annuli 1–5 more protruding, acute (Figs 17, 19, 22). 13
\- aa Serrula 4 without denticles; postcalcar on annuli 1–5 scarcely protruding, obtuse (Fig. 23). . . . . *E. mucronata*

13(12) a Denticles absent or indistinct on serrulae 2–3, never on 1 (Figs 19, 22). 14
\- aa Denticles clearly present on serrulae 2–3, sometimes also on 1 (Fig. 17). . . . . *E. hastatae*

14(13) a Serrula 4 with a few denticles; postcalcar of annuli 1–6 protruding, more acute (Fig. 22). . . . . *E. lappo*
\- aa Serrula 4 without denticles; postcalcar on annuli 1–5 scarcely protruding, obtuse (Fig. 19). . . . .
. . . . *E. daphnoidica, E. myrsinifoliae* [females not morphologically distinguishable]

15(12) a Basal height of lamnium of lancet markedly greater than height at middle: middle serrulae concave; annulus 4 nearly 2× as high as wide (Fig. 18).
b Body length always less than 4.0mm. *E. laeta*
\- aa Basal height of lamnium of lancet not much greater than height at middle: middle serrulae nearly flat; annulus 4 height about equal to width (Fig. 24).
bb Body length always more than 4.4mm. *E. subgemma*

16(1) a Valvula 3 apex in lateral view acute and / or emarginate below apex (Figs. 185–186, 190–199).
b Metatarsomere 4 upper edge shorter than apical slope (Fig. 68). 17
\- aa Valvula 3 apex in lateral view bluntly rounded and usually entire below apex (Fig. 187).
bb Metatarsomere 4 upper surface as long or longer than apical slope (Fig. 69). 27

17(16) a Terga usually extensively black; if only terga 1–3 or fewer with black markings, then postocellar area and whole anterior half of mesoscutellum yellow (Fig. 71).
b Valvulae 3 in dorsal view more or less tapering from base to apex (Fig. 188).
c Valvula 3 in lateral view clearly emarginate at apex (Figs 185, 192–199).
d Mesoscutellum flat (Fig. 73) or convex (Fig. 74); shiny (Fig. 73) or matt (Fig. 74).
e Mesosternum black (Fig. 76).
f Basal annular sutures of lancet less curved, distal sutures less oblique (Figs 26–39). 18
\- aa At most terga 1–3 with small medial black markings. Postocellar area and anterior half of mesoscutellum black (but latter may be pale laterally) (Fig. 72).
bb Valvulae 3 in dorsal view basally parallel-sided (Fig. 189).
cc Valvula 3 in lateral view scarcely emarginate below apex Fig. 186).
dd Mesoscutellum convex (domed); somewhat shiny between punctures (Fig. 75).
ee Mesosternum *usually* pale (Fig. 77).
ff Basal annular sutures of lancet strongly curved, distal sutures highly oblique (Fig. 25). . . . . *E. piliserra*

18(17) a Valvula 3 strongly emarginate above and /or below apex in lateral view (Figs 190, 192–199).
b Upper head shiny (Figs 92–94), or more or less matt with microsculpture (Fig. 4), but never tuberculate.
c Metatarsomere 4 upper surface shorter than apical slope (Fig. 68).
d Lamnium of lancet short, relative to greatest height; more strongly tapered (Figs 27–33). 19
\- aa Valvula 3 slightly emarginate below apex in lateral view (Fig. 191).
bb Upper head with tuberculate microsculpture (Figs 78, 103–104).
cc Metatarsomere 4 upper surface as long or longer than apical slope (Fig. 69).
dd Lamnium of lancet long, relative to greatest height; less strongly tapered (Fig. 37). . . . . *E. purpureae* [in part]

19(18) a Femora entirely red-yellow (Fig. 79).
b Metatibia without black fleck on posterior side at approx. 0.3–0.4 from base (Fig. 81). 20
\- aa Femora at least with narrow fuscous stripe (Fig. 80).
bb Metatibia usually with black fleck on posterior side at approx. 0.3–0.4 from base (Fig. 82). 22

20(19) a Underside of abdomen entirely pale (yellow) (Fig. 83).
b Costa entirely pale (Fig. 85).
c Valvula 3 in lateral view tapering to sharp point (Figs 194, 199).
d Metatibial spurs straight (Fig. 87).
e Annulus 1 of lancet about as long dorsally as ventrally. 21
\- aa Underside of abdomen only with area around hypopygium pale (red-brown) (Fig. 84).

bb Medial part of costa fuscous, contrasting with largely pale stigma (only edges slightly sordid) (Fig. 86).
cc Valvula 3 in lateral view tapering to blunt point (Fig. 193).
dd Metatibial spurs curved (Fig. 88).
ee Annulus 1 of lancet clearly longer dorsally than ventrally (Fig. 26).. . . . . *E. leucosticta*

21(20) a Postocellar area black (Fig. 89).
b Mesoscutellum strongly convex; matt in middle,with dense sculpture; entirely black (Fig. 74).
c Index length flagellomere 2: height of eye 0.75–0.85.
d Valvula 3 in lateral view tapering more evenly to long point (Fig. 192).
e Basal 3 annular sutures of lancet slightly sinuate; dorsally more strongly curved than ventrally (Fig. 27). . *E. scotaspis*
\- aa Postocellar area pale (Fig. 71).
bb Mesoscutellum flat; shiny between sparse shallow punctures; anterior pale (Fig. 90).
cc Index length flagellomere 2: height of eye 1.0–1.2.
dd Valvula 3 in lateral view tapering more abruptly to short point (Fig. 194).
ee Basal 3 annular sutures of lancet evenly curved, arcuate (Fig. 28). . . . . *E. oblita*

22(19) a Upper margin of antennal hollow and frontal crest (around frontal pit) not carinate (Figs 91, 93).
b Antennal hollows sculptured and matt (Fig. 93), or unsculptured and shiny.
c Valvula 3 apex in lateral view acute (Figs 197–199). 23
\- aa Upper margin of antennal hollow and frontal crest (around frontal pit) carinate (Fig. 92).
bb Antennal hollows unsculptured and shiny (Fig. 92).
cc Valvula 3 apex in lateral view acute, or obtuse (Fig. 196). . . . . *E. destricta*

23(22) a In lateral view upper (free) edge of valvula 3 at most slightly longer than perpendicular height of sheath below point where sheath overlaid by terga (Figs 195–197).
b Frontal area dull with dense sculpture (Fig. 93).
c Antennal hollow entirely sculptured and matt Fig. 93), or smooth and shiny (Fig. 92).
d Protibial spurs 0.5 to 0.66 as long as probasitarsus (Fig. 95).
e Lancet with 15–17 annulets, ctenidia clearly present; serrulae more prominent. 24
\- aa In lateral view upper (free) edge of valvula 3 much longer than perpendicular height of sheath below point where sheath overlaid by terga (Fig. 198).
bb Frontal area shiny (Fig. 94).
cc Antennal hollow shiny, outer part shiny between dense setae (Fig. 94).
dd Protibial spurs no more than 0.5 as long as probasitarsus (Fig. 96).
ee Lancet with about 20 annulets, without ctenidia; serrulae very flat (Fig. 30). . . . . *E. anglica*

24(23) a Antennal hollow shiny and less sculptured than duller upper inner orbit (Fig. 92).
b Protibial spurs at least two thirds as long as basitarsus (Fig. 95).
c Setae on upper posterior mesepistermum directed upwards (Fig. 97).
d At least half of annular suture 2 of lancet with ctenidea (Fig. 31). 25
\- aa Antennal hollow matt with sculpture similar to upper inner orbit (Fig. 93).
bb Protibial spurs no more than half as long as basitarsus (Fig. 96).
cc Setae on upper posterior mesepistermum directed downwards (Fig. 98).
dd Annular suture 2 of lancet without, or with very few ctenidea (Figs 32–33). 26

25(24) a Pterostigma nearly entirely pale (Fig. 99). . . . . *E. ischnocera* [part]
\- aa Pterostigma apically black (Fig. 100). . . . . . . *E. ischnocera* complex: *E. plicalapponum, E. plicaphylicifolia*, *E. plicadaphnoides*, *E. prussica*, *E. ischnocera* [part], *E. polita* [females not morphologically distinguishable]

26(24) a Mesoscutellar appendage with shiny interspaces between shallow, sparse punctures (Fig. 101).
b Cerci *usually* longer than half length of valvula 3 in dorsal view (Fig. 200).
c Valvula 3 in lateral view nearly symmetrical: with dorsal and ventral apical margins both concave (Fig. 199).
d Annular sutures 1–3 of lancet more strongly curved dorsally than ventrally; annular suture 2 with only few, small ctenidea; caudal edge of postcalcar oblique to axis of lamnium (Fig. 32). . . . . *E. leucapsis*
\- aa Mesoscutellar appendage densely punctate and sculptured, completely matt (Fig. 102).
bb Cerci *usually* only half length of valvula 3 in dorsal view (Fig. 201).
cc Valvula 3 in lateral view more asymmetrical: with apical dorsal margin convex, ventral margin concave (Fig. 202).
dd Annular sutures 1–3 of lancet more evenly curved; annular suture 2 with more numerous, larger ctenidea; caudal edge of postcalcar nearly perpendicular to axis of lamnium (Fig. 33). . . . . *E. acutiserra*

27(16) a Flagellomere 2 shorter than longest axis of eye 28
\- aa Flagellomere 2 much longer than longest axis of eye. . . . . [non-gallmakers: *Euura reticulata* and similar species]

28(27) a In dorsal view apex of valvulae 3 rounded or acute (Figs 205–219). 29

- aa In dorsal view apex of valvulae 3 narrowly truncate (Fig. 204). . . . . [non-gallmakers: *Euura polaris*, etc.]

29(28) a Head shiny, or more or less matt with coriaceous microsculpture (Fig. 4), but never tuberculate.
b Cerci in dorsal view reaching back to half of length of valvula 3 (Fig. 212), or to more than half its length (Fig. 205).
c In lateral view both mandibles similar (more or less gradually tapering to apex) (Figs 47–48) or right mandible gradually tapering, left one with swollen base and thin, blade-like apex (Figs 49–50). 35
- aa Head with tuberculate microsculpture (Figs 78, 104).
bb Cerci in dorsal view reaching back only to half of length of valvula 3 (Figs 206–211).
cc In lateral view right mandible gradually tapering, left one with swollen base and thin, blade-like apex (Figs 49–50). 30

30(29) a Tegula dark brown to black (Fig. 103).
b Stigma pale yellow to whitish (Fig. 105).
c Postcalcar of lancet serrulae 2–10 prominent, serrula thus somewhat concave (Figs 34–35). 31
- aa Tegula yellow or yellow-brown (Fig. 104).
bb Stigma usually infuscate apically (Fig. 106).
cc Postcalcar of lancet serrulae 2–10 not prominent, serrula thus nearly straight (Figs 36–39). 32

31(30) a Hind femur pale (Fig. 107) or infuscate only basally (as Fig. 109) .
b Ovipositor sheath shorter than head width (index: 075–0.95).
c Long setae on valvulae 3 in dorsal view form compact group close to apex (Fig. 206).
d Lancet lamnium shorter in relation to height (Fig. 34). . . . . *E. anomaloptera*
- aa Hind femur black except for extreme apex (Fig. 108).
bb Ovipositor sheath longer than head width (index: 1.00–1.15).
cc Long setae on valvulae 3 in dorsal view more or less scattered over distal half of valvula (Fig. 207).
dd Lancet lamnium longer in relation to height (Fig. 35). . . . . *E. crassispina*

32(30) a Hind femur entirely reddish yellow (Fig. 107) or slightly infuscate near base or on lower side (Fig. 109).
b Upperpart of mesepisternum smooth or slightly sculptured (Fig. 110).. 33
- aa Hind femur mostly black (Fig. 108).
bb Upper part of mesepisternum often strongly sculptured (Fig. 111).. 34

33(32) a Apex of valvulae 3 with tuft of long, curved setae (Fig. 208).
b Valvula 3 broader in lateral view; apically broadly rounded (as Fig. 187).
c Lancet shorter in relation to height; middle serrulae less prominent (Fig. 36). . . . . *E. cyrnea*
- aa Valvulae 3 with shorter setae distributed over a larger area [apical tuft of setae missing] (Fig. 209).
bb Valvula 3 narrower in lateral view; apically narrowly rounded (Fig. 191).
cc Lancet longer in relation to height; middle serrulae more prominent (Fig. 37). . . . . *E. purpureae* [in part]

34(32) a Valvula 3 on dorsal margin with 3–6 short setae basad of apical tuft of long setae (Fig. 210).
b Midlobe of mesoscutum medially strongly sculptured, matt (Fig. 112).
c Upper part of mesepisternum with strong microsculpture (Fig. 111).
d Distal cypsellae of lancet deeper, and more rounded (Fig. 38). . . . . *E. nudipectus*
- aa Valvula 3 on dorsal margin without setae or with 1–2 setae close to apical tuft of long setae (Fig. 211).
bb Midlobe of mesoscutum medially weakly sculptured, shiny (Fig. 113).
cc Upper part of mesepisternum usually with weak microsculpture (Fig. 114).
dd Distal cypsellae of lancet shallower, and less rounded (Fig. 39). . . . . *E. nitidinota*

35(29) a Frontal ridge absent or very weak, especially laterally (Fig. 115).
b Valvulae 3 in dorsal view at least 1.5× as long as basal width (Figs 203, 205).
c Abdomen black except, at most, around hypopygium (Fig. 117).
d In lateral view right mandible gradually tapering, left one with swollen base and thin, blade-like apex (Figs 49–50).
e Lancet with 19–25 serrulae, and postcalcar prominent *or* whole serrula flat (Figs 40, 41). 36
- aa Frontal ridge anteriorly and laterally usually well developed (Fig. 116).
bb Valvulae 3 in dorsal view often less than 1.5× as long as basal width (Figs 213, 215, 218).
cc Abdomen black, or with sterna / terga extensively pale (Fig. 118).
dd In lateral view mandibles similar (both more or less gradually tapering to apex) (Figs 47–48).
ee Lancet with 22–30 serrulae, and postcalcar not prominent (whole serrula flat) (Figs 42–44). 40

36(35) a Antennal hollows pilose and microsculptured; matt like upper head (Fig. 119).
b Cerci reach to apex of valvula 3 (Fig. 205).
c Ovipositor shorter than metatibia.
d Tegulae usually black or brown, rarely whitish.

e Supraclypeal area densely setose (Fig. 119).
f Lancet: postcalcar prominent (Fig. 40). 37
- aa Antennal hollows smooth and shiny; contrasting with matt upper head (Fig. 120).
bb Cerci not reaching to apex of valvula 3 (Figs 203, 212).
cc Ovipositor as long, or even longer than, metatibia.
dd Tegulae pale (whitish).
ee Supraclypeal area entirely glabrous (Fig. 120).
ff Lancet: postcalcar not prominent (serrulae flat) (Fig. 41). 39

37(36) a Metafemur black except for extreme apex (Fig. 121).
b Anterior margin of clypeus dark brown, or whole clypeus black (Fig. 123).
c Tegula entirely dark (black or dark brown), or entirely pale (white or yellow). 38
- aa At least upper apical 0.3 of metafemur pale (Fig. 122).
bb At least anterior margin of clypeus pale (yellow) (Fig. 124).
cc Tegula almost entirely pale (white or yellow). . . . . *E. virilis*

38(37) a Tegula entirely dark (black or dark brown). . . . .
. . . *E. dolichura*, *E. femoralis*, *E. glaucae*, *E. nigricantis, E. unigallae* [females not morphologically distinguishable]
- aa Tegula almost entirely pale (white or yellow). . . . . *E. bigallae*

39(36) a Setae on valvula 3 directed more outwards (Fig. 212).
b Metafemur entirely pale or only slightly darkened (Fig. 125). . . . .
. . . . *E. proxima*, *E. triandrae* [females not morphologically distinguishable]
- aa Setae on valvula 3 directed more backwards (Fig. 203).
bb Metafemur always at least slightly darkened basally (Fig. 126). . . . . *E. bridgmanii*

40(35) a Several abdominal terga orange, or partly orange (Fig. 127).
b Metafemur entirely pale. 41
- aa Only abdominal tergum 9 and sometimes part of 8 pale (Fig. 128).
bb Metafemur entirely pale or with fuscous markings. 43

41(40) a Stigma entirely pale.
b Valvulae 3 in dorsal view elongate (at least 2× as long as basal width); outline subtriangular with straight edges (Figs 214, 216).
c Mesepisternum with at most small glabrous patches near posterior and / or anterior margins; setae on median axis nearly equally distributed (Fig. 129). 42
- aa Stigma fuscous apically, or nearly completely.
bb Valvulae 3 in dorsal view stumpy (maximally 1.5× as long as basal width); outline with curved edges (Fig. 215).
cc Mesepisternum usually with a glabrous stripe extending from posterior to anterior margin (Fig. 130). . . . .
. . . . *E. viminalis* [in part; mostly southern European specimens]

42(41) a Longer setae on valvula 3 in dorsal view strongly curved apically (Fig. 216).
b Metatibia unicolorous yellow (Fig. 131).
c Median lobes of mesoscutum usually less clearly punctate (Fig. 133). . . . . *E. pustulator*
- aa Longer setae on valvula 3 in dorsal view nearly straight apically (Fig. 214).
bb Metatibia yellow with apex slightly darkened (Fig. 132).
cc Median lobes of mesoscutum usually more clearly punctate (Fig. 134). . . . . *E. vesicator*

43(40) a Antenna usually less than 1.5× as long as width of head (Fig. 135).
b Frons in front of median ocellus up to and including anterior frontal wall with very few and short hairs (Fig. 137).
c Inner orbits often continuously pale next to eye (Fig. 139); supraclypeal area at least partly pale. 44
- aa Antenna always more than 1.5× as long as width of head (Fig. 136).
bb Frons in front of median ocellus up to and including anterior frontal wall usually with several long hairs (Fig. 138)
cc Inner orbits next to eye usually at least partly dark (Fig. 140); supraclypeal area pale or dark. 45

44(43) a Lateral part of upper antennal hollow partly covered by adpressed setae (Fig. 141).
b Pterostigma distinctly bicoloured: black apically, base white (Fig. 143). . . . . *E. brevicornis*
- aa Lateral part of upper antennal hollow entirely glabrous (Fig. 142).
bb Pterostigma entirely pale or indistinctly blackened at margins (Fig. 144). . . . . *E. arcticornis*

45(43) a Longest setae on valvula 3 (dorsal view) appear to arise on its apical third (Figs 217, 219, 220, 222).
b Valvulae 3 (dorsal view) tapering gradually, then very strongly within last ca. third (Figs 217, 220–222).
c Valvulae 3 (dorsal view) often more than 2× as long as basally wide (Figs 217, 220–222).
d Metatibial spurs curved, thick, and shorter than apical width of metatibia (Fig. 145).

	e	Fore wing pterostigma unicolorous pale (Fig. 105).	46
-	aa	Longest setae on valvula 3 (dorsal view) appear to arise near its middle (Figs 223–226).	
	bb	Valvulae 3 (dorsal view) tapering evenly from base to apex, thus subtriangular (Figs 223–226).	
	cc	Valvulae 3 (dorsal view) not more than 2× as long as basally wide (Figs 223–226).	
	dd	Metatibial spurs straighter, thin, and as long as apical width of metatibia (Fig. 146).	
	ee	Fore wing pterostigma unicolorous pale or bicolored (apically dark, basally pale) (Fig. 106).	50
46(45)	a	Supraclypeal area usually pale; clypeus pale (Fig. 147).	
	b	Tegula entirely pale (Fig. 149).	47
-	aa	Supraclypeal area and most of clypeus black (Fig. 148).	
	bb	Anterior or whole of tegula black (Fig. 150)..	*E. myrsiniticola*
47(46)	a	Frontal field inside frontal ridge covered with setae (Fig. 151).	
	b	Longest setae on valvula 3 in dorsal view strongly curved (Figs 219, 222).	48
-	aa	No setae, or only very few scattered setae, on frontal field inside frontal ridge (Fig. 152)	
	bb	Longest setae on valvula 3 in dorsal view less curved (Fig. 220).	*E. aquilonis*
48(47)	a	Frontal basin not clearly formed; anterior wall weak and deeply notched (Fig. 153)..	49
-	aa	Frontal basin strongly concave, especially at anterior; well-developed anterior wall (Fig. 154).	*E. arbusculae*
49(48)	a	Head width may be greater than 1.20mm.	
	b	Bases of long subapical setae on one valvula 3 (dorsal view) forming obtuse angle with those on other (Fig. 221) [only reliable for larger specimens!].	
	c	Lamnium with 22–27 serrulae..	*E. crassipes*
-	aa	Head width never greater than 1.20mm.	
	bb	Bases of long subapical setae on one valvula 3 (dorsal view) forming acute angle with those on other (Fig. 222) [only reliable for larger specimens!].	
	cc	Lamnium with 26–30 serrulae..	*E. herbaceae*
50(45)	a	Upper head lateral of frontal ridges dull with at least some fine sculpture (Fig. 155).	
	b	Fore wing pterostigma entirely pale (Fig. 144) or partly dark (Fig. 143)	51
-	aa	Upper head lateral of frontal ridges without sculpture, appearing polished (Fig. 156).	
	bb	Fore wing pterostigma entirely pale (Fig. 144).	*E. glabrifrons*
51(50)	a	Valvulae 3 in dorsal view 1.0–1.3 × as long as greatest width (Figs 223, 225–226).	
	b	Pterostigma bicoloured with fuscous apex and pale base (Fig. 143).	52
-	aa	Valvulae 3 in dorsal view at least 1.5 × as long as greatest width (Figs 224, 227–228).	
	bb	Pterostigma bicoloured with fuscous apex and pale base (Fig. 143), or unicolourous (Fig. 144).	55
52(51)	a	Upper part of antennal hollow with a few setae, slightly sculptured, rather dull (Fig. 157).	53
-	aa	Antennal hollow entirely glabrous and very shiny (Fig. 158)..	*E. pedunculi*
53(52)	a	In dorsal view valvula 3 setae basally straight; apically more or less curved; apices of setae on one valvula subparallel with those on other (Figs 215, 225)..	54
-	aa	In dorsal view valvula 3 setae strongly and evenly curved over whole length; apices of setae on one valvula converging with those on other (Fig. 226).	*E. kriechbaumeri*
54(53)	a	Setae on postocellar area and lateral vertex more upright (Fig. 159).	
	b	Metafemur completely pale to extensively fuscous.	
	c	Frontal area less sculptured and more shiny than lateral vertex (Fig. 161)..	*E. myrtilloidica*
-	aa	Setae on postocellar area and lateral vertex strongly recumbent towards anterior of head (Fig. 160).	
	bb	Metafemur completely pale.	
	cc	Frontal area and lateral vertex equally sculptured and rather dull (Fig. 162).	*E. viminalis* [in part]
55(51)	a	Pterostigma unicolorous pale (usually translucent yellow-white, occasionally brown or grey).	56
-	aa	Pterostigma bicoloured with fuscous apex and pale base.	59
56(55)	a	Orbits mainly black; sometimes with small areas obscurely brown (Fig. 163).	
	b	Longest apical setae on valvula 3 in dorsal view straight or only weakly curved so that apices of setae on both valvulae do not converge with each other (Figs 224, 227).	57
-	aa	Outer orbits nearly entirely yellow-brown; upper inner orbit lined yellow-brown (Fig. 164).	
	bb	In dorsal view valvula 3 setae strongly curved; apices of setae on both valvulae converging (Fig. 228). … *E. collactanea* [in part: only this pale form in Denmark and S. Sweden; the dark form (couplet 57) from Finland and N.W.Russia]	

57(56) a Very few setae on and beside lateral frontal ridge; these shorter than diameter of posterior ocellus (Fig. 164).
b Metafemur entirely pale, to extensively black.
c Pronotum often with postero-dorsal margin pale (yellow-brown).
d Whole mesepisternum without sculpture, shiny (Fig. 167).. 58
- aa Numerous setae on and beside lateral frontal ridge; some of these as long or longer than diameter of posterior ocellus (Fig. 163).
bb Metafemur mainly black, to extensively pale, but always partly dark.
cc Pronotum always entirely black.
dd Upper two thirds of mesepisternum sometimes with sculpture, dull (Fig. 168)...................... *E. reticulatae*

58(57) a Lower lateral inner orbits with dense, horizontal pubescence, reaching into antennal hollows (Fig. 169).. *E. hastatavora*
- aa Lower part of lateral face glabrous, with only some sparse hairs (Fig. 170). .... *E. samolad* [part]

59(55) a Lower half of antennal hollow nearly glabrous, shiny; contrasting with duller and more setose inner orbit next to eye (Fig. 171).
b At least profemur *usually* basally fuscous, though sometimes only faintly. . . *E. nivalis, E. saliciscinereae, E. samolad* [part], *E. collactanea* [part: this dark form from Finland and N.W.Russia, not known in Sweden, cf. couplet 54 (pale form)] [females not morphologically distinguishable]
- aa Most of antennal hollow densely setose, dull (Fig. 172).
bb All femora entirely pale (yellowish).. *E. acutifoliae*

Key to males

The males of *E. crassispina* and *E. nitidinota* are unknown. Males of *E. triandrae* and *E. bridgmanii* were not available for examination.

1 a Vein 2r-m absent in both fore wings (Fig. 45).
b In lateral view both mandibles similar (more or less gradually tapering to apex) (Figs 47–48). 2
- aa Vein 2r-m present (rarely absent in one or both fore wings) (Fig. 46).
bb In lateral view both mandibles similar (more or less gradually tapering to apex) (Figs 47–48) *or* right mandible gradually tapering, left one with swollen base and thin, blade-like apex (Figs 49–50). 6

2(1) a Malar space entirely black (Fig. 51). 3
- aa Malar space at least partly pale (Fig. 52)... 4

3(2) a Lower face, including antennal hollows, dull with sculpture (Fig. 229).
b Metatrochanter and trochantellus mainly black (Fig. 231).
c Flagellomere 3: height of eye ratio 0.88–1.05......... *E. atra* subgroup [males not morphologically distinguishable]
- aa Lower face, particularly antennal hollows, nearly unsculptured (shiny) between the setae (Fig. 230).
bb Metatrochanter and trochantellus mainly pale (brown) (Fig. 232).
cc Flagellomere 3: height of eye ratio 0.79–0.80 ....*E. venusta* [in part]

4(2) a Inner tooth on metatarsal claw much longer than its basal width and about as long as outer tooth (Figs 68–69)..... 5
- aa Inner tooth on metatarsal claw about as long as its basal width and much shorter than outer tooth (Fig. 63).. *E. amerinae*

5(4) a Anterior of frontal field sculptured, dull like adjoining areas (Fig. 233).
b Pronotum entirely black or pale-marked; tegula black, dark brown or pale brown.
c Flagellum pale or extensively dark. .... *E. daphnoidica*, *E. hastatae, E. lappo*, *E. subgemma*, *E. laeta*, *E. myrsinifoliae*, *E. mucronata, E. testaceipes, E. venusta* [males not morphologically distinguishable].
- aa Anterior of frontal field nearly unsculptured, shiny (Fig. 234).
bb Pronotum entirely black; tegula black or dark brown.
cc Flagellum pale except for more or less upperside of antennomeres 3 and 4........................... *E. lanatae*

6(1) a All abdominal terga at least black medially (Fig. 241).
b Mesepisternum usually largely black (Fig. 243).
c Mesoscutellum smooth (Fig. 73) or densely punctured (Fig. 74).
d Metafemur completely pale (Fig. 239) or blackened (Fig. 240)...7
- aa Abdominal terga yellow except for at most medial parts of T. 1–4 (Fig. 242).
bb Mesepisternum yellow, with dark fleck on sterno-pleural line (Fig. 244).
cc Mesoscutellum densely punctured (Fig. 75).
dd Metafemur completely pale (Fig. 239).

[ee Penis valve: paravalva ventrad of valvispina scarcely emarginate, and distal edge more or less uneven (Fig. 280)]. . . . *E. piliserra*

7(6) a Mesoscutellum flatter (Fig. 73), with few punctures; shiny or dull.
b Metafemur completely pale or blackened. 8
- aa Mesoscutellum highly convex and dull between dense punctures (Fig. 74).
bb Metafemur completely pale.
[cc Penis valve: paravalva ventrad of valvispina deeply emarginate (Fig. 281)]. . . . . *E. scotaspis*

8(7) a In lateral view both mandibles similar (more or less gradually tapering to apex) (Figs 47–48).
b Penis valve ventrally with small spines (Fig. 282). 9
- aa In lateral view right mandible gradually tapering, left one with swollen base and thin, blade-like apex (Figs 49–50).
bb Penis valve ventrally without small spines (Figs 285–290) 16

9(8) a At most a small glabrous patch on lower posterior mesepisternum (Fig. 129).
b Antennomere 8 length: median breadth ratio 4.5–5.3.
c Antennal hollows largely setose (Fig. 245). 10
- aa Glabrous patch across nearly whole of mesepisternum (Fig. 130).
bb Antennomere 8 length: median breadth ratio 2.5–5.1.
cc Antennal hollows largely glabrous (Fig. 246). 11

10(9) a Median mesoscutal lobe more sparsely and shallowly punctured, shiny (Fig. 133). . . . . *E. pustulator*
- aa Median mesoscutal lobe densely and deeply punctured, dull (Fig. 134).. . . . . *E. vesicator*

11(9) a Flagellomere 4 length : median breadth ratio 2.6–3.1. 12
- aa Flagellomere 4 length : median breadth ratio 3.5–4.1. 14

12(11) a Malar space completely pale; inner and outer orbits usually partly pale (Fig. 246).
b Flagellum largely pale (Fig. 248).
c Frons with very few, short setae. 13
- aa Malar space at most narrowly pale; inner and outer orbits entirely dark (Fig. 247).
bb Flagellum largely dark (Fig. 249).
cc Frons with several, long setae. . . . . *E. myrtilloidica*

13(12) a Penis valve: apical margin of valviceps without incision (Fig. 283).. . . . .*E. brevicornis*
- aa Penis valve: apical margin of valviceps with incision (Fig. 284). . . . . *E. arcticornis*

14(11) a Ocellar area and lateral frons more or less dull, with sculpture, like rest of upper head (Fig. 250).
b Head *may* have orbits, clypeus and / or supraclypeal area partly pale.
c Pronotum and tegula entirely black, or more or less pale. 15
- aa Ocellar area and anterior lateral frons without sculpture, highly polished; more shiny than rest of upper head (Fig. 251).
bb Head black except for labrum and more or less antennal flagellum.
cc Pronotum entirely black, tegula black or dark brown. . . . .*E. glabrifrons*

15(18) a Index length metafemur without trochantellus: greatest width = 3.2–3.7 (Fig. 252). . . . . *E. aquilonis* [in part], *E. crassipes*, *E. herbaceae*, *E. arbusculae* [males not morphologically distinguishable]
- aa Index length metafemur without trochantellus: greatest width = 3.8–5.1 (Fig. 253) . . . . *E. aquilonis* [in part], *E. acutifoliae*, *E. collactanea*, *E. hastatavora*, *E. myrsiniticola*, *E. nivalis*, *E. pedunculi*, *E. reticulatae*, *E. saliciscinereae*, *E. samolad*, *E. viminalis* [males not morphologically distinguishable]

16(8) a Upper half of antennal hollow and interantennal ridges not carinate (Fig. 254).
b Metafemur black-marked or entirely pale. 17
- aa Edge of upper half of antennal hollow and interantennal ridges continuously carinate (Fig. 255).
bb Metafemur black-marked basally.
[cc Penis valve: paravalva ventrad of valvispina narrowly emarginate, and distal margin of basal lobe more or less uneven]. . . . .*E. destricta*

17(16) a Upper head often with fine, coriaceous sculpture, but never tuberculate (Fig. 256).. 21
- aa Upper head with tuberculate surface sculpture (Fig. 257).. 18

18(17) a Tegula yellow to brownish yellow.
b Penis valve: paravalva ventrad of valvispina emarginate *or* basal lobe angular (Figs 287–289). 19
- aa Tegula dark brown to black.
bb Penis valve: paravalva ventrad of valvispina not emarginate; basal lobe rounded (Fig. 286).. . . . . *E. anomaloptera*

19(18) a Metafemur entirely reddish yellow or slightly infuscate near base.
b Upper part of mesepisternum smooth (Fig. 110) or slightly sculptured (Fig. 114).
c Penis valve: apex of pseudoceps less upcurved, basal lobe angular (Figs 288–289). 20
- aa Metafemur mostly black .
bb Upper part of mesepisternum strongly sculptured (Fig. 111).
cc Penis valve: apex of pseudoceps strongly upcurved, basal lobe rounded (Fig. 287). .... *E. nudipectus*

20(19) a Flagellum shorter: flagellum / head width index ca. 2.1.
b Penis valve: apex of pseudoceps more strongly tapered (Fig. 288).. .... *E. cyrnea*
- aa Flagellum longer: flagellum / head width index ca. 2.7.
bb Penis valve: apex of pseudoceps less strongly tapered (Fig. 289).. .... *E. purpureae*

21(17) a Head never so extensively pale; never with continuously pale outer and inner orbits (Fig. 254).
b Femora black-marked or entirely pale.
c Antenna often shorter than combined length of thorax and abdomen (Fig. 259).
d Metatibial spurs straighter and thin (Fig. 263), or curved and thick (Fig. 264).
e Antennal hollow smooth and shiny or more or less sculptured and matt.................................. 22
- aa Head usually (but not always!) with continuously pale outer and inner orbits: black are only large ocellar spot, whole occiput, anterior tentorial pits (Fig. 258).
bb All femora with black basal markings.
cc Antenna at least as long as combined length of thorax and abdomen (Fig. 260).
dd Metatibial spurs straighter, and thin (Fig. 263).
ee Antennal hollow smooth and shiny. .... *E. oblita*

22(21) a Antennal hollow sculptured and matt, or lateral half densely setose, and rather dull (Fig. 261). 23
- aa Antennal hollow unsculptured, largely glabrous, and shiny (Fig. 262) 29

23(22) a Metatibial spurs nearly straight, thinner (Fig. 263).
b Femora black marked, at least basally; pale colour not reddish (Fig. 265).
c Subgenital plate black or pale; other sterna usually dark (Fig. 265)..24
- aa Metatibial spurs strongly curved, thick (Fig. 264).
bb Femora entirely reddish-yellow (Fig. 266).
cc Subgenital plate pale; at least preceding two sterna usually pale (Fig. 266)........................ *E. leucosticta*

24(23) a Tegula pale (whitish).
b Upper posterior corner of pronotum pale-edged or entirely black.
c Metacoxa apically extensively pale (Fig. 267). 26
- aa Tegula black or dark brown.
bb Upper posterior corner of pronotum entirely black.
cc Metacoxa entirely black or apically only narrowly pale (Fig. 268)...25

25(24) a Metatarsal claws with inner tooth about as long as outer (Fig. 269)............................... *E. dolichura*
- aa Metatarsal claws with inner tooth maximally half as long as outer (Fig. 270), or not developed.. ....
...... *E. femoralis*, *E. nigricantis*, *E. glaucae, E. bigallae*, *E. unigallae* [males not morphologically distinguishable]

26(24) a Clypeus entirely or nearly entirely pale (posterior edge may be darkened) (Fig. 271).
b Flagellomere 2 : height of eye index = 0.70–0.95.
c Metatarsal claws with inner tooth at least half as long as outer (Fig. 269) 27
- aa Clypeus bicolored: only anterior margin (approx. half) whitish, posterior black (Fig. 272).
bb Flagellomere 2 : height of eye index = 1.0–1.20.
cc Metatarsal claws with inner tooth at most half as long as outer (Fig. 270), or not present. .... *E. virilis*

27(26) a Upper head densely sculptured and dull (Fig. 93)..28
- aa Upper head with shiny interspaces between ill-defined wrinkles and punctures (Fig. 94).
[bb Penis valve: Fig. 291)]... *E. anglica*

28(27) a Metatarsal claws with inner tooth about as long as outer (Fig. 269).
b Mesoscutellar appendage with shiny interspaces between shallow, sparse punctures (Fig. 101).
c Paravalva of penis valve deeply emarginate ventrad of valvispina (Fig. 290). .... *E. leucapsis*
- aa Metatarsal claws with inner tooth about half as long as outer (Fig. 270).
bb Mesoscutellar appendage densely punctate and sculptured, completely matt (Fig. 102)
cc Paravalva of penis valve shallowly emarginate ventrad of valvispina (Fig. 292)..................... *E. acutiserra*

29(22) a Supraclypeal area with numerous setae laterally and on medial upper third (Fig. 273).
b Supraclypeal area dark (Fig. 274) or pale (Fig. 273).
c Often with a black fleck at approx. 0.3 from base of metatibia (Fig. 82).
d Clypeus strongly emarginate. 30
\- aa Supraclypeal area entirely glabrous (Fig. 274).
bb Supraclypeal area dark (Fig. 274).
cc Never with a black fleck at approx. 0.3 from base of metatibia (Fig. 81).
dd Clypeus weakly emarginate. . . . . *E. proxima*, *E. bridgmanii*, *E. triandrae* [only males of *E. proxima* examined]

30(29) a Antenna completely black or flagellum partly pale.
b Subgenital plate at least medially pale (Fig. 275).
c Index flagellomere 2 / height of eye = ca. 0.90–1.10. 31
\- aa Antenna completely black.
bb Subgenital plate completely black (Fig. 265).
cc Index flagellomere 2 / height of eye = ca. ca. 1.05–1.25.. . . . .*E. plicaphylicifolia*

31(30) a Pubescence on upper lateral inner orbits dense and reaching edge of antennal hollow (Figs. 276, 278–279). 32
\- aa Pubescence on upper lateral inner orbits sparse and not reaching edge of antennal hollow (Fig. 277). . . . . *E. plicadaphnoides*

32(31) a Distal margin of paravalva of penis valve with smooth outline. 33
\- aa Distal margin of paravalva of penis valve with uneven outline (Fig. 293). . . . . *E. ischnocera*

33(32) a Paravalva of penis valve shallowly emarginate ventrad of valvispina (Figs 295–296).. 34
\- aa Paravalva of penis valve deeply emarginate ventrad of valvispina (Fig. 294). . . . . *E. prussica*

34(33) a Dorsal outline of penis valve valviceps humped (Fig. 295).
b Malar space not entirely pale (Fig. 278). . . . . *E. plicalapponum*
\- aa Dorsal outline of penis valve valviceps flatter (Fig. 296).
bb Malar space entirely pale (Fig. 279). . . . . *E. polita*

Identification of galls

A number of works can be used to identify the galls of sawfly species, but numerous recent changes in taxonomy and nomenclature make these publications more or less obsolete. The most useful work covering Sweden is the guide by Coulianos & Holmåsen (1991), although it contains two misleading mistakes in the figure captions: fig. 231 is of *E. saliciscinereae* galls on *S. myrsinifolia*, not *E. collactanea* on *S. repens*, and fig. 234 is of *E. pedunculi* galls on *S. caprea*, not *E. bridgmanii* on *S. cinerea*. Also of help are the keys to galls occurring in the British Isles by Redfern *et al.* (2011), and the summary of gall types and hosts by Kopelke (1998). In most cases, successful identification of a gall requires not just an appraisal of its shape and its position on the plant, but also the identification of the willow species involved. The last requirement is often the hardest to fulfill, because plants may be of hybrid origin, and several willow species appear to be more morphologically variable than some botanists have stated (Skvortsov 1999). Without exact identification of the host, the galls of very few species are immediately identifiable as belonging to a particular sawfly species. In the European fauna, only the galls of *Euura amerinae*, *E. subgemma* and *E. bigallae* can be identified by unique characters in the shape of the gall, or its position on the host.

