The genera of Nematinae (Hymenoptera, Tenthredinidae)

by

Marko Prous, Stephan M. Blank, Henri Goulet, Erik Heibo, Andrew Liston, Tobias Malm, Tommi Nyman, Stefan Schmidt, David R. Smith, Hege Vårdal, Matti Viitasaari, Veli Vikberg, Andreas Taeger

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Abstract

Recent phylogenetic studies on Nematinae based on DNA sequences have shown extensive incongruencies with current nomenclature of genus-group taxa. Here, we expand previous DNA sequence datasets based on three genes (CoI, Cytb, and EF-1α), to include a fourth (NaK) and more genera. The analyses largely confirm the previous findings, particularly the existence of two well-supported large clades, *Euura* and *Pristiphora*, together comprising more than 75% of the species of Nematinae. Basal relationships within these two clades remain poorly resolved, mirroring the difficulties in delimiting genera based on morphology. In addition, a moderately supported small clade, *Nematus*, is found. The relationships between the *Euura*, *Pristiphora*, and *Nematus* clades are uncertain. Therefore, to stabilize the nomenclature we treat these clades as genera. This taxonomic treatment results in numerous new combinations of species names. The following synonymies are

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proposed for the available genus-group names. Synonyms of ***Euura*** Newman, 1837: *Cryptocampus* Hartig, 1837, *Evura* Agassiz, 1848, *Pontania* Costa, 1852, **syn. n.**, *Epitactus* Förster, 1854, **syn. n.**, *Amauronematus* Konow, 1890, **syn. n.**, *Holcocneme* Konow, 1890, **syn. n.**, *Pachynematus* Konow, 1890, **syn. n.**, *Holcocnema* Schulz, 1906, **syn. n.**, *Holcocnemis* Konow, 1907, **syn. n.**, *Pteronidea* Rohwer, 1911, **syn. n.**, *Pontopristia* Malaise, 1921, **syn. n.**, *Brachycoluma* Strand, 1929, **syn. n.**, *Decanematus* Malaise, 1931, **syn. n.**, *Pikonema* Ross, 1937, **syn. n.**, *Phyllocolpa* Benson, 1960, **syn. n.**, *Eitelius* Kontuniemi, 1966, **syn. n.**, *Gemmura* E.L. Smith, 1968, *Eupontania* Zinovjev, 1985, **syn. n.**, *Larinematus* Zhelochovtsev, 1988, **syn. n.**, *Polynematus* Zhelochovtsev, 1988, **syn. n.**, *Bacconematus* Zhelochovtsev, 1988, **syn. n.**, *Alpinematus* Lacourt, 1996, **syn. n.**, *Epicenematus* Lacourt, 1998, **syn. n.**, *Kontuniemiana* Lacourt, 1998, **syn. n.**, *Lindqvistia* Lacourt, 1998, **syn. n.**, *Luea* Wei and Nie, 1998, **syn. n.**, and *Tubpontania* Vikberg, 2010, **syn. n.** Synonyms of ***Nematus*** Panzer, 1801: *Craesus* Leach, 1817, *Hypolaepus* W.F. Kirby, 1882, and *Paranematus* Zinovjev, 1978. Synonyms of ***Pristiphora*** Latreille, 1810: *Diphadnus* Hartig, 1837, *Lygaeonematus* Konow, 1890, *Micronematus* Konow, 1890, *Gymnonychus* Marlatt, 1896, *Neopareophora* MacGillivray, 1908, **syn. n.**, *Neotomostethus* MacGillivray, 1908, *Dineuridea* Rohwer, 1912, *Sala* Ross, 1937, *Pristola* Ross, 1945, **syn. n.**, *Nepionema* Benson, 1960, **syn. n.**, *Melastola* Wong, 1968, **syn. n.**, *Sharliphora* Wong, 1969, *Oligonematus* Zhelochovtsev, 1988, *Lygaeotus* Liston, 1993, *Lygaeophora* Liston, 1993, and *Pristicampus* Zinovjev, 1993, **syn. n.** *Varna* Ross, 1937, **syn. n.** is treated as a synonym of ***Dineura*** Dahlbom 1835. ***Stauronematus*** Benson, 1953 is treated as a separate genus from *Pristiphora*. Names of 20 species-group taxa are junior secondary homonyms when combined with *Euura*. Replacement names are proposed for these. To facilitate the identification of Nematinae genera, we provide an illustrated key to the 31 extant genera of world Nematinae.

Keywords

Sawflies, taxonomy, phylogeny, key, new synonyms, new combinations, replacement names

Introduction

The Nematinae is the second-largest subfamily within the Tenthredinidae (Taeger et al. 2010). With about 1250 species, it is surpassed only by the Tenthredininae (about 1700 species) (Taeger and Blank 2011). In the Electronic World Catalogue of Symphyta (ECatSym) (Taeger and Blank 2011), 48 genera of Nematinae are currently recognised, but there is still no wider consensus on how many genera should be recognised, and how these should be delimited. Also lacking are comprehensive keys for identification of the genera. Only some regional keys are available (e.g. Benson 1958; Zhelochovtsev and Zinovjev 1988; Goulet 1992) which have to be combined with numerous other publications (Togashi 1964; Taeger 1989; Zinovjev 1993; Wei 1998a; b; Wei and Nie 1998; Zinovjev 2000; Lacourt 2006; Wei and Nie 2008) to cover most of the genera of the world. Many (sub)genera are based on few morphological characters. Furthermore, some of the character states lack discrete differences, making recognition of genera (and therefore species) difficult. Recent phylogenetic analyses based on DNA sequence data (Nyman et al. 2006; 2010) have shown that many genera (especially within the so-called 'higher Nematinae') are not monophyletic, indicating a need for a taxonomic revision. Here we expand these previous phylogenetic analyses (based on at most three genes: CoI, Cytb, and EF-1α) with the addition of one nuclear gene (NaK) and more genera to provide a new generic classification of Nematinae. The new classification seems to offer the best prospect of promoting

future stability of nomenclature. An extensively illustrated key to genera is also provided. This can be considered as a starting point for the revision of roughly half of the ca. 600 West Palaearctic nematine species, a project funded by the Swedish Taxonomy Initiative (STI). Unfortunately, the key does not solve all the problems in identifying genera. Perhaps the biggest drawback is our current inability to unequivocally separate *Euura* from *Nematus* based on morphology. The forthcoming keys to species of individual genera should remove some such remaining ambiguities in identifying genera.

Material and methods

Phylogenetic analyses

We extracted DNA from larval and adult samples stored in 99.5% ethanol at –20 °C by using the DNeasy Tissue Kit (Qiagen, Valencia, CA). Sequence data were collected from the mitochondrial genes Cytochrome oxidase I (CoI; 810 bp) and Cytochrome b (Cytb; 718 bp), and the nuclear genes Elongation factor-1α (EF-1α; two exons of the F2 copy; 777 bp in all) and Sodium–potassium adenosine triphosphatase (NaK; 997 bp). PCR amplification and sequencing of CoI, Cytb, EF-1α, and NaK were done as described earlier (Nyman et al. 2000; Nyman et al. 2006; Leppänen et al. 2012). New sequences have been deposited in GenBank under accession numbers KJ434795–KJ434930. CoI and Cytb sequences of *Monocellicampa pruni* were extracted from a partial mitochondrial genome available in GenBank (JX566509; Wei et al. 2013b). In some cases, unpublished barcode sequences (CoI; 658 bp) from the BOLD database (http://www.boldsystems.org/) were also included in the analysis to maximize representation of type species of genera.

We constructed two four-gene alignments. The first contains 134 specimens and 3302 base pairs with little missing data. Most specimens in this dataset have sequences from all four genes, but 19 specimens are missing one gene and 7 specimens are missing two genes. In order to examine the relationships between type species of the genus-group names, a second dataset of 79 specimens and 3537 bp was constructed. This alignment is longer because of the addition of the 658-bp barcode region of CoI (Hebert et al. 2003): 423 bp of this region overlaps with the 5' end of the 810-bp CoI portion used in the first dataset. When the overlapping region was identical between two different conspecific specimens, a single composite terminal taxon was created to minimize the missing cells in the dataset. In this second dataset, 21 specimens are missing one gene, 8 specimens are missing two genes, and 15 specimens are missing three genes. Four non-type species, *Pristicampus incisus* (Lindqvist, 1970), *Paranematus tulunensis* (Vikberg, 1972), *Craterocercus fraternalis* (Norton, 1872), and *Susana annulata* D.R. Smith, 1969, were added to the dataset, because the amount of sequence data for the respective type species (*Pristicampus arcticus* (Lindqvist, 1959) [422 bp of the CoI barcode region], *Paranematus wahlbergi* (Thomson, 1871) [658 bp of CoI], *Craterocercus obtusus* (Klug, 1816) [658 bp of CoI], and *Susana cupressi* Rohwer and Middleton, 1932 [997 bp of NaK]) was insufficient to reliably estimate their phylogenetic position.

When we exclude genus names which are based on fossils, or are taxonomically unplaced, there are 78 genera based on different type species. Of these, 62 type species have DNA data. Of the remaining 16 type species, most can be associated using morphology with species for which DNA data is available, but *Anhoplocampa*, *Armenocampus*, *Dinematus*, *Katsujia*, *Megadineura*, *Nescianeura* and *Renonerva* still lack DNA data.

We performed Bayesian phylogenetic analyses in MrBayes v. 3.2.2 (Ronquist et al. 2012) and maximum likelihood (ML) analyses in RAxML v. 7.6.6 (Stamatakis 2006; Stamatakis et al. 2008) using the CIPRES Science Gateway (Miller et al. 2010) at http://www.phylo.org/index.php/portal/. The dataset was partitioned by genes, and the best-fitting DNA substitution model for each gene was selected using jModelTest 2.1.4 (Darriba et al. 2012), which uses PhyML (Guindon and Gascuel 2003) for likelihood calculations. Model selection was done using five substitution schemes (including parameters for base frequencies, gamma-distributed rate variation across sites (G) with four categories, and a proportion of invariable sites (I), altogether 40 different models) on the basis of the Akaike Information Criterion (AIC). The best-fitting model for all four genes was GTR+I+G, which was used in MrBayes. In the RAxML runs, proportion of invariable sites (I) was not used as recommended in the manual of the program. In MrBayes, we used default priors, and each of the four partitions was allowed to have its own unlinked substitution model. We ran two parallel runs having four incrementally heated chains for 20 million generations, while sampling trees from the current cold chain every 1000 generations. We discarded 5000 trees sampled prior to reaching chain stationarity as a burn-in from both runs, and the remaining 15001 trees were used to calculate a 50% majority consensus rule tree, showing all groupings with posterior probability more than 0.5. In RAxML a separate GTR+G model was employed for each gene, and node supports were evaluated based on 500 bootstrap replicates. The root of the phylogenetic trees on Figs 2–5 was placed between Nematinae and other representatives of Tenthredinidae in the dataset. For the subfamilial phylogenetic relationships and placement of Nematinae within Tenthredinidae, see Malm and Nyman (2014).

Preparation of the key and morphological terminology

For the generic key, we studied most of the type species of the genus-group taxa, and additional species when necessary (excluding fossils). Only 5 out of 80 type species of the available genus-group names given for extant taxa were not available for study: *Anhoplocampa fumosa* Wei, 1998, *Caulocampus necopinus* Zhelochovtsev, 1941 (type species of *Armenocampus* Zinovjev, 2000), *Messa hortulana* Leach, 1817 (unplaced name), *Pristiphora varipes* Lepeletier, 1823 (*Stevenia* Brullé, 1846; unplaced name), and *Renonerva fumosa* Wei and Nie, 1998. Except for *Messa hortulana* and *Pristiphora varipes*, the published descriptions and figures were sufficient to include them in the key. Morphological terminology is based on Goulet (1992) and Viitasaari (2002) with small modifications to the terminology of wing veins and cells (Fig. 1). The term campaniform sensilla

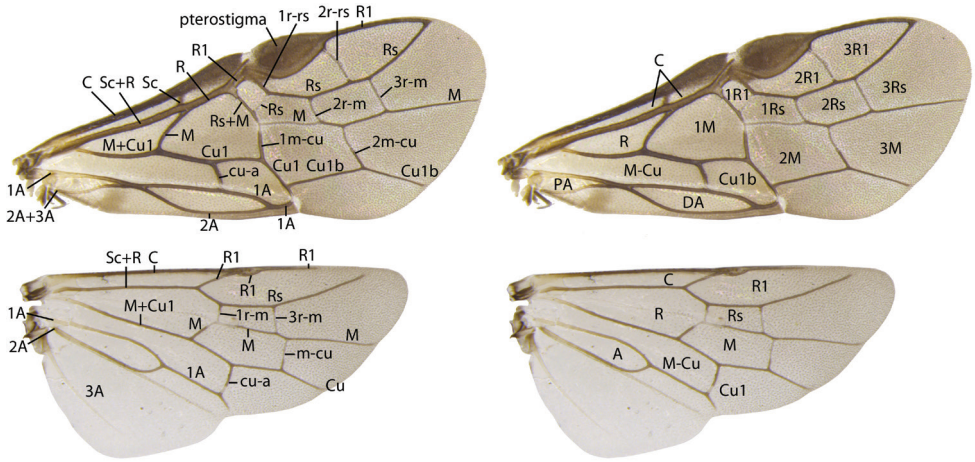


Figure 1. Wing veins (left) and cells of *Hoplocampa chrysorrhoea* (Klug, 1816). **Veins: 1A**, **2A**, **3A** – first, second, and third anal vein; **C** – costa; **Cu** – cubitus; **Cu1** – cubitus 1; **Cu1b** – cubitus 1b; **cu-a** - cubito-anal cross-vein; **M** – medius; **m-cu** – medio-cubital cross-vein; **1m-cu**, **2m-cu** – first, second medio-cubital cross-vein; **R** – radius; **R1** – radius 1; **Rs** – radial sector; **1r-m**, **2r-m**, **3r-m** – first, second, and third radio-medial cross-vein; **1r-rs**, **2r-rs** – first, second radial cross-vein; **Sc** – subcosta 1 (i.e., free sector of subcosta); **Sc+R** – subcosta (i.e., fused subcosta proper plus radius); **Cells: A** – anal cell; **C** – costal cell; **Cu1** – cubital cell 1; **Cu1b** – cubital cell 1b; **DA** – distal anal cell; **1M**, **2M**, **3M** – first, second, and third medial cell; **M-Cu** – medio-cubital cell; **PA** – proximal anal cell; **R** – radial cell; **1R1**, **2R1**, **3R1** – first, second, and third cell radius 1; **1Rs**, **2Rs**, **3Rs** – first, second, and third radius sector cell.

is applied to structures on the ovipositor, which were called pores by Vikberg (1982) and Viitasaari (2002). The membranous lamella along the protibial grooming spur (the anterior spur) is named velum, which is situated on the surface of the spur facing tarsomere 1 (Schönitzer and Lawitzky 1987).

Results

Phylogenetic analyses

Our focus here is nomenclature and delimitation of genera. Accordingly, we discuss the implications of phylogenetic results only from this perspective. The results largely agree with previous analyses (Nyman et al. 2006; 2010) regarding congruence with current taxonomy: *Hemichroa militaris* is distinct from other *Hemichroa*; *Stauronematus* does not belong to *Pristiphora*; *Pristiphora*, *Nematus*, and some other genera (as delimited in Taeger et al. 2010) in the *Euura* clade are non-monophyletic; and most species belong to two large clades, *Euura* and *Pristiphora* (Figs 2–5). (Note that *Dineura virididorsata* in Nyman et al. 2006 was a misidentified larva of *Nematinus acuminatus*; the name has been corrected in GenBank, accessions DQ302173 and DQ302261). The only important difference when it comes to delimitation of genera compared to the previous

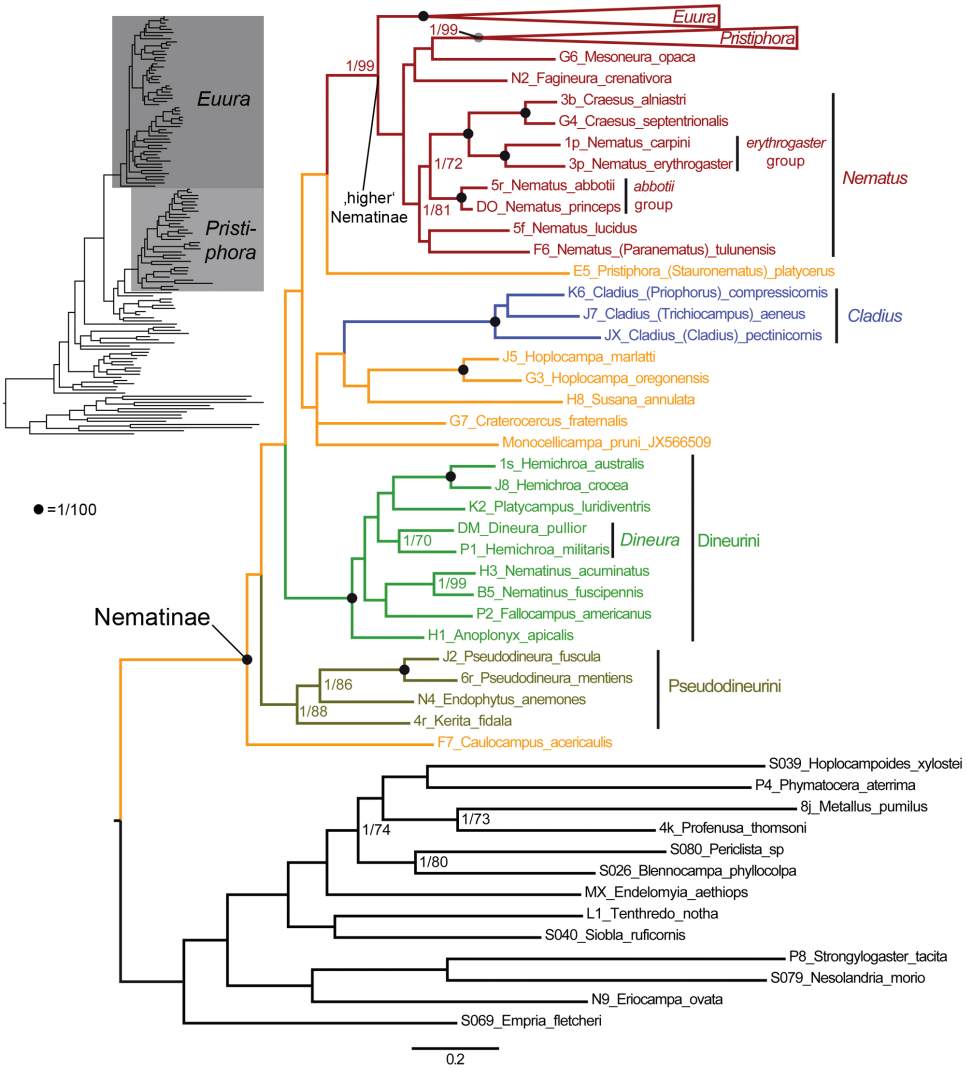


Figure 2. Phylogenetic tree of Nematinae based on the Bayesian analysis. Numbers above or right of branches show Bayesian posterior probabilities (PP) followed by bootstrap proportions (%, BP) from the corresponding ML analysis. Branches receiving maximum support (PP=1, BP=100%) are denoted by a black dot. Support values for weakly supported branches (PP<0.9 and/or BP<70) are not shown. *Euura* and *Pristiphora* clades are collapsed here, but are fully shown in Figs 3 and 4. The inset shows the outline of the full tree including the *Euura* and *Pristiphora* clades. Nomenclature is according to Taeger et al. (2010). Voucher ID numbers (e.g. G6) correspond to specimen identifiers in previous phylogenetic trees with different species names. The scale bar shows the number of estimated substitutions per nucleotide position.

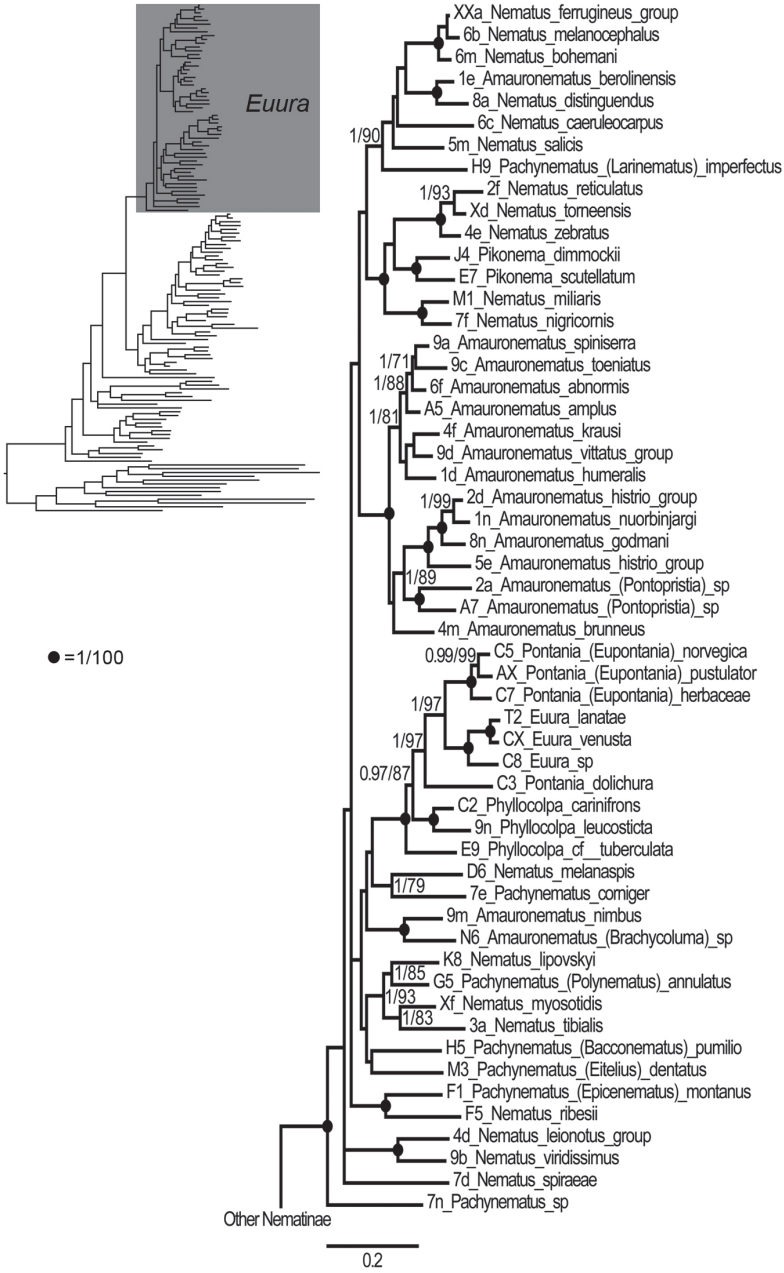


Figure 3. The *Euura* clade of the Bayesian phylogenetic tree shown in Fig. 2. Numbers above or right of branches show Bayesian posterior probabilities (PP) followed by bootstrap proportions (%, BP) from the corresponding ML analysis. Branches receiving maximum support (PP=1, BP=100%) are denoted by a black dot. Support values for weakly supported branches (PP<0.9 and/or BP<70) are not shown. The inset shows the outline of the full tree. Nomenclature is according to Taeger et al. (2010). Voucher ID numbers (e.g. 6b) correspond to specimen identifiers in previous phylogenetic trees with different species names. The scale bar shows the number of estimated substitutions per nucleotide position.

