

# Identification of Western Palearctic *Dolichomitus* species (Hymenoptera: Ichneumonidae: Pimplinae)

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## KEY WORDS

*Dolichomitus*, Europe, identification key

Entomologische Berichten 70 (4): 111-127

Illustrated identification keys for both males and females of Western Palearctic *Dolichomitus* species are presented. *Dolichomitus excavatus*, *D. milleri* and *D. quercicolus* are described as new species. *Dolichomitus mesocentrus afghanator* Aubert, is raised to species level: *D. afghanator* Aubert, 1984. Based on examination of holotypes the following synonymies are established: *Paucdolichomitus baiamarensis* Constantineanu & Pisica, 1970 and *Paucdolichomitus birnovensis* Constantineanu & Pisica, 1970 are junior synonyms of *D. pterelas* (Say, 1829); *Dolichomitus mucronatus* Constantineanu & Pisica, 1970 is a junior synonym of *D. terebrans* (Ratzeburg, 1844); *Dolichomitus romanicus* Constantineanu & Pisica, 1970 is a junior synonym of *D. agnoscendus* (Roman, 1939); *Ephialtes speciosus* Hellén, 1915 is considered to be a junior synonym of *D. cognator* (Thunberg, 1824).

## Introduction

The genus *Dolichomitus* Smith, 1877 (Pimplinae: Ephialtini) comprises 27 species in the Western Palearctic region (Yu *et al.* 2005). The specialized structure of the ovipositor (box 1) plays a prominent role in identification keys and some keys only permit the identification of females. Previous keys (Townes & Townes 1960, Constantineanu & Pisica 1970, Kasparyan 1981, Fitton *et al.* 1998, Mevi-Schütz *et al.* 2006) do not include all Western Palearctic species and some of them treat females only. This paper presents keys for both males and females, three new species are described and five new synonymies are established. One sub-species is raised to species level.

## Imaging techniques

The illustrations were made in the course of a few years in the Zoologische Staatssammlung München (ZSM) and are the result of stacking photography, mainly with two types of equipment. (i) The ovipositor photos were made with an Olympus SZX12 stereomicroscope with manual focusing (Camera: Jenoptik Prog Res C12 with Prog Res Capturepro 2.5 capture software). The required diffuse illumination was provided by an energy saving lamp, a Philips Master PL Electronic 27 W. (ii) The pictures of the male valves were taken with a Keyence VHX600 Digital Microscope, with objective VH-220 and built-in diffuse illumination. Stacking of the individual photographs was done with CombineZM software (see <http://www.hadleyweb.pwp.blueyonder.co.uk/>). Additional photo editing was done with GIMP (see <http://www.gimp.org>).

## Systematics

*Dolichomitus* females are not the only pimpline species with long ovipositors; some species of other genera share this character

and can easily be mistaken for a *Dolichomitus* species. In general the other genera lack the typical oblique basolateral furrows on the second metasomal tergite, or they show very weak furrows. Genera which are most likely to be mistaken for *Dolichomitus* can be recognised as follows: (i) *Atractogaster*: facial orbits and malar space between mandible and compound eye yellow (black in *Dolichomitus*) and metasoma matt, without punctation. (ii) *Ephialtes*: characterized by a very broad clypeus which is about three times as wide as high, red-brown in females and yellowish in males. In females the first tergite is about half as long as the second tergite (in *Dolichomitus* about equally long). In males the fore wing costa, and only the costa, is covered with long curled setae from base to pterostigma. (iii) *Liotryphon*: upper valve of ovipositor with minute teeth at apex. Lower valve does not enclose the upper valve.

*Townesia tenuiventris*, *Paraperithous gnathaulax* and *Liotryphon strobilellae* are included in the keys because they resemble *Dolichomitus* species more closely than the species of the above mentioned genera.

## Keys to *Dolichomitus* species

The following abbreviations are used in the keys:

Fwl = length of fore wing in mm, measured from the edge of the tegula to the apex of the wing.

Ha = upper hind angle of pronotum.

Htrs3/flg1 = length of segment 3 of hind tarsus divided by the length of the first flagellomere.

Htrs5/3 = length of last segment of hind tarsus divided by segment 3.

Lwfem3 = length of the hind femur, divided by its greatest width in lateral view.

Lwtrg1 = length of tergite 1 divided by apical width. The length is taken in lateral view from the subbasal position

**Box 1**

In general, the body of *Dolichomitus* species is black and the legs are red. Most *Dolichomitus* species are ectoparasitoids of xylophagous Coleoptera larvae, usually Cerambycidae. In order to reach the concealed host the *Dolichomitus* female is equipped with a long ovipositor. At rest the ovipositor is covered by a pair of sheaths. They are used for the location of the drilling position. The ovipositor consists of a central part and two attached sliding parts (valves) which can move longitudinally with respect to the central part (Lyngnes 1960). At the end of the lower valves, special tooth-like structures and grooves are present that support the penetration process into the wood where the host larva lives. Penetration takes place by alternating push and pull movements of the two lower valves, a process which is usually called 'drilling'. During drilling the sheaths do not enter the wood and they can be kept in various positions. Sometimes they remain near the entrance spot, sometimes they are pointed upward. With their rather large and slender appearance and the long ovipositor, the females are conspicuous and comprise some of the largest Pimplinae. Therefore, they can easily be observed when drilling into the wood. Males, however, are much smaller and inconspicuous and this probably contributes to their relative scarcity in entomological collections.

A *Dolichomitus* species (possibly *D. mesocentrus*). Photo: Cor Zonneveld  
Een *Dolichomitus*-soort (mogelijk *D. mesocentrus*).



where the height of the petiole is minimal, to the apex of the segment. In other tergites it is the maximum length divided by the apical width.

$Ovp/fw$  = length of ovipositor sheath divided by the length of the fore wing.

$Trg1/fem3$  = length of tergite 1 divided by the length of the hind femur.

$Trg1/htrs1$  = length of tergite 1 divided by the length of the first segment of the hind tarsus.

The relative length of the flagellum is presented as: 'Flag 33-35:  $trg3-4$ '. This means: flagellum with 33 to 35 articles and as long as mesosoma + tergites 1 to 3 or 4. Extra information which further confirms the identification of a species but which is not unique in the context of a couplet is given in a smaller typeface. The values given for the relative magnitudes represent the 'normal' range as measured in specimens with a 'normal' size. In exceptionally small or large specimens these values can be outside the range as given here.

**A: Females**

The ovipositor consists of a central upper valve and two lower valves which apically partly enclose the upper valve. The two lower valves can move longitudinally with respect to the upper valve and to one another. In *Dolichomitus* the lower valve has a subapical dorsal lobe that partly encloses the upper valve. This extension represents a widening of the ovipositor (best seen in dorsal view) and is usually well delimited both basally and apically (cf. figure 7). In a few species the lobe is not delimited apically but gradually develops into the apical teeth (cf. figure 10). On this dorsal lobe, two different transverse structures can be present: grooves and ridges. Grooves are deepening in the surface of the lobe, reach the dorsal edge of the lobe and cross through this edge (cf. figures 8, 9). The number and shape of the grooves is an important character in the identification of the females. At the distal end the lobe is usually delimited by a groove of variable dorsal extension. Though this groove does not always reach the upper edge of the lobe it is included in the number of grooves given in the key. In some species, especially in the *imperator* group, there are also a few ridges on the

basal part of the dorsal lobe (cf figures 1-3). In addition to these ridges, in some species the basal limit of the widening lobe itself can give the impression of a sharp edge but this can also depend on the angle of illumination of the specimen (cf. figures 1, 10, 16) and in other species the lobe just widens gradually and

presents no extra structure at its front (cf. figure 22). In counting the grooves this front edge, when present, is not included in the number of grooves given in the key. Beyond the dorsal lobe the lower valve bears a number of teeth which become gradually smaller towards the apex of the ovipositor.

