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Key to long horn bee species of the tribe Eucerini (Hymenoptera, Apoidea, Apidae) occurring in Europe

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Abstract. Europe hosts some 2180 wild bee species, representing ca 10% of the world bee diversity. The long horn bee tribe Eucerini (Hymenoptera, Apidae) is one of the most charismatic groups in this region, and is particularly diverse in the southern, Euro-Mediterranean region. While identification of most species is difficult, a comprehensive identification tool has largely been missing, but is essential for current monitoring programs. This work presents the first modern comprehensive key to species of the tribe Eucerini in Europe. Keys are provided separately for females and males, including 89 out of the 112 species of Eucerini listed in the most updated checklist of the bees of Europe. The keys comprise new morphological delimitations for numerous species, particularly in the female sex, to resolve gaps in species identification, including some long known and widely distributed species. In addition, species are presented in the keys in context of genera, subgenera, and previously recognised species groups, when this is possible.

Keywords. Insects, biodiversity, pollinators, taxonomy, systematics.

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This work is dedicated to the late Prof. Maximilian Schwarz, Ansfelden, Austria, in tribute to his vast contribution to bee taxonomy, and his invaluable professional and personal support given to the first author.

Introduction

The long horn bee tribe Eucerini Latreille, 1802 is one of the long known and most charismatic groups of bees occurring in the Palaearctic region (Michez *et al.* 2019). The tribe includes some of the oldest names of bee species, such as *Apis longicornis* Linnaeus, 1758 (Fig. 1), and was first recognised (under the name eucères or *eucerae*) by the famous French zoologist Pierre André Latreille (Latreille 1802). The tribe consists of strictly solitary, non-parasitic ground nesting bees, and is best known for the unusually elongated antennae of the male from which its name derives (Michener 2007: chapter 112). The generic classification of the Eucerini has been unstable as a result of the historical classification of the Palaearctic taxa and their rather homogenous external morphology (Dorchin *et al.* 2018; Freitas *et al.* 2023). This was largely due to the presence of a large lineage, the then genus *Eucera* Scopoli, 1770 that is endemic to the Palaearctic region, and which is characterised by only two submarginal cells in the forewing. The remaining species with three submarginal cells were placed in the genus *Tetralonia* Spinola, 1838 (= *Macrocera* Latreille, 1810), and in additional genera described from other regions of the world. Albeit practical, this classification was contested for not reflecting the true phylogenetic relationships among the species (Michener 2000). Here, we follow the most recent, phylogeny-based generic classification, which has reverted to recognise only two genera in the Palaearctic region, *Eucera* and *Tetralonia*, with however some modifications. Based on this classification, the genus *Eucera* is subdivided into three subgenera, the two-celled subgenera *Eucera* s. str. and *Cubitalia* Friese, 1911 (Fig. 2) [the latter recognised as an independent genus by some authors, e.g., Michener (2000) and references therein], plus the three-celled subgenus *Synhalonia* Patton, 1879 (Fig. 3). The second genus *Tetralonia* is not divided into subgenera and comprises the remaining three-celled species (Dorchin 2023; Freitas *et al.* 2023) (Fig. 4).

The historical confusion and instability in the classification of the Palaearctic Eucerini have likely played a role in hindering fuller treatment and understanding of their systematics (Michener 2007: chapter 112). In modern times, main contributions to the systematics of the Palaearctic Eucerini were those of B. Tkalců, starting in the 1970s. Tkalců studied important historical collections in Europe and contributed the first group revisions, introducing the subgeneric names *Stilbeucera* Tkalců, 1978 (for the *clypeata*-group, in part), *Pareucera* Tkalců, 1978 (*caspica*-group), *Hetereucera* Tkalců, 1978 (*hispana*-group), *Atopeucera* Tkalců, 1984 (*clypeata*-group, in part), and *Pteneucera* Tkalců, 1984 (*grisea*-group), to more finely subdivide the large genus *Eucera*. These works were followed by a cladistic study by A.A. Sitdikov and Y.A. Pesenko, in which they further added the subgeneric names *Agatheucera* Sitdikov & Pesenko, 1988 (*bidentata*-group), *Hemieucera* Sitdikov & Pesenko, 1988 (*clypeata*-group, in part), *Pileteucera* Sitdikov & Pesenko, 1988 (*cineraria*-group), and *Rhyteucera* Sitdikov & Pesenko, 1988 (*vulpes*-group), and provided a key to the identification of the subgenera (Sitdikov & Pesenko 1988). More recently, during the 1990s and 2000s, S. Risch published a series of species level revisions, adding descriptions for numerous species, accompanied by accurate line drawings and by keys to the identification of species of some of the previously proposed subgenera (e.g., Risch 1997, 1999, 2001, 2003). Finally, Dorchin (2019) and Dorchin & Michez (2024) provided descriptions and keys to groups of species. Despite these efforts, no comprehensive key to the identification of eucerine species in Europe has been available since the monograph of H. Friese, *Die Bienen Europa's (Apidae europaeae)* (Friese 1896), a work that is largely outdated both with respect to the taxonomy and species concepts that are currently accepted in the Eucerini. To date, the identification of most eucerine species remains difficult, and we are still lacking well-defined diagnoses in both sexes for some of the most common and widely distributed species in Europe, including species described and studied since more than two centuries. For example, Tkalců (1984) tabulated different character states for males and females and provided accurate illustrations of components of the male genital complex in the *longicornis*-group of species (Tkalců 1984), perhaps the most emblematic group of European Eucerini. Yet, we are still lacking comprehensive means of identification for these species. In the subgenus *Synhalonia* Patton, 1879, we are lacking means of identification for nearly all the species, and while males can be relatively easily identified,

the females of long known, charismatic species such as *Eucera ruficollis* (Brullé, 1833), *Eucera rufa* (Lepeletier, 1841), and *Eucera hungarica* Friese, 1895, remain extremely difficult to identify in parts of Europe where they co-occur. In the genus *Tetralonia*, a revision and key to species are available for the *ruficornis*-group of species (Tkalců 1979) and for the *pollinosa*-group of species (Dorchin & Michez 2024), but the systematics of the genus as a whole remains poorly studied. Other available keys are focused on the identification of species of a given country (Scheuchl 2000 for Germany and Austria, Amiet *et al.* 2007 for Switzerland, Aubert 2020 for France), and although useful, their species coverage quickly declines if attempted in other neighbouring countries.

In this work, we present new keys to species in the tribe Eucerini, separately for females and males, with aim to provide a tool for identification of described species that are (de facto) known to occur in Europe (as defined in Ghisbain *et al.* 2025, with the exceptions given in the Material and methods section). A first version of the key was prepared by AD in the framework of The European Pollinator Identification



Figs 1–4. 1. *Eucera (Eucera) longicornis* (Linnaeus, 1758), ♂, pseudocopulating on a flower of *Ophrys fuciflora* (F.W.Schmidt) Moench (= *O. holoserica* (Burm.f.) Greuter) (Orchidaceae), 7 Jun. 2011, Lavaux-Ste-Anne, Belgium, credit: Nicolas J. Vereecken. 2. *E. (Cubitalia) breviceps* Friese, 1911, ♀, at *Onosma* sp. (Boraginaceae), 21 Jun. 2018, Mas-Saint-Chély, Fraissinet, Lozère, France, credit: David Genoud. 3. *E. (Synhalonia) ruficollis* (Brullé, 1833), ♀, at *Psoralea bituminosa* L. (Fabaceae), 26 Apr. 2011, Solomos, Greece, credit: Nicolas J. Vereecken. 4. *Tetralonia dentata* (Klug, 1839), ♀, at *Centaurea* sp. (Asteraceae), 6 July 2012, Vaison-la-Romaine, France, credit: Nicolas J. Vereecken.

Courses (EPIC-Bee), a project funded by the Directorate-General for Environment of the European Commission in the years 2025 and 2026, and in support of the EU Pollinator Monitoring Scheme (EU-PoMS) (<https://epic-pollinators.com/epic-bee/>). The keys provide new morphological delimitations for numerous species, especially in the female sex, and species are presented in context of genera, subgenera, and previously recognised species groups, when this is possible.

Material and methods

Species and geographical coverage of the keys

The keys include 89 out of the 112 species of Eucerini listed in the last emendation to the checklist of the bees of Europe (Ghisbain *et al.* 2025), broadly comprising the mainland and island territories west to the Ural Mountains in Russia (see definition of the geographical framework in Rasmont *et al.* 2017). Excluded are species that are not likely to be collected elsewhere than the south-western districts of Russia in the northern Caucasus [namely, *Eucera alborufa* (Radoszkowski, 1871), *Eucera atriceps* Morawitz, 1877, *Eucera ferghanica* Morawitz, 1875, *Eucera flavicornis* Risch, 2003, *Eucera intermedia* (Morawitz, 1875), *Eucera mastrucata* (Morawitz, 1875), *Eucera puncticollis* Morawitz, 1875, *Eucera rufipes* Smith, 1879, *Eucera transitoria* (Morawitz, 1875), *Eucera tristis* Morawitz, 1875, and *Tetralonia vicina* Morawitz, 1875], and in the Canary Islands [*Eucera gracilipes* Pérez, 1895, *Eucera lanuginosa* Klug, 1845, *Eucera maroccana* (Dusmet, 1928), *Tetralonia hohmanni* Tkalců, 1993, and *Tetralonia lanzarotensis* Tkalců, 1993]. These species exhibit Central Asian or North African distributions, or they are endemic to the Canary Islands, respectively, rather than having European distribution per se. Some other species with mainly Caucasian or Central Asian distributions, namely *Eucera distinguenda* (Morawitz, 1875), *Eucera melectoides* (Radoszkowski, 1893), *Eucera velutina* (Morawitz, 1873), and *Eucera vernalis* (Morawitz, 1875), were included because they have been reported from additional countries in Eastern Europe (Reverté *et al.* 2023). Also excluded are species for which concepts are currently unclear [*Eucera cressa* (Tkalců, 1984), *Eucera mavromoustakisi* (Tkalců, 1984), *Eucera codinaei* Dusmet, 1926, *Tetralonia ruficornis* (Fabricius, 1804)], or for which adequate material was lacking for examination at the time of writing the keys [*Eucera matalae* Tkalců, 2003, *Eucera quilisi* (Dusmet, 1926), *Tetralonia gennargentui* (Nobile, Catania & Bella, 2021)]. Lastly, some species that are yet undescribed could not be included in the keys by name, albeit found in some collections under long known unpublished manuscript names. Thus, the keys remain incomplete, especially for the identification of bees in the eastern Euro-Mediterranean region. Although the keys offer new morphological delimitations for multiple species, especially for females, some couplets remain difficult, and require the comparison of more than one specimen, or comparison with identified reference material. Finally, the keys will fail outside of Europe due to the very different and more diverse eucerine faunas of the neighbouring regions, i.e., Northern Africa, the Middle East, and Central Asia, and they should not be attempted for specimens from these other regions.

For each species, the currently known distribution in Europe (Reverté *et al.* 2023) is given in parenthesis for further indication. Geographical regions are partitioned into: ‘South-Western’ and ‘South-Eastern’, the former corresponds to the Iberian Peninsula, France and Italy, and the latter to the Mediterranean and Balkan countries east of Italy and south of Romania. Species distributions that include countries from both regions are referred to cumulatively as ‘Southern’, while ‘Western’ and ‘Eastern’ correspond to the countries situated to the west of Germany and Switzerland, and to the east of Austria and the Czech Republic, respectively, with the rest of the countries treated as ‘Central’.

The material used to construct the keys includes specimens from various institutions and private collections that were examined by the first author since 2009. Specimen photographs were made using material mainly from the Oberösterreichisches Landesmuseum, Linz, Austria (OLML), the laboratory

of Zoology, the University of Mons (UM), and the Research collection of Achik Dorchin, the University of Mons, Belgium (CAD) (see also the Acknowledgements).

Recommended use of the keys

The keys were prepared using a dissecting microscope with a total magnification of $25\text{--}75\times$ with an intensive, broad external source of light to illuminate wide surfaces. This is particularly important for the identification of different patterns of surface sculpture that are extensively used in the keys, especially in the key to females. For the same reason, it is highly recommended to use well-mounted, clean and dry specimens, to avoid having integument surfaces covered by matted hairs and debris, and hair structures obscured. The surface sculpture of the posteromedial region of the mesonotum is repeatedly used in the keys, and the loss of this region due to the insertion of the pin through the centre of the mesonotum may render identification more difficult. Similarly, having the wings folded above the metasoma of specimens, and the mouth parts unstretched, will obscure, or hamper evaluating informative characteristic of the metasomal terga and mouth parts. In contrast, abrasion of the ordinary body hairs in old specimens should not have an important effect on the identification because these are used, in most cases, in addition to structures that are less easily abraded. In particular, various specialised hairs with unique structures or patterns in both females and males are often stiffer and are less prone to abrasion. In females, these hairs are typically associated with pollen collection, manipulation or transport such as the scopal or sometimes sternal or facial hairs, in addition to hairs found on the mouth parts of some species. In males, specialised hairs are found on the legs, sterna or genitalia and are likely associated with secondary sexual functions. In cases where hair pattern or colour is prone to change with age, an indication is given in the keys, and a useful way for estimating the specimens' age is the extent of abrasion of the wing margins, with intact wings indicating freshly collected specimens.

The terminology used follows that of Michener (2007: chapter 10), including the abbreviations for metasomal terga and sterna, T1–T7 and S1–S8, respectively. Note that T7 and T8 refer to males, they are hidden in repose and require dissection. The maxillary palpus is often 6-segmented but occasionally 5-segmented or with fewer segments, with the first segment differing, broadened and unaligned with the following segments as typically in the Eucerini. The presence and form of the converging carinae of S6 of the male are extensively used and are always described as seen in ventral view. These include a posterolateral carina, running obliquely or curved at each side, which may converge with an anterior carina or ridge and with a short lateral branch carina that runs onto an anterolateral lobe (Fig. 5). The terminology of Dorchin *et al.* (2018) is used for the structurally complex genitalia and S7 of the male, although an effort was made to reduce the use of internal, unexposed body parts to a minimum. These include the lateral and posteromedial processes of S7, and the posterior and anterior lobes of the lateral process of S7, which are also always described in ventral view (Fig. 6). The above-mentioned posterior lobe is often slender, sclerotised and dark, and the anterior lobe broader and often ventrally concave (Fig. 6). The male gonostylus may be reduced and short, or when well-developed, its structure varies as a function of the extent to which it is curved. When strongly curved, the gonostylus' structure is referred to as 'elbowed', thus, it is strongly curved or bent apicoventrad as seen in lateral view (Fig. 7), and often shortly to strongly expanded apicomesally or L-shaped, as seen in dorsal view (Fig. 8), with sometimes also an obtuse or acute preapical angle on its inner side. When more weakly curved, it is described as gently curved or arched apicoventrad (Fig. 9) or it appears straight as seen in lateral view, and with the apex spatulate or only weakly broadened as seen in dorsal view (Fig. 10).

The integument surface sculpture is described as either smooth (Figs 11–12) or shagreened (independently from puncture density), with intensities varying from coarsely shagreened or matt (Fig. 13) to finely or weakly shagreened (Fig. 14), or it is shinier and only striate in some species. In addition, the integument punctation varies in size and depth, with punctures described as either conspicuous and well-formed (Figs 11–12), weakly defined and inconspicuous, or faint (Fig. 13) and unrecognisable. Often the

punctures appear deeper on only one side, having a crescent shape structure in ordinary, dorsal angle of view, and are then referred to as asymmetric punctures (Fig. 14). Another distinguished pattern of punctuation is called ‘areolate’, indicating broad, flattened punctures that are crowded, occupy the entire surface, and are defined merely by their raised borders (Fig. 11). A special emphasis is placed here on the surface sculpture of the mesonotum, particularly its posteromedial region that often differs in sculpture from the other regions (Fig. 14). Similarly, a different pattern is often observed in the slightly impressed marginal zone of the metasomal terga as compared to the remaining surface of the disc anteriorly. The surface sculpture of T1 is described only on its horizontal surface, unless otherwise mentioned, never on its anterior, vertical surface.

Yellow or pale yellow facial markings may be either present or absent in either females, males, or both sexes. When the facial markings are present, their size and form is informative, but this character may vary within species and thus should be considered with care. In the key to males, the extent of the clypeal marking is defined as large when forming a sharp (Fig. 15) or a blunt plus-shape (Fig. 16), referring to the sharpness of its edges, which follow closely the clypeal margins. If more faded, the marking appears trapezoidal or subtriangular or it delineates anterior half circle (Fig. 17). When further reduced the marking appears as a smaller medial or anteromedial oblong or rounded spot, surrounded by wider dark margins (Fig. 18).

Ratios between the lengths of the flagellar segments of the antennae were evaluated using the minimum ventral lengths of segments. Measurements of body or forewing length were taken using a metal ruler under the microscope to an accuracy of 0.5 mm. Body length was measured from the apical margin of the clypeus to that of the metasoma in specimens with the head perpendicular to the main axis of the body. Forewing length was measured from the margin of the tegula to the wing’s apex using specimens with undamaged wings.

The number of submarginal cells in the forewing, representing the first diagnostic character proposed in the Eucerini (see in Dorchin *et al.* 2018), is used here in the first couplet of the key. While atypical or anomalous incidents of wing venation may be more frequent in some bee taxa (Scarpulla 2018), this character is highly stable in the Eucerini and is considered a reliable one. Specifically, we know of only one case of atypical number of submarginal cells in the Palearctic Eucerini (AD, observation), and another case was cited by Scarpulla (2018).

An incidental matter relevant to this work is the correct authority of the species *Tetralonia dentata* (Klug, 1839), one of the oldest names and most widely distributed species in Europe. The species was first described in Germar (1839), with the following citation: “Klug in lit. *Eucera dentata*.”, implying that the species description and name were provided (in litteris) by J.C.F. Klug, a main authority on Hymenoptera in Germany at the time. Subsequent authors attributed the species authority to Klug (e.g., Dalla Torre 1896; Friese 1896), not to Germar. More recently, Schwarz *et al.* (1996: 144–145) argued that Germar (1839) should be the correct authority and corrected the publication year from 1835 to 1839 based on evidence from Horn & Schenkling (1928–1929). [Furthermore, the claim by Schwarz *et al.* (1996) for inconsistent citation of species authority in Dalla Torre (1896) is unsubstantiated as the latter work was perfectly coordinated with that of Friese (1896), which was published in the same year.] The brief descriptions in Latin employed at the time of Germar (1839) do not clearly specify species authorities, and still, the description presentation of *T. dentata* follows exactly the same syntax as that used for previously named species, such as *T. ruficornis* (“Fabr. Syst. Piez. pag. 383. 5. *Eucera ruficornis*.”), supporting the opinion that Klug is the species authority. We therefore adopt the traditional interpretation and cite the species name *Tetralonia dentata* (Klug, 1839).

The figures are presented as an Appendix in order not to break up the keys.

Results

Key to species of Eucerini occurring in Europe

Females

1. Forewing with two submarginal cells 2
 - Forewing with three submarginal cells 61
2. Forewing with submarginal cell 1 not much smaller than 2, and distance from submarginal crossvein 1 to recurrent vein 1 about equal or smaller than distance from recurrent vein 2 to submarginal crossvein 2 (Fig. 19); clypeus short and labrum comparatively long, about as long as clypeus, tapering apically, with apicolateral margins oblique; maxillary palpus 3- or 4-segmented (*Eucera* subgenus *Cubitalia*) 3
 - Forewing often with submarginal cell 1 much smaller than 2, $\sim \frac{2}{3}$ as small, and with distance from submarginal crossvein 1 to recurrent vein 1 greater than distance from recurrent vein 2 to submarginal crossvein 2 (Fig. 20); *if* submarginal cells 1 and 2, and corresponding vein distances subequal then labrum shorter, much shorter than clypeus, with apicolateral margins almost transverse; maxillary palpus 5- or 6-segmented (*Eucera* subgenus *Eucera*) 5
3. Galea and labial palpus with conspicuous apically hooked hairs (Fig. 21); small species, body length 12–14.5 mm, forewing length 8.5–11 mm; head ordinarily slender, with compound eyes at most slightly divergent below (Eastern) *Eucera parvicornis* Mocsàry, 1878
 - Galea and labial palpus with inconspicuous fine hairs; large species, body length 16–20.5 mm, forewing length 12.5–14.5 mm; head robust, strongly modified, with compound eyes strongly divergent below (Fig. 22) 4
4. T1 with smooth impunctate marginal zone short, clearly shorter than minimum length of disc; T2–T4 weakly shagreened; first flagellar segment long, more than twice as long as second; vestiture often light, greyish fulvous to light ferruginous, sometimes dark, in melanic specimens known only from Greece (Southern) *Eucera breviceps* Friese, 1911
 - Terga overall smooth and shiny, with smooth, impunctate marginal zone of T1 long, about as long as or slightly longer than minimum length of disc; first flagellar segment short, about twice as long as second; vestiture dark brown to black (South-Eastern) *Eucera morio* Friese, 1922
5. Small or medium-sized species, body length 10–12.5 mm with strongly branched scopal hairs (Fig. 23); mesonotal surface sculpture smooth with well-defined large dense punctures, with nearly no visible interspaces laterally near parapsidal line, and no or at most small weakly punctate posteromedial area (Fig. 24); maxillary palpus 5-segmented (*grisea*-group) 6
 - Small to large species with combination of characteristics different, particularly scopal hairs commonly unbranched or more weakly branched with unbranched hairs at least medially on dorsal (outer) surface of tibia and basitarsus; *if* scopal hairs strongly branched then either size larger or smaller (> 12.5 mm, < 10 mm), *or* surface sculpture of mesonotum different, weakly to coarsely shagreened with sparser inconspicuous or weakly defined punctures, and sometimes with wide differing posteromedial region, smooth and finely punctate (Fig. 14); maxillary palpus frequently 6-segmented, occasionally 5-segmented 9
6. T1 with dense shallow punctures posteriorly with interspaces mostly narrower than puncture diameter wide, delineating well-defined boundary with uniformly wide impunctate surface on marginal zone (Fig. 25); mesonotum densely punctate, areolate laterally with shallow flattened punctures and with no visible interspaces, moderately sparser on posteromedial region with interspaces up to puncture diameter wide (Fig. 24) (South-Western) *Eucera grisea* Fabricius, 1793

- T1 with sparser deeper punctures posteriorly, with many interspaces puncture diameter wide, with impunctate surface on marginal zone not uniformly wide, and often not well-delimited due to infiltrating punctures medially; mesonotum with deeper more conspicuous punctures laterally, and with sparser punctures on posteromedial region with many interspaces ≤ 2 puncture diameters wide 7
- 7. T1 with more uniformly distributed denser punctures, posteromedially with interspaces ≤ 3 puncture diameters, delineating linear boundary with impunctate surface of marginal zone (Fig. 26) (South-Eastern, Italy) *Eucera pseudeucnemidea* Risch, 1997
- T1 with sparser more irregularly distributed punctures, with some wider interspaces, > 3 puncture diameters, with some punctures infiltrating into impunctate surface posteromedially (Figs 27–28) 8
- 8. T1 more irregularly punctate on anterior half of disc, with many minute punctures intermixed with much larger punctures, about twice as large, such that some, and often many interspaces medially on anterior half wider than adjacent small punctures (Fig. 27) (Southern, Eastern) *Eucera nigrifacies* Lepeletier, 1841
- T1 more uniformly punctate on anterior half of disc, at most with few minute punctures intermixed with twice as large punctures and with few interspaces medially on anterior half wider than adjacent punctures (Fig. 28) (Aegean Islands, Cyprus) *Eucera penicillata* Risch, 1997
- 9. Large species, > 12 mm long, with large keirotrichiate area, occupying entire of surface apically on ventral (inner) side of tibia and extended almost to base of tibia, with unbranched elongated scopal hairs largely limited to dorsal (outer) surface (Fig. 29) (*longicornis*-group) 10
- Small to equally large species, with keirotrichiate area smaller, not occupying all of surface apically on ventral (inner) side of tibia and often much narrower, attenuate basally and largely absent on basal $\frac{1}{3}$ of tibia, with elongate scopal hairs present also on ventral side of tibia (Fig. 30) 21
- 10. Galea with conspicuous, strongly apically curved hairs; labrum triangular, strongly tapering apically (Fig. 31); mesonotum coarsely uniformly shagreened and sparsely punctate with faint shallow punctures, with many interspaces ≥ 3 puncture diameters on posteromedial region (Fig. 13) 11
- Galea with inconspicuous fine hairs; labrum weakly tapering apically, quadrangular; mesonotum with surface sculpture variable, often with deeper denser punctures, at most with few interspaces three puncture diameters wide, and with smooth or shinier posteromedial region, except uniformly shagreened, with deep sparser punctures in *Eucera kullenbergi* Tkalců, 1984 12
- 11. T2–T4 with narrow translucent discoloured apical margin completely covered and obscured by dense white apical hairbands in fresh specimens, contrasted with black hairs on anterior of T3 and T4 (Fig. 32); scopal hairs pale fulvous on dorsal (outer) side of tibia and most of basitarsus, contrasted with black hairs on ventral (inner) side of basitarsus (South-Eastern) *Eucera dimidiata* Brullé, 1833
- T2–T4 with apical margin darker, at most hyaline fulvous and lighter than anterior rest of tergum, not obscured by sparse hairs of marginal zones (Fig. 33); scopal hairs ferruginous on dorsal (outer) side of tibia and most of basitarsus, either ferruginous or black on ventral (inner) side of basitarsus (Southern) *Eucera nigrilabris* Lepeletier, 1841
- 12. Malar distance long, with minimum lower distance at least twice as long as basal width of first flagellar segment, rarely shorter (in the Iberian Peninsula) (Figs 34–35); clypeus protuberant, strongly convex in profile 13
- Malar distance short, minimum lower distance less than twice as long as basal width of first flagellar segment; clypeus weakly protuberant or flattened, at most weakly convex in profile, *except* more strongly convex in *Eucera dalmatica* Lepeletier, 1841, in which case malar distance conspicuously short, about as long as basal width of first flagellar segment 15

13. Clypeus with wide smooth surfaces on medial region, multiple puncture diameters wide, strongly contrasted with rugopunctate lateral regions; mesonotum with differing posteromedial region, smoother and with deeper punctures than laterally (Fig. 36); T2 and T3 with marginal zones completely hairless, with dark inconspicuous apical hairband on T4 (South-Western) *Eucera numida* Lepeletier, 1841
 - Clypeus uniformly rugopunctate with interspaces less than two puncture diameters on medial region; mesonotum uniformly shagreened, with shallow weakly defined punctures, not strongly differing on posteromedial region than laterally (Fig. 37); T2–T4 with marginal zones always covered laterally by apical fasciae, often forming interrupted light apical hairbands on T2 and T3, or at least with complete apical hairband on T4, but with hairbands less conspicuous, darker light brown in specimens from Corsica 14
14. Lower paraocular area bulging, strongly convex immediately next to epistomal suture on both sides of clypeus (Fig. 35); malar distance long, $\approx \frac{3}{4}$ length of second flagellar segment (Fig. 35) (Aegean Islands, Cyprus) *Eucera cypria* Alfken, 1933
 - Lower paraocular area not visibly convex (Fig. 34); malar distance varying in length, $\approx < \frac{3}{4}$ length of second flagellar segment (Fig. 34) (in Eastern and in Western Europe, respectively) (Circum-European) *Eucera nigrescens* Pérez, 1879
15. Mesonotal surface sculpture uniformly weakly shagreened, densely punctate, with most interspaces much smaller than puncture diameter and up to puncture diameter wide on posteromedial region (Fig. 38) 16
 - Mesonotum shagreened laterally, with differing posteromedial region, conspicuously sparsely punctate and with surface often smoother than laterally, with many interspaces more than puncture diameter wide 18
16. Fore basitarsus produced posteroapically with posterior margin concave above clump of thickened bristles oriented posteriorly (Fig. 39); T2 and T3 with light apical fasciae restricted to lateral extremities even in fresh specimens, not forming visible apical hairbands as on T4 or fasciae entirely dark in melanic specimens (= *Eucera atricollis* Friese, 1922), *except* in Southern France and the Iberian Peninsula, exhibiting cline to more extensive bright ferruginous vestiture and hyaline fulvous marginal zones (= *Eucera hispaliensis* Pérez, 1902), reminiscent of *Eucera pollinosa* Smith, 1854, in which case marginal zones with more widely distributed and conspicuous punctures, present on anterior of marginal zone of T1 and on posteromedial regions of those of T2 and T3, delineating weakly delimited, uniformly wide impunctate apical band (Circum-European) *Eucera longicornis* (Linnaeus, 1758)
 - Fore basitarsus with posterior margin straight, with thickened spurs not conspicuously clumped, oriented apically; T2 and T3 with apical fasciae more abundant, forming interrupted light to ferruginous hairbands in fresh specimens in addition to complete hairband on T4; marginal zone of T1 largely impunctate, those of T2 and T3 with impunctate apical band expanded anteromedially and broader 17
17. Vestiture of terga uniformly ferruginous, with broad interrupted apical hairbands on T2 and T3 in addition to complete apical band on T4 in fresh specimens; clypeus weakly convex, rugopunctate with irregular interrupted ridges (Circum-European) *Eucera pollinosa* Smith, 1854
 - Tergal vestiture comprised of broad white apical hairbands, interrupted on T2, attenuate medially on T3 and complete on T4, contrasted with dark hairs on discs of T3 and T4 and prepygidial area of T5, and with greyish fulvous hairs of mesonotum; clypeus strongly convex, uniformly punctate without conspicuous ridges (Southern, Eastern) *Eucera dalmatica* Lepeletier, 1841
18. Mesonotum uniformly shagreened, sparsely punctate with deep small punctures and many interspaces multiple punctures wide; head and mesosoma with specialised unbranched hairs dorsally as seen in