An additional behavioural character that is sometimes of use in separating species, is whether the larva leaves its gall to overwinter in the ground, or remains inside the gall. Under natural conditions, all leaf-galling species (i.e. *Euura anomaloptera*, *leucapsis*, *piliserra*, *dolichura*, *proxima* and *viminalis* groups) leave the gall to form a cocoon in the ground, although they may sometimes remain in the gall under rearing conditions. Species of the *E. amerinae* group may adopt either strategy, and in this group the behaviour seems to be species-specific (Zinovjev & Vikberg 1998, Kopelke 2001). This character can however only be assessed after the larva has completed its development.

Galls of some species vary considerably in their shape, colour and surface texture (e.g. hairiness). Their appearance is influenced not only by biotic factors such as the effects of parasitoids and inquilines (Niklas 1955), use of different host species (or hosts of hybrid origin), and age-dependent reaction of the host plant tissue (Beneš 1968a, Carleton 1939), but also by abiotic factors such as humidity, light, and temperature (Kopelke 1982).Where

TABLE 1. The main types of gall.

Part of plant affected	Appearance of gall / larva	Figures	Name of species group	Table of species
Shoot, bud, leaf petiole or midrib	Closed gall; affected part usually at least slightly enlarged.	Figs 302–306	*Euura amerinae* group	Table 2
Leaves	Open gall; rolled leaf edge or whole leaf; a pustulate swelling (procecidium) at oviposition site, in which larva may initially feed.	Fig. 307	*Euura anomaloptera* group	Table 3
Leaves	Open gall; rolled or folded leaf edge or whole leaf; no swelling (procecidium) at oviposition site.	Figs 308–310	*Euura oblita* group *Euura piliserra* group	Table 4
Leaves	Closed gall; usually elongate (sausage shaped); in one species globose. Often paired on one leaf, one gall on each side of midrib. Projecting only from upper side of leaf.	Figs 311–313	*Euura dolichura* group	Table 5
Leaves	Closed gall; coffee bean shaped; on side veins; horizontally transected by leaf-blade, or developed only above it.	Figs 314–315	*Euura proxima* group	Table 6
Leaves	Closed gall; pea or bladder shaped; usually attached to midrib; projecting only below leaf, or horizontally transected by it.	Figs 316–331	*Euura viminalis* group	Tables 7–8
Leaves	Gall horizontally transected by leaf blade; feeding larva with or without dark spots on body; 3 or 4 dorsal annulets on abdominal segments 1–8.	Figs 316–317	- *crassipes* subgroup	Table 7
		Fig. 318	- *aquilonis* subgroup	
		Fig. 320	- *vesicator* subgroup	
		Fig. 319	- *viminalis* subgroup [one species]	
Leaves	Gall projecting only below leaf-blade, although a large scar can be present on leaf upperside; feeding larva without dark spots on body; 4 dorsal annulets on abdominal segments 1–8.	Figs 321–331	*viminalis* subgroup [most species]	Table 8

TABLE 2. ***Euura amerinae*** **group [shoot, bud, and leaf galls]**

Notes: Galled buds (*E. mucronata* subgroup) can be distinguished from uninfested ones by their larger size, and sometimes greater hardness, an oviposition scar on the base of the leaf petiole next to the bud, or the "beaked" appearance of the bud apex. It is not known which species of the *mucronata* subgroup caused the bud-galls on *S. myrsinites* found at Kilpisjärvi, Finland, by T. Nyman. Shoots inhabited by larvae of the *E. atra* subgroup are not always noticeably swollen, but can sometimes be detected after the larva makes an exit hole in autumn when it finishes feeding. The larva remains to overwinter in the gall, generally in a cocoon, and the adult emerges through the hole in spring. The hole is generally plugged with frass, fragments of host tissue, and silk, but sometimes left unplugged. If plugged, it is visible as a slightly depressed, round, discoloured area.

Part of plant affected	Appearance of gall	Overwintering site	Figures	Host plant(s)	Name of gall-maker
Shoot	Large, walnut-shaped; developed on one side of shoot, which is often strongly bent; usually contains several larvae.	In gall	Fig. 302	*Salix pentandra*	*Euura amerinae*
Leaf midrib, less often petiole,	Spindle shaped swelling; sometimes more than one gall per leaf.	Outside gall	Fig. 303	*Salix alba*, *S.* × *fragilis*, *S. triandra*	*Euura testaceipes*
Leaf petiole	Spindle shaped swelling; single gall per leaf.	Outside gall		*Salix aurita*, *S. caprea*, rarely *S. cinerea*, ? *S. lapponum*	*Euura venusta*
Shoot	Shoot weakly thickened, spindle shaped, or not thickened at all; contains single larva.	In gall		*Salix alba*, *S.* × *fragilis*, rarely *S. viminalis*, ? *S. babylonica*	*Euura atra*
Shoot	Shoot clearly thickened, spindle shaped; contains single larva.	In gall	Fig. 304	*Salix aurita*, *S. atrocinerea*, *S. lapponum*, ? *S. starkeana*, ? *S. cinerea*	*Euura auritae*
Shoot	Shoot clearly thickened, spindle shaped; contains single larva.	In gall		*Salix myrtilloides*	*Euura myrtilloides*
Shoot	Shoot weakly thickened, spindle shaped; contains single larva.	In gall		*Salix purpurea*	*Euura salicispurpureae*
Shoot	Shoot clearly thickened; sometimes developed on one side, causing shoot to bend; contains single larva.	In gall		*Salix repens*, *S. rosmarinifolia*	*Euura weiffenbachiella*
Shoot	Gall small, pustulate: in side of shoot directly below an axillary bud; contains single larva.	Outside gall	Fig. 305	*Salix viminalis*	*Euura subgemma*
Bud	Bud only slightly enlarged.	Outside gall		*Salix daphnoides*	*Euura daphnoidica*
Bud	Bud markedly enlarged.	Outside gall		*Salix hastata*	*Euura hastatae*
Bud	Bud usually enlarged.	Outside gall		*Salix viminalis*	*Euura laeta*
Bud	Bud markedly enlarged.	In gall		*Salix lanata*, *S. glauca*	*Euura lanatae*
Bud	Bud enlarged.	In gall		*Salix lapponum*	*Euura lappo*
Bud	Bud only slightly enlarged.	Outside gall	Fig. 306	*Salix aurita*, *S. caprea*, *S. cinerea*	*Euura mucronata*
Bud	Bud only slightly enlarged.	Outside gall		*Salix myrsinifolia, S. phylicifolia*	*Euura myrsinifoliae*

the same gall-maker species uses different hosts, the galls on each host may be noticeably different (Beneš 1968a). An example is *Euura pedunculi* on *Salix caprea* and *S. aurita.* Galls on *S. caprea* tend to be larger, yellow-green, and more or less glabrous, while on *S. aurita* they are smaller, often tinged red, and densely pilose. The differences in the galls apparently result from differences in the structure and physiology of the host tissues (Beneš 1968a). As remarked upon both by Kopelke (1999) and Zinovjev (1999), and discussed by the latter, closely related gall-makers of the groups which make "closed" galls (i.e. not the leaf-rollers or -folders) are never found on the same willow species (except on hybrids, rarely). Thus, there is only one case in Europe where two sawfly species (*E. herbaceae* and *E. aquilonis*) use the same host species (both on *S. herbacea* and *S. polaris*) and have indistinguishable galls. In this special case, identification is still possible using larval characters. Although the sawfly species making "open" galls (leaf-rolls or -folds) on the same *Salix* host species are probably usually not closely related to each other, their galls are often less distinctive than the closed ones, and much more likely to be misidentified. Up to five different sawfly species making open galls can occur on a single *Salix* species (i.e. on *S. phylicifolia*), and both *S. viminalis* and *S. cinerea* support three.

Beneš (1968a) discovered that in the leaf-rolling and leaf-folding species, treated here as the *Euura oblita* group, the form of the gall depended very much on which part of the leaf the female oviposited into. He concluded that a single species of this group can produce a variety of gall types, ranging from a simple fold on one leaf edge to a leaf blade that is spirally rolled along its axis, and that all intermediate forms occurred. As a result, the galls of different sawfly species on the same host are not always distinguishable. Nevertheless, Kopelke (2007a–c) maintained that the form of gall caused by the leaf-rolling species is absolutely stable and is a reliable character for identification. During examination of material reared and determined by Kopelke, we noticed rather frequent misidentifications of *oblita* group species, which had apparently been sorted on the basis of host species and gall form, rather than larval morphology. For example, specimens labelled as from twisted ("gedrillt") or straight fold ("Blattfalte") galls on *Salix lapponum* were labelled respectively *acutiserra* or *plicalapponum*, but each of these included specimens of both of these species, as well as *E. destricta*. We conclude, as suggested already by Beneš (1968a), that identification of the galls of leaf-rolling species should include examination of the larva itself.

The tables below should enable the identification of most galls, provided that the identity of the host *Salix* species is known. Identification of galls on hosts of hybrid origin is problematic. If the parentage of the putative hybrid is known, the gall-maker is likely to be one of the species found on either of the parent species (Kopelke 1999: 90–91). Galls formed on subsidiary hosts, including hybrids, may sometimes have an atypical shape, e.g. strongly asymmetrical, compared to those made on the usual host (Zinovjev 1994). Hybrids, except for *S.* × *fragilis*, that behaves like a species, are not usually included in the tables, because such occurrences are generally seldom recorded in the literature and are probably partly inaccurate. The variability in leaf-roll or -fold galls noted above, combined with the imperfectly known larval morphology of several of these species, makes their identification less likely to be reliable than of other (closed) gall types.

TABLE 3. *Euura anomaloptera* group [leaf-rolls]; modified from Vikberg (2010b)

Appearance of gall	Larval characters	Figures	Host plant(s)	Name of gall-maker
Usually only one leaf edge rolled down; holes eaten in upper epidermis of roll when larva large.	Anal tergum without black markings.		*Salix phylicifolia*, *S. hastata*, *S. starkeana*, ? other *Salix* spp.	*Euura anomaloptera*
Upper epidermis of roll remains intact. Leaf roll not twisted.	Anal tergum of larva with small blackish spots.		*Salix glauca*, *S. hastata*	*Euura crassispina*
Tight roll, many-layered, not twisted.	Anal tergum without black markings, pseudocerci apically black.		*Salix caprea*	*Euura cyrnea*
Not recorded	Larva unknown.		*Salix phylicifolia*	*Euura nitidinota*
Upper epidermis of roll remains intact. Leaf-roll twisted.	Anal tergum with black longitudinal lateral stripes		*Salix phylicifolia*	*Euura nudipectus*
Leaf-roll twisted.	Anal tergum without dark spots.	Fig. 307	*Salix purpurea*	*Euura purpureae*

TABLE 4. *Euura oblita* group [leaf-rolls or -folds]; additional details of larval morphology of several species in Lorenz & Kraus (1957) and Beneš (1968a)

Appearance of gall	Larval characters	Figures	Host plant(s)	Name of gall-maker
Both sides of leaf blade rolled downwards to form spacious tube. Larvae leave gall to feed on unrolled apical part of the leaf, leaving only veins untouched.	Pseudocerci absent. 3–5 larvae usually in single gall, but sometimes up to 8.		*Salix viminalis*, *S. dasyclados*	*Euura piliserra*
One side of leaf blade rolled tightly underneath nearly throughout its whole length.	Pseudocerci present. Abdominal segment 9 and anal tergum dorsally with two black spots; pseudocerci black with black fleck around base of each. Single larva per gall.		*Salix viminalis*, *S. dasyclados*	*Euura anglica*
One side of leaf blade rolled tightly underneath nearly throughout its whole length.	Pseudocerci present but small. Anal tergum without black dots. Single larva per gall.		*Salix viminalis*	*Euura scotaspis*
Usually both edges of the leaf rolled; twisted along the longitudinal axis.	Larva undescribed.		*Salix lapponum*, ? *S. glauca*	*Euura acutiserra*
Usually only one edge of leaf folded downwards; cavity flat.	Pseudocerci present; dark head; thoracic legs black-marked; abdominal segment 9 and anal tergum with several black spots.	Fig. 308	*Salix pentandra*, *S. glauca*, *S. phylicifolia*, ? *S. lapponum*	*Euura destricta*
Usually only one edge of leaf rolled downwards; cavity spacious.	Larva undescribed.		*Salix myrsinifolia*	*Euura ischnocera*
Usually both edges of the leaf folded, twisted along the longitudinal axis.	Pseudocerci large, dark; abdominal segment 9 and anal tergum dorsally with large black spots.	Fig. 309	*Salix cinerea*, *S. aurita,* ? *S. lapponum*	*Euura leucapsis*
Usually only one edge of leaf rolled downwards; cavity spacious.	Pseudocerci large, dark; abdominal segment 9 and anal tergum dorsally with large black spots.	Fig. 310	*Salix caprea*, *S. aurita*, *S. cinerea*	*Euura leucosticta*
Usually only one edge of leaf folded downwards; cavity flat.	Pseudocerci very large; pale.		*Salix alba*, *S.* × *fragilis*, *S. triandra*	*Euura oblita*
Usually only one edge of leaf folded downwards; cavity flat.	Pseudocerci small, apically dark; segment 9 and anal tergum dorsally each with pair of black spots.		*Salix daphnoides*, ? *S. acutifolia*	*Euura plicadaphnoides*
Usually only one edge of leaf folded downwards; cavity flat.	Larva undescribed.		*Salix lapponum*	*Euura plicalapponum*
Usually only one edge of leaf folded downwards; cavity flat.	Larva undescribed.		*Salix phylicifolia*	*Euura plicaphylicifolia*
Usually only one edge of leaf folded downwards; cavity flat.	Pseudocerci small, apically dark; segment 9 and anal tergum dorsally each with pair of black spots.		*Salix purpurea*	*Euura polita*
Usually only one edge of leaf rolled downwards; cavity spacious.	Larva undescribed.		*Salix cinerea*, ? *S. caprea*	*Euura prussica*

TABLE 5. *Euura dolichura* group [elongate or globose galls on leaf upperside]

Appearance of gall / position	Figures	Host plant(s)	Name of gall-maker
Globose; usually paired on leaf; near leaf apex.	Fig. 311	*Salix caprea*, *S. starkeana* ssp. *cinerascens*	*Euura bigallae*
Elongate; usually singly on leaf.		*Salix rosmarinifolia*	*Euura unigallae*
Elongate; often paired on leaf.		*Salix lapponum*	*Euura dolichura*
Elongate; often paired on leaf.	Fig. 312	*Salix phylicifolia*	*Euura femoralis*
Elongate; often paired on leaf.	Fig. 313	*Salix glauca*	*Euura glaucae*
Elongate; often paired on leaf.		*Salix myrsinifolia*	*Euura nigricantis*
Elongate; often paired on leaf.		*Salix purpurea*	*Euura virilis*

TABLE 6. *Euura proxima* group [coffee-bean galls]

Appearance of gall	Figures	Host plant(s)	Name of gall-maker
Surface smooth; dark green or brownish red above; pale green and slightly hairy below; single or very few galls per leaf.	Fig. 314	*Salix atrocinerea*, *S. aurita*, *S. caprea*, *S. cinerea*, *S. hastata*, *S. phylicifolia*, *S. starkeana*	*Euura bridgmanii*
Surface usually covered with small ridges and protuberances; bright reddish above; yellow or pink below; up to 20 galls per leaf.	Fig. 315	*Salix alba*, *S.* × *fragilis*, *S.* × *blanda*, ?*S. babylonica*, ? *S. pentandra*	*Euura proxima*
Surface smooth; dark red or brownish above; yellow-green below; single or very few galls per leaf.		*Salix triandra*	*Euura triandrae*

TABLE 7. *Euura viminalis* group: *crassipes*, *aquilonis*, *vesicator* subgroups and one species of *viminalis* subgroup [galls transected by leaf-blade]

Appearance of gall	Larval characters	Figures	Host plant(s)	Name of gall-maker
[not recorded]	Body of feeding larva with black spots; 3 annulets on abdominal segments 1–8.		*Salix arbuscula*	*Euura arbusculae*
Projecting about equally above and below leaf; usually at base of leaf; surface hairy, matt.	Body of feeding larva with black spots; 3 annulets on abdominal segments 1–8.	Fig. 316	*Salix lapponum*	*Euura crassipes*
Projecting about equally above and below leaf; surface glabrous, smooth.	Body of feeding larva with black spots; 3 annulets on abdominal segments 1–8.	Fig. 317	*Salix herbacea*, *S. polaris* and hybrids between these	*Euura herbaceae*
Projecting about equally above and below leaf; surface glabrous, smooth.	Body of feeding larva without black spots; 4 annulets on abdominal segments 1–8.	Fig. 318	*Salix herbacea*, *S. polaris* and hybrids between these	*Euura aquilonis*
Projecting both sides of leaf, but usually more on underside (about two-thirds).	Body of feeding larva without black spots; 4 annulets on abdominal segments 1–8.	Fig. 319	*Salix myrsinites*	*Euura myrsiniticola*
Projecting about equally above and below leaf; surface glabrous, smooth; single gall per leaf.	Body of feeding larva without black spots; 4 annulets on abdominal segments 1–8.	Fig. 320	*Salix phylicifolia*	*Euura pustulator*
Projecting about equally above and below leaf; surface glabrous, smooth; up to 4 galls per leaf.	Body of feeding larva without black spots; 4 annulets on abdominal segments 1–8.		*Salix purpurea*	*Euura vesicator*

TABLE 8. *Euura viminalis* group: majority of *viminalis* subgroup [galls developed only below leaf-blade]

Position of gall	Appearance of gall	Figures	Host plant(s)	Name of gall-maker
Only projecting below leaf.	Pea-shaped; becoming very large (up to 16mm diameter); glabrous; few warts; green to shiny red.	Fig. 321	*Salix acutifolia, S. daphnoides*	*Euura acutifoliae*
Only projecting below leaf.	Often irregular, sometimes bizarre shape, e.g. bicuspid; glabrous; yellow-green.	Fig. 322	*Salix phylicifolia*	*Euura arcticornis*
Only projecting below leaf.	Pea-shaped; markedly hairy; yellow-green.		*Salix cinerea*, [rarely] *S. aurita*	*Euura brevicornis*
Only projecting below leaf.	Pea-shaped; variably hairy; sometimes warty; red-tinged green to completely bright red.	Fig. 323	*Salix repens, S. rosmarinifolia*	*Euura collactanea*
Only projecting below leaf, but convex scar on leaf upperside.	Tip of leaf beyond gall often yellow; pea-shaped; markedly hairy; pale green, occasionally red-cheeked.	Fig. 324	*Salix lanata*	*Euura glabrifrons*
Only projecting below leaf.	Pea-shaped; completely glabrous; usually without warts; green to bright red.	Fig. 325	*Salix hastata*	*Euura hastatavora*
Only projecting below leaf.	Pea-shaped; markedly hairy; usually no warts; pale green to dark-red tinged.		*Salix elaeagnos*	*Euura kriechbaumeri*
Only projecting below leaf.	Pea-shaped; glabrous; few warts; pale green to completely bright red.	Fig. 326	*Salix myrtilloides*	*Euura myrtilloidica*
Only projecting below leaf.	Pea-shaped; usually rather hairy; no or few warts; pale green to red-cheeked.		*Salix glauca*	*Euura nivalis*
Only projecting below leaf.	Pea-shaped; variably hairy; often warty; green to red-cheeked.		*Salix aurita*, *S. caprea*, *S. starkeana starkeana*, *S. starkeana cinerascens*	*Euura pedunculi*
Only projecting below leaf, but prominent scar (often red) on upperside.	Pea-shaped, but can be very irregular; glabrous; no warts; green to completely dark red.	Figs 327–328: galls on sideveins are the (rare) result of mistakes made during oviposition	*Salix reticulata*	*Euura reticulatae*
Only projecting below leaf	Pea-shaped; glabrous to weakly hairy; usually no warts; green to red-cheeked.	Fig. 329	*Salix myrsinifolia*	*Euura saliciscinereae*
Only projecting below leaf	Pea-shaped; often rather small; dense adpressed hairs; no warts; green to bright red.	Fig. 330	*Salix lapponum*	*Euura samolad*
Only projecting below leaf	Pea-shaped; glabrous; often very warty; green to red-cheeked.	Fig. 331	*Salix purpurea*	*Euura viminalis*

Material examined and commentaries on species

To assist the user in identification work, both of adults and galls, species are placed together in groups and subgroups: see Table 9. Mostly, the species groups are equivalent to formerly recognised genus-group taxa. Although each group appears to represent a monophyletic lineage within *Euura* (Nyman *et al.*, in preparation), use of the formal genus-group names has been avoided, for the reasons given by Prous *et al.* (2014). Species in each group / subgroup, dealt with in alphabetical order, share a number of morphological and biological characters. Several different systems of species groups and subgroups have been proposed by various authors, e.g. by Benson (1960b), Kopelke (1999) and Vikberg (2010a). The main purpose of the subgroups in the present work is to draw together nominal species resembling each other morphologically so closely (and as far as is known also genetically and biologically), that it is not clear whether many of them should be regarded as host plant races or separate species. The *oblita* group is not divided into subgroups, partly because this does not seem to be of much practical value, and partly because the phylogenetic relations between some of the species are unclear. However, the taxonomically challenging "*ischnocera* complex" is treated separately from the other species. The names of the groups / subgroups are based on the oldest published species name which is still used as valid in the respective group.

TABLE 9. The groups, subgroups, complexes, and species of North and Central European gall-inducing *Euura* treated in this work.

Group	Subgroup	Complex	Species
amerinae	*amerinae*		*amerinae*
amerinae	*amerinae*		*testaceipes*
amerinae	*amerinae*		*venusta*
amerinae	*atra*		*atra*
amerinae	*atra*		*auritae*
amerinae	*atra*		*myrtilloides*
amerinae	*atra*		*salicispurpureae*
amerinae	*atra*		*weiffenbachiella*
amerinae	*mucronata*		*daphnoidica*
amerinae	*mucronata*		*hastatae*
amerinae	*mucronata*		*laeta*
amerinae	*mucronata*		*lanatae*
amerinae	*mucronata*		*lappo*
amerinae	*mucronata*		*mucronata*
amerinae	*mucronata*		*myrsinifoliae*
amerinae	*mucronata*		*subgemma*
anomaloptera			*anomaloptera*
anomaloptera			*crassispina*
anomaloptera			*cyrnea*
anomaloptera			*nitidinota*
anomaloptera			*nudipectus*
anomaloptera			*purpureae*
dolichura			*bigallae*
dolichura			*dolichura*
dolichura			*femoralis*
dolichura			*glaucae*
dolichura			*nigricantis*

......continued on the next page

TABLE 9. (Continued)

Group	Subgroup	Complex	Species
dolichura			*unigallae*
dolichura			*virilis*
oblita			*acutiserra*
oblita			*anglica*
oblita			*destricta*
oblita			*leucapsis*
oblita			*leucosticta*
oblita			*oblita*
oblita			*scotaspis*
oblita		*ischnocera*	*ischnocera*
oblita		*ischnocera*	*plicadaphnoides*
oblita		*ischnocera*	*plicalapponum*
oblita		*ischnocera*	*plicaphylicifolia*
oblita		*ischnocera*	*polita*
oblita		*ischnocera*	*prussica*
piliserra			*piliserra*
proxima			*bridgmanii*
proxima			*proxima*
proxima			*triandrae*
viminalis	*aquilonis*		*aquilonis*
viminalis	*crassipes*		*arbusculae*
viminalis	*crassipes*		*crassipes*
viminalis	*crassipes*		*herbaceae*
viminalis	*viminalis*		*acutifoliae*
viminalis	*viminalis*		*arcticornis*
viminalis	*viminalis*		*brevicornis*
viminalis	*viminalis*		*collactanea*
viminalis	*viminalis*		*glabrifrons*
viminalis	*viminalis*		*hastatavora*
viminalis	*viminalis*		*kriechbaumeri*
viminalis	*viminalis*		*myrsiniticola*
viminalis	*viminalis*		*myrtilloidica*
viminalis	*viminalis*		*nivalis*
viminalis	*viminalis*		*pedunculi*
viminalis	*viminalis*		*reticulatae*
viminalis	*viminalis*		*saliciscinereae*
viminalis	*viminalis*		*samolad*
viminalis	*viminalis*		*viminalis*
viminalis	*vesicator*		*pustulator*
viminalis	*vesicator*		*vesicator*

Cited publications containing information on bionomics do not include those which deal exclusively with the parasitoid complex associated with gall-inducing sawflies. Such publications comprise a substantial body of literature, to which the publications by Kopelke (1983, 1999, 2011), and Kasparyan & Kopelke (2009) offer an entry.

FIGURES 302–315. *Euura*, galls on *Salix*; **302** *amerinae*, *S. pentandra* TN **303** *testaceipes*, *S.* ×*fragilis* TN **304** *auritae*, *S. lapponum* TN **305** *subgemma*, *S. viminalis* vacated galls **306** *mucronata*, *S. aurita* TN **307** *purpureae*, *S. purpurea* TN **308** *destricta*, *S. pentandra* TN **309** *leucapsis*, *S. cinerea* TN **310** *leucosticta*, *S. caprea* TN **311** *bigallae*, *S. caprea* **312** *femoralis*, *S. phylicifolia* TN **313** *glaucae*, *S. glauca* TN **314** *bridgmanii*, *S. caprea* **315** *proxima*, *S. alba* (photo by M. Friedrich) **316** *crassipes*, *S. lapponum* **317** *herbaceae*, *S. herbacea* **318** *aquilonis*, *S. polaris* **319** *myrsiniticola*, *S. myrsinites* **320** *pustulator*, *S. phylicifolia* TN

FIGURES 321–331. *Euura*, galls on *Salix*; **321** *acutifoliae*, *S. daphnoides* **322** *arcticornis*, *S. phylicifolia* TN **323** *collactanea*, *S. repens* **324** *glabrifrons*, *S. lanata* **325** *hastatavora*, *S. hastata* TN **326** *myrtilloidica*, *S. myrtilloides* **327** *reticulatae*, *S. reticulata*, underdeveloped galls in abnormal position on sideveins **328** *reticulatae*, *S. reticulata* **329** *saliciscinereae*, *S. myrsinifolia* (*borealis*) TN **330** *samolad*, *S. lapponum* **331** *viminalis*, *S. purpureae*.

Euura amerinae group

=*Euura* Newman, 1837 sensu stricto

Diagnosis. Adult. In lateral view both mandibles similar (more or less gradually tapering to apex). Vein 2r-m always absent in both fore wings. Supraclypeal area densely setose. Antenna very short: ♀ shorter than costa of fore wing; ♂ not longer than costa of fore wing. Cercus at least 8× as long as medial width and reaching back at least nearly to apex of valvula 3. Lancet: long in relation to its height, tapering only slightly, and more or less curved. Penis valve ventrally without small spines.

Larva. Third abdominal segment with 3 dorsal annulets. Suranal plate without pseudocerci.

Gall. In buds, twigs, leaf-petioles or leaf-midribs. Many authors (e.g. Enslin 1915, Tullgren 1919) have reported that larvae of the species that leave their galls after they have finished feeding often bore into the twigs of the host to overwinter. The emergence of adults from twigs therefore does not necessarily mean that the larvae fed there, i.e. they may belong to any species of this group, not just those of the *atra* subgroup.

Phenology. All species are univoltine.

amerinae subgroup

Kopelke (1999, 2003a) placed *amerinae*, *testaceipes* and *venusta* each in its own species group. Morphologically and genetically, although not biologically, they are however so similar, that they are here placed together in a single group.

Euura amerinae (Linnaeus, 1758)

Cynips amerinae Linnaeus, 1758: 554. Described: adult, gall, recorded host: *Salix pentandra*. Type locality: not stated. Type material thought to be lost or destroyed: not mentioned by Malaise & Benson (1934), Kopelke (1996), or The Linnean Society (2015).

Cryptocampus amerinae: Konow (1890).

Euura amerinae: Enslin (1915).

Euura (*Euura*) *amerinae*: Viitasaari & Vikberg (1985).

Nematus (*Euura*) *amerinae*: Zhelochovtsev (1988).

Tenthredo salicispentandrae Retzius, 1783 [mandatory correction of original spelling *T. Salicis pentandrae*]: 73. Described by indication on Degeer (1771: 1009, pl. 39; "Fausse chenille dans les galles ligneuses des branches du Saule"). No information is available on the existence of types. Type locality: Sweden.

Tenthredo gallarum Latreille, 1804: 38–39. Described by indication on Degeer (1771: 1009); see under *Tenthredo salicispentandrae*.

Tenthredo saliceti Fallén, 1808: 111–112. Lectotype, ♀, designated by Kopelke (1996), MZLU [not examined]. Type locality: not stated, but can be assumed to be in Sweden. Until Lindqvist (1956), the name *saliceti* was generally wrongly applied to what is now called *E. mucronata* (and morphologically similar forms).

Nematus pentandrae Dahlbom, 1835: 28–29. Described by indication on Degeer 1771; see under *Tenthredo salicispentandrae*. Authorship of this species name is frequently, but wrongly, attributed to Thomson (1863).

Nematus (*Cryptocampus*) *medullarius* Hartig, 1837: 224–225. Described by indication on Degeer 1771; see *Tenthredo salicispentandrae*, above.

Nematus (*Cryptocampus*) *populi* Hartig, 1837: 223–224. Described: ♀, ♂, gall, recorded host: "Pappeln" [*Populus*]. Lectotype, ♂, designated by Liston *et al.* (2006), ZSM [examined]. Type locality: not stated, but probably Germany. Synonymy with *E. amerinae* by Enslin (1918a) and Liston *et al.* (2006).

Nematus impunctatus Herrich-Schäffer, 1840: 176. A new name for "[*Nematus*] *intercus* Lep. [Lepeletier] [no.] 200". Under the name *Nematus intercus* Lepeletier (1823) cited the descriptions of "*Tenthredo salicis pentandrae* De Vill., no. 88" and "DeG., no. 24, Tab. 39, fig. 9 et 10" and concluded his description of syntype females collected near Paris [probably lost], with the remark that his *Nematus intercus* is not the same as *Tenthredo intercus* Linnaeus, 1758 [probably not a symphytan]. These indications clearly refer to *Euura amerinae*. Was previously treated as a synonym of *E. viminalis* (L.) (Taeger *et al.* 2010). **Syn. nov.**

Nematus buccatus Thomson, 1863: 639. Described: ♀, ♂; syntypes should be in MZLU [not examined]. Type locality: Dalarna and Småland. Synonymy with *amerinae* following Dalla Torre (1894).

Pontania joergenseni Strand, 1908 [mandatory correction of incorrect original spelling *jörgenseni*]: 158. Described by indication on Jörgensen (1906b); syntypes should be in ZMUC, but could not be found. Type locality: Denmark, Sønderby. Synonymy with *amerinae* by Blank *et al.* (2009).

Variability. Female: Body length: 3.5–5.1mm. Upper rear pronotum pale marked to completely black. Lateral vertex pale marked to completely black. Tergum 10 extensively pale to completely black. Male: 3.8–6.0mm. Supraclypeal area mostly pale to mostly black. Upper rear pronotum pale marked to completely black. The darkest specimens examined are from Norway (Nordland), the palest from Germany. Total number of specimens examined: 20.

Genetic data. The closest barcodes to those of *E. amerinae* in BOLD are of *E. testaceipes* (diverging by a minimum of approx. 1.1%) and *E. venusta* (approx. 2.8%).

Similar species. Females of *E. venusta* and *E. testaceipes* are separable from *amerinae* by several characters (see Key). Males of both the former species are apparently rare, compared to *amerinae*, with a more normal sex-ratio. Male *amerinae* are best recognised by the short and wide inner tooth of the claw, which is longer and thinner in all other W. Palaearctic species in the group.

Bionomics. Host plants: *Salix pentandra* (Kopelke 1996). The host recorded for *N. populi* by Hartig (1837) is certainly a misidentification of *S. pentandra* (Liston *et al.* 2006), but there are unconfirmed observations of galls on other *Populus* species (see, e.g., Baer 1910). Biology: Kolehmainen *et al.* (1994), Kopelke *et al.* (2012), Liston

(1982, 2003), Roininen *et al.* (1993a), Roininen *et al.* (1996). This is the only European gall-inducing sawfly, apart from *E. piliserra*, in which several larvae normally inhabit a single gall.

Distribution. North and Central Europe, including the British Isles (Taeger *et al.* 2006), to the northern parts of the Russian Far East (Zhelochovtsev & Zinovjev 1995). Occurrence in Sweden: published records; Skåne (Wahlgren 1944), Halland (Andersson 1955), Småland, Öland, Gotland (Wahlberg 1951), Västergötland (Lundberg 1963), Bohuslän, Södermanland (Wahlberg 1951), Uppland (Wahlgren 1944, 1953), Värmland, Dalarna, Norrbotten, Torne Lappmark (Wahlberg 1951). Material examined: Skåne, Småland, Öland, Norrbotten.