1	Dorsal lobe with only one convexly bent groove at the apex and a ridge at base (figs 1-3) . . . . .	2
–	Dorsal lobe with more (straight) grooves cf. figures 4, 7, 10 . . . . .	4
2	Flagellum short, with 21-25 articles and at most as long as mesosoma + tergites 1+2. Dorsal lobe with a strong, reclivous front edge and a strong parallel ridge giving the impression of a double front edge (figure 1). Tergites 2 and 3 closely punctate without aciculation. Propodeum without well defined median longitudinal carinae. Lower tooth of mandible often slightly longer than upper tooth. Pterostigma variable. Trg1 weakly rugulose. Head parallel to buccate. Ha black. Fwl = 7-17.5. Lwtrg1 = 1.3-1.6. Lwtrg2 = 1.0-1.3. Trg1/htrs1 = 1. Trg1/fem3 = 0.7-0.9. Lwfem3 = 4.9-5.3. Htrs3/flg1 = 1.0-1.3. Htrs5/3 = 0.7-0.9. . . . . .	<i>D. curticornis</i> (Perkins, 1943)
–	Flagellum with at least 30 articles. Front edge of lobe simple or absent (figures 2, 3) . . . . .	3
3	Tergites 2 and 3 minutely punctate and with fine aciculation. Propodeum with strong median longitudinal carinae over about 0.6 × its length. Segment 3 of hind tarsus 0.9-1.3 × as long as first flagellomere. Ovipositor 1.7-2.2 × as long as fore wing. Pterostigma fuscous. Flagellum with 34-39 flagellomeres and as long as mesosoma + tergites 1-2(3). Trg1 rugulose. Head narrowed. Front edge rather strong (figure 2). Fwl = 11.0-21.0. Lwtrg1 = 1.8-2.3. Lwtrg2 = 1.4-1.9. Trg1/htrs1 = 0.9-1.0. Trg1/fem3 = 0.7-1.0. Lwfem3 = 5.2-6.4. Htrs5/3 = 0.5-0.8. . . . . .	<i>D. imperator</i> (Kriechbaumer, 1854)
–	Tergites 2 and 3 closely punctate without aciculation. Combined area basalis and area superomedia smooth, without well defined median longitudinal carinae. Segment 3 of hind tarsus 0.7-0.8 × as long as first flagellomere. Ovipositor 1.1-1.4 × as long as fore wing. Pterostigma yellowish-grey. Flagellum with 30-34 flagellomeres and as long as mesosoma + tergites 1-3(4). Trg1 punctate in apical half. Head parallel to buccate. Front edge rather weak (figure 3). Fwl 10.5-14.8. Lwtrg1 = 1.6-1.9(2.2). Lwtrg2 = 1.0-1.2. Trg1/htrs1 = 0.9-1.1. Trg1/fem3 = 0.7-0.9. Lwfem3 = 5.1-5.4. Htrs5/3 = 0.9-1.1. . . . . .	<i>D. pterelas</i> (Say, 1829)
4	Dorsal lobe on ventral valve with only 1 or 2 inclivous grooves (figures 4, 5) Dorsal valve with minute teeth apically . . . . .	5
–	Dorsal lobe on ventral valve with at least 3 grooves which are usually vertical or reclivous (figures 6, 8, 23) . . . . .	6
5	Dorsal lobe with 2 grooves (figure 4). Coxae red. Head with temples strongly narrowed in dorsal view. Tergite 2 densely punctate, distance between punctures usually less than their diameter. Ovipositor 2.4-2.7 × as long as fore wing. First tergite 1.6-2.1 × as long as wide. Segment 5 of hind tarsus 0.6-0.7 × as long as segment 3. Nervulus usually basal of basal vein. Fwl = 10.5-12.3. Lwtrg2 = 1.9-2.1. Trg1/htrs1 = 0.8-0.9. Trg1/fem3 = 0.5-0.6. Lwfem3 = 6.3-7.1. Htrs3/flg1 = 0.8-0.9. Flag 33-35: trg3-4. . . . . .	<i>Townesia tenuiventris</i> (Holmgren, 1860)
–	Dorsal lobe with 1 groove and a strong front edge (figure 5). Coxae black. Head with temples parallel to buccate in dorsal view. Tergite 2 rather sparsely punctate, distance between punctures equal to their diameter. Metasoma rather polished. Ovipositor 1.9 × as long as fore wing. First tergite 1.5 as long as wide. Segment 5 of hind tarsus 1.2-1.3 as long as segment 3. Nervulus opposite basal vein. . . . . .	<i>Liotryphon strobilellae</i> (Linnaeus, 1758)
6	Mandible coarsely longitudinally striate. Head with temples strongly narrowed in dorsal view, cf. figure 60. Dorsal valve with minute teeth apically. Dorsal lobe with 3 slightly inclivous grooves (figure 6). Pterostigma with fuscous front margin, greyish centrally. Fwl = 7.6-13. Ovp/fw = 1.5-1.7. Lwtrg1 = 1.5-1.7. Lwtrg2 = 1.1-1.3. Trg1/htrs1 = 1.1-1.2. Trg1/fem3 = 0.6-0.7. Lwfem3 = 4.5-5.0. Htrs3/flg1 = 0.7-0.8. Htrs5/3 = 1.2-1.3. Flag 28-34: trg(0.5-1)×3. . . . . .	<i>Paraperithous gnathaulax</i> (Thomson, 1877)
–	Mandible weakly sculptured, not coarsely striate. Head with temples less strongly narrowed. Dorsal valve without teeth . . . . .	7
7	Ovp/fw at least 2.4 . . . . .	8
–	Ovp/fw at most 2.2 . . . . .	10
8	Metasoma densely punctate. Dorsal lobe with 7 vertical grooves (figure 7). Pterostigma yellowish. Median longitudinal carinae about 0.4 × as long as propodeum. Frons trans-striate. Femur 3, tibia 3 and tars 3 red, not fuscous Fwl = 14.5-20. Ovp/fw = 2.7-3.4. Lwtrg1 = 1.6-1.9. Lwtrg2 = 1.1-1.3. Trg1/htrs1 = 0.9-1.0. Trg1/fem3 = 0.7-0.8. Lwfem3 = 4.7-5.5. Htrs3/flg1 = 0.7-0.8. Htrs5/3 = 1.3-1.4. Flag 41-45: trg0.5x5-0.5x6. . . . . .	<i>D. atratus</i> (Rudow, 1881)
–	Metasoma finely transverse aciculate. Stigma brown-fuscous. Median longitudinal carinae weak or absent . . . . .	9
9	Dorsal lobe well delimited apically and with 3 grooves (figure 8). Ventral valve with minute tubercles over its entire length (look for these with the ovipositor tip pointing to the light source). Ovipositor 2.6-3.2 × as long as fore wing. First tergite 1.0-1.1 × as long as first segment of hind tarsus. Tergites 2 and 3 elongate. Median longitudinal carinae sometimes present as more or less well developed ridges. Fwl = 11.5-15.3. Ovp/fw = 2.6-3.2. Lwtrg1 = 1.5-1.8. Lwtrg2 = 1.1-1.5. Trg1/fem3 = 0.8. Lwfem3 = 4.0-5.3. Htrs3/flg1 = 0.6-0.8. Htrs5/3 = 1.1-1.4. Flag 34-35: trg3-4. . . . . .	<i>D. aciculatus</i> (Hellén, 1915)



Dorsal lobe gradually tapering, not delimited apically and with a sharp front edge (figure 10). Ventral valve smooth. Ovipositor 3.7-5.6 × as long as fore wing. First tergite 0.7-0.8 as long as first segment of hind tarsus. Tergites 2 and 3 square – transverse. Median longitudinal carinae absent.

Fwl = 10.5-17.0. Ovp/fw = 3.7-5.4. Lwtrg1 = 1.3-1.5. Lwtrg2 = 0.8-1.0. Trg1/fem3 = 0.7-0.8. Lwfem3 = 4.3-4.6. Htrs3/flg1 = 0.8-0.9. Htrs5/3 = 1.0-1.1. Flag 35-38: trg4-5.