- profile, comprising apically curved hairs on clypeus and supraclypeal area and undulating hairs on vertex, mesonotum and scutellum (Fig. 40); T2–T4 weakly haired, with hairs on discs largely limited to lateral extremities, and with marginal zones hairless and impunctate as that of T1 (Greece, North Macedonia) *Eucera kullenbergi* Tkalců, 1984
- Mesonotum with ordinarily large shallower punctures, denser, with at most few interspaces three punctures wide on often smoother posteromedial region, and much denser laterally; head and mesosoma with ordinary branched hairs dorsally; T2–T4 with more abundant hairs forming interrupted or complete apical hairbands on marginal zones 19
19. Mesonotum uniformly shagreened, with shallow inconspicuous punctures including on posteromedial area, with punctures only slightly larger than punctures on other regions (Fig. 41) (South-Eastern) ...
..... *Eucera punctulata* Alfken, 1942
- Mesonotum with posteromedial region more strongly differing from other regions, smoother or shinier and with deeper more conspicuous punctures, contrasted with strongly shagreened and less conspicuously punctate surface of other regions (Fig. 42) 20
20. Terga comparatively more densely punctate, T1 with most interspaces anteromedially on disc narrower than puncture diameter widths, with well-defined deep punctures posteromedially near marginal zone, and with minute punctures on anterior half of marginal zone (Fig. 43); scopal hairs on ventral (inner) side of basitarsus bright ferruginous, contrasted with lighter ferruginous to pale hairs on dorsal (outer) sides of tibia and basitarsus (Southern, Central, Eastern)
..... *Eucera interrupta* Bär, 1850
- Tergal punctation sparser, T1 with most interspaces anteromedially on disc more than puncture diameter wide, with irregular sparse or faint punctures posteromedially near marginal zone, and with marginal zone largely impunctate, at most with few minute infiltrating punctures anteromedially (Fig. 44); scopal hairs on ventral (inner) side of basitarsus dark ferruginous to dark brown, contrasted with pale fulvous hairs on dorsal sides of tibia and basitarsus (Southern, Ukraine, Russia)
..... *Eucera proxima* Morawitz, 1875
21. Mesonotal surface sculpture areolate, with conspicuous, dense large flattened punctures over entire surface, with no, or only few visible interspaces outside of posteromedial area (Fig. 11); small or medium-sized species, body length 10–12.5 mm, with integument smooth and shiny with weak to strong blue, green, or golden-bronze metallic reflection, although reflection indistinct in *Eucera vulpes* Brullé, 1833; T1 with conspicuous punctures on marginal zone almost attaining apex, with narrow impunctate margin at most five apical punctures wide (*vulpes*-group) 22
- Combination of characteristics different, particularly, mesonotum more sparsely punctate, with many interspaces laterally or with punctures inconspicuous, *or* otherwise, T1 with punctation attenuate apically on marginal zone, with much smaller or faint inconspicuous punctures apically, and impunctate margin much longer; small to large species 24
22. Larger species, body length > 10 mm, forewing length ~7 mm; antenna conspicuously lighter on ventral side of flagellar segments 3 (or sometimes 2) distally, light to dark ferruginous, strongly contrasted with darker dorsal side (Greece, Cyprus) *Eucera laxiscopa* Alfken, 1935
- Smaller species, body length < 9 mm, forewing length ~6 mm; antennal ventral colour not strongly contrasted with dorsal colour, gradually lighter distally, with at least flagellar segments 1–5 dark ...
..... 23
23. Integument dark, without distinct metallic reflection; vestiture uniformly bright ferruginous, completely covering T3 and T4 as on T5 (Southern) *Eucera vulpes* Brullé, 1833

- Integument of head and mesosoma with strong blue metallic reflection; vestiture light brownish ferruginous, with complete apical hairbands on T3 and T4, contrasted with sparsely haired darker surface of discs (Cyprus) *Eucera caerulescens* Friese, 1899

- 24. Medium-sized species, body length ~ 10 mm, forewing length ~ 6 mm; mesonotum smooth, uniformly densely punctate with deep punctures and interspaces narrower than puncture diameter width, at most slightly sparser on posteromedial region, up to puncture diameter wide (Fig. 12); terga with deep conspicuous punctures and with broad impunctate hyaline fulvous apical band, multiple large tergal punctures wide, uncovered by hairs only on T1 and largely covered on following terga (Fig. 45) (*cineraria*-group) 25
- Combination of characteristics different, particularly, mesonotum either shagreened and shallowly punctate at least laterally, *or* with conspicuously sparser punctures on posteromedial region than laterally, *or* species much larger; terga with shallower or weakly defined punctures, *or* at least apical impunctate band of terga opaque, at most narrowly translucent along margin, 2–3 large tergal punctures in width 26

- 25. Dorsal vestiture uniformly fulvous, with dense tomentum covering entire surfaces of T2–T5; T1 with uniformly dense punctures decreasing in size posteriorly, with most interspaces narrower than puncture diameter width both anteriorly on disc and posteriorly, anterior to marginal zone (Fig. 45) (Southern, Central, Eastern) *Eucera cineraria* Eversmann, 1852
- T2–T5 with thick pale apical fascia strongly contrasted with sparse short brown hairs on discs; T1 with dense punctures anteriorly on disc and much sparser punctures posteriorly, anterior to marginal zone (South-Eastern) *Eucera fasciata* Risch, 1999

- 26. Mesonotal surface sculpture smooth with well-defined conspicuous punctures laterally, with sparser, smaller to minute punctures posteromedially, *or* sometimes with posteromedial area widely impunctate, rarely surface weakly shagreened with shallow punctures laterally (as in *Eucera pythagoras* Risch, 2003), *or* more strongly shagreened and contrasted with smooth posteromedial region (as in *Eucera oblitterata* Pérez, 1895), *if* so, then with scopal hairs unbranched; (T2–)T3–T5 with complete broad light apical hair bands entirely obscuring marginal zones in fresh specimens, *or* terga entirely covered with ferruginous tomentum in *Eucera microsoma* Cockerell, 1922 (suggesting *Eucera cineraria*); small or medium-sized species, body length 9–13 mm (*clypeata*-group) 27
- Characteristics different, particularly, most species with mesonotal surface weakly to strongly shagreened with minute, weakly defined or indistinct shallow punctures at least laterally, and *if* contrasted with smooth surface posteromedially as in the *bidentata*-group, then with some conspicuously branched scopal hairs, *or* rarely with branches inconspicuous and best visible in dorsal view; tergal apical hairbands of most species interrupted, incomplete, more slender or absent, where often (T2–)T3–T4 with premarginal hairbands present instead, and marginal zones largely exposed; small to large species 35

- 27. T2 with marginal zone strongly expanded anteromedially, much broader medially than laterally, widely exposed, uncovered by apical fasciae on $> \frac{1}{3}$ of tergal width (Figs 46–47); mesonotum with posteromedial region strongly differing, with punctures much sparser and smaller than laterally *or* sometimes nearly absent (Figs 48–49); maxillary palpus 5-segmented, rarely 6-segmented 28
- T2 with marginal zone at most weakly expanded anteromedially, completely covered with apical fasciae *or* at most exposed on $< \frac{1}{3}$ of tergal width in fresh specimens; mesonotum with posteromedial region less strongly differing, with punctures only moderately sparser and smaller than laterally; maxillary palpus 6-segmented, rarely 5-segmented 30

28. Mesonotum comparatively sparsely punctate, with posteromedial region largely impunctate (Fig. 49) (South-Eastern, Ukraine) *Eucera paraclypeata* Sitdikov, 1988
– Mesonotum comparatively densely punctate, with smaller punctures present posteromedially (Fig. 48) 29
29. T2 with marginal zone coarsely shagreened, finely punctate, with minute scarce punctures, strongly contrasted with densely punctate, much larger punctures on disc (Fig. 47); mesonotum coarsely shagreened laterally with shallow weakly defined punctures, strongly contrasted with smooth posteromedial area (Iberian Peninsula) *Eucera oblitterata* Pérez, 1895
– T2 with marginal zone not strongly differing in surface sculpture from disc, weakly shagreened, with punctures only moderately sparser than on disc (Fig. 46); mesonotum at most weakly shagreened laterally, with more conspicuous punctures, deeper than punctures on posteromedial region in most specimens (Southern, Eastern) *Eucera clypeata* Erichson, 1835
30. Small species, body length 9–10 mm, forewing length 5–6 mm 31
– Much larger species, body length (11–)12–13 mm, forewing length 7–8 mm 32
31. Vestiture of terga uniformly fulvous to light ferruginous, with dense tomentum covering entire surfaces of T2–T5 (suggesting *Eucera cineraria*, cf. Fig. 45); maxillary palpus 5-segmented (South-Eastern) *Eucera microsoma* Cockerell, 1922
– T2–T5 with thick pale apical fascia strongly contrasted with sparse short brown hairs on discs (only posterolaterally on T2); maxillary palpus 6-segmented (Greece) *Eucera digitata* Friese, 1895
32. Scopal hairs branched (Fig. 50); T2–T4 with complete light apical hairbands entirely covering marginal zones in fresh specimens (South-Eastern) *Eucera excisa* Mocsàry, 1879
– Scopal hairs unbranched, except for ordinary sparse branched hairs along posterior margins of tibia and basitarsus; apical hair band of T2 interrupted medially, complete on T3 and T4 33
33. Middle tibial spur slender, broadest on basal half and narrowed distally, with maximal width in basal half much narrower than middle distitarsus as seen in lateral view (Fig. 51); galea with inconspicuous erect hairs (Fig. 52) (Cyprus) *Eucera gaullei* Vachal, 1907
– Middle tibial spur robust, broadest on distal half, with maximal width almost as wide as middle distitarsus at base as seen in lateral view (Figs 53–54); galea with conspicuous apically curved hairs (that quickly abrade with age and become inconspicuous in old specimens) (Fig. 55) 34
34. Mesonotal surface sculpture uniformly smooth with comparably deep punctures laterally and on posteromedial region; middle tibial spur gradually and shortly tapering apically, without continuous slender apical section as seen in lateral view (Fig. 53); scopal hairs darker ferruginous (South-Eastern) *Eucera seminuda* Brullé, 1833
– Mesonotum weakly shagreened, shallowly punctate laterally near parapsidal line, with punctures appearing less conspicuous than on posteromedial region; middle tibial spur abruptly tapering and continued with slender apical section to distance about as long as maximal width of spur (Fig. 54); scopal hairs lighter fulvous (Aegean Islands) *Eucera pythagoras* Risch, 2003
35. Mesonotal surface sculpture uniformly coarsely shagreened with shallow inconspicuous punctures, without differing posteromedial area (Figs 56–58); mostly medium-sized species, 10–14 mm long, only *Eucera curvitaris* Mocsàry, 1879 larger, 16 mm long, and in some specimens with shinier and more deeply punctate posteromedial mesonotal region, if so, then (T2–)T3–T5 with broad ferruginous to light brown apical hairband entirely obscuring marginal zones in fresh specimens 36
– Mesonotal surface uniformly smooth with deeper well-formed punctures, or at least mesonotal posteromedial region smooth, with deeper, although sometimes smaller and sparser punctures,

- strongly differing from finely shagreened and less conspicuously punctate surface laterally; *if*, rarely, mesonotum uniformly weakly shagreened, *or* with posteromedial region only slightly smoother or shinier than laterally then punctures well-formed, although sometimes small, and T2–T3(–T4) with premarginal (in *Eucera colaris* Dours, 1873) or apical interrupted hairbands (in *Eucera taurea* Vachal, 1907), largely or partly exposing marginal zones, or with complete apical hairbands in fresh specimens, comprising white hairs anteriorly and dark brown hairs apicomediaally (in *Eucera barbiventris* Pérez, 1902); body length variable, 8–18 mm long 46
36. T2–T4 with light premarginal hairs or hairbands, with hairs partly or largely absent on marginal zones, at least apical margins exposed for most widths even in fresh specimens 37
- T2–T4 with either complete or interrupted light apical hairbands in fresh specimens, contrasted with darker hairs anteriorly and covering margins at least in part as on T5 39
37. Scopa with finely branched hairs (Fig. 59) (Southern) *Eucera furfurea* Vachal, 1907
- Scopa with unbranched hairs, except for ordinary sparse finely branched hairs along posterior margins of tibia and basitarsus 38
38. Metasomal vestiture scarce and darker, T2–T4 with tomentose hairs of disc largely restricted to basal and lateral extremities, T5 entirely covered with ferruginous to darker brown tomentum, scopal hairs ferruginous or fulvous; T2 with sparse punctures, with interspaces two puncture diameters wide medially on disc (South-Western) *Eucera hispana* Lepeletier, 1841
- Metasomal vestiture more abundant and lighter, T2–T4 with disc widely or completely covered with light tomentum in fresh specimens as on T5, except for fulvous prepygidial fimbria, and scopal hairs white; T2 with denser punctures, with interspaces puncture diameter wide medially on disc (Romania) *Eucera sogdiana* Morawitz, 1875
39. Galea with conspicuous erect and weakly to strongly apically curved hairs (Figs 60–61); smaller species, body length 10–11.5 mm 40
- Galea with inconspicuous fine hairs; predominantly larger species, body length 13–14 mm, only *Eucera caspica* Morawitz, 1873 and *Eucera albofasciata* Friese, 1895, 11.5 mm long or longer ... 41
40. Galea coarsely tessellate, matt, with strongly apically curved dark hairs on basal $\frac{3}{4}$ of upper postpalpal margin as well as lower margin as seen in lateral view (Fig. 60); T1 with faint, barely detectable punctures on anterior, horizontal surface of disc, and faint unrecognisable, yet abundant punctures on marginal zone, visible only in some lights (Greece) *Eucera parnassia* Pérez, 1902
- Galea finely tessellate and shiny, with less conspicuous golden brown hairs, at most weakly apically curved on basal $\frac{1}{2}$ of upper postpalpal margin and inconspicuous and short on apical half, weakly apically curved on lower margin as seen in lateral view (Fig. 61); T1 with more conspicuous but weakly defined, recognisable punctures on anterior, horizontal surface of disc, and scarce faint punctures on marginal zone separated on marginal zone by wide impunctate interspaces (Greece)
..... *Eucera ebmeri* Risch, 1999
41. Clypeus irregularly coarsely rugopunctate anteriorly, with some wide smooth surfaces, interspaces about as wide as punctures, with continuous or sometimes interrupted conspicuous midline (Fig. 62) (*caspica*-group) 42
- Clypeus densely punctate with at most fine ridges delineated by puncture edges, with interspaces much smaller than puncture diameter, without visible midline 43
42. Ventrally oriented lateral region of T1 impunctate mesally, ventral to lateral gradular arm, contrasted with punctate corresponding region of T2; smaller species, body length ≤ 12 mm (South-Eastern, Italy) *Eucera albofasciata* Friese, 1895

- Ventrally oriented lateral region of T1 with abundant punctures near lateral gradular arm, comparable to that of T2; larger species, body length ≥ 12 mm (Southern, Ukraine, Russia) *Eucera caspica* Morawitz, 1873
- 43. Mesonotum densely punctate, with visible punctures and interspaces up to puncture diameter posteromedially (Fig. 57); T1 densely punctate on anteromedial horizontal surface of disc, without visible interspaces, with marginal zone broad, $> \frac{1}{3}$ as long as disc; large species, body length 16 mm (South-Eastern) *Eucera curvitaris* Mocsàry, 1879
- Mesonotum sparsely punctate, with interspaces several puncture diameters wide posteromedially, or punctures faint and unrecognisable (Fig. 58); T1 sparsely punctate on anteromedial horizontal surface of disc, with many interspaces as wide as or wider than puncture diameters, with marginal zone slender, at most $\frac{1}{3}$ as long as disc; smaller species, body length 13–14 mm 44
- 44. Vestiture overall with long strongly branched hairs, scopa and sterna with fine inconspicuously branched hairs; tergal apical hairbands extended posteriorly well beyond margins; mouth parts long, galeal blade about twice as long as compound eye; mesonotum with faint unrecognisable punctures (South-Eastern) *Eucera helvola* Klug, 1845
- Vestiture with less developed branched hairs, scopa and sterna with coarse unbranched hairs, except ordinary branched hairs along posterior margins of tibia and basitarsus; tergal hair bands often not attaining, or otherwise only shortly surpassing margin of T2 and T3; mouth parts short, galeal blade $< 1.5 \times$ as long as compound eye; mesonotal punctures weakly defined though recognisable 45
- 45. T1 with marginal zone impunctate and smooth, clearly delimited by well-defined small punctures on adjacent anterior region of tergum (Fig. 63); T2–T4 with apical hairbands slender, widely exposing apical margin of T2 (Fig. 63), more narrowly exposing that of T3 even in fresh specimens; vestiture darker, with hairs on vertex, dorsal side of mesosoma and sometimes T1 dark brown in fresh specimens (South-Western) *Eucera notata* Lepeletier, 1841
- T1 with marginal zone weakly delineated, with fine inconspicuous punctures comparable to adjacent anterior region of tergum (Fig. 64); T2–T4 with apical hairbands broad, attaining and completely covering apical margins in fresh specimens (Fig. 64); vestiture lighter, with hairs on vertex, dorsal side of mesosoma and T1 bright fulvous to light brown in fresh specimens (Crete, Italy, Malta) *Eucera algira* Lepeletier, 1841
- 46. T2–T4 with hairs of disc often forming interrupted premarginal hairbands, with hairs largely absent on marginal zones, at least apical margins exposed for most length; scopa with coarse unbranched hairs except for some ordinary branched hairs along posterior margins of tibia and basitarsus 47
- T2–T4 with either complete or interrupted apical hairbands in fresh specimens (appearing slender in abraded old specimens) covering margins at least in part, or terga completely covered by dense tomentum in *Eucera squamosa* Lepeletier, 1841; scopa with branched hairs present to varying extents or hairs largely unbranched and somewhat finer 53
- 47. Sternum with ventral brush made of stiff unbranched hairs posteromedially, anterior to middle coxae, largely or partly obscuring underlying surface, contrasted with ordinary fine branched hairs on both sides (Figs 65–66) 48
- Sternum without specialised stiff hairs obscuring undersurface, at most with some inconspicuous fine unbranched hairs 50
- 48. Small species, body length 12 mm; mesonotum finely shagreened, sparsely punctate laterally near parapsidal line with some interspaces puncture diameter wide or more, smooth only on posteromedial region (Cyprus) *Eucera syriaca* Dalla Torre, 1896

- Large species, body length 16 mm or longer; mesonotum uniformly smooth, densely punctate laterally near parapsidal line with no visible interspaces 49
- 49. Sternum with denser posteromedial ventral brush, completely obscuring underlying surface (Fig. 65); scopa darker, dorsal (outer) side pale fulvous anteriorly and becoming darker posteriorly in certain angles of view, dark on ventral (inner) side of both tibia and basitarsus (Southern, Eastern) *Eucera taurica* Morawitz, 1870
- Sternum with posteromedial ventral brush sparse enough to expose underlying surface (Fig. 66); scopa lighter fulvous, bright ferruginous to dark only on ventral (inner) side of basitarsus and apex of tibia (Southern, Eastern) *Eucera pannonica* Mocsàry, 1878
- 50. Terga with shallow, weakly defined asymmetric punctures, notably on entire of horizontal surface of T1 and on disc of T2 (Fig. 67); premarginal lateral tomentum limited in extent, exposing $> \frac{1}{3}$ of total width of T3 and $\sim \frac{1}{3}$ of that of T4, not strongly differing from that of T2 (Cyprus) *Eucera palaestinae* Friese, 1922
- Terga with deep well-formed punctures, on posterior half of horizontal surface of T1 and most or all of T2 (Figs 68–70); T2–T4 with premarginal tomentum more developed, forming nearly complete hairband on T3 and complete band on T4 in fresh specimens 51
- 51. T2 and T3 with minute sparse punctures on marginal zone, with most interspaces more than puncture diameter wide (Fig. 68); vestiture ferruginous on mesosoma, scopal hairs bright ferruginous often with apices dark on posterior dorsal face of tibia; premarginal fascia restricted to lateral extremities of T2, interrupted medially on T3 (Fig. 68) (South-Western) *Eucera oraniensis* Lepeletier, 1841
- T2 and T3 with denser, more conspicuous punctures on marginal zone, with most interspaces puncture diameter wide or less (Figs 69–70); vestiture light fulvous to darker brown on mesosoma, scopa light to bright fulvous; premarginal fascia more developed, forming widely interrupted hairband on T2, and nearly complete or complete band on T3 in fresh specimens 52
- 52. T1 with punctures apically delineating linear well-defined boundary with impunctate surface of marginal zone (Fig. 69); vestiture light, overall fulvous to pale fulvous; smaller species, body length 11–12 mm (South-Western) *Eucera elongatula* Vachal, 1907
- T1 with punctures irregularly distributed apically, obscuring boundary of impunctate surface of marginal zone (Fig. 70); vestiture darker brown dorsally on head and mesosoma, and metasomal prepygidial and pygidial fimbria light to dark brown; larger species, body length 12–13 mm (South-Western) *Eucera colaris* Dours, 1873
- 53. Large species, body length 14.5–16 mm; mesonotum weakly shagreened, uniformly sparsely punctate with small conspicuous punctures and many interspaces ≥ 2 puncture diameters wide on most of surface, without strongly differing posteromedial region, at most shinier medially (Fig. 71) 54
- Small to large species, 8–18 mm long; mesonotum uniformly smooth *or* finely shagreened laterally and smooth on posteromedial region, either with denser conspicuous punctures, without visible interspaces outside of posteromedial region or *if* sparser then punctures weakly defined and shallow laterally, strongly differing from more conspicuous and often smaller punctures on posteromedial region (Figs 14, 72–74) 55
- 54. Terga smooth, at most weakly striate, T1 with conspicuous asymmetric punctures infiltrating anteromedially into otherwise impunctate marginal zone (Fig. 75); T2 and T3 with cream colour apical hairband interrupted medially and exposing tergal surface (Fig. 75); sterna uniformly covered with ferruginous apically curved unbranched hairs, not much longer apically than basally as seen in profile, with only few branched hairs restricted to lateral extremities; scopal hairs cream white; slightly larger species, body length 15–16 mm (Greece) *Eucera taurea* Vachal, 1907

- Terga finely shagreened, with unrecognisable minute punctures medially (Fig. 76); T2 and T3 with complete apical hairband in fresh specimens partly or largely obscuring underlying medial surface, comprising white hairs anteriorly and dark brown hairs apicomediaally (Fig. 76); sterna with apical hairbands of ferruginous unbranched hairs intermixed with light finely branched hairs, much longer than fine hairs anteriorly; scopal hairs bright ferruginous; slightly smaller species, 14.5–15 mm long (Iberian Peninsula, France) *Eucera barbiventris* Pérez, 1902
- 55. Small species, body length 8–11 mm; mesonotum weakly to coarsely shagreened with weakly defined shallow asymmetric punctures laterally and with smoother or shinier posteromedial region with deeper and more conspicuous, although sometimes much smaller punctures (Figs 14, 72–74); scopa with branched hairs to varying extents (Figs 77–78), or with hairs largely unbranched (Fig. 79) (*bidentata*-group) 56
- Large species, body length 13–18 mm; mesonotum uniformly smooth with punctures on posteromedial region not much deeper than laterally, sometimes reduced, minute and sparse; scopal hairs unbranched except for ordinary branched hairs along posterior margins of tibia and basitarsus 59
- 56. Mesonotum with punctures on posteromedial region much smaller and sparser than elsewhere, with interspaces multiple puncture diameters wide (Figs 14, 72); scopa with conspicuous branched hairs present at least along anterior and posterior of dorsal (outer) surface of tibia (Figs 77–78) 57
- Mesonotum with punctures on posteromedial region not much sparser than elsewhere, with interspaces ≤ 2 puncture diameters wide and mostly much narrower (Figs 73–74); scopa with unbranched hairs except for ordinary branched hairs along posterior margin of tibia, and inconspicuously so also along anterior margin as seen in magnification of $40\times$ (Fig. 79) 58
- 57. T1 with large asymmetric punctures on anterior of disc, punctures dense with almost no visible interspaces (Fig. 80); scopal hairs strongly branched (Fig. 78); mesonotum weakly shagreened, with posteromedial region smooth, only slightly shinier than laterally (Fig. 72) (South-Eastern, Italy) ...
..... *Eucera terminata* Pérez, 1895
- T1 with large asymmetric punctures on anterior of disc sparsely punctate with many interspaces more than puncture diameter wide (Fig. 81); scopal hairs branched along anterior and posterior of dorsal (outer) side of tibia, inconspicuously so or largely unbranched medially (Fig. 77); mesonotum more strongly shagreened laterally, contrasted with smooth or sometimes finely shagreened posteromedial region (Fig. 14) (South-Eastern) *Eucera bidentata* Pérez, 1887
- 58. Mesonotum with punctures on posteromedial region deep and well-defined, contrasted with shallow weakly defined punctures laterally (Fig. 73); T2 with deep conspicuous punctures on marginal zone not strongly differing in size or depth from punctures on disc (Fig. 82); apical fasciae comprising combination of white and ferruginous hairs in fresh specimens (Eastern)
..... *Eucera vittulata* Noskiewicz, 1936
- Mesonotum with punctures on posteromedial region shallow, not differing much in structure and depth from punctures laterally (Fig. 74); T2 with punctures on marginal zone strongly decreasing in size and depth posteriorly, with apical most punctures minute, distinctly smaller and shallower than on posterior of disc (Fig. 83); apical fasciae either uniformly ferruginous or dark brown in melanic specimens (Iberian Peninsula) *Eucera confinis* Pérez, 1895
- 59. Sternum with ventral brush made of dense stiff unbranched hairs posteromedially, anterior to middle coxae obscuring underlying surface (cf. Fig. 65); terga completely covered with dense ferruginous tomentum on marginal zone of T2 and on entirety of following terga (South-Eastern)
..... *Eucera squamosa* Lepeletier, 1841
- Sternum with sparse fine unbranched hairs posteromedially, anterior to middle coxae, not obscuring undersurface; (T2–)T3–T4 with complete light apical hairbands in fresh specimens (quickly abraded

- with age, appearing attenuate, slender or incomplete), contrasted with fine darker or inconspicuous hairs on discs (Fig. 84) (*aequata*-group) 60
60. Scutellum with well-defined large punctures posteromedially (Fig. 85); T1 with narrow impunctate band on apical $\sim 1/3$ of marginal zone, well-delimited by uniformly distributed punctures anteriorly (Fig. 86); compound eyes with inner margins parallel-sided or at most inconspicuously diverging below; mesonotum with punctures strongly reduced and faint on posteromedial region; apical fascia of T2–T4 with brownish hue, that of T2 briefly interrupted medially even in fresh specimens (South-Eastern) *Eucera dafnii* Dorchin, 2019
- Scutellum punctation reduced, with small faint inconspicuous punctures posteromedially (Fig. 87); T1 with wide impunctate surface, occupying most of marginal zone, with boundary obscured by infiltrating punctures anteriorly (Fig. 88); compound eyes with inner margins conspicuously diverging below; mesonotum with punctures less strongly reduced posteromedially, narrowly faint medially in some specimens; apical fascia of T2–T4 cream-white, complete despite narrowing medially (Cyprus) *Eucera aequata* Vachal, 1907
61. Scopal hairs unbranched, except for ordinary sparse weakly branched hairs along posterior margin of tibia; malar space comparatively broad, upper malar distance greater than lower malar distance (Figs 89–90), conspicuously longer than basal width of first flagellar segment, except narrow, about as long in *Eucera pollinaris* (Kirby, 1802) (*Eucera* subgenus *Synhalonia*) 62
- Scopal hairs branched, often strongly so, unbranched only in *Tetralonia salicariae* (Lepeletier, 1841); malar space narrow, with upper and lower malar distances subequal (Figs 91–92), and upper malar distance about as long as or conspicuously shorter than basal width of first flagellar segment (*Tetralonia*) 74
62. Mesonotal surface sculpture uniform, smooth with deep conspicuous punctures, with punctures on posteromedial region only slightly sparser or smaller than laterally such that only few interspaces > 3 puncture diameters (Fig. 93); T1, and sometimes also following terga, with marginal zone widely hyaline and lighter, *except* opaque and dark in melanic specimens from the Aegean Islands; (T2–) T3–T4 with broad white or cream coloured-fulvous apical bands of appressed tomentum, entirely covering marginal zones in fresh specimens, only narrowly exposing apical margins medially on T2 and T3, *except* only in *Eucera pollinaris*, with tomentum covering whole of terga but widely exposing T2 medially, *or* hairbands completely absent in melanic dark specimens from the Aegean Islands (*tricincta*-group) 63
- Mesonotal surface sculpture variable, either uniformly shagreened with inconspicuous or shallow punctures (Figs 94–96) or *if* partly or entirely smooth then with small shallow punctures, often much sparser on posteromedial region than laterally, with many interspaces > 3 puncture diameters (Fig. 97); terga opaque and dark; T2–T4 with light apical or premarginal hairbands made of semierect loose hairs, sometimes widely interrupted medially on T3 and T4, exposing marginal zone of T2 and larger portion of that T3 and sometimes also T4, *except* only in *Eucera velutina* with appressed hairs largely covering marginal zones 65
63. Mesonotum sparsely punctate, with many interspaces several puncture diameters wide both laterally near parapsidal line and on posteromedial region; vestiture uniformly cream coloured-fulvous, covering most of surface of T3–T5, except for triangular shape on marginal zone of T2 exposed; pygidial plate broadly rounded (Eastern) *Eucera pollinaris* (Kirby, 1802)
- Mesonotum densely punctate, with only few interspaces > 2 puncture diameters and mostly much smaller, less than puncture diameter laterally near parapsidal line (Fig. 93), *except* sparser, up to 2 puncture diameters laterally in melanic dark specimens from the Aegean Islands; T2–T4 with broad white or cream coloured-fulvous apical hairbands, contrasted with short dark hairs anteriorly, *or*