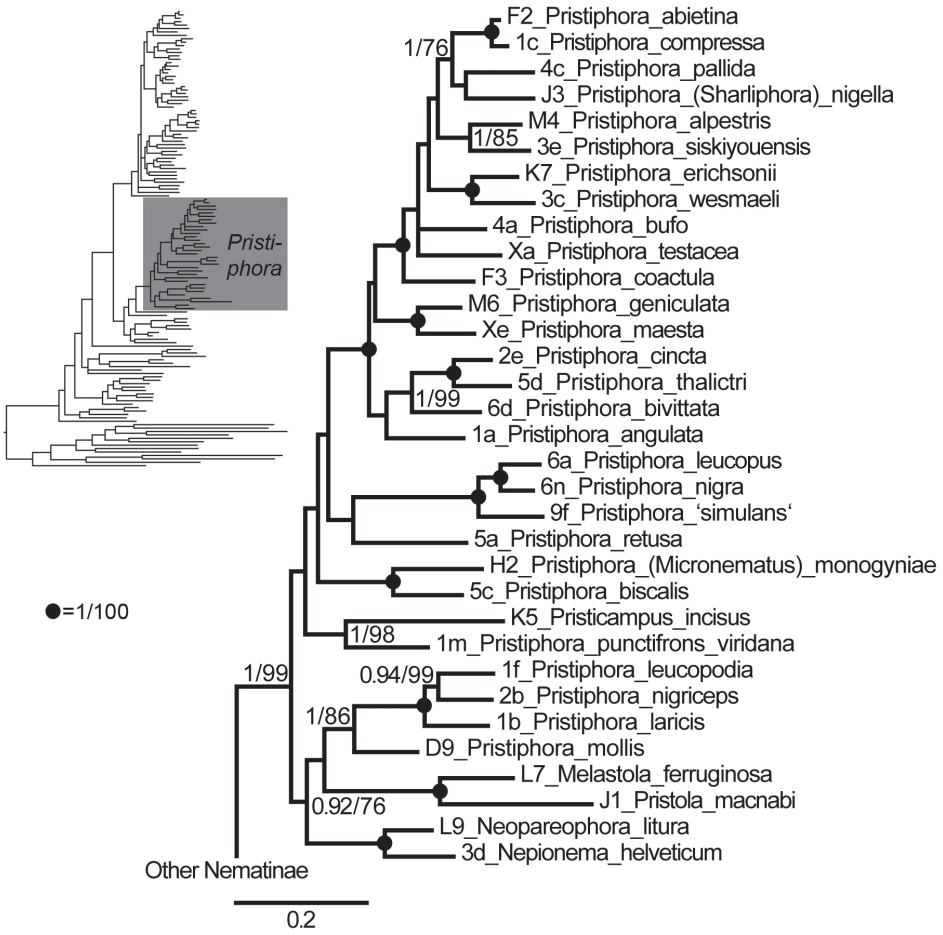


Figure 4. The *Pristiphora* clade of the Bayesian phylogenetic tree shown in Fig. 2. Numbers above or to the right of branches show Bayesian posterior probabilities (PP) followed by bootstrap proportions (%, BP) from the corresponding ML analysis. Branches receiving maximum support (PP=1, BP=100%) are denoted by a black dot. Support values for weakly supported branches (PP<0.9 and/or BP<70) are not shown. The inset shows the outline of the full tree. Nomenclature is according to Taeger et al. (2010). Voucher ID numbers (e.g. F2) correspond to specimen identifiers in previous phylogenetic trees with different species names. The scale bar shows the number of estimated substitutions per nucleotide position.

analyses is the phylogenetic position of the type species of *Nematus*, *N. lucidus*. The addition of the nuclear NaK gene to the dataset causes *N. lucidus*, as well as *Mesoneura*, *Fagineura*, *Craesus*, and some other species of *Nematus* to move away from the *Euura* clade (placed closer in Nyman et al. 2006; 2010) and approach the *Pristiphora* clade (Figs 2 and 5). Considering previous phylogenetic results and the results reported here (Figs 2–5), we propose in the **Taxonomy** section several changes compared to Taeger et al. (2010). Advantages and disadvantages of this and alternative taxonomies are highlighted in the **Discussion** section.

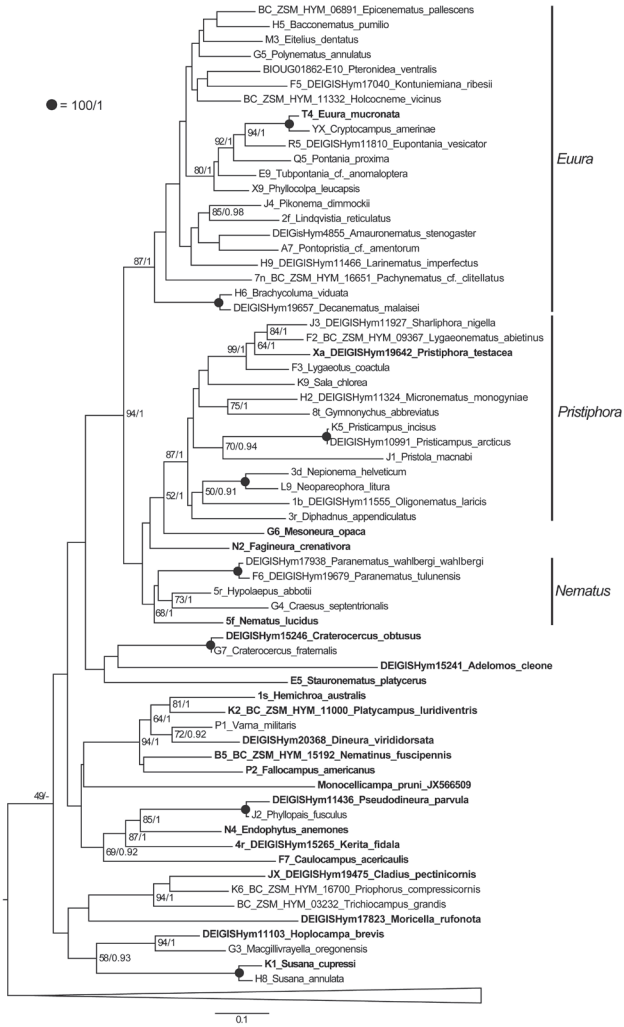
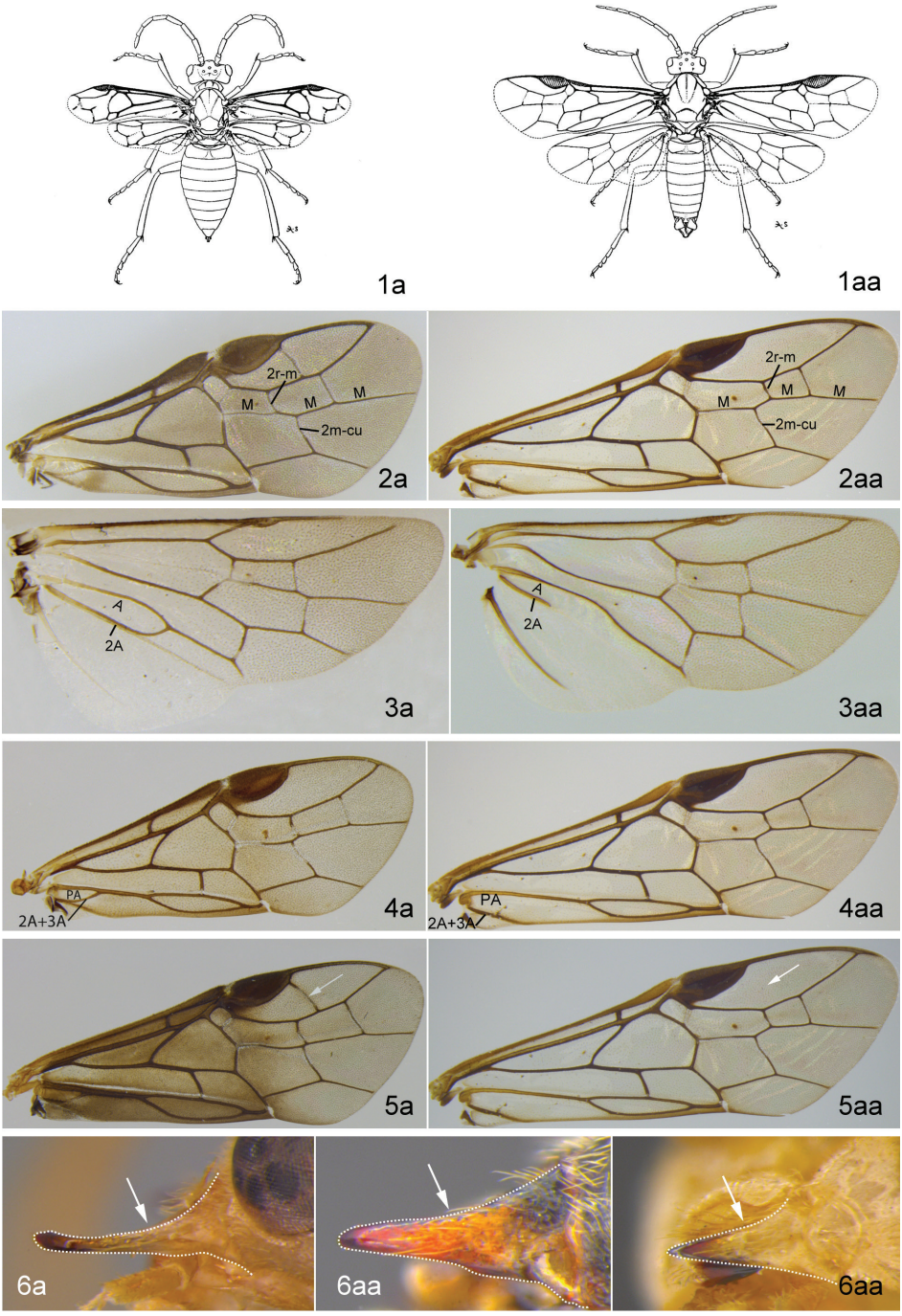


Figure 5. Phylogenetic relationships of type species for which at least 400 bp of the CoI barcode region was available. The tree was reconstructed according to a ML analysis allowing a separate GTR+I+G4 model of substitution for each gene. Numbers above or right of branches show bootstrap proportions (%, BP) followed by posterior probabilities (PP) from the corresponding Bayesian analysis. Branches receiving maximum support (BP=100%, PP=1) are denoted by a black dot. Support values for weakly supported branches (PP<0.9 and BP<50) are not shown. Nematinae was not monophyletic in the Bayesian analysis, because *Moricella rufonota* (only 658 bp of CoI available) was weakly placed as sister to the *Strongylogaster+Nesoselandria* clade. Some terminals in the dataset are composites of two conspecific specimens (indicated by two ID numbers, for example J3 and DEIGISHym11927 or F2 and BC ZSM HYM 09367). Four non-type species (*Pristicampus incisus*, *Paranematus tulunensis*, *Craterocercus fraternalis*, and *Susana annulata*) were also included in the analysis, because the CoI or NaK (for *S. cupressi*) sequences available for the type species of the respective genera were not sufficient to place them reliably in the tree. Type species in bold are the basis for genera defined here. Outgroup taxa have been collapsed for simplicity. Voucher ID numbers (e.g. F2) correspond to specimen identifiers in previous phylogenetic trees with different species names. The scale bar shows the number of estimated substitutions per nucleotide position.

Key

For some smaller genera and species groups there are comprehensive recent keys to species available, which we have referred to in the key. Because the morphological separation of *Euura*, *Pristiphora*, and *Nematus* can be difficult (see Discussion), there are two places (couplets 15 and 17) in the key where we have not separated them completely. Instead, we have given short descriptions of a few minor groups which run together with the genus intended to be keyed out. Full resolution of these problems requires species-level revisions. The key is arranged in alternating pages of text and plates. The couplets are illustrated by a plate on the facing page. We recommend using the key with two pages side by side, so that couplets and corresponding figures are simultaneously visible.

1	**a**	Fore wing shortened, apex usually not reaching tip of abdomen, veins often strongly aberrant. [Some arctic or high elevation specimens of *Euura* and *Pristiphora*, e.g. females of *Euura abnormis* (Holmgren, 1883)]..... **10**
–	**aa**	Fore wing normal, apex extending beyond tip of abdomen, veins normally developed..... **2**
2(1)	**a**	Vein 2r-m present, joining vein M proximal of 2m-cu..... **43**
–	**aa**	Vein 2r-m joining vein M either distal of 2m-cu or very slightly proximal of 2m-cu (few aberrant specimens), or vein 2r-m absent..... **3**
3(2)	**a**	Vein 2A of hind wing complete, cell A closed.
	b	Body length 2–15 mm..... **4**
–	**aa**	Vein 2A of hind wing incomplete, cell A open distally.
	bb	Body length 2–6 mm. [Pseudodineurini and few *Pristiphora*.]..... **40**
4(3)	**a**	Base of vein 2A+3A complete and curved up to 1A, cell PA closed .. **33**
–	**aa**	Base of vein 2A+3A incomplete and straight, cell PA open distally..... **5**
5(4)	**a**	Vein 2r-rs present..... **23**
–	**aa**	Vein 2r-rs absent..... **6**
6(5)	**a**	Left mandible markedly constricted near middle and right mandible tapered regularly towards apex..... **7**
–	**aa**	Left and right mandible both tapered regularly towards apex..... **18**



1a *Euura abnormis*, female **1aa** *E. abnormis*, male (1a and 1aa from Benson 1958) **2a** *Hoplocampa chrysorrhoea* **2aa** *Nematus lucidus* **3a** *Hoplocampa chrysorrhoea* **3aa** *Pseudodineura enslini* **4a** *Platycampus luridiventris* **4aa** *Nematus lucidus* **5a** *Hemichroa australis* **5aa** *Nematus lucidus* **6a** *Dinematus krausi* **6aa** *Nematinus fuscipennis* (left), *Dineura viridorsata*.

7(6) **a** Tarsal claw without basal lobe and subapical tooth absent or shorter than apical tooth.

b Clypeus deeply emarginate, subtruncate, or truncate.

c Apex of flagellomeres in males not produced ventrally **8**

– **aa** Tarsal claw with basal lobe *and* subapical tooth present, erect, well separated from apical tooth, *and* longer than apical tooth.

bb Clypeus not deeply emarginate.

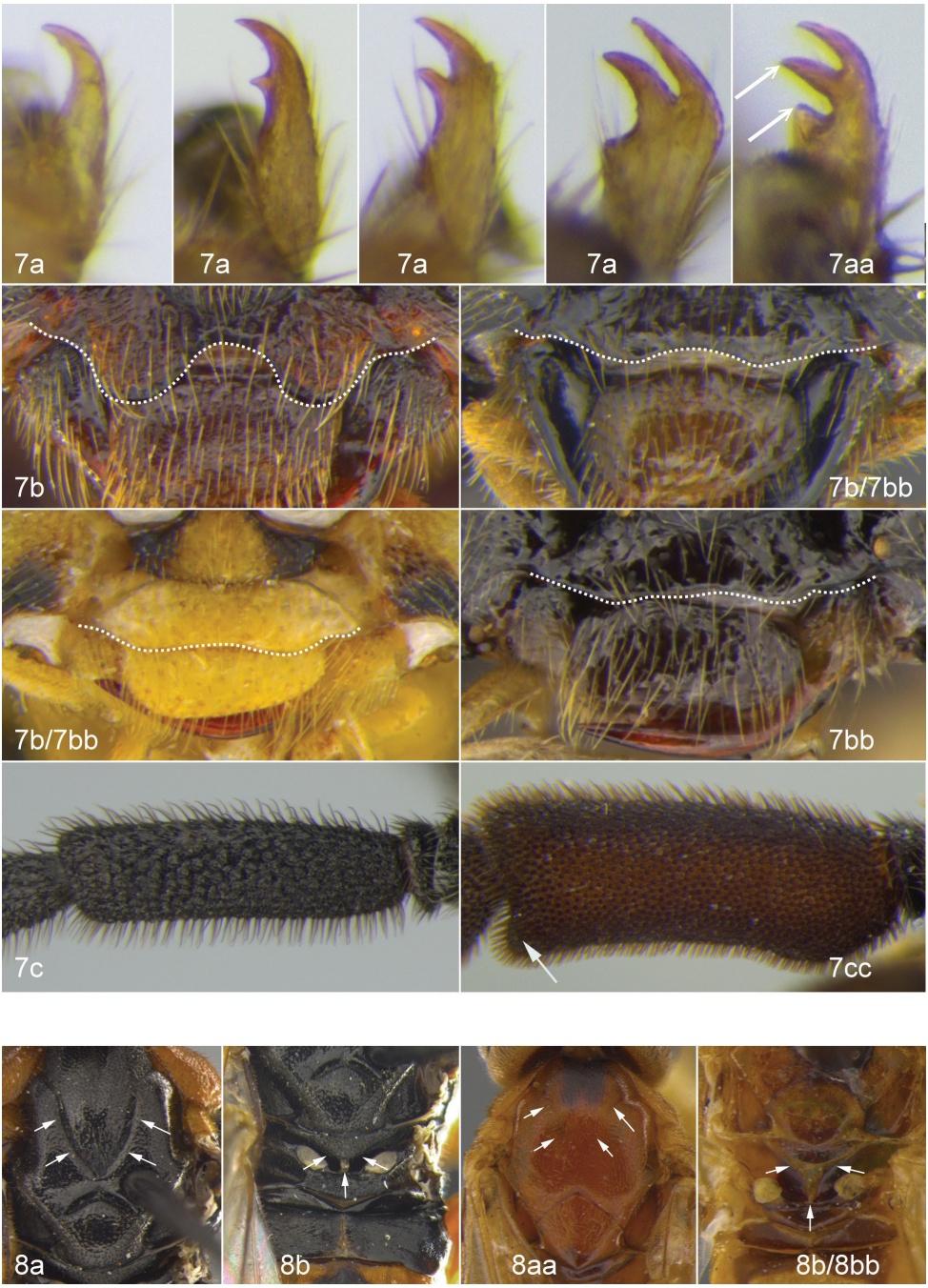
cc Apex of flagellomeres in male slightly produced ventrally.
Two species. Key to species by Liston (2007). Palaearctic.
..... ***Stauronematus*** Benson, 1953

8(7) **a** Notauli sharply outlined.

b Exposed part of membrane between mesoscutellar appendage and postnotum of mesothorax anteriorly widened or not **9**

– **aa** Notauli hardly outlined.

bb Exposed part of membrane between mesoscutellar appendage and postnotum of mesothorax anteriorly widened.
Four species of the *P. resinicolor* and *P. macnabi* groups. Formerly *Pristola* and *Melastola*. Key to species by Wong (1968). Nearctic.
..... ***Pristiphora*** Latreille, 1810 in part



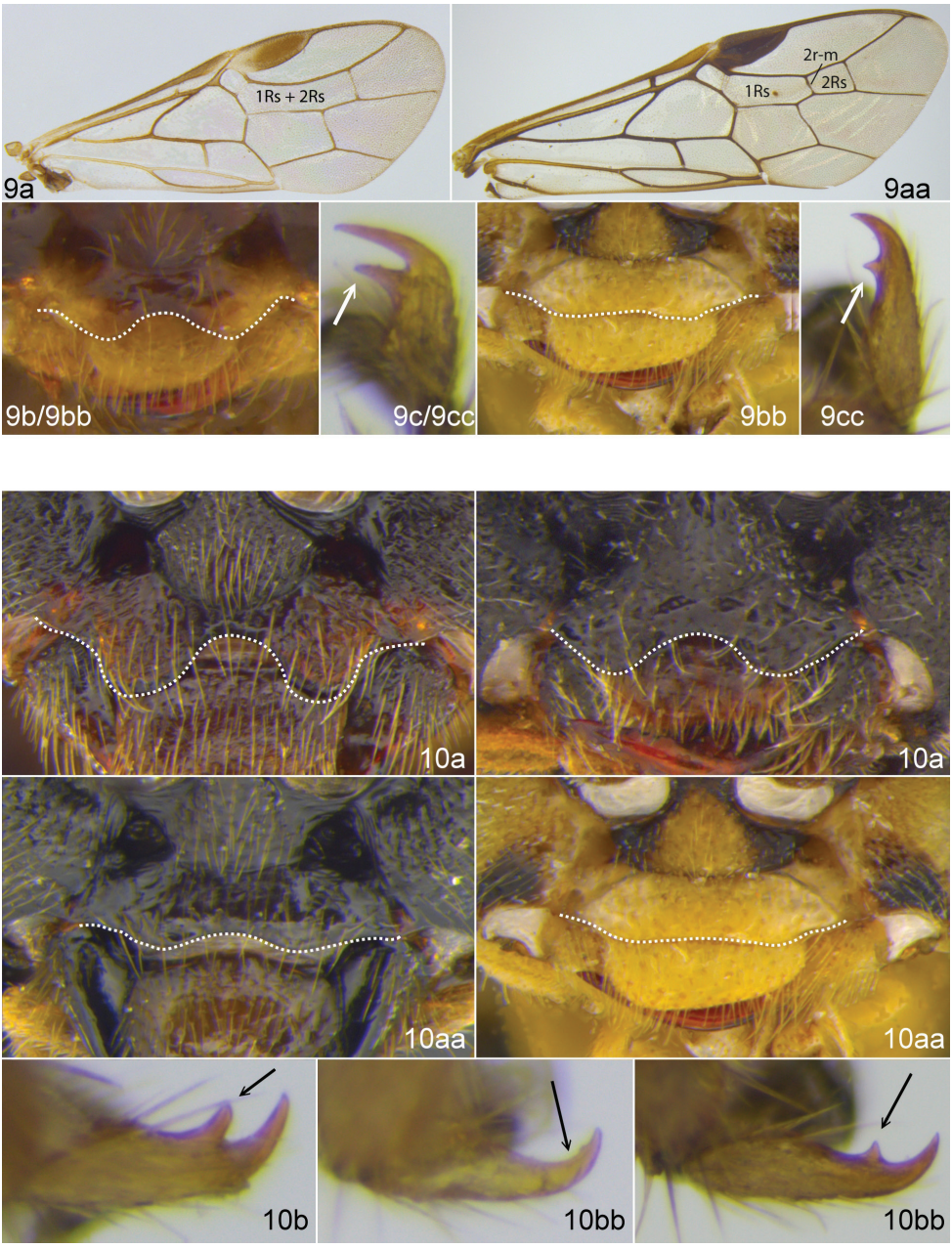
7a From left to right: *Euura pumilio*, *E. clitellata*, *Nematus lucidus*, *E. ribesii* **7aa** *Stauronematus platycerus* **7b** *N. septentrionalis* **7b/bb** *Pristiphora mollis* (upper right), *P. testacea* **7bb** *S. platycerus* **7c** *N. lucidus* **7cc** *S. platycerus* **8a** *N. lucidus* **8b** *N. lucidus* **8aa** *P. macnabi* **8b/bb** *P. resinicolor*.