- ..... *D. cephalotes* (Holmgren, 1860)
- 10 Lower tooth of mandible longer than upper tooth AND basal grooves on dorsal lobe strongly reclivous (figures 11-18) ..... 11
- Lower tooth of mandible as long as upper tooth OR grooves vertical or inclivous ..... 19
- 11 Propodeum and metasoma polished, almost without punctation. First tergite 2.6-2.9 × as long as wide.  
Ha brown. Head parallel. Frons smooth. Dorsal lobe weakly delimited (figure 11). Combined area basalis and area superomedia smooth without well defined median longitudinal carinae. Fwl = 13.2-14.4. Ovp/fw = 1.7-1.9. Lwtrg2 = 1.9-2.1. Trg1/htrs1 = 1.0-1.2. Trg1/fem3 = 0.9. Lwfem3 = 6.2-6.3. Htrs3/flg1 = 0.9-1.0. Htrs5/3 = 0.7-0.8. Flag 32: trg(0.5-1)x2.  
..... *D. nitidus* (Haupt, 1954)
- Metasoma punctate. First tergite at most 2.4 × as long as wide. .... 12
- 12 Upper hind corner of pronotum with a yellow line.  
Pterostigma fuscous. Head with frons and vertex, mesoscutum and scutellum densely punctate. First tergite evenly convex and evenly closely punctate over its entire surface. Dorsal lobe with 3 grooves and a strong front edge (figures 12-13). Tegulae yellow ..... 13
- Upper hind corner of pronotum black or with a yellow spot ..... 14
- 13 Upper hind corner of pronotum with yellow line only along its upper edge. Metasoma black. Head with temples parallel. All coxae red. Dorsal lobe see figure 12. Median longitudinal carinae of propodeum present as ridges of variable development, from 0.6 × propodeum to absent.  
Fwl = 7.0-11.8. Ovp/fw = 1.4-2.1. Lwtrg1 = 1.2-1.4. Lwtrg2 = 0.9-1.3. Trg1/htrs1 = 0.9-1.1. Trg1/fem3 = 0.6-0.7. Lwfem3 = 4.7-5.6. Htrs3/flg1 = 0.7-0.9. Htrs5/3 = 0.8-1.0(1.2). Flag 24-28: trg(0.3-1)x3.  
..... *D. kriebbaumeri* (Schulz, 1906)
- Upper hind corner of pronotum yellow in upper third. Metasoma orange-red. Tergites 2-4 black in apical 0.2. Head with temples roundly constricted in dorsal view. Fore and middle coxae and all trochanters and trochantelli yellow, hind coxa red. Dorsal lobe see figure 13. Combined area basalis and area superomedia rather smooth without well defined median longitudinal carinae.  
Tibia 3 reddish-fuscous. Fwl = 9.6. Ovp/fw = 1.5. Lwtrg1 = 1.4. Lwtrg2 = 1.1. Trg1/htrs1 = 1.06. Trg1/fem3 = 0.7. Lwfem3 = 5.14. Htrs3/flg1 = 0.7. Htrs5/3 = 1.06. Flag 28: trg2. Madeira.  
..... *D. lateralis* (Wollaston, 1858)
- 14 Lower tooth of mandible blunt and very large (figure 61). Dorsal lobe with a strong front edge and not delimited apically, with all grooves strongly reclivous (figures 14, 15). Head slightly buccate in dorsal view (cf. figure 63).  
Pterostigma fuscous. Median longitudinal carinae present over about 0.25 of propodeum ..... 15
- Lower tooth of mandible pointed and smaller. Dorsal lobe well differentiated apically. Only basal grooves reclivous (figures 16-18).  
Pterostigma greyish to fuscous ..... 16
- 15 Upper hind angle of pronotum black. Tegula fuscous to black. Frons trans-striate. Mesoscutum and scutellum closely punctate. Tergites 2-5 completely closely punctate over their entire surface, punctures touching one another, dull. Hind coxa with dorsal depression at apex only. Dorsal lobe see figure 14. Flagellum with 30-32 articles and as long as mesosoma + tergites 1- 2(3).  
Fwl = 11.5-12.8. Ovp/fw = 1.4-1.6. Lwtrg1 = 1.2-1.4. Lwtrg2 = 0.9-1.0. Trg1/htrs1 = 1.0-1.2. Trg1/fem3 = 0.7-0.8. Lwfem3 = 3.9-4.4. Htrs3/flg1 = 0.7-0.9. Htrs5/3 = 1.0-1.1.  
..... *D. mordator* (Aubert, 1965)
- (If first tergite evenly convex and evenly closely punctate over its entire surface, lwfem3 = 4.7-5.6 and mesopleurum densely punctate cf. *kriebbaumeri* without yellow line in upper hind angle of pronotum).
- Upper hind angle of pronotum yellow. Tegula yellowish. Frons smooth, shiny. Mesoscutum and scutellum smooth, virtually impunctate. Tergite 2 punctate only in basal half and distance between punctures about equal to their diameter. Tergites 3 and 4 in apical half impunctate, polished. Hind coxa with dorsal longitudinal depression from apex to base. Dorsal lobe see figure 15. Flagellum with 37 articles and as long as mesosoma + tergites 1-4.  
Fwl = 9.2-10.7. Ovp/fw = 1.5-1.6. Lwtrg1 = 1.3. Lwtrg2 = 1. Trg1/htrs1 = 1. Trg1/fem3 = 0.7. Lwfem3 = 3.9-4.0. Htrs3/flg1 = 0.8. Htrs5/3 = 1.  
..... *D. milleri* n. sp.
- 16 Dorsal lobe with 3 grooves and a strong front edge (figures 16, 17). Propodeum without median longitudinal carinae. First tergite closely punctate in apical half of median part and on lateral part.  
Coxae, trochanters and trochantelli red ..... 17
- Dorsal lobe with 4 grooves (figures 18, 27). Median longitudinal carinae about 0.6 × as long as propodeum. First tergite at most punctate in apical half of median part and rugulose on lateral part.  
Pterostigma fuscous. Head with temples parallel ..... 18
- 17 Nervellus usually vertical and intercepted at or slightly above the middle. Dorsal lobe weakly separated from apical teeth, as in figure 16. Head with temples convexly narrowed in dorsal view. Pterostigma greyish at the centre. Tergites 1-4 elongate. Tibia 3 usually fuscous, sometimes with basal 0.1 cream. Frons smooth - trans-striate. Ha yellow. Fwl = 5.5-10.5. Ovp/fw = 1.2-1.9. Lwtrg1 = (1.3)1.6-2.3. Lwtrg2 = 1.1-1.8. Trg1/htrs1 = 1.0-1.2. Trg1/fem3 = 0.7-0.8(1.0). Lwfem3 = (4.7)5.1-6.3. Htrs3/flg1 = 0.6-0.9. Htrs5/3 = 0.8-1.1. Flag 23-29: trg2-0.5x3.  
..... *D. agnoscendus* (Roman, 1939)
- (If dorsal lobe not differentiated apically, tergites 2-4 square and trg1 shorter than trg2: cf. *terebrans*)



1-29. Ovipositor tips in lateral view / Einden van ovipositors in lateral aanzicht 1. *Dolichomitus curticornis*, 2. *D. imperator*, 3. *D. pterelas*, 4. *Townesia tenuiventris*; 5. *Liotryphon strobilellae*, 6. *Paraperithous gnathaulax*, 7. *D. atratus*, 8. *D. aciculatus*, 9. *D. aciculatus* dorsal view, 10. *D. cephalotes*, 11. *D. nitidus*, 12. *D. kriebbaumeri*, 13. *D. lateralis*, 14. *D. mordator*, 15. *D. milleri* n. sp., 16. *D. agnoscendus*, 17. *D. dobrogensis*, 18. *D. quercicolus* n. sp., 19. *D. terebrans*, 20. *D. sericeus*, 21. *D. tuberculatus*, 22. *D. populneus*, 23. *D. messor*, 24. *D. cognator*, 25. *D. diversicostae*, 26. *D. mesocentrus*, 27. *D. dux*, 28. *D. scutellaris*, 29. *D. mesocentrus* ? (see text). Photos: C.J. Zwakhals