- hairbands completely absent in melanic specimens from the Aegean Islands; pygidial plate tapering, bluntly pointed 64
64. Large species, body length 14–15 mm; T1 with marginal zone dark basally, gradually becoming hyaline and lighter posteriorly, lighter than marginal zones of following terga (Fig. 98), except entirely dark and opaque in melanic specimens from the Aegean Islands (Southern, Eastern) *Eucera tricineta* Erichson, 1835
- Smaller species, body length 11 mm; T1 with marginal zone largely translucent and light, not much lighter than translucent impunctate apical bands of following terga (Fig. 99) (Eastern) *Eucera distinguenda* (Morawitz, 1875)
65. T2–T4 with complete or interrupted snow white apical hairbands, extended beyond margins in fresh specimens, with posterior margins only partially exposed on T2 and T3, at most with exposed portion limited to medial $\sim \frac{1}{3}$ on T3; mesonotal surface sculpture uniformly coarsely to finely shagreened and sparsely punctate, with interspaces puncture diameter wide or more laterally near parapsidal line (Fig. 94), or punctures weakly defined and inconspicuous; mesosoma with dorsal vestiture silvery grey or greyish fulvous in fresh specimens, sometimes intermixed with inconspicuous black hairs 66
- T2–T4 with complete apical or premarginal bands of cream coloured or ferruginous hairs, or sometimes hairbands absent with lighter hairs replaced by dark hairs, those of T2 and T3 not, or barely attaining posterior margin, with posterior margins exposed for most length; mesonotal surface sculpture smooth or finely shagreened, with much sparser punctures on posteromedial region than laterally, with most interspaces narrower than puncture diameter laterally near parapsidal line (Figs 96–97), but sometimes punctures weakly defined and inconspicuous (Fig. 95); mesosoma with dorsal vestiture light to bright ferruginous or sometimes darker brownish ferruginous in fresh specimens, without darker hairs 69
66. Scopal hairs dark on both dorsal (outer) and ventral (inner) side; T2–T4 with interrupted white apical hairbands progressively covering greater portions of marginal zones, that of T4 nearly complete in fresh specimens, with exposed surfaces of marginal zones impunctate and finely striate, matt, as that of marginal zone of T1; mesonotum finely shagreened with well-defined shallow punctures (Fig. 94) (Spain) *Eucera brachycera* (Gribodo, 1893)
- Scopal hairs either bright ferruginous or white on dorsal (outer) side, contrasted with dark hairs on ventral (inner) side of basitarsus; T2–T4 with pattern of white apical hairbands variable, either those of T3 and T4 complete in fresh specimens or that of T4 conspicuously interrupted medially, and with exposed surfaces either smoother or conspicuously punctate, similarly to that of T1; mesonotum coarsely shagreened with weakly defined inconspicuous punctures 67
67. Integument of hind tibia and tarsi and of middle and fore tarsi, and scopal and tarsal hairs bright ferruginous; T2–T4 with white apical hairbands densely covering and obscuring underlying surface of marginal zones, except briefly exposing that of T3, and attenuate medially on T2, exposing $< \frac{1}{3}$ of medial surface of T2 in fresh specimens; prepygidial fimbria white (Ukraine, Russia) *Eucera velutina* (Morawitz, 1873)
- Integument of leg segments dark, scopal and tarsal hairs white dorsally and dark ferruginous to black on ventral (inner) side of hind basitarsus; T2 with apical hairband widely interrupted medially, exposing $> \frac{1}{3}$ of marginal zone, those of T3 and T4 interrupted or complete and sparser, not obscuring completely underlying surface; prepygidial fimbria dark medially and white laterally 68
68. T2–T4 with white interrupted apical hairbands progressively covering greater portions of marginal zones and contrasted with black hairs medially, forming hair pattern reminiscent of *Melecta*; marginal zones finely striate, with minute weakly defined punctures on those of T2–T4, much denser than that

- of T1; hind tibia and basitarsus with dark hairs on ventral (inner) side contrasted with white scopal hairs dorsally (South-Eastern) *Eucera melectoides* (Radoszkowski, 1893)
- T3 and T4 with complete white apical hairbands in fresh specimens, and T2 with mainly white hairs, with only few inconspicuous dark hairs restricted to posterolateral regions; marginal zone of T2 widely medially exposed, smooth and shiny and largely impunctate as that of T1; hind basitarsus with dark ferruginous hairs on ventral (inner) side, contrasted with white hairs on ventral side of tibia and with white scopal hairs dorsally (Ukraine) *Eucera vernalis* (Morawitz, 1875)
69. Mesonotum smooth, at most finely striate laterally, with conspicuous well-defined punctures, much sparser and often smaller on posteromedial region than laterally, with most interspaces laterally near parapsidal line smaller than puncture diameters (Fig. 97); vestiture of T2–T4 comprising appressed velvety black hairs basally and greyish premarginal hairbands, or rarely entirely dark, with hairband of T3 short, leaving broad impunctate apical band lacking hairs (Figs 100–101) 70
- Mesonotum finely shagreened, at most shinier posteromedially, with overall shallow, less conspicuous punctures, with punctures denser on posteromedial region, but with weaker distinction between regions due to sparser puncture density laterally, with many interspaces one puncture diameter wide near parapsidal line (Figs 95–96); vestiture of T2–T4 comprising appressed velvety black hairs basally followed by ferruginous or fulvous, or sometimes lighter greyish fulvous premarginal hairbands, that of T3 longer, attaining, or approaching apical margin in fresh specimens, only narrowly exposing margin (Figs 102–105) 71
70. T2 and T3 with dense greyish tomentum posteriorly anterior to marginal zone, obscuring underlying surface in fresh specimens, and with marginal zones impunctate or at most with faint inconspicuous punctures, with that of T3 no more conspicuously punctate than that of T2 (Fig. 100) (Southern, Eastern) *Eucera rufa* (Lepeletier, 1841)
- T2 and T3 with greyish or rarely dark tomentum, sparse or absent and more strongly concave posteromedially, anterior to marginal zone, not entirely obscuring underlying surface, with minute punctures on marginal zone of T3 more conspicuous than faint punctures on marginal zone of T2 (Fig. 101) (Southern, Eastern) *Eucera hungarica* Friese, 1895
71. Vestiture of terga overall less well-developed, T1 with hairs arising from disc not attaining apical margin as seen in profile, those of T2 short and sparse, hardly extended posteromedially above marginal zone, and apical fascia of T3 not or barely attaining margin apicomediaally (Figs 102–103); T2 with faint minute inconspicuous punctures on marginal zone (Figs 102–103); galea smooth, inconspicuously tessellate (Southern, Eastern or South-Eastern) 72
- Vestiture of terga more developed, T1 with hairs arising from disc extended beyond apical margin of tergum as seen in profile, those of T2 denser, extended posteromedially and partly covering marginal zone, and apical fascia of T3 extended shortly apicomediaally beyond margin (Figs 104–105) as seen in profile; T2 with more conspicuous minute punctures on marginal zone (Figs 104–105); galea more coarsely tessellate and matt (Greece)..... 73
72. T3 with light apical hairband wide, with at most inconspicuous fine dark hairs apically as seen in profile, such that light tomentum attaining margin or nearly so in fresh specimens (Fig. 102); mesonotum shinier on posteromedial region, finely shagreened laterally, with shallow recognisable punctures laterally (Fig. 96); clypeus densely rugopunctate medially, with fine ridges and puncture interspaces smaller than puncture diameter widths (Southern, Eastern) *Eucera ruficollis* (Brullé, 1833)
- T3 with light apical hairband narrow, replaced by more conspicuous short unbranched dark hairs along apex as seen in profile, such that light tomentum further anterior to margin, not attaining margin (Fig. 103); mesonotum more strongly shagreened, coarsely shagreened laterally with weakly

- defined marginally identifiable punctures (Fig. 95); clypeus more sparsely rugopunctate medially, with broader ridges and many puncture wide interspaces (South-Eastern) *Eucera plumigera* Kohl, 1905
73. Smaller species, body length 11–15 mm; T2 with conspicuous minute punctures, with at least 5 punctures along medial longitudinal section (Fig. 104); vestiture of T2–T5 with broad light (pre-) marginal hairbands, that of T2 occupying most of surface of disc, with basal dark appressed hairs almost entirely covered by preceding T1, only narrowly exposed in following terga in repose (Fig. 104) (Greece) *Eucera obscura* (Brullé, 1833)
- Larger species, body length 16 mm; T2 with sparse inconspicuous punctures, at most with 3–4 punctures along medial longitudinal section (Fig. 105); vestiture of T2–T5 with light (pre-)marginal hairbands narrower, with basal dark appressed hairs widely exposed in repose, almost as wide as light hairbands on T2 and T3 (Fig. 105) (Greece) *Eucera mediterranea* Friese, 1895
74. Scopal hairs sparse with fine short branches, largely exposing dorsal (outer) surfaces of tibia and basitarsus, arising from tubercles spaced apart by mostly more than tubercle diameter (Fig. 106); mesonotum sparsely punctate, with many interspaces 2–3 puncture diameters wide laterally near parapsidal line (Figs 107–108); clypeus dark 75
- Scopal hairs denser and more conspicuously branched, or unbranched only in *Tetralonia salicariae*, partly or completely obscuring dorsal surfaces of tibia and basitarsus, with most interspaces between closest hair tubercles tubercle diameter or less (Figs 109–110); mesonotal punctation denser, with only few interspaces more than puncture diameter wide laterally near parapsidal line (Figs 111–112); clypeus yellow marked or dark 76
75. Large species, body length 11–12 mm; T1 with marginal zone widely translucent, hyaline fulvous, T2 and T3 with basal as well as apical band of appressed light tomentum separated by darker unbranched hairs; mesonotal punctation denser with most interspaces outside of sparser posteromedial area ≤ 2 –3 puncture diameters width (Fig. 107); maxillary palpus reduced, 4-segmented or 5-segmented with minute terminal segment (Southern, Central, Eastern) *Tetralonia malvae* (Rossi, 1790)
- Small species, body length 7.5–8 mm; T1 with marginal zone opaque and dark, T2 and T3 with light tomentum only anteriorly, restricted to base of T2, with minute inconspicuous dark hairs posteriorly; mesonotum sparsely punctate with interspaces multiple puncture diameters wide on most of surface (Fig. 108); maxillary palpus clearly 6-segmented, with two terminal segments small and sometimes weakly separated, appearing 5-segmented (Southern, Eastern) *Tetralonia nana* Morawitz, 1873
76. Scopal hairs unbranched except strongly branched along posterior margin of tibia and basitarsus; clypeus entirely dark; sternum with fulvous unbranched and apically undulating golden hairs mesally, anterior to middle coxae, contrasted with ordinary fine branched hairs on both sides, sparse enough to expose underlying surface (Fig. 113); small species, body length 8.5–9 mm (Southern, Central, Eastern) *Tetralonia salicariae* (Lepeletier, 1841)
- Scopal hairs conspicuously branched; clypeus yellow marked or dark; sternum without specialized dense hairs, or occasionally with well-developed dense ventral brush, entirely obscuring underlying surface (Fig. 114); small to large species 77
77. Clypeus with anterior yellow marking, sometimes reduced to apical band or anteromedial spot, entirely dark only in *Tetralonia fulvescens* Giraud, 1863 and in *Tetralonia lyncea* Mocsáry, 1879; scopal hairs coarsely branched, with long branches oriented apically subparallel to axis of main rachis (Fig. 109); S2–S5 with unbranched, sometimes apically undulating hairs on discs, contrasted with branched hairs along apical margins 78

- Clypeus dark; scopal hairs finely plumose, with fine branches that often oriented more laterally and diverge from axis of main rachis (Fig. 110); S2–S5 with plumose finely branched hairs as seen in profile in magnification of 40× (*pollinosa*-group) 86
- 78. Sternum with well-developed ventral brush made of dense stiff unbranched hairs, entirely obscuring underlying surface anterior to middle coxae, contrasted with ordinary fine branched hairs on both sides (Fig. 114); medium-sized or large species, body length 10.5–13 mm long, only *Tetralonia julliani* (Pérez, 1879) smaller, ~8 mm long; clypeus always yellow marked 79
- Sternum without specialized stiff hairs, not obscuring undersurface; predominantly smaller species, body length ≤10 mm, only *Tetralonia fulvescens* and *Tetralonia lyncea* 11–12.5 mm long, and both with clypeus dark, at most with small anteromedial yellow spot 82
- 79. Mandible strongly broadened distally, maximal distal width almost as wide as base (Fig. 115); tergal punctation reduced, T1 with sparse weakly defined faint punctures posteriorly, anterior to marginal zone, absent on marginal zone except for minute infiltrating punctures medially (Fig. 116); T2 and T3 with minute inconspicuous faint punctures on marginal zone (Fig. 116) (Southern, Central, Eastern) *Tetralonia dentata* (Klug, 1839)
- Mandible less strongly broadened distally, maximal distal width much narrower than base (Fig. 117); tergal punctation deeper and denser, T1–T3 with well-formed conspicuous punctures posteriorly, anterior to and on most of surface of marginal zone (Fig. 118) (covered by apical fasciae on T2 and T3 in *Tetralonia glauca* (Fabricius, 1775) (Fig. 119) 80
- 80. Terga broadly translucent hyaline fulvous apically, on T1 occupying at least apical half of marginal zone, thus translucent surface extended onto punctate anterior region of marginal zone (Fig. 119); T1 with punctures on anterior of marginal zone much denser and smaller than anteriorly on disc, then becoming much sparser apically, faint and inconspicuous (Fig. 119); tergal vestiture with fulvous tomentum forming basal as well as apical bands on T2 (Fig. 119) and covering almost entire of T3 (South-Eastern) *Tetralonia glauca* (Fabricius, 1775)
- Terga opaque with only edge lighter hyaline fulvous, rarely more broadly hyaline, but not translucent beyond impunctate apical band (Fig. 118); T1 with denser but not much smaller punctures on marginal zone than anteriorly on disc, similarly dense and conspicuous apically (Fig. 118); vestiture of T2 and T3 with basal fulvous or greyish tomentum, absent apically (Fig. 118) 81
- 81. Small species, body length 8–8.5 mm; tergal marginal zones densely punctate with most interspaces narrower than puncture diameters; mesonotum with shallow punctures, smaller and sparser posteromedially than laterally; T4 with basal tomentum and otherwise most of surface exposed, uncovered by hairs (Southern, Russia) *Tetralonia julliani* (Pérez, 1879)
- Larger species, body length 12–13 mm; tergal marginal zones more sparsely punctate with many interspaces puncture diameter or more; mesonotum with uniform deep punctures on posteromedial region as laterally; T4 entirely covered by dense tomentum in fresh specimens (Southern, Eastern) *Tetralonia graja* (Eversmann, 1852)
- 82. Clypeus dark; mesonotum irregularly sparsely punctate with many interspaces more than puncture diameter wide laterally near parapsidal line, and multiple puncture diameters wide mesally on rest of surface (Fig. 111); terga with small sparse punctures, on T1 with some interspaces multiple puncture diameters wide, with small weakly defined punctures infiltrating onto largely impunctate and widely translucent, hyaline fulvous marginal zone (Eastern) *Tetralonia lyncea* Mocsàry, 1879
- Clypeus with apical yellow marking, sometimes reduced to apical band or anteromedial spot, entirely dark only in *Tetralonia fulvescens*; mesonotum densely and more uniformly punctate with interspaces up to puncture diameter wide laterally near parapsidal line, and with only few interspaces >2 puncture diameters wide posteromedially (Fig. 112); terga more densely punctate, marginal zone

- of T1 punctate, with interspaces mostly narrower than puncture diameter width, and with only narrow hyaline fulvous impunctate apical band (*ruficornis*-group, in part) 83
83. Larger species, body length 10–12 mm, rarely as small as 9 mm long; clypeus flattened and entirely dark, at most with small faint anteromedial yellow spot; malar distance long, about as long as basal width of first flagellar segment or slightly shorter (Fig. 91); inner margins of compound eyes weakly converging below, almost parallel-sided (Southern, Eastern) *Tetralonia fulvescens* Giraud, 1863
- Smaller species, body length 7–9 mm; clypeus weakly anteriorly convex, with conspicuous apical yellow marking, sometimes reduced, appearing as medially attenuate band or at most divided into two apical spots; malar distance short, conspicuously shorter than basal width of first flagellar segment (Figs 120–121, cf. Fig. 92); inner margins of compound eyes conspicuously convergent below (Figs 120–122) 84
84. Clypeus with yellow marking reduced, often appearing as apical band, medially attenuate or sometimes divided into two apical spots (Fig. 120); antennae dark, reddish amber ventrally; terga with light basal tomentum limited in extent, not attaining marginal zone of T3, barely attaining marginal zone of T4 medially, thus as long as or shorter than maximum length of dark posterior part of terga uncovered by tomentum even in fresh specimens (Southern, Eastern) *Tetralonia inulae* Tkalcù, 1979
- Clypeus with yellow marking expanded posteromedially, subtriangular (Figs 121–122); antennae lighter, ferruginous or fulvous ventrally; terga with light basal tomentum more developed, attaining marginal zone of T3 and extended onto marginal zone of T4 medially; thus, in fresh specimens, longer than maximum length of dark posterior part of terga, rest of terga uncovered by tomentum 85
85. Clypeus punctation dense with most interspaces less than puncture diameter in width (Fig. 121); larger species, body length 8.5–9 mm; antennae ferruginous on ventral side (Southern, Eastern) *Tetralonia alticincta* (Lepeletier, 1841)
- Clypeus punctation sparse with many more interspaces more than puncture diameter in width (Fig. 122); smaller species, body length 7–8 mm; antennae fulvous to bright ferruginous on ventral side (Iberian Peninsula) *Tetralonia iberica* Dusmet, 1926
86. Larger species, body length 10.5–12 mm; T1 with weakly defined asymmetric punctures on anteromedial horizontal surface, and with marginal zone largely impunctate, except for some small infiltrating punctures anteromedially, thus impunctate surface wide, $\approx \frac{1}{3}$ – $\frac{1}{2}$ of disc length (Figs 123–124); vestiture of T3 and T4 with appressed tomentum exposing apical margins medially (Figs 123–124), although only slightly so on T4 in fresh specimens of *Tetralonia strigata* (Lepeletier, 1841) 87
- Smaller species, body length frequently 9–9.5 mm, ≤ 11 mm in *Tetralonia cinctella* (Saunders, 1908); T1 with well-formed punctures on anteromedial horizontal surface, and with narrow impunctate apical band, $< \frac{1}{3}$ length of disc (Figs 125–126); vestiture of T3 and T4 with appressed tomentum entirely covering apical margins in fresh specimens (Figs 125–126) 88
87. T2 with minute punctures, those on marginal zone faint and inconspicuous, much sparser than punctures medially on disc, there with most interspaces ≤ 2 puncture diameters wide (Fig. 123); T2–T4 with light tomentum, progressively covering greater portions of terga, with marginal zones widely exposed medially in fresh specimens, except narrowly exposed on T4 (Fig. 123); prepygidial and pygidial fimbria light brown (Southern, Eastern) *Tetralonia pollinosa* (Lepeletier, 1841)
- T2 with large conspicuous punctures, those on marginal zone much denser than medially on disc, there with interspaces > 2 puncture diameters wide and often much wider (Fig. 124); T2–T4 with dark unbranched semierect hairs, exposing surface of discs, and with white apical fasciae covering marginal zones, widely interrupted on T2, complete and entirely obscuring underlying surface of

- T4 in fresh specimens (Fig. 124); prepygidial and pygidial fimbria dark brown to black (Iberian Peninsula, France) *Tetralonia strigata* (Lepeletier, 1841)
88. Mesonotum sparsely punctate, with many interspaces > 2 puncture diameters wide on posteromedial region, and with visible interspaces, often with some puncture-diameter wide interspaces laterally near parapsidal line (Fig. 127); T1 sparsely punctate, with interspaces posteromedially multiple puncture diameters wide (Fig. 125); T2–T4 with anterior as well as posterior fulvous tomentum, progressively increasing in extent (Fig. 125) and entirely covering underlying surface of T4 in fresh specimens, and surface of T5 covered with ferruginous hairs (Southern, Eastern) *Tetralonia scabiosae* Mocsàry, 1880
- Mesonotum densely punctate with most interspaces narrower than puncture diameter on posteromedial region, with some confluent punctures, and with no visible interspaces laterally near parapsidal line (Fig. 128); T1 densely punctate, with interspaces 1–2 puncture diameters wide posteromedially on premarginal area, and mostly less than puncture diameter wide on marginal zone (Fig. 126); T2–T5 with complete bands of white apical fasciae in fresh specimens (attenuate medially on T2, mixed with golden hairs medially on T5) and sparse unbranched dark hairs that largely expose surface of discs anteriorly, except for narrow white basal tomentum on T2, often covered by T1 (Fig. 126) (Iberian Peninsula) *Tetralonia cinctella* (Saunders, 1908)
- Males**
1. Forewing with two submarginal cells 2
- Forewing with three submarginal cells 61
2. Antennae comparatively short, shorter than forewing, with first flagellar segment long, $> \frac{3}{4}$ as long as second, or sometimes longer than second; clypeus short, and labrum comparatively long, $\sim \frac{3}{4}$ as long as clypeus to much longer than clypeus; maxillary palpus 3- or 4-segmented (*Eucera* subgenus *Cubitalia*) 3
- Antennae ordinarily long, about as long as forewing or longer, occasionally shorter, with first flagellar segment short, $\leq \frac{2}{3}$ as long as second and often much shorter, $\leq \frac{1}{2}$ as long; clypeus longer, and labrum often shorter, $\approx \frac{1}{2}$ as long as clypeus, occasionally labrum longer, $\leq \frac{3}{4}$ as long as clypeus; maxillary palpus 5- or 6-segmented (*Eucera* subgenus *Eucera*) 5
3. Small species, body length 9.5–10.5 mm, forewing length 8–8.5 mm; first flagellar segment short, shorter than second; compound eyes at most weakly divergent below; labrum of normal elliptic shape and shorter than clypeus (Eastern) *Eucera parvicornis* Mocsàry, 1878
- Large species, body length 15.5–21.5 mm, forewing length 11.5–14 mm; first flagellar segment long, distinctly longer than second; compound eyes strongly divergent below (cf. Fig. 22); clypeus short, labrum triangular, strongly tapering and elongate, much longer than clypeus (Fig. 129) 4
4. Hind basitarsus with anterior margin deeply emarginate between long projections, with distance between projection summits as seen in lateral view only slightly longer than distance from summit of lower projection to apex of basitarsus anteriorly (Fig. 130); middle basitarsus with anterior process short and blunt, with maximal width $< 2 \times$ its minimal distal width as seen in lateral view (Fig. 131); S7 with median bulges not visibly divided in two pairs, thus appearing broad as seen in ventral view (Fig. 132) (Southern) *Eucera breviceps* Friese, 1911
- Hind basitarsus with anterior margin shallowly emarginate between short projections, with interprojection distance conspicuously longer than distance from summit of lower projection anteroapically, $\approx 1.5 \times$ as long or longer (Fig. 133); middle basitarsus with anterior process longer and sharp, with maximal width about twice as long as minimal distal width as seen in lateral view

- (Fig. 134); S7 with median bulges divided into two pairs, thus appearing slender as seen in ventral view (Fig. 135) (South-Eastern) *Eucera morio* Friese, 1922
5. Small species, body length 8–11 mm, with clypeus and labrum dark, without light marking; S5 with sublateral (pre-)apical tufts of specialized unbranched golden hairs (sometimes inconspicuous in *Eucera nigrifacies*) (Figs 136–139); mesonotum with conspicuous well-defined punctures, smooth or at most weakly shagreened, without metallic reflection; maxillary palpus 5-segmented (*grisea*-group) 6
- Small to large species with combination of characteristics different, particularly, clypeus and often labrum commonly with light yellow marking; mesonotum often with inconspicuous or weakly defined asymmetric punctures and coarsely to finely shagreened at least laterally, or *if* entirely smooth and with conspicuous punctures then species often much larger, *or* small and without facial marking only in *Eucera caerulea*, then with strong bluish metallic reflection; maxillary palpus frequently 6-segmented, occasionally 5-segmented 9
6. S5 with submedial apical tufts of unbranched golden hairs oblique, oriented posterolaterally, widely divided by distance greater than maximum length of hair tufts, but with tufts inconspicuous in some specimens (Fig. 136); gonocoxa with ventral lateral margin produced into small acute angle about half way from articulation of gonocoxa to gonostylus and lateral margin of penis valve as seen in dorsal view (Fig. 140) (Southern, Eastern) *Eucera nigrifacies* Lepeletier, 1841
- S5 with submedial apical tufts of golden hairs conspicuous, either almost transverse and oriented laterally or oblique, more narrowly divided by distance smaller or at most about as long as maximum length of hair tufts (Figs 137–139); ventral lateral margin of gonocoxa without acute angle (Fig. 141), sometimes otherwise modified, curved basad about half way from articulation of gonocoxa to gonostylus and lateral margin of penis valve (Fig. 141), at most delineating broad right angle (Fig. 142) 7
7. S5 with submedial apical tufts of golden hairs oblique, oriented posterolaterally, extended well beyond margin (Fig. 137); S6 with lateral margin not delineating conspicuous anterolateral lobe, and posterolateral carina adjacent to lateral margin similarly on posterior and on anterior ends of carina; gonocoxa with ventral lateral margins concave, not curved or angled basad as seen in dorsal view (Fig. 141) (South-Western) *Eucera grisea* Fabricius, 1793
- S5 with submedial apical tufts of golden hairs almost transverse, oriented laterally (Figs 138–139), barely attaining margin, but *if* extended beyond margin, then S6 with more conspicuous anterolateral lobe, and anterior end of posterolateral carina much further from lateral margin than posterior end; gonocoxa with ventral lateral margin bluntly curved basad (Fig. 142) or right-angled (Fig. 143) about half way from articulation of gonocoxa to gonostylus and lateral margin of penis valve as seen in dorsal view 8
8. S5 with submedial apical tufts of golden hairs arising anterior to apical impunctate band, barely attaining margin apically (Fig. 138); gonostylus with inferior lamella tapering apically as seen in lateral view (Fig. 144); gonocoxa with ventral lateral margins bluntly curved basad about half way from articulation of gonocoxa with gonostylus and lateral margin of penis valve as seen in dorsal view (Fig. 142) (South-Eastern, Italy) *Eucera pseudeucnemidea* Risch, 1997
- S5 with submedial apical tufts of golden hairs arising at impunctate apical band, extended beyond margin (Fig. 139); gonostylus with continuous broad inferior lamella present apically as seen in lateral view (Fig. 145); gonocoxa with ventral lateral margins sharply curved basad delineating right angle about half way from articulation of gonocoxa to gonostylus and lateral margin of penis valve as seen in dorsal view (Fig. 143) (Aegean Islands, Cyprus) *Eucera penicillata* Risch, 1997

9. Mesonotum with surface sculpture areolate, smooth with dense large flattened punctures, without visible interspaces laterally near parapsidal line (cf. Fig. 11); small species, body length 8–10 mm, only *Eucera laxiscopa* larger, 11 mm long, and integument with weak to strong bluish green or golden bronze metallic reflection; S6 without conspicuous carinae, at most with shallow posterolateral blunt ridges (Fig. 146) (*vulpes*-group) 10
 - Combination of characteristics different, particularly, mesonotum often finely to coarsely shagreened and punctures sparser, with visible interspaces laterally near parapsidal line, *if* smooth then dark, without metallic reflection; small to large species; S6 variable, with various sections of converging carinae present (cf. Fig. 5), sometimes with only short branch carina present on anterolateral lobe (such as in the *cineraria*-group, cf. Fig. 148), or with carinae entirely absent (cf. Fig. 175) 12
10. Clypeus and labrum dark; integument with strong bluish green metallic reflection; small species, body length 8–9 mm (Cyprus) *Eucera caerulescens* Friese, 1899
 - Clypeus and labrum with light yellow marking; integument with weaker to inconspicuous metallic reflection; larger species, body length 9–11 mm 11
11. Small species, body length 9–10 mm; antenna dark, ordinarily long, about as long as forewing, with first flagellar segment short, $\approx \frac{1}{3}$ as long as second; hind basitarsus unmodified, with anterior margin straight, moderately broadened apically, with apex $< 2 \times$ as wide as base as seen in lateral view (Southern) *Eucera vulpes* Brullé, 1833
 - Larger species, body length 11 mm; antenna short, conspicuously shorter than forewing, with first flagellar segment long, $\frac{1}{2}$ – $\frac{2}{3}$ as long as second, lighter ferruginous on ventral side; hind basitarsus modified curved anteriorly with anterior margin concave, apically broadened, $> 2 \times$ as wide as base as seen in lateral view (Fig. 147) (Greece, Cyprus) *Eucera laxiscopa* Alfken, 1935
12. Medium-sized species, body length 11–12 mm, with mesonotum smooth and uniformly punctate with deep well-formed punctures (cf. Fig. 12); clypeus and labrum with yellow or pale yellow marking, forming irregular band on anterior $\frac{1}{2}$ of clypeus or less; S6 without carinae on disc, with conspicuous short lateral branch carina at anterolateral lobe that thus appear pointed (Figs 148–149) (*cineraria*-group) 13
 - Small to large species, with combination of characteristics different, particularly mesonotum often shagreened and shallowly punctate with weakly defined punctures at least laterally, but *if* smooth with conspicuous punctures then often larger, > 12 mm long; clypeus with yellow marking often larger, occupying most of surface or forming medial spot, *or* more rarely both clypeus and labrum entirely dark; S6 variable, with various sections of posterior or anterior carinae present, or more rarely both carinae absent 14
13. Labrum with most of surface pale yellow-marked; antennae dark; tergal apical margins translucent and discoloured (cf. Fig. 45); S6 with smooth and shiny depressed area anteromesal to lateral branch carina (Fig. 148); gonostylus gently curved apicomesally and slightly broadened apically as seen in dorsal view (Fig. 150) (Southern, Central, Eastern) *Eucera cineraria* Eversmann, 1852
 - Labrum with yellow medial spot; antennae lighter ferruginous; tergal apical margins darker hyaline brown; S6 without strongly differing depressed area anteromesal to lateral branch carina (Fig. 149); gonostylus strongly curved apicomesally and spatulate as seen in dorsal view (Fig. 151) (South-Eastern) *Eucera fasciata* Risch, 1999
14. Large species, body length 12.5–16 mm, with clypeus and labrum entirely dark; S6 without visible carinae *or* with high posterolateral carinae situated at lateral margins (Fig. 152); gonostylus long, about as long as gonocoxa, elbowed or strongly curved apicoventrad as seen in lateral view (*aequata*-group) 15

- Small to large species, almost always with yellow marking on clypeus or on both clypeus and labrum, but *if* with face entirely dark then mostly much smaller in size, ≤ 10 mm long, *except* only *Eucera colaris*, 12–13 mm long, in which case with gonostylus gently curved as seen in lateral view; S6 variable, with various sections of posterior or anterior carinae present, with posterolateral carina situated mesal to lateral margin, *or* carinae sometimes largely absent; gonostylar structure variable, reduced and short to long and strongly or gently curved as seen in lateral view 16

- 15. S6 depressed medially and with conspicuous posterolateral carinae present (Fig. 152); antenna long, $\approx 4 \times$ as long as compound eye, with first flagellar segment short, $\approx \frac{1}{3}$ as long as second; T(3–)T4–T5 with pale posterior hair band on marginal zone contrasted with darker brown hairs on disc in fresh specimens; gonostylus elbowed, strongly bent apicoventrad as seen in lateral view, with apex expanded medially, L-shaped as seen in dorsal view (Fig. 153) (South-Eastern) *Eucera dafnii* Dorchin, 2019
- S6 flat, without carinae; antenna short, $< 3.5 \times$ as long as compound eye, with first flagellar segment longer, $> \frac{1}{3}$ as long as second; vestiture of T(3–)T4–T5 uniformly greyish fulvous with inconspicuous apical bands formed by less erect hairs of same colour; gonostylus more weakly curved as seen in lateral view, spatulate apically as seen in dorsal view (Fig. 154) (Cyprus) *Eucera aequata* Vachal, 1907