9(8) **a** Cell 1Rs and 2Rs fused, vein 2r-m absent.
b Clypeus emarginate.
c Tarsal claw with long subapical tooth.
About 60 species of *Euura*. Former *Euura* s.str., *Alpinematus*, and some *Pontania*. Holarctic.
.....***Euura*** Newman, 1837 in part

– **aa** Cell 1Rs and 2Rs not fused, vein 2r-m present.
bb Clypeus emarginate or truncate.
cc Tarsal claw without or with short or long subapical tooth **10**

10(1, 9) **a** Clypeus clearly and rather deeply emarginate,
b *and* tarsal claw with long subapical tooth..... **11**

– **aa** Clypeus more or less truncate,
bb *or/and* tarsal claw without or with small subapical tooth **16**



9a *Euura mucronata* **9aa** *Nematus lucidus* **9b/9bb** *E. mucronata* **9c/9cc** *E. mucronata* **9bb** *Pristiphora testacea* **9cc** *E. clitellata* **10a** *N. septentrionalis* (left), *N. lucidus* **10aa** *P. mollis* (left), *P. testacea* **10b** *N. lucidus* **10bb** *E. pumilio* (left), *E. clitellata*.

11(10) **a** Height of eye in lateral view about 2–3 times as long as distance from dorsal margin of eye to dorsalmost point of head.
b Sawsheath emarginate in dorsal view.
c Tangium of lancet with campaniform sensilla ("pores").
d Valviceps not divided into pseudoceps and paravalva, without valvispina. Small, 4.0–5.5 mm, black and yellow-brown; thorax (except pronotum), abdomen above, head (almost entirely) and antennae black; clypeus, labrum and base of mandibles white. In the forewing costa same colour as pterostigma (usually pale). Three species of the *P. arctica* group. Formerly *Pristicampus*. Revision by Zinovjev (1993). Palaearctic.
..... ***Pristiphora*** Latreille, 1810 in part

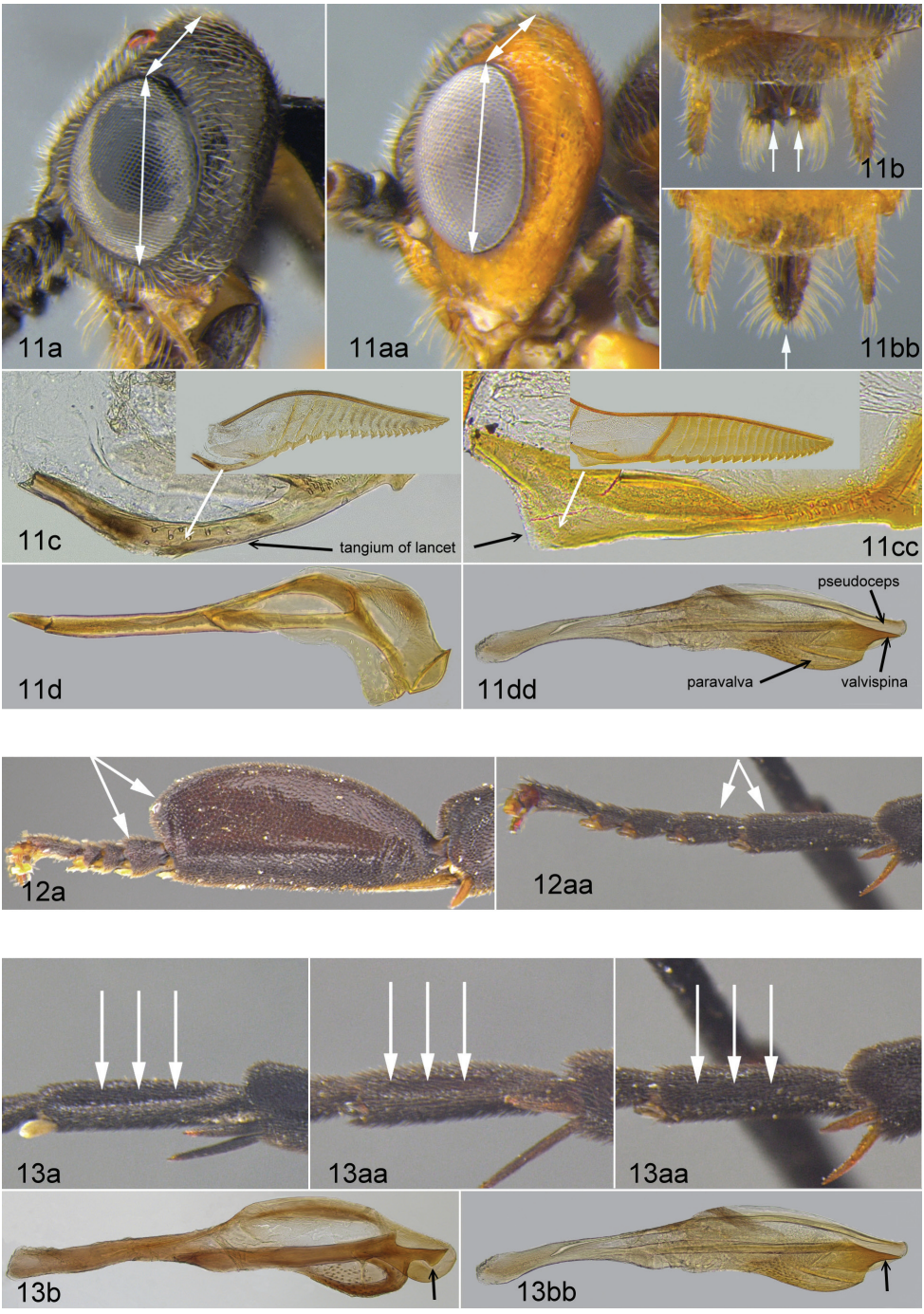
– **aa** Height of eye in lateral view *usually* about 3–4 times as long as distance from dorsal margin of eye to dorsalmost point of head.
bb Sawsheath *usually* not emarginate in dorsal view.
cc Tangium of lancet without campaniform sensilla, if present, then aa apply.
dd Valviceps divided into pseudoceps and paravalva, often with valvispina... **12**

12(11) **a** Metatarsomere 1 2.0–3.0 times as wide as width of metatarsomere 2. 22 species of the *N. septentrionalis* group. Formerly *Craesus*. Holarctic, Oriental.
..... ***Nematus*** Panzer, 1801 in part

– **aa** Metatarsomere 1 1.0–1.5 times as wide as width of metatarsomere 2... **13**

13(12) **a** Metatarsomere 1 with *long and deep* groove on anterior and posterior surfaces.
b Valvispina widened preapically.
c Body length 8–12 mm.
About four species of the *N. abbotii* group, including *N. princeps* Zaddach, 1876. Key to Nearctic species by Smith (2008). Holarctic.
..... ***Nematus*** Panzer, 1801 in part

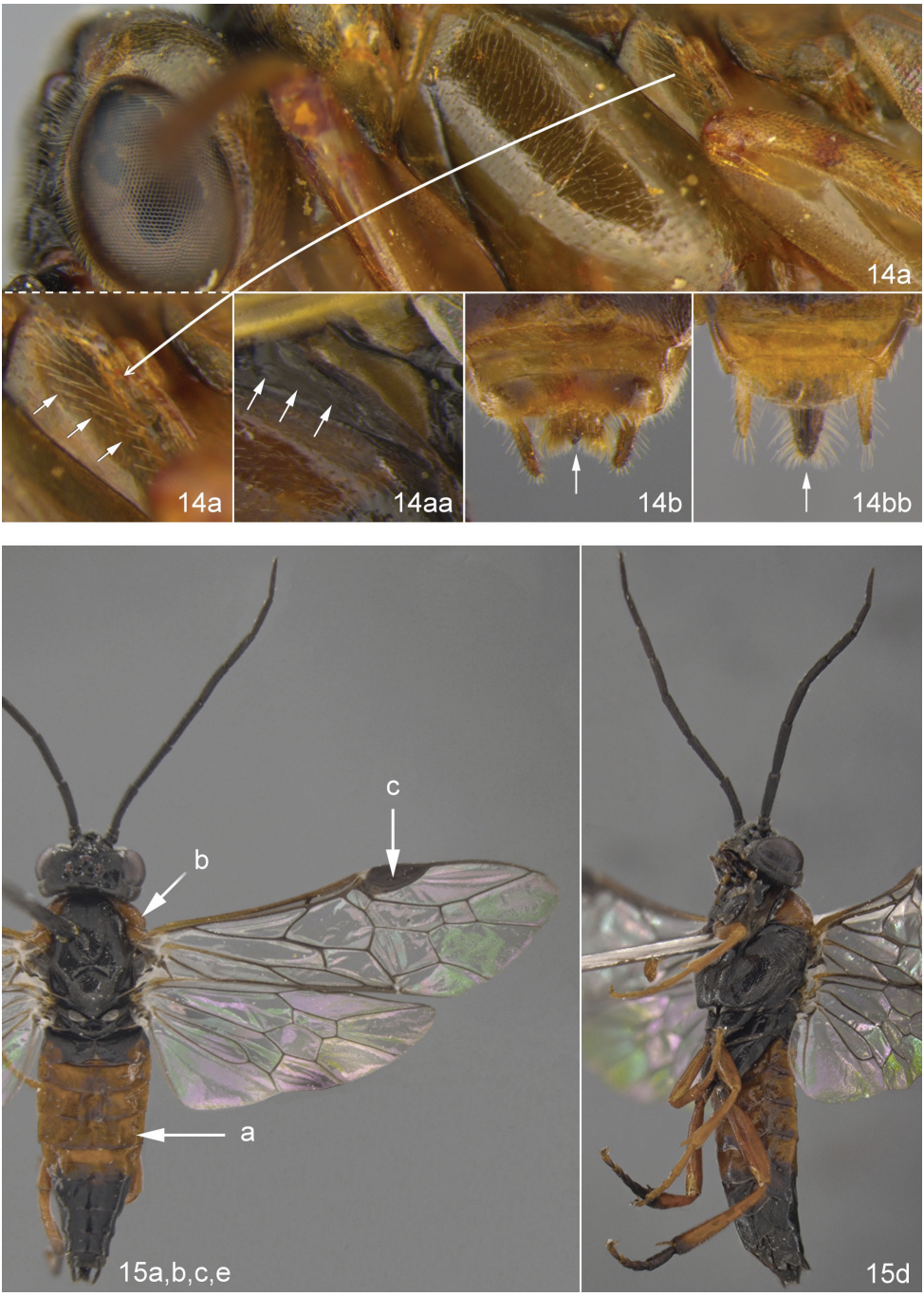
– **aa** Metatarsomere 1 at most with *short and shallow* groove on anterior and posterior surfaces.
bb Valvispina evenly tapering towards tip.
cc Body length 3–12 mm..... **14**



11a *Pristiphora arctica* **11aa** *Euura reticulata* **11b** *P. incisa* **11bb** *E. reticulata* **11c** *P. arctica* **11cc** *E. reticulata* **11d** *P. arctica* **11dd** *E. vicina* **12a** *Nematus septentrionalis* **12aa** *E. caeruleocarpus* **13a** *N. abbotii* **13aa** *E. vicina* (left), *E. caeruleocarpus* **13b** *N. princeps* **13bb** *E. vicina*.

14(13) **a** Mesothoracic katepimeron extensively covered with hairs.
b Sawsheath slightly emarginate or not emarginate in dorsal view.
c Tangium of lancet with campaniform sensilla (see Fig. 11c).
Sawsheath slightly emarginate in dorsal view in the type species, *F. crenativora* Vikberg & Zinovjev, 2000, not emarginate in *F. quercivora* Togashi, 2006. Two species. Key to species by Togashi (2006). East Palaearctic.
..... ***Fagineura*** Vikberg and Zinovjev, 2000 in part
– **aa** Mesothoracic katepimeron with at most few hairs.
bb Sawsheath *usually* not emarginate in dorsal view.
cc Tangium of lancet without campaniform sensilla (see Fig. 11cc)..... **15**

15(14) **a** At least terga 2–3 or at most terga 1–6 reddish.
b Pronotal angles reddish.
c Stigma dark.
d Legs largely red; coxae, trochanters and hind tarsi black.
e Body elongate, torpedo-shaped.
The type species of *Nematus*, *N. lucidus* Panzer, 1801. 7–11 mm. Palaearctic.
..... ***Nematus*** Panzer, 1801 in part
– **aa–ee** Combination of characters not as in a–e.
Large part of about 700 *Euura* species, e.g. most of former *Amauronematus*, *Nematus (Pteronidea)*, *Phyllocolpa*, and *Pontania*. Holarctic, Oriental, and introduced to Afrotropic, Neotropic and Australasia. The type species, *E. mucronata*, keys out in couplet 9 or 22.
..... ***Euura*** Newman, 1837 in part
Body 8 mm; head and antennae entirely black; thorax dorsally mostly reddish, ventrally mostly black; pronotum and tegulae yellowish; stigma dark brown; legs black; abdomen yellowish, sawsheath black; mesepisternum smooth. One species, *N. noblecourti* Lacourt, 2006. *Nematus*? West Palaearctic.
..... ***Nescianeura*** Lacourt, 2006
Body 5.5–10.5 mm, black; pronotal angles and tegulae yellowish; stigma dark brown; legs largely pale; hind tibia at least in basal third pale; mesepisternum smooth; sawsheath in dorsal view narrowing towards the apex, apically broadly rounded. On *Lonicera*. About six species of the *N. wahlbergi* group. Formerly *Paranematus*. Keys to species by Vikberg (1972), Zinovjev (1978). Palaearctic.
..... ***Nematus*** Panzer, 1801 in part
Body 4.5–7.0 mm, black or with yellowish or reddish abdomen, sometimes also thorax largely reddish; stigma dark brown; hind tibia slightly widened with an indistinct longitudinal groove; metatarsomere 1 cylindrical, without a groove; sawsheath short and rounded in lateral view, wide in dorsal view; cerci longer than sheath; lancet with lateral spines on annuli; male penis valve is slightly curved, with stout valvispina, and a rather low, rounded adjacent lobe. About six species of the *N. erythrogaster* group, including *N. lucens* (Enslin, 1918) and *N. umbratus* Thomson, 1871. Keys to species by Liston et al. (2006), Smith (2008). Holarctic.
..... ***Nematus*** Panzer, 1801 in part



14a, **14b** *Fagineura crenativora* **14aa,14bb** *Euura reticulata* **15a,b,c,e,d** *Nematus lucidus*.

16(10) **a** Head length behind eyes 0.2–0.4 times as long as eye length in dorsal view.

b Sawsheath *frequently* distinctly emarginate in dorsal view.

c Clypeus more or less truncate (see Fig. 10aa).

d Apex of vein C *usually* swollen, at the point of origin of vein Rs+M from R cell C is *usually* only about as wide as vein R.

e Medial surface of head near antennal sockets markedly elevated in lateral view and angular below medial pit.

f In female, apical part of abdomen *sometimes* laterally compressed, so that it appears narrow in dorsal view.

g Tangium of lancet with campaniform sensilla.

h In male, tergum 8 without long medial projection, if present, then a, c, d, and e apply.

About 240 species, Holarctic, Oriental, and Neotropical.

..... ***Pristiphora*** Latreille, 1810 in part

Body 7 mm; head (including antennae), thorax, and abdomen dorsally mostly black, ventrally yellowish, except ventral black half of mesepisternum; pronotum, tegulae, and stigma yellowish, legs mostly yellowish; mesepisternum smooth. One species, *D. krausi* Lacourt, 2006. *Pristiphora*? West Palaearctic.

..... ***Dinematus*** Lacourt, 2006 in part

– **aa** Head length behind eyes 0.4–0.7 times as long as eye length in dorsal view.

bb Sawsheath *usually* not distinctly emarginate in dorsal view.

cc Clypeus *usually* deeply emarginate (see Fig. 10a).

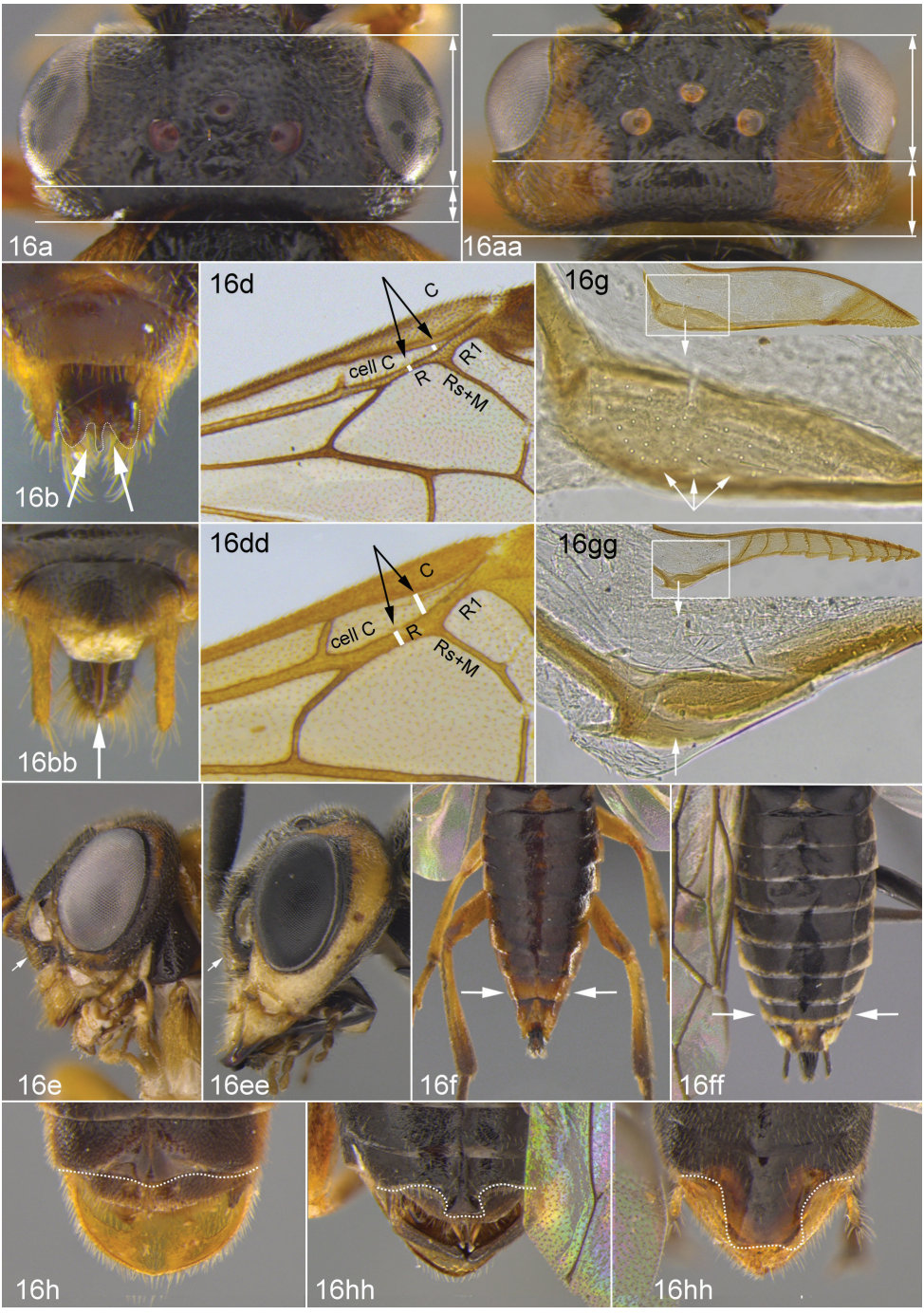
dd Apex of vein C *usually* less swollen, at the point of origin of vein Rs+M from R cell C is about twice as wide as vein R or wider.

ee Medial surface of head near antennal sockets *sometimes* elevated in lateral view and slightly or not angular below median pit.

ff In female, apical part of abdomen not laterally compressed.

gg Tangium of lancet *usually* without campaniform sensilla.

hh In male, tergum 8 *usually* with long medial projection..... **17**



16a *Pristiphora pallidiventris* **16aa** *Euura annulata* **16b** *P. pallidiventris* **16bb** *E. annulata* **16d** *P. pallidiventris* **16dd** *E. annulata* **16e** *P. testacea* **16ee** *E. stenogaster* **16f** *P. pseudodecipiens* **16ff** *E. stenogaster* **16g** *P. compressa* **16gg** *E. annulata* **16h** *P. testacea* **16hh** *E. imperfecta* (left), *E. clitellata*.