***Euura testaceipes* (Brischke, 1883)**

Cryptocampus testaceipes Brischke, 1883b: 209. Described: ♀, ♂, larva, gall, recorded host: *Salix fragilis.* Type material thought to have been destroyed, with most of the rest of Brischke's collection (Blank & Taeger 1998). Type locality: not explicitly stated, but according to a comment in the introduction probably Prussia, near Danzig (now Poland, Gdansk). Authorship of the species name often wrongly attributed to Zaddach, or Zaddach & Brischke.
Euura testaceipes: Benson (1958).
Euura (*Euura*) *testaceipes*: Viitasaari & Vikberg (1985).
Nematus (*Euura*) *testaceipes*: Zhelochovtsev (1988).
Euura cynips Newman, 1837: 260. Described: ♀, ♂, recorded host: *Salix* sp. Types probably lost or destroyed (Liston & Prous 2014). Type locality: London area. With respect to *C. testaceipes*, *E. cynips* is a nomen oblitum (Liston *et al.* 2006).

Variability. Female: Body length: 3.8–4.7mm. Pronotum mainly yellow to pale only on dorsal margin. Male: 3.2mm [only one specimen examined]. Total number of specimens examined: 10.

Genetic data. Nearest neighbours in COI barcoding are *E. amerinae* (minimum divergence about 1.1%), and *E. venusta* (minimum divergence about 3.2%).

Similar species. Female; morphologically very similar to *venusta*. See key for details. Male; only distinguished from *venusta* by the colour of the metafemur. However, we have examined very few males of either species, and it is not clear whether this character is reliable.

Comments. The male of this species was unknown to Benson (1958). Perhaps it only occurs rarely. We examined a single male: Zucht [reared], Litauen, nr. Rociskiai, Kopelke 9.8.2006, *S. fragilis* Mittelrippe (SMF).

Bionomics. Host plants: *Salix alba*, *S.* × *fragilis* (Kopelke 2003a), *S. triandra* (Benson 1958), *S. babylonica* (Malaise 1921a; possibly relates to hybrids of *alba* or ×*fragilis* with *babylonica*), *S.* × *blanda* (Wahlgren 1959; as *S. elegantissima*). Kopelke (1999) mentions several other host records published by previous authors under the name *testaceipes*. These may have originated through misidentification (partly with *venusta*?). Unclarified is Kopelke's own record of galls on *Salix lapponum*, tentatively attributed to *E. testaceipes*, from Norway, Oppland. These were not reared. In view of the primarily lowland and southern distribution of *E. testaceipes* compared to the relatively upland and northern range of *venusta*, the galls on *S. lapponum* seem more likely to belong to *venusta* (or a further, undescribed species). Biology: Kopelke (2003a).

Distribution. Central and North Europe, north to Finland, southern Norway and Sweden (Taeger *et al.* 2006, Haris 2009). Occurrence in Sweden: published records; Skåne (Wahlgren 1944), Västergötland (Lundberg 1966), Bohuslän, Uppland (Wahlgren 1944), Lycksele Lappmark (Haris 2009). Material examined: Skåne.

Euura venusta (Brischke, 1883)

Cryptocampus venustus Brischke, 1883b: 206–207. Described: ♀, ♂, larva, gall, recorded hosts: *Salix aurita* and *capraea* [*sic*]. Type material thought to have been destroyed, with most of the rest of Brischke's collection (Blank & Taeger 1998). Type locality: Prussia; Weichselmünde, Brösen und Jäschkenthale (now in Poland, near Gdansk). Authorship of the species name often wrongly attributed to Zaddach or Zaddach & Brischke.
Euura venusta: Enslin (1915).
Euura (*Euura*) *venusta*: Viitasaari & Vikberg (1985).
Nematus (*Euura*) *venustus*: Zhelochovtsev (1988).
Cryptocampus pullulus Brischke, 1883b: 207. Unavailable name: mentioned by Brischke as a manuscript name given by Zaddach to specimens that Brischke considered conspecific with *C. venustus* Brischke.
Cryptocampus brevicornis Brischke, 1883b: 210–211. Described: ♀, ♂, recorded hosts: *Salix aurita* and *capraea* [*sic*]. Type

material thought to have been destroyed, with most of the rest of Brischke's collection (Blank & Taeger 1998). Type locality: same as for *C. venustus*, because Brischke wrote ".. ich erzog sie [*C. brevicornis*] mit *venustus* aus denselben Gallen". Junior secondary homonym in *Euura* of *Nematus brevicornis* Förster, 1854.

Comments. The male of this species was unknown to Benson (1958). We examined five males reared from galls collected by Kopelke from *S. caprea* in Norway, Nordland, Lofoten (SMF).

Variability. Female: Body length: 3.3–5.0mm. Malar space partly pale to completely black. Lateral vertex brown marked to completely black. Male: 3.4–4.0mm. Malar space partly pale to completely black. Lower inner orbits pale to completely black. Total number of specimens examined: 16.

Genetic data. Nearest neighbour COI barcodes to *E. venusta* (2 specimens from France, one from Finland) are of *E. testaceipes* and *E. amerinae* with divergences of respectively about 3.2% and 2.8%.

Similar species. Female; morphologically most similar to *testaceipes*. Male; only distinguished from *testaceipes* by the colour of the metafemur. However, we have examined very few males of either species, and it is not clear whether this character is reliable.

Bionomics. Host plants: *Salix aurita*, *S. caprea* (Kopelke 2003a), *S. lapponum* [in Giant Mountains, Czech Republic] (Beneš 1968b), *S. silesiaca* [in Carpathians] (Beneš 2013), rarely *S. cinerea* (Vikberg & Zinovjev 2006), *S. atrocinerea* (Scotland, Perths., Doll, Craig Rennet, 25.08.1994, 1 ♀, reared K. P. Bland). Perhaps, but rarely, on *S. lapponum* in Scandinavia: see under *testaceipes*. Biology: Kopelke (2003a).

Distribution. Central and North Europe (Taeger *et al.* 2006), Caucasus (Armenia), Russian Far East (Zhelochovtsev & Zinovjev 1995). Occurrence in Sweden: published records; Skåne (Wahlberg 1951), Halland (Andersson 1955), Västergötland (Lundberg 1966), Södermanland, Uppland, Hälsingland, Norrbotten (Wahlberg 1951), Lycksele Lappmark (Haris 2009), Torne Lappmark (Wahlberg 1951), north to Torne Träsk area (Malaise 1921a, 1931a). Material examined: Öland, Småland, Uppland, Västmanland, Torne Lappmark.

atra subgroup

Currently available data indicate that most species in this subgroup are not identifiable using COI barcodes. Specimens of *E. auritae* (Finland), *E. elaeagnos* (Austria), *E. myrtilloides* (Finland), *S. salicispurpureae* (Austria), and *E. weiffenbachiella* (Russia), share highly similar COI barcodes. On the other hand, a significant divergence, of about 3%, exists between the barcodes of these five taxa and five German and Finnish *E. atra* specimens (nearly identical with each other). Roininen *et al.* (1993b) studied Finnish populations from five willow species, using oviposition experiments, and analysis of allozyme differentiation. They concluded that these comprise three distinct lineages, equivalent to *E. atra* (*S. alba*, *S.* × *fragilis*), *E. weiffenbachiella* (*S. rosmarinifolia*), and *E. auritae* [= *E. salicislapponicae*] (*S. cinerea* and *S. lapponum*). We did not detect the supposed interspecific differences in the degree of curvature of the lancet used by Kopelke (1996, 2006) to distinguish nominal species in this subgroup. Furthermore, the number of annuli was found to be more variable within a segregate, and similar between the segregates, than given in these papers. In our opinion, neither of these characters is useful for identification. Similarly, morphology of the penis valve is very uniform throughout the subgroup. We do not consider the minute differences in the shape of the distal lobe of the paravalva illustrated by Kopelke (1996) to be of taxonomic significance.

Euura atra (Jurine, 1807)

Pteronus ater Jurine, 1807: Plate 6, Fig. 9. Described: ♀. Type locality: not mentioned, but supposedly Central Europe (Zinovjev & Vikberg 2006). Type material [not examined] thought to be lost or destroyed (Zinovjev & Vikberg 2006).
Cryptocampus ater: Brischke (1883b).
Euura atra: Westwood (1839).
Euura (*Euura*) *atra* (Jurine, 1807): Viitasaari & Vikberg (1985).
Nematus (*Euura*) *ater*: Zhelochovtsev (1988).
Nematus angustus Hartig, 1837: 222–223. Described: ♀, ♂, recorded host: *Salix viminalis*. Lectotype, ♀, designated by Kopelke (1996), ZSM [examined]. Type locality: Germany, Berlin area. **Syn. nov.**
Euura angusta: Cameron (1885).

Cryptocampus angustus: Konow (1890).

Euura (*Euura*) *angusta*: Kopelke (1996).

Euura salicicola E. A. Smith, 1879: 41–42. Described: ♀, ♂, larva, pupa, recorded host: *Salix alba*. Lectotype, ♀, designated by Zinovjev & Vikberg (2006), USNM [examined]. Type locality: Peoria, Illinois [USA]. Synonymy with *E. atra* by Zinovjev & Vikberg (2006).

Cryptocampus helveticus Zaddach, 1883 [in Brischke 1883b]: 205–206. Described: ♀, ♂. Syntypes in ETH Zurich [examined]. Lectotype, ♀, designated by Kopelke (2001: 192). Type locality: Gotthard [Switzerland]: see clarification below. Synonymy with *E. atra* by Kopelke (2001).

Euura nigra Provancher, 1888: 346–347. Described: ♀. Lectotype, ♀, designated by Gahan & Rohwer (1917), Laval University, Quebec [not examined]. Type locality: Cap Rouge [Canada, Quebec]. Primary homonym of *Euura orbitalis* var. *nigra* Norton, 1867.

Notes on types and taxonomy. The colour characters mentioned by Kopelke (1996) as distinguishing *angusta* from *atra*, are probably the result of originally black body parts fading to brown in the only adult specimens of *angusta* that he was able to examine (the type series). Other differences mentioned by Kopelke (1996, 2006), such as the shape of valvula 3 in lateral view, its setation, and the denser pubescence on the inner orbits, were not observed in the material examined (lectotype and eight paralectotypes of *N. angustus*). Kopelke (1996) found galls on *S. viminalis* at only a single locality, and did not rear adults from them. The scarcity of records by other authors of the *E. atra* group from this willow species, and the congruence in morphology between *atra* and *angusta*, lead us to think that *S. viminalis* is merely a rarely used, secondary host of *E. atra*. We accordingly treat *E. angusta* as a synonym of *E. atra*. In designating the lectotype and a single male paralectotype of *C. helveticus*, Kopelke (2001) did not mention if any label data was available, such as locality. However, Zaddach [in Brischke 1883b] stated "Ich erhielt 7 Exemplare aus dem Züricher Museum durch Heer, 3♂ waren gezogen von Bremi aus Gallen vom Kattensee [Katzensee, near Zürich, Switzerland], 1♂ gefangen, 2♀ und 1♂ aus Gallen vom Gotthard [Switzerland]". It follows that the lectotype is from Gotthard.

Variability. Female: Body length: 3.5–5.3mm. Antennal flagellum apically extensivly pale to completely black. Tegula pale (whitish) to black. Male: 2.9–4.9mm. Female and male: all specimens examined from central and northern Europe have completely black coxae, trochanters and trochantelli. In specimens from Cyprus and Crete, these are extensively pale. The antennal hollows of the latter specimens are also markedly less sculptured, and therefore more shiny. Number of specimens examined: 35.

Genetic data. Apparently distinguishable by COI barcoding from all other species of the subgroup for which data is available. Roininen *et al.* (1993b) presented allozyme data which substantiate that *E. atra* has a rather distinctive genotype within the subgroup, and that populations on *S. alba* and *S.* × *fragilis* are conspecific.

Similar species. Because *E. atra* is found principally in climatically milder, lowland regions, often in river valleys, the species of the *atra* subgroup with which it is most likely to co-occur is *E. salicispurpureae*. Females of *atra* can usually be separated from *salicispurpureae* by the relative proportions of cerci and ovipositor sheath: see key. Other species in the subgroup have either a markedly boreo-montane distribution, or are largely restricted (*E. weiffenbachiella*) to heath or marshland habitats. Males of the *atra* subgroup are not morphologically separable.

Bionomics. Host plants: *Salix alba*, *S.* × *fragilis* (Kopelke 1996), *S.* × *rubens* (= *alba* × *fragilis*) (Kopelke *et al.* 2003); rarely on *Salix viminalis* (Hartig 1837, Kopelke 1996), with only a single record of use of this host in Fennoscandia: Norway, Nord-Trøndelag (Fjelddalen 1992; as *E. atra*). Records from "*S. babylonica*" (e.g. Wong *et al.* 1976) possibly relate to hybrids of that species with *S. alba* and S. × *fragilis.* Biology: Kopelke *et al.* (2003), MacCall *et al.* (1972), Price *et al.* (1997), Roininen *et al.* (1993b: as *E. atra* on *S. alba* and *S. fragilis*), Urban (1992a).

This species usually does not form galls: larvae simply tunnel along the shoots, for a short distance (Wong *et al.* 1976, Kopelke 1996, Zinovjev & Vikberg 2006).

Distribution. South, Central and North Europe, including British Isles, north to Sweden and Finland (Taeger *et al.* 2006). May reach Kyrgyzstan and Kazakhstan in the East (Zhelochovtsev & Zinovjev 1995), but many earlier records require confirmation. Introduced to North America (Wong *et al.* 1976). Occurrence in Sweden: published records; previous published records of *E. atra* from Sweden may refer to several species. Without checking voucher specimens, or if information on the host plant species is lacking, the identity of the sawfly species involved is not clear. Material examined: Öland.

Euura auritae Kopelke, 2000

Euura (*Euura*) *cinereae* Kopelke, 1996: 102. Described: ♀, ♂, gall, recorded host: *Salix cinerea*. Holotype, ♀, SMF [examined]. Type locality: Finland, Joensuu. Preoccupied in *Euura* by *Nematus cinereae* Thomson, 1871 (=*Euura saliciscinereae* (Retzius)). **Syn. nov.**

Euura (*Euura*) *auritae* Kopelke, 2000: 160–162. Described: ♀, ♂, gall, recorded host: *Salix aurita*. Holotype, ♀, SMF [examined]. Type locality: Norway, N.-Trøndelag, Malm.

Euura (*Euura*) *lapponica* Kopelke, 1996: 106. Described: ♀, ♂, gall, recorded host: *Salix lapponum.* Holotype, ♀, SMF [examined]. Type locality: Norway, Nordland, Korgfjellet. Preoccupied in *Euura* by *Pontania lapponica* Malaise, 1921 (=*E. crassipes* (Thomson)). **Syn. nov.**

Euura salicislapponicae Kopelke in Prous *et al.* 2014: 53, replacement name for *E. lapponica* Kopelke.

Notes on types and taxonomy. Kopelke (1996) described the underside of valvula 3 of *E. cinereae* in lateral view as concave, and stated that this is unique amongst the nominal taxa previously treated as *E. atra*. The ventral edge of valvula 3 of the holotype is quite strongly concave, but of eight further specimens labelled as reared from *S. cinerea*, only one has valvula 3 somewhat concave: in one other this edge is straight, and in the remaining six convex. The lancets of these specimens are not as strongly curved as described or illustrated by Kopelke (1996) and are in this respect not clearly distinguishable from those of other nominal taxa (this can be seen in the illustrations of the lancets published by Kopelke 2006). In particular, we found no morphological differences between specimens reared from *S. aurita*, *S. cinerea*, and *S. lapponum*. Therefore, we treat the three nominal taxa associated with these hosts as conspecific.

Variability. Female: Body length: 3.3–5.5mm. Antennal flagellum apically extensively pale to completely black. Upper hind angle of pronotum pale to completely dark. Tegula yellow to black. Male: 2.6–5.2mm. Female and male: outer orbits and lateral vertex somewhat brown to completely black. Total number of specimens examined: 37.

Genetic data. No COI barcoding data are available for specimens reared from *S. aurita* and *S. cinerea*. Roininen *et al.* (1993b) presented allozyme data which show that there is no significant differentiation between *E. auritae* and *E. salicislapponicae*.

Similar species. Females are most similar to *E. atra*, which may also have pale tegulae. They can usually be distinguished by the different distribution of ctenidia on the lancet (see key). Males of the *atra* subgroup are not morphologically separable.

Bionomics. Host plants: *Salix aurita* (Kopelke 2000, 2002; Roininen *et al.* 2001), *S. lapponum* (Kopelke 1996), *S. atrocinerea*, *S.* ? *bebbiana* × *atrocinerea* (Zinovjev 2010: these hosts only recorded in N. America), *S.* ?*cinerea* (Kopelke 1996), *S.* ? *starkeana* (below). According to Roininen *et al.* (2001) the host from which the types of *E. cinereae* were reared was misidentified and is really *S. aurita*. Kopelke (2002) rejected this opinion and repeated that *S. cinerea* is the correct host. On balance, we find the interpretation of Roininen *et al.* (2001) more plausible. Zinovjev (2010) reached the same conclusion, and questioned whether *E. auritae* uses *S. cinerea* as a host. Galls made by a species of the *atra* subgroup have been found on *S. starkeana* at many localities in southern Finland by Nyman and Vikberg. The adults are very similar to those of *auritae*, and possibly conspecific. Biology: Kopelke (1996), Roininen *et al.* (1993b: as *E. atra* on *S. cinerea* and *S. lapponum*).

Distribution. Central and North Europe (Taeger *et al.* 2006), north to Finland and N. Trøndelag in Norway. Occurrence in Sweden: published records; Halland (Andersson 1955: *E. atra* on *Salix aurita*), Uppland (Wahlgren 1951: recorded a female *E. atra* reared from a gall on *Salix cinerea*, which may belong to this species), Lule Lappmark, Torne Lappmark (Malaise 1921a, Coulianos & Holmåsen 1991, both as *E. atra* on *S. lapponum*).

Euura myrtilloides Kopelke, 1996

Euura (Euura) myrtilloides Kopelke, 1996: 107. Described: ♂, gall, recorded host: *Salix myrtilloides.* Holotype, ♂, SMF [examined]. Type locality: Norway, Finnmark, S.-Varanger, Vaggatem. Description of ♀: Kopelke (2006).

Variability. Female: Body length: 3.8–4.5mm. Male: 4.0–4.2mm. Total number of specimens examined: 4.

Genetic data. COI barcode not distinguishable from those of *E. salicislapponicae*, *E. salicispurpureae*, and *E. weiffenbachiella*.

Similar species. Females are most similar to *E. weiffenbachiella*: see key for distinguishing characters. Males of the *atra* subgroup are not morphologically separable.

Bionomics. Host plants: *Salix myrtilloides* (Kopelke 1996). Biology: Kopelke (1996, 2006).

Distribution. Published records are only from Finnmark in Norway (Kopelke 1996, 2006), but galls have been found in Finland by T. Nyman. Occurrence in Sweden: not recorded, but probably occurs.

Euura salicispurpureae Kopelke, 2014

Euura purpureae Kopelke, 1996: 107–109. Described: ♀, ♂, gall, recorded host: *Salix purpurea.* Holotype, ♀, SMF [examined]. Type locality: Switzerland, Valais, Oberwald. Preoccupied in *Euura* by *E. purpureae* (Cameron, 1884).

Euura salicispurpureae Kopelke in Prous *et al.* 2014: 53, replacement name for *E. purpureae* Kopelke.

Variability. Female: Body length: 2.6–4.4mm. Tegula pale to black. Male: 2.9–4.9mm. Female and male: outer orbits and lateral vertex somewhat brown to completely black. Total number of specimens examined: 17.

Genetic data. COI barcode not distinguishable from those of *E. myrtilloides*, *E. salicislapponicae*, and *E. weiffenbachiella.*

Similar species. See under *E. atra*.

Bionomics. Host plants: *Salix purpurea* (Kopelke 1996), *S. purpurea* × *viminalis* (Liston & Späth 2004), *S. purpurea* × *silesiaca* (Beneš 2013). Biology: Kopelke (1996), Kopelke *et al.* (2003).

Distribution. North Africa, South and Central Europe, north to Denmark (Taeger *et al.* 2006). Occurrence in Sweden: not recorded, but may occur.

Euura weiffenbachiella Liston & Vikberg, nom. nov.

Euura weiffenbachii Ermolenko in Zerova, Dyakonchuk & Ermolenko, 1988: 48–49. Described: ♀, ♂, gall, recorded host: *Salix rosmarinifolia.* Syntypes, ♀ and ♂, SIZK [not examined]. Type locality: Ukraine, near Kiev, Romanivka District. *Euura weiffenbachiella* nom. nov. is proposed for *E. weiffenbachii* Ermolenko, preoccupied in *Euura* by *Pteronidea weiffenbachi* Lindqvist, 1958 [*E. piliserra* (Thomson, 1863)].

Euura (*Euura*) *weiffenbachii* Ermolenko: Kopelke (1996).

Variability. Female: Body length: 4.6–5.5mm. Tegula brown to black. Male: 3.6–6.1mm. Female and male: outer orbits and lateral vertex somewhat brown to completely black. Total number of specimens examined: 19.

Genetic data. COI barcode not distinguishable from those of *E. myrtilloides*, *E. salicislapponicae*, and *E. salicispurpureae*.

Similar species. Its robust and usually large body are helpful in recognising this taxon. Females are otherwise most similar to *E. myrtilloides*: see key for distinguishing characters.

Bionomics. Host plants: *Salix repens*, *S. rosmarinifolia* (Kopelke 2003a). Biology: Enslin (1918b; as *E. atra* on *S. repens*), Kopelke (1996), Roininen *et al.* (1993b: as *E. atra* on *S. rosmarinifolia*), Weiffenbach (1992). Enslin (1918b) and Weiffenbach (1992) both remarked on two different basic shapes of gall caused by this species: either spindle-shaped, with the shoot remaining straight, or very strongly developed on one side of the shoot, and causing it to bend, like a miniature gall of *E. amerinae*. We assume that the reason for this is a difference in the way oviposition takes place, and that the different-looking galls are caused by the same species.

Distribution. Central and North Europe (Taeger *et al.* 2006), east to Yakutia (Popov 2011). Occurrence in Sweden: published records; Skåne (Kullaberg; Benander 1966, as *E. atra* on *Salix repens*), Öland (Coulianos & Holmåsen 1991, as *E. atra* on *Salix repens*). Material examined: Skåne.

mucronata subgroup

COI barcode data has not yet been obtained for all species in this subgroup. Barcodes of the North European taxa for which data is available form three clusters: [*E. lanatae*, *E.* sp. on *S. myrsinites*, *E. lanatae*, *E. lappo*, and *E.*

hastatae], [*E. myrsinifoliae*, and *E. mucronata*], and [*E. subgemma*]. Within the first two clusters, the short, BOLD-length barcodes of individual species are practically not distinguishable.

Euura daphnoidica Kopelke, 2001

Euura (*Gemmura*) *daphnoidica* Kopelke, 2001: 201–210. Described: ♀, ♂, gall, recorded host: *Salix daphnoides*. Holotype, ♀, SMF [examined]. Type locality: Switzerland, Valais, Obergoms, Obergesteln.

Variability. Female: Body length: 4.4–4.7mm. Lateral vertex black to pale marked. Male: 4.0–4.0. Pronotum completely black to pale on upper posterior angle. Total number of specimens examined: 6.

Genetic data. No data available.

Similar species. Female not morphologically distinguishable from *E. myrsinifoliae*.

Bionomics. Host plants: *Salix daphnoides* (Kopelke 2001). Biology: Kopelke (2001).

Distribution. Central Europe (Austria, Switzerland, Czech Republic, Germany), north to Denmark (Nielsen 1905; as *C. saliceti* on *S. daphnoides*). Occurrence in Sweden: not recorded, but might occur.

Euura hastatae Malaise, 1921

Euura lappo var. *hastatae* Malaise, 1921: 108–109. Described: ♀, ♂, larva, gall, recorded host: *Salix hastata*. Lectotype, designated below. Type locality: Sweden, Torne Träsk area. Kopelke (2001) referred in error to the existence of a holotype.

Euura (*Gemmura*) *hastatae*: Kopelke (1999).

Notes on types and taxonomy. *E. lappo* var. *hastatae*. Lectotype, ♀, hereby designated, NHRS; labels "78", "Torne Tr. Malaise", "Euura lappo var. hastatae", "Paratypus" [red], "Euura saliceti Fall. O. Conde det. 1937", "Euura mucronata Hartig det. V. Vikberg", "Euura hastatae Mal. Kopelke det. 1999", "NHRS-HEVA000003485", "Lectotype ♀ Euura lappo var. hastatae Malaise, 1921 des. A. Liston 2016" [red], "DEI-GISHym21295". Paralectotypes: 1♀ ("DEI-GISHym21296", "NHRS-HEVA000003487"), 2♂ ("DEI-GISHym21297", "NHRS-HEVA000003486" & "..21298", "NHRS-HEVA000003488"), other labels similar to lectotype, NHRS. Kopelke (2001) referred in error to the existence of a holotype. The original description refers to a type series of 6♀ and 3♂. The whereabouts of the missing specimens are unknown.

Variability. Female: Body length: 3.5–4.2mm. Male: 3.0–4.5mm. Lower inner orbits pale to completely black. Female and male: Tegula pale to black. Total number of specimens examined: 11.

Genetic data. *E. hastatae* cannot be identified using COI sequences, but appears to be distinct based on nuclear ITS2 sequences (Leppänen *et al.* 2014).

Similar species. Female not distinguishable from others in this subgroup, using external morphological characters, except *laeta*, *lanatae*, and *subgemma*.

Bionomics. Host plants: *Salix hastata* (Malaise 1921). Biology: Kopelke (2001).

Distribution. Central Europe (Alps, Carpathians) (Kopelke 2001, Beneš 2014) and North Europe, north to N. Finnmark in Norway (Kopelke 2001). Occurrence in Sweden: published records: Torne Lappmark, Torne Träsk area (Malaise 1921, Kopelke 2001). Material examined: Torne Lappmark.

Euura laeta (Brischke, 1883)

Cryptocampus laetus Brischke, 1883b: 204–205. Described: ♀, ♂, larva, gall, recorded host: *Salix viminalis*. Type material thought to have been destroyed, with most of the rest of Brischke's collection (Blank & Taeger 1998). Type locality: not mentioned, but presumably Danzig area, now in Poland. Authorship of the species name often wrongly attributed to Zaddach or Zaddach & Brischke.

Euura (*Gemmura*) *viminalis* Kopelke, 2001: 220–221. Described: ♀, ♂, gall, recorded host: *Salix viminalis*. Holotype, ♀, SMF [examined]. Type locality: Czech Republic, Skalička near Hranice na Moravě. Synonymy by Liston *et al.* (2006). Notes. Prior to Liston *et al.* (2006) the name *laetus* or *laeta* was wrongly applied to the species now known as *E. subgemma*.

Euura mucronata: Křístek (1972), Urban (1995); misidentification.

Notes on types and taxonomy. *C. laetus*. The taxonomy and nomenclature of this species was last discussed by Liston *et al.* (2006), who concluded, based mainly on the biological data presented in the original description (Brischke 1883b) and subsequently published figures (Brischke 1884: plate I(8): figs 9a–9f), that the species name had been widely misapplied to a morphologically similar taxon on the same *Salix* host species. This second taxon was given the name *subgemma*. Although the original description of adult morphology of *C. laetus* is partly ambiguous, e.g. the body length given ("♀: L. 4,8—4,1 mm. ♂ L. 5, 4,3 — 4,1 mm") is somewhat larger than in the *laeta* specimens that we examined, the biological data correspond unequivocally to that taxon, not *subgemma*. Accordingly, designation of a neotype for *C. laetus* is not necessary.

Apart from the different positions of the galls of *E. laeta* and *E. subgemma*, Urban (1992b) described and illustrated morphological characters that distinguish their larvae. Although he found that the size ranges of the larvae overlapped (possibly because the larvae were not sexed), the body lengths of adults which we examined are distributed in two discrete size classes according to species. These differences support the status of *E. laeta* and *E. subgemma* as separate species. Genetic data are available for *E. subgemma* but not *E. laeta*.

Variability. Female: Body length: 2.9–4.0mm. Clypeus entirely pale to almost completely black. Inner orbits narrowly pale-lined next to eye to completely black. Antennal flagellum nearly entirely pale, except basally, to nearly completely black. Male: 3.0–3.7mm. Lower inner orbits pale to level of toruli; pale colour sometimes extending above this. Antennal flagellum entirely pale to basally infuscate on upper surface. Total number of specimens examined: 15.

Genetic data. No data available.

Similar species. Female; particularly similar in external morphology and colouration to *E. subgemma*, which also has *S. viminalis* as a host, but their lancets are substantially different, and the body lengths of each fall in two discrete ranges which do not overlap (see key). Male; not distinguishable from other nominal taxa in the *mucronata* subgroup.

Bionomics. Host plants: *Salix viminalis* (Kopelke 2001). Biology: Křístek (1972), Urban (1995).

Distribution. Central Europe and southern parts of North Europe, such as Denmark and Kaliningrad Region of Russia (Taeger *et al.* 2006). Occurrence in Sweden: not recorded, but possibly present.

Euura lanatae Malaise, 1921

Euura lanatae Malaise, 1921: 105–106. Described: ♀, ♂, larva, gall, recorded host: *Salix lanata*. Lectotype, designated below. Type locality: Sweden, Torne Träsk area.

Euura (*Gemmura*) *lanatae*: Viitasaari & Vikberg (1985).

Nematus (*Euura*) *lanatae*: Zhelochovtsev (1988).

Euura (*Gemmura*) *boreoalpina* Kopelke, 2001: 197–201. Described: ♀, ♂, gall, recorded host: *Salix glauca*. Holotype, ♀, SMF [examined]. Type locality: Norway, Hordaland, Vikafjell near Viksøyri. Preoccupied in *Euura* by *E. boreoalpina* (Lindqvist, 1961). **Syn. nov.**

Euura glaucatumida Kopelke in Prous *et al.* 2014: 53, replacement name for *E. boreoalpina* Kopelke.

Notes on types and taxonomy. *E. lanatae*. Lectotype, ♀, hereby designated: "2", "Torne Tr. Malaise", "Type", "Euura lanatae (ex gall) n. sp." [Malaise's handwriting], "Typus" [red], "NHRS-HEVA000003490", "Lectotype ♀ Euura lanatae Malaise, 1921 des. A. Liston 2016" [red], "DEI-GISHym21299", NHRS. Paralectotypes: 5♀, 4♂, same data as lectotype, with labels "DEI-GISHym21299[–21308]" and "NHRS-HEVA000003491[-3499]", NHRS. Kopelke (2001) referred in error to the existence of a holotype. The original description of *lanatae* refers to a type series of 13 females and 8 males. The whereabouts of the missing specimens are unknown.

E. glaucatumida is not morphologically distinguishable from *E. lanatae*. The colour of the tegulae and metafemora, indicated to differ between the two nominal species by Kopelke (2001), is variable in specimens reared from both hosts. On average, specimens reared from *S. lanata* are larger than those from *S. glauca*, but this may only be a result of the larger buds of the former host. Kopelke (2001) described and figured the penis valve of *E. lanatae* as lacking the small notch between the base of the valvispina and the distal lobe of the paravalva, whereas the notch should be present in *E. boreoalpina*. In the specimens examined, we found this character to display a continuous spectrum of variability (Figs 297–301), that was not correlated with host plant differences. Specimens of both segregates share a very similar COI barcode, and broader population-genetic analyses have thus far failed to find significant differences between the forms (Nyman 2002, Leppänen *et al.* 2014). Accordingly, we regard them as conspecific.

Variability. Female: Body length: 3.3–4.5mm. Clypeus medially black to completely pale. Outer orbit continuously pale to completely black. Tegula white, through brown, to black. Cerci pale to black. Male: 3.4–4.3mm. Lower inner orbits completely white to completely black. Tegula white, through brown, to black. Total number of specimens examined: ca. 70.

Genetic data. COI barcode not distinguishable from those of *E. hastatae*, *E. lappo*, and *E.* sp. [*Salix myrsinites*].

Similar species. Female; can be confused with *E. venusta*, but the shape of sawsheath in dorsal view (more evenly tapering in *lanatae*), and the frequently dark brown or black tegula (yellow in *venusta*) distinguish them. Male; not distinguishable from other nominal taxa in the subgroup.

Bionomics. Host plants: *Salix lanata* (Malaise 1921a), *S. glauca* (Kopelke 2001). Possibly *Salix calcicola* (Benson 1962), if the Canadian specimens referred to are conspecific with *E. lanatae*. Biology: Malaise (1921a), Kopelke (2001).

Distribution. North Europe (but not British Isles), north to N. Finnmark in Norway; Central Europe (Alps); in Russia probably east at least to the Taymyr Peninsula (*E. mucronata* on *S. glauca*: Roininen & Danell 1997). Possibly also North America (Benson 1962). Occurrence in Sweden: published records; Norrbotten, Lycksele Lappmark, Lule Lappmark, Torne Lappmark (Malaise 1921a, Haris 2009). Material examined: Härjedalen, Lule Lappmark, Torne Lappmark.

Euura lappo Malaise, 1921

Euura lappo Malaise, 1921a:106–108. Described: ♀, ♂, larva, gall, recorded host: *Salix lapponum*. Lectotype, designated below. Type locality: Sweden, Torne Träsk area.
Euura (*Gemmura*) *lappo*: Kopelke (1999).

Notes on types and taxonomy. *E. lappo*. Lectotype, ♀, hereby designated, NHRS; labels "3", "Torne Tr. Malaise", "Type", "Euura lappo n. sp. Malaise", "Euura saliceti Fall. O. Conde det. 1937", "Typus" [red], "Euura lappo Mal. Kopelke det.", "NHRS-HEVA000003467", "Lectotype ♀ Euura lappo Malaise, 1921 des. A. Liston 2016" [red], "DEI-GISHym21309",. Paralectotypes: 11♀, 6♂, same data as lectotype, with labels "DEI-GISHym21310[–21326]" and "NHRS-HEVA000003468[–]NHRS-HEVA000003484", NHRS. Kopelke (2001) referred in error to the existence of a holotype. The original description refers to a type series of 17♀ and 14♂. The whereabouts of the missing specimens are unknown.

Although morphologically very similar to several other nominal taxa in the *mucronata* subgroup, *E. lappo* differs biologically from these (except *E. lanatae*) in remaining inside the gall to overwinter. Furthermore, Nyman (2002), in an analysis of seven variable enzyme loci, found that *E. lappo* belonged to a separate lineage from a lineage comprising *E. myrsinifoliae* and *E. hastatae.* The validity of *E. lappo* is also supported by genetic differences in longer mitochondrial COI and nuclear ITS2 sequences (Leppänen *et al.* 2014).

Variability. Female: Body length: 3.7–4.6mm. Male: 3.1–3.8mm. Female and male: specimens reared by J.-P. Kopelke and E. Heibo from several localities in Norway are much darker than any other bud-galling *Euura* species so far examined: e.g. metafemora almost entirely black, whereas they are at least apically extensively pale in the other taxa. However, the leg and head coloration of the type specimens is much paler than these Norwegian specimens. Total number of specimens examined: 28.

Genetic data. COI barcode not distinguishable from those of *E. hastatae*, *E. lanatae*, and *E.* sp. [*Salix myrsinites*].

Similar species. Female; externally not distinguishable from others in the subgroup, except *laeta*, *lanatae*, and *subgemma*, or from *E. testaceipes* and *venusta*. Male; not distinguishable from other nominal taxa in the subgroup.

Bionomics. Host plants: *Salix lapponum* (Malaise 1921a, Kopelke 2001). Biology: Kopelke (2001).

Distribution. North Europe (but not British Isles), north to N. Finnmark in Norway. Possibly also Central Europe (Czech Republic: Beneš 1968b; galls of *E. mucronata* on *S. lapponum*). Occurrence in Sweden: only known from the Torne Träsk area (Malaise 1921a).

Euura mucronata (Hartig, 1837)

Nematus mucronatus Hartig, 1837: 223. Described: ♀, ♂. Lectotype, designated by Kopelke (2001), ♀, ZSM [examined: according to the original description, types in ZMHUB (= "Mus. Klug")]. Type locality: not stated.

Cryptocampus mucronatus: Vollenhoven (1871: but name applied to *E. amerinae*).