- 16. Middle basitarsus, and sometimes also middle tibia, weakly to highly modified, basitarsus broadened basally with posterior margin conspicuously basally convex then weakly to strongly concave and with dorsal (outer) surface impressed, thus basitarsus appears curved, with maximum basal width $\sim 1.3 \times$ as long as minimum distal width as seen in lateral view (Figs 155–157); clypeus yellow on most of surface, or sometimes with yellow marking reduced to anterior spot or rarely completely absent, and with labrum dark, at most with faint basal spot, except yellow-marked to various extents in *Eucera clypeata* and in *Eucera microsoma*; small or medium-sized species, body length 7–12 mm; maxillary palpus 5- or 6-segmented (*clypeata*-group) 17
- Middle basitarsus and tibia almost always unmodified, basitarsus at most slightly broader basally than distally as seen in lateral view, with posterior margin not visibly convex at base, at most inconspicuously concave distally, even if, rarely, dorsally impressed and appearing weakly curved (as in *Eucera barbiventris*; cf. Fig. 178), sometimes otherwise modified, weakly to strongly curved anteroapicad with anterior margin concave as seen in lateral view; clypeus and labrum with or without yellow markings; small to large species; maxillary palpus 6-segmented 25

- 17. Middle tibia and basitarsus highly modified, tibia with anterior margin strongly impressed, medially concave as seen in lateral view, and produced into small preapical ventral spine (Fig. 158); middle basitarsus incised anteriorly on basal half to accommodate tibial spur (Figs 156–157); both middle and hind outer tibial spurs strongly modified, with hind outer tibial spur strongly curved apically (Figs 159–160) 18
- Middle tibia either unmodified or otherwise modified, produced into anteroapical stout spinous process (Fig. 161); middle basitarsus more weakly modified, without basal anterior incision (Fig. 162); middle and hind tibial spurs unmodified (Figs 162–163) 19

- 18. Middle tibial spur greatly broadened apically, much wider distally than basally (Fig. 156); hind tibia strongly impressed medially on anterior face, swollen apically, with anterior margin medially concave as seen in lateral view, and with outer tibial spur broadened then abruptly tapering and curved apically (Fig. 160) (South-Eastern) *Eucera seminuda* Brullé, 1833
- Middle tibial spur widest on basal half and tapering apically (Fig. 157); hind tibia with anterior face shallowly apically concave, with anterior margin largely straight, and outer tibial spur slender and more strongly apically hooked (Fig. 159) (Cyprus) *Eucera gaullei* Vachal, 1907

19. Both middle tibia and basitarsus strongly modified, tibia produced into anteroapical stout spinous process, extended well beyond base of basitarsus (Fig. 161); middle basitarsus strongly impressed on dorsal (outer) surface, with anterior margin produced medially, strongly convex as seen in anterior view, and with tibial spur curved to match curvature of anterior margin of basitarsus (Fig. 162) 20
 - Middle tibia unmodified, without anterior process; basitarsus otherwise modified, more weakly dorsally impressed, with anterior margin not visibly produced and tibial spur straight 21
20. Small species, body length 9 mm; clypeus with medial irregular yellow spot and dark margins, labrum dark; hind tibia strongly impressed on distal $\sim 1/2$ of anterior face (Fig. 163) (Greece) *Eucera digitata* Friese, 1895
 - Larger species, body length 10 mm; clypeus with larger blunt plus-shaped marking and narrow dark posterior margin, labrum yellow with dark margins; hind tibia with anterior face not much lower distally than basally (Aegean Islands) *Eucera pythagoras* Risch, 2003
21. Fore basitarsus modified (Fig. 164) similarly to middle basitarsus (Fig. 165), strongly broadened basally with posterior basal margin convex, obtusely angled, and concave below angle, with maximum basal width much greater than minimum distal width as seen in lateral view, and with dorsal (outer) surface impressed (South-Eastern) *Eucera excisa* Mocsàry, 1879
 - Fore basitarsus slender basally, much narrower than middle basitarsus, with maximum basal width about equal to minimum distal width as seen in lateral view 22
22. Clypeus with trapezoidal or irregular yellow medial spot, labrum dark, rarely with small basal spot; S6 with only posterolateral carina, curved laterally, without anterior carina, at most with inconspicuous anterior ridge (Fig. 166); penis valves robust, swollen laterally with lateral spinous process short and inconspicuous, oriented dorsally on each side as seen in dorsal view, produced into broad ventral lobe, extended ventrally way beyond level of gonocoxo-gonostylar articulation as seen in lateral view (Fig. 167) (South-Eastern, Ukraine) *Eucera paraclypeata* Sitdikov, 1988
 - Both clypeus and labrum often with wide light markings, clypeal marking sometimes reduced to anterior yellow spot or rarely completely absent, and labrum yellow or pale yellow medially with dark margins, or sometimes with reduced marking or entirely dark; S6 with both posterolateral carina and anterior carina present, curved posterolaterally, converging and extended onto anterolateral lobe (Fig. 168), but either one or both carinae sometimes lower and inconspicuous; penis valves ordinarily slender, with short or sometimes inconspicuous lateral spinous process oriented laterally on each side as seen in dorsal view, without ventral lobe, with ventral surface at most attaining level of gonocoxo-gonostylar articulation as seen in lateral view 23
23. Clypeal marking reduced to anterior medial spot, labrum dark; T2 with marginal zone scarcely punctate with inconspicuous weakly defined punctures, much sparser than punctures on disc, with most interspaces multiple puncture diameters wide (Fig. 169); antennae dark, with first flagellar segment long, $\approx 1/3$ as long as second (Iberian Peninsula) *Eucera obliterated* Pérez, 1895
 - Both clypeus and labrum often with wider light markings, clypeal marking sometimes reduced to anterior yellow spot or rarely completely absent, and labrum yellow or pale yellow medially with dark margins, or sometimes with reduced marking or entirely dark; T2 with well-defined punctures on marginal zone, only moderately sparser than punctures on disc, with most interspaces $\leq 2-3$ puncture diameters wide (Fig. 170); first flagellar segment often shorter, $\sim 1/4$ as long as second, but if longer then flagellum lighter ferruginous 24
24. Larger species, body length 10–13 mm; antenna dark with first flagellar segment short, $\approx 1/4$ as long as second; maxillary palpus 5-segmented, more rarely 6-segmented (Southern, Eastern) *Eucera clypeata* Erichson, 1835

- Smaller species, body length 7–8 mm; antennal flagellum ferruginous, with first flagellar segment longer, $\approx \frac{1}{3}$ as long as second; maxillary palpus 6-segmented, sometimes with segments 4 and 5 weakly separated (South-Eastern) *Eucera microsoma* Cockerell, 1922
- 25. Large robust species, body length 15–17 mm, with mesonotal surface sculpture smooth or weakly shagreened and conspicuous dense punctures, with most interspaces up to puncture diameter except on posteromedial region; antennae long, longer than forewing; both clypeus and labrum with wide light markings, covering anterior $\frac{3}{4}$ of clypeus or more, but sometime reduced to form band on anterior $\frac{1}{2}$ of clypeus and two basal spots on labrum, or rarely completely absent on labrum; S6 with conspicuous oblique posterolateral carina, without anterior carinae or conspicuous anterolateral lobes (Fig. 171); gonostylus gently arched as seen in lateral view, apically spatulate, at most weakly expanded apicolesally as seen in dorsal view 26
- Small to large species with combination of characteristics different, particularly with mesonotal surface finely to coarsely shagreened, and with much sparser weakly defined or faint indistinct punctures on most of surface, with most interspaces several puncture diameters wide; *if*, only in *Eucera pollinosa*, mesonotum smooth and conspicuously punctate, then S6 with conspicuous anterior carinae and well-defined anterolateral lobes, and with gonostylus elbowed, strongly curved apicoventrad as seen in lateral view, and strongly expanded apicolesally, L-shaped, as seen in dorsal view; antennal length, facial markings and structure of S6 and gonostylus variable 28
- 26. Facial light markings reduced, on labrum limited to two submedial yellow spots, sometimes faint or completely absent; tergal punctation sparser, on marginal zone of T2 with many impunctate surfaces multiple puncture diameters wide (Fig. 172); terga with weakly developed and sparse apical hairbands, with apical margins largely exposed (Fig. 172) (Southern, Eastern) *Eucera pannonica* Mocsàry, 1878
- Facial markings more extensive, with labrum entirely yellow or at most pale yellow basally with dark margins; tergal punctation denser, on marginal zone of T2 with interspaces at most 2–3 puncture diameters wide, frequently ≤ 2 puncture diameters wide (Figs 173–174) (but sparser, approaching alternative state in Sicily); terga with more pronounced and dense apical hairbands, with apical margin exposed medially on T2, at most narrowly exposed on T3 and T4 in fresh specimens (Figs 173–174) 27
- 27. Terga with dense deep punctures, with punctures on marginal zone of T2 comparably dense to punctures medially on disc, with most interspaces 1–2 puncture diameters wide, only narrowly uncovered by medially sparser apical fasciae in fresh specimens (Fig. 173) (South-Eastern) *Eucera squamosa* Lepeletier, 1841
- Terga with sparser shallower punctures, conspicuously sparser on marginal zone of T2 than medially on disc, with many interspaces > 2 puncture diameters, with surface widely exposed, uncovered by apical fasciae (Fig. 174) (Southern, Eastern) *Eucera taurica* Morawitz, 1870
- 28. Both clypeus and labrum with light marking, clypeus and often also labrum largely yellow, or labrum with yellow or pale yellow spot with dark margins, or at most labrum with light marking reduced to inverted medial triangle or longitudinal line; compound eyes not conspicuously bulging above, with preoccipital ridge transverse laterally between eye and lateral ocellus as seen in frontal view, *except* strongly bulging with preoccipital ridge concave in *Eucera fufurea* and in *Eucera barbiventris*; S6 with posterolateral and basal carinae present or absent, when both converging carinae present, angle between carinae obtuse, and carinae not extended laterally onto anterolateral lobe 29
- Facial markings more limited in extent, labrum dark, clypeus frequently with yellow or pale yellow medial triangle or spot, or with oblong marking or band on distal $\frac{1}{3}$ – $\frac{1}{2}$ of surface with rest of surface dark, or sometimes entirely dark; *if*, occasionally, clypeus with wider light marking, then compound

- eyes strongly bulging above such that preoccipital ridge concave between eye and lateral ocellus; rarely, only in *Eucera vittulata*, labrum with small to large yellow basal spot, then T6 with both converging carinae present, extended laterally and forming acute angle at anterolateral lobe 41
29. Clypeus strongly protuberant, appearing strongly convex in profile, and both clypeus and labrum largely yellow or pale yellow, at most with narrow dark margins; S6 simple, without carinae or ridges, at most with inconspicuous indication of ridges (Figs 175–176); mesonotum uniformly finely shagreened, matt, with weakly defined to faint, unrecognisable punctures..... 30
- If clypeus strongly protuberant, then often both clypeus and labrum with smaller subtriangular or rounded yellow marking, or labrum largely or entirely dark, but both widely marked almost only when clypeus weakly convex as seen in profile; S6 with various fractions of posterolateral and anterior converging carinae present (cf. Fig. 5), sometimes both carinae largely absent but with conspicuous lateral branch carina present at anterolateral lobe (cf. Fig. 193); mesonotum weakly or strongly shagreened, weakly to strongly punctate, rarely with punctures unrecognisable..... 31
30. Smaller species, body length 13 mm; clypeus with large plus-shape marking on almost entire of surface, labrum entirely pale yellow; antennae long, longer than forewing, with first flagellar segment short $\approx \frac{1}{4}$ as long as second; S6 with anterolateral lobes inconspicuous, delineating obtuse angle on each side (Fig. 175); mesonotum with faint unrecognisable punctures (South-Eastern) *Eucera helvola* Klug, 1845
- Large robust species, 15 mm long; clypeus with smaller trapezoidal marking, labrum yellow or pale yellow with dark margins; antennae short, shorter than forewing, with first flagellar segment long, $> \frac{1}{3}$ as long as second; S6 with conspicuous anterolateral lobes, delineating acute angle on each side (Fig. 176); mesonotum with weakly defined recognisable punctures (Greece) *Eucera taurea* Vachal, 1907
31. Middle basitarsus modified, either slender and curved anteroapicad, with anterior margin strongly concave (Fig. 177) *or* broad with dorsal (outer) surface basally impressed and anterior margin weakly convex as seen in lateral view (Fig. 178); S6 robust, strongly produced apicomediaally, with only posterolateral carina present, curved laterally onto right-angled anterolateral lobe, without anterior carinae (Fig. 179); labral marking reduced to basal medial yellow spot 32
- Middle basitarsus unmodified, with anterior margin at most inconspicuously weakly concave as seen in lateral view; S6 ordinarily slender, with various fractions of posterolateral and anterior carinae present, with anterolateral lobe delineating acute or obtuse angle or sometimes inconspicuous; labral marking often wider, sometimes reduced to basal medial spot (*longicornis*-group, in part) 33
32. Middle basitarsus slender, with maximal width $\sim \frac{1}{3} \times$ that of tibia, strongly curved anteroapicad, with anterior margin strongly concave as seen in lateral view (Fig. 177); S5 with ordinary finely branched hairs; gonostylus reduced, inconspicuous or short, barely attaining apex of posterolateral dorsal process of gonocoxa (Fig. 180); S7 produced with large, elaborate posteromedial process (Fig. 181) (Southern) *Eucera furfurea* Vachal, 1907
- Middle basitarsus broad, with maximal width $> \frac{1}{2}$ that of tibia, with dorsal (outer) surface basally impressed and anterior margin weakly convex as seen in lateral view (Fig. 178); S5 with large submedial tufts made of stiff ferruginous unbranched bristles oriented laterally, strongly contrasted with adjacent fine branched hairs (Fig. 182); gonostylus long, about as long as penis valve, elbowed, strongly curved apicoventrad as seen in lateral view, strongly expanded apicomediaally, L-shaped as seen in dorsal view; posteromedial process of S7 inconspicuous, only shortly extended posteriorly, slender and apically acute (Iberian Peninsula, France) *Eucera barbiventris* Pérez, 1902

33. Malar distance long, with minimum lower distance subequal to or longer than basal width of first flagellar segment, rarely shorter (in the Iberian Peninsula) (Figs 183–185); clypeus protuberant, strongly convex in profile; S6 with both converging carina present, posterior carina, curved anterolaterally, and anterior carina or ridge, longitudinal, largely parallel to main axis of body, together delineating obtuse lateral angle (Fig. 186) 34
 - Malar distance short, with minimum lower distance shorter than width of first flagellar segment (Fig. 187); clypeus weakly protuberant, weakly convex in profile, *except* more strongly convex in *Eucera numida* and in *Eucera dalmatica*, in which case S6 with anterior carina or ridge oblique; S6 with varying fractions of posterolateral and anterior carinae present, often with anterior carina or ridge oblique, or partial, with only posterior end present and converged with posterior carina 35
34. Lower paraocular area bulging, strongly convex immediately next to epistomal suture on both sides of clypeus (cf. Fig. 35); malar distance long, about as long as first flagellar segment; first flagellar segment long, $> 1.5 \times$ as long as wide (Fig. 183) (Aegean Islands, Cyprus) *Eucera cypria* Alfken, 1933
 - Lower paraocular area not visibly convex; malar distance varying in length, about as long as first flagellar segment or much shorter (in Eastern, Fig. 184, or Western Europe, Fig. 185, respectively); first flagellar segment shorter, $< 1.5 \times$ as long as wide (Circum-European) *Eucera nigrescens* Pérez, 1879
35. Clypeus protuberant with yellow marking reduced to anterior $\frac{2}{3}$ – $\frac{3}{4}$, roughly delineating half circle, labrum almost entirely yellowish or pale yellow (Fig. 187); antennae short, shorter than forewing, with first flagellar segment long, $> \frac{1}{4}$ as long as second; T3–T5 with complete apical bands of thick appressed light hairs, obscuring underlying surface in fresh specimens, contrasted with dark semierect hairs on disc (Southern, Eastern) *Eucera dalmatica* Lepeletier, 1841
 - Clypeus, as also labrum, with light markings present to varying extents, weakly protuberant and weakly convex in profile, more strongly convex only in *Eucera numida*; antennae long, about as long as forewing or longer, with first flagellar segment short, $\leq \frac{1}{4}$ as long as second; terga without light hairbands, with surface largely exposed, or with ferruginous hairbands on T3 and T4 in *Eucera pollinosa*, not differing in colour from hairs on disc 36
36. Facial markings reduced, delineating irregular half circle or triangle on anterior $\frac{2}{3}$ – $\frac{3}{4}$ of clypeus, and forming yellowish or pale yellow basal medial spot or line on labrum with wide dark margins (Figs 188–189) 37
 - Facial markings more extensive, frequently forming blunt or sharp yellow plus shape on almost entire of surface of clypeus, and yellow or pale yellow on entire of surface of labrum 38
37. S6 with both converging carinae conspicuous and high, oblique, converged at anterolateral angle with lateral branch carina, extended onto anterolateral lobe (Fig. 190); clypeus with smooth anteromedial region widely impunctate (Fig. 188); larger species, body length 12–16 mm (South-Western) *Eucera numida* Lepeletier, 1841
 - S6 with only posterolateral carinae present, at most with inconspicuous anterior ridge, thus without visible anterolateral angle formed by converging carina and ridge, without lateral branch carina at anterolateral lobe (Fig. 191); clypeus with sparse punctures and ridges infiltrating into smooth anteromedial region (Fig. 189); smaller species, body length 11–13 mm (Southern, Ukraine, Russia) *Eucera proxima* Morawitz, 1875
38. Marginal zone of S5 incurved and strongly expanded anteromedially, forming depressed, impunctate and hairless surface between tufts of erect long hairs on each side (Fig. 192); S6 with converging

- carinae inconspicuous, appearing as low ridges, but with conspicuous short lateral branch carina at anterolateral lobe (Fig. 193) (Southern, Central, Eastern) *Eucera interrupta* Bär, 1850
- S5 with marginal zone not expanded anteromedially, at most inconspicuously incurved, with hairs present apicomediaally above margin, not forming tufts; S6 with both converging carinae present at least in part, conspicuous, higher than lateral branch carina 39
39. Clypeus with light marking more limited, appearing as blunt plus shape or sometimes yellow triangular or rounded spot; S6 with only lateral parts of converging carinae conspicuous, thus carinae short, oblique, and forming lateral angle, and lateral branch carina lower and less conspicuous (Fig. 194); mesonotum coarsely shagreened, sparsely punctate with inconspicuous shallow punctures, with many interspaces 2–3 puncture diameters wide (South-Eastern) *Eucera punctulata* Alfken, 1942
- Clypeus with sharp plus shape yellow marking; S6 with converging carinae conspicuous and longer, and with lateral branch carina comparably high (Figs 5, 195); mesonotum finely or weakly shagreened, densely punctate, with deeper more conspicuous punctures, with most interspaces less than puncture diameter wide outside of posteromedial region 40
40. Hind basitarsus produced anteroapically, with anterior margin sloping anteriorly appearing much broader apically than basally as seen in lateral view (Fig. 196); mesonotum finely shagreened with shallow to weakly defined punctures (cf. Fig. 38); S7 with posteromedial process short and inconspicuous, not extended posteriorly beyond sternal margin; dorsal vestiture fulvous to light brown, dark brown on T3–T5 or black in melanic specimens (= *Eucera atricollis*) with marginal zones opaque, *except* in southern France and the Iberian peninsula, exhibiting cline to bright ferruginous vestiture and hyaline fulvous tergal marginal zones (= *Eucera hispaniensis*) (Circum-European) *Eucera longicornis* (Linnaeus, 1758)
- Hind basitarsus not visibly produced anteroapically, with anterior margin at most weakly sloping, largely straight, not much wider apically than basally as seen in lateral view (Fig. 197); mesonotum weakly shagreened with deep conspicuous punctures; S7 with posteromedial process produced, long and slender, extended posteriorly way beyond sternal margin (Fig. 6); vestiture uniformly bright ferruginous in fresh specimens, and tergal marginal zones hyaline fulvous (Circum-European) *Eucera pollinosa* Smith, 1854
41. S6 with carinate acute or sometimes almost right angle at anterolateral lobe formed by conspicuous strongly sclerotised lateral ends of both converging carinae (Figs 198–200), *or* in *Eucera terminata*, only anterior carina present, with apex elevated and sharp forming acute point above anterolateral lobe (Fig. 201); small to medium-sized species, body length 8–10.5 mm; mesonotum more weakly shagreened and shiny with shallow asymmetric punctures (*bidentata*-group) 42
- S6 without conspicuous carinate angle or acute point at anterolateral lobe, although sometimes either posterolateral or anterior carina conspicuous and attaining anterolateral lobe (cf. Fig. 206), or converging carinae lower and inconspicuous, almost always forming obtuse angle mesal to anterolateral lobe (cf. Fig. 233), or, in *Eucera caspica*, both carinae high, converging mesal to anterolateral lobe without angle (cf. Fig. 205); medium-sized or large species, body length ≥ 12 mm, only *Eucera parnassia* smaller, 9.5–10 mm; mesonotum almost always coarsely shagreened, matt, with unrecognisable faint punctures 45
42. S6 with posterolateral carinae absent, with anterior carina ended in acute point above anterolateral lobe (Fig. 201); T1 densely punctate anteriorly on dorsal horizontal surface, with almost no visible puncture interspaces; S7 with large thinly lamellate posterolateral process on each side (Fig. 202) (South-Eastern, Italy) *Eucera terminata* Pérez, 1895

- S6 with both converging carinae present, forming angle at anterolateral lobe (Figs 198–200); T1 more sparsely punctate anteriorly on horizontal surface, with many puncture interspaces; S7 more strongly sclerotised, without lamellate processes 43
- 43. Antennae short, flagellum slightly shorter than forewing, with first flagellar segment long, $\approx \frac{1}{2}$ as long as second; hind basitarsus slender, rounded in cross section on basal $\sim \frac{1}{2}$ then abruptly broadened distally as seen in lateral view (Fig. 203); S6 with converging carinae delineating anterolateral angle of $\sim 45^\circ$ (Fig. 198) (South-Eastern) *Eucera bidentata* Pérez, 1887
- Antennae longer, flagellum slightly longer than forewing, with first flagellar segment short, $\approx \frac{1}{3}$ as long as second; hind basitarsus broader and weakly dorsoventrally compressed, elliptic in cross section, at most shortly rounded at base, gradually broadened distally as seen in lateral view (Fig. 204); S6 with converging carinae delineating wider anterolateral angle of $\sim 60^\circ$ – 90° (Figs 199–200) 44
- 44. S6 with converging carinae delineating acute anterolateral angle of $\sim 60^\circ$ (Fig. 199); T1–T3 with deep well-formed punctures on marginal zone, not much shallower than on disc; clypeus and labrum with yellow markings or sometimes markings absent (Eastern) *Eucera vittulata* Noskiewicz, 1936
- S6 with converging carinae delineating wider anterolateral angle of nearly 90° (Fig. 200); T1–T3 with shallower more weakly defined punctures on marginal zone than on disc; clypeus and labrum always dark (Iberian Peninsula) *Eucera confinis* Pérez, 1895
- 45. S6 with conspicuous, high, sharp anterior carinae and with anterolateral lobes acute (Figs 205–206); gonostylus long and slender, extended beyond $\frac{3}{4}$ of distance from base to apex of penis valves, broadly spatulate apically as seen in dorsal view, straight, with lower margin not angled or curved as seen in lateral view; posteromedial process of S7 elongate and slender, with fine setae apically (*caspica*-group) 46
- S6 with anterior carinae either inconspicuous or completely absent, or appearing as blunt ridges, and anterolateral lobes obtuse or at most roughly delineating right angle (cf. Figs 212–213); gonostylus either reduced and short, barely attaining $\frac{2}{3}$ of distance from base to apex of penis valves, not, or more narrowly spatulate apically as seen in dorsal view, or curved or more strongly bent apicoventrad as seen in lateral view; posteromedial process of S7 either short and inconspicuous, or otherwise conspicuous and broader, sometimes elaborate and greatly enlarged 47
- 46. S6 with both converging carinae present, forming continuous high carina curved posteromedially at each side, and ended at deep longitudinal medial groove (Fig. 205); hind trochanter ventrally carinate, delineating apicomедial right angle; posteromedial process of S7 long, extended posteriorly well beyond level of lateral process (Southern, Ukraine, Russia) *Eucera caspica* Morawitz, 1873
- S6 with only anterior carinae present, oblique, oriented posterolaterally, without conspicuous longitudinal medial groove (Fig. 206); hind trochanter regularly rounded, not carinate; posteromedial process of S7 shorter, barely extended beyond level of lateral process (South-Eastern, Italy) *Eucera albofasciata* Friese, 1895
- 47. Clypeus with large blunt plus shape or trapezoidal yellow marking, almost attaining margins, leaving narrow dark margins (Fig. 207); S6 with posterolateral carinae sharp, oblique, or sometimes weakly curved anterolaterally, not converged with lateral branched carina and oriented at anterolateral lobe, with anterior carinae absent or appearing as blunt ridges (Figs 208–209); antennae long, about as long as forewing; gonostylus long, extended beyond posterior $\frac{3}{4}$ of distance from base to apex of penis valves, elbowed or strongly bent apicoventrad as seen in lateral view, expanded apicomедally, L-shaped, or spatulate as seen in dorsal view (Figs 210–211); S7 with posteromedial process always short and inconspicuous (*longicornis*-group, in part) 48

- Combination of characteristics different, particularly clypeus almost always with smaller light marking forming blunt medial triangle or spot with at least much wider dark posterior margins, or with oblong marking on distal $\sim \frac{1}{2}$ and dark basally, or sometimes with light marking absent; S6 with posterolateral carina often curved posterolaterally, converged with lateral branch carina running onto anterolateral lobe, although sometimes inconspicuous and either accompanied by anterior carina or not; gonostylus either long or reduced and short, gently curved apicoventrad or straight as seen in lateral view, spatulate apically or at most slightly curved apicomesally as seen in dorsal view; S7 with posteromedial process varying in structure 50
- 48. S6 with posterolateral carinae curved, highest apically and forming preapical angles, oriented laterally, away from midline thus appearing widely separated apically (Fig. 208); tergal marginal zones opaque and dark, at most with narrow lighter apical band (Greece, North Macedonia)
..... *Eucera kullenbergi* Tkalců, 1984
- S6 with posterolateral carinae oblique and straight, attenuate and oriented apicomesally, thus appearing closer to midline apically (Fig. 209); T1–T5 with marginal zones lighter, broadly hyaline fulvous or translucent 49
- 49. T2 and T3 with marginal zones broadly translucent, discoloured, and with white apical hairband, contrasted on T3 with dark hairs on disc (cf. Fig. 32); gonostylus more weakly bent apicoventrad, delineating obtuse ventral angle as seen in lateral view, with apex spatulate as seen in dorsal view (Fig. 211) (South-Eastern) *Eucera dimidiata* Brullé, 1833
- T2 and T3 with tergal marginal zones darker hyaline fulvous, with hairs either not differing in colour from hairs on disc or lighter but not forming continuous apical band (cf. Fig. 33); gonostylus elbowed, more strongly bent apicoventrad, delineating acute ventral angle as seen in lateral view, and with apex weakly to strongly produced mesally, L-shaped as seen in dorsal view (Fig. 210) (Southern)
..... *Eucera nigrilabris* Lepeletier, 1841
- 50. S6 with converging carinae largely absent, or at most posterolateral carina low and inconspicuous, but with lateral branch carina present, forming together with converging end of anterior carina almost right-angled anterolateral lobe (Figs 212–213); middle femur with conspicuous denticle on ventral anterior margin near base (Fig. 214); hind trochanter with conspicuous ventral preapical denticle (Fig. 215); S5 with medial region covered by short stiff weakly branched hairs, differing from longer branched hairs laterally; gonostylus short, barely attaining $\frac{2}{3}$ of distance from base to apex of penis valves as seen in dorsal view (Figs 216–217); posteromedial process of S7 elaborate, greatly enlarged (Figs 218–219) 51
- Combination of characteristics different, particularly S6 with conspicuous posterolateral carina, not lower than lateral branched carina; leg parts without denticle *or* middle femur with small inconspicuous denticle on ventral anterior margin; S5 not covered with dense specialised hairs; gonostylus and posteromedial process of S7 varying in structure, elaborate (cf. Fig. 223) or simple and inconspicuous 52
- 51. Clypeus with oblong yellow marking on anterior half, sometimes reduced to anteromedial spot; tergal vestiture with dark hairs on marginal zone of T2 and on entirety of following terga, strongly contrasted with lighter fulvous hairs anteriorly on disc of T2, entirety of T1, and on mesosoma; specialised, stiff hairs on S5 dark brown; S6 with posterolateral carina present but inconspicuous (Fig. 212); gonostylus rounded in cross section and slender for apical $\sim \frac{1}{2}$, curved apicomesally and rounded apically with sparse short hairs as seen in dorsal view (Fig. 216); posteromedial process of S7 linear, broadened apically with dense apicomedia tuft of hairs (Fig. 218) (South-Western)
..... *Eucera notata* Lepeletier, 1841