17(16) **a** Height of eye in lateral view about 2–3 times as long as distance from dorsal margin of eye to dorsalmost point of head,

b *and* sawsheath emarginate in dorsal view.

c Tangium of lancet with campaniform sensilla.

d Valviceps not divided into pseudoceps and paravalva, without valvispina. Small, 4.0–5.5 mm, black and yellowish brown; thorax (except pronotum), abdomen above, head (almost entirely) and antennae black; clypeus, labrum and base of mandibles white. Forewing costa same colour as pterostigma (usually pale). Three species of the *P. arctica* group. Formerly *Pristicampus*. Revision by Zinovjev (1993). Palaearctic.

..... ***Pristiphora*** Latreille, 1810 in part

– **aa** Height of eye in lateral view about 3–4 times as long as distance from dorsal margin of eye to dorsalmost point of head,

bb *or/and* sawsheath not emarginate in dorsal view.

cc Tangium of lancet *usually* without campaniform sensilla.

dd Valviceps divided into pseudoceps and paravalva, often with valvispina. Part of about 700 *Euura* species, e.g. most of former *Pachynematus*. Holarctic, Oriental, and introduced to Afrotropic, Neotropic and Australasia.

..... ***Euura*** Newman, 1837 in part

Body 5.5–10.5 mm, black; stigma dark brown; pronotal angles and tegulae yellowish; legs largely pale; hind tibia at least in basal third pale; claws with large subapical tooth; mesepisternum smooth; sawsheath in dorsal view narrowing towards the apex, apically broadly rounded. On *Lonicera*. About six species of the *N. wahlbergi* group. Formerly *Paranematus.* Keys to species by Vikberg (1972), Zinovjev (1978). Palaearctic.

..... ***Nematus*** Panzer, 1801 in part

Body 6.0–7.5 mm, black; tegulae, pronotal angles, stigma, tarsi and tibiae yellow, femora usually only partly yellow; claws with small subapical tooth, mesepisternum rough. One species of *Pristiphora*, *P. mollis* (Hartig, 1837). West Palaearctic, Nearctic.

..... ***Pristiphora*** Latreille, 1810 in part

18(6) **a** Tarsal claw with subapical tooth larger than apical tooth.

b Malar space 0.1–0.6 times as long as diameter of front ocellus.

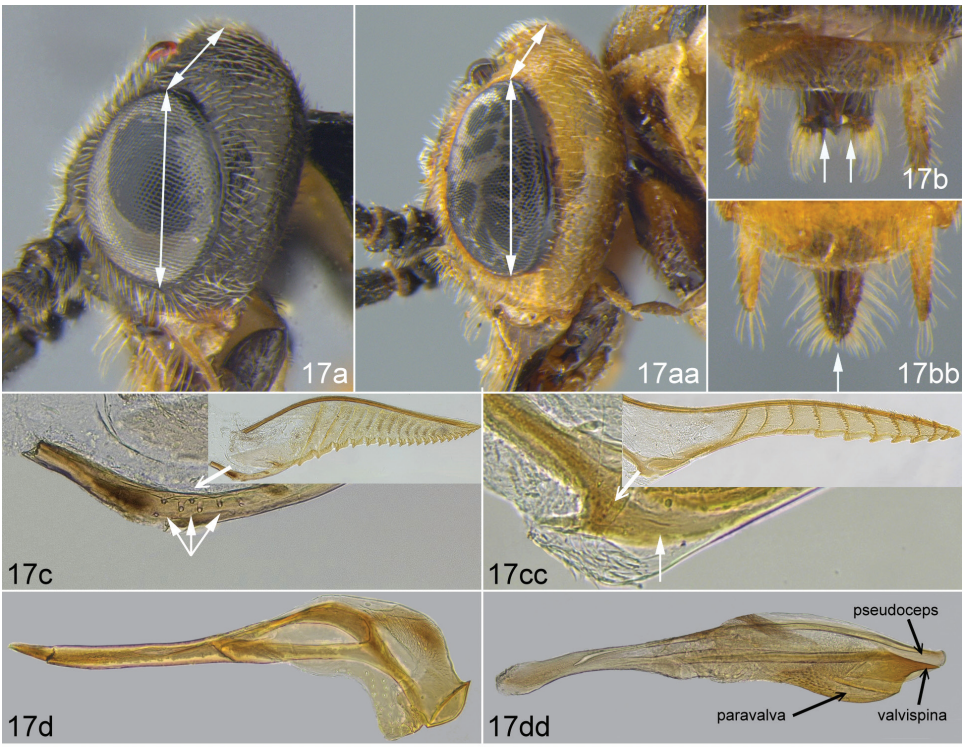
c Clypeus truncate or slightly and narrowly emarginate. Few specimens of *Moricella*. Oriental.

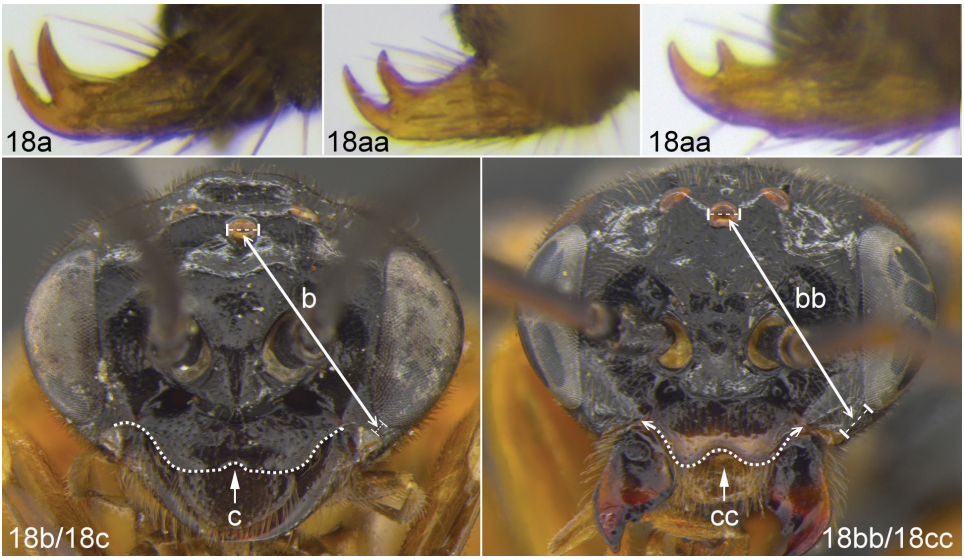
..... ***Moricella*** Rohwer, 1916 in part

– **aa** Tarsal claw with subapical tooth smaller than apical tooth or absent.

bb Malar space 1.0–2.0 times as long as diameter of front ocellus.

cc Clypeus widely emarginate **19**



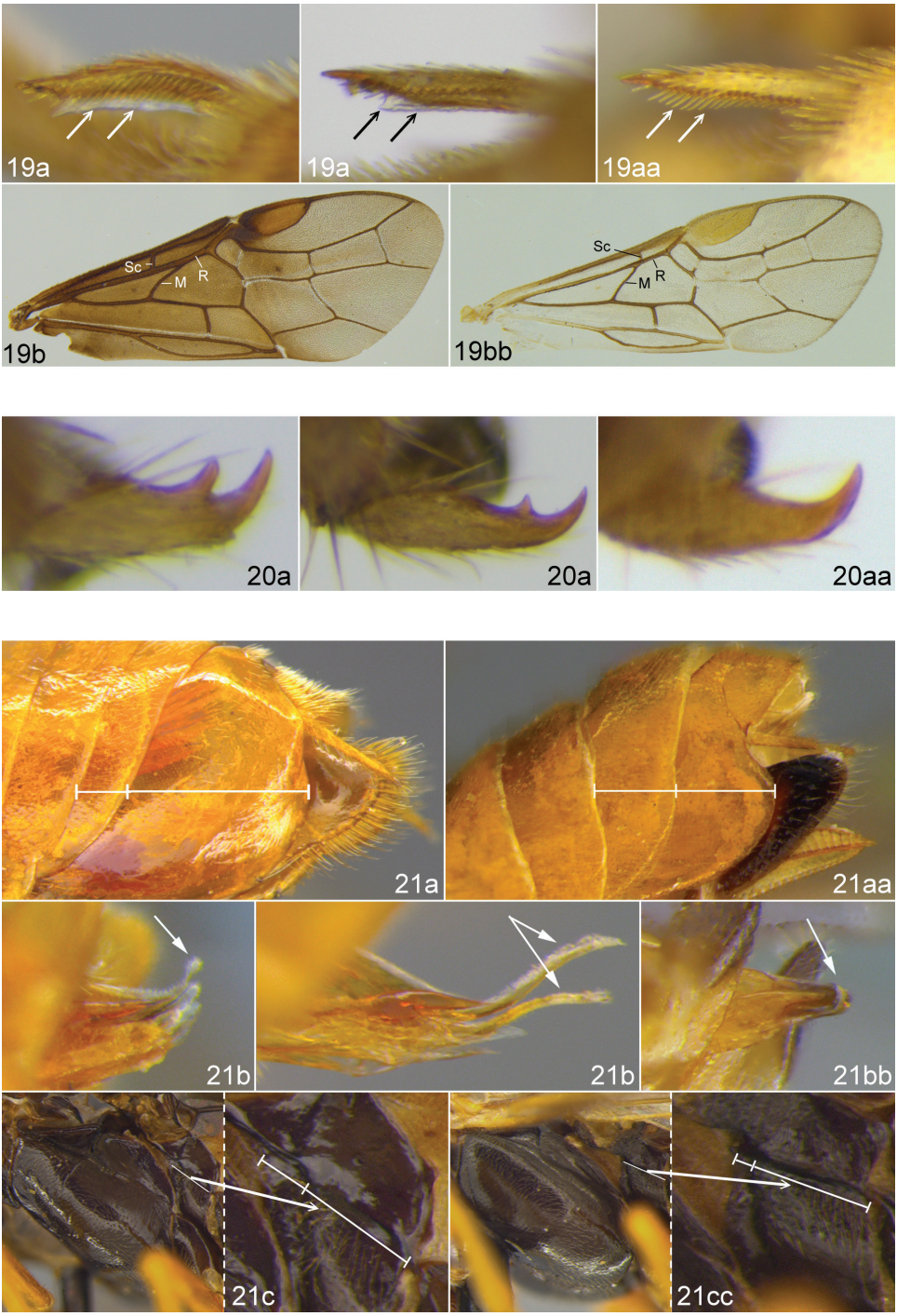


17a *Pristiphora incisa* **17aa** *Euura imperfecta* **17b** *P. incisa* **17bb** *E. annulata* **17c** *P. arctica* **17cc** *E. annulata* **17d** *P. arctica* **17dd** *E. vicina* **18a** *Moricella rufonota* **18aa** *Nematinus fuscipennis* (left), *Dineura viridorsata* **18b/18c** *M. rufonota* **18bb/18cc** *N. fuscipennis*.

19(18) **a** Anterior protibial spur with velum.
b Vein Sc *usually* situated before point of origin of vein M from R **20**
– **aa** Anterior protibial spur without velum, but with hairs.
bb Vein Sc *usually* situated beyond or at point of origin of vein M from R.
Ten species, including *D. militaris* (Cresson, 1880) (previously in *Hemichroa*). Holarctic and Oriental.
..... ***Dineura*** Dahlbom, 1835 in part

20(19) **a** Tarsal claw with subapical tooth **21**
– **aa** Tarsal claw without subapical tooth.
Only few *Anoplonyx* specimens key out here. Holarctic.
..... ***Anoplonyx*** Marlatt, 1896 in part

21(20) **a** Abdominal tergum IX in female in lateral view more than 3 times as long as tergum VIII.
b Penis valve in male of several species with filament.
c Anterior depressed section of metepisternum along metepimero-episternal suture 0.3–0.7 times as wide as posterior section.
d Cell 1Rs and 2Rs not fused because vein 2r-m present (see Fig. 9aa).
26 species. Holarctic.
..... ***Nematinus*** Rohwer, 1911
– **aa** Abdominal tergum IX in lateral view in female less than 2 times as long as tergum VIII.
bb Penis valve in male without filament.
cc Anterior depressed section of metepisternum along metepimero-episternal suture 0.1–0.3 times as wide as posterior section.
dd Cell 1Rs and 2Rs *often* fused because vein 2r-m absent (see Fig. 9a) **22**

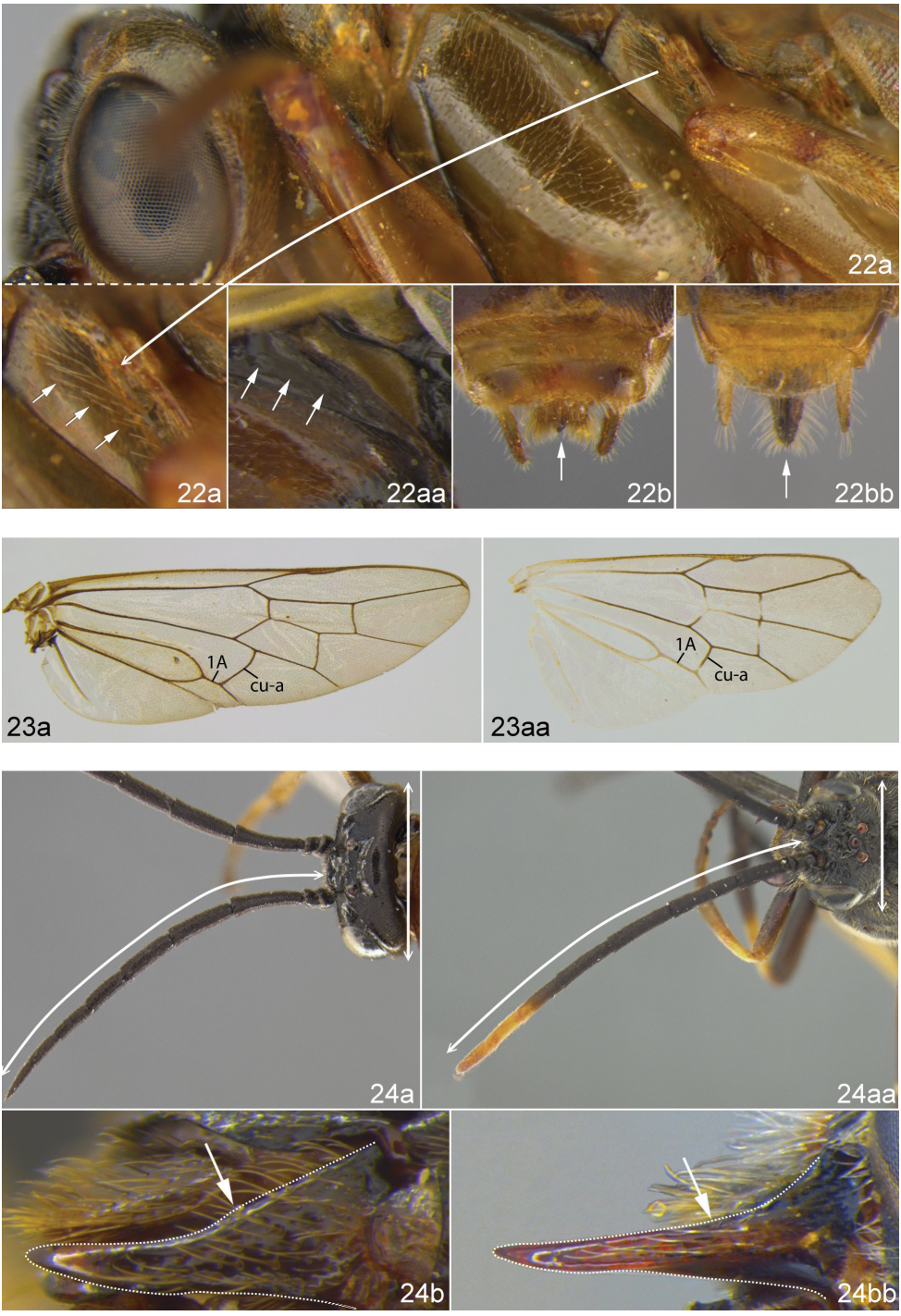


19a *Nematinus fuscipennis* (left), *N. bilineatus* **19aa** *Dineura militaris* **19b** *N. fuscipennis* **19bb** *D. viridorsata* **20a** *N. fuscipennis* (left), *E. clitellata* **20aa** *Anoplonyx ovatus* **21a** *N. fuscipennis* **21aa** *Euura vesicator* **21b** *N. fuscipennis* (left), *N. bilineatus* **21bb** *E. vesicator* **21c** *N. fuscipennis* **21cc** *E. vesicator*.

22(21) **a** Katepimeron extensively covered with hairs.
b Sawsheath slightly emarginate or not emarginate in dorsal view.
c Tangium of lancet with campaniform sensilla.
Sawsheath slightly emarginate in dorsal view in the type species, *F. crenativora* Vikberg & Zinovjev, 2000, not emarginate in *F. quercivora* Togashi, 2006. Two species. Key to species by Togashi (2006). East Palaearctic.
..... ***Fagineura*** Vikberg and Zinovjev, 2000 in part
– **aa** Katepimeron without hairs.
bb Sawsheath not emarginate in dorsal view.
cc Tangium of lancet without campaniform sensilla.
About 150 species of *Euura*, including former *Euura* s.str., *Pontania*. Holarctic, Oriental, and introduced to Neotropic and Australasia.
.....***Euura*** Newman, 1837 in part

23(5) **a** Petiole of anal cell 1A shorter than cu-a **24**
– **aa** Petiole of anal cell 1A longer than cu-a **26**

24(23) **a** Antenna about 2 times as long as width of head.
b Left (illustrated) and right mandible both tapered regularly towards apex.
c Body length 5–9 mm..... **25**
– **aa** Antenna about 4 times as long as width of head.
bb Left mandible constricted near middle and right mandible tapered regularly towards apex.
cc Body length 10–15 mm.
Four species. Key to species by Wei and Nie (2008). East Palaearctic and Oriental.
..... ***Megadineura*** Malaise, 1931



22a,22b *Fagineura crenativora* **22aa,22bb** *Euura vesicator* **23a** *Megadineura grandis* **23aa** *Dineura viridorsata* **24a** *Moricella rufonota* **24aa** *M. grandis* **24b** *M. rufonota* **24bb** *M. grandis.*

25(24) **a** Clypeus truncate or slightly and narrowly emarginate.
b Anterior protibial spur without velum, but with hairs.
c Sawsheath emarginate in dorsal view.
Three species. Oriental.
.....***Moricella*** Rohwer, 1916 in part