Euura mucronata: Lindqvist (1956). Note: prior to Lindqvist (1956) the name *saliceti* was wrongly used for this taxon.

Euura (*Gemmura*) *mucronata*: Viitasaari & Vikberg (1985).

Nematus (*Euura*) *mucronatus*: Zhelochovtsev (1988).

Euura gallae Newman, 1837: 260. Described: holotype, ♀; OUMNH [examined]. Type locality: Scotland. Nomen oblitum with respect to *N. mucronatus* (Liston & Prous 2014).

Cryptocampus gemmarum Brischke, 1883b: 207. Described: ♀, ♂, larva, gall, recorded host: *Salix aurita.* Type material thought to have been destroyed, with most of the rest of Brischke's collection (Blank & Taeger 1998). Type locality: Heubude, Weichselmünde and Brösen [Danzig area, now in Poland]. Note. Authorship of the species name often wrongly attributed to Zaddach or Zaddach & Brischke.

Cryptocampus pictus Brischke, 1883b: 212. Described: holotype, ♂. Type material thought to have been destroyed, with most of the rest of Brischke's collection (Blank & Taeger 1998). Type locality: Königsberg [now Kaliningrad, Russia]. Note. Authorship of the species name often wrongly attributed to Zaddach or Zaddach & Brischke.

Euura nigritarsis Cameron, 1885: 212–213. Described: ♀, ♂, larva, gall, recorded host: *Salix caprea.* Syntypes may be in BMNH [not examined]. Type locality: Scotland, Clydesdale. Name preoccupied in *Euura* by *Nematus nigritarsis* André, 1880 [a synonym of *Euura viminalis*]. **Syn. nov.**

Cryptocampus nigritarsis: Konow (1890).

Euura (*Gemmura*) *nigritarsis*: Kopelke (2001).

? *Euura insularis* Kincaid, 1900: 352. Described: ♀, ♂. Lectotype, ♀, designated below, USNM. Type locality: Alaska, Popof Island. Synonymised by Benson (1962) with *Euura mucronata*, without any explanation.

Euura (*Gemmura*) *gemmacinereae* Kopelke, 2001: 210–211. Described: ♀, ♂, gall, recorded host: *Salix cinerea.* Holotype, ♀, SMF [examined]. Type locality: Switzerland, Valais, Grimselpaß, Räterichsbodensee. **Syn. nov.**

Notes on types and taxonomy. Kopelke (2001) referred to the existence of a holotype of *E. nigritarsis*, but Cameron's description was based on a syntype series. We detected no significant differences in the morphology, including genitalia, of the nominal species *E. mucronata*, *E. nigritarsis*, and *E. gemmacinereae*. Furthermore, sequencing failed to reveal any genetic differences. Accordingly, these three taxa are treated as synonyms.

Photos of a female syntype of *Euura insularis* and its labels are available: (http://www.usnmhymtypes.com/default.asp?Action=Show_Types&Single_Type=True&TypeID=6057). The labels include "Co Type No. 5302 U.S.N.M." and "Lectotypus Euura insularis Kincaid 1900 desig. Kopelke 200[?9]". Kopelke apparently did not publish the designation. We hereby designate this specimen as lectotype of *E. insularis*. Kincaid (1900), in his description of *Euura insularis*, wrote "Type no. 5301, U. S. National Museum". The published number is wrong: 5301 was correctly assigned by Kincaid (1900) to *Pontania peninsularis* Kincaid, 1900. It is important to note that the registration numbers used and published by Kincaid [and frequently also by S. A. Rohwer, who worked at the USNM at around the same period] were often applied to syntype series, not individual specimens. Thus, of 10 female and 2 male extant paralectotypes of *E. insularis* in the USNM, 2 females and 2 males are all labelled "Co Type No. 5302 U.S.N.M.". The other specimens are without such a label.

Variability. Female: Body length: 2.3–4.4mm. Supraclypeal area pale to dark. Pronotum pale-margined to completely black. Tegula yellow to fuscous. Male: 3.2–4.0mm. Extent of pale on inner and outer orbits very variable. Total number of specimens examined: 24.

Genetic data. COI barcode not distinguishable from that of *E. myrsinifoliae*.

Similar species. Female; externally not distinguishable from others in the subgroup, except *laeta*, *lanatae*, and *subgemma*, or from *E. testaceipes* and *venusta*. Male; not distinguishable from other nominal taxa in the subgroup.

Bionomics. Host plants: *Salix aurita* (Kopelke 2001), *Salix caprea* (Cameron 1885, Kopelke 2001), *Salix cinerea* (Kopelke 2003a). Biology: Kopelke (2001), Roininen *et al.* (1988; as *E. mucronata* on *S. cinerea*), Roininen (1991; as *E. mucronata* on *S. cinerea*).

Distribution. Central and North Europe north to N. Trøndelag in Norway (Kopelke 2001).

Possibly also North America (Benson 1962). Occurrence in Sweden: probably nearly throughout the country, but most previous records need checking because of confusion with several similar species. Published records: Halland (Andersson 1955, as *E. saliceti* on *S. aurita* and *S. cinerea*), Västergötland (Wahlgren 1961, as *E. mucronata* on *Salix cinerea*).

Euura myrsinifoliae Kopelke, 2001

Euura (Gemmura) myrsinifoliae Kopelke, 2001: 218. Described: ♀, ♂, gall, recorded host: *Salix myrsinifolia.* Holotype, ♀, SMF [examined]. Type locality: Austria, Salzburg, Tauernpass, Obertauern.

Euura (*Gemmura*) *phylicifoliae* Kopelke, 2001: 220. Described: ♀, ♂, gall, recorded host: *Salix phylicifolia.* Holotype, ♀, SMF [examined]. Type locality: Norway, Finnmark, N.-Varanger, Tana Bru. Name preoccupied in *Euura* by *Pontania phylicifoliae* Forsius (=*E. arcticornis*). **Syn. nov.**

Euura salicisphylicifoliae Kopelke, 2014, in Prous *et al.* (2014): 53, replacement name for *E. phylicifoliae* Kopelke.

Notes on types and taxonomy. Morphologically, the nominal species *myrsinifoliae* and *salicisphylicifoliae* cannot be separated. Neither were differences found in allozymes, or COI and ITS2 sequences in northern Fennoscandian material of these segregates (Nyman 2002, Leppänen *et al.* 2014). Accordingly, we treat these taxa as synonyms.

Variability. Female: Body length: 2.4–4.2mm. Clypeus medially black to entirely pale. Supraclypeal area pale to black. Pronotum completely black to narrowly pale-margined. Tegula fuscous to pale yellow. Femora completely yellow to nearly entirely fuscous. Entire underside of abdomen yellow to completely black. Male: 3.5–3.9. No significant variability in colour pattern. Total number of specimens examined: 11.

Genetic data. COI barcode not distinguishable from those of *E. mucronata*, and *E. nigritarsis*.

Similar species. Female; externally not distinguishable from others in the subgroup, except *laeta*, *lanatae*, and *subgemma*, or from *testaceipes* and *venusta*. Male not distinguishable from other nominal taxa in the subgroup.

Bionomics. Host plants: *Salix myrsinifolia*, *S. phylicifolia* (Kopelke 2001). Biology: Kopelke (2001).

Distribution. Central and North Europe, north to Finnmark in Norway (Kopelke 2001); in Russia probably east at least to the Taymyr Peninsula (*E. mucronata* on *S. phylicifolia*: Roininen & Danell 1997).

Occurrence in Sweden: published records; Torne Lappmark (Kopelke 2001).

Euura subgemma Liston, 2006

Euura subgemma Liston, 2006: 248. Described: ♀. Holotype, ♀, SDEI [examined]. Type locality: Germany, Brandenburg, Niederfinow.

Euura laeta: Jörgensen 1906a, Tullgren 1919, Coulianos & Holmåsen 1991, Kopelke 2001; misidentification.

Notes on types and taxonomy. See above, under *E. laeta*.

Variability. Female: Body length: 4.4–5.5mm. Male: 4.0–4.5mm. Female and male: no significant variability in specimens examined. Total number of specimens examined: 31.

Genetic data. A single specimen, from Leningrad oblast, Russia, has been sequenced. There is marked divergence from other species of the *mucronata* subgroup so far sampled, but no sequence data are available for *E. laeta*.

Similar species. Female; particularly similar in external morphology and colouration to *E. laeta*, which also has *S. viminalis* as a host, but their lancets are substantially different, and the body lengths of each fall in two discrete ranges which do not overlap (see key). Male; not distinguishable from other nominal taxa in the *mucronata* subgroup.

Bionomics. Host plant: *Salix viminalis* (Taeger *et al.* 2006). Biology: Křístek (1972), Tullgren (1919), Urban (1995).

Distribution. Central and North Europe, north to Uppland in Sweden (Taeger *et al.* 2006, Haris 2009) and Leningrad oblast in Russia. Occurrence in Sweden: has caused damage in cultivated stands of basket willow (Tullgren 1919). Published records: Skåne, Öland, Uppland (Coulianos & Holmåsen 1991). Material examined: Skåne, Uppland.

Euura anomaloptera group

=*Tubpontania* Vikberg, 2010

Diagnosis. Adult. In lateral view right mandible gradually tapering, left one with swollen base and thin, blade-like apex. Vein 2r-m normally present in both fore wings. Supraclypeal area densely setose. Antenna moderately long:

♀ about as long, or slightly longer, than costa of fore wing; ♂ longer than costa of fore wing. Cercus at most 4× as long as basal width and in dorsal view reaching back only to midpoint of valvula 3. Lancet: tapering rather strongly from base to apex; more or less curved, sometimes slightly sinuate. Sculpture on upper head more or less tuberculate. Penis valve ventrally without small spines; base of valvispina ventrally clearly divided from lobe on which it arises by an incision or at least a right-angled turn.

Larva. Third abdominal segment with 4 dorsal annulets; 1–3 with setae. Suranal plate with pseudocerci.

Gall. In leaves. A straight or spirally-twisted roll, sometimes many-layered. A procecidium is formed on upper leaf surface at the oviposition site.

Phenology. Most species univoltine, but at least *E. purpureae* and *E. nitidinota* often bivoltine (Benander 1966, Stritt 1938, Vikberg 2010b).

Provisionally, the relatively well characterised morphological species are also readily identifiable by COI barcoding, but no data are yet available for *E. nitidinota*.

Euura anomaloptera (Förster, 1854)

Nematus anomalopterus Förster, 1854a: 308–309. Described: ♀. Lectotype, ♀, designated by Kopelke (2007a), ZSM [examined]. Type locality: Germany, near Aachen.
Phyllocolpa anomaloptera: Kopelke (2007c).
Tubpontania anomaloptera: Vikberg (2010b).
Euura anomaloptera: Prous *et al.* (2014).
Amauronematus maidli Zirngiebl, 1937: 336–337. Described: ♀. Holotype, ♀, NHMW [examined]. Type locality: Istria. Synonymised with *Phyllocolpa anomaloptera* by Kopelke (2007c).
Nematus (*Pontania*) *tuberculatus* Benson, 1953: 151–152. Described: ♀, ♂, recorded host: ? *Salix atrocinerea*. Holotype, ♀, BMNH [examined]. Type locality: Ireland, Cavan, Lough Mentis. Synonymy with *N. anomalopterus* by Vikberg (2010b).
Pontania tuberculata: Benson (1958).
Pontania (*Phyllocolpa*) *tuberculata*: Vikberg (1982).

Variability. Female: Body length: 3.0–4.9mm. Male: 3.0–4.4mm. Total number of specimens examined: 24.

Genetic data. Nearest neighbours in COI barcoding are *E. cyrnea* and *E. purpureae*. The latter share the same BIN, diverging by a minimum of 5.6% from *E. anomaloptera*. The seven barcoded *E. anomaloptera* specimens have two apparent haplotypes, diverging by a minimum of 2.4%. Both were represented in Swedish material: haplotype 1 comprised two females from Härjedalen and Torne Lappmark (Stordalen); haplotype 2 comprised five females from Torne Lappmark, Abisko NP, 390–900m (four) and France, Departement Ariège (one). No morphological differences were correlated with the apparent genetic dichotomy.

Bionomics. Host plants: In northern Europe *Salix hastata* (Kopelke 2007c), *S. phylicifolia* and *S. starkeana* (Zinovjev & Vikberg 1999, Vikberg 2010b) have been recorded as definite hosts. These willow species do not occur at the type localities of *N. anomalopterus*, *A. maidli* or *N. tuberculatus*. Benson (1953) suggested *S. atrocinerea* as the probable host at the type locality of *N. tuberculatus*. Zinovjev (1999) and Zinovjev & Vikberg (1999) list several other willow species which are possibly hosts in the East Palaearctic. The host spectrum of *E. anomaloptera* is unusually wide, so that further investigation seems called for. Biology: Vikberg (2010b), Zinovjev & Vikberg (1999: as *tuberculata*).

Distribution. South, Central and North Europe (Taeger *et al.* 2006), ? northern Russian Far East (Zhelochovtsev & Zinovjev 1995). Occurrence in Sweden: published records; Norrbotten (Haris 2009), Torne Träsk area (Vikberg 2010b). Material examined: Härjedalen, Jämtland, Norrbotten, Lule Lappmark, Torne Lappmark.

Euura crassispina (Thomson, 1871) comb. nov.

Nematus crassispina Thomson, 1871: 164–165. Described: ♀. Lectotype, ♀, designated by Zinovjev & Vikberg (1999), MZLU [examined]. Type locality: Sweden, Jämtland, Skalstugan.
Pontania crassispina: Konow (1890).
Pontania (*Phyllocolpa*) *crassispina*: Viitasaari & Vikberg (1985).
Pontania (*Pontania*) *crassispina*: Zinovjev (1993b).

Phyllocolpa crassispina: Kopelke (2007c).
Tubpontania crassispina (Thomson, 1871): Vikberg (2010b).

Variability. Female: Body length: 3.1–4.3mm. The single female which has so far been reared from *Salix hastata* differs slightly in details of valvula 3 setation from those reared from *S. glauca* (Vikberg 2010b). Male: unknown. Total number of specimens examined: 9.

Genetic data. Of species of this group for which COI barcodes are currently available, the nearest neighbour is *E. anomaloptera*, at a minimum of 7.1% divergence.

Bionomics. Host plants: *Salix glauca*, occasionally *S. hastata* (Vikberg 2010b). Biology: Vikberg (2010b), Zinovjev & Vikberg (1999).

Distribution. The only definite records are from Norway, Sweden, Finland and northern European Russia (Vikberg 2010b), but possibly also occurs in northern parts of the Russian Far East (Zhelochovtsev & Zinovjev 1995). Occurrence in Sweden: published records; Jämtland (Zinovjev & Vikberg 1999), Torne Lappmark (Haris 2009). Material examined: Jämtland, Lule Lappmark, Torne Lappmark.

Comments. A supposed male of this species described by Zinovjev & Vikberg (1999) was probably misidentified (Vikberg 2010b).

Euura cyrnea (Liston, 2005)

Pontania cyrnea Liston, in Liston & Späth 2005b: 4–6. Described: ♀. Holotype, ♀, ZSM [examined]. Type locality: France, Corsica, Corti, Santo Pietro di Venacu.
Tubpontania cyrnea: Vikberg (2010b).
Euura cyrnea: Beneš (2015b).
Pontania joergenseni Enslin, 1916: 17. Described: [name proposed for specimens of *Pontania pedunculi* Konow nec Hartig]. Lectotype, ♀, designated by Zinovjev & Vikberg (1999), SDEI [examined]. Type locality: Germany, Mecklenburg-Vorpommern, Teschendorf. Primary homonym of *Pontania joergenseni* Strand, 1908. Synonymy with *P. cyrnea* by Vikberg (2010b).
Pontania (Phyllocolpa) joergenseni: Viitasaari & Vikberg (1985).
Nematus (*Pontania*) *joergenseni*: Zhelochovtsev (1988).
Phyllocolpa anomaloptera: Kopelke (2007c); misidentification.

Notes on types and taxonomy. *P. cyrnea*. A technical problem concerning the lancet of the holotype was discussed by Vikberg (2010b: 7).

Variability. Female: Body length: 3.4–5.2mm. Male: 3.5–4.2mm. Total number of specimens examined: 15.

Genetic data. The COI barcode of the only sequenced specimen of *E. cyrnea* (paratype from Corsica) shares the same BIN as five *E. purpureae* from Austria, France, and Morocco. Nevertheless, divergence of *E. cyrnea* from the nearest *E. purpureae* amounts to about 1.9%.

Bionomics. Host plants: *Salix caprea* (Kopelke 2007c, Vikberg 2010b). Biology: Beneš (2015a), Vikberg (2010b), Zinovjev & Vikberg (1999: as *joergenseni*). The galls illustrated by Mol (2013: fig. 6) were definitely not caused by *E. cyrnea*: they show the characters typical of the *ischnocera* complex of the *E. oblita* group.

Distribution. South, Central and North Europe north to Nordland in Norway (Kopelke 2007c). Occurrence in Sweden: published records; Skåne, Småland (Haris 2009), Bohuslän (Vikberg 2010b), Närke (Haris 2009). Material examined: Småland, Västmanland.

Euura nitidinota (Vikberg, 2010) comb. nov.

Tubpontania nitidinota Vikberg, 2010b: 20–22. Described: ♀, ♂, larva, gall, recorded host: *Salix phylicifolia*. Holotype, ♀, FMNH [examined]. Type locality: Finland, North Savo, Nilsiä, Syvärinranta.

Variability. Female: Body length: 2.9–4.5mm. Male: unknown. Total number of specimens examined: 4.

Genetic data. None available.

Similar species. Resembles *E. nudipectus* in external morphology. The lancets (*E. nudipectus*, Fig. 38; *E.*

nitidinota, Fig. 39) are also very similar, except that the distal cypsellae are shallower and less rounded in *E. nitidinota.*

Bionomics. Host plants: *Salix phylicifolia* is definitely a host, but possibly other willow species may also be used (Vikberg 2010b). Biology: no data available.

Distribution. Only known from North Europe (Sweden, Finland, Russia) (Vikberg 2010b). Occurrence in Sweden: published records; Lycksele lappmark (Vikberg 2010b).

Euura nudipectus (Vikberg, 1965) comb. nov.

Pontania nudipectus Vikberg, 1965: 54–57. Described: ♀, ♂, larva, gall, recorded host: *Salix phylicifolia.* Holotype, ♀, FMNH [examined]. Type locality: Finland, PK, Kitee.
Pontania (*Phyllocolpa*) *nudipectus*: Viitasaari & Vikberg (1985).
Nematus (*Phyllocolpa*) *nudipectus*: Zhelochovtsev (1988).
Phyllocolpa nudipectus: Kopelke (1999).
Tubpontania nudipectus: Vikberg (2010b).
Pontania arctophilae: Vikberg (1962); misidentification.

Variability. Female: Body length: 3.3–4.2mm. Male: 2.9–3.8mm. Total number of specimens examined: 12.

Genetic data. Nearest COI barcode neighbour is *E. purpureae*, with about 4.3% divergence.

Similar species. Resembles *E. nitidinota* in external morphology. The lancets (*E. nudipectus*, Fig. 38; *E. nitidinota*, Fig. 39) are also very similar, except that the distal cypsellae are deeper and more rounded in *E. nitidinota.*

Bionomics. Host plants: *Salix phylicifolia* (Kopelke 2007c, Vikberg 2010b). Biology: Vikberg (2010b), Zinovjev & Vikberg (1999).

Distribution. Only recorded in North Europe: Norway, Sweden, Finland, northern Russia (Vikberg 2010b), and Estonia (1 Fem., Raplamaa, Jõeääre, 30 m., +58.81700 +24.45800, 08.06.2015, M. Prous, SDEI). Occurrence in Sweden: published records; Jämtland, Västerbotten, Norrbotten, Torne Lappmark (Haris 2009). Material examined: Härjedalen, Torne Lappmark.

Euura purpureae (Cameron, 1884)

Nematus purpureae Cameron, 1884: 80. Described: adult [sex not stated], larva, gall, recorded host: *Salix purpurea*. Lectotype, ♀, designated by Kopelke (2007a), BMNH [not examined]. Type locality: England, Worcester.
Pontania purpureae: Konow (1890).
Phyllocolpa purpureae: Benson (1960a).
Nematus (*Phyllocolpa*) *purpureae*: Zhelochovtsev (1988).
Tubpontania purpureae: Vikberg (2010b).
Euura purpureae: Prous *et al.* (2014).
Euura acuminata Enslin, 1915: 339. Described: ♀. Lectotype, ♀, designated by Kopelke (2007a), ZSM [examined]. Type locality: Germany, Saxony, Meissen ["Merseburg " probably given in error by Enslin]. Synonymy with *purpureae* by Kopelke (2007c).

Variability. Female: Body length: 3.0–4.3mm. Male: 3.4–3.9mm. Total number of specimens examined: 41.

Genetic data. The COI barcodes of five *E. purpureae* from Austria, France, and Morocco share the same BIN with the only successfully sequenced specimen of *E. cyrnea* (paratype from Corsica). Nevertheless, divergence of *E. purpureae* from *E. cyrnea* is a minimum of about 1.9%.

Bionomics. Host plants: *Salix purpurea* (Kopelke 2007c, Vikberg 2010b). Biology: Benander (1966), Beneš (2015a), Stritt (1938), Vikberg (2010b), Zinovjev & Vikberg (1999).

Distribution. North Africa (Lacourt 1999), and through most of Europe north to southern Sweden (Vikberg 2010b). Occurrence in Sweden: published records; Skåne (Benander 1966), Halland (Andersson 1955: *Pontania* sp. making spirally twisted gall on *S. purpurea*), Västergötland (Wahlgren 1960), Uppland (Coulianos & Holmåsen 1991). Material examined: Skåne.

E. dolichura group

=*Pontania* Costa, 1852, in part

Diagnosis. Adult. In lateral view right mandible gradually tapering, left one with swollen base and thin, blade-like apex. Vein 2r-m normally present in both fore wings. Supraclypeal area densely setose. Antenna moderately long: ♀ about as long, or slightly longer, than costa of fore wing; ♂ longer than costa of fore wing. Cercus long: about 6× as long as basal width and reaching back to apex of valvula 3. Lancet: not tapering very strongly from base to apex; slightly sinuate. Medial annular sutures straight and nearly vertical; medial and basal annuli with more or less clearly developed serrulae. Antennal hollow entirely pilose and dull. Penis valve ventrally without small spines; base of valvispina ventrally clearly divided from lobe on which it arises by an incision, or at least a right-angled deflection.

Larva. Third abdominal segment with 4 dorsal annulets. Suranal plate with widely separated pseudocerci.

Gall. In leaves. Only developed above the leaf-blade. Usually elongate ("sausage-shaped"), rarely globose; often occurring in pairs, one on each side of the midrib.

Phenology. All species strictly univoltine.

Notes. A number of *Salix* species in addition to those mentioned below have been recorded in northern Europe as hosts of this group in earlier literature. They may represent misidentifications, as yet unrecognised galler species, or secondary hosts of the nominal species listed below. Examples of such unclarified records from Sweden are *Pontania femoralis* on *S. cinerea* in Uppland (Wahlgren 1951) and *Pontania femoralis* on *S. polaris* in Torne Lappmark (Vassijaure) (Palm 1923). Other *dolichura* group / host plant species combinations mentioned in the literature from other parts of northern Europe, and which might occur in Sweden, are from *Salix arbuscula* (Benson 1958, Kopelke 2003a, Trail 1889), *S. aurita* (Benson 1935), *S. cinerea* (Zinovjev 1999), *S. hastata* (Zinovjev 1999), *S. herbacea* (Zinovjev 1999), *S. lanata* (Benson 1958), *S. myrsinites* (Benson 1954), and *S. viminalis* (Zinovjev 1999).

Although Kopelke (1994) stated that the species of this group are strictly monophagous, Beneš (2015a: 146) noted that a female reared from a gall on *Salix myrsinites* (Slovakia, High Tatra Mts) oviposited (in captivity) both on *S. retusa* and *S. purpurea*, on which galls and larvae subsequently developed. A further case in the *dolichura* group of successful development of galls on an atypical host was mentioned by Zinovjev (1999: 211). According to Zinovjev (1999), the species of this group studied by Kopelke (1986) "might be associated with entire willow sections rather than particular species" and they "may just appear to be monophagous: in particular regions, host plants of these sawflies are the only representatives of their sections". This may be the case in Europe, where each of the nominal species recognised by Kopelke (1986, 1994), as well as the two European taxa added by Vikberg & Zinovjev (2014), has a recorded host that following Skvortsov (1999) belongs to a Section of *Salix* different from Sections used by any other European *dolichura* group segregate.

Kopelke (1994: 130) illustrated more or less different shapes of the clypeus in seven species of the *dolichura* group, including four species that occur in Scandinavia. We were unable to find consistent differences in this character between series of reared specimens of these species. Perhaps the shape of the emargination is variable. In any case, the perception of the shape of the emargination and the proportions of the parts of the clypeus lateral to this is greatly altered both by the angle at which it is viewed and by distortion in dried specimens.

Vikberg & Zinovjev (2014) stated that the ratio of the length of the lamnium of the lancet to head width can be used as an aid to identification of females of the *dolichura* group. They plotted this relationship for a few individuals of five Palaearctic nominal species, and the ranges of these ratios mostly did not overlap. However, the ratios of three of the most widespread northern European nominal taxa were not included: *E. dolichura*, *E. glaucae* and *E. nigricantis*. Once these are included, large overlaps occur between several species. The character is therefore of limited practical value for identification.

On external morphological characters, most nominal species in this group are scarcely distinguishable. The shape of the metatarsal claws was mentioned by Vikberg & Malinen (2012) as a character that might be of potential use in recognising some species: in particular to distinguish the male of *E. dolichura* from the others. It may be possible to separate *virilis*, only potentially occurring in Scandinavia, from those definitely known there by its more extensively pale coloration. On the other hand, two other nominal taxa (*E. elaeagnocola* (Kopelke, 1994) **comb. nov.**, transferred from *Pontania*, and *E. helveticae* (Kopelke, 1994)) that are at present only known from Central Europe, share the paler colour pattern of *virilis*. Furthermore, some specimens of *E. femoralis* from the

British Isles are also very pale (Vikberg & Malinen 2012). One might therefore question whether these differences are of taxonomic significance. They might simply represent clinal variability, recognised in many other sawfly species, with more southern populations tending to be paler.

Based on COI and Cytb sequences, genetic differences among species within the group are in many cases very small (Nyman *et al.* 2007), and barcode data at BOLD for 15 specimens under the names *virilis*, *dolichura*, *glaucae*, *nigricantis* and *lapponicola* can hardly be interpreted, because it is frequently not clear how the samples were identified and in what sense the names were used.

Euura bigallae **(Vikberg & Zinovjev, 2014) comb. nov.**

Pontania bigallae Vikberg & Zinovjev, 2014: 4–7. Described: ♀, ♂, larva, gall, recorded hosts: *Salix caprea* and *S. starkeana* ssp. *cinerascens*. Holotype, ♀, FMNH [examined]. Type locality: Finland, Kainuu (Kn): Hyrynsalmi.

Variability. Female: Body length: 3.4–4.4mm. Male: 3.3–3.7mm. Total number of specimens examined: 3.

Genetic data. None available.

Bionomics. Host plants: *Salix caprea* and *Salix starkeana* ssp. *cinerascens* (Vikberg & Zinovjev 2014) and hybrids of these (Kokkonen 2000). Biology: Kokkonen (2000: as species P1; undescribed sp. of the *dolichura* group), Vikberg & Zinovjev (2014). The galls of this species are unique in the West Palaearctic: round, paired galls developed only above the leaf blade.

Distribution. Definite records so far were only from Norway, Finland and northern Russia, but possibly occurs also in Central Europe (Vikberg & Zinovjev 2014). Occurrence in Sweden: material examined; Västerbotten.

Euura dolichura **(Thomson, 1871)**

Nematus dolichurus Thomson, 1871: 164. Described: ♀, ♂. Lectotype, ♀, designated by Kopelke (1990b), MZLU [examined]. Type locality: Sweden, Jämtland, Skalstugan.
Pontania dolichura: Konow (1890).
Pontania (*Pontania*) *dolichura*: Viitasaari & Vikberg (1985).
Nematus (*Pontania*) *dolichura*: Zhelochovtsev (1988).
Euura dolichura: Shinohara & Hara (2015).
Pontania lapponicola Kopelke, 1994: 138–140. Described: ♀, ♂, gall, recorded host: *Salix lapponum*. Holotype, ♀, SMF [examined]. Type locality: Norway, Nordland, Polar Circle B. Synonymy by Vikberg & Malinen (2012).

Variability. Female: Body length: 2.8–4.0mm. Male: 2.6–3.6mm. Vikberg & Malinen (2012) discuss variability, perhaps related to different geographic provenance, in the structure of the lancet. Total number of specimens examined: 7.

Genetic data. COI barcode not clearly distinguishable from others of this group, except perhaps *E. virilis*.

Bionomics. Host plants: *Salix lapponum* (Kopelke 1994, Vikberg & Malinen 2012). Biology: Kopelke (1994).

Distribution. Central Europe (Czech Republic, Giant Mountains: Beneš 2013), North Europe (Scotland, Scandinavia, Finland: Liston *et al.* 2012, Vikberg & Malinen 2012). Possibly North America (Benson 1962). Occurrence in Sweden: published records; Jämtland (Kopelke 1990b, Vikberg & Malinen 2012).

Euura femoralis **(Cameron, 1876) comb. nov.**

Nematus femoralis Cameron, 1876b: 295–299. Described: ♀, ♂, larva, gall, recorded host: *Salix* ? *laurina.* Syntypes: ♀, ♂. Lectotype, ♀, designated by Vikberg & Malinen (2012), BMNH [examined]. Type locality: Scotland, Perthshire, Rannoch.
Pontania femoralis: Vikberg & Malinen (2012).
Pontania robbinsi Benson, 1935: 26–27. Unnecessary replacement name for *N. femoralis* Cameron, which Benson wrongly treated as unavailable. As stated by Vikberg & Malinen (2012), the lectotype designation by Kopelke (1990b) is invalid (ICZN 1999: 72.4.4, 72.7): the lectotype of *N. femoralis* Cameron is also the lectotype of its objective junior synonym *P. robbinsi*.
Pontania dolichura: Kopelke (1990b), Kopelke (1994); misidentification.

Variability. Female: Body length: 3.0–3.9mm. Male: 2.8–3.6mm. Total number of specimens examined: 4.

Genetic data. COI barcode not clearly distinguishable from others of this group, except perhaps *E. virilis*.

Bionomics. Host plants: *Salix phylicifolia* (Kopelke 1994). Biology: Kopelke (1994).

Distribution. North Europe (N. England, Scotland, Scandinavia, Finland, N. W. Russia: Liston *et al.* 2012, Vikberg & Malinen 2012, Zinovjev 1999). Occurrence in Sweden: published records; Torne Lappmark (Kopelke 1994); galls of the *dolichura* group found on *S. phylicifolia* at Hällefors, Västmanland (Vikberg & Malinen 2012) were probably caused by this species. Material examined: Lycksele Lappmark.

Euura glaucae (Kopelke, 1994) comb. nov.

Pontania glaucae Kopelke, 1994: 135–136. Described: ♀, ♂, gall, recorded host: *Salix glauca.* Holotype, ♀, SMF [examined]. Type locality: Norway, Nordland, Korgen.

Variability. Female: Body length: 3.2–4.2mm. Male: 3.2–4.3mm. Total number of specimens examined: 4.

Genetic data. COI barcode not clearly distinguishable from others of this group, except perhaps *E. virilis*.

Bionomics. Host plants: *Salix glauca* (Kopelke 1994). Biology: Kopelke (1994).

Distribution. North Europe: Norway (Kopelke 1994), Finland (north to Utsjoki: Vikberg & Malinen 2012). Noblecourt (2004) and Taeger *et al.* (2006) listed *glaucae* in France, but according to T. Noblecourt [personal communication by email; translated]: "*Pontania glaucae* does not belong to the fauna of France: it was a mistake on my part in the interpretation of the synonymy". Occurrence in Sweden: published records; Torne Lappmark (Julin 1936; as *Pontania femoralis* on *Salix glauca*).

Euura nigricantis (Kopelke, 1986) comb. nov.

Pontania nigricantis Kopelke, 1986: 52–58. Described: ♀, ♂, larva, gall, recorded host: *Salix nigricans.* Holotype, ♀, SMF [examined]. Type locality: Austria, Tirol, Zillertaler Alpen, Vorderlanersbach.

Variability. Female: Body length: 2.6–3.7mm. Male: 2.9–3.8mm. Total number of specimens examined: 8.

Genetic data. COI barcode not clearly distinguishable from others of this group, except perhaps *E. virilis*.

Bionomics. Host plants: *Salix myrsinifolia* (Kopelke 1994). Biology: Kopelke (1986, 1994).

Distribution. Central Europe (Alps: Kopelke 1994) and North Europe (Scotland, Scandinavia, Finland: Liston *et al.* 2012, Vikberg & Malinen 2012). Occurrence in Sweden: published records; Torne Lappmark (Kopelke 1994). Material examined: Jämtland, Västerbotten, Lycksele Lappmark, Torne Lappmark.

Euura unigallae (Vikberg & Zinovjev, 2014) comb. nov.

Pontania unigallae Vikberg & Zinovjev, 2014: 10–12. Described: ♀, ♂, gall, recorded host: *Salix repens* ssp. *rosmarinifolia*. Holotype, ♀, ZIN [examined]. Type locality: Russia, Leningrad oblast, 60 km S of St. Petersburg, River Suida.

Variability. Female: Body length: 2.6–3.6mm. Male: 2.4–3.5mm. Total number of specimens examined: 5.

Genetic data. COI barcode not clearly distinguishable from others of this group, except perhaps *E. virilis*.

Bionomics. Host plants: *Salix repens* ssp. *rosmarinifolia* (Vikberg & Zinovjev 2014). Biology: Vikberg & Zinovjev (2014). Galls usually occur singly, one per leaf blade.

Distribution. North Russia (St Petersburg area), Estonia (Vikberg & Zinovjev 2014). Occurrence in Sweden: not recorded, but presence possible.

Euura virilis **(Zirngiebl, 1955)**

Pontania femoralis var. *virilis* Zirngiebl, 1955: 67–68. Described: ♀, ♂, larva, gall, recorded host: *Salix* sp. Lectotype, ♀, designated by Kopelke (1990b), ZSM [examined]. Type locality: Germany, Rhineland-Palatinate, Naturschutzgebiet Dannstadt.

Pontania virilis: Kopelke (1990b); new status.

Euura virilis: Beneš (2015b).

Pontania rifana Lacourt, 1973: 190–192. Described: ♀. Holotype, ♀, JLLP [not examined]. Type locality: Morocco, Rif, Djebel Tidighine. Synonymy with *P. virilis* by Kopelke (1990b).

Variability. Female: Body length: 2.9–4.5mm. Male: 2.7–3.3mm. Adults from further south in Europe tend to be much paler than, for example, those from the north of Germany. Reared females from the French Pyrenees (leg. E. Heibo) are themselves variable in colour; in the palest, the whole clypeus, supraclypeal area, pronotum, mesepisternum apart from sterno-pleural black patch, part of mesoscutellum, entire femur and most of apex and sterna of abdomen are yellow-brown. North African specimens are intermediate in colour to those from the Pyrenees and N. Germany. Total number of specimens examined: 30.

Genetic data. The COI barcode of a single specimen identified as *virilis* (GenBank accession EU084002, from Germany) diverges from the next nearest of other *dolichura* group species by approximately 4.9% (see also Nyman *et al.* 2007). However, newer COI sequences of *dolichura* group larvae collected from *S. purpurea* (which should therefore be *E. virilis*), locate at two different positions in the tree (Nyman, unpublished).

Bionomics. Host plants: *Salix purpurea* (Kopelke 1994), *S. viminalis* × *purpurea* (Beneš 2015a). Biology: Kopelke (1985, as *P. dolichura*), Zirngiebl (1955).

Distribution. North Africa (Morocco: Lacourt 1999), through most of South and Central Europe (Taeger *et al.* 2006), north to Schleswig-Holstein in Germany (Blank *et al.* 2001) and Estonia (Taeger *et al.* 2006). Occurrence in Sweden: no records from Fennoscandia, but presence in southern Sweden possible.