- Clypeus with larger medial spot or subtriangular yellow marking attaining basal half; vestiture of T1–T5 light fulvous as on mesosoma, and T6 darker brown; specialised stiff hairs of S5 ferruginous; S6 with posterolateral carina absent (Fig. 213); gonostylus laterally compressed and broadened for apical half, only weakly curved apicomesally, with apex transverse and conspicuously setose (Fig. 217); posteromedial process of S7 more elaborate in structure, with elongated basal tuft of hairs, and with apical part thinly lamellate, without visible hairs (Fig. 219) (Crete, Italy, Malta) *Eucera algira* Lepeletier, 1841
- 52. Clypeus and labrum dark, or clypeus with pale yellow medial spot or sometimes with only weak indication of spot; S6 with short oblique posterolateral carinae, not converging with lateral branched carina, oriented anteriorly, not toward anterolateral lobe, with anterior carinae absent (Fig. 220); middle femur ventrally compressed and flattened and with small inconspicuous denticle on ventral anterior margin, on $\sim \frac{1}{3}$ of distance from base to apex (Fig. 221), although sometimes reduced, absent and indicated by merely low inconspicuous anterior carina; antennae long, about as long as forewing 53
- Combination of characteristics different, particularly clypeus always with pale yellow or yellow marking varying in size; S6 with posterolateral carina almost always curved laterally, converging with lateral branch carina running onto anterolateral lobe, although carina sometimes inconspicuous, and either accompanied by anterior carina or not; middle femur not strongly ventrally compressed, without anterior denticle or carina; antennae often shorter than forewing, sometimes as long 55
- 53. Clypeus with pale yellow medial spot; vestiture greyish fulvous to light brown, except pygidial and prepygidial fimbria darker brown; posteromedial process of S7 with moderately large emargination, occupying most of apical width of process, not extended anteriorly anterior to row of stiff setae arising along inner margin as seen in ventral view (Fig. 222) (South-Western) *Eucera oraniensis* Lepeletier, 1841
- Clypeus dark, at most with weak indication of yellow medial spot; vestiture either uniformly greyish fulvous to light brown or dark brown on marginal zone of T2 and on entirety of following terga; posteromedial process of S7 with either smaller emargination, occupying $\sim \frac{1}{2}$ of apical width of process (Fig. 223), or deeper, extended anteriorly anterior to row of stiff setae arising along inner margin as seen in ventral view (Fig. 224) 54
- 54. Vestiture uniformly greyish fulvous to light brown (Fig. 225); posteromedial process of S7 slender, with large emargination occupying most of apical width of process, and extended anteriorly anterior to stiff setae arising along inner margin (Fig. 224); small species, body length 12 mm (South-Western) *Eucera elongatula* Vachal, 1907
- Vestiture greyish fulvous to light brown, dark brown on marginal zone of T2 and on entirety of following terga (Fig. 226); posteromedial process of S7 robust, broad, with smaller emargination, occupying about half of apical width of process, not extended anteriorly anterior to row of minute sclerotized hairs along inner margin (Fig. 223); larger species, body length 12–13 mm (South-Western) *Eucera colaris* Dours, 1873
- 55. Antennae short, shorter than forewing, or at most about as long, with first flagellar segment long, $> \frac{1}{2}$ as long as second, $< \frac{1}{2}$ as long only in *Eucera curvitaris* then species large, 16 mm long; clypeal light marking either large, approaching posterior margin or reduced to form medial spot, and with narrow dark anterior margin; posteromedial process of S7 conspicuous and elongated, extended posteriorly beyond rest of sternum (Figs 227–229) (*hispana*-group, in part) 56
- Antennae long, longer than forewing, with first flagellar segment short, $< \frac{1}{2}$ as long as second; clypeal light marking either trapezoidal and limited to anterior $\frac{1}{2}$ – $\frac{3}{4}$ or forming smaller irregular anteromedial spot, always situated on anterior margin; posteromedial process of S7 small and

- inconspicuous, not extended posteriorly beyond rest of sternum, although lateral processes sometimes enlarged (Figs 230–231); medium-sized species, 9.5–11 mm long 60
56. Middle tibia highly modified, broadened, with maximal width greater than maximal basal width of femur, impressed on dorsal anterior surface, with concave surface delimited by carina along anterior margin (Fig. 232); antenna with first flagellar segment short, $> \frac{1}{2}$ as long as second; genitalia robust, gonostylus strongly broadened apically, much broader apically than basally, with apex weakly produced mesally as seen in dorsal view; large, robust species, body length 16 mm long (South-Eastern) *Eucera curvitaris* Mocsàry, 1879
- Middle tibia unmodified, with dorsal surface convex, and maximal width about as broad as width of femur at base; antenna with first flagellar segment long, $< \frac{1}{2}$ as long as second; genitalia ordinarily slender, with gonostylus not much broader apically than basally or apex spatulate in dorsal view, not produced mesally; smaller species, body length ≤ 15 mm 57
57. S6 with posterolateral carinae inconspicuous, low and blunt, not converged with lateral branch carina, curved anterolaterally away from anterolateral lobe (Fig. 233); metasomal vestiture uniformly pale fulvous; posteromedial process of S7 with well-developed dense hairs at base (Fig. 227) (Cyprus) ...
..... *Eucera syriaca* Dalla Torre, 1896
- S6 with posterolateral carina conspicuous, high, curved posterolaterally and converged with lateral branch carina running onto anterolateral lobe (Figs 234–235); metasomal vestiture with darker brown hairs on (marginal zone of T2,) T3 and following terga, contrasted with pale fulvous, ferruginous, or lighter brown hairs on T1 and T2; posteromedial process of S7 with at most minute inconspicuous hairs at base (Figs 228–229) 58
58. S6 with posterolateral carinae blunt, not much higher and conspicuous than anteriorly converging carinae (Fig. 234); compound eyes less strongly bulging, such that ocelloccipital ridge not visibly concave laterally between lateral ocellus and compound eye, and with ocellocular distance long, $\approx 2 \times$ transverse diameter of medial ocellus (Fig. 236); smaller species, body length 12 mm (Cyprus)
..... *Eucera palaestinae* Friese, 1922
- S6 with posterolateral carinae conspicuous and sharp, with anterior carinae absent (Fig. 235); compound eyes strongly bulging, such that ocelloccipital ridge concave laterally between lateral ocellus and compound eye as seen in frontal view, and with ocellocular distance short, $< 2 \times$ transverse diameter of medial ocellus (Figs 237–238); larger species, body length 13–15 mm 59
59. Clypeal light marking small, bluntly trapezoidal or with irregular spot, not approaching posterior margin; compound eyes strongly bulging, such that posterior tangent to eyes above vertex as seen in frontal view, and with ocellocular distance short, $< 1.5 \times$ transverse diameter of medial ocellus (Fig. 237); S7 with posteromedial process sclerotised, extended as elbowed projection (Fig. 228) (South-Western) *Eucera hispana* Lepeletier, 1841
- Clypeal light marking larger, sharply trapezoidal or plus-shaped, leaving narrow dark margins posteriorly; compound eyes less strongly bulging, with posterior tangent to eyes on vertex as seen in frontal view, and with ocellocular distance longer, $\approx 1.5 \times$ transverse diameter of medial ocellus or slightly longer (Fig. 238); S7 with posteromedial process extended as thin lamella (Fig. 229) (Romania) *Eucera sogdiana* Morawitz, 1875
60. S6 with carinae low and inconspicuous, with only posterior ends of anterior carinae present, oblique (Fig. 239); S7 with lateral process simple, with semirounded anterior lobe and more sclerotised and darker slender posterior lobe as seen in ventral view (Fig. 230) (Greece)
..... *Eucera parnassia* Pérez, 1902

- S6 with converging carinae higher, conspicuous, with posterior ends of anterior carinae curved (Fig. 240); S7 elaborate in structure and heavily sclerotised, produced into both submedial and posterolateral robust processes (Fig. 231) (Greece) *Eucera ebmeri* Risch, 1999

- 61. S6 with converging carinae running obliquely or smoothly curved basally onto anterior half of disc without angle, and often without visible anterolateral lobes (Figs 241–245), sometimes carinae shorter, hardly attaining anterior half of disc, or attenuate and extended anteriorly as low inconspicuous ridges, and with inconspicuous anterolateral lobe (as in *Tetralonia dentata*; Figs 246–247); malar space narrow, with upper and lower malar distances subequal (cf. Figs 91–92), about equal to clypeocular distance; small or medium-sized species, body length 7–13 mm (*Tetralonia*) 62
- S6 varying in structure, with posterolateral carinae frequently converged at anterior end with lateral branch carina and curved posterolaterally onto anterolateral lobe on each side (Fig. 248), either short, not, or at most shortly extended onto anterior half of disc (such as in *Eucera rufa*; Figs 249–251) or converged with oblique anterior carina or ridge at angle mesal to anterolateral lobe (Figs 248, 252), or sometimes both carina and lobe reduced to completely absent, with posterolateral carina appearing as low inconspicuous ridge, then almost transverse for most length and curved basally near lateral margin (Figs 253–254); malar space almost always broader, upper malar distance greater than lower malar distance (cf. Figs 89–90), greater than clypeocular distance, rarely inconspicuously so when malar space narrow; medium-sized to large species, body length 10.5–17 mm (*Eucera* subgenus *Synhalonia*) 77

- 62. S6 with sharp high posterolateral carinae, ended in submedial posterior point or acute angle immediately laterally to deep medial longitudinal groove, delineating sharply delimited inverted posterior triangle (Fig. 241); hind femur with ventral posterior margin produced with small denticle or blunt point covered with hairs about half way from base to apex, sometimes inconspicuous (Fig. 255); terga with deep conspicuous dense punctures apically on marginal zones, with most interspaces less than puncture diameter wide; predominantly small species, body length ≤ 9 mm, only *Tetralonia fulvescens* ≤ 12 mm long (*ruficornis*-group) 63
- S6 with posterolateral carinae frequently lower and blunt, with posterior end low, not pointed at most obtusely angled, shallowly depressed along midline, without well-delimited medial groove (Figs 242–247); hind femur with ventral posterior margin not denticulate or pointed; terga with punctures apically on marginal zones sparser, with most interspaces puncture diameter wide or more, sometimes faint and inconspicuous; small to large species, body length 7.5–13 mm 67

- 63. Larger species, body length 9–12 mm; antennal flagellum dark, at most reddish amber or dark ferruginous on ventral side; first flagellar segment long, about equal in length to its maximum apical width, and $\approx 1/5$ as long as second (Fig. 256); gonostylus gently curved apicoventrad as seen in lateral view, without preapical angle on inner side and with apex only slightly broadened, at most weakly produced mesally as seen in dorsal view (Fig. 257) (Southern, Eastern) *Tetralonia fulvescens* Giraud, 1863
- Smaller species, body length 7.5–9 mm; antennal flagellum often lighter ferruginous or fulvous on ventral side; first flagellar segment shorter, shorter than its maximum apical width, and $\approx 1/6$ as long as second (Fig. 258); gonostylus often more strongly bent apicoventrad as seen in lateral view, with conspicuous preapical angle on inner side, and with apex more strongly produced mesally as seen in dorsal view (Figs 259–260) 64

- 64. Antennal flagellum dark, at most reddish amber on ventral side; dorsal vestiture darker brown fulvous, with basal tomentum of terga more limited in extent, not attaining marginal zone of T3, barely attaining marginal zone of T4 medially, thus as wide as or shorter than dark posterior part of terga uncovered by tomentum, even in fresh specimens; lateral process of S7 with sclerotised dark

- posterior lobe divided from anterior lobe by moderately wide lateral emargination, emargination width $\gg \frac{1}{2}$, $<$ full lateral width of anterior lobe, as seen in ventral view that maximise width of emargination (Fig. 261) (Southern, Eastern) *Tetralonia inulae* Tkalcù, 1979
- Antennal flagellum lighter, ferruginous or fulvous on ventral side; dorsal vestiture lighter brownish to greyish fulvous, with basal tomentum of terga greater in extent, attaining marginal zone of T3, extended onto marginal zone of T4 medially, thus longer than maximum length of dark posterior part of terga uncovered by tomentum in fresh specimens; lateral process of S7 with posterior lobe either widely separated apart from anterior lobe by lateral emargination wider than anterior lobe (Fig. 262) or with emargination much narrower, $\sim \frac{1}{2}$ lateral width of anterior lobe as seen in ventral view that maximise width of emargination (Fig. 263) 65
65. Sterna uniformly densely punctate, S4 with small punctures anterolaterally, similar in size and density to punctures on S3; gonostylus gently curved apicoventrad as seen in lateral view, without preapical angle on inner side and with apex only slightly broadened apically as seen in dorsal view (cf. Fig. 257); lateral process of S7 with sclerotised dark posterior lobe widely separated apart from anterior lobe by lateral emargination much wider than anterior lobe as seen in ventral view that maximise width of emargination (Fig. 262) (Southern, Russia) *Tetralonia julliani* (Pérez, 1879)
- Sterna more irregularly sparsely punctate, S4 with larger and sparser punctures anterolaterally than on S3; gonostylus more strongly bent apicoventrad as seen in lateral view, with conspicuous preapical angle on inner side and with apex produced mesally, L-shaped, as seen in dorsal view (Figs 259–260); lateral process of S7 with sclerotised dark posterior lobe divided from anterior lobe by much narrower lateral emargination, $\sim \frac{1}{2}$ lateral width of anterior lobe as seen in ventral view that maximise emargination width (Fig. 263) 66
66. Larger species, body length 9 mm; clypeus densely punctate with only few interspaces, puncture diameter wide (cf. Fig. 121); antennae darker, dark on dorsal side, ferruginous on ventral side; gonostylus curvature comparatively weaker, bent apicoventrad as seen in lateral view, with right angle on inner side, at $\sim \frac{2}{3}$ of distance from base to apex, and with apex only shortly produced mesally and broader apically than preapically as seen in dorsal view (Fig. 259) (Southern, Eastern) *Tetralonia alticincta* (Lepeletier, 1841)
- Smaller species, body length 7 mm; clypeus sparsely punctate with many interspaces, puncture diameter wide (cf. Fig. 122); antennae lighter, ferruginous to reddish amber on dorsal side, bright ferruginous or fulvous on ventral side; gonostylus elbowed, more strongly curved as seen in lateral view, with more conspicuous acute angle about half way from base to apex on inner side, and with apex extended mesally, L-shaped, not broader apically than preapically as seen in dorsal view (Fig. 260) (Iberian Peninsula, France) *Tetralonia iberica* Dusmet, 1926
67. Antennae short, with flagellum much shorter than forewing, and $3.3 \times$ as long as compound eye; clypeal light marking reduced, forming irregular triangle or band on anterior $\frac{1}{2}$ – $\frac{2}{3}$; T1 with minute faint punctures apically, with wide hyaline brown to hyaline fulvous impunctate apical band on marginal zone, and T2 and T3 with basal as well as preapical band of appressed light tomentum separated by darker unbranched hairs, with preapical bands of tomentum not attaining apical margins; gonostylus gently curved apicoventrad in lateral view, curved apicomesad and apically spatulate in dorsal view (Fig. 264) (Southern, Central, Eastern) *Tetralonia malvae* (Rossi, 1790)
- Antennae longer, with flagellum about as long as forewing or longer, at most slightly shorter, almost $4 \times$ as long as compound eye or longer; clypeus light marking more developed, sharp or blunt plus shaped or subtriangular, attaining or approaching posterior margin; T1 with often well-defined deep punctures apically, and T2, or both T2 and T3, often with light tomentum only anteriorly, absent posteriorly or largely restricted to posterolateral extremities, with darker unbranched hairs posteriorly; if T1 with margin translucent and weakly punctate and T2 and T3 with both basal and

- apical hairbands as in *Tetralonia glauca* (cf. Fig. 119), then tomentum attaining and largely obscuring apical margins in fresh specimens; gonostylus variable in structure 68
68. Larger species, body length 11–13 mm; S6 with posterolateral carinae short, not extended anterior to weakly convex anterolateral lobes into basal half of disc, at most continued as inconspicuous faint ridges visible only in some lights (Fig. 246); gonostylus curved apicoventrad in lateral view (Fig. 9), sinusoidal, curved mesally then laterally, and apically spatulate as seen in dorsal view (Fig. 10); T2–T4 with light tomentum anteriorly, absent apically, with apical margins exposed, uncovered by hairs (*dentata*-group) 69
- Combination of characteristics different, particularly often smaller species, with posterolateral carinae of S6 longer, extended anteriorly onto basal half of disc, attaining level of posterior end of lateral gradular carinae, without or at most with marginally recognisable anterolateral lobe, sometimes with carinae appearing anteriorly as blunt ridges (Figs 243–245), but *if* shorter and absent on basal half of disc (Fig. 247) then T2–T4 with well-developed apical hairbands obscuring apical margins; gonostylus elbowed, strongly bent apicoventrad in lateral view (Fig. 7), with lateral margins angled or appearing almost straight, and with apex shortly or strongly expended mesally as seen in dorsal view (Fig. 8) 70
69. T1 and T2 with sparse weakly defined or faint punctures posteriorly on marginal zones, with many interspaces more than puncture diameter wide, and often much wider, not delineating clearly defined, uniformly wide impunctate apical band (cf. Fig. 116); antennae dark, with scape swollen, $< 1.5 \times$ as long as broad, with maximal ventral width $> 2 \times$ basal width of first flagellar segment; lateral process of S7 not clearly divided into lobes, with sclerotize dark posterior lobe appearing as mere apicolateral point on anterior lobe, and anterior lobe with only basal angle, without apicolateral angle as seen in ventral view (Fig. 265) (Southern, Central, Eastern) *Tetralonia dentata* (Klug, 1839)
- T1 and T2 with dense conspicuous deep punctures, with most interspaces less than puncture diameter wide, delimitating well-defined, uniformly wide impunctate apical band (cf. Fig. 118); antennae with flagellum light to dark ferruginous ventrally, with scape slender, $> 1.5 \times$ as long as broad, with maximal ventral width $< 2 \times$ basal width of first flagellar segment; lateral process of S7 clearly divided into two lobes by deep incision, such that anterior lobe with both basal and apical lateral angles (Fig. 266) (Southern, Eastern) *Tetralonia graja* (Eversmann, 1852)
70. Clypeus yellow and labrum dark or at most labrum with small medial yellow spot; S6 with converging carinae low and blunt (Fig. 243); prementum with apically curved stiff hairs on ventral surface; small species, body length 8–9 mm (Southern, Central, Eastern) *Tetralonia salicariae* (Lepeletier, 1841)
- Either both clypeus and labrum yellow, sometimes labrum with dark margins or with marking further reduced to basal medial spot, *or* both labrum and clypeus entirely dark; S6 with converging carinae often high and conspicuous; prementum with fine inconspicuous hairs ventrally; small to large species 71
71. S5 with smooth, depressed, impunctate surface apicomediaally between dark submedial tufts of hairs, contrasted with lighter laterally adjacent hairs (Fig. 244); T4 with pale greyish basal tomentum contrasted with fine dark hairs posteriorly, with marginal zone largely exposed, uncovered by hairs, as on T2 and T3; small species, body length 7.5–8.5 mm (Southern, Eastern) *Tetralonia nana* Morawitz, 1873
- S5 without or with less conspicuous depressed and impunctate surface apicomediaally, and rarely with submedial tufts of hairs, but *if* with differing apicomediaal region, then with sparse light hairs, not formed into tufts; T4 largely covered with light tomentum or with apical light hairband, with hairs obscuring apical margins as sometimes also on T2 and T3; larger species, body length ≥ 9 mm 72

72. Antennae light, ferruginous to fulvous or sometimes darker reddish amber; terga broadly translucent hyaline fulvous apically, on T1 translucent surface extended onto punctate anterior region of marginal zone, and with dense minute weakly defined punctures apically (cf. Fig. 119); tergal vestiture with fulvous tomentum forming basal as well as apical bands on T2 and T3, obscuring both basal regions and apical margins (cf. Fig. 119) (South-Eastern) *Tetralonia glauca* (Fabricius, 1775)
 - Antennae dark; terga opaque, at most with lighter hyaline brown surface apically, restricted to impunctate apical band; T1 with punctation pattern varying, often with conspicuous punctures apically; vestiture of T2 and T3 either with fulvous to light brown basal tomentum and with apical margins widely exposed, *or* with apical light hairbands present and with surface of basal region largely visible, not obscured by hairs 73
73. Large species, body length 11–12.5 mm with clypeus and labrum yellow; S6 with continuous converging carinae, extended onto anterior half of disc (cf. Fig. 244); vestiture of T2 and T3 with light basal tomentum contrasted with dark unbranched hairs posteriorly, and T4 entirely covered by light tomentum as on T5; maxillary palpus 6-segmented with well-defined segments (Eastern) *Tetralonia lyncea* Mocsàry, 1879
 - Combination of characteristics different, particularly T4 almost always partly exposed, uncovered by hairs either on anterior or on posterior region, or *if* entirely covered as in *Tetralonia scabiosae* then body length ≤ 10 mm; maxillary palpus 5- or 6-segmented often with two last segments small and weakly separated; facial markings present or absent, and converging carinae of S6 varying in length (*pollinosa*-group) 74
74. Clypeus and labrum dark; S5 with dense apical submedial tufts of hairs, made of thicker darker hairs, strongly contrasted with laterally adjacent hairs, with surface between tufts not visibly differing from rest of sternum (Iberian Peninsula) *Tetralonia cinctella* (Saunders, 1908)
 - Clypeus and labrum with broad light markings; S5 with depressed, weakly punctate and largely hairless (pre-)apicomedial surface, with sparser hairs on both sides, not forming tufts, at most slightly denser than laterally but not strongly differing in texture and colour 75
75. Mesonotum with conspicuous, deep punctures on posteromedial region (cf. Fig. 127); vestiture of T3–T5 with appressed tomentum entirely or almost entirely obscuring anterior underlying surface in fresh specimens; small species, body length 9.5–10 mm, forewing length 6.5–7 mm (Southern, Eastern) *Tetralonia scabiosae* Mocsàry, 1880
 - Mesonotum with weakly defined shallow punctures or widely impunctate on posteromedial region; vestiture of T3–T5 with semierect hairs, not entirely obscuring underlying anterior surface; larger species, body length 10.5–12 mm, forewing length 7.5–8 mm 76
76. S6 with posterolateral carinae short, not extended into anterior half of disc (Fig. 247); mesonotum with shallower, sometimes faint inconspicuous punctures on posteromedial region, at most with narrow impunctate area few punctures wide; clypeus with light markings reduced, bluntly triangular; vestiture of T2–T5 with dense apical fasciae, much denser than hairs on disc, entirely or almost entirely obscuring apical margins in fresh specimens (cf. Fig. 124) (Iberian Peninsula, France) *Tetralonia strigata* (Lepeletier, 1841)
 - S6 with posterolateral carinae long, extended anteriorly onto anterior half of disc, attaining level of lateral gradular carinae (Fig. 245); mesonotum with widely impunctate surface on posteromedial region multiple punctures wide; clypeus with light markings either larger and plus-shaped or similarly triangular; vestiture of T2–T5 forming premarginal bands, not much denser than hairs on rest of disc anteriorly, with margins of T2–T4 exposed at least medially, even in fresh specimens (cf. Fig. 123) (Southern, Eastern) *Tetralonia pollinosa* (Lepeletier, 1841)

77. S6 without carinae and anterolateral lobes, with only weak indication of converging carinae (Fig. 253), and at most low lateral branch carina delimiting anterolateral lobe; mesonotum uniformly coarsely to finely shagreened with sparse inconspicuous and shallow to faint and unrecognisable punctures (cf. Fig. 94); middle femur with erect fine hairs on ventral (inner) side, not obscuring underlying surface, differing from adjacent hairs laterally only in colour, or at most shorter and unbranched 78
 - S6 almost always with conspicuous carinae and anterolateral lobes, varying in structure (Figs 248–252), if carinae and lobes inconspicuous or absent then mesonotum uniformly smooth with denser, deep conspicuous punctures (cf. Fig. 93); middle femur often with ventral patch of dense appressed hairs varying in size and shape, entirely obscuring underlying surface 80
78. Clypeus with large plus-shaped pale yellow marking attaining posterior margin, labrum dark; antennae short, much shorter than forewing, with first flagellar segment long, longer than following segments; mesonotum finely shagreened with shallow recognisable punctures (cf. Fig. 94) (Spain) *Eucera brachycera* (Gribodo, 1893)
 - Clypeus with smaller irregular anterior or medial light marking, dark basally, labrum with light marking or dark; antennae long, with flagellum longer than forewing or about as long, with first flagellar segment short, much shorter than following segments; mesonotum coarsely shagreened with faint unrecognisable punctures 79
79. Clypeal light marking forming irregular half circle anteriorly, attaining anterior margin, labrum yellow or pale yellow medially, with dark margins; S6 with only weak indication of lateral branch carina, and with surface of anterolateral lobe largely flattened; marginal zones of T1–T4 with minute unrecognisable faint punctures (Ukraine) *Eucera vernalis* (Morawitz, 1875)
 - Clypeus with yellow irregular medial spot, not attaining anterior margin, labrum dark; S6 with more conspicuous lateral branch carina appearing as high ridge, mesally delimiting concave surface of anterolateral lobe; marginal zones of T1–T4 with larger, shallow recognisable punctures (South-Eastern) *Eucera melectoides* (Radoszkowski, 1893)
80. S6 with converging carinae and anterolateral lobe inconspicuous or largely absent, at most with carinae low and blunt and lobe indicated by concave surface anterolaterally (Fig. 254); mesonotum uniformly smooth with deep conspicuous punctures (cf. Fig. 93); (T2–)T3–T4 with complete apical bands of appressed light hairs largely obscuring underlying surface of marginal zones in fresh specimens; clypeus with sharp plus shape yellow marking, labrum entirely yellow or pale yellow (Figs 15, 267) (*tricincta*-group) 81
 - S6 with posterolateral carina always conspicuous and high, and anterolateral lobe more developed, separated from rest of sternum by lateral emargination or angle (Figs 248–252); mesonotum often weakly to coarsely shagreened with inconspicuous shallow punctures, sometimes shinier, smooth on posteromedial region, and with deeper conspicuous punctures; T2–T4 without light apical hairbands, at most with sparse lighter hairs, largely exposing underlying surfaces even in fresh specimens; clypeus with sharp to blunt plus shape or subtriangular yellow marking, labrum entirely or partly yellow or dark 83
81. Antennae short, much shorter than forewing; compound eyes strongly bulging, such that posterior tangent to eyes above vertex as seen in frontal view, and ocellular distance short, $\approx 1.5 \times$ transverse diameter of medial ocellus (Fig. 267); S6 with anterolateral lobe indicated by concave surface lateral to blunt anterior carina; T2–T4 with light apical hairband narrow, not attaining margin, entirely exposing impunctate apical band, hairband of T2 widely interrupted medially even in fresh specimens (Eastern) *Eucera pollinaris* (Kirby, 1802)

- Antennae longer, with flagellum about as long as forewing; compound eyes less strongly bulging, such that posterior tangent to eyes on vertex as seen in frontal view, and ocelloccipital distance longer, $\approx 2 \times$ transverse diameter of medial ocellus or slightly longer (Fig. 15); S6 with both anterolateral lobe and anterior carina inconspicuous or absent, without concave surface anterolaterally; T2–T4 with light apical hairbands complete and broad, attaining margin, only narrowly exposing impunctate apical band medially in fresh specimens 82
- 82. Large species, body length 13–14 mm; S6 without visible carinae (Fig. 254); T1 with impunctate apical band hyaline brown, only slightly lighter than dark region anteriorly (cf. Fig. 98) (Southern, Eastern) *Eucera trincta* Erichson, 1835
- Smaller species, body length 10.5–11 mm; S6 with low blunt converging carinae running along lateral margins; T1 with impunctate apical band lighter hyaline fulvous to translucent and discoloured, strongly contrasted with dark region anteriorly (cf. Fig. 99) (Eastern)
..... *Eucera distinguenda* (Morawitz, 1875)
- 83. Middle tibia highly modified, with dorsal (outer) surface strongly impressed along lower anterior margin, and with upper anterior margin carinate, delimiting patch of dense appressed hairs on anterior surface (Fig. 268); S6 with posterolateral carinae long, running obliquely mesal to anterolateral lobe, attaining level of anterior of lobe, without anterior carina on surface basally to lobe (Fig. 249); large robust species, body length 14–17 mm, rarely 13 mm (Southern, Eastern)
..... *Eucera rufa* (Lepeletier, 1841)
- Middle tibia unmodified or weakly modified, neither impressed dorsally nor with patch of dense hairs on anterior surface; S6 with posterolateral carinae shorter, not surpassing level of posterior end of anterolateral lobe (Fig. 250), often curved anterolaterally toward anterolateral lobe and with anterior carina or low ridge present on basal region of disc (Figs 251–252); often smaller species, body length 12–15 mm 84
- 84. S6 highly modified, with anterolateral lobes produced, greatly enlarged, extended laterally way beyond lateral gradular carina and separated anteriorly from disc by deep incisions, with posterolateral carinae oblique and short, and with anterior carinae or ridges absent (Fig. 250); mesonotum striate and shiny laterally between punctures, smooth on posteromedial region, with conspicuous well-defined punctures (Southern, Eastern) *Eucera hungarica* Friese, 1895
- S6 without enlarged separate anterolateral lobes, with posterolateral carinae longer, curved anterolaterally and extended by short lateral branched carina onto anterolateral lobe, and with anteriorly converging carina or often low blunt ridge forming angle immediately anterior to curved section of posterolateral carina; mesonotum uniformly finely to coarsely shagreened, with shallow inconspicuous punctures 85
- 85. Labrum entirely yellow; middle tibia broadened with concave ventral surface about twice as long as wide, entirely covered and obscured by oval patch of dense appressed golden hairs (Fig. 269); all tarsi with integument lighter, bright ferruginous; S5 covered with short ferruginous semierect hairs, denser and strongly branched mesally, largely obscuring underlying surface (Ukraine, Russia)
..... *Eucera velutina* (Morawitz, 1873)
- Labral light marking reduced, limited to medial spot with wide dark margins, or faint, or completely absent; middle tibia more slender, with concave ventral surface $\sim 3 \times$ as long as wide, with much smaller and sparser patch of appressed golden hairs such that surface largely exposed; at least integument of basitarsi dark; S5 with minute sparse hairs anteriorly on disc, with surface exposed 86
- 86. Middle femur with ventral patch of appressed golden hairs forming slender anterior band on $\sim \frac{2}{3}$ of distance from base to apex, dense, entirely obscuring underlying surface (Fig. 270); middle

- basitarsus with dorsal (outer) surface weakly to strongly concave, smooth and sparsely haired basally (Figs 271–272) 87
- Middle femur with ventral patch of appressed golden hairs wider, not delineating anterior band, sparsely covering greater portion of ventral surface, not entirely obscuring underlying surface; middle basitarsus without concave weakly haired dorsal surface (Fig. 273), although weakly dorsoventrally curved in *Eucera mediterranea* as seen in posterior dorsal view (Fig. 274) 88
87. Labrum yellow medially with wide dark margins; middle basitarsus strongly broadened at base, with maximal basal width about twice its apical width (Fig. 271); middle femur with ventral patch of appressed golden hairs much broader distally, attenuate basally (Fig. 270) (Southern, Eastern) *Eucera ruficollis* (Brullé, 1833)
- Labrum dark, sometimes with faint basal spot, rarely with medial yellow spot; middle basitarsus weakly broadened at base, with maximal basal width less than twice its apical width (Fig. 272); middle femur with ventral patch of appressed golden hairs not much broader distally than basally to at most twice as wide (South-Eastern) *Eucera plumigera* Kohl, 1905
88. Smaller species, body length 11–14 mm; middle basitarsus unmodified, with anterior margin straight as seen in posterior dorsal view (Fig. 273); S6 with posterolateral carina not visibly adjoined by and delimiting anterior ridge, with only weak indication of ridge (Fig. 251); gonostylus straight for most length as seen in dorsal view; S7 with sclerotised dark posterior lobe of lateral process short and spinous (Fig. 275) (Greece) *Eucera obscura* (Brullé, 1833)
- Larger species, body length 15–16 mm; middle basitarsus weakly dorsoventrally curved, with anterior margin weakly concave as seen in posterior dorsal view (Fig. 274); S6 with posterolateral carina often adjoined by and delimiting anterior low oblique ridge (cf. Fig. 248); gonostylus weakly curved mesally as seen in dorsal view; S7 with sclerotised dark posterior lobe of lateral process more strongly produced, larger and apically blunt (Fig. 276) (Greece) *Eucera mediterranea* Friese, 1895

Discussion

The main purpose of this work was to provide a tool for the identification of bees of the long horn bee tribe Eucerini by means of dichotomous keys. The newly developed keys should allow researchers, teachers, students, and nature enthusiasts with basic entomological knowledge to identify most and more specifically, 89 out of the 112 species of Eucerini that were included in the most updated checklist of the bees of Europe (Ghisbain *et al.* 2025). For example, the keys were used in trainings aimed for building up a critical mass of para-taxonomy experts from all EU Member States (EPIC, <https://epic-pollinators.com/epic-bee/>). The keys will thereby contribute to the materialisation of a recently developed monitoring scheme, as part of the EU initiative to address the decline of pollinating insects and the EU Biodiversity Strategy by the year 2030 (EU-PoMS, https://joint-research-centre.ec.europa.eu/jrc-news-and-updates/protecting-pollinators-new-eu-monitoring-scheme-safeguard-ecosystems-2024-10-21_en; Potts *et al.* 2025). While the keys newly delimitate previously inseparable or vaguely separable species, especially in the female sex, the identification of some species remains difficult. Particularly challenging to tell apart are females in the *grisea*-group and some females and males in the *longicornis*-group of the *Eucera* subgenus *Eucera* s. str., the latter including some of the most widely distributed species in Europe (Reverté *et al.* 2023). Additionally, in the subgenus *Eucera*, separating females of the species *E. parnassia* and *E. ebmeri*, and males of the species *E. taurica*, *E. squamosa* and sometimes also *E. pannonica* may be difficult. In the three-celled *Eucera* subgenus *Synhalonia*, separating females of *E. rufa* and *E. hungarica*, and females of *E. ruficollis*, *E. plumigera*, *E. obscura*, and *E. mediterranea* can all be extremely difficult even with the new keys. In the genus *Tetralonia*, identifying some females of the *ruficornis*-group is challenging, namely *T. alticincta*, *T. inulae*, and *T. iberica*, and the presence of the nominal species, *T. ruficornis*, in Europe remains

doubtful [it is reported from southern Spain based on the interpretation of Tkalců (1979)]. In all these cases listed above, simply matching the females with males (or vice versa) collected at the same region or even in the same site is not recommended due to the presence of some closely related species in sympatry, and because of variation in emergence times among years (AD unpubl. data). This is particularly evident in the Euro-Mediterranean region, which harbours greater eucerine diversity and species identification challenges (AD unpubl. data).