- Nervellus strongly reclivous, its upper end far more distad than its lower end and intercepted at its upper third. Dorsal lobe with 2 angled, reclivous grooves at base and 1 apical inclivous groove (figure 17). Head with temples parallel to buccate in dorsal view. Pterostigma fuscous.  
Ha yellow-brown. Tibia 3 infuscate. Frons slightly punctate. Fwl = 8.5-15.3. Ovp/fw = 1.7-2.1. Lwtrg1 = 1.7-2.2. Lwtrg2 = 1.4-1.7. Trg1/htrs1 = 0.9-1.1. Trg1/fem3 = 0.7-0.8. Lwfem3 = 5.5-6.2. Htrs3/flg1 = 0.7-0.8. Htrs5/3 = 0.8-1.0. Flag 28-32: trg2-0.5x3  
..... *D. dobrogensis* Constantineanu & Pisica, 1970
- 18 All trochanters and trochantelli red. Basal grooves on dorsal lobe strongly reclivous (figure 18). Upper hind corner of pronotum yellow. Median raised part of first tergite rather flat and more or less densely punctate. Tibia 3 fuscous. Front edge variable. Coxa3 red. Fwl = 8.1-17.0. Ovp/fw = 1.4-1.8. Lwtrg1 = 1.5-1.9. Lwtrg2 = 1.1-1.5. Trg1/htrs1 = 0.9-1.0. Trg1/fem3 = 0.7-0.9. Lwfem3 = 4.7-5.5. Htrs3/flg1 = 0.7-0.9. Htrs5/3 = 0.9-1.1. Flag 31-36: trg3-0.5x4.  
..... *D. quercicolus* n. sp.
- Trochanters and trochantelli yellow. Basal grooves on dorsal lobe weakly inclivous (figure 27). Upper hind corner of pronotum black. Median raised part of tergite 1 weakly concave and rugulo-punctate, laterally bounded by rather weak, rounded ridges (figure 62). Tibia 3 fuscous with cream base.  
Front edge absent. Coxa 3 red to black. Fwl = 13.3-16.5. Ovp/fw = 1.5-1.7. Lwtrg1 = 1.5-1.8. Lwtrg2 = 1.1-1.3. Trg1/htrs1 = 1.1-1.2. Trg1/fem3 = 0.7-0.8. Lwfem3 = 5.1-6.0. Htrs3/flg1 = 0.6-0.8. Htrs5/3 = 0.9-1.1. Flag 34-36: trg0.5x4.  
..... *D. dux* (Tschek, 1869)
- 19(10) Dorsal lobe with 3-4 reclivous grooves, not differentiated apically, gradually tapering to apical teeth (figure 19). Nervellus vertical, usually broken slightly above the middle. Metasoma from tergite 2 with tergites square. Pterostigma fuscous, sometimes grey at centre. Ha black. Head parallel – constricted. Median longitudinal carinae 0.4 × propodeum. Tergite 1 rugulose laterally. Fwl = 5.5-10.7. Ovp/fw = 1.1-1.4. Lwtrg1 = 1.0-1.4. Lwtrg2 = 0.6-0.8. Trg1/htrs1 = 0.9-1.1. Trg1/fem3 = 0.6-0.7. Lwfem3 = 4.8-5.3. Htrs3/flg1 = (0.6) 0.7-0.8. Htrs5/3 = 1.0-1.1. Flag 27-32: trg3-4.  
..... *D. terebrans* (Ratzeburg, 1844)  
(If tergites 2-4 elongate, first tergite both laterally and in apical half of median raised part closely punctate, dorsal lobe weakly differentiated (figure 16) and head with temples convexly narrowed, cf. *agnoscendus*)
- Dorsal lobe well delimited apically. Nervellus reclivous, broken at its upper third ..... 20
- 20 Dorsal lobe with at least 5 grooves (see figures 20-24) ..... 21
- Dorsal lobe with 3-4 grooves (see figures 25-28).  
Median longitudinal carinae 0.6 × propodeum ..... 25
- 21 Pterostigma fuscous and prepectal carina extending to front edge of mesopleurum.  
Tergite 1 with median raised area punctate or rugulose. Median longitudinal carinae 0.6 × propodeum.  
..... 22
- Pterostigma pale yellowish and prepectal carina ending at lower edge of pronotum.  
Tergite 1 with median raised area punctate. Median longitudinal carinae variable.  
..... 23
- 22 Mesopleurum with very long, dense setae. Dorsal lobe with 5 grooves and ending with a vertical edge (figure 20). Tergite 1 with median raised area punctate. Second tergite 1.2-1.4 × as long as wide. Tarsomere 5 of hind tarsus as long as tarsomere 3.  
Ha black. Tibia 3 and tars 3 fuscous. Fwl 12.7-13.5. Ovp/fw = 1.8-1.9. Lwtrg1 = 1.7-1.8. Trg1/htrs1 = 1.0. Trg1/fem3 = 0.7-0.8. Lwfem3 = 5.0-5.3. Htrs3/flg1 = 0.7-0.8. Flag 33-34: trg0.5x4-0.5x5.  
..... *D. sericeus* (Hartig, 1847)
- Mesopleurum without unusually long, dense setae. Dorsal lobe with 6-7 grooves and gradually tapering to apical teeth (figure 21) Tergite 1 with median raised area slightly rugulose, not punctate. Second tergite 0.9-1.2 × as long as wide. Tarsomere 5 of hind tarsus 1.2-1.5 × as long as tarsomere 3.  
Ha black. Head parallel-narrowed. Tibia 3 reddish-fuscous. Fwl = 10.5-15.5. Ovp/fw = 1.5-1.7. Lwtrg1 = 1.4-1.8. Trg1/htrs1 = 1.1-1.2. Trg1/fem3 = 0.7-0.9. Lwfem3 = 4.3-4.9. Htrs3/flg1 = 0.7-0.8. Flag 33-36: trg3-0.5x4.  
..... *D. tuberculatus* (Geoffroy, 1785)
- 23 Dorsal lobe with 7 strongly inclivous grooves and distally gradually tapering to apical teeth (figure 22). In smaller specimens, with length of fore wing <12 mm, sometimes with 6 grooves. Median longitudinal carinae on propodeum present as weak ridges, not as well defined carinae.  
Head parallel. Distance between hind ocellus and occipital carina 2.9-3.0 × diameter of hind ocellus. Fwl 11.2-14.0. Ovp/fw = 1.2-1.4. Lwtrg1 = 1.4-1.6. Lwtrg2 = 1.0-1.1. Trg1/htrs1 = 1.0-1.2. Trg1/fem3 = 0.8-0.9. Lwfem3 = 3.8-4.3. Htrs3/flg1 = 0.7-0.9. Htrs5/3 = 1.1-1.3. Flag 33-35: trg(0.5-1)x3.  
..... *D. populneus* (Ratzeburg, 1848)
- Dorsal lobe distally well separated from apical teeth. Usually with 5, rather vertical, grooves (figures 23, 24). In large specimens, with length of fore wing > 12 mm, sometimes with 6 grooves. Median longitudinal carinae well defined, 0.6 × as long as propodeum.  
Front edge absent ..... 24
- 24 Head with temples slightly narrowed. Distance between hind ocellus and occipital carina 2.5-3.0 × diameter of hind ocellus. Median raised part of tergite 1 closely punctate. First tergite 1.3-1.9 × as long as wide. Tarsomere 3 of hind tarsus 0.7-0.9 × as long as first flagellomere. Hind tibia reddish. Clypeus fuscous-brown. Dorsal lobe usually with 5 grooves, well separated from apical teeth (figure 23).  
Fwl 9.5-20.5. Ovp/fw = 1.4-1.9. Lwtrg2 = 1.1-1.5. Trg1/htrs1 = 0.9-1.1. Trg1/fem3 = 0.7-0.9. Lwfem3 = 4.1-5.3. Htrs5/3 = 1.0-1.3. Flag 32-38: trg2-3. Tibia 3 red.  
..... *D. messor* (Gravenhorst, 1829)