Euura oblita **group**

= *Phyllocolpa* Benson, 1960a

Diagnosis. Adult. In lateral view right mandible gradually tapering, left one with swollen base and thin, blade-like apex. Vein 2r-m normally present in both fore wings. Supraclypeal area densely setose, or at least with numerous setae laterally and on upper third. Antenna moderately long to very long: ♀ as long as costa of fore wing, to as long as combined length of costa and pterostigma; ♂ longer than costa of fore wing, to as long as length of fore wing. Valvula 3 in dorsal view subtriangular; in lateral view emarginate at least on ventral margin. Metatarsomere 4 dorsally shorter than its apical width. Cercus short to moderately long. Lancet: lamnium curved, tapering gradually from base to apex. Medial annular sutures nearly straight. Penis valve ventrally without small spines; base of valvispina ventrally clearly divided from lobe on which it arises by an incision or at least a right-angled turn.

Larva. Third abdominal segment with 4 dorsal annulets; 1–3 with setae. Suranal plate with widely separated pseudocerci.

Gall. Rolled leaves, sometimes spirally twisted, or folded leaf-margins; without swelling at oviposition site.

Phenology. Uni- or bivoltine.

Euura acutiserra **(Lindqvist, 1949)**

Pontania acutiserra Lindqvist, 1949: 66–68. Described: ♀, ♂. Holotype, ♀, FMNH [examined]. Type locality: Finland, Utsjoki, Outakoski.

Phyllocolpa acutiserra: Benson (1960a).

Pontania (*Phyllocolpa*) *acutiserra*: Viitasaari & Vikberg (1985).

Nematus (*Phyllocolpa*) *acutiserra*: Zhelochovtsev (1988).

Euura acutiserra: Prous *et al.* (2014).

Variability. Female: Body length: 3.7–4.0mm. Male: 3.6–4.0mm. Female and male: no significant variability in colour pattern. Total number of specimens examined: 17.

Genetic data. COI barcodes in BOLD of four *E. acutiserra* specimens from Norway and Finland with approx. 0.2% intraspecific variability diverge by a minimum of about 3.0% from the morphologically most similar north European species, *E. leucapsis*. The European *E. acutiserra* barcodes nest within a BIN containing sequences of seven Canadian specimens under the name *Phyllocolpa excavata*: the most similar of these sequences to a European specimen differs by about 1.0%.

Bionomics. Host plants: *Salix lapponum* (Kopelke 2007b), ?*S. glauca* (Vikberg 1970, Zinovjev 1999). The record from *S. glauca* in Vikberg (1970) is based on a single specimen reared by E. Peltonen. Possibly the *Salix* species was misidentified, or *S. glauca* is a rarely used host. Males of *E. acutiserra* are rare (Vikberg 1970, Kopelke 2007b): apart from the single male paratype, we examined two males reared by Kopelke. Biology: Kopelke (2007b), Zinovjev & Vikberg (1998).

Distribution. North Europe (Kopelke 2007a), possibly including Scotland (Benson 1958; but the identity of the single specimen needs checking, because neither recorded host is known at its collection site), Russia (Yakutia: Popov 2011). Recorded in Canada (Benson 1962), but determination requires checking; see also above, under Genetic data. Occurrence in Sweden: published records; Jämtland (Haris 2009), Västerbotten (Kopelke 2007b), Lycksele Lappmark, Torne Lappmark (Haris 2009). Material examined: Hälsingland, Jämtland, Lule Lappmark, Norrbotten, Torne Lappmark.

Euura anglica (Cameron, 1877) comb. nov.

Nematus anglicus Cameron, 1877a: 173. Described: ♀. Lectotype, ♀, designated by Kopelke (2007a), BMNH [not examined]. Type locality: [?] England.

Phyllocolpa anglica (Cameron, 1877): Benson (1960a), Vikberg (2010a).

Nematus (*Phyllocolpa*) *anglicus*: Zhelochovtsev (1988).

Pontania (*Phyllocolpa*) *anglica*: Zinovjev (1993b).

Nematus nigrolineatus Cameron, 1879 [mandatory correction of incorrect original spelling *nigro-lineatus*]: 108–110. Described: ♀, ♂, gall, recorded host: *Salix viminalis*. Lectotype, ♀, designated by Kopelke (2007a), BMNH [not examined]. Type locality: England, Worcester. Synonymy with *anglica* by Benson (1940b).

Pontania fibulata Konow, 1901a: 84. Described: ♀, ♂. Lectotype, ♀, designated by Kopelke (2007a), SDEI [examined]. Type locality: Czech Republic, Moravia. Synonymy with *anglica* by Vikberg (2010a).

Phyllocolpa scotaspis: Kopelke 2007c; misidentification.

Notes on types and taxonomy. See remarks under *E. scotaspis*.

Variability. Female: Body length: 3.6–3.9mm. Male: 3.5–3.8mm. Female and male: supraclypeal area and lateral vertex pale marked to completely black. Total number of specimens examined: 12.

Genetic data. A COI barcode for a single specimen from the Netherlands is nearly identical to sequences of *E. leucapsis*.

Similar species. External morphology and colour pattern resembles *E. leucapsis*.

Bionomics. Host plants: *Salix viminalis*, *S. dasyclados* (Vikberg 2010a). Biology: Benander (1969)

Distribution. Central Europe and British Isles (Taeger *et al.* 2006), southern parts of Scandinavia (Benander 1969), Russian Far East (Zhelochovtsev & Zinovjev 1995). Occurrence in Sweden: published records; Skåne (Benander 1969, Coulianos & Holmåsen 1991).

Euura destricta (MacGillivray, 1923) comb. nov.

Pontania destricta MacGillivray, 1923: 168–169. Described: ♀. Lectotype, ♀, INHS [examined], designated by Frison (1927). Type locality: U.S.A., Alaska, Katmai.

Pontania apicifrons Malaise, 1931b: 33–34. Described: ♀, ♂. Lectotype, ♀, designated by Kopelke (2007a), NHRS [NHRS-HEVA000005013; examined]. Type locality: Russia, Kamtchatka.

Pontania apicifrons var. *punctifrons* Malaise, 1931b: 34. Described: sex not stated. Lectotype, ♀, designated by Kopelke (2007a), NHRS [NHRS-HEVA000005014; examined]. Type locality: Russia, Kamtchatka. According to Taeger *et al.* (2010) an infrasubspecific name and therefore unavailable. Name preoccupied in *Euura* by *Pachynematus punctifrons* Malaise, 1921 (Malaise 1921b).

Pontania carinifrons Benson, 1940b: 209–211. Described: ♀, ♂, recorded host: *Salix pentandra*. Holotype, ♀, BMNH [examined]. Type locality: Scotland, Roxburghshire, Newcastleton. **Syn. nov.**

Phyllocolpa carinifrons: Taeger *et al.* (2010).
Pontania excavata: Coulianos & Holmåsen (1991); misidentification.
Phyllocolpa excavata: Benson (1960a); misidentification.
Pontania (*Phyllocolpa*) *excavata*: Viitasaari & Vikberg (1985); misidentification.
Nematus (*Phyllocolpa*) *excavatus*: Zhelochovtsev (1988); misidentification.
Phyllocolpa plicaglauca Kopelke, 2007a: 99–100. Described: ♀, ♂, gall, recorded hosts: *Salix glauca* and *glaucosericea*. Holotype, ♀, SMF [examined]. Type locality: Norway, Finnmark, N.-Varanger, Reppen. **Syn. nov.**

Notes on types and taxonomy. *P. destricta*. MacGillivray (1923) stated neither the number of specimens in the type series, nor made any reference to a specimen as the primary type. Zinovjev & Smith (2000) wrongly referred to the single extant specimen in INHS as the holotype.

Other North American specimens examined: U.S.A.: Alaska, 1♀, Sealer's Is.,10.07.1965, D. M. DeLong, USNM. Oregon, 1♂, Union Co., Red Bridge St. Pk. 10 mi. E Starkey, 26.05.1984, D. R. Smith, USNM; 1♀, Deschutes Co., Tumalo St. Pk. 2 mi. W Tumalo, 04.06.1984, D. R. Smith, USNM. California, 1♀, Placer Co., 1 mi W of Baxter, 3800', 08.06.1980, L. G. Bezark, USNM. New York, 1♀, Franklin Co., 5mi. E of Tupper Lake, Malaise Trap, 09.06.1983, D. R. Smith, USNM. Canada: British Columbia, 1♀, Rogers Pass, creek margin, Glacier N. Park, 30.06.1968, W. W. Wirth, USNM. Alberta, 1♀, 17 mi. S Seebe, Kananaskis For. Exp. Sta., 04–06.06.1978, D. R. Smith, USNM. Quebec, 1♀, James Bay Hwy km 221, sweeping, 06–08.06.1985, H. Goulet & D. R. Smith, USNM; 1♀, James Bay Hwy km 335, Malaise trap, 08–19.06.1985, H. Goulet & D. R. Smith, USNM.

P. apicifrons. Additional type material examined: Paralectotypes 3♀, 3♂, NHRS.

P. plicaglauca. Kopelke (2007a) stated that "The morphological characters of the new species *plicaglauca* do not correspond with any other species of this group". The conspicuous carina along the antennal hollows, in our opinion unique to a single taxon amongst the European gall-makers, is not mentioned. Nor is this described for the segregate that he called *carinifrons.* His illustrations of the lancets and penis valves of *carinifrons* and *plicaglauca* show these to be practically identical.

The very similar morphology and coloration of the nominal taxa *destricta*, *apicifrons*, *carinifrons* and *plicaglauca*, combined with the congruence of COI sequence data for these, have led us to conclude that they are conspecific. The species has already been considered by some authors to have a Holarctic distribution (e.g. Benson 1958, Smith 1979), and the names *destricta* (type locality: Katmai, Alaska) and *excavata* (type locality: Colorado) have sometimes been used for European populations. Zinovjev & Smith (2000) doubted whether *excavata* and *destricta* are conspecific. Kopelke (2007a) rejected the hypothesis that *carinifrons* is conspecific with any of the Nearctic taxa, arguing that *carinifrons* cannot occur in N. America, where *Salix pentandra* grows only as an introduced species. However, since *carinifrons* seems to have more than one host, and one of these, *S. glauca*, is widespread in North America, this argumentation is not convincing. After examining all relevant types, we agree with Zinovjev & Smith (2000), that *excavata* and *destricta* are not conspecific. See below under *E. megacephala* for further discussion.

Variability. Female: Body length: 4.1–4.9mm. The apex of valvula 3 in lateral view is usually quite obtuse, but not infrequently more acute, both in specimens reared from *S. pentandra* and *S. glauca*. Male: 3.7–4.4mm. Female and male: The colour pattern and morphology of this species, including surface sculpture, are remarkably stable throughout most of its range. The primary types of *destricta*, *apicifrons* and *carinifrons* differ only slightly in the extent of pale on the femora, pronotum, and lateral vertex. Total number of specimens examined: 52.

Genetic data. BOLD barcode data for 21 European and Canadian specimens under the names *Phyllocolpa excavata* and *P. carinifrons* share the same BIN. Intraspecific variability within this BIN is approximately 1.6%, attributable largely to the Canadian specimens (Alberta, Manitoba, British Columbia). Four specimens from Finland (GenBank accession EU083959), Sweden, Norrbotten (DEI-GISHym20679), Scotland (DEI-GISHym5032) and Canada, Manitoba (10PROBE-21909) have an identical barcode. The nearest neighbouring European species, with a minimum of 2% difference, is *E. leucapsis*.

Similar species. Morphologically, including their lancets, *E. destricta* strongly resembles species of the *ischnocera* complex. The latter lack the carina along the antennal hollows, and annular suture 2 has a fully developed band of ctenidia: Fig. 28 (ctenidia very few, or absent, on annular suture 2 in *E. destricta*: Fig. 29).

Bionomics. Host plants: main hosts are *Salix pentandra* (Kopelke 2007a, as *Phyllocolpa carinfrons*), *Salix phylicifolia* (Vikberg 1970, as *Pontania excavata*), and *Salix glauca* (Kopelke 2007a, as *P. plicaglauca*). *S. myrtilloides* and *S. lapponum* are probably additional, perhaps infrequently used hosts (below). Kopelke (2007a) rejected Vikberg's record of *S. phylicifolia* as a host at Kilpisjärvi, northern Finnish Lapland, because he held *P. carinifrons* to be strictly monophagous on *S. pentandra*. Females from Kilpisjärvi, reared from *S. phylicifolia*, are morphologically indistinguishable from specimens reared from *S. pentandra*, *S. glauca* and *S. lapponum*. Furthermore, several *E. destricta* were collected by sweeping at subalpine levels near Abisko, Swedish Lapland, at a site where no *S. pentandra* occurs. Here, *S. phylicifolia*, *S. glauca* and /or *S. lapponum* may be the hosts. That *S. myrtilloides* is also a host is indicated by sequence data, identical to samples from *S. pentandra* and *S. glauca*, for a larva (AS_Euura_species_Salix_myrtilloides, leg. Nyman) collected in Finland from this host Three females and five males reared by Kopelke from *S. lapponum* and determined by him partly as *P. acutiserra*, partly as *P. plicalapponum*, are morphologically indistinguishable from *destricta* reared from other hosts. These specimens are all from a single locality: Norway, S. Trøndelag, Meldal. In view of this, the possibility of misidentification of the willow should be borne in mind, and use of *S. lapponum* as a host by *E. destricta* therefore requires confirmation. Biology: Kopelke (2007a).

Distribution. Central and North Europe including Britain and Ireland (Taeger *et al.* 2006), north to Kilpisjärvi in Finland; E. Siberia and Russian Far East (Zhelochovtsev & Zinovjev 1995); N. America (northern Canada, and U.S.A., south to California, in the Sierra Nevada Mountains). Occurrence in Sweden: published records; Skåne (Benander 1969), Halland (Andersson 1955: as *P. ? leucaspis* [*sic!*] on *S. pentandra*), Jämtland, Västerbotten (Haris 2009), Torne Lappmark (Coulianos & Holmåsen 1991). Material examined: Ångermanland, Västerbotten, Torne Lappmark.

Euura leucapsis (Tischbein, 1846)

Nematus leucapsis Tischbein, 1846: 77. Described: adult [sex not stated]. Neotype, ♀, designated by Kopelke (2007a), SMF [examined]. Type locality: Germany, Mecklenburg-Vorpommern, Zittwitz.
Phyllocolpa leucapsis: Kopelke (1999).
Euura leucapsis: Prous *et al.* (2014).
Nematus alienatus Förster, 1854a: 334–335, 338. Described: ♀. Lectotype, ♀, designated by Kopelke (2007a), ZSM [examined].Type locality: Germany, near Aachen. **Syn. nov.**
Pontania alienata: Konow (1890).
Phyllocolpa alienata: Kopelke (2007b).
Euura alienata: Beneš (2015b).
Nematus (*Pontania*) *coriaceus* Benson, 1953: 150–151. Described: ♀, ♂. Holotype, ♀, BMNH [not examined]. Type locality: England, Buckinghamshire, Whaddon Chase. Synonymy by Kopelke (2007b), but see also Taeger *et al.* (2010: 11).
Pontania coriacea: Benson (1958).
Phyllocolpa coriacea: Benson (1960a).
Pontania (*Phyllocolpa*) *coriacea*: Viitasaari & Vikberg (1985).
Nematus (*Phyllocolpa*) *coriaceus*: Zhelochovtsev (1988).
Phyllocolpa rolleri Liston, 2005: 183-185. : ♀, ♂. Holotype, ♀, SDEI [examined]. Type locality: Slovakia, Lower Tatras, Krakova hol´a. **Syn. nov.**

Notes on types and taxonomy. Vikberg (2010a) and Beneš (2013) have already discussed the unfortunate decision by Kopelke (2007a) to designate a specimen of this taxon (with sculptured and dull antennal hollows) as neotype of *leucapsis*. During the preceding decades, nearly all authors (e.g. Benson 1958, 1960, Beneš 1968a, Zhelochovtsev 1988) had interpreted the name *leucapsis* as denoting a single species (with glabrous and shiny antennal hollows), which Kopelke (2007a) regarded as a group of species including, amongst others, *ischnocera*, *polita* and *prussica*. Although the novel application of the name *leucapsis* to a species that is not very closely related to those which were previously so named is certain to cause much confusion, the ICZN (1999) does not seem to offer a way of reversing Kopelke's action.

Kopelke (2007b) regarded *Phyllocolpa alienata* and *P. leucapsis* as separate species, monophagous respectively on *Salix aurita* and *S. cinerea*. The main morphological characters presented in his key to distinguish them were the length: breadth index of valvulae 3 in dorsal view and very slight differences in the profile of valvula 3 in lateral view. The key states that ctenidia are present on the lancet from annulus 3 in both taxa, although his Figure 1d (*leucapsis*) shows these as present from annulus 2. All these characters are somewhat variable and are not correlated with the host plants. The penis valves are practically indistinguishable, as are Kopelke's drawings of these. On the other hand, specimens from *S. aurita* tend to be darker than those from *S. cinerea*. This applies to the coloration of the head, pronotum, femora and cerci, but a complete spectrum of intermediate specimens exists. Possibly the trend is merely a reflection of the generally cooler sites, often in more northern or upland areas, where *S. aurita* is the main host. Nearly the same applies to *Phyllocolpa rolleri*, which represents an even darker extreme than *P. alienata*, on the same continuum of variability. In view of these considerations, and the lack of evidence for a genetic difference, we propose the synonymy of these three taxa.

Blank *et al.* (2009) followed the error made by Kopelke (2007b: in the text), and treated *coriacea* (Benson) as a synonym of *alienata*. However, it was Kopelke's intention to place *coriacea* as a synonym of *leucapsis* (Kopelke 2007b: in the abstract), as noted by Taeger *et al.* (2010).

Variability. Female: Body length: 3.1–4.1mm. Male: 3.3–3.8mm. See also above (Notes on types and taxonomy). Total number of specimens examined: 21.

Genetic data. COI barcodes of five German *leucapsis* specimens from *S. cinerea* and five German and Scottish specimens from *S. aurita* were identical. The barcodes of *E. acutiserra*, morphologically the most similar north European species, differ from *leucapsis* by an approximate minimum of 3.0%.

Bionomics. Host plants: *Salix cinerea* (Kopelke 2007b), *S. aurita* (Kopelke 2007b: as *alienata*), and *S. silesiaca* (Liston 2011: *Salix hastata*, reported in the original description as the host of *rolleri*, was a misidentification). A larva collected from *S. lapponum* by TN (tree: 5x_Euura_acutiserra_Salix_lapponum) was identified by its barcode as *E. leucapsis*. Perhaps this represents a case of oviposition on an atypical host. Biology: Kopelke (2007b).

Distribution. Central and North Europe, north to Finnmark (Kopelke 2007b), Russian Far East (Zhelochovtsev & Zinovjev 1995), Canada (Benson 1962). Occurrence in Sweden: published records; Skåne (Benander 1966, as *Pontania coriacea* on *S. cinerea* and *S. aurita*), Halland, Torne Lappmark (Coulianos & Holmåsen 1991). Material examined: Skåne, Hälsingland.

Euura leucosticta **(Hartig, 1837)**

Nematus leucostictus Hartig, 1837: 202. Described: adult [sex not stated]. Lectotype, ♀, designated by Kopelke (2007a), ZMHUB [examined]. Type locality: "Germania".
Pontania leucostica: Konow (1890).
Phyllocolpa leucosticta: Benson (1960a).
Pontania (*Phyllocolpa*) *leucosticta*: Viitasaari & Vikberg (1985).
Nematus (*Phyllocolpa*) *leucostictus*: Zhelochovtsev (1988).
Euura leucosticta: Beneš (2015b).
Nematus klugii Gimmerthal, 1844: 37. Described: ♀. Holotype, ♀: it is not known, whether the specimen still exists. Type locality: Latvia, near Riga. Synonymy with *leucosticta* by Konow (1905).
Nematus erythropygus Förster, 1854a: 309–310. Described: ♀. Lectotype, ♀, designated by Kopelke (2007a), ZSM [examined]. Type locality: Germany, near Aachen. **Syn. nov.**
Phyllocolpa erythropyga: Kopelke (2007a).
Euura erythropyga: Beneš (2015b).
Nematus crassulus Thomson, 1863: 630–631. Described: ♀, ♂. Lectotype, ♀, designated by Kopelke (2007a), ZMLU [examined]. Type locality: Norway, Norrbotten, Småland, Öland, Blekinge and Skåne [from original description: lectotype without indication of locality]. Synonymy with *leucosticta* by Konow (1897).
Nematus sharpi Cameron, 1876c: 191–192. Described: ♀. Syntypes possibly in BMNH [not examined]. Type locality: probably Scotland. Synonymy with *N. leucostictus* by Dalla Torre (1894).
Pontania ischnoceros var. *nigrifrons* Konow, 1897: 174–177. Described: ♀, ♂. Lectotype, ♂, designated by Kopelke (2007a), SDEI [examined]. Type locality: Germany, Teschendorf in Mecklenburg. Synonymy with *leucosticta* by Kopelke (2007a).
Pontania auberti Zirngiebl, 1957: 173–174. Described: ♀. Holotype, ♀, Musée Zoologique Cantonale, Lausanne [not examined]. Type locality: Algeria, Saida. Synonymy with *leucosticta* by Lacourt (1997).

Notes on types and taxonomy. Kopelke (2007a) treated *leucosticta* and *erythropyga* as separate species, monophagous respectively on *S. caprea* and *S. aurita*. According to his key (Kopelke 2007a: 83), *erythropyga* differs from *leucosticta* in its more narrowly pale posterior margin of the pronotum, broader valvulae 3 in dorsal view, shorter cerci, ctenidia present on lancet from annulus 2 (3 in *leucosticta*), and a very slight difference in the outline of the paravalva of the penis valve. All these characters vary somewhat in the material studied, and do not correlate with the host plant from which they were reared. Accordingly, we treat these nominal taxa as synonymous.

Variability. Female: Body length: 3.8–5.5mm. Male: 3.8–4.6mm. Female and male: lower inner orbits, outer orbits and lateral vertex mainly pale to nearly completely black; extent of pale on pronotum variable. Total number of specimens examined: ca. 100.

Genetic data. The 24 COI barcode sequences available on BOLD under the names *Phyllocolpa leucosticta* and *P. erythropyga,* from Italy and Portugal north to Finland, form a single BIN with intraspecific variability of about 1.1%. Nearest European barcoding neighbour, about 6.6% different, is *E. polita.*

Bionomics. Host plants: *Salix aurita*, *S. caprea* (Kopelke 2007a) and *S. cinerea* (below). Three specimens, from separate rearing batches collected on *Salix cinerea* at three German localities were reared by J.-P. Kopelke and determined by him as *Phyllocolpa prussica*, but they clearly belong to *leucosticta*. Biology: Kopelke (2007a).

Distribution. Nearly throughout Europe north to Finnmark (Taeger *et al.* 2006, Kopelke 2007a), Turkey, Transcaucasus (Benson 1968), North Africa (Lacourt 1999), Central Asia (Zhelochovtsev & Zinovjev 1995), Yakutia (Popov 2011). Occurrence in Sweden: published records; Skåne (Benander 1966), Blekinge, Småland, Öland, Närke, Dalarna, Gästrikland, Jämtland (Haris 2009), Västerbotten (Kopelke 2007a). Material examined: Skåne, Småland, Västergötland, Uppland, Dalarna, Torne Lappmark.

Euura oblita (Serville, 1823)

Nematus oblitus Serville, 1823: 72. Described: ♀. Lectotype, ♀, designated by Blank & Taeger (1998), MRSN [not examined]. Type locality: France, Paris.
Phyllocolpa oblita: Blank & Taeger (1998).
Euura oblita: Beneš (2015b).
Nematus oblitus Lepeletier, 1823: 69. Described: ♀. The lectotype is the same specimen as designated for *N. oblitus* Serville [see above]. Type locality: France, near Paris.
Nematus pineti Hartig, 1837: 208. Described: ♀, recorded host: Rothtanne [*Picea abies*]. Lectotype, ♀, designated by Kopelke (2007a), ZSM [not examined]. Type locality: Berlin area ["bei uns"]. Used as a valid name, with *puella* as a synonym, by Dalla Torre (1894).
Nematus pleurostictus Förster, 1854b: 432–433. Described: ♂. Holotype [Förster's description of damage makes it clear that he only had one specimen], ♂, ZSM [examined]. Type locality: near Aachen. Synonymy with *Phyllocolpa oblita* by Taeger *et al.* (2010), based on examination of the type by V. Vikberg.
Nematus puella Thomson, 1871: 160. Described: ♀. Lectotype, ♀, designated by Kopelke (2007a), MZLU [examined]. Type locality: Sweden, Skåne.
Pontania puella: Konow (1890).
Phyllocolpa puella: Benson (1960a).
Pontania (*Phyllocolpa*) *puella*: Viitasaari & Vikberg (1985).
Nematus (*Phyllocolpa*) *puella*: Zhelochovtsev (1988).

Variability. Female: Body length: 4.0–5.8mm. Head with only a small black fleck around each ocellus, varying to a large black patch covering whole ocellar area. Black markings on mesoscutum more or less extensive. Metapleuron from entirely black to nearly completely pale. Terga 1–7 black except for downturned lateral margins, or nearly entirely pale. Ratio of length flagellomere 2 / height of eye 1.02–1.18. Male: 4.0–4.8mm. Colour variability similar to female, but male on average much darker, e.g. mesoscutum and mesoscutellum completely black. Black mesepisternum with brown fleck on upper half, or completely black. Metafemur with narrow black stripe on posterior edge, to extensively black basally. All abdominal sterna pale, varying to basal sterna mainly black. Total number of specimens examined: 16.

Genetic data. The COI barcodes obtained for *E. oblita* are closely similar to those of the nominal taxa belonging to the *E. ischnocera* complex, with the possible exception of *E. plicalapponum*.

Similar species. *E. oblita* resembles species of the *ischnocera* complex, but the latter have a much darker colour pattern, shorter flagellomeres (ratio length flagellomere 2 / height of eye 0.76-1.03), and less acute lancet serrulae: e.g. Fig. 31 (*E. oblita* lancet: Fig. 28).

Bionomics. Host plants: *Salix alba*, *S.* × *fragilis*, *S.* × *rubens* (Kopelke 2007a), *S. triandra* (Lorenz & Kraus 1957, Beneš 2015a), *S. babylonica*, *S. vitellina* (Beneš 2015a). Biology: Kopelke (2007a).

Distribution. Central Europe (Taeger *et al.* 2006), British Isles (Benson 1958), southern Scandinavia (Coulianos & Holmåsen 1991), Turkey (Benson 1968), Yakutia (Popov 2011). Occurrence in Sweden: published records; Skåne (Thomson 1871, Benander 1969), Öland (Coulianos & Holmåsen 1991), Västergötland (Benander 1969), Bohuslän (Coulianos & Holmåsen 1991), Jämtland (Haris 2009). Material examined: Skåne.

Euura scotaspis (Förster, 1854)

Nematus scotaspis Förster, 1854a: 307–308. Described: ♀. Lectotype, ♀, designated by Kopelke (2007a), ZSM [examined]. Type locality: Germany, near Aachen.
Pontania scotaspis: Konow (1890).
Phyllocolpa scotaspis: Benson (1960a).
Nematus (*Phyllocolpa*) *scotaspis*: Zhelochovtsev (1988).
Euura (*Phyllocolpa*) *scotaspis*: Noblecourt (2016).
Nematus westermanni Boheman, 1852: 173–174. Described: adult, sex not specified. Syntypes probably lost: could not be located at NHRS. Type locality: Sweden, Skåne, Fågelsång. **Syn. nov.**
Nematus westermanni Thomson, 1863: 615–616. Described: ♀, ♂. Lectotype, ♀, designated by Kopelke (2007a), MZLU [examined]. Type locality: southern Skåne. Junior primary homonym of *N. westermanni* Boheman.

Notes on types and taxonomy. *N. westermanni* Boheman. Blank *et al.* (2009) stated that it is not possible to identify this taxon from its description. However, the described coloration and "Scutellum convexum, nigrum, punctulatum" actually fits *E. scotaspis* very well. *N. westermanni* Boheman is a nomen oblitum with respect to *N. scotaspis* Förster (nomen protectum), because the former has not been used as a valid name after 1899, whereas the latter has been used as valid in at least 25 works, published by at least 10 authors in the immediately preceding 50 years and encompassing a span of not less than 10 years (ICZN 1999: 23.9.1).

N. scotaspis. Kopelke (2007a) designated as lectotype a specimen which belongs to this taxon, but the description, as well as biological and distributional data in his subsequent paper (Kopelke 2007c) are all based on misidentified specimens of *E. anglica* (Vikberg 2010a).

Variability. Female: Body length: 4.6–5.7mm. Colour pattern constant in examined specimens. Male: 4–5mm [according to Benson 1958]. Total number of specimens examined: 8.

Genetic data. None available.

Bionomics. Host plants: *Salix viminalis*, *S. schwerinii*; latter in the E. Palaearctic (Vikberg 2010a). According to Beneš (2015a), *S. dasyclados* is also a host. Biology: Benander (1969).

Distribution. Central and North Europe, north to Skåne (Taeger *et al.* 2006), Afghanistan (MZLU, examined), Russia (Yakutia) (Popov 2011). Occurrence in Sweden: published records; Skåne: (Benander 1969, Coulianos & Holmåsen 1991). Material examined: Skåne.

ischnocera complex

It does not seem possible to distinguish females of this complex morphologically. They display characteristic tendencies in coloration, correlated with host association, but coloration is sometimes highly variable within series reared from the same *Salix* species, and overlaps broadly in every case with the range of colour pattern in some other segregates. Neither the species differences given by Kopelke (2007a) in the morphology of valvula 3, nor the length of the metatibial spurs were detected in the material examined. Differences in penis valve morphology possibly distinguish the males, according to Kopelke (2007a), but the variability of these characters has not been thoroughly checked. Colour pattern of the males seems to be more stable than that of females. All taxa, as well as *E. oblita*, but possibly excepting *E. plicalapponum*, have nearly identical COI barcodes. *E. oblita* is however not included in the complex, because it is clearly distinguishable by its very long antennae, extremely pale colour pattern in the female, as well as larval morphology. Benson (1958), Zinovjev (1999), and many other authors treated this complex (without *E. oblita*) as a single species, under the name *leucapsis* Tischbein. Zinovjev (1999) additionally recorded *Salix atrocinerea*, *S. aurita* and *S. starkeana* as hosts of *Phyllocolpa leucapsis* auct. [= *ischnocera* complex], but these hosts are not mentioned by Kopelke (2007a). *Salix caprea* is probably also used as a host (see under Bionomics of *E. prussica* and *E. cyrnea*). Finally, *P. leucapsis* auct., as well as *P. puella* [= *E. oblita*], were recorded as separate species which both have *S. fragilis*, *S. alba*, and *S. triandra* as hosts (Beneš 1968a: 119). Possibly the six nominal species listed below are conspecific, but we retain them provisionally as valid until more complete genetic data is available, and a study of their larval morphology has been made. Adults of this complex are rather abundant in Sweden, but because of the difficulties mentioned above, we are only able to list a few definite records for species based on the material that we have seen.

Euura ischnocera (Thomson, 1863) comb. nov.

Nematus ischnocerus Thomson, 1863: 638. Described: ♀, ♂. Lectotype, ♀, designated by Kopelke (2007a), MZLU [examined]. Type locality: Sweden, Norrland.
Pontania ischnoceros [*sic*]: Konow (1890).
Phyllocolpa ischnocera (Thomson, 1863): Kopelke (1990b).
Nematus leucostigmus Cameron, 1876c: 308. Described: ♀. Lectotype, ♀, designated by Kopelke (2007a), BMNH [not examined]. Type locality: Scotland, Rannoch. Synonymy by Kopelke (2007a).

Variability. Female: Body length: 3.4–3.9mm. Ratio of length flagellomere 2 / height of eye 0.86-0.93. Male: 3.2–4.2mm. Female and male: within wider geographic regions, the colour pattern seems very stable, but specimens from the Alps have a much more extensively pale head, pronotum and femora than those from northern Europe. The pterostigma is usually entirely pale, but can be apically more or less darkened. Total number of specimens examined: 14.

Genetic data. COI barcodes of species of this complex, as well as *E. oblita*, are highly similar, and not useful for identification.

Similar species. Females are most similar to the other segregates with typically extensively dark orbits: *E. plicalapponum, E. plicaphylicifolia*.

Bionomics. Host plant: *Salix myrsinifolia* (Kopelke 2007a). Biology: Kopelke (2007a).

Distribution. Central Europe (mainly Alps) and northern Europe, including Scotland (Kopelke 2007a, Liston *et al.* 2012). Occurrence in Sweden: published records; Västerbotten, Torne Lappmark (Kopelke 2007a).

Euura plicadaphnoides (Kopelke, 2007)

Phyllocolpa plicadaphnoides Kopelke, 2007a: 97–99. Described: ♀, ♂, gall, recorded host: *Salix daphnoides*. Holotype, ♀, SMF [examined]. Type locality: Austria, Salzburg, Obertauern.
Euura plicadaphnoides: Liston (2015).

Variability. Female: Body length: 3.4–5.5mm. Outer margin of inner orbits partly black to narrowly but continuously pale. Upper outer orbits partly pale to outer orbits continuously pale. Ratio of length flagellomere 2 / height of eye 1.00-1.03. Male: 3.2–4.3mm. Upper outer orbits and lateral vertex clearly pale to almost black. Total number of specimens examined: 11.

Genetic data. COI barcodes of species of this complex, as well as *E. oblita*, are highly similar, and not useful for identification.

Similar species. Females are most similar to the other segregates with typically extensively pale orbits: *E. polita, E. prussica*.

Bionomics. Host plants: *Salix daphnoides, ? S. acutifolia* (Kopelke 2007a). Biology: Kopelke (2007a).

Distribution. Published records are from Alpine areas of Central Europe (Austria and Switzerland: Kopelke 2007a), as well as lowland areas in the Czech Republic (Beneš 2015a) and Germany (Liston 2015). Kopelke (2007a) noted that galls similar to those on *S. daphnoides* were found on *S. acutifolia* in Lithuania, but no specimens were reared. Occurrence in Sweden: no records, but should be looked for where its host(s) occurs.

Euura plicalapponum (Kopelke, 2007) comb. nov.

Phyllocolpa plicalapponum Kopelke, 2007a: 100–101. Described: ♀, ♂, gall, recorded host: *Salix lapponum.* Holotype, ♀, SMF [examined]. Type locality: Norway, Finnmark: S.-Varanger, Færdesmyra.

Variability. Female: Body length: 3.5–4.4mm. Ratio of length flagellomere 2 / height of eye 0.84-0.93. Male: not examined. Female and male: too few specimens were examined to allow an assessment of variability. Total number of specimens examined: 5.

Genetic data. COI barcodes of species of this complex, as well as *E. oblita*, are generally highly similar, and not useful for identification. However, the single sequence available for *E. plicalapponum* differs markedly from the sequences of the other members of the complex. The tissue sample was from a larva, which was perhaps not correctly identified.

Similar species. Females are most similar to the other segregates with typically extensively dark orbits: *E. ischnocera, E. plicaphylicifolia*.

Bionomics. Host plant: *Salix lapponum* (Kopelke 2007a). Biology: Kopelke (2007a).

Distribution. Only recorded from Scotland (Liston *et al.* 2012) and Norway (Kopelke 2007a). Apparently a rather uncommon species: many of the specimens from Norway identified by Kopelke as this species are *E. acutiserra*. Occurrence in Sweden: no published records, but can be assumed to be present.

Euura plicaphylicifolia (Kopelke, 2007) comb. nov.

Phyllocolpa plicaphylicifolia Kopelke, 2007a: 101–102. Described: ♀, ♂, gall, recorded host: *Salix phylicifolia.* Holotype, ♀, SMF [examined]. Type locality: Norway, S.-Trøndelag: Dovrefjell, Grønbakken.

Variability. Female: Body length: 2.9–4.4mm. Ratio of length flagellomere 2 / height of eye 0.79-1.04. Male: 3.6–4.1mm. Female and male: small brown area on lateral vertex may be absent. Extent of pale on lower inner orbits and malar space variable. Distal ca. half of metafemur pale to nearly whole femur black. Total number of specimens examined: 5.

Genetic data. COI barcodes of species of this complex, as well as *E. oblita*, are highly similar, and not useful for identification.