Systematics, including both the phylogenetic relationships and morphological descriptions of the Palaearctic Eucerini, are far from being resolved (Dorchin *et al.* 2018), even within the relatively better studied European fauna. Various groups would benefit from further revision, preferably based on phylogenetic evidence. Notably, morphological delimitation of the three-celled taxa classified as the genus *Eucera* subgenus *Synhalonia* and the genus *Tetralonia* is still unsatisfying, although clearly, they form different clades (Freitas *et al.* 2023). Separating these two lineages may prove difficult when using the keys.

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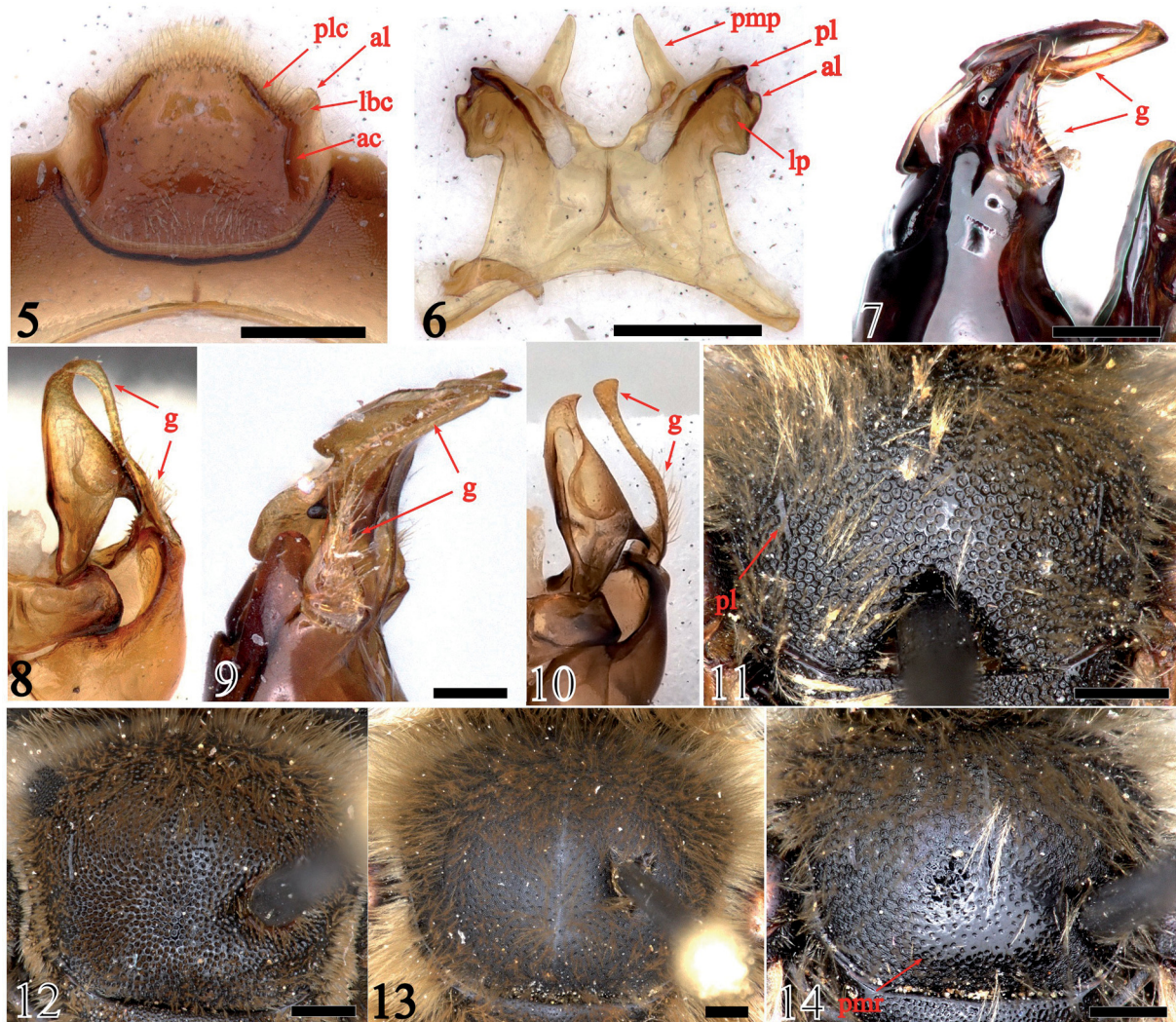
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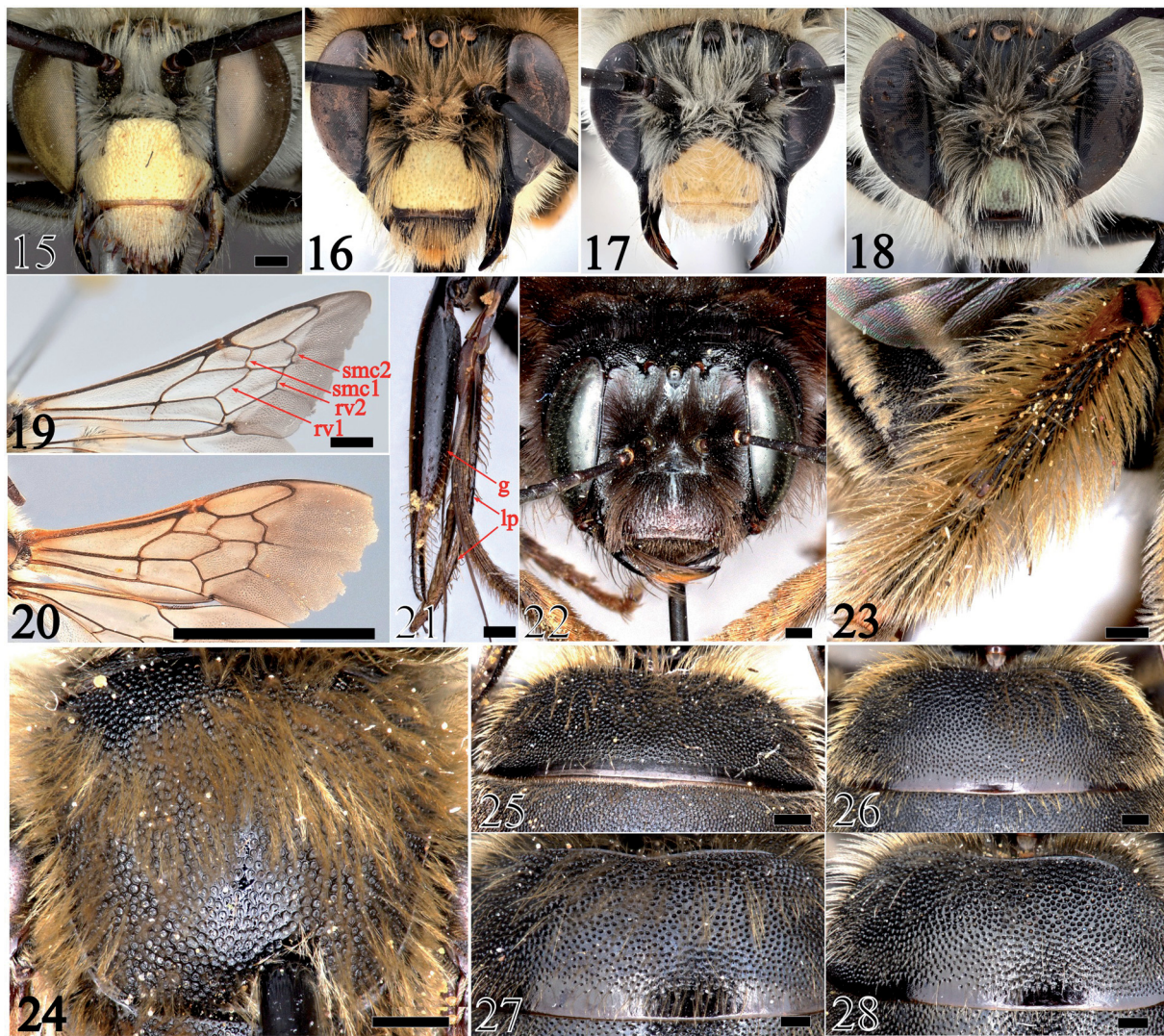
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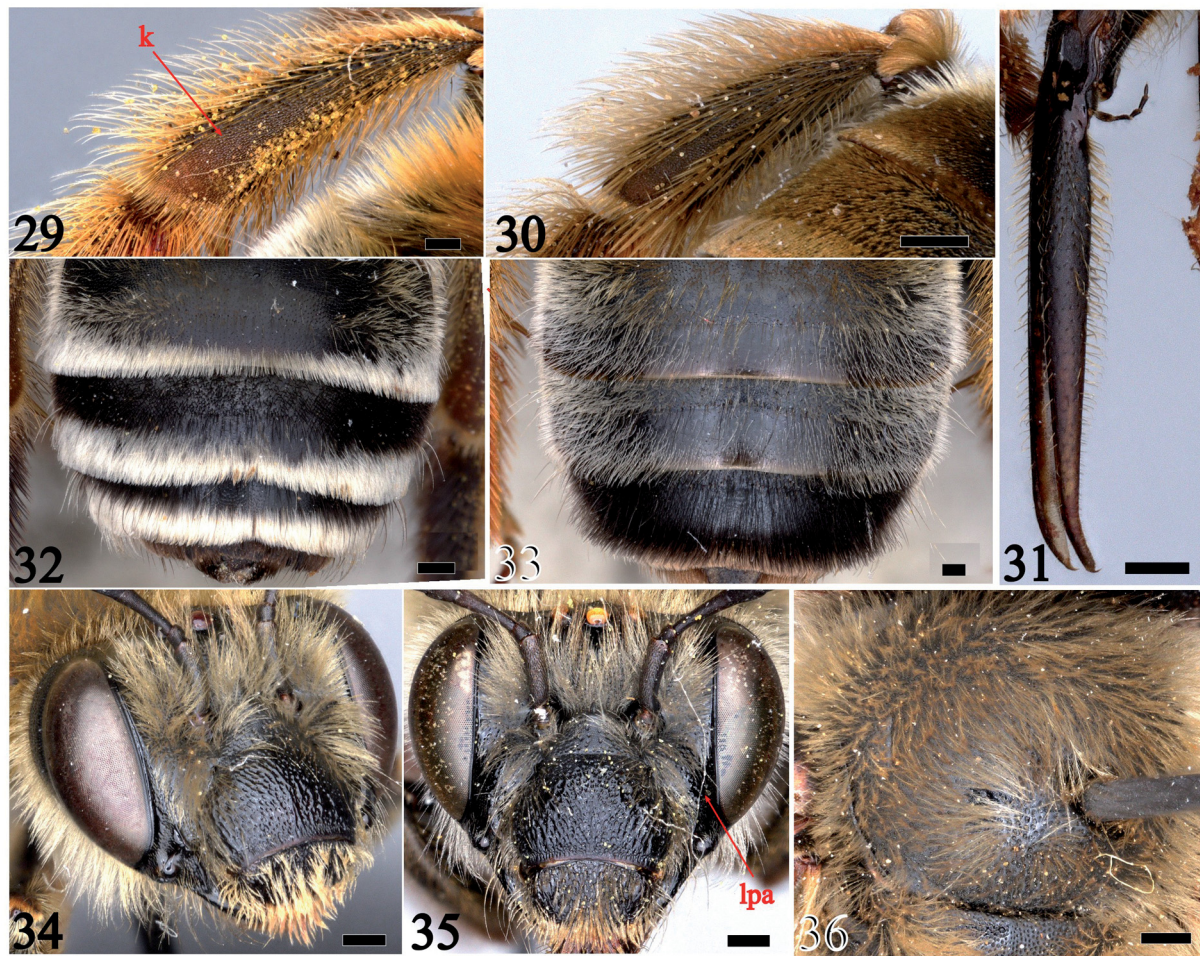
Appendix



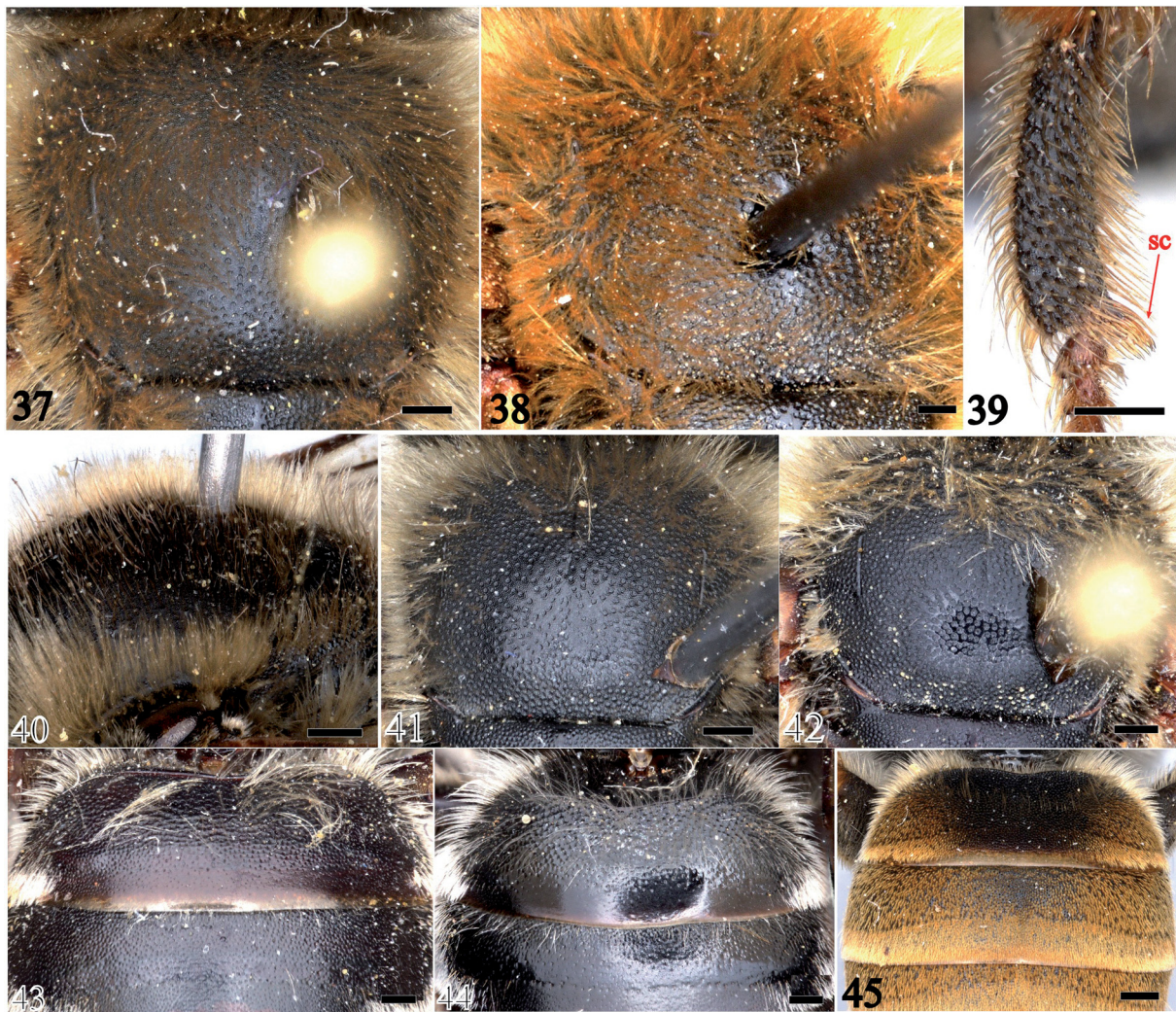
Figs 5–14. 5–6. *Eucera pollinosa* Smith, 1854, ♂, France, Var, Brignoles (CAD). 5. S6, ventral view (ac = anterior carina; al = anterior lobe; lb = lateral branch carina; plc = posterolateral carina). 6. S7, ventral view (al = anterior lobe; lp = lateral process; pl = posterior lobe; pmp = posteromedial process). 7–8. *Tetralonia scabiosae* Mocsàry, 1880, ♂, Bulgaria, Slancev, Briag (CAD). 7. Gonostylus (g), lateral view. 8. Gonostylus (g), dorsal view. 9–10. *T. dentata* (Klug, 1839), ♂, Italy, Sicily, Mt Madonie, 20 km SE of Collesange (CAD). 9. Gonostylus (g), lateral view. 10. Gonostylus (g), dorsal view. 11. *E. vulpes* Brullé, 1833, ♀, France, Salins-les-Bains (UM), mesonotum (pl = parapsidal line). 12. *E. cineraria* Eversmann, 1852, ♀, Greece, Peloponnese, Strofylia NP, NW of Metochi (CAD), mesonotum. 13. *E. dimidiata* Brullé, 1833, ♀, Cyprus, Limassol, Yermasoyia dam (CAD), mesonotum. 14. *E. bidentata* Pérez, 1887, ♀, Israel, Seragim (CAD), mesonotum (pmr: posteromedial region). Scale bars: 5–6, 11–14 = 0.5 mm; 7, 9 = 0.25 mm.



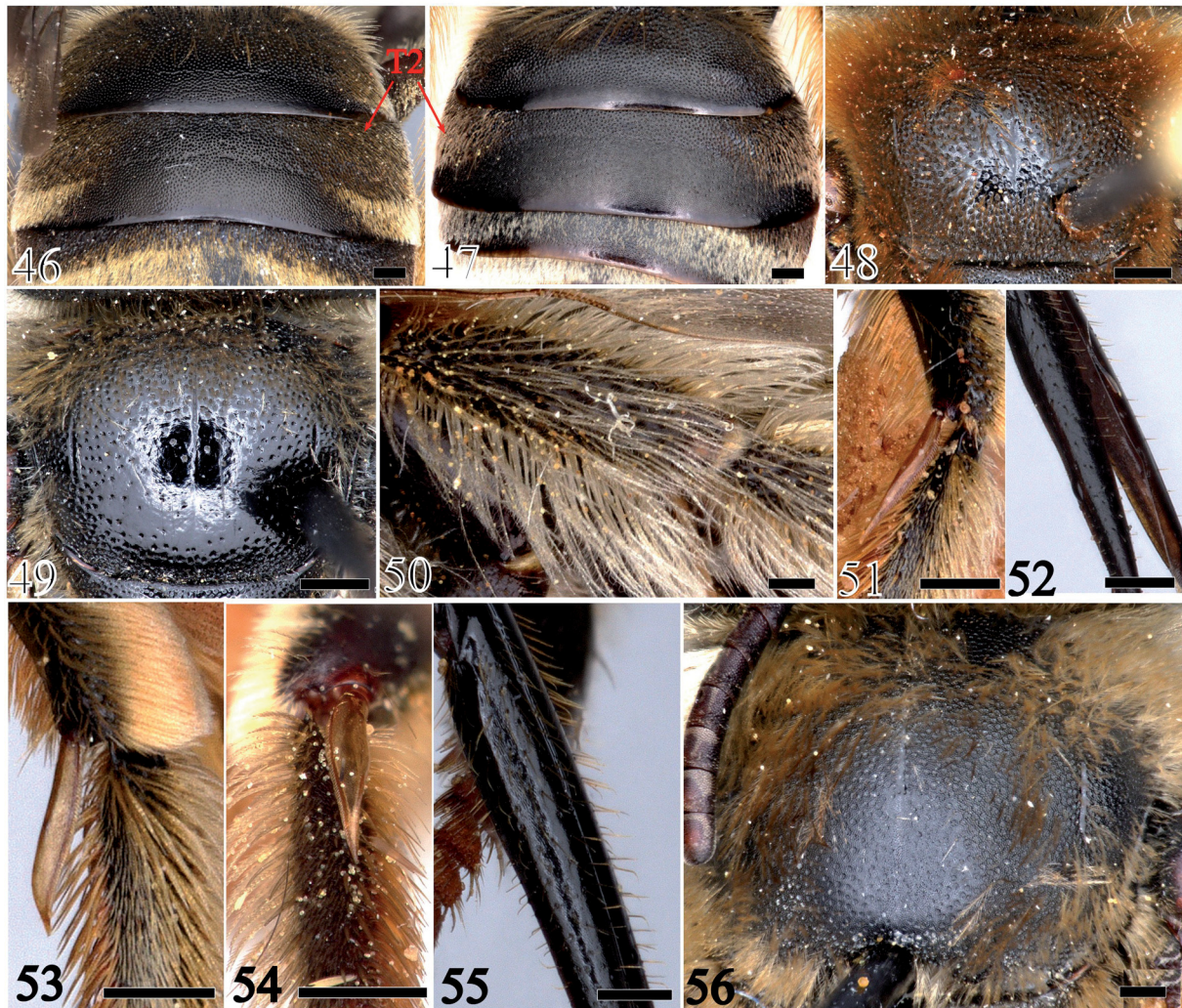
Figs 15–28. 15. *Eucera tricincta* Erichson, 1835, ♂, Israel, Nahal Sekher, 0.9 km NE of haNegev JCN (CAD), head, frontal view. 16. *E. obscura* (Brullé, 1833), ♂, Morocco, Rabat (CAD), head, frontal view. 17. *E. punctulata* Alfken, 1942, ♂, Turkey, Taurus, near Akseki, Süleymaniye (CAD), head, frontal view. 18. *E. oraniensis* Lepeletier, 1841, ♂, Italy, Sardinia, Cagliari, Soleminis, 6 km S of Dolianova (CAD), head, frontal view. 19. *E. parvicornis* Mocsáry, 1878, ♀, Greece, Macedonia, 3 km W of Nea Karvali (CAD), forewing (rv1: recurrent vein 1, rv2: recurrent vein 2; smc1: submarginal crossvein 1; smc2: submarginal crossvein 2). 20. *E. pollinosa* Smith, 1854, ♀, France, Var, Gonfaron, La Tuilière d'Aille (UM), forewing. 21. *E. parvicornis*, ♀, Greece, Peloponnese, 1 km W of Varvasena (CAD), mouth parts, lateral view (g: galea, lb: labial palpus). 22. *E. morio* Friese, 1922, ♀, Turkey, Van, Erçek (OLML), head, frontal view. 23. *E. nigrifacies* Lepeletier, 1841, ♀, Bulgaria, 2 km NW of Lozenec (CAD), tibial and basitarsal scopa. 24. *E. grisea* Fabricius, 1793, ♀, Spain, Andalusia, Málaga, Benaoján (CAD), mesonotum. 25. *E. grisea*, ♀, ibidem, T1. 26. *E. pseudeucnemidea* Risch, 1997, ♀, Israel, 1.7 km E of Bet Hanan (CAD), T1. 27. *E. nigrifacies*, ♀, idem 23, T1. 28. *E. penicillata* Risch, 1997, ♀, Israel, Mt Gilboa', 1.3 km NE of Merav (CAD), T1. Scale bars: 15, 21–26 = 0.5 mm; 19 = 1 mm; 20 = 5 mm; 27–28 = 0.25 mm.



Figs 29–36. 29. *Eucera nigrilabris* Lepeletier, 1841, ♀, Israel, Nahal Yatir, 1.5 km E of Hura (CAD), hind tibia, ventral view (k: keitrichiae). 30. *E. cineraria* Eversmann, 1852, ♀, Greece, Peloponnese, Strofylia NP, NW of Metochi (CAD), hind tibia, ventral view. 31–32. *E. dimidiata* Brullé, 1833, ♀, Cyprus, Limassol, Yermasoyia dam (CAD). 31. Galea, lateral view. 32. T3–T5, dorsal view. 33. *E. nigrilabris*, ♀, idem Fig. 29, T3–T5, dorsal view. 34. *E. nigrescens* Pérez, 1879, ♀, Italy, Sicily, Cassano (CAD), head, frontolateral view. 35. *E. cypria* Alfken, 1933, ♀, idem Fig. 31, head, frontal view (lpa: lower paraocular area). 36. *E. numida* Lepeletier, 1841, ♀, Malta, Gozo, Ta' Ghammar (CAD), mesonotum. Scale bars = 0.5 mm.



Figs 37–45. 37. *Eucera cyprina* Alfken, 1933, ♀, Cyprus, Limassol, Yermasoyia dam (CAD), mesonotum. 38–39. *E. longicornis* (Linnaeus, 1758), ♀, Czech Republic, Bohemia, S of Dobrá Voda, Lusný rybník (CAD). 38. Mesonotum. 39. Fore basitarsus, dorsolateral view (sc: spur clump). 40. *E. kullenbergi* Tkalců, 1984, ♀, Israel, Mt Gilboa', Malkhishua' (CAD), mesonotum, lateral view. 41. *E. punctulata* Alfken, 1942, ♀, Greece, Peloponnese, 5.6 km W of Thermopylae (CAD), mesonotum. 42–43. *E. interrupta* Bär, 1850, ♀, France, Drome, 6 km E of Nyons, Condorcet (CAD). 42. Mesonotum. 43. T1. 44. *E. proxima* Morawitz, 1875, ♀, idem Fig. 41, T1. 45. *E. cineraria* Eversmann, 1852, ♀, Greece, Peloponnese, Strofylia NP, NW Metochi (CAD), T1, T2. Scale bars: 37, 39–45 = 0.5 mm; 38 = 0.25 mm.



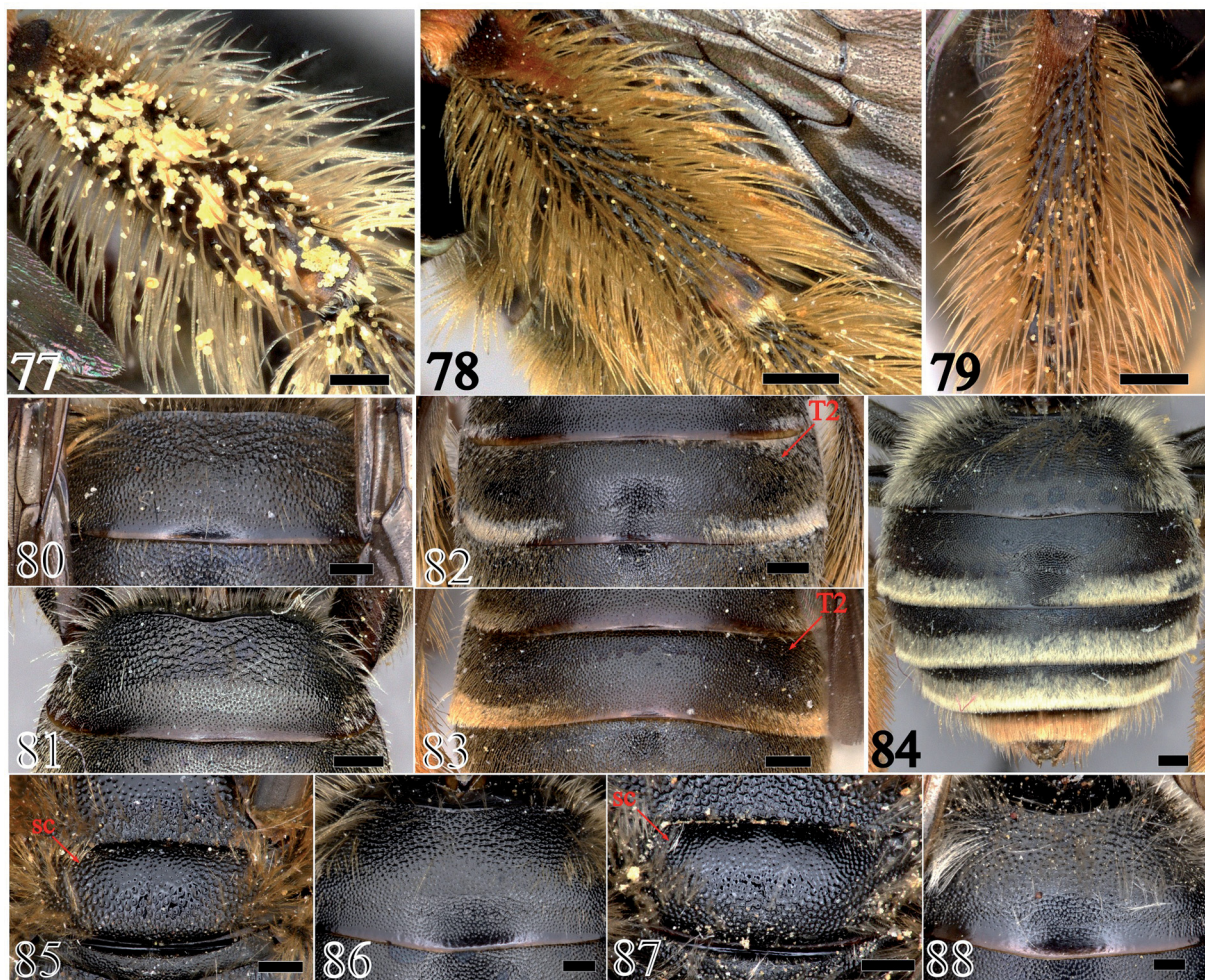
Figs 46–56. 46. *Eucera clypeata* Erichson, 1835, ♀, Israel, Ma’ale Efrayim JCN, 1.8 km SW of Gittit (CAD), T1, T2. 47. *E. obliterated* Pérez, 1895, ♀, Morocco, Oueled Sghir (CAD), T1, T2. 48. *E. clypeata*, ♀, idem, Fig. 46, mesonotum. 49. *E. paraclypeata* Sitdikov, 1988, ♀, Israel, Nahal Batra (CAD), mesonotum. 50. *E. excisa* Mocsàry, 1879, ♀, Turkey, 20 km N of Agri (OLML), tibial scopa. 51–52. *E. gaullei* Vachal, 1907, ♀, Israel, N of Seragim (CAD). 51. Middle tibial spur, lateral view. 52. Galea, lateral view. 53. *E. seminuda* Brullé, 1833, ♀, Greece, Peloponnese, 5.6 km W of Thermopylae (CAD), middle tibial spur, lateral view. 54. *E. pythagoras* Risch, 2003, ♀, Greece, Lesbos, 1.5 km SW of Agra (the University of the Aegean, Greece), middle tibial spur, (ventro-)lateral view. 55. *E. seminuda*, ♀, idem Fig. 53, galea, lateral view. 56. *E. furfurea* Vachal, 1907, ♀, Spain, Andalusia, Málaga, Benaolán (CAD), mesonotum. Scale bars = 0.5 mm.