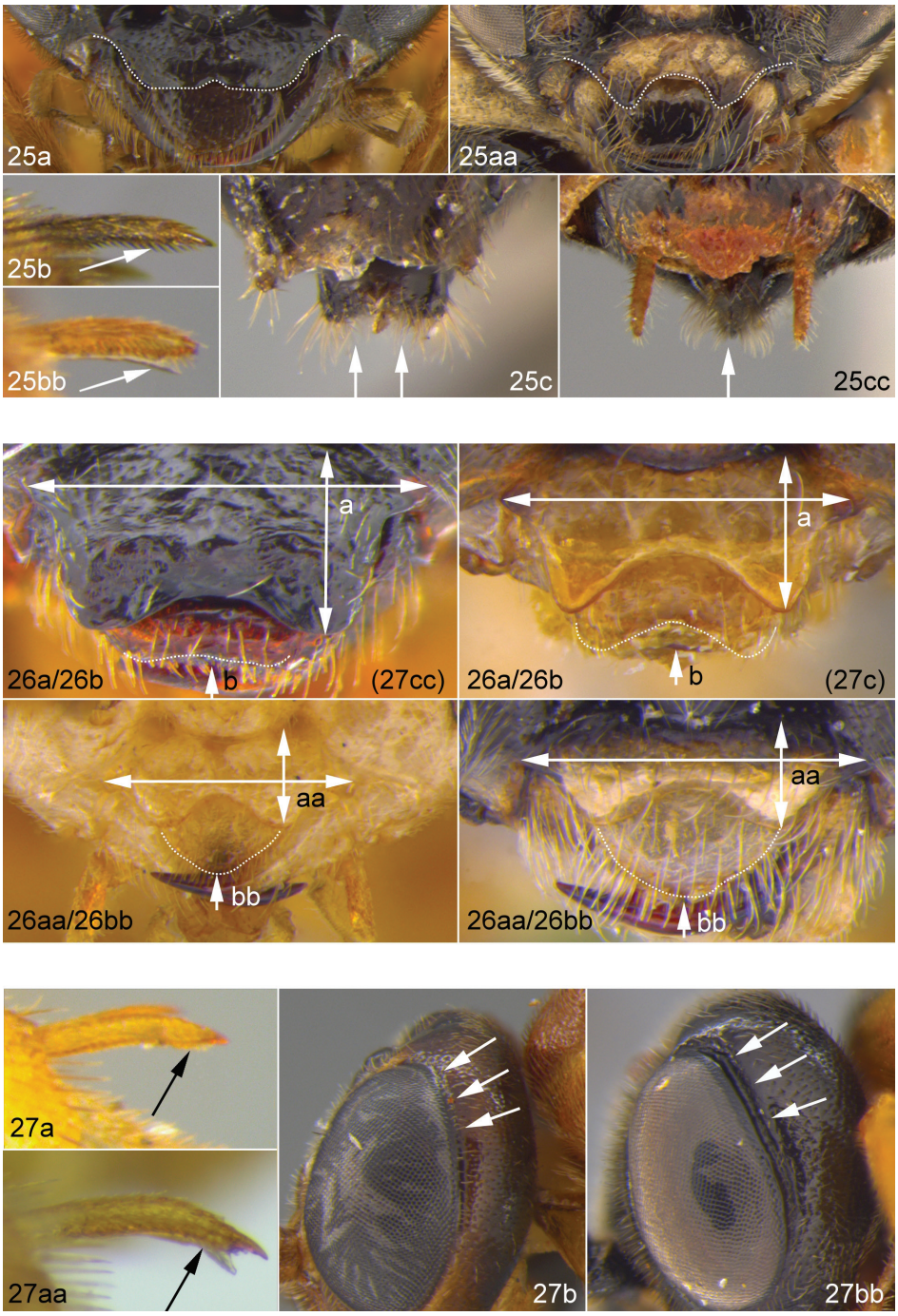
– **aa** Clypeus deeply and widely emarginate.
bb Anterior protibial spur with velum.
cc Sawsheath not emarginate in dorsal view.
One species, *K. planaritibia* Togashi, 1964. East Palaearctic.
.....***Katsujia*** Togashi, 1964

26(23) **a** Clypeus long, width 2.2–2.6 times as long as length.
b Labrum apically emarginate.
c Antenna 1.4–2.0 times as long as width of head.
d Left and right mandible both tapered regularly towards apex..... **27**

– **aa** Clypeus short, width 2.8–4.0 times as long as length.
bb Labrum apically rounded.
cc Antenna 1.4–4.0 times as long as width of head.
dd Left and right mandible both tapered regularly towards apex or left mandible markedly constricted near middle and right mandible tapered regularly towards apex..... **28**

27(26) **a** Anterior protibial spur without velum.
b Outer margin of eye without distinct furrow.
c Clypeus deeply emarginate.
One species, *A. cleone* Ross, 1935. Only the type specimen is known to have a vein r (cross-vein of cell R1) of hind wing present. Nearctic.
.....***Adelomos*** Ross, 1935

– **aa** Anterior protibial spur with velum.
bb Outer margin of eye with distinct furrow.
cc Clypeus slightly emarginate.
One species, *N. arquata* (Klug, 1816). West Palaearctic.
.....***Neodineura*** Taeger, 1989



25a *Moricella rufonota* **25aa** *Katsujia planaritibia* **25b** *M. rufonota* **25bb** *K. planaritibia* **25c** *M. rufonota* **25cc** *K. planaritibia* **26a/26b (27cc)** *Neodineura arquata* **26a/26b (27c)** *Adelomos cleone* **26aa/26bb** *Dineura virididorsata* (left), *Mesoneura opaca* **27a** *A. cleone* **27aa** *N. arquata* **27b** *A. cleone* **27bb** *N. arquata*.

28(26) **a** Left mandible markedly constricted near middle and right mandible tapered regularly towards apex **29**

– **aa** Left and right mandible both tapered regularly towards apex **32**

29(28) **a** Shortest distance between eyes about 2.0–2.5 times as long as height of eye.

b Antenna 3.5–4.0 times as long as width of head.

c Malar space 1.5–2.0 times as long as diameter of front ocellus.

d Clypeus shallowly emarginate.

One species, *R. fumosa* Wei and Nie, 1998. East Palaearctic.

.....***Renonerva*** Wei and Nie, 1998

– **aa** Shortest distance between eyes 1.1–2.0 times as long as height of eye.

bb Antenna 1.4–3.2 times as long as width of head.

cc Malar space 0.2–2.0 times as long as diameter of front ocellus.

dd Clypeus shallowly or deeply emarginate **30**

30(29) **a** Malar space 0.2–0.5 times as long as diameter of front ocellus.

b Antenna 1.4–1.9 times as long as width of head.

c Veins 2r-rs, 2r-m, and 2m-cu nearly forming single straight line in anterio-posterior direction.

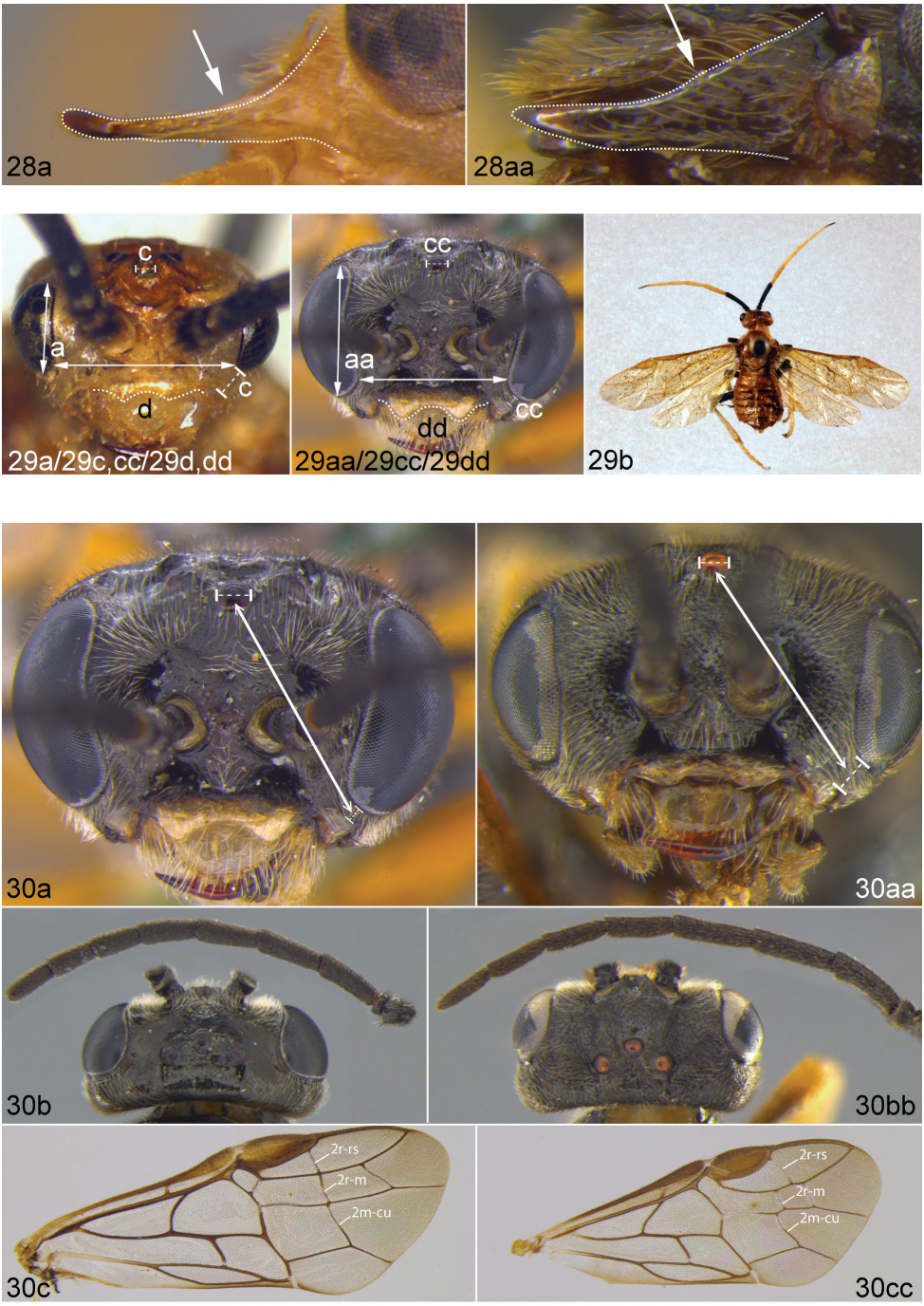
Nine species. Key to species by Wei et al. (2013a). Palaearctic.

.....***Mesoneura*** Hartig, 1837

– **aa** Malar space 0.7–2.0 times as long as diameter of front ocellus.

bb Antenna 1.8–3.2 times as long as width of head.

cc Veins 2r-rs, 2r-m, and 2m-cu forming three separate lines in anterio-posterior direction **31**



28a *Dinematus krausi* **28aa** *Moricella rufonota* **29a/29c,cc/29d,dd** *Renonerva fumosa* (original photo by Gengyun Niu) **29aa/29cc/29dd** *Mesoneura opaca* **29b** *R. fumosa* (photo by Shaobing Zhang; http://www.sawfly.cn/yftk/ShowPhoto.asp?PhotoID=143) **30a** *M. opaca* **30aa** *Pristiphora incisa* **30b** *M. opaca* **30bb** *P. arctica* **30c** *M. opaca* **30cc** *P. litura*.

31(30) **a** Clypeus truncate or slightly emarginate.

b Apex of vein C usually swollen, at the point of origin of vein Rs+M from R cell C is usually only about as wide as vein R.

c Sawsheath slightly emarginate in dorsal view *and/or* tarsal claw without subapical tooth.
Four species of *Pristiphora*. Formerly *Nepionema*, *Neopareophora*. Nearctic, West Palaearctic.
..... ***Pristiphora*** Latreille, 1810 in part

Body 7 mm; head (including antennae), thorax, and abdomen dorsally mostly black, ventrally yellowish, except black ventral half of mesepisternum; pronotum, tegulae, and stigma yellowish, legs mostly yellowish; mesepisternum smooth. One species, *D. krausi* Lacourt, 2006. *Pristiphora*? West Palaearctic.
..... ***Dinematus*** Lacourt, 2006 in part

– **aa** Clypeus widely and deeply emarginate.

bb Apex of vein C less swollen, at the point of origin of vein Rs+M from R cell C is about twice as wide as vein R or wider.

cc Sawsheath not emarginate in dorsal view *and* tarsal claw with long subapical tooth.
One species of *Euura*, some females of *E. radialis* (Smith, 1994), **comb. n.** Nearctic.
..... ***Euura*** Newman, 1837 in part

32(28) **a** Tarsal claw with subapical tooth as long as or slightly longer than apical tooth.

b Malar space 0.1–0.6 times as long as diameter of front ocellus.

c Clypeus truncate or slightly and narrowly emarginate.
Three species. Oriental.
..... ***Moricella*** Rohwer, 1916 in part

– **aa** Tarsal claw without subapical tooth or with subapical tooth shorter than apical tooth.

bb Malar space 1.0–2.0 times as long as diameter of front ocellus.

cc Clypeus deeply and widely emarginate.
Ten species. Holarctic and Oriental.
..... ***Dineura*** Dahlbom, 1835 in part

33(4) **a** Length of vein R between junctions with veins M and Rs+M longer than first sector of Rs.

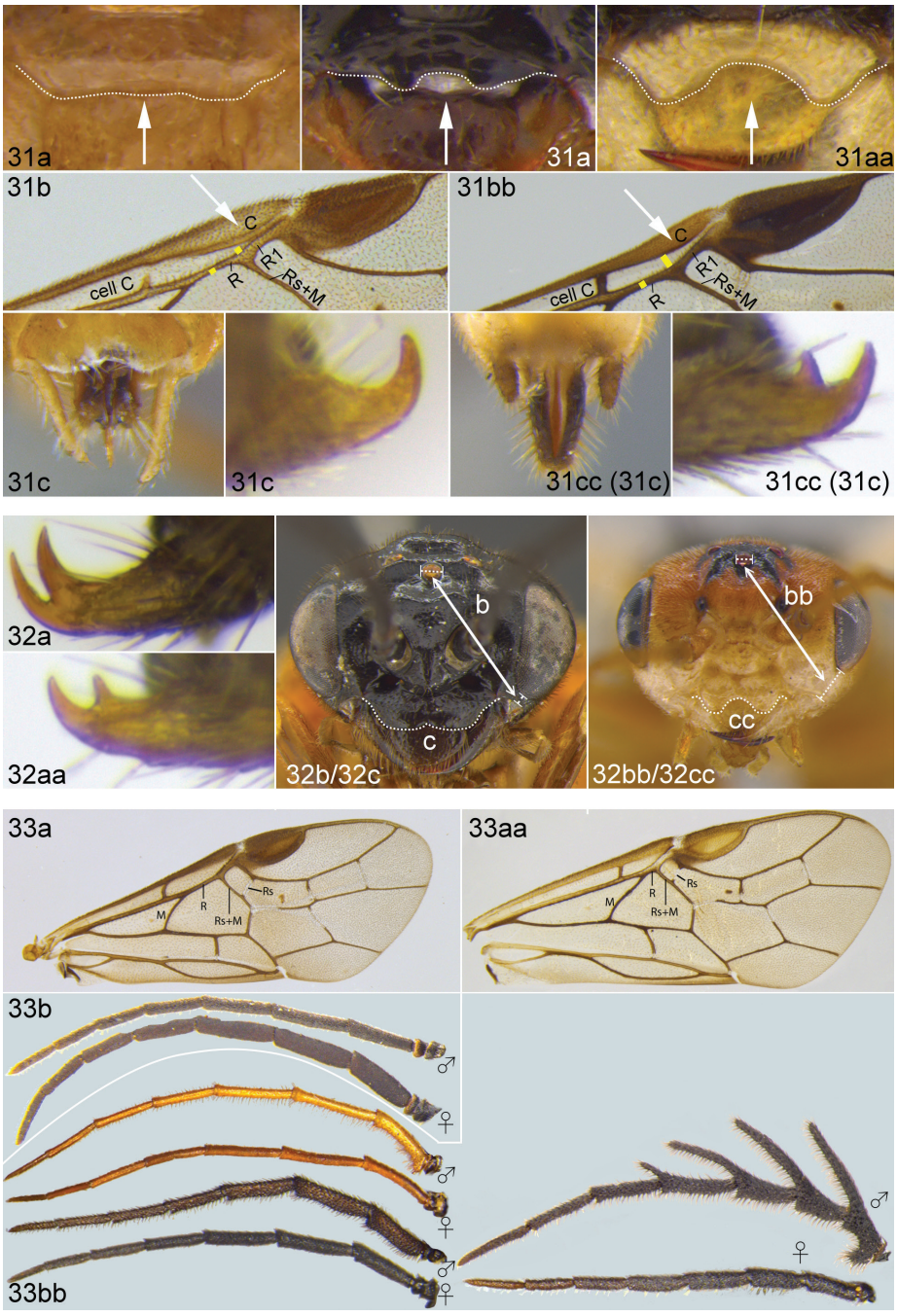
b Male and female flagellum similar: thread or seta-like, with short pubescence.

c Vein 2r-rs present or absent **34**

– **aa** Length of vein R between junctions with veins M and Rs+M not longer than first sector of Rs.

bb Male and female flagellum dissimilar: seta-like, with short pubescence in female, and seta-, comb-, or saw-like, with long pubescence in male.

cc Vein 2r-rs absent.
Few aberrant specimens of *Cladius*.
..... ***Cladius*** Illiger, 1807 in part



31a *Dinematus krausi* (left), *Pristiphora litura* **31aa** *Euura radialis* **31b** *P. pallidiventris* **31bb** *Nematus lucidus* **31c** *P. litura* sawsheath (left), *P. helvetica* tarsal claw **31cc (31c)** *E. radialis* sawsheath and tarsal claw **32a** *Moricella rufonota* **32aa** *Dineura virididorsata* **32b/32c** *M. rufonota* **32bb/32cc** *D. virididorsata* **33a** *Platycampus luridiventris* **33aa** *Cladius compressicornis* **33b** *Platycampus luridiventris* ♂, ♀ **33bb** *C. grandis* ♂, ♀ (top); *C. compressicornis* ♂, ♀ (bottom); *C. pectinicornis* ♂, ♀ (right).

34(33) **a** Clypeus widely and deeply emarginate.
b Malar space clearly shorter than diameter of front ocellus.
c Anterior half of mesepimeron partly or completely covered with setae.
d Vein 2r-rs of fore wing present (see Fig. 5a).
e Nearctic.
Six species. Key to most of the species by Smith (1969a).
..... ***Craterocercus*** Rohwer, 1911

– **aa** Clypeus narrowly and deeply or shallowly emarginate.
bb Malar space equal to or longer than diameter of front ocellus.
cc Anterior half of mesepimeron without setae.
dd Vein 2r-rs of fore wing absent or present (see Figs 5a and 5aa).
ee Holarctic **35**

35(34) **a** Tarsal claw with subapical tooth.
b Clypeus 2–3 times as wide as long.
c Cercus in female 3–20 times as long as wide..... **36**

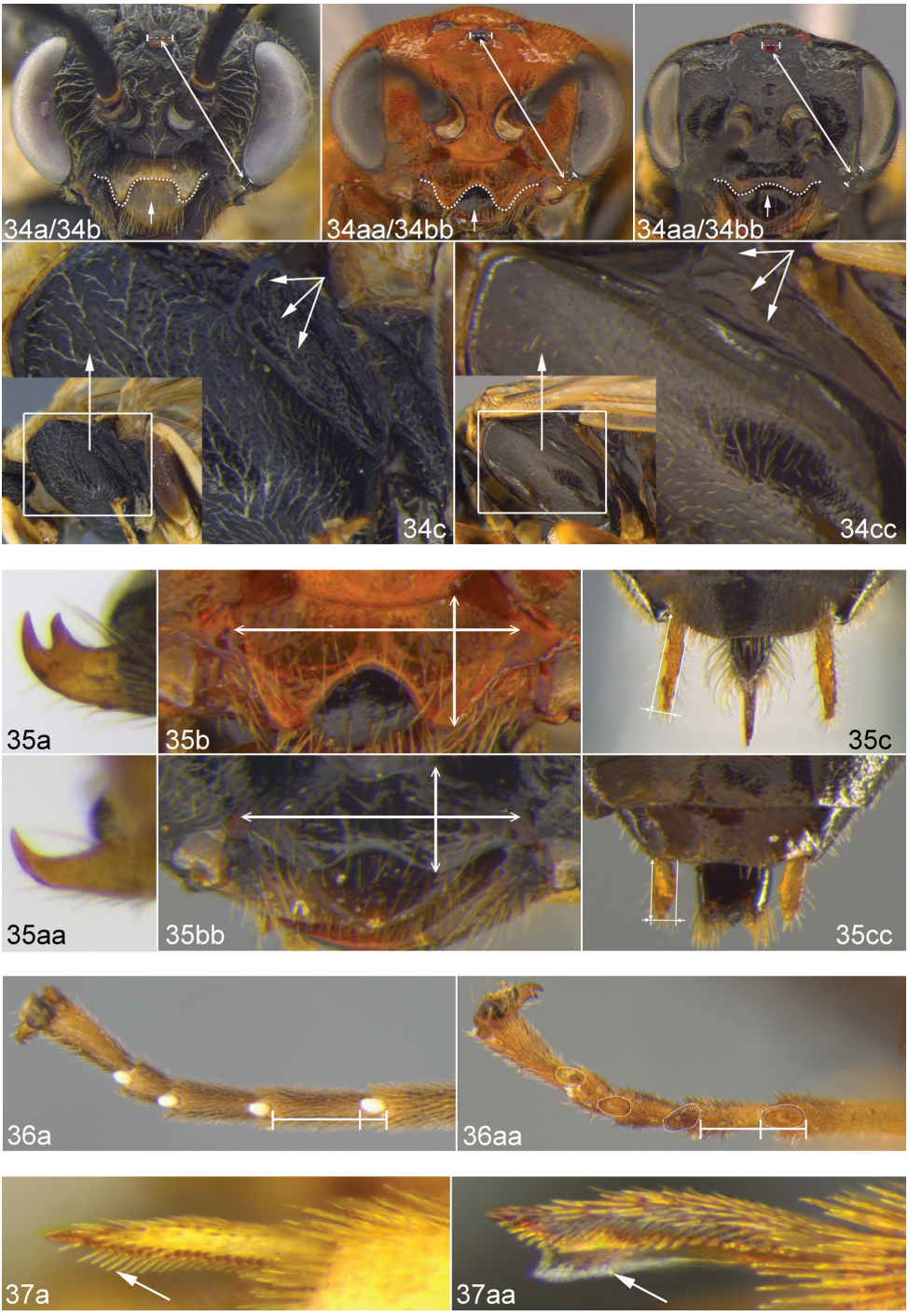
– **aa** Tarsal claw without subapical tooth.
bb Clypeus 3 times as wide as long.
cc Cercus in female 2–4 times as long as wide.
Twelve species. Holarctic.
..... ***Anoplonyx*** Marlatt, 1896 in part

36(35) **a** Distance between pulvilli of metatarsomeres 1 and 2 about twice or more their length.
b Vein 2r-rs of fore wing absent or present (see Figs 5a and 5aa) **37**

– **aa** Distance between pulvilli of metatarsomeres 1 and 2 subequal to their length.
bb Vein 2r-rs of fore wing absent.
Two species. Key to species by Smith (1976a) under *Platycampus*. Nearctic.
..... ***Fallocampus*** Wong, 1977

37(36) **a** Anterior protibial spur without velum, but with hairs.
b Vein 2r-rs of fore wing absent (see Fig. 5aa) **38**

– **aa** Anterior protibial spur with velum.
bb Vein 2r-rs of fore wing absent or present..... **39**



34a/34b *Craterocercus obtusus* **34aa/34bb** *Hemichroa australis* (left), *Anoplonyx apicalis* **34c** *C. obtusus* **34cc** *A. apicalis* **35a,35b,35c** *H. australis* **35aa,35bb,35cc** *A. ovatus* **36a** *Platycampus luridiventris* **36aa** *Fallocampus americanus* **37a** *Dineura militaris* **37aa** *H. australis*.