- Head with temples parallel. Distance between hind ocellus and occipital carina 3.3-3.5 × diameter of hind ocellus. Median raised part of tergite 1 at most punctate at the sides and apex. First tergite 1.9-2.3 × as long as wide. Tarsomere 3 of hind tarsus 1.0-1.2 × as long as first flagellomere. Hind tibia reddish-fuscous. Clypeus orange-brown. Dorsal lobe with 6 grooves and more gradually tapering to apex (figure 24). Fw1 = 16.0-20.0. Ovp/fw = 1.6-1.8. Lwtrg2 = 1.4-1.7. Trg1/htrs1 = 1.0. Trg1/fem3 = 0.8-0.9. Lwfem3 = 4.4-4.9. Htrs5/3 = 0.9-1.0. Flag 38-40: trg0.5x3.  
..... *D. cognator* (Thunberg, 1824)
- 25(20) Dorsal longitudinal carinae of propodeum strongly diverging.  
Fore coxa at least basally black, middle coxa sometimes partly black, hind coxa red. Dorsal lobe with 4 grooves, the basal grooves slightly recurved (figure 25). Ha black. Palpi fuscous. Head with temples parallel. Pterostigma fuscous. Hind tibia fuscous, sometimes cream at base. Fem3 fuscous apically. Fw1 = 7.5-12.0. Ovp/fw = 1.4-1.7. Lwtrg1 = 1.2-1.5. Lwtrg2 = 0.9-1.2. Trg1/htrs1 = 1.0-1.1. Trg1/fem3 = 0.6-0.7. Lwfem3 = 4.8-5.4. Htrs3/flg1 = 0.7-0.8. Htrs5/3 = 0.9-1.2. Flag 28-33: trg3-0.5x4.  
..... *D. diversicostae* (Perkins, 1943)
- Dorsal longitudinal carinae of propodeum parallel to weakly diverging ..... 26
- 26 Pterostigma pale. Head with temples narrowed. Hind corner of pronotum usually yellow. Hind tibia (reddish) fuscous, not cream at base. All coxae red.  
Front edge weak to absent. Dorsal lobe with 4 grooves (figure 26), sometimes with 3 grooves (figure 29). Fw1 = 10.0-20.3. Ovp/fw = 1.5-1.9. Lwtrg1 = 1.7-2.0. Lwtrg2 = 1.2-1.6. Trg1/htrs1 = 0.9-1.0. Trg1/fem3 = 0.7-0.9. Lwfem3 = 5.3-6.2. Htrs3/flg1 = 0.7-0.8. Htrs5/3 = 0.8-1.0. Flag 32-38: trg0.5x3-4.  
..... *D. mesocentrus* (Gravenhorst, 1829)
- Pterostigma fuscous. Hind corner of pronotum usually black. Hind tibia with basal 0.15 cream. Hind coxa varying from red to black ..... 27
- 27 Head with temples parallel. Median raised area of tergite 1 weakly concave and rugulo-punctate, laterally not bounded by sharp edges but just convexly sloping down to lateral area (figure 62). Trochanters and trochantelli yellow. First tergite 1.5-1.8 × as long as wide. Second tergite 1.1-1.3 × as long as wide. Dorsal lobe as in figure 27. Lower tooth of mandible often slightly larger than upper one. Fore coxa red, middle and hind coxae varying from red to black. Fw1 = 13.3-16.5. Ovp/fw = 1.5-1.6. Trg1/htrs1 = 1.0-1.1. Trg1/fem3 = 0.7-0.8. Lwfem3 = 5.1-6.0. Htrs3/flg1 = 0.6-0.7. Htrs5/3 = 0.9-1.0. Flag 34-36: trg0.5x4.  
..... *D. dux* (Tschek, 1869)
- Head with temples slightly narrowed. Median raised area of tergite 1 flat rugulo-punctate and bounded by rather sharp lateral edges. Trochanters and trochantelli red. First tergite 2.1-2.4 × as long as wide. Second tergite 1.7-1.8 as long as wide. Dorsal lobe as in figure. 28. Usually at least hind coxa black.  
Fw1 = 11.0-16.0. Ovp/fw = 1.7-2.1. Trg1/htrs1 = 0.9-1.0. Trg1/fem3 = 0.8-0.9. Lwfem3 = 5.3-6.9. Htrs3/flg1 = 0.9-1.0. Htrs5/3 = 0.7-0.8. Flag 33-36: trg3-0.3x4.  
..... *D. scutellaris* (Thomson, 1877)

## B: Males

(The male of *D. nitidus* is unknown)

- 1 Median flagellomeres (9-19) strongly widened, square and with cream underside (figure 66). Mesopleurum covered with long, dense, curled setae. Valve very broad, about as long as wide and with a central longitudinal ridge (figure 30). Head with temples slightly widening. Palpi cream-white. Clypeus orange-brown. Antenna with underside of scape largely ivory and basal flagellomeres fuscous. Hind angle of pronotum black. Pterostigma fuscous. Fore and middle coxae yellowish, hind coxa reddish-fuscous. Fore coxa darkened at base. All trochanters and trochantelli ivory. Epicnemial carina very weak. Hind tibia ivory ventrally, fuscous dorsally, basal 0.1 ivory. Hypopygium very weakly incised apically. Strong parallel median longitudinal carinae about 0.6 × as long as propodeum. Fw1 = 8.8-9.8. Lwtrg1 = 2.3-2.5. Lwtrg2 = 1.8-2.1. Trg1/htrs1 = 1.9-2.1. Trg1/fem3 = 0.8. Lwfem3 = 4.4-4.9. Htrs3/flg1 = 0.4-0.6. Htrs5/3 = 2.1-2.3. Flag 36-39: trg (0.5-1)xtrg6.  
..... *D. sericeus* (Hartig, 1847)
- Flagellum not widening and not with cream underside centrally. Mesosoma without exceptionally long and dense setosity. Valve elongate ..... 2
- 2 Fore wing with dense, long, curled setae along costa, medius and basal vein. Nervulus usually basal of basal vein. Valve with long upper part of distal margin strongly inclivous (figure 31). Ha with yellow line. Head with temples convexly constricted. Combined area basalis – area superomedia slightly depressed, without delimiting carinae. Fore and middle coxae yellow, hind coxa red. All trochanters and trochantelli cream. Hind tibia fuscous, basal 0.15 cream. Scape and pedicel yellow beneath. Clypeus fuscous. Mandible yellow at base. Fw1 = 8.5-9.3. Lwtrg1 = 2.6-2.8. Lwtrg2 = 2.6-3.3. Trg1/htrs1 = 1.0-1.1. Trg1/fem3 = 0.6. Lwfem3 = 5.8-6.4. Htrs3/flg1 = 0.9. Htrs5/3 = 1.0-1.1. Flag 34: trg4.  
..... *Townesia tenuiventris* (Holmgren, 1860)
- No long dense setosity along veins of fore wing. Nervulus opposite basal vein ..... 3
- 3 Middle coxa with a tooth or coriaceous swelling laterally (figures 54-56).  
Ventral face of first trochanter coriaceous. Coxae red. Pterostigma pale. .... 4
- Middle coxa without protuberance ..... 6
- 4 Middle coxa with a broad coriaceous swelling (figure 54). Fore trochanter in ventral view rather flat with sides widening apically. Head with temples parallel.  
Valve with straight, slightly recurved distal margin (figure 32). Ha brown. Fore femur parallel sided. Clypeus yellowish-orange. Palpi yellow. Scape yellow beneath, pedicel black. Flagellum yellowish-brown beneath. Median longitudinal carinae 0.4 - 0.5





30-53. Male valves in lateral view / Mannelijke valven in lateral aanzicht. 30. *Dolichomitus sericeus*, 31. *Townesia tenuiventris*, 32. *D. atratus*, 33. *D. mesocentrus*, 34. *D. excavatus* n. sp., 35. *Paraperithous gnathaulax*, 36. *D. curticornis*, 37. *D. kriebbaumeri*, 38. *D. dobrogensis*, 39. *D. mordator*, 40. *D. milleri* n. sp., 41. *D. quercicolus* n. sp., 42. *D. agnoscendus*, 43. *D. populneus*, 44. *D. messor*, 45. *D. dux*, 46. *D. diversicostae*, 47. *D. cephalotes*, 48. *D. aciculatus*, 49. *D. tuberculatus*, 50. *D. terebrans*, 51. *D. imperator*, 52. *D. pterelas*, 53. *D. scutellaris*. Photos: C.J. Zwakhals



as long as propodeum. Coxae reddish, hind coxa darkened ventrally. Hind tibia fuscous, ventral 0.9 and basal 0.1 yellow.