Figs 57–66. 57. *Eucera curvitaris* Mocsàry, 1879, ♀, Greece, Macedonia, W of New Vrasna (CAD), mesonotum. 58. *E. notata* Lepeletier, 1841, ♀, Morocco, Rabat (CAD), mesonotum. 59. *E. furfurea* Vachal, 1907, ♀, Spain, Andalusia, Málaga, Benaolán (CAD), tibial scopa. 60. *E. parnassia* Pérez, 1902, ♀, Israel, Yaquim (CAD), galea, lateral view. 61. *E. ebmeri* Risch, 1999, ♀, Israel, Mt Gilboa', W of Merav (CAD), galea, lateral view. 62. *E. caspica* Morawitz, 1873, ♀, Croatia, Split, Gornji Muc (CAD), head, frontal view. 63. *E. notata*, ♀, idem Fig. 58, T1, T2. 64. *E. algira* Lepeletier, 1841, ♀, Malta, Marsasclà (CAD), T1, T2. 65. *E. taurica* Morawitz, 1870, ♀, France, Aveyron, Millau, Saint Michel (OLML), sternal brush. 66. *E. panonica* Mocsàry, 1878, ♀, Bulgaria, Kavarna (OLML), sternal brush. Scale bars = 0.5 mm.



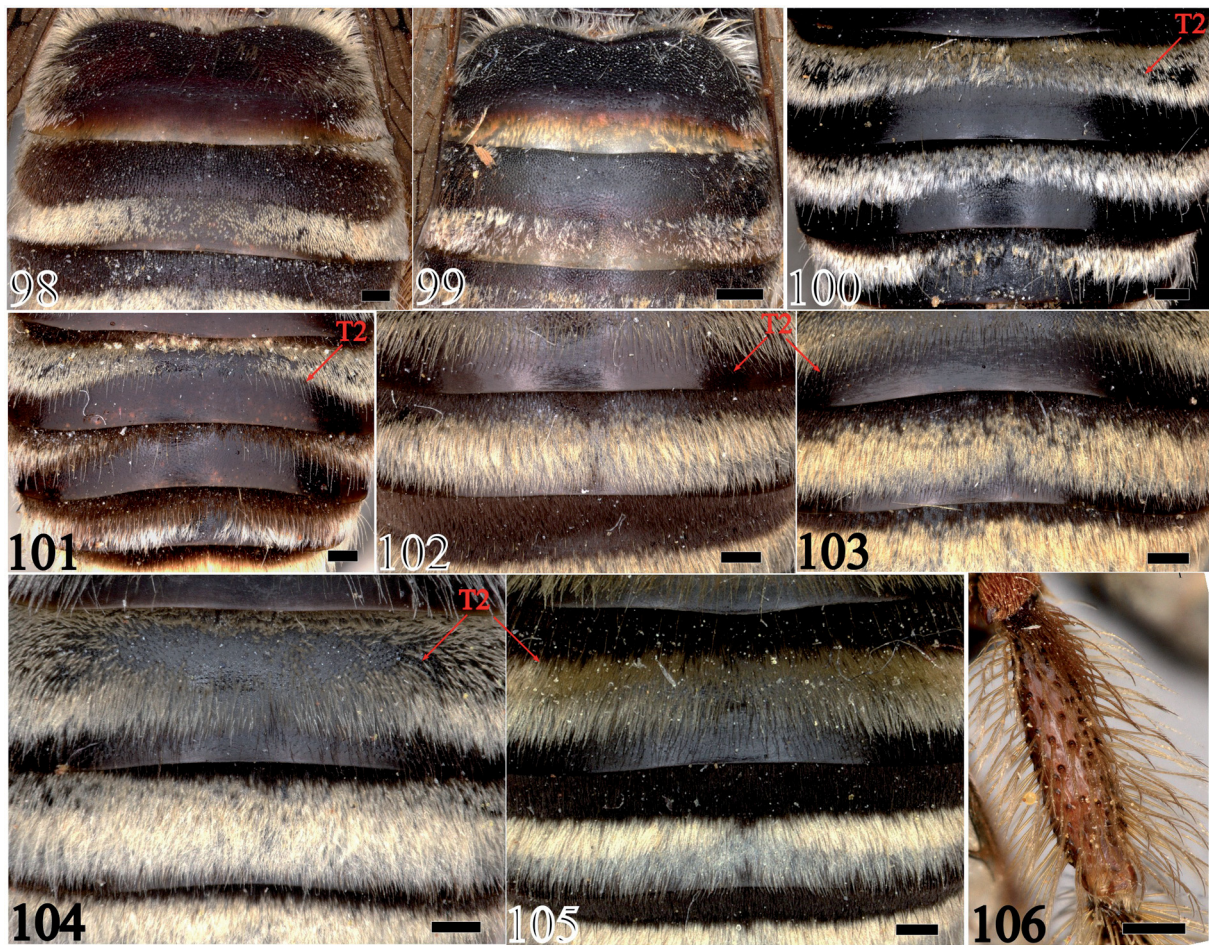
Figs 67–76. **67.** *Eucera palaestinae* Friese, 1922, ♀, Israel, Nahal Shuah (CAD), T1, T2. **68.** *E. oraniensis* Lepeletier, 1841, ♀, Italy, Sardinia, Fertilia (OLML), T2, T3. **69.** *E. elongatula* Vachal, 1907, ♀, Spain, Font Roja (CAD), T1, T2. **70.** *E. colaris* Dours, 1873, ♀, Morocco, Rabat (CAD), T1, T2. **71.** *E. barbiventris* Pérez, 1902, ♀, Spain, Catalonia, Barcelona (OLML), mesonotum. **72.** *E. terminata* Pérez, 1895, ♀, Italy, Lazio, Viterbo, Norchia (CAD), mesonotum. **73.** *E. vittulata* Noskiewicz, 1936, ♀, Hungary, N Veszprém (CAD), mesonotum. **74.** *E. confinis* Pérez, 1895, ♀, Tunisia, 20 km E of Tabarka (OLML), mesonotum. **75.** *E. taurea* Vachal, 1907, ♀, Israel, Bet Guvrin (CAD), T1, T2. **76.** *E. barbiventris* Pérez, 1902, ♀, Spain, Catalonia, Barcelona (OLML), T1–T3. Scale bars = 0.5 mm.



Figs 77–88. 77. *Eucera bidentata* Pérez, 1887, ♀, Cyprus, Limassol, Polemidia NFP (CAD), tibial scopa. 78. *E. terminata* Pérez, 1895, ♀, Italy, Lazio, Viterbo, Norchia (CAD), tibial scopa. 79. *E. confinis* Pérez, 1895, ♀, Tunisia, 20 km E of Tabarka (OLML), tibial scopa. 80. *E. terminata*, ♀, idem Fig. 78, T1. 81. *E. bidentata* Pérez, 1887, ♀, idem Fig. 77, T1. 82. *E. vittulata* Noskiewicz, 1936, ♀, Hungary, N of Veszprém (CAD), T2. 83. *E. confinis*, ♀, idem Fig. 79, T2. 84–86. *E. dafnii* Dorchin, 2019, ♀, Greece, Peloponnese, 1 km W of Varvasena (CAD). 84. Metasoma. 85. Scutellum. 86. T1, T2. 87–88. *E. aequata* Vachal, 1907, ♀, Cyprus, Akrotiri (CAD). 87. Scutellum. 88. T1, T2. Scale bars: 77, 81 = 0.25 mm; 78–80, 82–88 = 0.5 mm.



Figs 89–97. 89. *Eucera tricineta* Erichson, 1835, ♀, Slovakia, Kráľovský Chlmec (OLML), malar region. 90. *E. velutina* (Morawitz, 1873), ♀, Ukraine, Ponomareva (OLML), malar region. 91. *Tetralonia fulvescens* Giraud, 1863, ♀, Kyrgyzstan, 10 km S of Sari-Tzelek (OLML), malar region. 92. *T. julliani* (Pérez, 1879), ♀, Iran, 16 km W of Bojnurd (OLML), malar region. 93. *E. tricineta*, ♀, idem Fig. 89, mesonotum. 94. *E. brachycera* (Gribodo, 1893), ♀, Israel, Dimona JCN (CAD), mesonotum. 95. *E. plumigera* Kohl, 1905, ♀, Lebanon, Bshari, Cedars of God forest (CAD), mesonotum. 96. *E. ruficollis* (Brullé, 1833), ♀, Morocco, Mzamza, Janoubia (CAD), mesonotum. 97. *E. rufa* (Lepelletier, 1841), ♀, Greece, Macedonia, 3 km W of Nea Karvali (CAD), mesonotum. Scale bars = 0.5 mm.



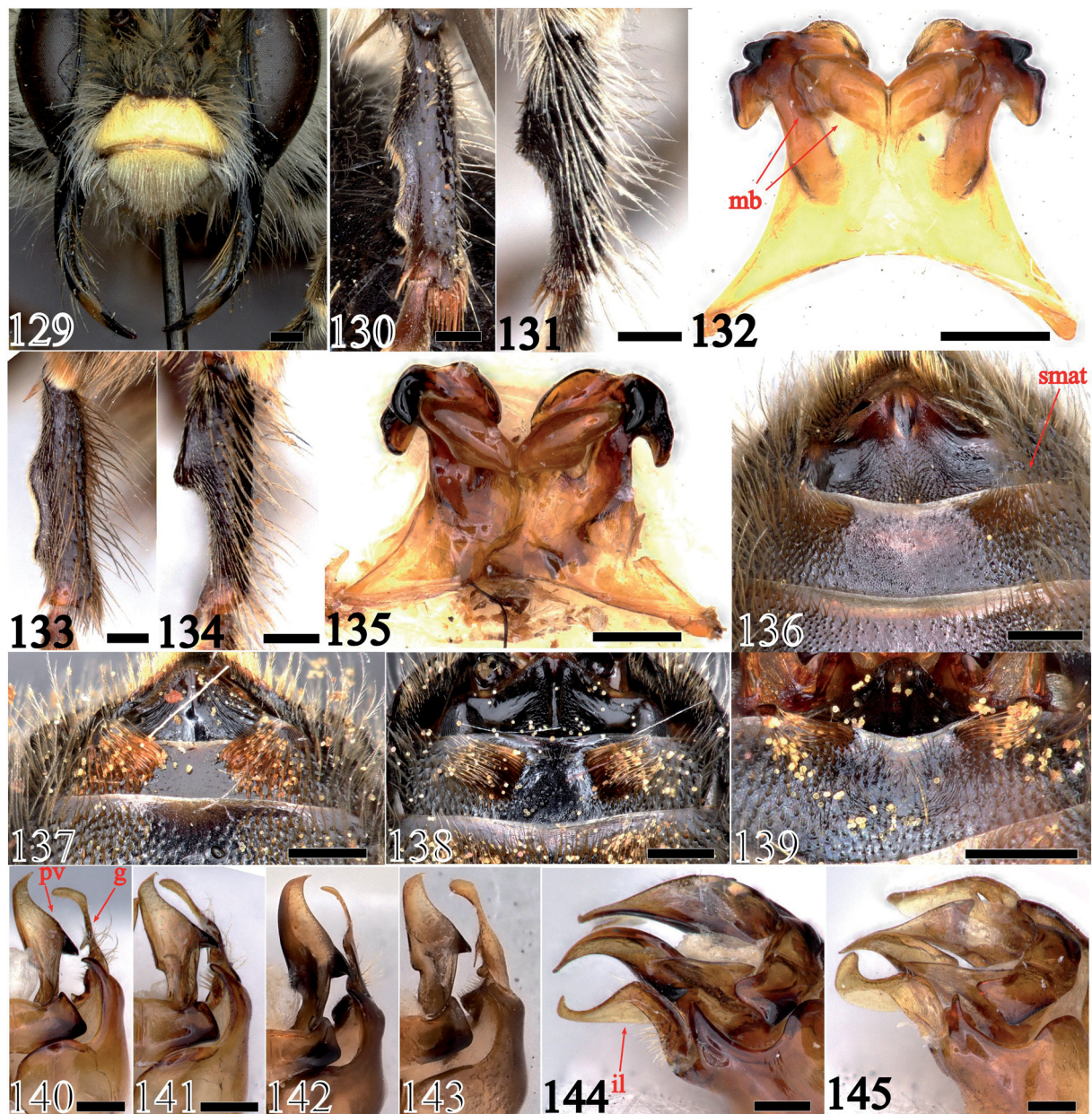
Figs 98–106. 98. *Eucera tricincta* Erichson, 1835, ♀, Slovakia, Kráľovský Chlmec (OLML), T1, T2. 99. *E. distinguenda* (Morawitz, 1875), ♀, Kasakhstan, SE of Aksay (OLML), T1, T2. 100. *E. rufa* (Lepeletier, 1841), ♀, Greece, Macedonia, 3 km W of Nea Karvali (CAD), T2–T4. 101. *E. hungarica* Friese, 1895, ♀, Hungary, Simontornya (OLML), T2–T4. 102. *E. ruficollis* (Brullé, 1833), ♀, Greece, Itea (OLML), T2, T3. 103. *E. plumigera* Kohl, 1905, ♀, Israel, Mt Hermon (CAD), T2, T3. 104. *E. obscura* (Brullé, 1833), ♀, Israel, Mt Gilboa', W of Merav (CAD), T2, T3. 105. *E. mediterranea* Friese, 1895, ♀, Israel, Tel Yizhaq S NR (CAD), T2, T3. 106. *Tetralonia malvae* (Rossi, 1790), ♀, France, Nicole, Lot-et-Garonne (CAD), tibial scopa. Scale bars = 0.5 mm.



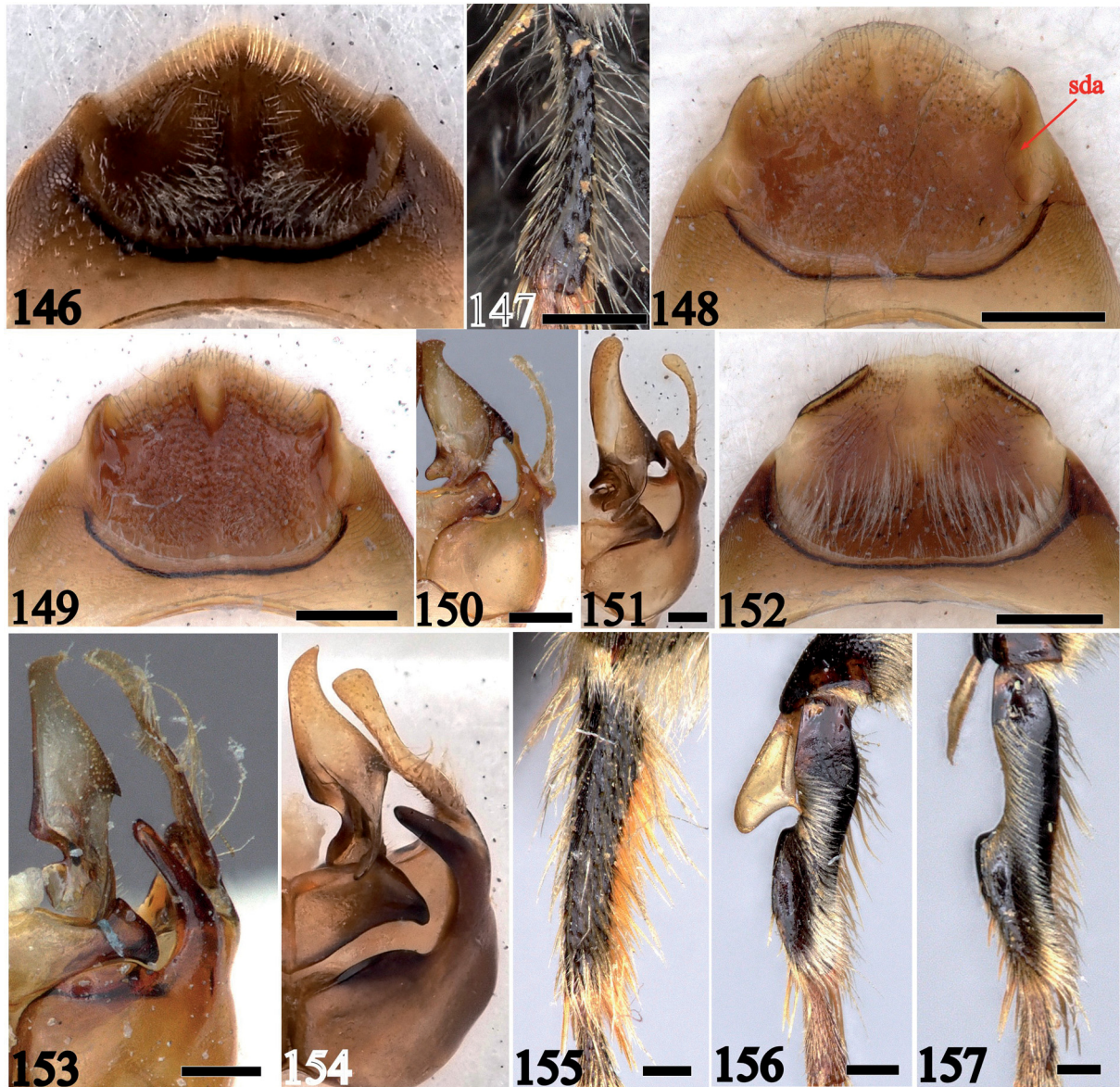
Figs 107–119. **107.** *Tetralonia malvae* (Rossi, 1790), ♀, France, Nicole, Lot-et-Garonne (CAD), mesonotum. **108.** *T. nana* Morawitz, 1873, ♀, Romania, Breazou (CAD), mesonotum. **109.** *T. fulvescens* Giraud, 1863, ♀, Kyrgyzstan, 10 km S of Sari-Tzelek (OLML), tibial scopa. **110.** *T. scabiosae* Mocsàry, 1880, ♀, Romania, Hagieni (CAD), tibial scopa. **111.** *T. lyncea* Mocsàry, 1879, ♀, Romania, Agigea (Collection Bogdan Tomozii, Museum of Natural Sciences Bacău, Romania), mesonotum. **112.** *T. fulvescens*, ♀, Czech Republic, Moravia, S of Pouzdrany (OLML), mesonotum. **113.** *T. salicariae* (Lepeletier, 1841), ♀, France, Saint-Sauveur, La Bouchasse (CAD), sternal brush. **114–116.** *T. dentata* (Klug, 1839), ♀, France, Vaucluse, Bonnieux (CAD). **114.** Mandible, lateral view. **115.** T1, T2. **116.** Sternal brush. **117–118.** *T. graja* (Eversmann, 1852), ♀, Israel, 1.8 km SE of Bet Rimon (CAD). **117.** Mandible, lateral view. **118.** T1, T2. **119.** *T. glauca* (Fabricius, 1775), ♀, Turkey, Nemrut Dagı Karadut (OLML), T1, T2. Scale bars = 0.5 mm.



Figs 120–128. **120.** *Tetralonia inulae* Tkalců, 1979, ♀, Slovakia, Štúrovo (OLML), clypeus (ms: malar space). **121.** *T. alticincta* (Lepeletier, 1841), ♀, Bulgaria, Balčik (OLML), clypeus (ms: malar space). **122.** *T. iberica* Dusmet, 1926, ♀, Spain, 25 km W of Toledo (OLML), clypeus. **123.** *T. pollinosa* (Lepeletier, 1841), ♀, France, Vaucluse, Bonnieux (CAD), T1–T3. **124.** *T. strigata* (Lepeletier, 1841), ♀, Morocco, Rabat (CAD), T1–T3. **125.** *T. scabiosae* Mocsàry, 1880, ♀, Romania, Hagieni (CAD), T1–T3. **126.** *T. cinctella* (Saunders, 1908), ♀, Spain, Andalusia, Málaga, Benaolán (CAD), T1–T3. **127.** *T. scabiosae* ♀, idem Fig. 125, mesonotum. **128.** *T. cinctella*, ♀, idem Fig. 126, mesonotum. Scale bars = 0.5 mm.



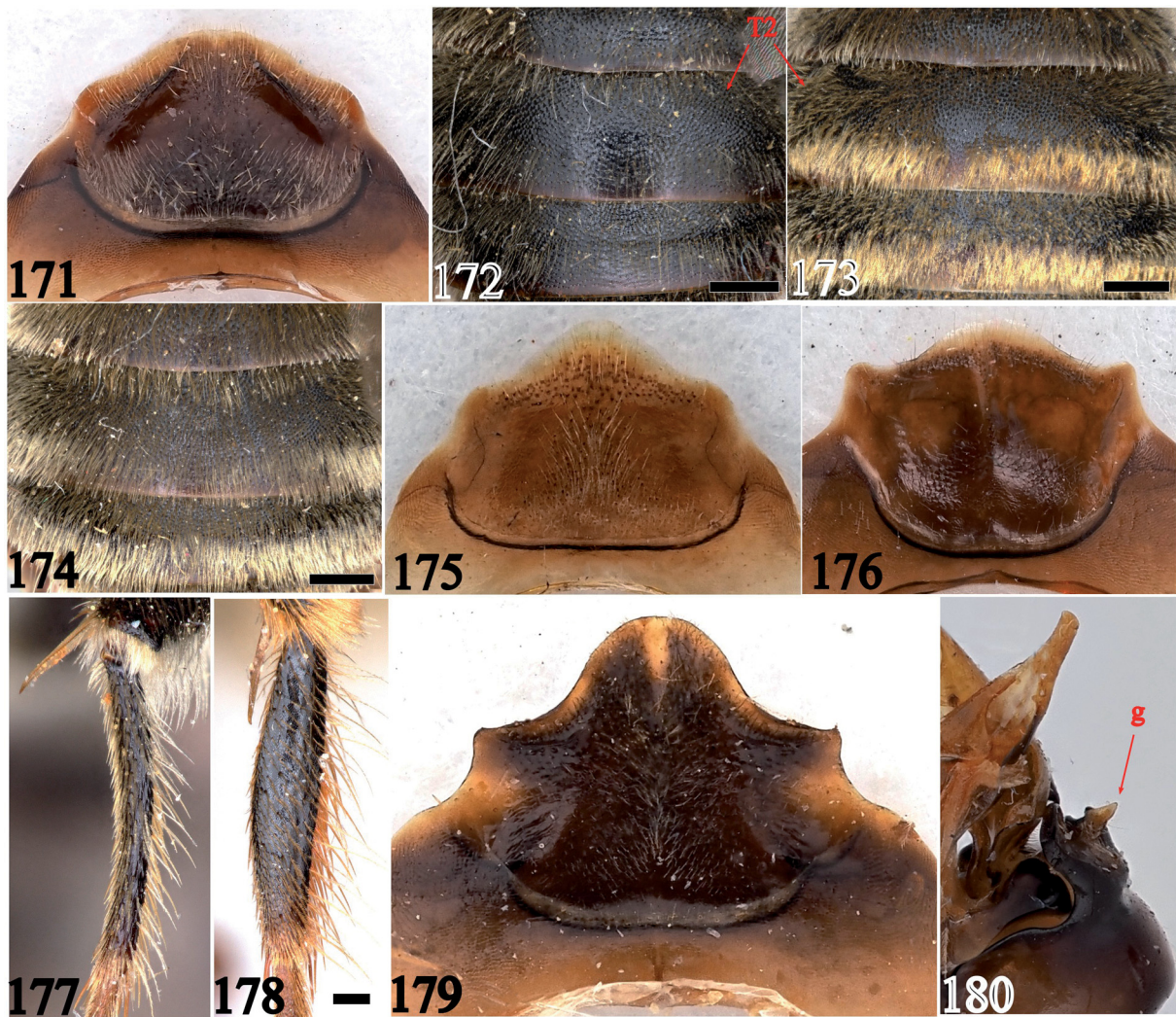
Figs 129–145. 129–132. *Eucera breviceps* Friese, 1911, ♂. 129. Turkey, 20 km N of Agri (OLML), clypeus, labrum. 130. Turkey, Kuyusak, Adyaman (OLML), hind basitarsus, lateral view. 131. Ibidem, middle basitarsus, lateral view. 132. Idem Fig. 129, S7, ventral view (mb: median buldges). 133–135. *E. morio* Friese, 1922, ♂, North Macedonia, Ohrid (OLML). 133. Hind basitarsus, lateral view. 134. Middle basitarsus, lateral view. 135. S7, ventral view. 136. *E. nigrifacies* Lepeletier, 1841, ♂, France, Var, Flassans-sur-Issole, Rouvède (UM), S5 (smat: submedial apical tufts). 137. *E. grisea* Fabricius, 1793, ♂, Morocco, Laanoucer (CAD), S5. 138. *E. pseudeucnemidea* Risch, 1997, ♂, Greece, Peloponnes, Lampeia (CAD), S5. 139. *E. penicillata* Risch, 1997, ♂, Cyprus, Akrotiri (CAD), S5. 140. *E. nigrifacies*, ♂, Algeria, S of Faidja (CAD), gonostylus (g), penis valve (pv). 141. *E. grisea*, ♂, idem Fig. 137, gonostylus, penis valve. 142. *E. pseudeucnemidea*, ♂, Israel, Yaqum (CAD), gonostylus, penis valve. 143. *E. penicillata*, ♂, Israel, S of Bet Oren (CAD), penis valve. 144. *E. pseudeucnemidea*, ♂, idem Fig. 142, gonostylus (il: inferior lamella), penis valves. 145. *E. penicillata*, ♂, idem Fig. 143, gonostylus, penis valves. Scale bars: 129–139 = 0.5 mm; 140–141, 144–145 = 0.25 mm.



Figs 146–157. **146.** *Eucera vulpes* Brullé, 1833, ♂, Israel, Netanya (CAD), S6. **147.** *E. laxiscopa* Alfken, 1935, ♂, Cyprus, Limassol, Polemidia NFP (CAD), hind basitarsus, dorsal view. **148.** *E. cineraria* Eversmann, 1852, ♂, Turkey, Yesilhisar, Keyseri (CAD), S6 (sda: smooth depressed area). **149.** *E. fasciata* Risch, 1999, ♂, Syria, 40 km NE of Damascus (OLML), S6. **150.** *E. cineraria*, ♂, gonostylus, idem Fig. 148, penis valve, dorsal view. **151.** *E. fasciata*, ♂, idem Fig. 149, gonostylus, penis valve, dorsal view. **152–153.** *E. dafnii* Dorchin, 2019, ♂, Israel, Yaqum (CAD). **152.** S6. **153.** Gonostylus, penis valve, dorsal view. **154.** *E. aequata* Vachal, 1907, ♂, Israel, 1.2 km NW of Bene Ziyon (CAD), gonostylus, penis valve, dorsal view. **155.** *E. clypeata* Erichson, 1835, ♂, Israel, Mt Hermon (CAD), middle basitarsus, dorsal view. **156.** *E. seminuda* Brullé, 1833, ♂, Slovakia, Štúrovo (OLML), middle basitarsus and tibial spur, dorsal view. **157.** *E. gaullei* Vachal, 1907, ♂, Israel, Mt Gilboa', Malkhishua' (CAD), middle basitarsus and tibial spur, dorsal view. Scale bars: 147–149, 152 = 0.5 mm; 150–151, 153, 155–157 = 0.25 mm.