Similar species. Females are most similar to the other segregates with typically extensively dark orbits: *E. ischnocera, E. plicalapponum*.

Bionomics. Host plant: *Salix phylicifolia* (Kopelke 2007a). Biology: Kopelke (2007a).

Distribution. Only previously recorded from Scotland (Liston *et al.* 2012), and Norway (Kopelke 2007a). Occurrence in Sweden: no published records, but can be assumed to be present.

Euura polita (Zaddach, 1883)

Nematus politus Zaddach, 1883 [in Brischke 1883a]: pl. I(7):14 [larva, host]; text description in Brischke 1884: 167–168 [♀, ♂]. Described: ♀, ♂, larva, recorded host: *Salix helix*. Neotype, ♀, designated by Kopelke (2007a), SMF [examined]. Type locality: Germany, Hesse: Wetterau, Ortenberg I (Nidder).

Phyllocolpa polita: Kopelke (2007a).

Euura polita: Prous *et al.* (2014).

Nematus sieboldii Zaddach, 1884 [in Brischke 1884]: 171–172. Described: ♀. Syntypes stated by Zaddach to have been received from ZMHUB, but have not been located there (Kopelke 2007a). Type locality: Danzig. Synonymy with *Phyllocolpa polita* by Kopelke (2007a).

Pontania leucapsis var. *connata* Enslin, 1915: 347. Described: adult, sex not specified. Lectotype, ♀, designated by Kopelke (2007a), ZSM [examined]. Type locality: Germany, Gotha. Synonymy with *Phyllocolpa polita* by Kopelke (2007a).

Variability. Female: Body length: 2.8–4.0mm. Ratio of length flagellomere 2 / height of eye 0.88-1.00. Male: 2.9–3.8mm. No significant variability in colour pattern of specimens examined. Total number of specimens examined: 12.

Genetic data. COI barcodes of species of this complex, as well as *E. oblita*, are highly similar, and not useful for identification.

Similar species. Females are most similar to the other segregates with typically extensively pale orbits: *E. plicadaphnoides*, *E. prussica*.

Bionomics. Host plants: *Salix purpurea* (Kopelke 2007a), *Salix purpurea* × *silesiaca* (Beneš 2015a). Biology: Beneš (1968a; as *Phyllocolpa leucapsis*), Kopelke (2007a).

Distribution. Mainly in Central Europe (Kopelke 2007a), but also Greece: 1 fem., 11.5.2007, Nom. Evritania, Karpenisi E 4km, Agios Nikolaos, 900 m., 38.91666°N 21.78333°E, leg. Liston (SDEI) [first record from Greece]. Occurrence in Sweden: published records; Skåne (Benander 1966, as *Pontania leucapsis* reared from *Salix purpurea*), Västergötland (Wahlgren 1960, as galls of *Pontania leucapsis* on *S. purpurea*).

Euura prussica (Zaddach, 1883)

Nematus prussicus Zaddach, 1883 [in Brischke 1883a]: Taf.1(7), Fig.4 [larva, host]; text description in Brischke 1884: 166–167. Described: ♀, ♂, recorded hosts: *Salix viminalis* and *cinerea*. Neotype, ♀, designated by Kopelke (2007a), SMF [examined]. Type locality: Germany Mecklenburg-Vorpommern, Rügen, Zittvitz.
Pontania prussica: Konow (1890).
Phyllocolpa prussica: Kopelke (2007).
Euura prussica: Beneš (2015b).

Variability. Female: Body length: 2.8–4.3mm. Outer orbits continuously pale to only pale below. Ratio of length flagellomere 2 / height of eye 0.76-0.89. Male: 3.3–4.4mm. Antennal flagellum completely black to pale underneath. Outer orbits continuously pale to only pale below. Abdominal sterna mainly pale to mainly black. Total number of specimens examined: 15.

Genetic data. COI barcodes of species of this complex, as well as *E. oblita*, are highly similar, and not useful for identification.

Similar species. Females are most similar to the other segregates with typically extensively pale orbits: *E. plicadaphnoides*, *E. polita*.

Bionomics. Host plants: *Salix cinerea* (Kopelke 2007a), ? *S. caprea* (below, and see under Bionomics of *E. cyrnea*). Biology: Kopelke (2007a). Five males reared from German localities in Mecklenburg and Baden-Württemberg bear determination labels by Kopelke "*Phyllocolpa anomaloptera* /*S. caprea* / Blattrolle/falte klein". The specimens clearly belong to the *oblita* group, *ischnocera* subgroup. Based on their rather pale head coloration, darkened femora, and the close relationship of *S. cinerea* and *S. caprea* (section Vetrix), they are probably *E. prussica*.

Distribution. Central Europe, north to Jämtland in Sweden (Kopelke 2007a). Occurrence in Sweden: published records; Jämtland (Kopelke 2007a).

Species of the *oblita* group not occurring in northern Europe

To explain our interpretation of the name *Euura destricta*, we present notes on a Nearctic taxon with which the former has sometimes been considered conspecific.

Euura megacephala (Rohwer, 1908) spec. rev., comb. nov.

Pontania excavata Marlatt, 1896: 30. Described: ♀, ♂. Lectotype, ♀, designated by Kopelke (2007a), USNM [examined]. Type locality: U.S.A., Colorado, Veta Pass. Secondary homonym (see below).
Pontania megacephala Rohwer, 1908: 47. Described: ♂. Lectotype, ♂, designated below, USNM. Type locality: U.S.A., Colorado, Florissant. Rohwer mentions that the specimen(s) were collected from *Salix brachycarpa*.

Notes on types and taxonomy. Marlatt (1896) described *Amauronematus excavatus* and *P. excavata* in the same paper. Combined with *Euura*, following the generic synonymy proposed by Prous *et al.* (2014), *P. excavata* and *A. excavatus* are secondary homonyms. The latter is currently regarded as a valid species (e.g. Taeger *et al.* 2010, as *Nematus excavatus*). As first revising authors, we give *A. excavatus* priority over *P. excavata.* Benson (1960b) treated *P. excavata* as the valid species name for a Holarctic taxon, and listed as its synonyms *apicifrons*, *carinifrons*, *destricta* and *megacephala*. However, in our opinion these names refer to two separate taxa: one with a circumpolar and primarily northern distribution (*destricta*), the other restricted to the southern parts of the Rocky Mountains in Colorado, U.S.A. (*megacephala*). *E. megacephala* differs from *E. destricta* in the following characters (character state for *destricta* in parentheses): Female; antenna shorter, i.e. index length flagellomere 2 : height of eye 0.64–0.77 (0.92–0.97), valvula 3 in lateral view apically very obtuse and ventrally less emarginate (apically more or less acute and ventrally highly emarginate); upper head weakly sculptured and rather shiny (finely but densely sculptured and matt); carina developed along upper half of antennal hollow (along upper three-quarters); pale are outer orbits completely, lower inner orbits and supraclypeal area (black); more or less pale are a fleck on upper mesepisternum, venter of abdomen, tergum 9 and valvula 3 pale (black). Differences in the male, based for *megacephala* on the only available specimen (the lectotype) are less clear, but similarly to the female: upper head weakly sculptured and rather shiny (finely but densely sculptured and matt); carina developed along upper half of antennal hollow (along upper three-quarters); venter of abdomen more extensively pale (mainly black).

P. excavata. Additional type material examined: paralectotypes, USNM; 1♀, data same as lectotype; 1♂ "Col." [Colorado].

P. megacephala. Lectotype, ♂, hereby designated, USNM; labels: "on Salix brachycarpa", "Florissant, Colo. Expedition 1906 [year scored out] Coll. S. A. Rohwer. June 16 1907", "Type 12845 No. U.S.N.M.", "Pontania megacephala Rohwer. Type.", "USNM Ent 00779208", "Lectotype ♂ Pontania megacephala Rohwer, 1908 des. A. Liston 2016", "DEI-GISHym21328". No paralectotypes.

Other material examined: 3♀; U.S.A., Colorado, Monarch Pass, 2 mi W Garfield, 10000', 18.06.1981, D. R. Smith (2 in USNM, 1 in SDEI).

E. piliserra group

Diagnosis. Adult. In lateral view right mandible gradually tapering, left one with swollen base and thin, blade-like apex. Vein 2r-m normally present in both fore wings. Supraclypeal area densely setose. Antenna long: in female longer than fore wing costa, in male longer than combined length of costa and pterostigma. Valvula 3 in dorsal view nearly parallel-sided basally, or slightly bulbous, with abruptly tapered apex; in lateral view not emarginate, or scarcely so, on either margin. Metatarsomere 4 dorsally shorter than its apical width. Lancet: very broad; annular sutures strongly arcuate. Penis valve: ventrally without small spines; base of valvispina ventrally not clearly divided from lobe on which it arises.

Larva. Third abdominal segment with 4 dorsal annulets; 1–3 with setae. Suranal plate without pseudocerci.

Gall. Each side of leaf-blade rolled downwards and meeting below the midvein, so forming a tube in which several larvae live: usually 3–5, but sometimes up to 8). At first they eat the lower epidermis and parenchyma, leaving the upper epidermis intact. Later instars leave the roll and eat the leaf-blade from the tip, leaving the midrib intact. Oviposition in the underside of leaf-blade, between midrib and edge (Lorenz & Kraus 1957).

Phenology. Bivoltine according to Benson (1958) and Beneš (1968a).

Euura piliserra **(Thomson, 1863)**

Nematus piliserra Thomson, 1863: 616–617. Described: ♀. Lectotype, ♀, designated by Kopelke (2007a), MZLU [examined]. Type locality: Sweden, Skåne, Arrie. *Pontania piliserra*: Konow (1890), as synonym of *P. xanthogastra* (Förster, 1854)[=*Euura bipartita* (Serville, 1823)].

Phyllocolpa piliserra: Benson (1960a).

Nematus (*Phyllocolpa*) *piliserra*: Zhelochovtsev (1988).

Pontania (*Phyllocolpa*) *piliserra*: Zinovjev (1993b).

Euura piliserra: Beneš (2015b).

Pontania piliserra var. *mascula* Enslin, 1915: 344. Described: ♀. Lectotype, ♀, designated below. Type locality: Germany, Crefeld [Krefeld].

Pontania piliserra var. *tristis* Enslin, 1915: 344. Described: ♂. Syntypes, ♂, should be in ZSM, but were not located. Type locality: not stated.

Pteronidea weiffenbachi Lindqvist, 1958: 107–108. Described: ♀, larva, recorded host: *Salix viminalis*. Holotype, ♀, FMNH [examined]. Type locality: Germany, Niederhessen, Waldauer Bruch. Synonymy with *Pontania piliserra* by Vikberg (1970).

Notes on types and taxonomy. *P. piliserra* var. *mascula.* Lectotype, ♀, hereby designated, ZSM; labels: "Crefeld Rh. Ulbricht 5.", "Pontania piliserra v. mascula ♀ E. Dr. Enslin det.", "Sammlung Dr Enslin", "Type" [red], "GBIF-GISHym 3344", "Lectotype ♀ Pontania piliserra v. mascula Enslin, 1915 des. A. Liston 2016". No paralectotypes.

Variability. Female: Body length: 4.7–5.8mm. Black patch surrounding only ocelli or extending forwards to reach toruli and laterally on upper inner orbits nearly to eyes. Mesoscutum and mesoscutellum entirely black to extensively pale-marked. Mesepisternum entirely pale or with variably sized black patch on lower half. Male: 4.9–5.6mm. Variability similar to female, but abdominal terga with black only medially on T1 to black medially on T1–4(5). Total number of specimens examined: 8.

Genetic data. The CO1 barcode of the single specimen so far sequenced diverges by about 8% from its nearest neighbour (*E. anomaloptera*).

Bionomics. Host plants: *Salix viminalis* (Kopelke 2007c), *S. dasyclados* (Vikberg 2010a). Biology: Benander (1969), Beneš (1968a, 2015a), Brischke (1883a; as *Nematus xanthogaster*, misidentification). This is the only European gall-inducing sawfly, apart from *E. amerinae*, in which several larvae normally inhabit a single gall.

Distribution. Central and North Europe, to southern Scandinavia (Kopelke 2007c) and British Isles (Benson 1958). Occurrence in Sweden: published records; Skåne (Benander 1969, Coulianos & Holmåsen 1991). Material examined: Skåne.

E. proxima group

=*Pontania* Costa, 1852, in part

Diagnosis. Adult. In lateral view right mandible gradually tapering, left one with swollen base and thin, blade-like apex. Vein 2r-m normally present in both fore wings. Supraclypeal area entirely glabrous, or with at most 1–5 setae. Antenna moderately long: ♀ about as long, or slightly longer, than costa of fore wing; ♂ longer than costa of fore wing. Cercus short: about 3× as long as maximal width and reaching back only to about middle of valvula 3. Medial and basal annuli with flat ventral edge (serrulae not clearly developed). Antennal hollow nearly entirely glabrous and shiny. Penis valve: ventrally with small spines; base of valvispina ventrally clearly divided from lobe on which it arises by an incision or at least a right-angled turn.

Larva. Third abdominal segment with 4 dorsal annulets. Suranal plate with widely separated pseudocerci.

Gall. In leaves. Rather flat; "coffee bean" shaped. Developed only above the leaf-blade, or projecting on both sides. Not usually touching midrib.

Phenology. Usually bivoltine, or even trivoltine, depending on climatic conditions.

Notes. Compared to other gall-inducing *Euura*, species of this group exhibit some unusual biological traits. Unlike nearly all other West Palaearctic species, they reproduce by thelytokous parthenogenesis (Carleton 1939, Kopelke 2005). Males have occasionally been obtained in large scale rearings, at a ratio of one to several hundreds, and are therefore likely to be rare in nature. On the other hand, Carleton (1939: 592) pointed out that the number of males could be underestimated in rearings, if the males leave their galls earlier than females and galls are picked shortly before they mature. If, however, thelytoky is accepted as normal in the European members of this group, then the conventional tests of species limits are difficult to apply, e.g. there is no possibility of attempting to mate opposite sexes of different segregates. Larvae in the fourth, or sometimes an earlier instar, make a hole in the gall, usually on its underside, through which they eject the excrement. The larvae sometimes temporarily leave the gall through this hole to feed externally on the leaf-blade (Kopelke 1999). Further, whereas all but a few species in other species groups are univoltine, members of the *proxima* group are bi- or even trivoltine at localities where the growing season is sufficiently long. Zinovjev (1999) noted that the host specificity of some sawflies in this group is not as narrow as is the rule in, for example, the *viminalis* group: *E. bridgmanii* is recorded from numerous species in various sections of *Salix* subgenus *Vetrix*.

Euura bridgmanii (Cameron, 1883)

Nematus bridgmanii Cameron, 1883: 193–194. Described: ♀, ♂, recorded host: sallow [*Salix caprea*]. Lectotype, ♀, designated by Benson (1940a), Castle Museum, Norwich [not examined]. Type locality: England, Norwich, Brundall.

Pontania bridgmani [*sic*]: Konow (1890).

Pontania (*Pontania*) *bridgmanii*: Viitasaari & Vikberg (1985).
Nematus (*Pontania*) *bridgmanii*: Zhelochovtsev (1988).
Euura bridgmanii: Shinohara & Hara (2015).
Pontania kirchneri Zirngiebl, 1959: 22–26. Described: ♀, larva, gall, recorded host: *Salix aurita*. Holotype, ♀, ZSM [not examined]. Type locality: Germany, Birkenheide, Dürkheimer Bruch. Synonymy by Beneš (1968a).
Pontania obscura Kopelke 2005: 89–90. Described: ♀, gall, recorded host: *Salix foetida and S. waldsteiniana*. Holotype, ♀, SMF [examined]. Type locality: Switzerland, Wallis, Obergoms, Binntal. **Syn. nov.**
Euura abdita Kopelke in Prous *et al.* 2014: 53, replacement name for *P. obscura* Kopelke.
Pontania capreae (on *S. caprea*): Wahlgren (1951), Andersson (1955); misidentification.

Notes on types and taxonomy. The slight but constant morphological differences to *proxima* and *triandrae* (arrangement of setae on valvula 3; colour of femora), coupled with different host associations, and a possible differentiation in COI sequences (but based on too few specimens), support the status of *bridgmanii* as a valid species. Note that the figure of the lancet of *bridgmanii* by Kopelke (2005: 89) is not accurate, in that annulus 1 is shown to be about as long as high (actually higher than long, as in *proxima* and *triandrae*), and that no pores are indicated on the lower parts of the radix or basal ca. annuli 1–10 of the lamnium (pores are present in similar numbers, and similarly distributed in all three taxa). No morphological characters which will separate *E. abdita* from *E. bridgmanii* were found. Neither were genetic differences detected. Accordingly, we treat them as conspecific. Weiffenbach (1989) described a male specimen under the name *bridgmanii*. Unlike the scarcely emarginate clypeus of the specimen of *proxima* that we examined, he stated that the clypeus of *bridgmanii* was deeply emarginate, almost to its top.

Variability. Female: Body length: 2.6–3.8mm. Lateral vertex with obscure brown fleck, to black. Dorsoposterior angle of pronotum pale, to black. Male: not examined. Total number of specimens examined: 33.

Genetic data. COI barcode sequences are available for ten specimens from France, Austria, and Germany. Distance to the nearest neighbour, *E. proxima*, is approximately 1.1%.

Bionomics. Host plants: *Salix aurita*, *S. caprea*, *S. cinerea*, *S. atrocinerea*, *S. appendiculata* (Kopelke 2005), *S. starkeana* (Nyman *et al.* 2006), *S. phylicifolia* (Benson 1958, Hjaltén *et al.* 2000), *S. silesiaca* (Beneš 2015a), and *S. hastata* (Zinovjev 1999) . Biology: Kopelke (2005), Zirngiebl (1959).

Distribution. Central and North Europe north to Troms (Kopelke 2005), Transcaucasia (Benson 1968). Occurrence in Sweden: published records; Skåne (Wahlgren 1951), Blekinge (Wahlgren 1953, as *P. capreae* on *S. caprea*), Halland (Andersson 1955), Uppland, Dalarna (Wahlgren 1951), Västergötland (Wahlgren 1962; Lundberg 1963, 1966), Jämtland (Benander 1969), Lule Lappmark (Julin 1936, as *P. capreae* on *S. caprea*). Material examined: Skåne, Öland, Västmanland, Härjedalen, Västerbotten, Norrbotten.

Euura proxima (Serville, 1823)

Nematus proximus Serville, 1823: 69. Described: ♀. Syntypes probably lost or destroyed (Lacourt 2000). Type locality: near Paris.
Euura proxima: Prous *et al.* (2014).
Nematus proximus Lepeletier, 1823: 67–68. Described: ♀. Syntypes are the same as for *N. proximus* Serville. Type locality: near Paris.
Pontania proxima: Konow (1901a).
Pontania (*Pontania*) *proxima*: Viitasaari & Vikberg (1985).
Nematus (*Pontania*) *proximus*: Zhelochovtsev (1988).
Nematus gallicola Stephens, 1835: 36. Described: adult, sex not stated. Syntypes may be in BMNH [not examined]. Type locality: near London. According to Cameron (1877a), potential syntypes belong to "*N.* [*Nematus*] *Vallisnieri* and a *Cryptocampus*".
Nematus vallisnierii Hartig, 1837: 205–207. Described: ♀, larva, gall, recorded host: Weiden [*Salix*]. Lectotype, ♀, designated below. Type locality: Berlin area ["hiesiger Gegend"].
Nematus redii Contarini, 1852: 129–130, plate V. Described: ♀, recorded host: *Salix fragilis*. There is no record of extant type material. Type locality: northern Italy. Note: reared from *Salix* × *fragilis*; the illustration of galls on the plate confirms that these belong to *E. proxima*.
Pontania gallicola Costa, 1852 [this is a separatum from the journal issued in 1854]: 1–17, 1 plate. Described: ♀, larva, gall, recorded host: *Salix russelliana* [= *S.* × *fragilis*]. There is no record of extant type material. Type locality: near Naples. Secondary homonym of *Nematus gallicola* Stephens, 1835. Note: the galls illustrated on the plate definitely belong to *E. proxima*.

Messa hyalina Norton, 1864: 8. Described: ♀. Holotype, ♀, ANSP [not examined]. Type locality: New Jersey. Synonymy with *P. proxima* by Benson (1960b).

Euura flavipes Cameron, 1885: 211–212. Described: ♀, ♂. Syntypes possibly in BMNH [not examined]. Type locality: Scotland, Rannoch and Clydesdale. Synonymy with *P. proxima* by Benson (1958).

Pontania daedala MacGillivray, 1921: 33–34. Described: ♀. Lectotype, ♀, designated by Frison (1927), INHS [not examined]. Type locality: Ithaca, New York. Synonymy with *P. proxima* by Zinovjev & Smith (2000).

Pontania capreae (on *S. alba*, *S.* ×*fragilis*): Wahlgren 1951; misidentification.

Notes on types and taxonomy. *N. vallisnierii.* The lectotype and paralectotypes were labelled as such by Kopelke in 1990, but the designation was not published. Lectotype, ♀, hereby designated, ZSM; labels "Cotype" [red], "Nematus vallisnierii Htg. Th. Hartig det.", "Pontania capreae L. E. Clément det.", "Pontania proxima Lep. ♀ Conde det.", "GBIF-GISHym3454", "Lectotypus N. vallisnierii Htg. 1837 det. Kopelke 1990", "Pontania ♀ proxima (Lep.) Kopelke det. 1990", "Lectotype ♀ Nematus vallisnierii Hartig, 1837 des. Liston 2016". 6♀ paralectotypes, labels similar to lectotype, ZSM.

See below, under *E. triandrae*, for discussion of taxonomic status.

Variability. Female: Body length: 2.9–4.6mm. Lateral vertex with obscure brown fleck, to black. Male: 3.2mm [only one specimen examined]. Total number of specimens examined: 28.

Genetic data. Insufficient data is available. Good quality COI barcode sequences are available only for two specimens. Their nearest neighbour, differing by about 2.1%, is the sequence of a single *E. triandrae*. All specimens are from Finland.

Similar species. Morphologically not clearly distinguishable from *E. triandrae.*

Bionomics. Host plants: *Salix alba*, *S.* ×*fragilis*, *S.* × *rubens*, *S. babylonica* (Kopelke 2005; a rarely used host, or misidentified, according to Zinovjev 1999), *S. blanda* (Halstead 2001), *Salix* × *meyeriana* (= *Salix pentandra* × *euxina*), *S. euxina* (Zinovjev 2011), *S. fragilis* × *pentandra* (Mol 2013), *S. excelsa* (Özay 1997). According to Zinovjev (1999: Table 5), rare records (e.g. Conde 1938) of *proxima* group galls from *S. pentandra* are probably attributable to *E. proxima*, because this willow belongs in the subgenus *Salix*, like the other host species of *E. proxima*, whereas *E. bridgmanii* is restricted to hosts of subgenus *Vetrix*.

Biology: Al-Saffar & Aldrich (1997), Carleton (1939), Higton (1991), Ivanova-Kasas (1959), Kehl *et al.* (2010), Kehl & Rambold (2010), Kopelke (1985), Niklas (1955), Slepian & Gabaraeva (1976, 1978, 1981), Slepian & Gurevich (1976). Parthenogenetic species with very rare males (Benson 1958, Kopelke 1999).

Distribution. South, Central and North Europe (Taeger *et al.* 2006), north to southern Finland (Kangas 1985), Caucasus (Muche 1973), Yakutia (Popov 2011). Introduced to N. America, Australia and New Zealand (Muggeridge 1931, Benson 1962, Schmidt & Smith 2009). Occurrence in Sweden: published records; Skåne, Öland (Wahlgren 1951), Gotland, Närke (Haris 2009), Västergötland (Lundberg 1963, 1966), Uppland (Wahlgren 1951), Dalarna, Ångermanland (Coulianos & Holmåsen 1991). Material examined: Skåne.

Euura triandrae (Benson, 1941)

Pontania triandrae Benson, 1941: 131–132. Described: ♀, gall, recorded host: *Salix triandra*. Holotype, ♀, BMNH [not examined]. Type locality: England, N. Somerset, Bristol.

Euura triandrae: Beneš (2015b).

Notes on types and taxonomy. Carleton (1939) first conducted oviposition experiments on this taxon, which showed that females reared from *Salix triandra* would not readily oviposit on *S.* ×*fragilis*, and that when they did, galls were undersized, larval mortality high, and the few adults reared were undersized and weak, and would not lay eggs on the "wrong" host. Furthermore, she found phenological differences between sawfly samples reared from these two hosts. Her results led to the tentative conclusion that *proxima* and *triandrae* might represent "biological races" of the same species, with the caveat that further investigation was required. Kopelke (2003a, 2005) performed similar trials with both *E. triandrae* and *E. proxima* on a larger number of *Salix* species, and similarly recorded that only the "normal" host species was used by the respective females.

Benson (1941) stated that *proxima* and *triandrae* were distinguishable by the length of the ovipositor sheath relative to the length of the metatibia, and the length of valvula 3 relative to the combined length of metatarsomeres 1+2. In both cases, the index was stated to be larger in *proxima*. In seven females reared from *S. triandra* and six from *S.* × *fragilis* we obtained indices of ovipositor sheath length / head width of respectively 0.98–1.14 (mean 1.03) and 0.93–1.27 (mean 1.07). It was not possible to measure the leg parts suggested by Benson, because these could not be seen clearly in most of the available specimens. Nevertheless, we suspect that ovipositor length is not a suitable character for separating these species. Kopelke (2005: 87) in his identification key mentioned the following diagnostic characters for distinguishing *proxima* from *triandrae* (character state of the latter in parentheses): sawsheath in dorsal view triangular (sawsheath in dorsal view almost evenly rounded); saw slightly curved only in the basal part (saw slightly S-shaped); ctenidea starting at the 2nd annulus (ctenidea starting at the 1st annulus); saw consisting of 23–24 annuli (saw consisting of 24–25 annuli); head and mesonotum with slight microsculpture, mostly not dotted (head and mesonotum with slight microsculpture, normally finely dotted). In the specimens available for examination, we could not detect differences between the two segregates for any of these characters, except for the number of annuli of the lancet. However, the lancets of *proxima* (two specimens from Finland) had 24 and 25 annuli, while *triandrae* (one specimen from England) had 22 annuli. Ctenidia were present from annulus 2 in all three specimens. We conclude that these two taxa are in practice not morphologically separable.

Carleton (1939) and Benson (1941, 1958) observed that the appearance of the galls of these nominal species differ. Such differences may be a result of physiological and chemical differences in the respective host species (Beneš 1968a) and are therefore not necessarily of taxonomic value with respect to the gall-maker. Carleton (1939) undertook no-choice oviposition trials, in which females reared from *S. triandra* were offered *S. fragilis* for oviposition, and *vice versa*. Zinovjev (1999: 207), commenting on the results of Carleton's oviposition tests, wrote that "All galls that developed on *S. triandra* [induced by females reared from *S. fragilis*] retained shape and colour typical for galls on *S. fragilis*, although they were undersized". Carleton (1939) did not however provide such a clear statement of differences: she merely noted (p. 595) that "[galls induced by females reared from *S. fragilis*] were pale greenish-yellow and never became red on the upper surface as in normal galls".

Vikberg (1970) has already proposed the formal synonymy of *triandrae* with *proxima*. However, the differences in host choice certainly speak for some degree of genetic segregation. Whether these nominal taxa should be regarded as host plant races, or separate species, cannot at present be decided. For the moment, it seems desirable to retain the name *triandrae*, because of the rather large number of biological studies that have previously treated these segregates as separate species.

Variability. Female: Body length: 2.9–4.5mm. Lateral vertex with obscure brown fleck, to black. Male: none examined. Total number of specimens examined: 13.

Genetic data. See above, under *E. proxima*.

Similar species. Morphologically not clearly distinguishable from *E. proxima* (see there).

Bionomics. Host plant: *Salix triandra* (Benson 1941, Kopelke 2005). Biology: Carleton (1939; as *P. proxima* on *S. triandra*), Hjältén *et al.* (2007), Leitch (1994; as *P. proxima* on *S. triandra*), Magnus (1914; as *P. proxima* on *S. amygdalina*), Niemi (2006), Price (2003), Rey (1967, 1968; as *P. proxima* on *S. triandra*).

Distribution. Central and North Europe north to N. Trøndelag in Norway (Kopelke 2005). Occurrence in Sweden: published records; Skåne (Coulianos & Holmåsen 1991), Norrbotten, Torne älv (Wahlgren 1929). Material examined: Dalarna.

Euura viminalis **group**

= *Pontania* Costa, 1852, in part
= *Eupontania* Zinovjev, 1985

Diagnosis. Adult. In lateral view both mandibles similar (more or less gradually tapering to apex). Vein 2r-m normally present in both fore wings. Supraclypeal area densely setose. Antenna short to long: ♀ shorter than length of fore wing costa, to as long as combined length of fore wing costa and pterostigma; ♂ shorter than costa to longer than combined length of costa and pterostigma. Cercus moderately long: about 3.5–6.0× as long as maximal width, and in dorsal view reaching back at least to middle of valvula 3. Medial and basal annuli with flat ventral edge (serrulae not clearly developed). Penis valve ventrally with small spines; base of valvispina ventrally clearly divided from lobe on which it arises by an incision or at least a right-angled turn.

Larva. Third abdominal segment with 3 or 4 dorsal annulets. Suranal plate with minute pseudocerci placed very close together.

Gall. In leaves. Always attached to midrib: very rarely, a female may oviposit by mistake into lateral veins (Fig. 327), but larvae in such galls fail to reach maturity. Spherical, or bladder-shaped, or irregularly pyriform. Developed only below the leaf-blade, or projecting on both sides.

Phenology. Most species strictly univoltine, but *E. vesicator* and *E. viminalis* bivoltine, where climate allows.

aquilonis subgroup

Other European taxa occur in the Carpathian Mountains and the Alps (Vikberg 2003), but only a single species is known in northern Europe. *E. myrsiniticola*, although it resembles *aquilonis* in adult morphology and was included by Vikberg (2003) in his *aquilonis* group, belongs to the *viminalis* subgroup according to genetic data.

Euura aquilonis (Benson, 1941) comb. nov.

Pontania aquilonis Benson, 1941. Published as a "new name" for *Pontania herbaceae* sensu Malaise, 1921a. Lectotype, ♀, designated by Vikberg (2003), BMNH [examined]. Type locality: Sweden, Torne Träsk area.

Eupontania aquilonis (Benson, 1941): Vikberg (2003).

Pontania algida Benson, 1941: 134–136. Described: ♀. Holotype, ♀, BMNH [examined]. Type locality: Scotland, Perthshire, Breadalbane Mountains near Killin. Synonymy by Vikberg (2003).

Pontania polaris: Kopelke (1989b); misidentification.

Pontania (*Eupontania*) *polaris*: Zinovjev (1993b); misidentification.

Variability. Female: Body length: 3.4–5.3mm. Supraclypeal area, outer orbits, upper inner orbits and lateral vertex brown, to completely black. Femora mainly pale, to mainly black. Male: 3.3–4.9mm. No significant colour variability in specimens examined. Total number of specimens examined: 34.

Genetic data. Nyman *et al.* (2000) already published a tree that shows *aquilonis* placed outside the *crassipes* and *viminalis* subgroups. COI barcoding permits unequivocal identification of *E. aquilonis*, with the nearest neighbouring sequences (about 4% different) being those of the *E. crassipes* subgroup.

Bionomics. Host plants: *Salix herbacea*, *S. polaris*, and their hybrid (Vikberg 2003). Biology: Hakkarainen *et al.* (2005), Kopelke (1989b), Roininen *et al.* (2002), Vikberg (2003).

Distribution. North Europe (Scotland, Norway, Sweden, Finland), Central Europe (Slovakia, Tatra Mts) (Vikberg 2003). Occurrence in Sweden: published records; Torne Lappmark (Malaise 1921a, Vikberg 2003). Material examined: Torne Lappmark (galls and reared adults).

Species not occurring in northern Europe

Here, we update the nomenclature of a Nearctic taxon of the *aquilonis* group that has generally been treated under the species name *arctica* MacGillivray in recent works.

Euura delicatula (MacGillivray, 1919) comb. nov.

Euura arctica MacGillivray, 1919: 5G–6G. Described: ♀, gall, recorded host: *Salix reticulata*. Lectotype, ♀, CNC, designated by Vikberg (2003). Type locality: Canada, Northwest Territories, Cape Barrow and Cape Krusenstern. Synonymised with *arctica* by Benson (1960b). Secondary homonym in *Euura* of *Nematus arcticus* Holmgren, 1869 (*Euura villosa* (Thomson, 1863) and *Nematus arcticus* Thomson, 1871 (*Euura reticulata* (Holmgren, 1883)).

Euura abortiva MacGillivray, 1919: 4G–5G. Described: ♀, recorded host: *Salix reticulata*. Holotype, ♀, CNC [examined by Vikberg (Vikberg 2003)]. Type locality: Canada, Yukon Territory, Herschel Island. Synonymised with *arctica* by Benson (1960b).

Pontania delicatula MacGillivray, 1919: 8G–9G. Described: ♂, larva, recorded host: *Salix reticulata*. Holotype, ♂, CNC [examined by Vikberg (Vikberg 2003)]. Type locality: Canada, Yukon Territory, Herschel Island. Synonymised with *arctica* by Benson (1960b).

Pontania deminuta MacGillivray, 1919: 9G–10G. Described: ♀. Holotype, ♀, CNC [examined by Vikberg (Vikberg 2003)]. Type locality: Canada, Northwest Territories, Chantry Island. Synonymised with *arctica* by Benson (1960b).

As first revising authors, we elect to use the name *delicatula* for this taxon, because the association of the type material with *Salix reticulata* is clear, and the holotype is of rather normal appearance compared to that of *E. abortiva*. Possibly *E. delicatula* also occurs in Arctic Siberia (Zinovjev 1999).

crassipes subgroup

Euura arbusculae (Benson, 1941) comb. nov.

Pontania arbusculae Benson, 1941: 133–135. Described: ♀, ♂, larva, gall, recorded host: *Salix arbuscula*. Holotype, ♀, BMNH [examined]. Type locality: Scotland, Killin, Crags above Lochan à Lairige.
Nematus (*Pontania*) *arbusculae*: Zhelochovtsev (1988).
Eupontania arbusculae: Vikberg (2003).

Notes on types and taxonomy. *P. arbusculae*. Apart from the holotype, the only other known specimens of this species are the 2♀ and 2♂ paratypes, all from the type locality, BMNH [1♀, 1♂ examined].

The morphological characters given by Benson (1941), Kopelke (1989b) and Vikberg (2003) to separate adults of *arbusculae* from its close relatives (i.e. in northern Europe *E. herbaceae* and *E. crassipes*), are very slight, and could easily fall within the range of variability of a single species. For example, the colour characters used by Benson (1941) to distinguish *arbusculae* from *herbaceae* do not work, because the latter often also has (especially in reared specimens) a nearly completely yellow clypeus and femora. However, the shape and sculpture of the frontal area of *arbusculae* recorded by Vikberg (2003) appear to be reliable in distinguishing it from the other two species, although only three specimens of the *arbusculae* type series were available for examination. In *arbusculae* the frontal area is more concave, appearing deeper towards anterior, and is rather dull because of sculpture; in *herbaceae* and *crassipes* it is flatter and more shiny. The pattern of black markings of the larva may be species-diagnostic in this subgroup of species (Benson 1941; Kopelke 1989b), but this also needs to be checked in a larger number of specimens.

Variability. Female: Body length: 3.4–3.7mm. Male: 3.9–4.9mm. Total number of specimens examined: 3.

Genetic data. None available.

Bionomics. Host plants: *Salix arbuscula* (Benson 1941). Note that a further, unidentified species of the *viminalis* subgroup apparently uses *S. arbuscula* as a host (*Euura* sp. *Salix arbuscula*, larval sample from Torne Träsk Region), so that pea-shaped galls on this willow species cannot be assumed to belong to *E. arbusculae*. Examination of the larva should however clarify this. Biology: Benson (1941).

Distribution. The only definite record is of the type series from Scotland (Benson 1941). Galls on *S. arbuscula* which possibly belong to *E. arbusculae* have been found on Kolguyev Island, N. Russia (Zinovjev 1999). Occurrence in Sweden: may be present. Vikberg (2003) wrote "In August 1989 I found two bean-shaped galls on *Salix arbuscula* in the Torne Träsk area, Sweden but no larvae were found inside galls or they had been killed when small. It is possible that some other species of the group had tried this species of *Salix* without success".