Hypopygium weakly concave. Fw1 = 11.6-12.0. Lwtrg1 = 1.9-2.1. Lwtrg2 = 1.6-1.9. Trg1/htrs1 = 1.5-1.7. Trg1/fem3 = 0.9. Lwfem3 = 4.3-4.5. Htrs3/flg1 = 0.7. Htrs5/3 = 1.5-1.7. Flag 37-40:trg 4-0.5x5.

- ..... **D. atratus (Rudow, 1881)**
- Middle coxa with a tooth (figures 55, 56). Fore trochanter in ventral view slightly excavate and sides rather parallel. Head with temples constricted ..... 5
  - 5 Mid coxal tooth very long and sharply pointed (figure 55). In ventral view fore femur strongly widened, clavate (figure 57). Middle and hind trochanters and trochantelli red. Scape usually black. Valve with straight inclivous distal margin (figure 33).  
Ha yellow - black. Median longitudinal carinae about 0.6 - 0.7 × as long as propodeum. Hind tibia fuscous. Fw1 = 7.8-11.8. Lwtrg1 = 2.0-2.1. Lwtrg2 = 1.7-2.0. Trg1/htrs1 = 1.1-1.4. Trg1/fem3 = 0.7-0.9. Lwfem3 = 4.7-5.1. Htrs3/flg1 = 0.5-0.7. Htrs5/3 = 1.3-1.7. Flag 31-37: trg4-5.  
..... **D. mesocentrus (Gravenhorst, 1829)**
  - Middle coxa in dorso-lateral view excavate with short, broad tooth rather like a raised lamella (figure 56). Fore femur rather parallel sided, not clavate (figure 58). All trochanters and trochantelli cream. Scape yellow beneath. Valve with sharply pointed distal margin (figure 34).  
Median longitudinal carinae on propodeum rather strong, 0.6-0.7x propodeum. Hind tibia fuscous, basal 0.1 and ventral 0.8 cream. Fw1 = 7.4-10.3. Lwtrg1 = 1.8-2.1. Lwtrg2 = 1.9-2.4. Trg1/htrs1 = 1.3-1.6. Trg1/fem3 = 0.7-0.8. Lwfem3 = 4.8-5.2. Htrs3/flg1 = 0.6-0.7. Htrs5/3 = 1.3-1.5. Flag 30-32: trg4.  
..... **D. excavatus n. sp.**
  - 6 Hypopygium very deep and very widely incised (figure 59). Propodeum evenly convex, combined area basalis and area superomedia not depressed and without delimiting carinae.  
Ha yellow. Pterostigma rather fuscous. Head with temples parallel. Fore and middle coxae yellow, hind coxae black. All trochanters and trochantelli cream. Scape and pedicel cream beneath. Valve rounded. Nervellus vertical, broken at the middle. Flag 23: trg3. Fw1 = 5.2-5.7. Lwtrg1 = 2.0-2.2. Lwtrg2 = 2.4-2.5. Trg1/htrs1 = 1.3-1.4. Trg1/fem3 = 0.6-0.7. Lwfem3 = 4.2-4.6. Htrs3/flg1 = 0.7-0.8. Htrs5/3 = 1.2-1.3.  
..... **Liotryphon strobilellae (Linnaeus, 1758)**
  - Hypopygium less deep and less widely incised, at most like figure 65 ..... 7
  - 7 Mandible coarsely longitudinally striate. Head with temples strongly narrowed (figure 60). Hypopygium with apical margin slightly convex. Valve with long upper part of distal margin strongly inclivous (figure 35).  
Scape and pedicel with yellow underside. Fore and middle coxae and all trochanters and trochantelli yellow. Hind coxa red. Ha yellow. Pterostigma yellowish to fuscous. Hind tibia fuscous, basal 0.25 and underside cream. Nervellus broken at upper quarter. Median raised part of tergite1 punctate apically, lateral part rugulo-punctate. Median longitudinal carinae 0.6-0.8 × as long as propodeum. Fw1 = 4.7-9.0. Lwtrg1 = 1.7-2.1. Lwtrg2 = 1.2-1.6. Trg1/htrs1 = 1.2-1.5. Trg1/fem3 = 0.6-0.7. Lwfem3 = 3.7-4.4. Htrs3/flg1 = 0.7-1.0. Htrs5/3 = 1.4-1.6. Flag 30-34: trg4-5.  
..... **Paraperithous gnathaulax (Thomson, 1877)**
  - Mandible weakly sculptured, not coarsely striate. Head with temples buccate, temples parallel or weakly narrowed. Hypopygium at least slightly concave ..... 8
  - 8 Flagellum short, as long as mesosoma + tergites 1+2 and with 25-27 flagellomeres. Valve figure 36.  
Head with temples parallel - slightly widening. Hypopygium weakly concave. Ha black. Coxae red. All trochanters and fore and middle trochantelli yellowish. Hind trochantellus reddish. Hind tibia fuscous, basal 0.1 cream. Median longitudinal carinae 0.3 - 0.6 × as long as propodeum. Fw1 = 9.5-11.0. Lwtrg1 = 1.6-1.9. Lwtrg2 = 1.2-1.4. Trg1/htrs1 = 1.1-1.3. Trg1/fem3 = 0.7-0.9. Lwfem3 = 4.2-4.7. Htrs3/flg1 = 1.0-1.3. Htrs5/3 = 1.0-1.2.  
..... **D. curticornis (Perkins, 1943)**
  - Flagellum longer than mesosoma + tergites1+2 and usually with more flagellomeres. .... 9
  - 9 Lower tooth of mandible longer than upper tooth ..... 10
  - Mandible with equal teeth ..... 17
  - 10 Upper hind corner of pronotum with a yellow line, clypeus not bilobed, sharply produced at the centre of the apical margin.  
Valve narrowed apically, rather triangular (figure 37). Pterostigma brown-fuscous. Propodeum without median longitudinal carinae ..... 11
  - Upper hind corner of pronotum black or with a yellow spot. Clypeus bilobed, with a central incision ..... 12
  - 11 Metasomal tergites black. Head with temples parallel to slightly widening. Coxae red.  
Valve figure 37. Mesoscutum strongly punctate. Tergite 1 densely punctate over its entire surface. Hypopygium rather broad and deeply incised. Hind tibia fuscous, ventral 0.8 and basal 0.1 cream to reddish. Scape and pedicel black. Nervellus vertical, broken at the middle. Median longitudinal carinae present as weak ridges and about as long as 0.25 of propodeum. Fw1 = 5.1-7.5. Lwtrg1 = 1.3- 1.5. Lwtrg2 = 1.0-1.3. Trg1/htrs1 = 1.1-1.3. Trg1/fem3 = 0.6-0.8. Lwfem3 = 4.1-4.8. Htrs3/flg1 = 0.8-0.9. Htrs5/3 = 1.1-1.2. Flag 26-27: trg0.5x3-0.5x5.  
..... **D. kriechbaumeri (Schulz, 1906)**
  - Metasomal tergites orange-brown with black apical border. Head with temples roundly constricted. Fore and middle coxae yellowish, hind coxa reddish.  
Valve like figure 37. Madeira. Fw1 = 6.5. Lwtrg1 = 1.93. Lwtrg2 = 1.5. Trg1/htrs1 = 1.1. Trg1/fem3 = 0.6. Lwfem3 = 4.8. Htrs3/flg1 = 0.9. Htrs5/3 = 1.2. Flag 28: trg0.7x4.  
..... **D. lateralis (Wollaston, 1858)**
  - 12 Valve strongly excavate at the middle of the dorsal margin where the valve suddenly narrows to half its basal width (figure 38).  
Head with temples parallel. Palpi brown. The combined area basalis-superomedia delimited by parallel rounded ridges about