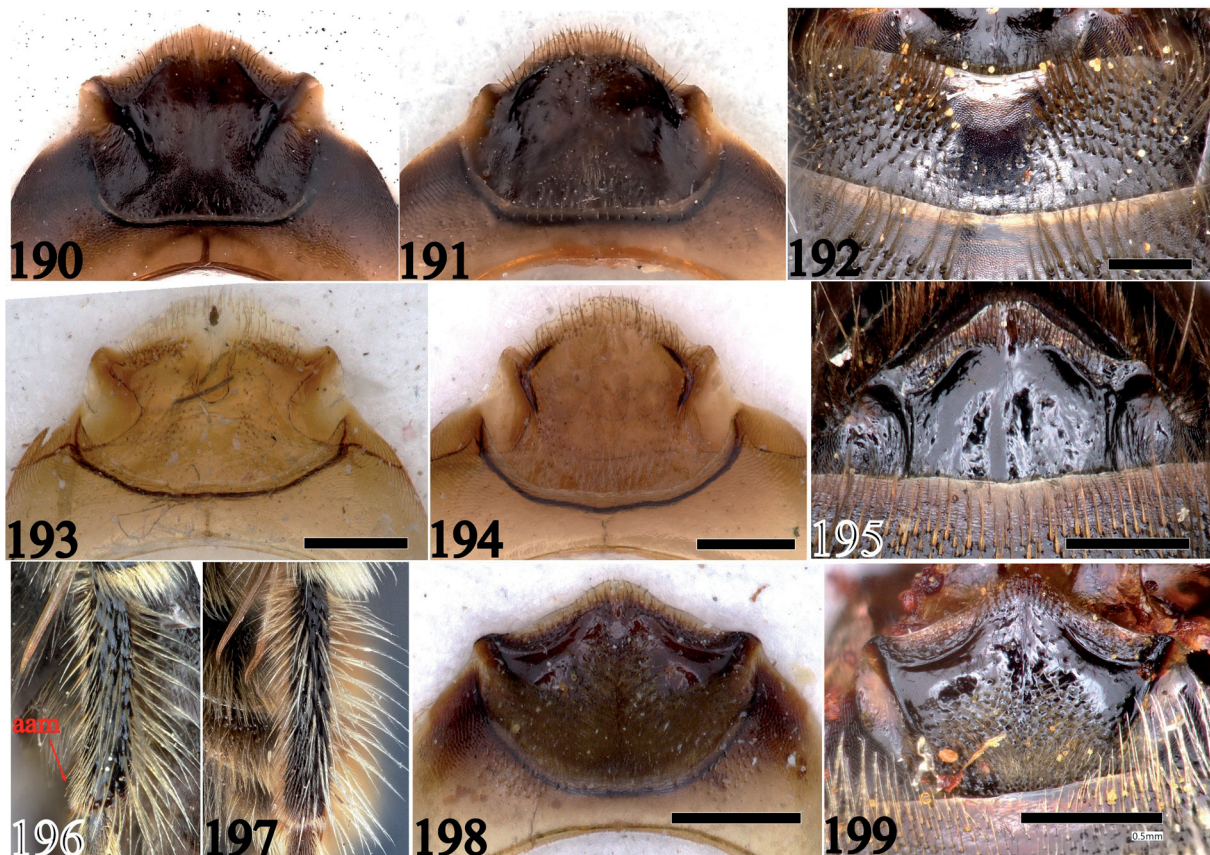
Figs 158–170. **158–159.** *Eucera gaullei* Vachal, 1907, ♂, Israel, Mt Gilboa', Malkhishua' (CAD). **158.** Middle tibia, (postero-)ventral view. **159.** Hind tibia and outer tibial spur, dorsal view. **160.** *E. seminuda* Brullé, 1833, ♂, Greece, Peloponnese, 35 km NW of Tripoli (CAD), hind tibia and outer tibial spur, anterodorsal view. **161–163.** *E. digitata* Friese, 1895, ♂, Turkey, Antalya, Side (CAD). **161.** Middle tibia, dorsal view. **162.** Middle basitarsus, dorsal view. **163.** Hind tibia, anterodorsal view. **164–165.** *E. excisa* Mocsàry, 1879, ♂, Armenia, Nshkhark, Selim Pass (CAD). **164.** Fore basitarsus, dorsal view. **165.** Middle basitarsus, dorsal view. **166–167.** *E. parachlypeata* Sitdikov, 1988, ♂, Israel, Nahal Zeva'im, 3.2 km NE of Bet HaShitta (CAD). **166.** S6. **167.** Genitalia (pvvl: penis valve ventral lobe), lateral view. **168.** *E. clypeata* Erichson, 1835, ♂, Israel, Mt Hermon (CAD), S6. **169.** *E. oblitterata* Pérez, 1895, ♂, Morocco, Ouled Ben (CAD), T2. **170.** *E. clypeata*, ♂, idem Fig. 168, T2, T3. Scale bars: 158–165, 167 = 0.25 mm; 166, 168–170 = 0.5 mm.



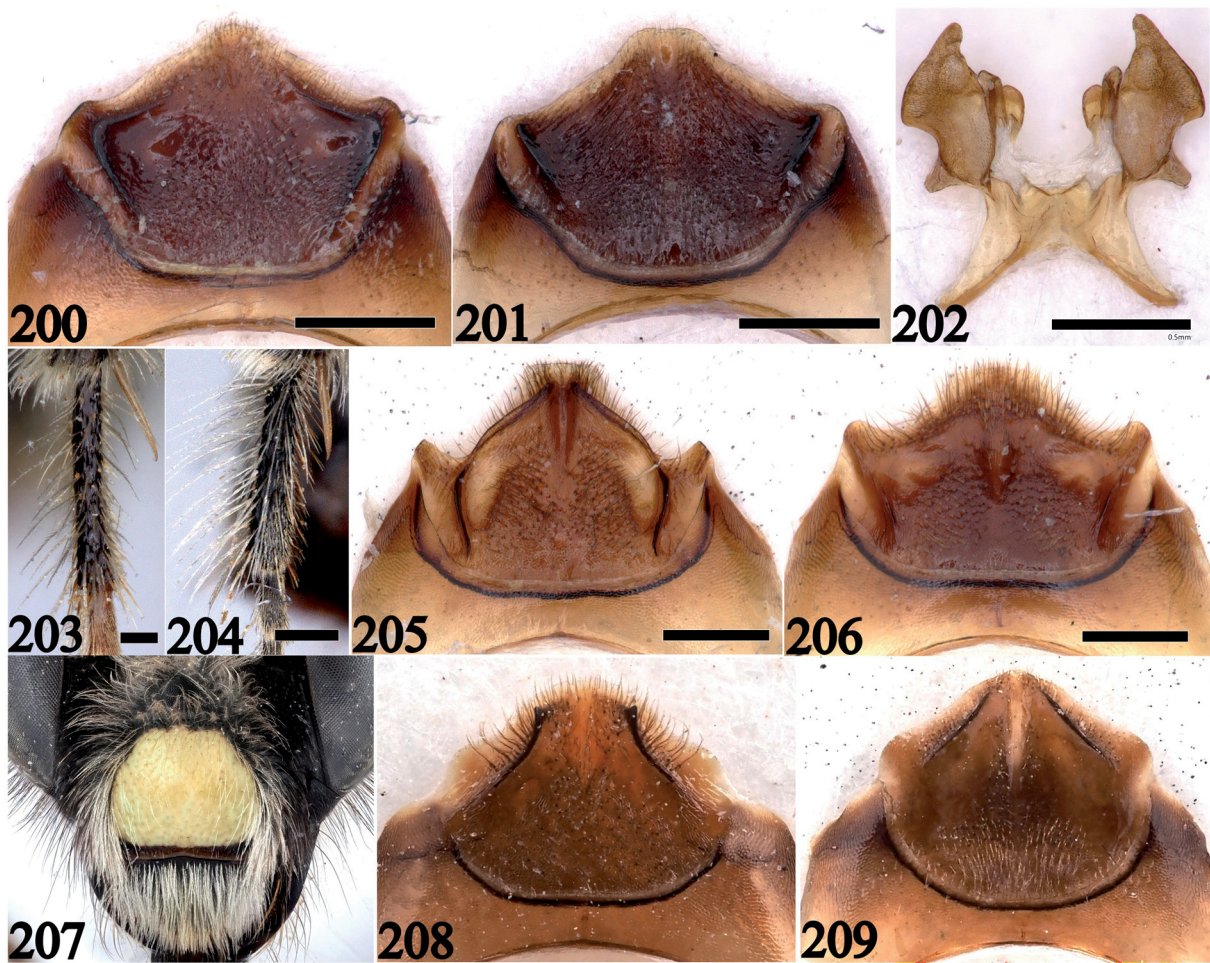
Figs 171–180. 171. *Eucera taurica* Morawitz, 1870, Kazakhstan, SE Aksay (OLML), S6. 172. *E. pannonica* Mocsàry, 1878, ♂, France, Agde (OLML), T2, T3. 173. *E. squamosa* Lepeletier, 1841, ♂, Israel, E of Lehavot HaBashan (CAD), T2, T3. 174. *E. taurica*, ♂, Croatia, Vodnjan (OLML), T2, T3. 175. *E. helvola* Klug, 1845, ♂, Turkey, Göreme (OLML), S6. 176. *E. taurea* Vachal, 1907, ♂, Israel (CAD), S6. 177. *E. fufurea* Vachal, 1907, Israel, Haifa University (CAD), ♂, middle basitarsus, dorsal view. 178. *E. barbiventris* Pérez, 1902, ♂, Spain, Murcia, Mula (CAD), middle basitarsus, dorsal view. 179–180. *E. fufurea*, ♂, idem Fig. 177. 179. S6. 180. Gonostylus (g). Scale bars = 0.5 mm.



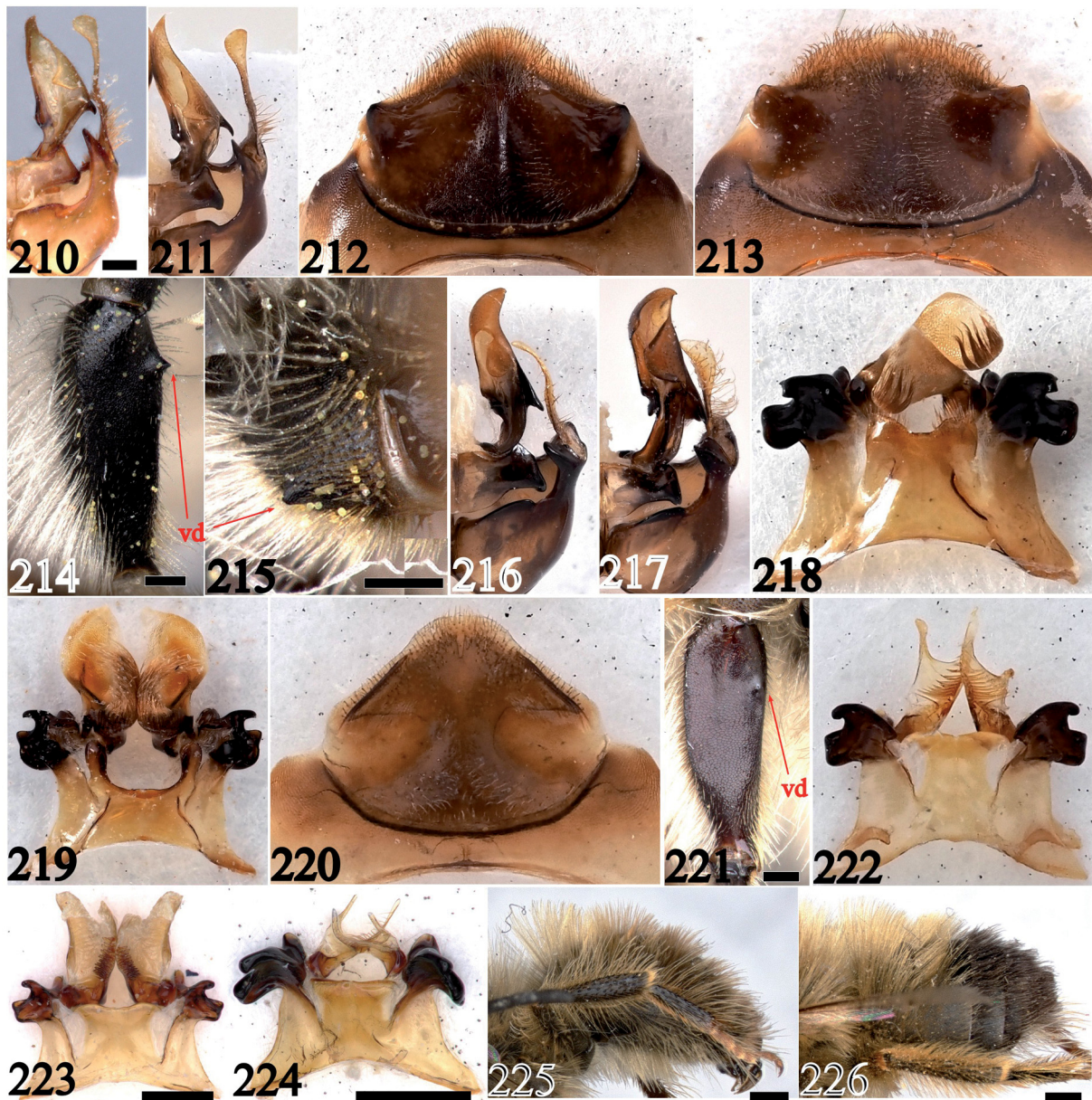
Figs 181–189. **181.** *Eucera furfurea* Vachal, 1907, ♂, Israel, Haifa University (CAD), S7 (pmp: posteromedial process). **182.** *E. barbiventris* Pérez, 1902, ♂, Spain, Murcia, Mula (CAD), S5, S6. **183.** *E. cypria* Alfken, 1933, ♂, Israel, ‘En Harod Ihud (CAD), malar region. **184–186.** ♂, *E. nigrescens* Pérez, 1879. **184.** Greece, Konitsa (CAD), malar region. **185.** Idem Fig. 114, malar region. **186.** France, Vaucluse, Bonnieux (UM), S6. **187.** *E. dalmatica* Lepeletier, 1841, ♂, France, Bormes, Les Mimosas L’Estagnol (UM), lower head region, frontolateral view. **188.** *E. numida* Lepeletier, 1841, ♂, Malta, Mellieha (CAD), clypeus. **189.** *E. proxima* Morawitz, 1875, ♂, Israel, Tel Yizhaq NR (CAD), clypeus. Scale bars = 0.5 mm.



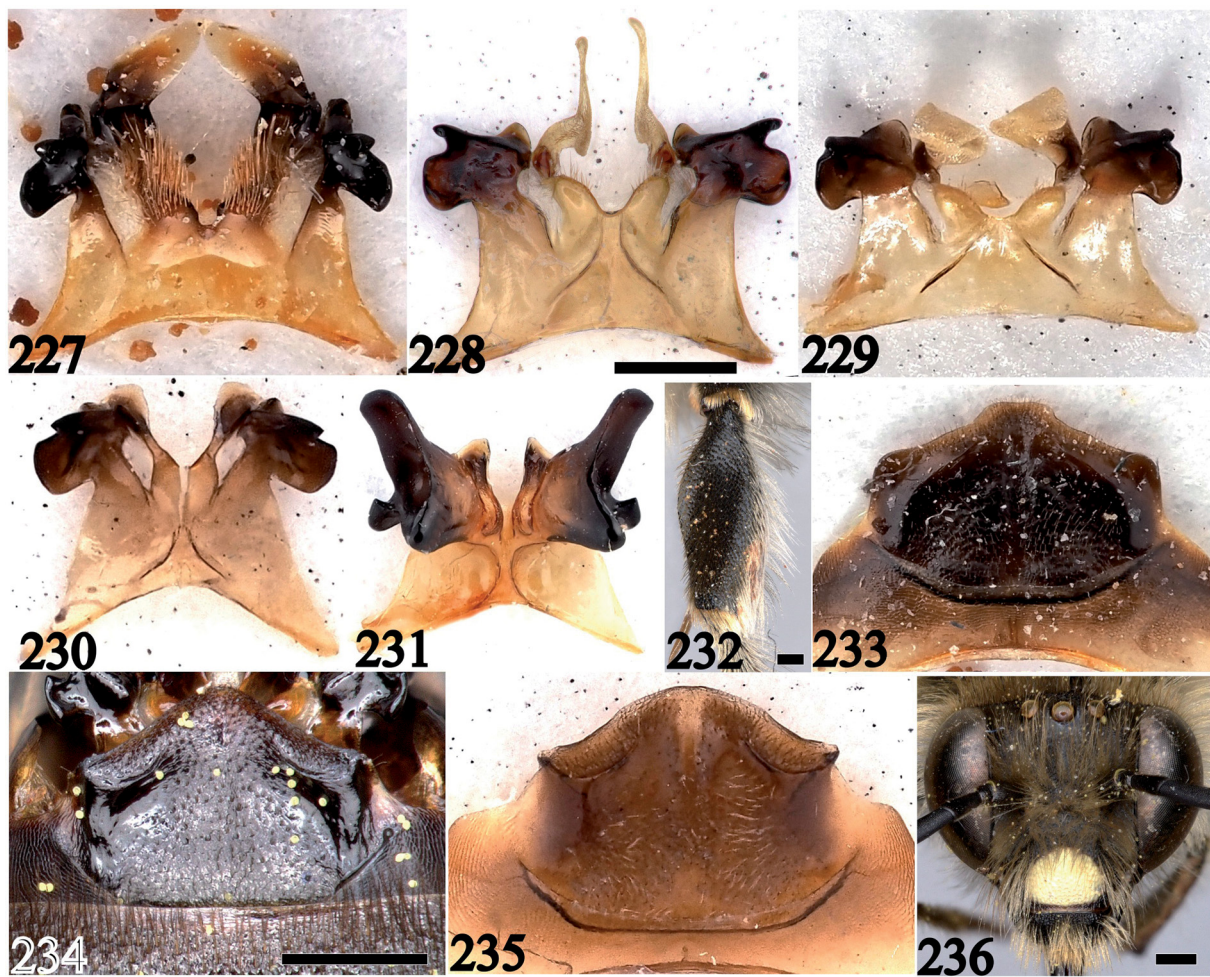
Figs 190–199. **190.** *Eucera numida* Lepeletier, 1841, ♂, Malta, Mellieha (CAD), S6. **191.** *E. proxima* Morawitz, 1875, ♂, Israel, Tel Yizhaq NR (CAD), S6. **192–193.** *E. interrupta* Bär, 1850, ♂. **192.** Greece, Macedonia, W of New Vrasna (CAD), S5. **193.** France, Ardèche, Saint Montan (CAD), S6. **194.** *E. punctulata* Alfken, 1942, ♂, Greece, Mesovouni (CAD), S6. **195–196.** *E. longicornis* (Linnaeus, 1758), ♂, Czech Republic, Bohemia, S of Dobrá Voda, Lusný rybník (CAD). **195,** S6. **196.** Hind basitarsus (aam: anteroapical margin), dorsal view. **197.** *E. pollinosa* Smith, 1854, ♂, France, Var, Gonfaron, La Tuilière d’Aille (UM), hind basitarsus, dorsal view. **198.** *E. bidentata* Pérez, 1887, ♂, Israel, Tel Yizhaq S NR (CAD), S6. **199.** *E. vittulata* Noskiewicz, 1936, ♂, Turkey, Kars, 20 km W of Sarikamis (OLML), S6. Scale bars = 0.5 mm.



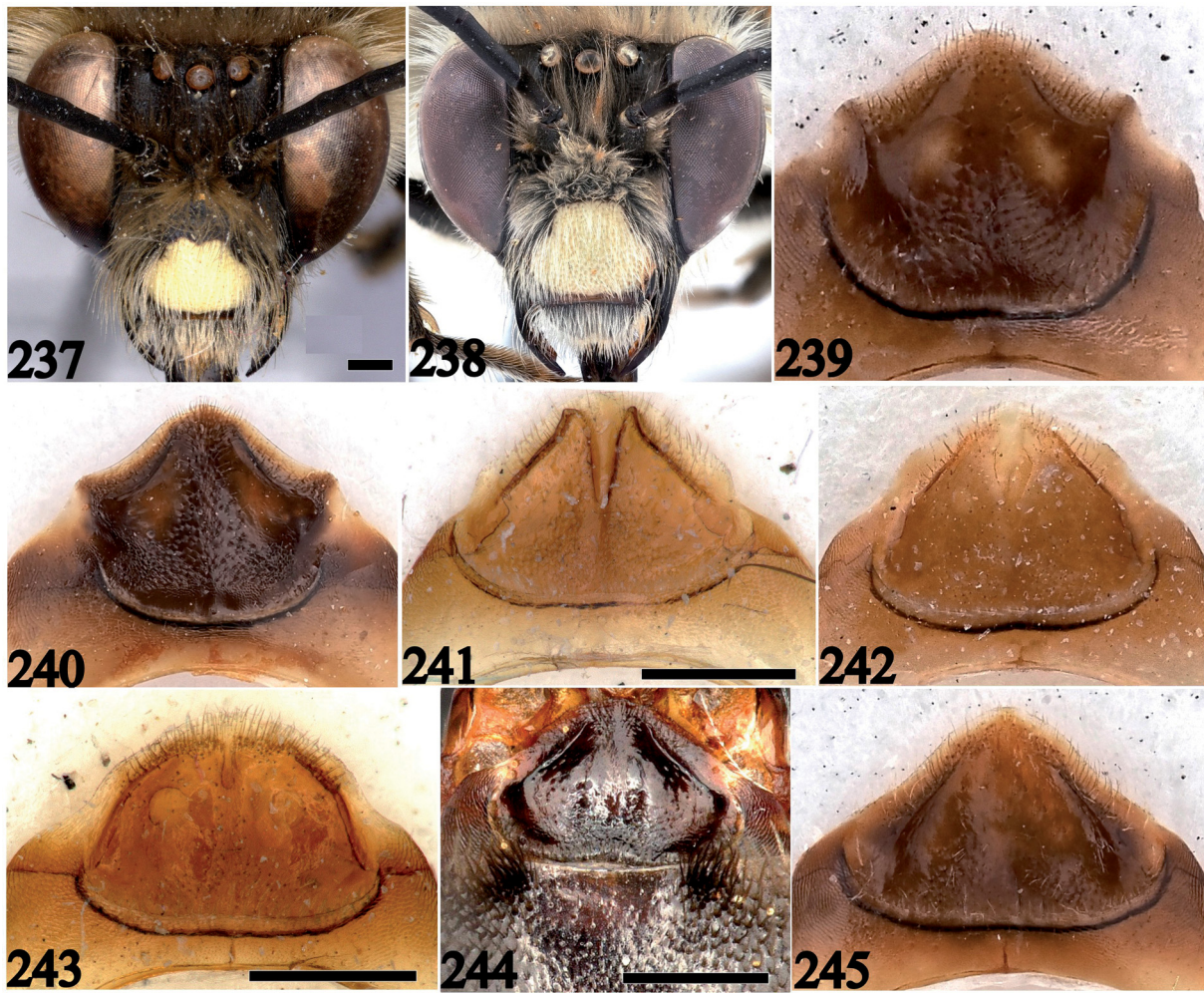
Figs 200–209. 200. *Eucera confinis* Pérez, 1895, ♂, Algeria, Tizi Ouzou, Makouda (CAD), S6. 201–202. *E. terminata* Pérez, 1895, ♂, Israel, Kharme Yossef (CAD). 201, S6. 202. S7. 203. *E. bidentata* Pérez, 1887, ♂, Israel, Tel Yizhaq S NR (CAD), hind basitarsus, dorsal view. 204. *E. vittulata* Noskiewicz, 1936, ♂, Turkey, Hakkari, Suvari-Halil Pass (OLML), hind basitarsus, dorsal view. 205. *E. caspica* Morawitz, 1873, ♂, France, Gruissan (CAD), S6. 206. *E. albofasciata* Friese, 1895, ♂, Israel, Yaqum (CAD), S6. 207. *E. nigrilabris* Lepeletier, 1841, ♂, Israel, SW of Tel Yizhaq (CAD), clypeus. 208. *E. kullenbergi* Tkalců, 1984, ♂, Israel, ‘En Perat, E ‘Anatot (CAD), S6. 209. *E. dimidiata* Brullé, 1833, ♂, Israel, Borot Loz, 20.7 km SE of Mizpe Ramon (CAD), S6. Scale bars: 200–202, 204–206 = 0.5 mm; 203 = 0.25 mm.



Figs 210–226. 210. *Eucera nigrilabris* Lepeletier, 1841, ♂, Israel, SW of Tel Yizhaq (CAD), gonostylus, penis valve. 211. *E. dimidiata* Brullé, 1833, ♂, Israel, Borot Loz, 20.7 km SE of Mizpe Ramon (CAD), gonostylus, penis valve. 212. *E. notata* Lepeletier, 1841, ♂, Morocco, Oueled Sghir (CAD), S6. 213. *E. algira* Lepeletier, 1841, ♂, Israel Geva’ot HaKhurkhar NP (CAD), S6. 214–216. *E. notata*, ♂, idem Fig. 212. 214. Middle femur (vd: ventral denticle), ventral view. 215. Hind trochanter (vd: ventral denticle), ventral view. 216. Gonostylus, penis valve. 217. *E. algira*, ♂, idem Fig. 213, gonostylus, penis valve. 218. *E. notata*, ♂, idem Fig. 212, S7. 219. *E. algira*, ♂, idem Fig. 213, S7. 220–222. *E. oraniensis* Lepeletier, 1841, ♂, Italy, Sardinia, Cagliari, Soleminis, 6 km S of Dolianova (CAD). 220. S6. 221. Middle femur (vd: ventral denticle), ventral view. 222. S7. 223. *E. colaris* Dours, 1873, ♂, Morocco, Rabat (CAD), S7. 224–225. *E. elongatula* Vachal, 1907, ♂, Spain, Arnes (CAD). 224. S7. 225. Metasoma, lateral view. 226. *E. colaris*, ♂, idem Fig. 223, metasoma, lateral view. Scale bars: 210, 214–215, 221 = 0.25 mm; 223–224 = 0.5 mm; 225–226 = 1 mm.



Figs 227–236. 227. *Eucera syriaca* Dalla Torre, 1896, ♂, Israel, Tiv'on (CAD), S7. 228. *E. hispana* Lepelletier, 1841, ♂, Algeria, Tissemsilt, Sidi Huari (CAD), S7. 229. *E. sogdiana* Morawitz, 1875, ♂, Uzbekistan, Angren, Cet Cuv (OLML), S7. 230. *E. parnassia* Pérez, 1902, ♂, Israel, 'Arad (CAD), S7. 231. *E. ebmeri* Risch, 1999, ♂, idem Fig. 227, S7. 232. *E. curvitaris* Mocsáry, 1879, ♂, idem Fig. 227, middle tibia, dorsal view. 233. *E. syriaca*, ♂, idem Fig. 227, S6. 234. *E. palaestinae* Friese, 1922, ♂, Cyprus, Limassol, Polemidia NFP (CAD), S6. 235. *E. sogdiana*, ♂, idem Fig. 229, S6. 236. *E. palaestinae*, ♂, idem Fig. 234, head, frontal view. Scale bars: 228, 234, 236 = 0.5 mm; 232 = 0.25 mm.



Figs 237–245. 237. *Eucera hispana* Lepeletier, 1841, ♂, Algeria, Tissemsilt, Sidi Huari (CAD), head, frontal view. 238. *E. sogdiana* Morawitz, 1875, ♂, Uzbekistan, Angren, Cet Cuv (OLML), head, frontal view. 239. *E. parnassia* Pérez, 1902, ♂, Israel, ‘Arad (CAD), S6. 240. *E. ebmeri* Risch, 1999, ♂, Israel, Tiv’on (CAD), S6. 241. *Tetralonia julliani* (Pérez, 1879), ♂, Bulgaria, Trakya, Plovdiv (OLML), S6. 242. *T. malvae* (Rossi, 1790), ♂, France, Nicole, Lot-et-Garonne (CAD), S6. 243. *T. salicariae* (Lepeletier, 1841), ♂, France, Saint-Sauveur, La Bouchasse (CAD), S6. 244. *T. nana* Morawitz, 1873, ♂, Romania, Breazou (CAD), S5, S6. 245. *T. pollinosa* (Lepeletier, 1841), ♂, Slovakia, Štúrovo (OLML), S6. Scale bars: 237, 241, 243–244 = 0.5 mm.



Figs 246–254. **246.** *Tetralonia dentata* (Klug, 1839), ♂, Italy, Sicily, Mt Madonie, 20 km SE of Collesange (CAD), S6. **247.** *T. strigata* (Lepeletier, 1841), ♂, Algeria, Tissemsilt, Sidi Huari (CAD), S6. **248.** *Eucera plumigera* Kohl, 1905, ♂, Israel, Tiv'on (CAD), S6. **249.** *E. rufa* (Lepeletier, 1841), ♂, Israel, Sha'ar Poleg NR (CAD), S6. **250.** *E. hungarica* Friese, 1895, ♂, Kazakhstan, 3 km S of Issik (OLML), S6. **251.** *E. obscura* (Brullé, 1833), ♂, Morocco, Rabat (CAD), S6. **252.** *E. velutina* (Morawitz, 1873), ♂, Kazakhstan, Sarepta (OLML), S6. **253.** *E. brachycera* (Gribodo, 1893), ♂, Israel, Dimona JCN (CAD), S6. **254.** *E. tricincta* Erichson, 1835, ♂, Israel, Nahal Sekher, 0.9 km NE of haNegev JCN (CAD), S6. Scale bars: 249, 253–254 = 0.5 mm.



Figs 255–267. **255.** *Tetralonia inulae* Tkalců, 1979, Hungary, W of Budapest, Töröbálint (CAD), ♂, hind femur (vp: ventral point), ventral view. **256–257.** *T. fulvescens* Giraud, 1863, ♂, Israel, Merom Golan (CAD). **256.** Antennal base. **257.** Gonostylus, penis valve. **258–259.** *T. alticincta* (Lepelletier, 1841), ♂, Bulgaria, Albena (OLML). **258.** Antennal base. **259.** Gonostylus, penis valve. **260.** *T. iberica* Dusmet, 1926, ♂, Spain, Cáceres, Nuñomoral (Collection Javier Ortiz-Sánchez, University of Almería, Spain), gonostylus, penis valve. **261.** *T. inulae*, ♂, idem, Fig. 255, S7. **262.** *T. julliani* (Pérez, 1879), ♂, Bulgaria, Trakya, Plovdiv (OLML), S7. **263.** *T. iberica*, ♂, idem Fig. 260, S7. **264.** *T. malvae* (Rossi, 1790), ♂, France, Nicole, Lot-et-Garonne (CAD), S7. **265.** *T. dentata* (Klug, 1839), ♂, Italy, Sicily, Mt Madonie, 20 km SE of Collesange (CAD), S7. **266.** *T. graja* (Eversmann, 1852), ♂, Greece, Aestos/Karystos (CAD), S7. **267.** *Eucera pollinaris* (Kirby, 1802), ♂, Serbia, Vojvodina, Lukino selo (OLML), head, frontal view. Scale bars: 255, 260–263 = 0.25 mm; 267 = 0.5 mm.



Figs 268–276. **268.** *Eucera rufa* (Lepeletier, 1841), ♂, Israel, Yaqum (CAD), middle tibia, anterodorsal view. **269.** *E. velutina* (Morawitz, 1873), ♂, Kazakhstan, Sarepta (OLML), middle tibia, ventral view. **270–271.** *E. ruficollis* (Brullé, 1833), ♂, Greece, Riachovo (CAD). **270.** Middle femur, ventral view. **271.** Middle basitarsus, dorsal view. **272.** *E. plumigera* Kohl, 1905, ♂, Israel, Tiv'on (CAD), middle basitarsus, dorsal view. **273.** *E. obscura* (Brullé, 1833), ♂, Morocco, Rabat (CAD), middle basitarsus, dorsal view. **274.** *E. mediterranea* Friese, 1895, ♂, idem Fig. 268, middle basitarsus, posterodorsal view. **275.** *E. obscura*, ♂, idem Fig. 273, S7. **276.** *E. mediterranea*, ♂, idem Fig. 268, S7. Scale bars: 269–270, 276 = 0.5 mm; 271–274 = 0.25 mm.