Euura crassipes (Thomson, 1871)

Nematus crassipes Thomson, 1871: 162. Described: ♀. Lectotype, ♀, designated by Vikberg (2003) [lectotype designation by Kopelke (1989a) is invalid], MZLU [examined]. Type locality: Sweden, Lapland.
Pontania crassipes: Konow (1890).
Pontania (*Eupontania*) *crassipes*: Zinovjev (1985).
Pontania (*Pontania*) *crassipes*: Viitasaari & Vikberg (1985).
Nematus (*Pontania*) *crassipes*: Zhelochovtsev (1988).
Eupontania crassipes (Thomson, 1871): Vikberg (2003).
Euura crassipes: Prous *et al.* (2014).
Pontania lapponica Malaise, 1921a: 112–114. Described: ♀, ♂, larva, gall, recorded host: *Salix lapponum*. Lectotype, ♀, designated by Vikberg (2003), NHRS [NHRS-HEVA000003530; examined]. Type locality: Sweden, Torne Träsk area. Synonymy by Vikberg (2003).
Pontania (*Eupontania*) *lapponica*: Zinovjev (1985).

Nematus (*Pontania*) *lapponicus*: Zhelochovtsev (1988).

Pontania enslini Zirngiebl, 1937: 337–338. Described: ♀. Holotype, ♀, NHMW [examined]. Type locality: Sweden, Torne Träsk area, Nissontjokko. Synonymy by Vikberg (2003).

Notes on types and taxonomy. The name *crassipes* was used by earlier authors in several senses both for individual species and groups of species. For example, Benson (1941) treated *crassipes* as a species unknown to him in a group of species which he called the *herbaceae* group. Later, the same author used *crassipes* as the valid name of the taxon currently called *herbaceae* (with *arbusculae* as a tentative synonym) (Benson 1954), and a few years later as the valid name for a circumpolar species with ten nominal taxa treated as its synonyms (including *herbaceae*, *lapponica* Malaise and *aquilonis*) (Benson 1960b). Finally, he even synonymised *reticulatae* (as *arctica* auct.) within this extremely wide species concept (Benson 1960c).

Variability. Female: Body length: 2.7–5.4mm. Pronotum with posterior margins pale lined, to entirely black. Supraclypeal area, upper outer orbits and lateral vertex brown, to black. Male: 2.8–4.8mm. Female and male: femora extensively pale, to nearly completely black. Total number of specimens examined: 10.

Genetic data. Sequences of mtDNA and nuclear of *E. crassipes* are nearly identical to *E. herbaceae* (see also Nyman *et al.* 2007).

Similar species. Morphologically very similar to *E. herbaceae*. Determination of some smaller female specimens is not always possible, if the number of serrulae lies in the range of overlap with *E. herbaceae*. Reliable identification of males does not seem to be possible, but see Vikberg (2003) for more detail on characters that may distinguish both sexes of these species.

Bionomics. Host plants: *Salix lapponum* (Vikberg 2003). Biology: Kopelke (1989b), Roininen *et al.* (2002), Vikberg (2003).

Distribution. Scotland (Benson 1958), Scandinavia, Finland and N. European Russia (Kola Peninsula) (Vikberg 2003). Benson (1962) regarded *Pontania crassipes* as "circumpolar arctic-alpine", but his concept of this species at that time was exceedingly wide (see above), and the possible presence of *E. crassipes* s. str. in the Nearctic requires further investigation. Occurrence in Sweden: published records; Jämtland (Benander 1969, as *Pontania crassipes* on *S. lapponum*), Torne Lappmark, Torne Träsk area (Malaise 1921a). Material examined: Torne Lappmark.

Euura herbaceae **(Cameron, 1876) comb. nov.**

Nematus herbaceae Cameron, 1876c: 304–307. Described: ♀, ♂, larva, gall, recorded host: *Salix herbacea*. Lectotype, ♀, designated by Vikberg (2003), BMNH [examined]. Type locality: Scotland, "Rannoch" [=Garbh Mheall; Liston *et al.* 2012].

Pontania herbaceae: Konow (1890).

Pontania (*Eupontania*) *herbacea* [*sic*]: Zinovjev (1985).

Nematus (*Pontania*) *herbaceae*: Zholochovtsev (1988).

Eupontania herbaceae: Vikberg (2003).

Pontania polaris Malaise, 1921a: 112. Described: ♀, ♂, gall, recorded hosts: *Salix herbacea*, *S. polaris* and hybrids of these. Lectotype, ♀, designated by Vikberg (2003), NHRS [NHRS-HEVA000003533; examined]. Type locality: Sweden, Torne Träsk. Synonymy with *P. herbaceae* by Vikberg (2003).

Variability. Female: Body length: 2.8–4.4mm. Supraclypeal area, outer orbits, upper inner orbits and lateral vertex pale, to completely black. Femora entirely pale, to partly fuscous basally or along edges. Venter of abdomen completely pale, to completely black except around hypopygium. Male: 3.2–4.6mm. Femora with approximately basal half black, to nearly completely black. Abdominal sternum 9 pale to dark. Total number of specimens examined: 22.

Genetic data. Sequences of mtDNA of *E. herbaceae* are nearly identical to those of *E. crassipes* (Nyman *et al.* 2007).

Similar species. See above, under *E. crassipes*.

Bionomics. Host plants: *Salix herbacea* (Cameron 1876c), *S. polaris*, and hybrids of these (Vikberg 2003, Malaise 1921a). Biology: Kopelke (1989b), Vikberg (2003).

Distribution. At present only known from North and West Europe: British Isles, including Ireland (Alexander

1994), Norway, Sweden, Finland and N. Russia (Vikberg 2003, Zhelochovtsev & Zinovjev 1995). Occurrence in Sweden: published records; Torne Lappmark (Malaise, 1921a, Vikberg 2003). Material examined: Torne Lappmark.

viminalis subgroup

The majority of these taxa have very similar mitochondrial COI and Cytb gene sequences (Nyman *et al.* 2007, Leppänen *et al.* 2014), and many species share the same CO1 barcode BIN in BOLD: *acutifoliae*, *arcticornis*, *brevicornis*, *collactanea*, *glabrifrons*, *hastatavora*, *myrsiniticola*, *myrtilloidica, nivalis, reticulatae, saliciscinereae*, and *samolad.* Nevertheless, the more detailed analyses of Leppänen *et al.* (2014) revealed clearly different haplotype and allele frequencies in mtDNA COI and/or nuclear ITS2 gene among population samples collected from different willow host species in northern Fennoscandia. Furthermore, in most cases, some morphological differences associated with numerous biological characters leave little doubt that the majority are distinct species. In BOLD, only the barcodes of *kriechbaumeri*, *pedunculi* and *viminalis* are widely separated from each other, and also from the large, shared BIN occupied by the taxa listed above.

Euura acutifoliae (Zinovjev, 1985)

Pontania (*Eupontania*) *acutifoliae* Zinovjev, 1985: 14–16. Described: ♀, ♂, larva, gall, recorded host: *Salix acutifolia*. Holotype, ♀, ZIN [not examined]. Type locality: Russia, Gor'kiy.
Nematus (*Pontania*) *acutifoliae*: Zhelochovtsev (1988).
Eupontania acutifoliae: Vikberg & Zinovjev (2006).
Euura acutifoliae: Liston (2015).
Pontania acutifoliae daphnoides Zinovjev, 1993a: 47–49. Described: ♀, ♂, gall, recorded host: *Salix daphnoides* ssp. *daphnoides*. Holotype, ♀, SMF [examined]. Type locality: Switzerland, Valais, Ursental, Realp. **Syn. nov.**
Eupontania acutifoliae daphnoides: Vikberg & Zinovjev (2006).
Pontania acutifoliae daphnoides forma *baltica* Zinovjev, 1993a: 38. Infrasubspecific and therefore unavailable name.
Eupontania acutifoliae baltica Vikberg & Zinovjev, 2006: 260–261. Described: ♀, ♂, gall, recorded host: *Salix daphnoides* var. *pomeranica.* Holotype, ♀, ZIN [examined]. Type locality: Russia, Sestroretsk (north-west of St Petersburg). The name *baltica* is preoccupied in *Euura* by *Pteronus balticus* Enderlein, 1908. **Syn. nov.**

Notes on types and taxonomy. *P. acutifoliae*. Examined: 3♀, 1♂ paratypes (SMF). *E. acutifoliae baltica*. Examined: 1♂ paratype (SMF).

Morphological differences between *acutifoliae* and *daphnoides* are exhibited mainly in the relative dimensions of the antenna, ovipositor and compound eyes (Zinovjev, 1993a). The two segregates are associated with different host *Salix* species that are considered to be closely related. Introgression between these willow taxa is widespread in the Baltic Region, with the hybrid populations often referred to as *S. daphnoides* var. *pomeranica*. The sawfly taxon described as *E. acutifoliae baltica* is associated with willow populations in this introgression zone, and has morphological characters intermediate to the populations treated as *acutifoliae acutifoliae* and *acutifoliae daphnoides* (Zinovjev, 1993a). We interpret the existence of this intermediate form, which occurs widely and commonly in the area of host introgression, as indicating that there is no significant reproductive barrier between the sawfly populations on "pure" populations of each of the parent host species. Although geographic differentiation of the sawfly populations obviously exists, we do not consider that these should formally be accorded subspecific status. Accordingly, we treat these three nominal taxa as synonymous.

Variability. Female: Body length: 4.0–6.8mm. Male: 3.8–6.1mm. Variability related to geographic provenance is discussed in detail by Zinovjev (1993a). Total number of specimens examined: 17.

Genetic data. The short BOLD COI barcode sequence will not separate *acutifoliae* from the other eleven North European species with closely similar barcodes (*acutifoliae*, *arcticornis*, *brevicornis*, etc.).

Bionomics. Host plants: *Salix acutifolia* (Zinovjev 1985), *Salix daphnoides* (Zinovjev 1993a). Biology: Zinovjev (1985, 1993a).

Distribution. Central and northern Europe, including Finland (Vikberg & Zinovjev 2006), Russia, and Ukraine (Zhelochovtsev & Zinovjev 1995). Occurrence in Sweden: no records, but should be looked for where its hosts occur.

Euura arcticornis (Konow, 1904)

Pontania arcticornis Konow, 1904: 230–231. Described: ♀, ♂. Lectotype, ♀, designated by Vikberg & Zinovjev (2006), FMNH [examined]. Type locality: Russia, Kanin Peninsula.
Pontania (*Eupontania*) *arcticornis*: Zinovjev (1985).
Pontania (*Pontania*) *arcticornis*: Viitasaari & Vikberg (1985).
Nematus (*Pontania*) *arcticornis*: Zhelochovtsev (1988).
Eupontania arcticornis: Vikberg & Zinovjev (2006).
Euura arcticornis: Prous *et al.* (2014).
Pontania phylicifoliae Forsius, 1919: 165–168. Described: ♀, ♂, gall, recorded host: *Salix phylicifolia.* Lectotype, ♀, designated by Vikberg & Zinovjev (2006), RFT [examined]. Type locality: Finland, Helsinki. Synonymy with *P. arcticornis* by Lindqvist (1955).
Pontania viminalis var. *hepatimaculae* Malaise, 1921: 115–117. Described: ♀, ♂, larva, gall, recorded host: *Salix phylicifolia.* Lectotype, ♀, designated by Vikberg & Zinovjev (2006), NHRS [NHRS-HEVA000003513; examined]. Type locality: Sweden, Torne Träsk area. Synonymy with *P. phylicifoliae* by Forsius (1932).

Variability. Female: Body length: 3.0–4.9mm. Head extensively pale on supraclypeal area, inner and outer orbits and lateral vertex, to nearly completely black. All abdominal sterna and downturned parts of terga completely yellow, to nearly completely black. Male: 3.5–3.8mm. Total number of specimens examined: 30.

Genetic data. Although there is no distinct barcode sequence, *E. arcticornis* is apparently identifiable using nuclear ITS2 sequences (Leppänen *et al.* 2014).

Bionomics. Host plants: *Salix phylicifolia* (Vikberg & Zinovjev 2006), *S. lapponum* × *phylicifolia* (Kopelke 1991). Biology: Barstad & Nilsson (2012, 2015), Kopelke (1991), Nyman & Julkunen Tiitto (2000), Roininen *et al.* (2002).

Distribution. North Europe including northern parts of the British mainland (Benson 1958), throughout Fennoscandia (Vikberg & Zinovjev 2006), and N. Russia (Kanin Peninsula: Konow 1904). Also recorded in Yakutia (Popov 2011). Occurrence in Sweden: published records; Västergötland (Wahlgren 1959), Jämtland, Torne Lappmark (Coulianos & Holmåsen 1991). Material examined: Jämtland, Lycksele Lappmark, Torne Lappmark.

Euura brevicornis (Förster, 1854)

Nematus brevicornis Förster, 1854a: 335–336. Described: ♀. Lectotype, ♀, designated by Vikberg & Zinovjev (2006), ZSM [examined]. Type locality: Germany, near Aachen.
Eupontania brevicornis: Vikberg & Zinovjev (2006).
Pontania (*Eupontania*) *brevicornis*: Taeger *et al.* (2010).
Euura brevicornis: Beneš (2015b).
Nematus foersteri André, 1880: 152, unnecessary replacement name for *N. brevicornis.*
Nematus congruens Förster, 1854a: 346–347. Described: ♂. Lectotype, ♂, designated by Kopelke (1991), ZSM [examined]. Type locality: Germany, near Aachen. Synonymy with *E. brevicornis* by Vikberg & Zinovjev (2006).
Pontania carpentieri Konow, 1907: 133–134. Described: ♀, ♂; no type material has been located in the SDEI, where most of Konow's collection is deposited. Type locality: France, Amiens. Synonymy with *E. brevicornis* by Vikberg & Zinovjev (2006).
Pontania pedunculi: Kopelke (1991); misidentification.

Variability. Female: Body length: 3.2–4.6mm. Male: 2.8–4.8mm. Femora completely pale, to fuscous on anterior and posterior edges. Female and male: head usually yellow with large black ocellar patch extending to toruli, to nearly entirely black with only lateral vertex and upper orbits obscurely brown. Total number of specimens examined: 8.

Genetic data. The short BOLD COI barcode sequence will not separate *brevicornis* from the other eleven North European species with closely similar barcodes (*acutifoliae*, *arcticornis*, *collactanea*, etc.).

Bionomics. Host plants: *Salix cinerea* (Vikberg & Zinovjev 2006), *S. cinerea* × *caprea* (Beneš 2015a), and rarely on *S. aurita* (Zinovjev 1999). Biology: Kopelke (1991), Vikberg & Zinovjev (2006).

Distribution. Central and North Europe, north to S. Finland (Vikberg & Zinovjev 2006). Distribution in detail is unclear, because of taxonomic and nomenclatural confusion. *E. brevicornis* was reported from the British Isles by Liston *et al.* (2012), but these specimens have now been re-identified as *E. pedunculi*. Accordingly, *E.*

brevicornis must be deleted from the faunal list of the British Isles. Occurrence in Sweden: published records; Skåne (Benander 1966; the specimens identified as *Pontania arcticornis* are probably the morphologically very similar *E. brevicornis*, because the host of *P. arcticornis* does not occur at that locality). Material examined: Härjedalen.

Euura collactanea (Förster, 1854)

Nematus collactaneus Förster, 1854a: 299–300. Described: ♀, gall [but the gall seems to belong to *E. weiffenbachiella*], recorded host: *Salix repens*. Lectotype, ♀, designated by Kopelke (1991), ZSM [examined]. Type locality: Krefeld.

Pontania collactanea: Konow (1901a).

Pontania (*Pontania*) *collactanea*: Viitasaari & Vikberg (1985).

Nematus (*Pontania*) *collactanea*: Zhelochovtsev (1988).

Eupontania collactanea: Vikberg & Zinovjev (2006).

Euura (*Eupontania*) *collactanea*: Noblecourt (2016).

Nematus deficiens Förster, 1854a: 318–319. Described: ♂. Lectotype, ♂, designated by Kopelke (1991), ZSM [examined]. Type locality: Krefeld. Synonymy with *P. collactanea* by Weiffenbach (1962).

Nematus crassipes var. *vacciniellus* Cameron, 1876d: 190–191. Described: ♀, ♂, recorded host: *Vaccinium vitis-idaea*. Syntypes possibly in BMNH [not examined]. Type locality: Scotland. Synonymy with *collactanea* by Benson (1958).

Nematus xanthostylos Zaddach, 1884 [in Brischke 1884]: 131. Described: ♀. Holotype, ♀, thought to have been destroyed, with most of the rest of Brischke's collection (Blank & Taeger 1998). Type locality: "Damhof" [Ostpreußen, probably Dammhof; now Russia, Kalingrad area, Cholmogorowka]. Synonymy with *collactanea* by Konow (1901b).

Pontania viminalis var. *lugubris* Enslin, 1918a: 732–733. Described: ♂. Lectotype, ♂, designated by Kopelke (1991), ZSM [examined]. Type locality: "Altdorf [near Nürnberg] 1916 e larva Dr. Enslin leg." [lectotype label]. [det. as *P. viminalis* by Kopelke [Kopelke 1991], det. as *P. collactanea* Förster by Zinovjev 1996]. **Syn. nov.**

Pontania collactanea relicta Weiffenbach, 1962: 129–130, 133. Described: ♀, ♂, gall, recorded host: *Salix repens*. Holotype, ♀, Museum Oldenburg [not examined]. Type locality: Germany, Oldenburg, Poggenpohlsmoor. Synonymy with *P. collactanea* by Kopelke (1991).

Eupontania collactanea rosmarinifoliae Vikberg & Zinovjev, 2006: 259–260. Described: ♀, ♂, recorded hosts: *Salix repens rosmarinifoliae* and *S. repens repens*. Holotype, ♀, FMNH (examined). Type locality: Finland, South Häme: Janakkala, Punkka. **Syn. nov.**

Nematus helicinus: Thomson (1871); misidentification. See Vikberg (2003).

Notes on types and taxonomy. *E. collactanea rosmarinifoliae* differs from the nominal subspecies only in its darker coloration of the fore wing stigma and body. The name was proposed for populations occurring in Finland and northern Russia. Such dark specimens have not so far been found in Sweden. No strict monophagy on *Salix repens repens* respectively *S. repens rosmarinifolia* is indicated by data for either putative subspecies: Central European populations use both *S. repens* and *S. rosmarinifolia* as hosts. The record of *P. collactanea rosmarinifoliae* from the Czech Republic, based only on herbarium specimens of galls on *S. rosmarinifolia*, is accordingly inadmissible. In view of the generally very wide range of variance in colour pattern in species of the *viminalis* group, and a tendency in several species towards darker coloration in northern populations, there seems little justification for recognising two subspecies of *collactanea*. Accordingly, they are treated here as synonyms.

Variability. Female: Body length: 2.4–4.8mm. Outer and inner orbits extensively pale, or almost entirely black. Dorso-posterior margins of pronotum pale, to black. Femora entirely pale, to basally fuscous. Male: 2.9–4.9mm. All femora partly black and metafemur nearly entirely so, to pro- and mesofemur black basally with metafemur entirely yellow. Total number of specimens examined: 20.

Genetic data. The short BOLD COI barcode sequence will not separate *collactanea* from the other eleven North European species with closely similar barcodes (*acutifoliae*, *arcticornis*, *brevicornis*, etc.).

Bionomics. Host plants: *Salix repens repens*, *S. repens rosmarinifolia* (Kopelke 2003a, Vikberg & Zinovjev 2006). Biology: Hanapi & Askew (1991), Kopelke (1991).

Distribution. Central and North Europe, including the British Isles (Taeger *et al.* 2006), north to Lake Ladoga in Russian Karelia (Vikberg & Zinovjev 2006). Occurrence in Sweden: published records; Skåne (Wahlgren 1944, as *Pontania viminalis* on *Salix repens*), Halland (Andersson 1955), Öland (Benander 1966), Uppland (Coulianos & Holmåsen 1991). Material examined: Skåne.

Euura glabrifrons (Benson, 1960) comb. nov.

Pontania glabrifrons Benson, 1960b: 375–377. Described: ♀, ♂, gall, recorded host: *Salix lanata*. Holotype, ♀, BMNH [not examined]. Type locality: Sweden, Torne Lappmark, Torne Träsk district.
Pontania (*Pontania*) *glabrifrons*: Viitasaari & Vikberg (1985).
Nematus (*Pontania*) *glabrifrons*: Zhelochovtsev (1988).
Pontania (*Eupontania*) *glabrifrons*: Lacourt (1999).
Eupontania glabrifrons: Vikberg & Zinovjev (2006).

Notes on types and taxonomy. Genetic data supports the status of *glabrifrons* as a distinct species.

Variability. Female: Body length: 3.6–5.6mm. Upper outer and inner orbits brown lined to entirely black. Tegula brown to black. Pronotum black, rarely with pale margin. Male: 3.7–4.0mm. Female and male: anterior and posterior edge of femur lined with black to femur nearly entirely black. Total number of specimens examined: 76.

Genetic data. Although the short BOLD COI barcode sequence will not separate *glabrifrons* from the other eleven North European species with closely similar barcodes (*acutifoliae*, *arcticornis*, *brevicornis*, etc.), longer COI, and ITS2 sequences are distinctive (Leppänen *et al.* 2014).

Bionomics. Host plants: *Salix lanata* (Benson 1960b). Biology: Barstad & Nilsson (2012, 2015), Olofsson & Strengbom (2000), Roininen *et al.* (2002).

Distribution. Norway, Sweden, Finland and N. Russia (Taeger *et al.* 2006), W. Siberia, ?E. Siberia and ?N. Russian Far East (Zhelochovtsev & Zinovjev 1995). Occurrence in Sweden: published records; Jämtland (Benander 1969), Lule Lappmark (Coulianos & Holmåsen 1991), Lycksele Lappmark (Haris 2009), Torne Lappmark (Coulianos & Holmåsen 1991). The specimen tentatively identified by R. B. Benson as this species from Skåne, Kullaberg, mentioned by Benander (1966), is a misidentification of *E. pedunculi* (see Benander 1969). Material examined: Torne Lappmark.

Euura hastatavora Vikberg, 2014

Pontania hastatae Vikberg, 1970: 17–18. Described: ♀, ♂, gall, recorded host: *Salix hastata*. Holotype, ♀, FMNH [examined]. Type locality: Finland, Kilpisjärvi, Saana. In *Euura*, the name *hastatae* Vikberg is proccupied by *E. hastatae* Malaise, 1921.
Euura hastatavora Vikberg in Prous *et al.* 2014: 53, replacement name for *P. hastatae* Vikberg.
Pontania (*Pontania*) *hastatae*: Viitasaari & Vikberg (1985).
Pontania (*Eupontania*) *hastatae*: Lacourt (1999).
Eupontania hastatae: Vikberg & Zinovjev (2006).

Variability. Female: Body length: 3.3–5.4mm. Outer orbits, upper inner orbits and lateral vertex brown, to black. Tegula pale, to black. Pronotum narrowly pale margined, to completely black. Male: 2.8–5.3mm. Female and male: metafemur nearly entirely pale, to nearly entirely black. Total number of specimens examined: 8.

Genetic data. Although the short BOLD COI barcode sequence will not separate *hastatavora* from the other eleven North European species with closely similar barcodes (*acutifoliae*, *arcticornis*, *brevicornis*, etc.), longer COI, and ITS2 sequences are distinctive and support the validity of this taxon (Leppänen *et al.* 2014).

Bionomics. Host plants: *Salix hastata* (Vikberg 1970). Biology: Kopelke (1991).

Distribution. Central Europe (Alps), North Europe (Scandinavia and N. Russia) (Kopelke 1991), Siberia (Zhelochovtsev & Zinovjev 1995). Occurrence in Sweden: published records; Torne Lappmark (Vikberg 1970).

Euura kriechbaumeri (Konow, 1901) comb. nov.

Pontania kriechbaumeri Konow, 1901a: 83 (key). Lectotype, ♂, designated by Zinovjev (1985), SDEI [examined]. Type locality: Germany, Frankfurt / Main.
Pontania (*Eupontania*) *kriechbaumeri*: Zinovjev (1985).
Eupontania kriechbaumeri: Vikberg & Zinovjev (2006).
Nematus lanificus: in litteris name, mentioned by Kriechbaumer (1876: 67), used by Bremi for specimens reared from pilose galls on *S. elaeagnos.*

?=*Pontania crassivalvis* Konow, 1901a: 83 (key). Lectotype, ♀, designated by Zinovjev (1985), SDEI [examined]. Type locality: Austria or northern Italy, Tyrol. Tentative synonymy by Zinovjev (1985).

Notes on types and taxonomy. The lectotype of *P. kriechbaumeri*, in very poor condition, is pinned together with two densely hairy galls on a short length of leaf-blade that has characters fitting *S. elaeagnos* (narrow, dense white felt on underside, down-rolled and entire margins). There therefore seems to be little doubt about the identity of the host, or the lectotype. The mention by Kriechbaumer (1876) of *N. lanificus* Bremi in connection with a detailed description of galls on *S. incana* (= *elaeagnos*) could be considered to have made the name *lanificus* available, with Kriechbaumer as author. However, in this case Article 23.9 of the Code (ICZN 1999) must be applied: the senior synonym (*N. lanificus*) has not been used as a valid name after 1899, and the junior synonym (*P. kriechbaumeri*) has been used for a particular taxon, as its presumed valid name, in at least 25 works, published by at least 10 authors in the immediately preceding 50 years and encompassing a span of not less than 10 years. Accordingly, *lanificus* is nomen oblitum, and *kriechbaumeri* nomen protectum, and the latter remains in use as valid.

Genetic data. The COI barcode of *E. kriechbaumeri* is apparently sufficiently distinctive for determination, with a minimum divergence of 1.7% from the group of species which share closely similar barcodes (*acutifoliae*, *arcticornis*, *brevicornis*, etc.).

Variability. Female: Body length: 2.8–5.4mm. Upper outer and inner orbits partly brown to completely black. Male: 3.1–4.8mm. Pronotum narrowly pale margined to completely black. Femora basally fuscous to completely pale. Total number of specimens examined: 23.

Bionomics. Host plants: *Salix elaeagnos* is thought to be the only host (Kopelke 2003a). Biology: Kopelke (1991).

Distribution. Central and South Europe; most northerly records along river systems with catchments in the Alps. *Salix elaeagnos* does not now occur naturally in Hesse, the location of the type locality. However, the possibility cannot be excluded that the lectotype originated on a planted host. Occurrence in Sweden: no records, and not expected.

Euura myrsiniticola (Kopelke, 1991) comb. nov.

Pontania myrsiniticola Kopelke, 1991: 116–118. Described: ♀, ♂, larva, gall, recorded host: *Salix myrsinites*. Holotype, ♀, SMF [examined]. Type locality: Norway, S.-Trøndelag, Dovrefjell.
Pontania (*Eupontania*) *myrsiniticola*: Zinovjev (1993b).
Eupontania myrsiniticola: Vikberg (2003).

Notes on types and taxonomy. Because of shared morphological characters, Vikberg (2003) placed *myrsiniticola* in what he called the *aquilonis* species group. Adult morphology of the included species resembles that of the *crassipes* subgroup, but the larvae of the *aquilonis* group are morphologically closer to those of the *viminalis* subgroup. Sequence data indicates that *myrsiniticola* should be included in the *viminalis* subgroup, and that it is a distinct species (Leppänen *et al.* 2014).

Variability. Female: Body length: 2.4–4.6mm. Lateral vertex slightly brown to completely black. Male: 3.0–3.3mm. No significant variability observed. Total number of specimens examined: 13.

Genetic data. Although the short BOLD COI barcode sequence will not separate *myrsiniticola* from the other eleven North European species with closely similar barcodes (*acutifoliae*, *arcticornis*, *brevicornis*, etc.), ITS2 sequences are distinctive and support the validity of this taxon (Leppänen *et al.* 2014).

Bionomics. Host plants: *Salix myrsinites* (Kopelke 1991). Biology: Kopelke (1991), Nyman & Julkunen Tiitto (2000), Roininen *et al.* (2002).

Distribution. Scotland, Norway, Sweden, and Finland (Taeger *et al.* 2006), Russia; Kolguyev Island (Roininen *et al.* 2002). Occurrence in Sweden: published records; Jämtland, Edsåsdalen (Benander 1969, as *P. crassipes* on *S. myrsinites*), Torne Lappmark, Abisko area (Baudyš 1926, as *Pontania viminalis* on *S. myrsinites*), Abisko area, Jukkasjärvi and Nuolja (Julin 1936, as *Pontania* sp. on *S. myrsinites*). Material examined: Torne Lappmark.

Euura myrtilloidica (Kopelke, 1991) comb. nov.

Pontania myrtilloidica Kopelke, 1991: 119–120. Described: ♀, ♂, larva, gall, recorded host: *Salix myrtilloides*. Holotype, ♀, SMF [examined]. Type locality: Norway, Finnmark, S.-Varanger, Vaggatem.
Eupontania myrtilloidica (Kopelke, 1991): Vikberg & Zinovjev (2006).

Notes on types and taxonomy. Zinovjev (1999) stated that *E. myrtilloidica* is very similar to *E. pedunculi*, and Vikberg & Zinovjev (2006) considered that they might be conspecific. Based on examination of the available specimens, we disagree with this. Firstly, there are small morphological differences between these two segregates. Females have upper antennal hollow slightly sculptured and setose (entirely smooth and glabrous in *pedunculi*), and the metafemur may be partly dark (often entirely pale in *pedunculi*). The flagellomeres of male *myrtilloidica* are shorter than those of *pedunculi*. Secondly, there is possibly a genetic difference, in the COI barcode region (see below).

Variability. Female: Body length: 2.8–4.9mm. Head except for labrum and more or less clypeus completely black, to pale on upper outer and inner orbits, lateral vertex, and supraclypeal area. Upper pronotum extensively pale to completely black. Femora entirely pale, to extensively fuscous. All abdominal sterna and downturned parts of terga completely yellow, to nearly completely black. Male: 2.2–3.8mm. Dorsal margin of pronotum narrowly pale, to completely black. Total number of specimens examined: 14.

Genetic data. Only a single specimen of *myrtilloidica*, from Germany, has been barcoded (BOLD: DEI-GISHym11086). This sequence is very similar to those of the eleven other northern European species which in BOLD share the same BIN (*arcticornis*, *hastatavora*, *samolad*, etc.).

Bionomics. Host plants: *Salix myrtilloides* (Kopelke 1991). Biology: Kopelke (1991), Liston & Späth (2005a), Vikberg & Zinovjev (2006).

Distribution. Has only been recorded at a very few sites in S. Germany, Norway, Sweden, Finland, and N. Russia (Liston & Späth 2005a, Vikberg & Zinovjev 2006).

Occurrence in Sweden: material examined; galls of the *E. viminalis* group type on *S. myrtilloides* (no adults reared) found at two localities: Norrbotten, Kaunisvaara 2 km N, 170 m., +67.40000 +23.34500, 07.06.2014, vid. Liston. Torne Lappmark, Kiruna, near airport, 450 m., +67.84000 +20.35000, 25.08.2013, vid. Liston (Fig. 326). These records are tentatively ascribed to *E. myrtilloidica*.

Euura nivalis (Vikberg, 1970) comb. nov.

Pontania nivalis Vikberg, 1970: 14–17. Described: ♀, ♂, larva, gall, recorded host: *Salix glauca*. Holotype, ♀, FMNH [examined]. Type locality: Finland, EnL: Kilpisjärvi, Leutsuvaara.
Pontania (*Pontania*) *nivalis*: Viitasaari & Vikberg (1985).
Eupontania nivalis (Vikberg, 1970): Vikberg & Zinovjev (2006).

Notes on types and taxonomy. Partly separable using COI data, but not ITS2 sequences (Leppänen *et al.* 2014).

Variability. Female: Body length: 4.0–6.2mm. Antennal flagellum apically and ventrally more or less brown, to entirely black. Clypeus laterally pale to entirely pale. Pronotum with margin yellow lined to completely black. Tegula yellow to completely black. Male: 4.4–5.6mm. Anterior and posterior edge of metafemur lined with black, to nearly whole metafemur black. Total number of specimens examined: 18.

Genetic data. The short BOLD COI barcode sequence will not separate *nivalis* from the other eleven North European species with closely similar barcodes (*acutifoliae*, *arcticornis*, *brevicornis*, etc.).

Bionomics. Host plants: *Salix glauca* (Vikberg 1970, Kopelke 1991). Biology: Barstad & Nilsson (2012, 2015), Kopelke (1991), Nyman & Julkunen Tiitto (2000), Roininen *et al.* (2002).

Distribution. Central Europe (Alps), North Europe (Scandinavia, Finland, N. Russia) (Kopelke 1991), Siberia (Zhelochovtsev & Zinovjev 1995), and arctic Canada (Hjältén *et al.* 2003).

Occurrence in Sweden: published records; Uppland, Jämtland, Norrbotten (Haris 2009), Lule Lappmark, Torne Lappmark (Vikberg 1970).

Euura pedunculi (Hartig, 1837)

Nematus pedunculi Hartig, 1837: 388. Described: ♀, ♂, gall [mixed up with galls of *E. venusta*], recorded host: Saalweide [*Salix caprea*]. Lectotype, ♀, designated by Kopelke (1991), ZSM [examined]. Type locality: Germany, near Berlin.
Pontania pedunculi: Konow (1890).
Pontania (*Pontania*) *pedunculi*: Viitasaari & Vikberg (1985).
Nematus (*Pontania*) *pedunculi*: Zhelochovtsev (1988).
Pontania (*Eupontania*) *pedunculi*: Lacourt (1999).
Eupontania pedunculi: Vikberg & Zinovjev (2006).
Euura pedunculi: Prous *et al.* (2014).
Nematus bellus Zaddach, 1876: Tafel III(6), 13. Text in Brischke (1884: 170–171). Described: ♀, ♂, gall, larva, recorded hosts: *Salix aurita*, *S. capraea* [sic!]. Type material thought to have been destroyed, with most of the rest of Brischke's collection (Blank & Taeger 1998). Type locality: not stated, but probably East Prussia.
Pontania bella: Konow (1901a).
Pontania (*Eupontania*) *bella*: Lacourt (1999).
? *Nematus baccarum* Cameron, 1876d: 189–190. Described: ♀, gall, recorded host: *Salix* cf. *aurita*. Syntypes probably lost: not located in BMNH. Type locality: Scotland, near Dunkeld. Tentative synonymy with *Pontania pedunculi* sensu Kopelke [= *E. brevicornis*] by Kopelke (1991), or with *E. pedunculi* by Vikberg & Zinovjev (2006).
Nematus curticornis Cameron, 1885: 202. Described: ♀. Syntypes not located in BMNH. Type locality: Scotland, Rannoch.
Pontania curticornis: Konow (1890).
Pontania bella var. *nigrescens* Enslin, 1915: 360. Described: ♀. Syntypes, ♀, ZSM [not examined]. Type locality: not stated. Synonymy with *P. pedunculi* by Taeger *et al.* (2010).
Pontania pusilla Lindqvist, 1964: 122–124. Described: ♀, ♂. Holotype, ♀, FMNH [examined]. Type locality: Finland, Sundholmen Island (now part of Helsinki). Synonymy with *P. pedunculi* by Vikberg (1970), confirmed by Vikberg & Zinovjev (2006).
Pontania gallarum: Kopelke 1991: 89; misidentification.

Notes on types and taxonomy. *P. pusilla*. Also examined: paratype ["Allotype"], 1♂, FMNH.

Variability. Female: Body length: 2.5–4.3mm. Supraclypeal area, upper outer and inner orbits pale, to black. Male: 2.8–3.7mm. Female and male: femora usually entirely pale, but may be extensively fuscous in northern specimens. Total number of specimens examined: 17.

Genetic data. In BOLD COI barcoding, nearest neighbours are *viminalis*, and at a different position but also differing by about 1.9%, the nearly undifferentiated aggregation of numerous *viminalis* subgroup taxa that includes, for example *saliciscinereae* and *nivalis*. Thus, the short BOLD sequence for *pedunculi* appears to be sufficiently distinctive to identify this species. However, only the first sample under the name *pedunculi* in Fig. 1 (*E. pedunculi* / *S. caprea*, next to *E. viminalis*) apparently has this haplotype. The other three samples included in Fig. 1 under the name *pedunculi* are problematic, and were possibly misidentified.