0.5-0.6 × as long as propodeum, without well defined carinae. Tergite 1 with apical half of median raised part and lateral area (rugulo)punctate. Tergites 5-6 polished, impunctate in apical half. All coxae, trochanters and trochantelli red. Hind tibia fuscous, sometimes basal 0.1 cream. Fwl = 5.6-8.3. Lwtrg1 = 2.1-2.3. Lwtrg2 = 1.8-2.1. Trg1/htrs1 1.1-1.3. Trg1/fem3 = 0.7-0.8. Lwfem3 = 4.3-5.6. Htrs3/flg1 = 0.9-1.1. Htrs5/3 = 1.2-1.4. Flag 29-30: trg0.5x3-4.

..... *D. dobrogensis* Constantineanu & Pisica, 1970

- Dorsal margin of valve at most weakly excavate, as in figures 49, 50 ..... 13
- 13 Lower tooth of mandible very broad and very long, upper tooth very small (figure 61). First tergite 1.1-1.4 as long as wide. Second tergite 1.0-1.1 as long as wide. Tarsomere 3 of hind tarsus 0.5-0.7 as long as first flagellomere. Head with temples slightly widening, as in figure 63.  
Coxae red ..... 14
- Lower tooth of mandible pointed, upper tooth normal. First tergite 1.8-2.6 as long as wide. Second tergite 1.6-2.6 as long as wide. Tarsomere 3 of hind tarsus 0.8-1.0 as long as first flagellomere. Head with temples parallel to constricted ..... 15
- 14 Metasoma, including whole surface of tergite 5 densely punctate and matt. Frons trans-striate. Mesoscutum and scutellum densely punctate. Valve elongate with upper and lower margins rather parallel (figure 39). Hind angle of pronotum black. Tegulae fuscous to black.  
Hind tibia fuscous. Hypopygium weakly concave. Diverging median longitudinal carinae about 0.5 – 0.6 × as long as propodeum. Fwl = 9.5-11.0. Lwtrg1 1.2-1.3. Lwtrg2 = 1.0-1.1. Lwtrg3 = 0.9-1.1. Trg1/htrs1 1.5-1.7. Trg1/fem3 = 0.8-0.9. Lwfem3 = 3.9-4.0. Htrs3/flg1 = 0.5-0.7. Htrs5/3 = 1.2-1.5. Flag 33-35: trg3-0.5x5.  
..... *D. mordator* (Aubert, 1965)
- Metasoma from tergite 4 almost impunctate, polished. Frons smooth. Mesoscutum and scutellum smooth, almost impunctate. Valve short, broad (figure 40). Hind angle of pronotum yellow. Tegula yellowish.  
Hind tibia fuscous, basal 0.1 cream. Hypopygium weakly concave. Slightly diverging median longitudinal carinae about one third as long as propodeum and at apex more or less continued to lateral carinae. Fwl = 7.8-8.0. Lwtrg1 = 1.4. Lwtrg2 = 1.0-1.1. Trg1/htrs1 = 1.4-1.5. Trg1/fem3 = 0.7-0.8. Lwfem3 = 3.5-3.7. Htrs3/flg1 = 0.6-0.7. Htrs5/3 = 1.3-1.4. Flag 35-36: trg3.  
..... *D. milleri* n. sp.
- 15 Fore trochanter coriaceous beneath and valve in lateral view widening from base to its greatest width at about 0.6 from base, then narrowed to an angled apex (figure 45).  
Fore and middle coxae and all trochanters and trochantelli yellow. Hind coxa usually black. Head with temples parallel. Pterostigma rather fuscous. In ventral view: first trochanter widening distally and fore coxa somewhat produced. Hypopygium not incised. Ha black. Median longitudinal carinae 0.6 – 0.7 × as long as propodeum. Scape and pedicel yellow below. Hind tibia fuscous, ventral 0.9 and basal 0.2 cream. Lower tooth of mandible slightly longer than upper tooth. Fwl = 9.0-1.7. Lwtrg1 = 2.4-2.7. Lwtrg2 = 2.0-2.1. Trg1/htrs1 = 1.0-1.5. Trg1/fem3 = 0.7-0.8. Lwfem3 = 4.8-6.0. Htrs3/flg1 = 0.7-1.0. Htrs5/3 = 1.2-1.3. Flag 38-39: trg3-0.5x4.  
..... *D. dux* (Tschek, 1869)
- Fore trochanter not coriaceous, punctate. Valve in lateral view different ..... 16
- 16 Valve with the distal margin rather straight and perpendicular to the longitudinal axis (figure 41). First tergite 1.7-2.0 as long as wide. Second tergite 1.6-1.9 × as long as wide. Propodeum with combined area basalis-superomedia delimited by carinae about as long as 0.6 – 0.7 of propodeum. Tergite 1 smooth to slightly rugulose, both on raised median and on lateral parts.  
Head parallel. Palpi cream. Ha yellow. Pterostigma fuscous. Hypopygium rather strongly incised (fig. 65). Hind tibia fuscous, ventral 0.5 and basal 0.1 cream. Coxae red. Fore and middle trochanters and trochantelli yellowish. Hind trochanter red. Fwl = 5.1-11.9. Trg1/htrs1 = 1.1-1.3. Trg1/fem3 = 0.7-0.9. Lwfem3 = 4.2-4.8. Htrs3/flg1 = 0.8-0.9. Htrs5/3 = 1.2-1.5. Flag 31-36: trg(0.5-1)x4.  
..... *D. quercicolus* n. sp.
- Valve with inclivous distal margin (figure 42). First tergite 2.1-2.6 as long as wide. Second tergite 1.8-2.6 as long as wide. Propodeum with combined area basalis-superomedia present as a slight depression with delimiting ridges rather than carinae. Tergite 1 in apical half, both on raised median and lateral parts, punctate.  
Head with temples convexly constricted. Palpi ivory. Ha yellow. Pterostigma pale-grey. Hypopygium weakly concave. Hind tibia fuscous, ventral 0.8 and basal 0.15 cream. Fore and middle coxae and all trochanters and trochantelli ivory, hind coxa red to black. Scape black to ivory, pedicel usually ivory. Nervellus sometimes vertical and broken at the middle. Fwl = 4.5-8.5. Trg1/htrs1 = 1.2-1.3. Trg1/fem3 = 0.7-0.8. Lwfem3 = 4.8-5.5. Htrs3/flg1 = 0.8-1.0. Htrs5/3 = 1.1-1.4. Flag 25-32: trg(0.5-1)x4.  
..... *D. agnoscendus* (Roman, 1939)
- 17 (9) Ventral face of first trochanter and trochantellus coriaceous. Usually first tergite closely punctate on raised median part ..... 18
- Ventral face of first trochanter and trochantellus polished and punctate. First tergite rather rugulose or sparsely punctate on raised median part ..... 20
- 18 Apex of valve concave and penis with a dorsal lobe (figure 43).  
Head with temples slightly constricted to parallel. Median longitudinal carinae about 0.3 × as long as propodeum. Hind tibia fuscous, ventral 0.5 and basal 0.1 yellow. Ha brown-fuscous. Scape yellow marked. Fem3 red. Hypopygium weakly concave. Pterostigma pale. Fwl = 6.7-10.0. Lwtrg1 = 1.6-2.0. Lwtrg2 = 1.3-1.7. Trg1/htrs1 = 1.4-1.5. Trg1/fem3 = 0.7-0.8. Lwfem3 = 4.0-4.3. Htrs3/flg1 = 0.6-0.8. Htrs5/3 = 1.4-1.9. Flag 30-36: trg(0.5-1)x4.  
..... *D. populneus* (Ratzeburg, 1848)
- Apex of valve not concave and penis flat ..... 19
- 19 Valve with upper and lower margins parallel, its distal margin straight and perpendicular to longitudinal axis (figure 44). Coxae, trochanters and trochantelli red. First tergite 1.5-2.0 × as long as wide. Head with temples parallel to slightly narrowed. Pterostigma pale.