38(37) **a** Mesoscutellar appendage 4.0–5.2 times as wide as long.
b In female, mesepisternum entirely orange; in male, black, or partly or entirely orange.
c Abdomen *often* orange.
One species of *Dineura*, *D. militaris* (Cresson, 1880). Nearctic.
..... ***Dineura*** Dahlbom, 1835 in part

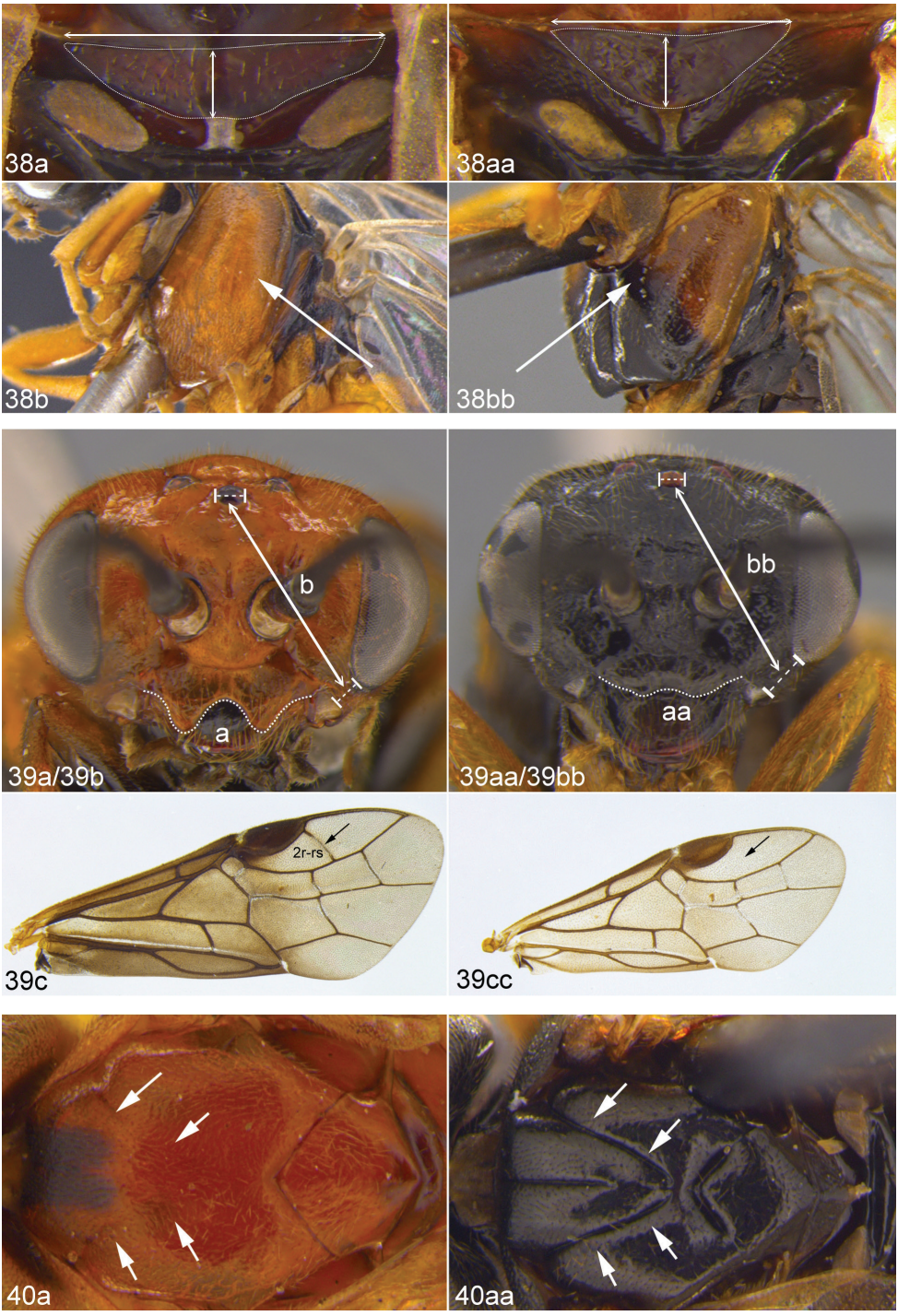
– **aa** Mesoscutellar appendage 2.8–3.5 times as wide as long.
bb In female mesepisternum black or partly orange; in male, black.
cc Abdomen black.
Some East Palaearctic species of *Platycampus*: *P. amurensis* Zinovjev, 1986, *P. coryli* Zinovjev, 1986, *P. japonicus* Togashi, 1991. Key to most of the species by Zinovjev (1986).
..... ***Platycampus*** Schiødte, 1839 in part

39(37) **a** Clypeus deeply emarginate.
b Malar space equal to or slightly longer than diameter of front ocellus.
c Vein 2r-rs of fore wing present.
Twelve species. Holarctic and Oriental.
..... ***Hemichroa*** Stephens, 1835

– **aa** Clypeus shallowly emarginate.
bb Malar space more than 1.5 times as long as diameter of front ocellus.
cc Vein 2r-rs of fore wing absent.
Five species of *Platycampus*. Key to most of the species by Zinovjev (1986). Palaearctic and Oriental.
..... ***Platycampus*** Schiødte, 1839 in part

40(3) **a** Notauli weakly outlined
Few *Pristiphora* species. Formerly *Pristola*. Nearctic.
..... ***Pristiphora*** Latreille, 1810 in part

– **aa** Notauli sharply outlined **41**



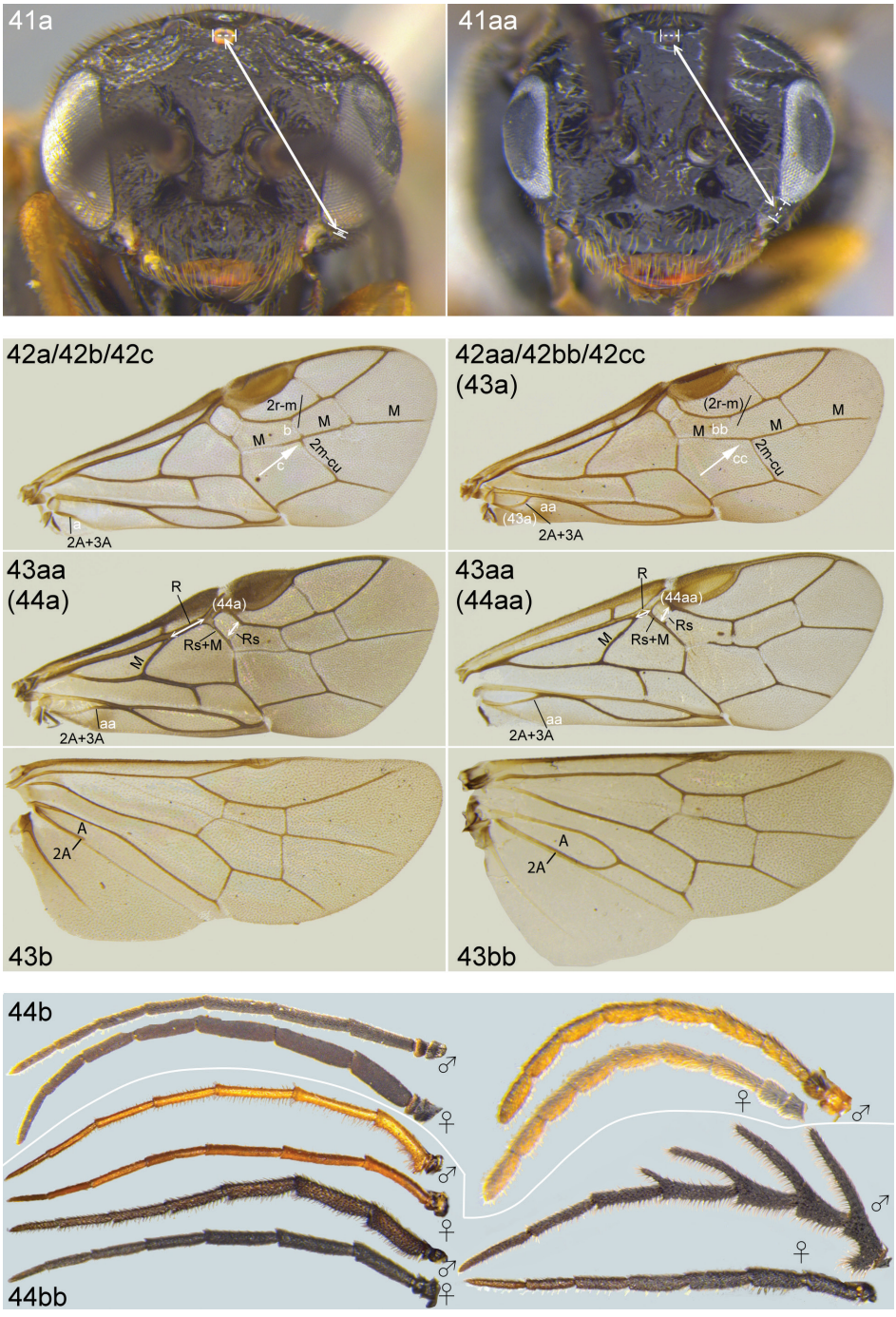
38a,38b *Dineura militaris* **38aa,38bb** *Platycampus amurensis* **39a/39b,39c** *Hemichroa australis* **39aa/39bb,39cc** *Platycampus luridiventris* **40a** *Pristiphora macnabi* **40aa** *Pseudodineura fuscula*.

41(40) **a** Malar space shorter than half a diameter of front ocellus.
b Holarctic **42**
– **aa** Malar space as long as or longer than diameter of front ocellus.
bb Nearctic.
Three species. Key to species by Smith (1976b).
..... ***Kerita*** Ross, 1937

42(41) **a** Base of vein 2A+3A incomplete and straight.
b Vein 2r-m *usually* present.
c Vein 2m-cu present and joined to vein M either proximal of 2r-m or very slightly distal of 2r-m.
Twelve species. Holarctic.
..... ***Pseudodineura*** Konow, 1885
– **aa** Base of vein 2A+3A more or less complete and curved up to 1A.
bb Vein 2r-m of fore wing *often* absent.
cc Vein 2m-cu absent or present and joined to vein M distal of 2r-m (if 2r-m present; e.g. Fig 43aa).
One species, *E. anemones* (Hering, 1924). West Palaearctic.
..... ***Endophytus*** Hering, 1934 in part

43(2) **a** Base of vein 2A+3A of fore wing abruptly curved up to 1A.
b Vein 2A of hind wing incomplete, thus cell open.
One species, *E. anemones* (Hering, 1924). West Palaearctic.
..... ***Endophytus*** Hering, 1934 in part
– **aa** Base of vein 2A+3A of fore wing gradually fuses with 1A.
bb Vein 2A of hind wing complete (rarely incomplete in *Monocellicampa*), thus cell closed..... **44**

44(43) **a** Length of vein R between junctions with veins M and Rs+M longer than first sector of Rs (see also Fig. 33a).
b Male and female flagellum similar: thread or seta-like, with short pubescence **45**
– **aa** Length of vein R between junctions with veins M and Rs+M not longer than first sector of Rs (see also Fig. 33aa).
bb Male and female flagellum dissimilar: seta-like, with short pubescence in female, and seta-, comb-, or saw-like, with long pubescence in male.
41 species. Holarctic and Oriental, introduced to Neotropic and Australasia.
..... ***Cladius*** Illiger, 1807 in part



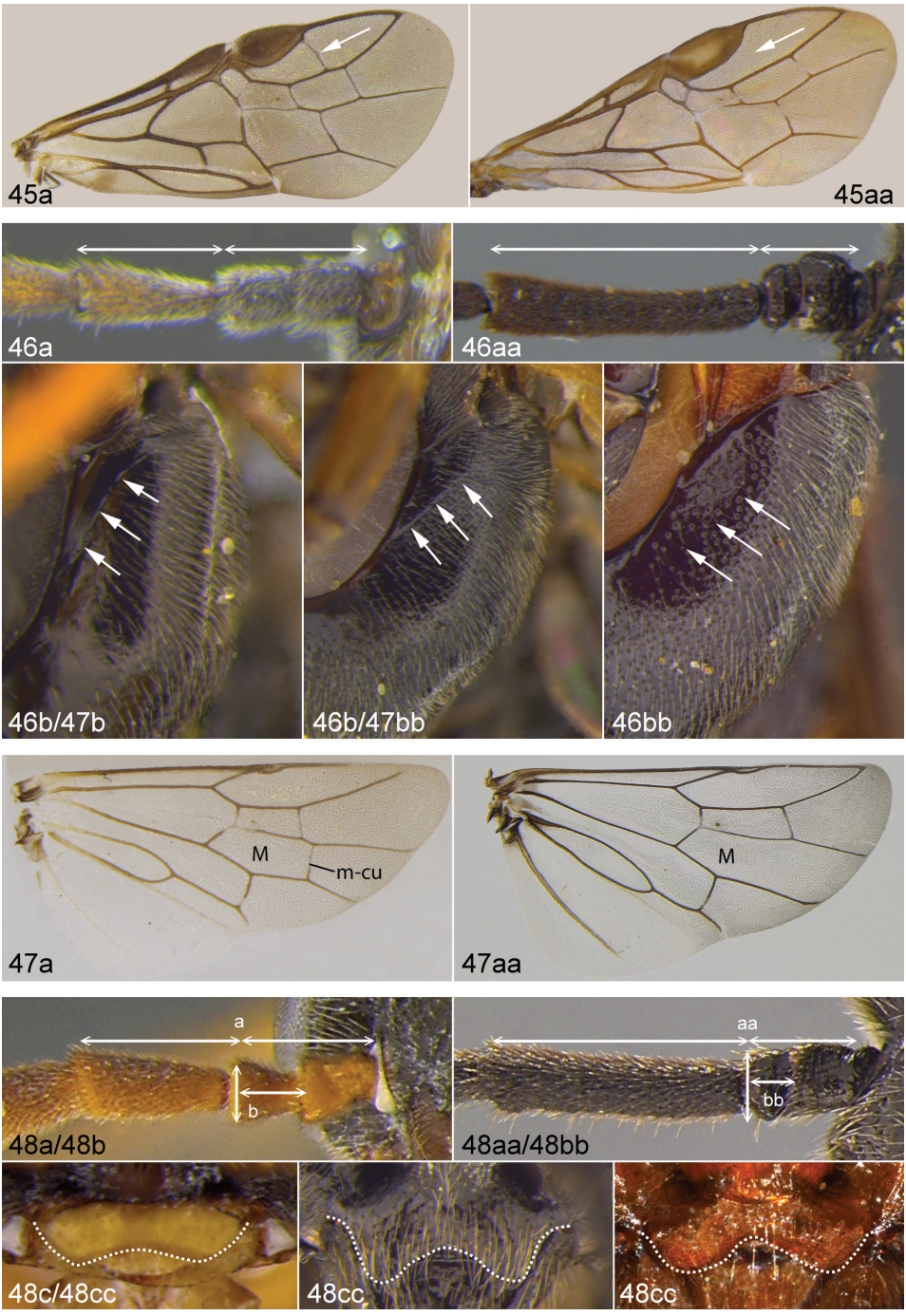
41a *Pseudodineura fuscula* **41aa** *Kerita fidala* **42a/42b/42c** *P. enslini* **42aa/42bb/42cc (43a)** *Endophytus anemones* **43aa (44a)** *Hoplocampa chrysorrhoea* **43aa (44aa)** *Cladius compressicornis* **43b** *E. anemones* **43bb** *H. chrysorrhoea* **44b** *Platycampus luridiventris* ♂, ♀ (left); *H. chrysorrhoea* ♂, ♀ **44bb** *Cladius grandis* ♂, ♀ (top); *C. compressicornis* ♂, ♀ (bottom); *C. pectinicornis* ♂, ♀ (right).

45(44) **a** Vein 2r-rs of fore wing present **46**
– **aa** Vein 2r-rs of fore wing absent **48**

46(45) **a** Combined length of scape and pedicel 0.7 times as long as or longer than flagellomere 1.
b Epicnemial surface sharply or weakly outlined by furrow **47**
– **aa** Combined length of scape and pedicel 0.5 times as long as or shorter than flagellomere 1.
bb Epicnemial surface not outlined.
Ten species. Key to species by Smith (2006). Western Nearctic.
..... ***Susana*** Rohwer and Middleton, 1932

47(46) **a** Vein m-cu of hind wing present, thus cell M closed.
b Epicnemial surface sharply outlined by furrow.
42 species. Holarctic and Oriental.
.....***Hoplocampa*** Hartig, 1837
– **aa** Vein m-cu of hind wing absent, thus cell M open.
bb Epicnemial surface weakly outlined by furrow.
One species, *M. pruni* Wei, 1998. East Palaearctic.
.....***Monocellicampa*** Wei, 1998

48(45) **a** Combined length of scape and pedicel 0.7 times as long as or longer than flagellomere 1.
b Pedicel longer than wide.
c Clypeus with shallow emargination.
d Body length about 3–5 mm **49**
– **aa** Combined length of scape and pedicel *usually* 0.5 times as long as or shorter than flagellomere 1.
bb Pedicel shorter than wide.
cc Clypeus with deep or shallow emargination.
dd Body length 4–11 mm **50**



45a *Hoplocampa chrysorrhoea* **45aa** *Caulocampus acericaulis* **46a** *H. chrysorrhoea* **46aa** *Susana cupressi* **46b/47b** *H. chrysorrhoea* **46b/47bb** *Monocellicampa pruni* **46bb** *S. cupressi* **47a** *H. chrysorrhoea* **47aa** *M. pruni* **48a/48b** *C. acericaulis* **48aa/48bb** *Cladius compressicornis* **48c/48cc** *C. acericaulis* **48cc** *Cladius compressicornis* (left), *Anhoplocampa yunanensis* (Fig. modified from Wei and Niu 2011).

49(48) **a** Cell A of hind wing rectangular, widening at apex with vein 1A beginning from anterior margin of cell A.

b Subapical tooth of tarsal claw long and slender.
Two species. Key to species by D.R. Smith (1968). Nearctic.
..... ***Caulocampus*** Rohwer, 1912

– **aa** Cell A of hind wing not rectangular, tapering at apex with vein 1A beginning approximately from centre of cell A.

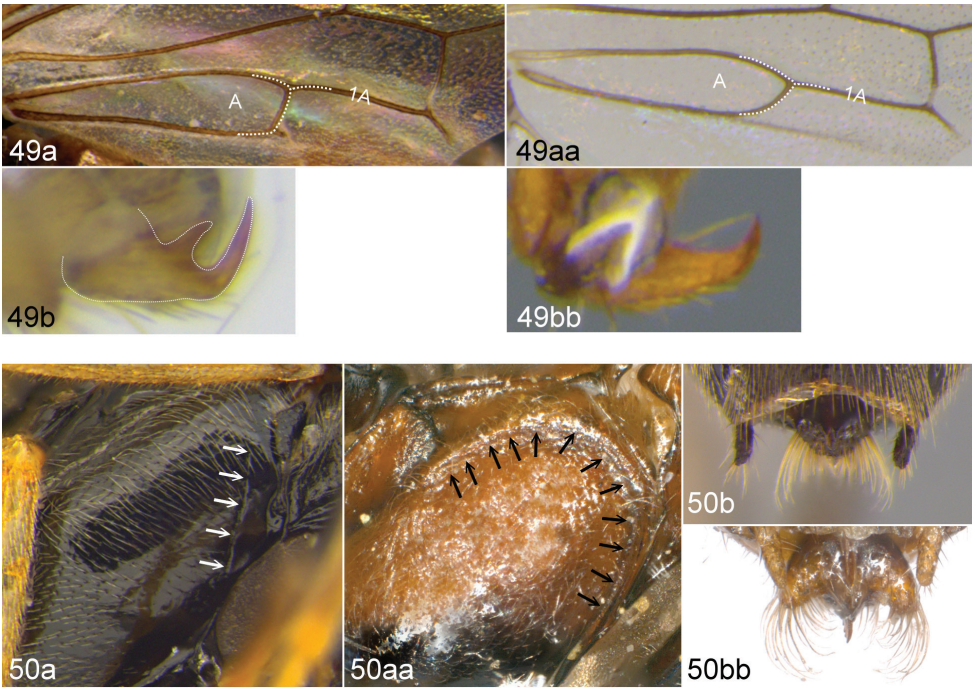
bb Subapical tooth of tarsal claw absent.
One species, *A. necopinus* (Zhelochovtsev, 1941). West Palaearctic.
..... ***Armenocampus*** Zinovjev, 2000

50(48) **a** Epicnemium broad and not elevated, with narrow furrow between the epicnemium and mesepisternum, not strongly curved in upper part of mesepisternum.

b Sawsheath not distinctly emarginate in dorsal view.
Few specimens of *Cladius*.
..... ***Cladius*** Illiger, 1807 in part

– **aa** Epicnemium narrow and strongly elevated, with broad and deep furrow between epicnemium and mesepisternum, strongly curved in upper part of mesepisternum.

bb Sawsheath distinctly emarginate in dorsal view.
Three species. Key to species by Wei and Niu (2011). East Palaearctic and Oriental.
..... ***Anhoplocampa*** Wei, 1998



49a,49b *Caulocampus acericaulis* **49aa** *Hoplocampa chrysorrhoea* **49bb** *Anoplonyx ovatus* **50a,50b** *Cladius compressicornis* **50aa,bb** *Anhoplocampa yunanensis* (Figs modified from Wei and Niu 2011).