Bionomics. Host plants: *Salix aurita*, *S. caprea*, *S. starkeana starkeana*, *S. starkeana cinerascens* (Vikberg & Zinovjev 2006), *S. silesiaca* (Beneš 2015a), *S. caprea* × *phylicifolia* (Hjältén *et al.* 2000). Biology: Hartley (1998), Kokkonen (2000), Vikberg & Zinovjev (2006).

Distribution. Through most of Europe north to Inari Lapland in Finland, and East to Yakutia, Magadan and Sakhalin (Vikberg & Zinovjev 2006). Occurrence in Sweden: published records; probably throughout Sweden (Coulianos & Holmåsen 1991) north to Luleå Lappmark (Jokkmokk; Julin 1936). Material examined: Skåne, Västerbotten, Luleå Lappmark (Gällivare).

Euura reticulatae (Malaise, 1921)

Pontania reticulatae Malaise, 1921a: 109–110. Described: ♀, ♂, larva, gall, recorded host: *Salix reticulata*. Lectotype, ♀, designated by Vikberg (2003), NHRS [NHRS-HEVA000003545; examined]. Type locality: Sweden, Torne Träsk area.
Pontania (Eupontania) reticulatae: Zinovjev (1985).
Pontania (*Pontania*) *reticulatae*: Viitasaari & Vikberg (1985).
Nematus (*Pontania*) *reticulatae*: Zhelochovtsev (1988).
Eupontania reticulatae: Vikberg & Zinovjev (2006).
Euura (*Eupontania*) *reticulatae*: Noblecourt (2016).
Pontania arctica (MacGillivray, 1919): Coulianos & Holmåsen (1991); misidentification.

Notes on types and taxonomy. Under the name *Pontania arctica* (MacGillivray, 1919) this was for a time considered to be a Holarctic species (e.g. Beneš 1967, Zhelochovtsev & Zinovjev 1995). However, although the North American taxon also has *S. reticulata* as its host, its galls are different from *E. reticulatae* and it belongs to a different genetic branch (Nyman, unpublished). Vikberg (2003) placed *arctica* in the *aquilonis* group (here: subgroup). See there, under 'Species not occurring in northern Europe', regarding the nomenclature of the Nearctic taxon.

Variability. Female: Body length: 3.7–5.0mm. Male: 2.6–4.9mm. Upper outer orbits and lateral vertex slightly brown, to entirely black. Female and male: mesepisternum entirely smooth and shiny, to sculptured and matt on upper half. Tegula pale, to black. Total number of specimens examined: 34.

Genetic data. Cannot be identified using COI data, but is distinct in ITS2 sequences (Leppänen *et al.* 2014).

Bionomics. Host plants: *Salix reticulata* (Malaise 1921a). Biology: Beneš (1967), Malaise (1921a), Nyman & Julkunen Tiitto (2000), Roininen *et al.* (2002).

Distribution. Central Europe (Alps and Carpathians) and North Europe (Scandinavia) (Vikberg & Zinovjev 2006). Occurs only above, or North of, the tree line. Occurrence in Sweden: published records; Härjedalen, Hamra Mts (Malaise 1921a), Jämtland (Coulianos & Holmåsen 1991), Luleå Lappmark, Sarek Mts.; Torne Lappmark, Torne Träsk area (Malaise 1921a). Material examined: Torne Lappmark.

Euura saliciscinereae (Retzius, 1783)

Tenthredo saliciscinereae Retzius, 1783: 73[by indication on Degeer 1771: p. 1013, tab. 38 figs 26–31]. Syntypes, ♀ and ♂, probably lost or destroyed [see Vikberg & Zinovjev 2006]. The neotype of *Nematus gallarum* [see below] is hereby designated as neotype of *Tenthredo saliciscinereae*. Type locality: Sweden, near Uppsala. See Blank *et al.* (2009) on availability of the name.

Pontania saliciscinereae: Blank *et al.* (2009).

Pontania (*Eupontania*) *saliciscinereae*: Taeger *et al.* (2010).

Euura (*Eupontania*) *saliciscinereae*: Noblecourt (2016).

Tenthredo salicis Christ, 1791: 453. Described by indication on Degeer (1771, t. 38 f. 26–31). Primary homonym of *Tenthredo salicis* Linnaeus, 1758 [*Euura salicis* (L.)].

Nematus gallarum Hartig, 1837: 220–221 Described by indication on Götze 1779: p. 274, tab. 38 figs 26–31. Neotype, ♀, designated by Vikberg & Zinovjev 2006, NHRS [examined]. Type locality: Sweden, Uppland, Norrtälje. Secondary homonym in *Euura* of *Tenthredo gallarum* Latreille, 1804 [= *E. amerinae*]. Synonymy with *saliciscinereae* by Blank *et al.* (2009).

Nematus acerosus Hartig, 1840 [mandatory correction of incorrect original spelling *acerosum*]: 26. Described: ♀. Lectotype, ♀, designated below, ZSM [examined]. Type locality: northern Germany. Synonymy with *Pontania viminalis* by Beneš *et al.* (1981). **Syn. nov.**

Nematus saliceti Förster, 1854a: 336–338. Described by indication on Degeer (1771: p. 1013, tab. 38 figs 26–31) and Hartig (1837: 220, n. 55) [the latter based on indication of the same taxon in Degeer's work] and also ♀ syntypes collected near Aachen. The latter should be in the ZSM, but are thought to be lost. Kriechbaumer (1876) treated *N. saliceti* as a synonym of *N. gallarum*, Dalla Torre (1894) as a synonym of *N. viminalis* (L.). Both these opinions were probably based on Förster's citation of the work of Degeer, which is now considered to refer to *E. saliciscinereae*, but was interpreted in various different ways by earlier authors. Described by indication on the same work, the neotype of *Nematus gallarum* (see above) is also the neotype of *N. saliceti* Förster.

Nematus aestivus Thomson, 1863: 638. Described: ♀, ♂. Lectotype, ♀, designated by Kopelke (1991), MZLU [examined]. Type locality: Sweden, Jämtland, Skalstugan. Synonymy with *gallarum* by Vikberg & Zinovjev (2006).

Pontania (*Eupontania*) *aestiva*: Zinovjev (1993b).

Nematus cinereae Thomson, 1871: 160–161. New name for *T. saliciscinereae* Retzius.

? *Pontania harrisoni* Benson, 1940a: 91–94. Described: ♀, ♂, gall, recorded host: *Salix purpurea* and its hybrids. Lectotype, ♀, designated by Vikberg & Zinovjev (2006), BMNH [examined]. Type locality: Scotland, Roxburghshire, Newcastleton.

Pontania (*Eupontania*) *aestiva harrisoni*: Zinovjev (1993b).

Pontania varia Kopelke, 1991: 121–124. Described: ♀, ♂, larva, gall, recorded hosts: *Salix nigricans*, *S. nigricans* ssp. *alpicola*, and diverse hybrids. Holotype, ♀, SMF [examined]. Type locality: Switzerland, Valais, Les Hauderes. Synonymy with *gallarum* by Vikberg & Zinovjev (2006).

Pontania norvegica Kopelke, 1991: 120–121. Described: ♀, ♂, larva, gall, recorded host: *Salix borealis* and diverse hybrids. Holotype, ♀, SMF [examined]. Type locality: Norway, Troms, Ramfjorden. Synonymy with *aestivus* by Zinovjev (1993b).

Notes on types and taxonomy. *N. acerosus*. Lectotype, ♀, hereby designated, ZSM; labels: "Type" [red], "acerosum n.", "Nematus acerosus Th. Hartig det.", "Pontania viminalis ♀ E. Clément det.", "Nematus viminalis L. ♀ O. Conde det. 1939", "GBIF-GISHym3188", "Sammlung Th. Hartig", "Euura saliciscinereae (Retzius) ♀ det. A. Liston 2016", " Lectotype Nematus acerosum Hartig, 1840 des. A. Liston 2016". The lectotype has long antennae (approx. 2x as long as width of head), largely black metafemora and in dorsal view rather narrow valvulae 3. This character combination, in conjunction with the provenance of the lectotype, only fits *E. saliciscinereae*. Accordingly, we treat *acerosus* as its synonym.

P. harrisoni. Kopelke (1999) assumed that the actual host was *S. phylicifolia* × *purpurea*, and placed *harrisoni* as a synonym of *arcticornis*. Probably he based this decision partly on the irregular shape of the galls of *harrisoni* (as in *arcticornis*). On the other hand, Zinovjev (1993b) stated that the hosts were "*Salix purpurea* and its hybrids with *Salix viminalis*" and treated *harrisoni* as a subspecies of *aestiva* [current name *saliciscinereae*]. Vikberg & Zinovjev (2006) treated it as a (British) subspecies of *gallarum* [= *saliciscinereae*]. Both sexes of *E. harrisoni* differ from typical *E. saliciscinereae* by their longer antennae and longer pubescence on the frons, as well as by the dark inner orbits and malar spaces of the male (Zinovjev 1993b). It does not seem unlikely that the British population represents a geographical form of *saliciscinereae*, but we do not think that it is at present justifiable to treat *harrisoni* formally as a subspecies, without much stronger data on their relationships.

Variability. Female: Body length: 2.8–5.4mm. Coloration extremely variable. The palest specimens are from Germany (Black Forest), but some specimens from Norway (S-Trøndelag) are nearly as pale. The pale German specimens have: head yellow except for patch around ocelli reaching forwards to toruli and back to cover postocellar area; upper surface of antennal flagellum basally black; scape and pedicel black; entire pronotum and tegula pale; lateral margin of median mesoscutal lobe pale; two large spots on anterior of mesoscutellum (leaving a black anchor-shaped marking); nearly whole upper half of mesepisternum pale; legs entirely pale except for bases of coxae and more or less tarsomeres 2–5; all abdominal sterna and downturned flanks of terga pale. The darkest specimens are from northern Norway (e.g. the holotype of *P. norvegica*): pale are only clypeus and labrum, tegula, distal ca. fifth of femora, part of hypopygium and valvifer 2. Male: 3.0–5.3mm. Colour pattern darker than female and less variable. Antennal flagellum nearly entirely pale, to entirely black. Supraclypeal area and malar space partly pale to entirely black. Upper outer orbit partly pale to entirely black. Pronotum pale margined to entirely black. Tegula pale to black. Femora entirely pale to partly infuscate. Abdominal sterna entirely pale to entirely black except for pale sternum 9. Total number of specimens examined: 22.

Genetic data. The short BOLD COI barcode sequence will not separate *saliciscinereae* from the other eleven North European species with closely similar barcodes (*acutifoliae*, *arcticornis*, *brevicornis*, etc.), but it is distinct in ITS2 sequences (Leppänen *et al.* 2014).

Bionomics. Host plants: *Salix myrsinifolia* (Vikberg & Zinovjev 2006), including the synonymous forms / subspecies *borealis* and *alpicola* (Zinovjev 1994, Leppänen *et al.* 2014). Biology: Nyman & Julkunen Tiitto (2000; as *P. aestiva* on *S. borealis*), Zinovjev (1994, as *P. aestiva*).

Distribution. Central and North Europe (Kopelke 1991), to the Urals (Zhelochovtsev & Zinovjev 1995). Occurrence in Sweden: published records; Skåne (Wahlgren 1944, as *Pontania viminalis* on *Salix nigricans*), Västergötland (Lundberg 1966, as *P. viminalis* on *S. nigricans*), Dalarna (Vikberg & Zinovjev 2006). Material examined: Dalarna, Västerbotten.

Euura samolad **(Malaise, 1921)**

Pontania samolad Malaise, 1921a: 117–119. Described: ♀, ♂, larva, gall, recorded host: *Salix lapponum*. Lectotype, ♀, designated by Vikberg & Zinovjev (2006), NHRS [NHRS-HEVA000003551; examined]. Type locality: Sweden, Torne Träsk area.
Pontania (*Pontania*) *samolad*: Viitasaari & Vikberg (1985).
Pontania (*Eupontania*) *samolad*: Zinovjev (1993b).
Eupontania samolad (Malaise, 1921): Vikberg & Zinovjev (2006).
Euura (*Eupontania*) *samolad*: Noblecourt (2016).

Notes on types and taxonomy. See below (Genetic data).

Variability. Female: Body length: 3.2–6.2mm. Pronotum dorsally extensively pale, to completely black. Metafemora completely pale, to extensively fuscous. All abdominal sterna and downturned flanks of terga pale, to nearly wholly black. Male: 2.7–4.8mm. Female and male: inner and outer orbits, lateral vertex and supraclypeal area pale, to completely black. Total number of specimens examined: 17.

Genetic data. The short BOLD COI barcode sequence will not separate *saliciscinereae* from the other eleven North European species with closely similar barcodes (*acutifoliae*, *arcticornis*, *brevicornis*, etc.), but differences in ITS2, and longer COI sequences, support its status as a separate species (Leppänen *et al.* 2014).

Bionomics. Host plants: *Salix lapponum* (Vikberg & Zinovjev 2006), *S. lapponum* × *phylicifolia* (Kopelke 1991). Biology: Kopelke (1991), Nyman & Julkunen Tiitto (2000), Roininen *et al.* (2002).

Distribution. North Europe (Scotland, Scandinavia, Finland, N. Russia), France (Massif Central: Lacourt 2001) possibly also E. Siberia and the northern parts of the Russian Far East (Zhelochovtsev & Zinovjev 1995). Occurrence in Sweden: published records; Jämtland, Torne Lappmark (Benander 1969). Material examined: Jämtland.

Euura viminalis (Linnaeus, 1758)

Cynips viminalis Linnaeus, 1758: 554. Described [by indication on Rösel von Rosenhof (1749: 51, Tafel X, figs 5–7)]: larva, gall, recorded host: Bindweiden [*Salix purpurea*]. Linnaeus' indication "Habitat in Salicis viminalis foliis sub costa" makes it clear that only the gall on the right of Tafel X [on the leaf underside] is indicated, not the different type of gall [*E. vesicator*: developed above and below the leaf blade] on the left. Neotype designated by Kopelke (1989a), SMF [examined]. Type locality: Germany, Hessen, Griesheim.

Pontania viminalis: Benson (1958).

Pontania (*Eupontania*) *viminalis*: Zinovjev (1985).

Pontania (*Pontania*) *viminalis*: Viitasaari & Vikberg (1985).

Nematus (*Pontania*) *viminalis*: Zhelochovtsev (1988).

Eupontania viminalis: Vikberg (2003).

Euura viminalis: Beneš (2015b).

Nematus vollenhoveni Cameron, 1874: 296–299. Described: ♀, ♂, larva, gall, recorded host: *Salix purpurea*. Syntypes may be in BMNH [not examined]. Type locality: Scotland, probably Glasgow area. Synonymy with *viminalis* by Dalla Torre (1894).

Nematus interstitialis Cameron, 1876a: 260. Described: ♀. Syntypes may be in BMNH [not examined]. Type locality: Scotland. Synonymy with *P. viminalis* by Benson (1958).

Nematus nigritarsis André, 1880: 151. Described: ♀, ♂. Syntypes may be in ZIN [not examined]. Type locality: southern France. Synonymy with *viminalis* by Konow (1905).

? *Pontania ciccum* Konow, 1901a: 84 [key]; 1901b: 130–131 [text]. Described: ♀. Lectotype, ♀, SDEI [examined]. Single extant specimen was inferred to be the holotype by Oehlke & Wudowenz (1984), which represents a valid lectotype fixation (ICZN 1999: 74.6). Type locality: Germany, Frankfurt am Main. Synonymy with *viminalis* by Muche (1970).

Pontania viminalis var. *xanthaspis* Enslin, 1915: 356. Described: ♀. Lectotype, ♀, designated by Kopelke (1991), ZSM [examined]. Type locality: Leipzig. Synonymy with *P. viminalis* by Kopelke (1991).

Pontania hungarica Enslin, 1918a: 733–735. Described: ♀, ♂. Lectotype, ♀, designated by Kopelke (1991), ZSM [examined]. Type locality: Hungary.

Variability. Female: Body length: 2.9–5.4mm. Lateral vertex, inner and outer orbits yellow, to black. Mesoscutellum, mesoscutellar appendage, upper half and lowest part of mesepisternum, lateral margins of mesoscutal lobes and whole of abdomen yellow except tergum 1 yellow, to black. Pterostigma nearly completely brown, to basal half white. Male: 2.8–4.7mm. Supraclypeal area yellow, to black. Pronotum narrowly pale margined, to completely black. Total number of specimens examined: 27.

Genetic data. In BOLD COI barcoding, nearest neighbours are *pedunculi*, and at a different position but also differing by about 1.9%, the nearly undifferentiated aggregation of numerous *viminalis* subgroup taxa that includes, for example *saliciscinereae* and *nivalis*. Thus, the short BOLD sequence appears to be sufficiently distinctive to identify *viminalis*.

Bionomics. Host plants: *Salix purpurea* (Kopelke 1999), rarely *Salix babylonica* (Zinovjev 1994; but development on this host usually unsuccessful). Occasional records from hosts in subgenus *Salix* (i.e. *alba*, *fragilis*, *triandra*) indicate rare, incidental hosts, or are based on misidentifications of the willow (Zinovjev 1999). Biology: Kopelke (1985, 1991), Magnus (1914; as *P. salicis* on *S. purpurea*), Zinovjev (1994). Differs from most species of the *viminalis* group in sometimes having more than one generation per year (Zinovjev 1993b).

Distribution. Throughout most of South and Central Europe, north to southern Sweden (Taeger *et al.* 2006).

Published records from Norway and Finland are based on misidentifications (Vikberg & Zinovjev 2006). Also in Turkey (Benson 1968), the Caucasus (Muche 1974; but record requires confirmation), and East to Yakutia (Popov 2011). Occurrence in Sweden: published records; Skåne (Benander 1966; reared from *S. purpurea*). Material examined: Skåne.

vesicator subgroup

Euura pustulator (Forsius, 1923) comb. nov.

Pontania pustulator Forsius, 1923: 51–54. Described: ♀, ♂, larva, gall, recorded host: *Salix phylicifolia*. Lectotype, ♀, designated by Vikberg & Zinovjev (2006), RFT [examined]. Type locality: Finland, Sompio Lapland, Sodankylä, Torpan Paavo.
Pontania (*Eupontania*) *pustulator*: Zinovjev (1985).
Pontania (*Pontania*) *pustulator*: Viitasaari & Vikberg (1985).
Nematus (*Pontania*) *pustulator*: Zhelochovtsev (1988).
Eupontania pustulator: Vikberg & Zinovjev (2006).

Variability. Female: Body length: 3.0–6.1mm. Head except for labrum, and more or less clypeus completely black, to extensively pale with black only on postocellar area, occiput, and as patch around ocelli. Dorsum of thorax completely black, except for pronotum and tegulae, to whole mesoscutellum and lateral parts of mesoscutal lobes pale. Mesepisternum ventrally pale to completely black. Terga 3–10 to 6–10 completely pale. Male: 4.0–6.6mm. Dorsal posterior angle of pronotum pale to black. Sternum 9 pale to black. Total number of specimens examined: 17.

Genetic data. The nearest neighbouring barcode of a European taxon is that of *E. vesicator*, with approx. 3.8% difference.

Similar species. In Europe, only *E. vesicator* is similar. As stated by Vikberg & Zinovjev (2006), the head of female *E. pustulator* is usually pale marked on lower gena, lower lateral face and supraclypeal area (these parts completely black in *E. vesicator*), but this is not an absolutely reliable way of separating them: these parts are nearly entirely black in two female *E. pustulator* from Härjedalen.

Bionomics. Host plants: *Salix phylicifolia* (Forsius 1923, Vikberg & Zinovjev 2006), *S. pulchra* [in Polar Urals] (Vikberg & Zinovjev 2006). The mention by Benson (1958) of *S. nigricans* (= *myrsinifolia*) as a host was thought by Zinovjev (1999) to be mistaken, although Harrison (1937) recorded *S. andersoniana* (currently usually treated as a synonym of *myrsinifolia*) and *S. phylicifolia* × *andersoniana* as more rarely used hosts, after *S. phylicifolia*. According to our own observations, galls are seldom to be found on plants of *S. phylicifolia* showing evidence of hybridisation with *S. myrsinifolia*. Such hybrids are in many European regions more abundant than pure *S. phylicifolia*, and this may explain why *E. pustulator* is scarce or local in some areas. Biology: Forsius (1923), Price *et al.* (1999), Roininen *et al.* (2002). A strictly univoltine species.

Distribution. Northern parts of British Isles, Scandinavia, N. Russia and Slovak Republic (Carpathians), east to Polar Urals (Vikberg & Zinovjev 2006, Roller 1999). Published statements that *E. pustulator* occurs in China (e.g. Xiaodong & Zi 2010) seem likely to be based on misidentifications. Occurrence in Sweden: published records; Dalarna (Haris 2009), Härjedalen (Coulianos & Holmåsen 1991), Jämtland (Benander 1969). Material examined: Dalarna, Härjedalen, Lycksele Lappmark, Lule Lappmark.

Euura vesicator (Bremi-Wolf, 1849)

Nematus vesicator Bremi-Wolf, 1849: 93–94. Described: adult [sex not explicitly stated, but description fits only ♀], gall, recorded host: *Salix purpurea*. Syntypes, not located at ETH Zürich or University of Zürich. Type locality: Switzerland, near Zurich.
Pontania vesicator: Konow (1890).
Pontania (*Eupontania*) *vesicator*: Zinovjev (1985).
Pontania (*Pontania*) *vesicator*: Viitasaari & Vikberg (1985).
Nematus (*Pontania*) *vesicator*: Zhelochovtsev (1988).

Eupontania vesicator: Vikberg & Zinovjev (2006).

Euura vesicator: Prous *et al.* (2014).

Nematus helicinus Brischke, 1850: 409–410. Described: ♀, ♂, larva, gall, recorded host: *Salix purpurea*. Lectotype, ♂, designated by Kopelke (1989a), MZLU [not examined]. Type locality: ? Danzig [see Kopelke 1989a]. Note: author of the species name sometimes given as Dahlbom.

Nematus leptocerus Förster, 1854a: 289–291. Described: ♀. Lectotype, designated below. Type locality: Germany, near Aachen. Synonymy with *P. vesicator* by Konow (1890) (as *leptoceros*).

Nematus lugdunensis Snellen van Vollenhoven, 1871: 243–248, plate 11. Described: ♀, ♂, larva, gall, recorded host: *Salix purpurea*. Lectotype, ♂, designated by Thomas (1987), RNHL [not examined]. Type locality: Netherlands, Noordwijk near Leiden. Synonymy with *P. vesicator* by Kriechbaumer (1877: 20), who also pointed out that the galls illustrated by Snellen van Vollenhoven are of *E. vesicator* and *E. proxima*. However, Snellen van Vollenhoven (1871: 244) wrote that all the adults that he reared were from the galls on *S. purpurea*.

Nematus vesicator var. *minor* Brischke, 1883a: 173. Described: ♀, ♂. Infrasubspecific and therefore unavailable name (ICZN 1999: 45.6.1): Brischke explicitly mentions that the name refers to small-sized individuals obtained from rearing.

Pontania vesicator ab. *borealis* Saarinen, 1945. Described: ♀. Infrasubspecific (ICZN: 1999: 45.6.2) and therefore unavailable name.

Notes on types and taxonomy. *N. vesicator*. At our request, R. Eastwood tried to find potential syntypes in the ETH. Although three or four historical specimens exist in the Schulthess Collection, labelled as from Zürich or nearby and "Weidengallen" [so probably reared], it is not possible to link these specimens in any way to Bremi. We were also informed (B. Oberholzer & G. Bächli: personal communications) that no Bremi material is in the University of Zürich insect collection.

N. leptocerus. The lectotype and two female paralectotypes were labelled as such by J.-P. Kopelke, but the designation was never published. Lectotype, ♀, hereby designated, ZSM; labels "Cotype" [red, printed], "[illegible]", "Nematus leptocerus Frst. A. Förster det. ♀", "Pontania ♀ vesicator Bremi Konow. det.", "Nematus vesicator Br. O. Conde det. 1932", "Pontania ♀ vesicator (Bremi) Kopelke det. 1990", "Lectotypus N. leptocerus För. det. Kopelke" [red], "GBIF-GISHym3332". Paralectotypes, ♀: labelling similar, but "GBIF-GISHym21293" and "GBIF-GISHym21294", ZSM.

Variability. Female: Body length: 3.0–6.2mm. Male: 3.6–5.6mm.

Both Zaddach (in Brischke 1883a) and Saarinen (1945) described individuals obtained by rearing, that were not only significantly smaller than normally sized ones, but also very much darker. This variability does not form a continuum. Female: the very small specimens have the pronotum only narrowly margined with pale (normally largely pale) and the abdomen except for terga 9–10 completely black (normally all sterna and terga (1–)3–10 entirely pale). Furthermore, the normally completely pale femora are partly infuscate in the dwarf individuals. Male: small individuals do not differ from larger ones so strongly as in the female. The femora are more extensively black and sternum 9 can be black instead of the normal pale. Total number of specimens examined: 37.

Genetic data. The nearest neighbouring barcode of a European taxon is that of *E. pustulator*, with approx. 3.8% difference.

Bionomics. Host plants: *Salix purpurea* (Kopelke 1999), *S.* × *superpurpurea* (Beneš 2015a). Biology: Kopelke (1985), Magnus (1914), Niklas (1955), Staeger (1919). Normally bivoltine (Niklas 1955), even in southern Finland, in some years (Vikberg & Zinovjev 2006).

Distribution. South, Central and North Europe north to Finland (Helsinki, on planted *S. purpurea*: Saarinen 1945), ? Caucasus (Zhelochovtsev & Zinovjev 1995), Yakutia (Popov 2011). Occurrence in Sweden: published records; Skåne (Benander 1966), Halland (Andersson 1955), Västergötland (Coulianos & Holmåsen 1991). Material examined: Skåne.

Species inquirendae

Cryptocampus fuscus Zaddach, 1883 [in Brischke 1883b]: 211–212. Described: ♀, ♂. Syntypes probably destroyed, with most of the rest of Brischke's collection (Blank & Taeger 1998). Type locality: not stated. Probably belongs in the *E. amerinae* group (Taeger *et al.* (2010).

Cryptocampus pygmaeus Brischke, 1883b: 209–210. Described: ♀, ♂, larva, gall, recorded host: *Salix purpurea* var. *Helix*. Type locality: Nehrung? [now in Poland, Lithuania and Russia] (Blank & Taeger 1998). Type material thought to have been destroyed, with most of the rest of Brischke's collection (Blank & Taeger 1998).

Treated by Konow (1905) as a valid species; synonymised with *E. saliceti* auct. by Enslin (1915). Authorship of the species name often wrongly attributed to Zaddach or Zaddach & Brischke.

In his treatment of European species related to *E. mucronata*, Kopelke (2001) does not mention a species developing on *Salix purpurea*. However, other authors have mentioned this willow species as a host of a taxon resembling *mucronata*, e.g. Nielsen (1905). Konow (1905) treated *C. pygmaeus* as a valid species.

Cryptocampus robustus Zaddach, 1883 [in Brischke 1883b]: 212–213. Described: ♂. Holotype ♂ probably lost or destroyed (Kopelke 1999). Type locality: Bautzen [Germany]. Was placed by Konow (1905) as a synonym of *Cryptocampus ater* [*Euura atra*], but this is unlikely to be correct, because Zaddach described the trochanters as largely yellow (mainly black or at most partly brown in males of the *atra* subgroup, and the tegulae as whitish (usually black, or at most dark brown, in males of lowland species of the *atra* subgroup).

Euura saliceti var. *sibirica* Stroganova, 1985: 60–61. Described: ♀, ♂. Syntypes probably deposited in Institute for Systematics and Ecology of Animals, Novosibirsk [not examined]. Type locality: West Siberia. Infrasubspecific name according to ICZN (1999), and therefore not available. Listed as a synonym of *Euura mucronata* by Taeger *et al.* (2010), but Stroganova (1985) stated that adults oviposited in buds and sometimes in the leaves and that larvae developed in rolled leaves of an unnamed *Salix* sp. Therefore, the description may be based on a mixture of sawfly species, or perhaps refers to a species of the *Euura anomaloptera* or *oblita* groups.

Hoplocampa gallicola Cameron, 1877b: 156-157. Described: ♂, gall, recorded host *Salix* sp. Syntypes perhaps in BMNH [not examined]. Type locality: England, Devonshire. Synonymised with *Hoplocampa pectoralis* Thomson, 1871 by Konow (1905). Listed as a synonym of *Pontania proxima* (Lepeletier) by Benson (1958). The pale ventral parts of thorax and abdomen described by Cameron do not fit *P. proxima*, with these parts black. The gall described by Cameron, from which the specimen(s) were reportedly reared, obviously belongs to a species of the *E. viminalis* species group: "pea-shaped, woolly-haired galls, which do not differ materially from those of *Nematus pedunculi*".

Nematus albicarpus Costa, 1859: 22–23. Described: ♀. Syntypes perhaps in Naples [not examined]. Type locality: Italy, high plain of the Sile. Synonymy with *Pontania proxima* (Lepeletier) by Konow (1901b). Listed as a synonym of *Pontania proxima* (Serville) by Taeger *et al.* (2010).

Pontania albicarpus: Ghigi (1905), treated as a valid species

Nematus commixtus Zaddach, 1884 [in Brischke 1884]: 172–173. Described: ♀. Holotype ♀: probably destroyed, with most of the rest of Brischke's collection (Blank & Taeger 1998). Type locality: Scotland. Synonymised with *N. nigrolineatus* Cameron by Dalla Torre (1894), and with *N. viminalis* Hartig, 1840 by Konow (1905). Listed as a synonym of *Phyllocolpa leucapsis* (Tischbein) by Taeger *et al.* (2010).

Nematus degeeri Dufour, 1847: 587. Described: adults [sex not specified], larva, gall, recorded host: *Salix triandra*. Type material probably lost. Type locality: France, Saint-Sever, banks of River l'Adour. The description of the gall places this taxon in the *E. viminalis* group, but no species of this group is known from *Salix triandra*, the host recorded by Dufour. Perhaps the host was misidentified.

Nematus festivus Zaddach, 1884 [in Brischke 1884]: 146–147. Described: ♂. Type material thought to have been destroyed, with most of the rest of Brischke's collection (Blank & Taeger 1998). Placed as a synonym of *P. proxima* (Lepeletier) by Konow (1901b) and of *P. proxima* (Serville) by Taeger *et al.* (2010), but the black-marked femora described by Zaddach speak against it belonging to *E. proxima*, males of which are also very rare (Carleton 1939).

Nematus lepidus Förster, 1854a: 345–346. Described: ♂. The single remaining syntype, ZSM [examined] is largely destroyed, with only parts of head, an antenna, fore legs, thorax and right fore wing remaining. Identification of these remains is not possible. Type locality: near Aachen. Synonymy with *Pontania puella* by Konow (1905). Listed as a synonym of *Phyllocolpa oblita* (Serville) by Taeger *et al.* (2010). According to Enslin (1915), the darker coloration of *N. lepidus* makes it more likely to represent "*leucosticta* or *leucapsis*".

Nematus pullatus André, 1880: 153, 156. Described: adult [sex not stated]. Syntypes may be in ZIN [not examined]. Type locality: Prussia. Synonymy with "*Pontania salicis* (Christ, 1791)" by Konow (1905). Listed as a synonym of *P. viminalis* by Taeger *et al.* (2010).

Nematus rubidicornis André, 1880: 145–146. Described: ♀. Syntypes may be in ZIN [not examined]. Type locality: Sommets du Jura. Taeger *et al.* (2010) noted that this is perhaps a *Pontania* species.

Nematus viminalis Hartig, 1840: 26. Described: ♀. Type material not located in ZSM; probably lost or destroyed. Type locality: northern Germany. Name preoccupied in *Euura* by *viminalis* (Linnaeus, 1758). Konow

(1905) used *Pontania viminalis* (Hartig) as the valid name for a taxon which included *Nematus leucaspis* [*sic*!] in its synonymy. Listed as a synonym of *Phyllocolpa leucapsis* (Tischbein) by Taeger *et al.* (2010).

Discussion and conclusions

Recent specialists in Europe have evidently felt that species concepts based solely on morphological characters do not adequately reflect the biological diversity displayed within the gall-maker groups. As a result, they described numerous additional nominal species, distinguished primarily on biological characters. Although molecular-genetic studies have shed light on the phylogeny of the main galler lineages (Nyman *et al.* 2000, 2007), and species limits within some bud- and leaf-galling species in northern Fennoscandia (Nyman 2002, Leppänen *et al.* 2014), geographically wider population-level sampling and the use of more powerful molecular markers will be needed to clarify the species status of many of the forms provisionally treated above as valid species. The taxonomy of the species in the *dolichura* group appears to be particularly problematic. A practical difficulty in employing morphological methods, seems to be that the range of variability linked to different geographic provenance within the same gall-maker can often be so great as to mask the comparatively weak differences between closely related species.

Many species of the *leucapsis* group have wider host ranges (Zinovjev 1999) than for example species of the *viminalis* group (Nyman *et al.* 2000). In the former, the true extent of host ranges may furthermore have been underestimated, because the galls are less easily identifiable, and adults more difficult to rear from larvae than those of species making closed galls. This possibly also applies to the open gall making *crassispina* group. As a result of the new synonymies proposed above, several gall-maker species formerly thought to be monophagous are now considered to be oligophagous: e.g. *E. destricta*, *E. lanatae*, *E. leucapsis*, *E. leucosticta*, and *E. myrsinifoliae*. In the latter three species the *Salix* hosts of each are rather closely related (at least belonging to the same subgenus), but in *E. destricta* (*S. pentandra*, *S. glauca*, *S. phylicifolia*) and *E. lanatae* (*S. lanata*, *S. glauca*), the hosts are not closely related (placed in different subgenera by most recent botanists: see Table 1 in Kopelke 1999). The latter two examples fit better with the general pattern observed by Nyman *et al.* (2000: 532), in which "the pattern of host shifts excludes any coevolutionary hypotheses in the sense of gallers "tracking" speciation events in willows".

Other problems which require further research, are the largely unclear relationships between Palaearctic taxa and similar forms in the Nearctic. The same applies to pairs of related taxa distributed in the Central European Alps / northern Europe. The following 17 additional, described West Palaearctic taxa should be considered when identifying specimens from outside the area covered by the keys. In the *amerinae* group, *atra* subgroup: *Euura elaeagnos* Kopelke, 1996 (Alps). In the *amerinae* group, *mucronata* subgroup: *Euura gemmafoetidae* Kopelke, 2001 (Alps), *E. gemmahelveticae* Kopelke, 2001 (Alps). In the *dolichura* group: *Euura elaeagnocola* (Kopelke, 1994) **comb. nov.** (from *Pontania*; Alps), *E. helveticae* (Kopelke, 1986) (Alps). In the *oblita* group: *Euura kopelkei* (Lacourt, 1996) (Alps), *E. hubertpschornwalcheri* Kopelke, 2014 (Alps), *E. maroccana* (Lacourt, 1997) **comb. nov.** (from *Phyllocolpa*; Morocco), *E. spirappendiculata* (Kopelke, 2007) **comb. nov.** (from *Phyllocolpa*; Alps), and *E. spirhelvetica* (Kopelke, 2007) **comb. nov.** (from *Phyllocolpa*; Alps). In the *viminalis* group, *aquilonis* subgroup: *Euura alpinae* (Vikberg, 2003) **comb. nov.** (from *Pontania*; Carpathians), *E. breviserratae* (Kopelke, 1989) **comb. nov.** (from *Pontania*; Alps), *E. retusae* (Benson, 1960c) (Alps, Carpathians). In the *viminalis* group, *crassipes* subgroup: *Euura foetidae* (Kopelke, 1989) **comb. nov.** (from *Pontania*; Alps), *E. maculosa* (Kopelke, 1989) **comb. nov.** (from *Pontania*; Alps). In the *viminalis* group, *viminalis* subgroup: *Euura foetidatumida* Kopelke, 2014 (Alps), *E. pedicellatae* (Lacourt, 1997) **comb. nov.** (from *Phyllocolpa*; Morocco) [sequence data of fresh specimens and field observations by Liston indicate that this is the species that causes the pea-shaped galls on *S. pedicellata* in Morocco, which have usually been attributed to *Pontania pedunculi* (e.g. Lacourt 1997)].

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