Taxonomy

Adelomos Ross, 1935. Nearctic.

Adelomos Ross, 1935: 201–202. Type species: *Adelomos cleone* Ross, 1935, by original designation.

Anhoplocampa Wei, 1998. East Palaearctic, Oriental.

Anhoplocampa Wei, 1998: 14–15. Type species: *Anhoplocampa fumosa* Wei, 1998, by original designation.

Anoplonyx Marlatt, 1896. Holarctic.

Anoplonyx Marlatt, 1896: 18. Type species: *Nematus lariciphagus* Zaddach in Brischke, 1883 [= *Nematus pectoralis* auct. nec Lepeletier], by subsequent designation of Taeger et al. (2010: 11).

Marlattia Ashmead, 1898: 287. Type species: *Hemichroa laricis* Marlatt, 1896 [= *Anoplonyx luteipes* (Cresson, 1880)], by original designation.

Armenocampus Zinovjev, 2000. West Palaearctic.

Armenocampus Zinovjev, 2000: 452. Type species: *Caulocampus necopinus* Zhelochovtsev, 1941 [= *Armenocampus necopinus* (Zhelochovtsev, 1941)], by original designation.

Caulocampus Rohwer, 1912. Nearctic.

Caulocampus Rohwer, 1912: 239–240. Type species: *Priophorus acericaulis* MacGillivray, 1906 [= *Caulocampus acericaulis* (MacGillivray, 1906)], by original designation.

Cladius Illiger, 1807. Palaearctic, Nearctic, Oriental, [Neotropical], [Australasian], Fossil.

Cladius Illiger, 1807: 190. Type species: *Tenthredo difformis* Panzer, 1799 [= *Cladius pectinicornis* (Geoffroy, 1785)], by subsequent designation of Latreille (1810).

Nematus (*Priophorus*) Dahlbom, 1835: 4, 7. Type species: *Tenthredo compressicornis* Fabricius, 1804 [= *Cladius compressicornis* (Fabricius, 1804)], by subsequent designation of Blank et al. (2009).

Cladius (*Trichiocampus*) Hartig, 1837: 176. Type species: *Nematus grandis* Lepeletier, 1823 [= *Cladius grandis* (Serville, 1823)], by subsequent designation of Rohwer (1911).

Stevenia Brullé, 1846: 667. Type species: *Pristiphora varipes* Lepeletier, 1823 [= *Pristiphora varipes* Serville, 1823], by monotypy. Note. Correct placement of the name uncertain. The type species "Lep. no. 178" (= *Pristiphora varipes* Lepeletier) is unplaced.

Eudryas Gistel, 1848: viii. Name for *Cladius* Illiger, 1807. Homonym of *Eudryas* Boisduval, 1836 [Lepidoptera].

Prionophorus Agassiz, 1848: 888, 889. Name for *Nematus* (*Priophorus*) Dahlbom, 1835.

Craterocercus Rohwer, 1911. Nearctic.

Craterocercus Rohwer, 1911: 385. Type species: *Hemichroa phytophagica* Dyar, 1898 [= *Craterocercus obtusus* (Klug, 1816)], by original designation.

Dinematus Lacourt, 2006. West Palaearctic.

Dinematus Lacourt, 2006: 237–239. Type species: *Dinematus krausi* Lacourt, 2006, by original designation. Note. Possibly *Pristiphora*.

Dineura Dahlbom, 1835. Holarctic, Fossil.

Tenthredo (*Dineura*) Dahlbom, 1835: 5, 13. Type species: *Tenthredo De Geeri* Klug, 1817 [= *Dineura viridiventris* (Retzius, 1783)], by subsequent designation of Westwood (1839).

Leachia Brullé, 1846: 664. Note. Published as a synonym of *Dineura* Dahlbom as "*Leachia* Lep. (Mss.)" and never used as valid.

Dinevra Agassiz, 1848: 358. Name for *Tenthredo* (*Dineura*) Dahlbom, 1835.

Hemichroa (*Varna*) Ross, 1937: 79; **syn. n.** Type species: *Nematus militaris* Cresson, 1880 [= *Dineura militaris* (Cresson, 1880), **comb. n.**], by original designation.

Driocampus J. Zhang & X. Zhang, 1990. Fossil.

Driocampus J. Zhang & X. Zhang, 1990: 29–30. Type species: *Driocampus shanwanganus* J. Zhang & X. Zhang, 1990, by original designation.

Endophytus Hering, 1934. West Palaearctic.

Endophytus Hering, 1934: 353. Type species: *Endophytus anemones* (Hering, 1924), by original designation.

Neopelmatopus Conde, 1934: 181. Type species: *Pelmatopus anemones* Hering, 1924 [= *Endophytus anemones* (Hering, 1924)], by original designation.

Verna Kaisila, 1960: 300. Type species: *Pelmatopus tenuiserra* Lindqvist, 1949 [= *Endophytus anemones* (Hering, 1924)], by monotypy. Note. Published in synonymy of *Pelmatopus*.

Verna Kontuniemi in Kaisila, 1960: 170–171. Type species: *Pelmatopus tenuiserra* Lindqvist, 1949 [= *Endophytus anemones* (Hering, 1924)], by original designation.

Eohemichroa Zhelochovtsev & Rasnitsyn, 1972. Fossil.

Eohemichroa Zhelochovtsev & Rasnitsyn, 1972: 323. Type species: *Hemichroa eophila* Cockerell, 1906 [= *Eohemichroa eophila* (Cockerell, 1906)], by original designation.

Euura Newman, 1837. Holarctic, Oriental, [Neotropical], [Afrotropical], [Australasian], Fossil.

Euura Newman, 1837: 259–260. Type species: *Euura gallae* Newman, 1837 [= *Euura mucronata* (Hartig, 1837)], by subsequent designation of Rohwer (1911). Note. Identity of *E. gallae* Newman, 1837 is discussed in Liston and Prous (2014).

Nematus (*Cryptocampus*) Hartig, 1837: 221–222. Type species: *Nematus* (*Cryptocampus*) *medullaris* Hartig, 1837 [= *Euura amerinae* (Linné, 1758)], by subsequent designation of Rohwer (1911). Note. See Opinion 1963 (ICZN 2000).

Evura Agassiz, 1848: 439, 440. Name for *Euura* Newman, 1837.

Pontania Costa, 1852. Original paper not seen, cited in Costa (1854): 293; **syn. n.** Type species: *Pontania gallicola* Costa, 1852 [= *Euura proxima* (Serville, 1823), **comb. n.**], by monotypy. Note. Separatum published in 1852 (Hagen 1862).

Epitactus Förster, 1854: 435; **syn. n.** Type species: *Epitactus praecox* Förster, 1854 [= *Euura clitellata* (Serville, 1823), **comb. n.**], by monotypy. Note. Opinion 2280 (ICZN 2011) gives precedence of the name *Pachynematus* Konow, 1890 over *Epitactus*, whenever they are consider to be synonyms.

Amauronematus Konow, 1890: 233, 237–238, **syn. n.** Type species: *Nematus stenogaster* Förster, 1854 [= *Euura stenogaster* (Förster, 1854), **comb. n.**], by subsequent designation of Lacourt (1999).

Holcocneme Konow, 1890: 233, 238, **syn. n.** Type species: *Nematus vicinus* Serville, 1823 [= *Euura vicina* (Serville, 1823), **comb. n.**], by subsequent designation of Blank et al. (2009).

Pachynematus Konow, 1890: 233, 238, **syn. n.** Type species: *Nematus trisignatus* Förster, 1854 [= *Euura clitellata* (Serville, 1823), **comb. n.**], by subsequent designation of Schmidt et al. (1998).

Brachycolus Konow, 1895: 166, **syn. n.** Homonym of *Brachycolus* Buckton, 1879 [Hemiptera]. Type species: *Nematus viduatus* (Zetterstedt, 1838) [= *Euura viduata* (Zetterstedt, 1838), **comb. n.**], by subsequent designation of Rohwer (1911b).

Nematus (*Holcocnema*) Schulz, 1906: 80, **syn. n.** Name for *Holcocneme* Konow, 1890.

Holcocnemis Konow, 1907: 331, **syn. n.** Name for *Holcocneme* Konow, 1890.

Pteronidea Rohwer, 1911: 98, **syn. n.** Type species: *Nematus ventralis* Say, 1824 [= *Euura ventralis* (Say, 1824), **comb. n.**], by original designation. Note. Proposed as new name for *Pteronus* sensu Panzer (1806).

Pontopristia Malaise, 1921: 12–13, **syn. n.** Type species: *Nematus suavis* Ruthe, 1859 [= *Euura amentorum* (Förster, 1854), **comb. n.**], by original designation.

Brachycoluma Strand, 1929: 26, **syn. n.** Name for *Brachycolus* Konow, 1895.

Decanematus Malaise, 1931: 31, **syn. n.** Type species: *Decanematus longiserra* Malaise, 1931 [= *Euura malaisei* (Hellén, 1970), **comb. n.**], by original designation.

Pikonema Ross, 1937: 86, **syn. n.** Type species: *Nematus dimmockii* Cresson, 1880 [= *Euura dimmockii* (Cresson, 1880), **comb. n.**], by original designation.

Phyllocolpa Benson, 1960: 60, **syn. n.** Type species: *Nematus leucapsis* Tischbein, 1846 [= *Euura leucapsis* (Tischbein, 1846), **comb. n.**], by original designation.

Eitelius Kontuniemi, 1966: 44–47, **syn. n.** Type species: *Pachynematus dentatus* Lindqvist, 1937 [= *Euura dentata* (Lindqvist, 1937), **comb. n.**], by original designation.

Euura (*Gemmura*) E.L. Smith, 1968: 1401. Type species: *Cryptocampus mucronatus* (Hartig, 1837) [= *Euura mucronata* (Hartig, 1837)], by original designation. Note. See Opinion 1963 (ICZN 2000).

Ribinematus Kontuniemi, 1975: 38, **syn. n.** Not available. Type species: no type species selected.

Pontania (*Eupontania*) Zinovjev, 1985: 4, **syn. n.** Type species: *Nematus vesicator* Bremi-Wolf, 1849 [= *Euura vesicator* (Bremi-Wolf, 1849), **comb. n.**], by original designation.

Nematus (*Larinematus*) Zhelochovtsev in Zhelochovtsev and Zinovjev, 1988: 70 (key), 169, **syn. n.** Type species: *Nematus imperfectus* Zaddach, 1876 [= *Euura imperfecta* (Zaddach, 1876), **comb. n.**], by original designation.

Nematus (*Polynematus*) Zhelochovtsev in Zhelochovtsev and Zinovjev, 1988: 71 (key), 137, **syn. n.** Type species: applying Article 70.3.2 (ICZN 1999), we hereby select as type

species *Nematus annulatus* Gimmerthal, 1834 [= *Euura annulata* (Gimmerthal, 1834), **comb. n.**], this being the taxonomic species indicated by Zhelochovtsev's original designation of "*Nematus rumicis* L." [misidentification of *Tenthredo rumicis* Linnaeus, 1758; currently treated as an unplaced name in the Tenthredinidae: Taeger et al. 2010].

Nematus (*Bacconematus*) Zhelochovtsev in Zhelochovtsev & Zinovjev, 1988: 70 (key), 128, **syn. n.** Type species: *Nematus pumilio* (Konow, 1903) [= *Euura pumilio* (Konow, 1903), **comb. n.**], by original designation.

Alpinematus Lacourt, 1996: 269–270, **syn. n.** Type species: *Alpinematus elongatulus* Lacourt, 1996 [= *Euura elongatula* (Lacourt, 1996), **comb. n.**], by original designation.

Epicenematus Lacourt, 1998: 82, **syn. n.** Type species: *Nematus pallescens* Hartig, 1837 [= *Euura pallescens* (Hartig, 1837), **comb. n.**], by original designation.

Kontuniemiana Lacourt, 1998: 80–81, **syn. n.** Type species: *Tenthredo ribesii* Scopoli, 1763 [= *Euura ribesii* (Scopoli, 1763), **comb. n.**], by original designation.

Lindqvistia Lacourt, 1998: 81, **syn. n.** Type species: *Nematus reticulatus* Holmgren, 1883 [= *Euura reticulata* (Holmgren, 1883), **comb. n.**], by original designation.

Luea Wei and Nie, 1998: 15–18, **syn. n.** Type species: *Luea sinica* Wei and Nie, 1998 [= *Euura sinica* (Wei and Nie, 1998), **comb. n.**], by original designation.

Tubpontania Vikberg, 2010: 4, **syn. n.** Type species: *Nematus anomalopterus* Förster, 1854 [= *Euura anomaloptera* (Förster, 1854), **comb. n.**], by original designation.

Fagineura Vikberg & Zinovjev, 2000. East Palaearctic.

Fagineura Vikberg & Zinovjev in Shinohara et al., 2000: 114–115. Type species: *Fagineura crenativora* Vikberg and Zinovjev, 2000, by original designation.

Fallocampus Wong, 1977. Nearctic.

Fallocampus Wong, 1977: 1103–1107. Type species: *Camponiscus americanus* Marlatt, 1896 [= *Fallocampus americanus* (Marlatt, 1896)], by original designation.

Florissantinus Zhelochovtsev & Rasnitsyn, 1972. Fossil.

Florissantinus Zhelochovtsev and Rasnitsyn, 1972: 320–323. Type species: *Florissantinus angulatus* Zhelochovtsev and Rasnitsyn, 1972, by monotypy.

Hemichroa Stephens, 1835. Holarctic, Oriental.

Hemichroa Stephens, 1835: 55. Type species: *Tenthredo australis* Serville, 1823 [= *Hemichroa australis* (Serville, 1823)], by subsequent designation of Blank et al. (2009).

Dineura (*Leptocerca*) Hartig, 1837: 228. Type species: *Tenthredo alni* Linné, 1767 [= *Hemichroa australis* (Serville, 1823)], by subsequent designation of Rohwer (1911).

Engages Gistel, 1848: ix. Name for *Dineura* (*Leptocerca*) Hartig, 1837.

Leptocercus Thomson, 1871: 69, 70, 76. Name for *Dineura* (*Leptocerca*) Hartig, 1837.

Hoplocampa Hartig, 1837. Holarctic, Oriental, Fossil.

Tenthredo (*Hoplocampa*) Hartig, 1837: 276–277. Type species: *Tenthredo* (*Allantus*) *brevis* Klug, 1816 [= *Hoplocampa brevis* (Klug, 1816)], by subsequent designation of Rohwer (1911). Note. Described as *Tenthredo* (*Selandria* [*Hoplocampa*]).

Macgillivraya Ashmead, 1898: 257. Homonym of *Macgillivraya* Forbes, 1852 [Mollusca]. Type species: *Macgillivraya oregonensis* Ashmead, 1898 [= *Hoplocampa oregonensis* (Ashmead, 1898)], by original designation.
Macgillivrayella Ashmead, 1900: 606. Name for *Macgillivraya* Ashmead, 1898.

Katsujia Togashi, 1964. East Palaearctic.
Katsujia Togashi, 1964: 479. Type species: *Katsujia planaritibia* Togashi, 1964, by original designation.

Kerita Ross, 1937. Nearctic.
Kerita Ross, 1937: 80. Type species: *Kerita fidala* Ross, 1937, by original designation.

Megadineura Malaise, 1931. East Palaearctic, Oriental.
Megadineura Malaise, 1931: 147–148. Type species: *Dineura grandis* André, 1882 [= *Megadineura grandis* (André, 1882)], by original designation.
Stenomesoneura Wei, 1998: 411. Not available. Type species: *Stenomesoneura apicalis* Wei, 1998 [= *Megadineura grandis* (André, 1882)], by monotypy. Note. Not available since only pictures and no description in words are included in the work.

Mesoneura Hartig, 1837. Palaearctic.
Dineura (*Mesoneura*) Hartig, 1837: 228–229. Type species: *Tenthredo opaca* Fabricius, 1775 [= *Mesoneura opaca* (Fabricius, 1775)], by subsequent designation of Taeger and Blank (1996).
Selandria (*Pristis*) Brullé, 1846: 665. Type species: *Tenthredo punctigera* Lepeletier, 1823 [= *Mesoneura opaca* (Fabricius, 1775)], by original designation.
Mesonevra Agassiz, 1848: 667. Name for *Dineura* (*Mesoneura*) Hartig, 1837.
Lisconeura Rohwer, 1908: 529. Type species: *Scolioneura vexabilis* Brues, 1908 [= *Mesoneura vexabilis* (Brues, 1908)], by original designation.

Monocellicampa Wei, 1998. East Palaearctic.
Monocellicampa Wei, 1998: 16. Type species: *Monocellicampa pruni* Wei, 1998, by original designation.

Moricella Rohwer, 1916. Oriental.
Moricella Rohwer, 1916: 111. Type species: *Moricella rufonota* Rohwer, 1916, by original designation.

Nematinus Rohwer, 1911. Holarctic.
Nematinus Rohwer, 1911: 84. Type species: *Nematus fuscipennis* Lepeletier, 1823 [= *Nematinus fuscipennis* (Serville, 1823)], by subsequent designation of Taeger and Blank (1996).

Nematus Panzer, 1801. Holarctic, Oriental.

Nematus Panzer, 1801: 82:10. Type species: *Tenthredo* (*Nematus*) *lucida* Panzer, 1801 [= *Nematus lucidus* (Panzer, 1801)], by monotypy. Note. Described in synonymy of *Tenthredo lucida*.

Nematus Jurine in Panzer, 1801: 163. Type species: no type species selected. Note. Suppressed by Opinion 135 (ICZN 1939).

Nematus Jurine, 1807: 59. Homonym of *Nematus* Panzer, 1801. Type species: no type species selected.

Craesus Leach, 1817: 129. Type species: *Nematus septentrionalis* (Linné, 1758), by monotypy.

Hypolaepus W.F. Kirby, 1882: 324–325. Type species: *Hypolaepus abbotii* W.F. Kirby, 1882 [= *Nematus abbotii* (W.F. Kirby, 1882)], by monotypy.

Nematus (*Paranematus*) Zinovjev, 1978: 626–627. Type species: *Nematus wahlbergi* Thomson, 1871, by original designation.

Neodineura Taeger, 1989. West Palaearctic.

Neodineura Taeger, 1989: 150–151. Type species: *Mesoneura arquata* (Klug, 1816) [= *Neodineura arquata* (Klug, 1816)], by original designation.

Nescianeura Lacourt, 2006. West Palaearctic.

Paraneura Lacourt, 2004: 42. Not available. Nomen nudum.

Nescianeura Lacourt, 2006: 235–236. Type species: *Nescianeura noblecourti* Lacourt, 2006, by original designation. Note. Probably *Euura* or *Nematus*.

Platycampus Schiödte, 1839. Palaearctic, Oriental.

Nematus (*Leptopus*) Hartig, 1837: 184. Homonym of *Leptopus* Latreille, 1809 [Hemiptera]. Type species: *Nematus hypogastricus* Hartig, 1837 [= *Platycampus luridiventris* (Fallén, 1808)], by monotypy.

Platycampus Schiødte, 1839: 20. Name for *Nematus* (*Leptopus*) Hartig, 1837.

Erasminus Gistel, 1848: ix. Name for *Nematus* (*Leptopus*) Hartig, 1837.

Camponiscus Newman, 1869: 215–217. Type species: *Camponiscus healaei* Newman, 1869 [= *Platycampus luridiventris* (Fallén, 1808)], by monotypy.

Pristiphora Latreille, 1810. Holarctic, Oriental, Neotropical.

Pristiphora Latreille, 1810: 294, 435. Type species: *Pteronus testaceus* Jurine, 1807 [= *Pristiphora testacea* (Jurine, 1807)], by original designation.

Nematus (*Diphadnus*) Hartig, 1837: 225. Type species: *Nematus fuscicornis* Hartig, 1837 [= *Pristiphora appendiculata* (Hartig, 1837)], by subsequent designation of Gimmerthal (1847).

Lygaeonematus Konow, 1890: 233, 238. Type species: *Nematus pini* (Retzius, 1783) [= *Pristiphora abietina* (Christ, 1791)], by subsequent designation of Rohwer (1911).

Micronematus Konow, 1890: 233, 239. Type species: *Nematus pullus* Förster, 1854 [= *Pristiphora monogyniae* (Hartig, 1840)], by subsequent designation of Rohwer (1911).

Gymnonychus Marlatt, 1896: 19 (key), 122. Type species: *Gymnonychus californicus* Marlatt, 1896 [= *Pristiphora abbreviata* (Hartig, 1837)], by original designation.

Neopareophora MacGillivray, 1908: 289. Type species: *Neopareophora martini* MacGillivray, 1908 [= *Pristiphora litura* (Klug, 1816), **comb. n.**], by original designation.

Neotomostethus MacGillivray, 1908: 290. Type species: *Neotomostethus hyalinus* MacGillivray, 1908 [= *Pristiphora hyalina* (MacGillivray, 1908)], by original designation.

Dineuridea Rohwer, 1912: 240. Type species: *Marlattia erythrothorax* Rohwer, 1911 [= *Pristiphora erythrothorax* (Rohwer, 1911), **comb. n.**], by original designation.

Pristiphora (*Sala*) Ross, 1937: 85. Type species: *Nematus chloreus* Norton, 1867 [= *Pristiphora chlorea* (Norton, 1867)], by original designation.

Pristola Ross, 1945: 153–154, **syn. n.** Type species: *Pristola macnabi* Ross, 1945 [= *Pristiphora macnabi* (Ross, 1945), **comb. n.**], by original designation.

Lygaeonematus (*Lygaeotus*) Lindqvist, 1952: 82. Not available. Type species: no type species selected.

Lygaeonematus (*Lygaeophora*) Lindqvist, 1952: 82. Not available. Type species: no type species selected.

Nepionema Benson, 1960: 173–174, **syn. n.** Type species: *Nepionema helvetica* Benson, 1960 [= *Pristiphora helvetica* (Benson, 1960), **comb. n.**], by original designation.

Melastola Wong, 1968: 1049, 1051, 1053, **syn. n.** Type species: *Gymnonychus resinicolor* Marlatt, 1896 [=*Pristiphora resinicolor* (Marlatt, 1896)], by original designation.

Sharliphora Wong, 1969: 332–334. Type species: *Tenthredo ambiguus* Fallén, 1808 [= *Pristiphora nigella* (Förster, 1854)], by original designation.

Lygaeophora Hellén, 1975: 100. Not available. Type species: *Nematus lanificus* Zaddach in Brischke 1883 [= *Pristiphora lanifica* (Zaddach, 1883)], by original designation. Note. Treated as a junior synonym of *Pristiphora* and therefore not made available (Art. 11.5., ICZN 1999).

Lygaeotus Hellén, 1975: 100. Not available. Type species: *Nematus coactulus* Ruthe, 1859 [= *Pristiphora coactula* (Ruthe, 1859)], by original designation. Note. Invalid because published as a junior synonym of *Pristiphora*.

Pristiphora (*Lygaeophora*) Liston, 1981: 181–184. Not available. Type species: no type species selected.

Nematus (*Oligonematus*) Zhelochovtsev in Zhelochovtsev and Zinovjev, 1988: 72 (key), 162. Type species: *Nematus laricis* Hartig, 1837 [= *Pristiphora laricis* (Hartig, 1837)], by original designation.

Pristiphora (*Lygaeotus*) Liston, 1993: 105. Type species: *Nematus coactulus* Ruthe, 1859 [= *Pristiphora coactula* (Ruthe, 1859)], by original designation.

Pristiphora (*Lygaeophora*) Liston, 1993: 104–105. Type species: *Lygaeonematus variipes* Lindqvist, 1952 [= *Pristiphora sermola* Liston, 1993], by original designation.

Pristicampus Zinovjev, 1993: 80, **syn. n.** Type species: *Mesoneura arctica* Lindqvist, 1959 [= *Pristiphora arctica* (Lindqvist, 1959), **comb. n.**], by original designation.

Pseudodineura Konow, 1885. Holarctic.
Dolerus (*Pelmatopus*) Hartig, 1837: 244. Homonym of *Pelmatopus* Fischer von Waldheim, 1824 [Coleoptera]. Type species: *Dolerus minutus* Hartig, 1837 [= *Pseudodineura fuscula* (Klug, 1816)], by monotypy.
Pseudodineura Konow, 1885: 295, 297. Type species: *Tenthredo* (*Allantus*) *parvula* Klug, 1816 [= *Pseudodineura parvula* (Klug, 1816)], by subsequent designation of Rohwer (1911).
Phyllopais Hering, 1934: 353. Name for *Dolerus* (*Pelmatopus*) Hartig, 1837.

Renonerva Wei & Nie, 1998. East Palaearctic.
Renonerva Wei & Nie, 1998: 14–15. Type species: *Renonerva fumosa* Wei and Nie, 1998, by original designation.

Stauronematus Benson, 1953. Palaearctic.
Stauronema Benson, 1948: 22. Homonym of *Stauronema* Sollas, 1877 [Spongidae]. Type species: *Nematus platycerus* Hartig, 1840 [= *Stauronematus platycerus* (Hartig, 1840)], by subsequent designation of Liston (2007).
Stauronematus Benson, 1953: 153. Name for *Stauronema* Benson, 1948.

Susana Rohwer & Middleton, 1932. Nearctic.
Susana Rohwer & Middleton, 1932: 93. Type species: *Susana cupressi* Rohwer and Middleton, 1932, by original designation.

Unplaced Nematinae genera

Messa Leach, 1817 West Palaearctic
Messa Leach, 1817: 126. Type species: *Messa hortulana* Leach, 1817, by monotypy.

Secondary homonymy of species names

The new and much wider circumscription of *Euura* adopted in this work involves the synonymy of several partly species-rich nominal genera. As a result, a number of species names become secondary homonyms when they are placed in *Euura*. In all except five of the 25 cases listed below, the senior homonym has been applied after 1899 to a taxon considered to be valid. Article 23.9.1 of the International Code of Zoological Nomenclature (ICZN 1999) is therefore not fulfilled in these cases, and the junior homonyms require replacement. In the five remaining cases (*Amauronematus poppii*, *Euura cinereae*, *Pontopristia punctulata*, *Pteronidea brachycera* and *P. curticornis*) the junior homonym has not 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. The second condition stipulated by Article 23.9.1 is

thus not met, and these homonyms also require replacement. Only dealt with below are cases of secondary homonymy where the taxonomy of both species at present seems reasonably clear. In several remaining cases, the validity of the species denoted by the junior homonym is highly questionable and it is therefore not desirable to replace them now. The decision on whether a replacement name is necessary should be made once the relevant groups have been better studied. The replacement names proposed are suggested by the authors of the present paper who studied the individual cases, except for the species described in *Euura*, *Phyllocolpa* and *Pontania*. Jens-Peter Kopelke allowed us to publish, in his own words, the relevant replacement names for secondary homonyms of the latter.

Amauronematus acutiserra Lindqvist, 1974; secondary homonym of *Pontania acutiserra* Lindqvist, 1949, currently recognised as valid in the combination *Euura acutiserra* (Lindqvist, 1949), **comb. n.** *Euura aceroserra* Taeger and Blank, **nom. n.** is proposed for *A. acutiserra* Lindqvist.

Amauronematus atratus Lindqvist, 1961; secondary homonym of *Pontania atrata* MacGillivray, 1919, currently recognised as valid in the combination *Euura atrata* (MacGillivray, 1919), **comb. n.** *Euura lethe* Prous and Liston, **nom. n.** is proposed for *A. atratus* Lindqvist.

Amauronematus enslini Lindqvist, 1959; secondary homonym of *Pontania enslini* Zirngiebl, 1937, currently recognised as a junior subjective synonym of *Euura crassipes* (Thomson, 1871), **comb. n.** *Euura bavarica* Blank and Liston, **nom. n.** is proposed for *A. enslini*.

Amauronematus lateralis Konow, 1895; secondary homonym of *Nematus lateralis* Norton, 1867, currently recognised as valid in the combination *Euura lateralis* (Norton, 1867), **comb. n.** The valid name for *A. lateralis* Konow is *E. trautmanni* (Enslin, 1919).

Amauronematus mimus Schmidt, 1997; secondary homonym of *Pteronus mimus* Konow, 1903, currently recognised as valid in the combination *Euura mima* (Konow, 1903), **comb. n.** *Euura mimator* Schmidt, **nom. n.** is proposed for *A. mimus* Schmidt.

Amauronematus nitens Lindqvist, 1977; secondary homonym of *Nematus nitens* Thomson, 1888, currently recognised as a junior subjective synonym of *Euura respondens* (Förster, 1854), **comb. n.** *Euura nitidula* Prous and Taeger, **nom. n.** is proposed for *A. nitens* Lindqvist.

Amauronematus pacificus Malaise, 1931; secondary homonym of *Pontania pacifica* Marlatt, 1896, currently recognised as valid in the combination *Euura pacifica* (Marlatt, 1896), **comb. n.** *Amauronematus obscurus* Lindqvist, 1962 is a junior subjective synonym of *E. pacifica* (Malaise) but the former is not available as a replacement name because it is a junior secondary homonym of *Euura obscura* (Norton, 1861), **comb. n.** *Euura tranquilla* Vårdal and Prous, **nom. n.** is proposed for *A. pacificus* Malaise.

Amauronematus poppii Konow, [September]1904; secondary homonym of *Pontania poppii* Konow, [July]1904, currently recognised as a junior subjective synonym of *Euura parvula* (Holmgren, 1883), **comb. n.** *Euura bertilpoppii* Heibo and Liston, **nom. n.** is proposed for *A. poppii* Konow.

Amauronematus propinquus Saarinen, 1950; secondary homonym of *Cryptocampus propinquus* Rohwer, 1909, currently recognised as valid in the combination *Euura propinqua* (Rohwer, 1909), **comb. n.** *Euura propinquator* Schmidt, **nom. n.** is proposed for *A. propinquus* Saarinen.

Euura (*Gemmura*) *boreoalpina* Kopelke, 2001; secondary homonym of *Amauronematus* (*Pontopristia*) *boreoalpina* (Lindqvist, 1961), currently recognised as valid in the combination *Euura boreoalpina* (Lindqvist, 1961), **comb. n.** *Euura glaucatumida* Kopelke, **nom. n.** is proposed for *E. boreoalpina* Kopelke.

Euura (*Euura*) *lapponica* Kopelke, 1996; secondary homonym of *Pontania* (*Eupontania*) *lapponica* Malaise, 1921, currently recognised as a junior subjective synonym of *Euura crassipes* (Thomson, 1871). *Euura salicislapponicae* Kopelke, **nom. n.** is proposed for *E. lapponica* Kopelke.

Euura (*Gemmura*) *phylicifoliae* Kopelke, 2001; secondary homonym of *Pontania phylicifoliae* Forsius, 1919, currently recognised as a junior subjective synonym of *Euura arcticornis* (Konow, 1904), **comb. n.** *Euura salicisphylicifoliae* Kopelke, **nom. n.** is proposed for *E. phylicifoliae* Kopelke.

Euura (*Euura*) *purpureae* Kopelke, 1996; secondary homonym of *Nematus purpureae* Cameron, 1884, currently recognised as valid in the combination *Euura purpureae* (Cameron, 1884), **comb. n.** *Euura salicispurpureae* Kopelke, **nom. n.** is proposed for *E. purpureae* Kopelke.

Pachynematus tenuiserra Lindqvist, 1949; secondary homonym of *Amauronematus tenuiserra* Lindqvist, 1944, currently recognised as valid in the combination *Euura tenuiserra* (Lindqvist, 1944), **comb. n.** *Euura scandica* Vårdal and Heibo, **nom. n.** is proposed for *P. tenuiserra* Lindqvist.

Phyllocolpa pschornwalcheri Kopelke, 2007; secondary homonym of *Nematus pschornwalcheri* Muche, 1972, currently recognised as a junior subjective synonym of *Euura monticola* (Thomson, 1871), **comb. n.** *Euura hubertpschornwalcheri* Kopelke, **nom. n.** is proposed for *P. pschornwalcheri* Kopelke.

Pontania hastatae Vikberg, 1970; secondary homonym of *Euura hastatae* Malaise, 1921, currently recognised as valid. *Euura hastatavora* Vikberg, **nom. n.** is proposed for *Pontania hastatae* Vikberg.

Pontania (*Eupontania*) *montivaga* Kopelke, 1991; secondary homonym of *Pachynematus montivagus* Marlatt, 1896, currently recognised as valid in the combination *Euura montivaga* (Marlatt, 1896), **comb. n.** *Euura foetidatumida* Kopelke, **nom. n.** is proposed for *P. montivaga* Kopelke.

Pontania obscura Kopelke, 2005; secondary homonym of *Nematus obscurus* Norton, 1861, currently recognised as valid in the combination *Euura obscura* (Norton, 1861). *Euura abdita* Kopelke, **nom. n.** is proposed for *P. obscura* Kopelke.

Pontopristia montana Lindqvist, 1961; secondary homonym of *Nematus montanus* Zaddach, 1883, currently recognised as valid in the combination *Euura montana* (Zaddach, 1883), **comb. n.** *Euura oreophila* Liston and Prous, **nom. n.** is proposed for *P. montana* Lindqvist.

Pontopristia punctulata Lindqvist, 1961; secondary homonym of *Nematus punctulatus* Thomson, 1863, currently recognised as a junior subjective synonym of *Euura vaga* (Fabricius, 1781), **comb. n.** *Euura suecica* Blank and Taeger, **nom. n.** is proposed for *P. punctulata* Lindqvist.

Pteronidea brachycera Lindqvist, 1975; secondary homonym of *Nematus brachycerus* Hartig, 1840, currently recognised as a junior subjective synonym of *Euura fallax* (Serville, 1823), **comb. n.** *Euura brevicera* Taeger and Blank, **nom. n.** is proposed for *P. brachycera* Lindqvist.

Pteronidea brunnea Lindqvist, 1971; secondary homonym of *Nematus brunneus* Norton, 1864, currently recognised as valid in the combination *Euura brunnea* (Norton, 1864), **comb. n.** The valid name for *P. brunnea* Lindqvist is *E. brunnescens* (Vikberg, 1982), **comb. n.**

Pteronidea curticornis Lindqvist, 1969; secondary homonym of *Nematus curticornis* Cameron, 1885, currently recognised as a junior subjective synonym of *Euura pedunculi* (Hartig, 1837), **comb. n.** The valid name for *P. curticornis* Lindqvist is *E. truncicornis* (Vikberg, 1982), **comb. n.**

Pteronidea polita Lindqvist, 1974; secondary homonym of *Nematus politus* Zaddach, 1883, currently recognised as valid in the combination *Euura polita* (Zaddach, 1883), **comb. n.** The valid name for *P. polita* Lindqvist is *E. glabra* (Vikberg, 1982), **comb. n.**

Discussion

It has been evident since 2006 (Nyman et al. 2006) that changes are necessary in the classification of the Nematinae to reflect the current understanding of their phylogeny. Most problematic are the 'higher' Nematinae as defined in Nyman et al. (2006). Subsequent analyses (Nyman et al. 2010; this work), including more taxa and genes, have confirmed the existence of two well-supported and species-rich clades within the 'higher' Nematinae. Although there are several ways to divide the phylogenetic tree into genera, we decided to treat these two major clades as *Pristiphora* and *Euura*, which are the oldest available genus group names for these clades. Although it might seem preferable to use the name *Nematus* instead of *Euura*, because most of the species have been placed in *Nematus* in the past (e.g. Zhelochovtsev and Zinovjev 1988), the phylogenetic placement of the type species *Nematus lucidus* is unfortunately not stable. Previous analyses (Nyman et al. 2006; 2010) placed *N. lucidus* closer to *Euura*, but this relationship is no longer supported in our analysis that also includes NaK sequences. Even if later analyses with more markers support a *N. lucidus*-*Euura* clade, and *Euura* could be subsumed under *Nematus*, the possibility still remains to treat these potential sister groups (it is unlikely that *N. lucidus* falls within *Euura*) as separate genera (Fig. 6). Regardless of the position of *N. lucidus*, *Euura* is a well-supported clade and therefore is a good candidate for a genus. The deeper relationships within this clade, however, are genetically poorly resolved and often at odds with current nomenclature, which argues against creating or

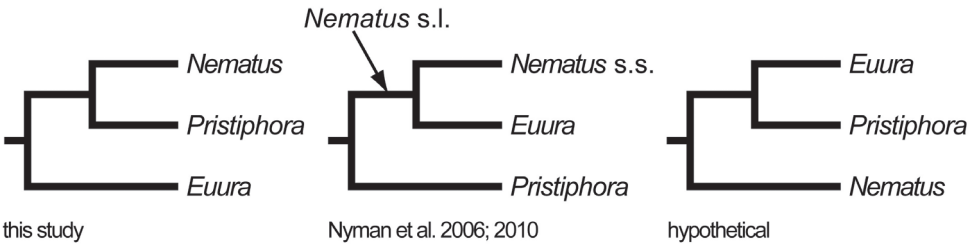


Figure 6. Three possible relationships between the *Euura*, *Pristiphora*, and *Nematus* clades. All are consistent with treatment of these three clades as separate genera, or combining all of them as a single genus *Nematus*. Including *Euura*, but not *Pristiphora*, within *Nematus* is consistent only with the tree shown in the middle (supported by previous analyses: Nyman et al. 2006; 2010).

maintaining genera within this clade. Within the *Euura* clade, another possibility would be to retain monophyletic genera, modify those which are not monophyletic, and create new ones for the remaining species. However, this option would result in the proliferation of morphologically and genetically poorly defined, unstable genera (many of which would be monotypic) because of weakly established phylogenetic relationships. Attempting to maintain the status quo is equally unlikely to result in nomenclatural stability, because the creation of new genera and the redefinition of established ones would be expected to continue in the foreseeable future. It would also be possible to include *Pristiphora*, *Mesoneura*, *Fagineura*, and *Euura* in *Nematus* (this clade is well supported), but this would result in many more nomenclatural changes (new combinations and secondary homonyms) compared to the "*Euura*" option.

In the other big clade, *Pristiphora*, which is here treated as a genus, the nomenclatural changes are fortunately less extensive than in *Euura*. Splitting up *Pristiphora* in order to maintain a few small genera, such as *Melastola*, *Pristola*, *Nepionema*, *Neopareophora* and *Pristicampus*, would cause problems similar to those that would result from splitting up *Euura*. The creation of several poorly defined genera with weakly resolved phylogenetic relationships would certainly lead to nomenclatural instability in the future.

We want to emphasize that although there are uncertainties regarding many relationships in the phylogeny of Nematinae (including the exact placement of *N. lucidus*), this does not mean that all or even most relationships are unreliably reconstructed. The support for the two largest clades, *Pristiphora* and *Euura*, has increased with the addition of NaK (compared to Nyman et al. 2010, ML bootstrap support went up from 98% to 100% for *Euura* and from 89% to 99% for *Pristiphora*).

Some taxa in *Euura*, *Nematus*, and *Pristiphora* are monophyletic and relatively well defined (*Euura s.s.*, a large part of *Amauronematus*, *Craesus*, *Pristicampus* etc.), which would allow recognition of these groups. However, for the sake of nomenclatural stability we strongly recommend that the formal acceptance of these clades as genera should be avoided. Preferably such infrageneric groups should be referred to as species groups (within the context of ICZN) or defined according to the PhyloCode (Cantino and de Queiroz 2010).

Although the *Nematus* clade received less support than *Euura* and *Pristiphora*, we did not attempt to divide it further because it includes only few species and most of them already have the generic name *Nematus*. The only exception is *Craesus* as it is usually considered to represent a separate genus. However, it is nearly indistinguishable from the *erythrogaster*-group of *Nematus* when we exclude the exceptionally expanded hind tibia and metatarsomere 1 of *Craesus* (Smith 2008). If future phylogenetic research shows that this group is not monophyletic, *Nematus* can, if necessary, still be divided into smaller genera. However, this will affect only a small number of species.

The rather broad definitions of genera like *Pristiphora* and *Euura*, and the resulting nomenclatural changes will certainly cause controversy, but in our opinion this is the best solution in light of current evidence. *Pristiphora* and *Euura* are strongly supported clades (and it is unlikely that future data will challenge this), but their relationships to other 'higher' Nematinae, as well as basal branching patterns within *Pristiphora* and *Euura*, remain controversial. We wish to stabilize the nomenclature of 'higher' Nematinae by considering these clades as genera, so that in the future it is possible to concentrate on actually studying these sawflies without having to deal with constant name changes. The downside of our approach is that we have to make many nomenclatural changes, especially concerning *Euura*, but when accepted, it will be a once-only event.

The other change, compared to the World Catalog (Taeger et al. 2010), is the transfer of *Nematus militaris* Cresson, 1880 to *Dineura*, creating *Dineura militaris* (Cresson, 1880), **comb. n.** (previously in *Hemichroa*). According to DNA sequence data, *Dineura militaris* forms a clade with *Dineura* s.s. to the exclusion of other genera in Dineurini (Figs 2 and 5). Absence of a velum in *Dineura militaris* and other *Dineura* might be a synapomorphy for these taxa.

Based on current data, the higher level relationships (i.e. between genera) within Nematinae are generally not well supported, but there are few clades worth mentioning: Dineurini, Pseudodineurini and 'higher' Nematinae (Fig. 2). Of these three clades, composition of only Pseudodineurini matches with the morphology based classifications (e.g. Zhelochovtsev and Zinovjev 1988; Goulet 1992). Composition of Dineurini and 'higher' Nematinae is the same as found by Nyman et al. (2006). However, before any tribal classification of Nematinae is proposed, molecularly yet unsampled genera and more sequence data should be gathered to confidently resolve the phylogeny of genera.

Although we are far from having resolved all problems involved in the definition and identification of the genera of Nematinae, we are confident that our pictorial approach using photographs of actual specimens rather than drawings makes identification much easier than before in this challenging group. We regard the key as a starting point for future improvements: the main remaining shortcomings involve *Euura*, *Nematus* and *Pristiphora*, two of which (*Euura* and *Pristiphora*) comprise over 75% of nematine species. Nevertheless, most species of these genera should key out correctly, as only a few *Pristiphora* species are likely to run to *Euura* or vice versa. *Pristiphora* has campaniform sensilla on the tangium of the lancet and generally a more or less truncate clypeus and a swollen apex of vein C, while *Euura* and *Nematus* lack campaniform sensilla and generally have an emarginate clypeus and a less swollen apex of vein C. While some groups of

Nematus are differentiated morphologically from *Euura* by characters of metatarsomere 1 (see couplets 12–13 in the Key), we are currently unaware of unequivocal characters to distinguish the *Nematus wahlbergi* and *erythrogaster* groups from *Euura*. In addition, there are currently many, mostly Nearctic species that are placed in *Nematus* or *Pteronidea* in Taeger et al. (2010), but which cannot be associated confidently with our current concepts of *Nematus* or *Euura* due to lack of recent revisions and/or DNA sequence data. Solving these problems requires species-level revisions, regardless of how genera are defined. For *Euura*, *Nematus* and *Pristiphora*, a key to species level is urgently needed, rather than having an intermediate step keying out genera or subgenera. Work is currently under way in this direction for the West Palaearctic species.

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