54-66. Males (and one female) / Mannetjes (en één vrouwtje). 54-56 middle coxa [middelste coxa] 54. *D. atratus*, 55. *D. mesocentrus*, 56. *D. excavatus* n. sp., 57. fore femur [eerste femur] *D. mesocentrus*, 58. fore femur [eerste femur] *D. excavatus* n. sp., 59 hypopygium *Liotryphon strobilellae*, 60. head [kop] *Paraperithous gnathaulax*, 61. mandible [kaak] *D. milleri* n. sp., 62. first metasomal tergite [eerste metasomale segment] *D. dux* female [vrouwtje], 63. head [kop] *D. cephalotes*, 64. head [kop] *D. aciculatus*, 65. hypopygium *D. quercicolus* n. sp., 66. median segments of flagellum [middelste antenne leden] *D. sericeus*. Photos: C.J. Zwakhals

Ha brown. Median longitudinal carinae 0.6 - 0.7 × as long as propodeum. hind tibia reddish to fuscous. Scape usually black, sometimes yellow marked. Fwl = 6.0-10.0. Lwtrg1 = 1.5-2.0 Lwtrg2 = 1.3-1.8. Trg1/htrs1 = 1.3-1.4. Trg1/fem3 = 0.8-0.9. Lwfem3 = 3.9-4.4. Htrs3/flg1 = 0.6-0.8. Htrs5/3 = 1.4-1.7. Flag 30-35: trg4-0.5x5.

..... *D. messor* (Gravenhorst, 1829)

- Valve in lateral view widening from base to its greatest width at about 0.6 from base, then narrowed to an angled apex (figure 45). Fore and middle coxae and all trochanters and trochantelli yellow. Hind coxa (?usually) black. First tergite 2.4-2.7 × as long as wide. Head with temples parallel. Pterostigma rather fuscous. In ventral view fore trochanter widening distally and fore coxa somewhat produced.

Hypopygium not incised. Ha black. Median longitudinal carinae 0.6 - 0.7 × as long as propodeum. Scape and pedicel yellow below. Hind tibia fuscous, ventral 0.9 and basal 0.2 cream. Sometimes lower tooth of mandible slightly longer than upper tooth. Fwl = 9.0-11.7. Lwtrg2 = 2.0-2.1. Trg1/htrs1 = 1.0-1.5. Trg1/fem3 = 0.7-0.8. Lwfem3 = 4.8-6.0. Htrs3/flg1 = 0.7-1.0. Htrs5/3 = 1.2-1.3. Flag 38-39: trg3-0.5x4.

..... *D. dux* (Tschek, 1869)

- 20 Median longitudinal carinae on propodeum distinct and strongly diverging, the apical distance between them about 3 × their basal distance.

- Fore coxa red, at least basally black, middle and hind coxae usually red. Head with temples parallel, ha black, palpi cream. Pterostigma fuscous. Valve with distal margin in upper half strongly inclivous (figure 46). Median longitudinal carinae about 0.6 × as long as propodeum. Hind tibia fuscous, basal 0.1 paler. Fwl = 6.5-9.0. Lwtrg1 = 1.4-1.7. Lwtrg2 = 1.2-1.6. Trg1/htrs1 = 1.3-1.5. Trg1/fem3 = 0.7-0.8. Lwfem3 = 4.1-4.7. Htrs3/flg1 = 0.7-0.8. Htrs5/3 = 1.3-1.5. Flag 33-34: trg0.5x4.  
..... **D. diversicostae (Perkins, 1943)**
- Dorsal longitudinal carinae on propodeum, if present, rather parallel, apical distance at most 2 × their basal distance . . . . . 21
- 21 Tergites 2 and 3 smooth or aciculate, not punctate. . . . . 22
- Pterostigma fuscous. Coxae red . . . . . 23
- Tergites 2 and 3 punctate . . . . . 23
- 22 Head with temples widening, temple longer than eye (figure 63). All trochanters and trochantelli yellow. Metasoma rather smooth, weakly aciculate. Hypopygium strongly incised. Valve curved, strongly widening at base, this part tending to be horizontal and with a crease in the upper margin where the basal part meets the vertical part (figure 47). Flagellum with 36-38 flagellomeres and as long as mesosoma + tergites 1-4(5). First tergite 0.9 × as long as first segment of hind tarsus.  
Fwl = 10.4-12.2. Lwtrg1 = 1.8-1.9. Lwtrg2 = 1.3-1.6. Trg1/fem3 = 0.8. Lwfem3 = 4.0-4.2. Htrs3/flg1 = 1.1-1.2.  
..... **D. cephalotes (Holmgren, 1860)**
- Head with temples parallel (figure 64). Trochanters and trochantelli reddish. Metasoma aciculate. Hypopygium weakly incised. Valve rather flat with the distal margin in its upper half strongly inclivous (figure 48). Flagellum with 32-33 flagellomeres and as long as mesosoma + tergites 1-2(3). First tergite 1.1-1.2 × as long as first segment of hind tarsus.  
Fwl = 8.0-8.8. Lwtrg1 = 1.6-1.8. Lwtrg2 = 1.3-1.4. Trg1/fem3 = 0.8. Lwfem3 = 4.8-4.9. Htrs3/flg1 = 0.8. Htrs5/3 = 1.1-1.3.  
..... **D. aciculatus (Hellen, 1915)**
- (If tarsomere 3 of hind tarsus 1.3-1.6 × as long as first flagellomere and flagellum with 38-42 segments cf. *imperator*)
- 23 Valve with a notch at the middle of the upper margin, where the apical, vertical part meets the widening basal, horizontal part. (figures 49, 50). Apical part of valve circular – convex. Nervellus usually vertical and broken at the middle. . . . . 24
- Fem3 usually fuscous apically. Pterostigma fuscous. Ha black . . . . . 24
- Upper margin of valve without a notch. Nervellus reclivous and broken at upper third. . . . . 25
- 24 All coxae red. Fore wing 10-13 mm. Apical part of valve elongate (figure 49).  
Median longitudinal carinae 0.5 – 0.6 as long as propodeum. Hind tibia fuscous, ventral 0.5 and basal 0.15 cream. Trg1 rugulose, rugulo-punctate at centre. Scape and pedicel usually yellow marked ventrally. Head with temples parallel to slightly constricted. Hypopygium very weakly concave.  
Lwtrg1 = 1.5-1.7. Lwtrg2 = 1.1-1.2. Trg1/htrs1 = 1.2-1.4. Trg1/fem3 = 0.7-0.8. Lwfem3 = 3.0-4.1. Htrs3/flg1 = 0.8-0.9. Htrs5/3 = 1.4-1.6. Flag 35-37: trg4-0.5x5.  
..... **D. tuberculatus (Geoffroy, 1785)**
- Fore and middle coxae yellow ventrally and usually more or less black dorsally. Hind coxa black. Fore wing 6-8 mm. Apical part of valve short, about as long as wide (figure 50).  
Median longitudinal carinae 0.6 – 0.7 × as long as propodeum. Hind tibia fuscous, ventral 0.5 and basal 0.15 cream. Trg1 smooth at centre, lateral part rugulose. Scape and pedicel black. Head with temples parallel. Hypopygium weakly concave. Coxa1 fuscous at base.  
Fwl = 4.6-7.5. Lwtrg1 = 1.6-1.9. Lwtrg2 = 1.2-1.3. Trg1/htrs1 = 1.1. Trg1/fem3 = 0.6-0.7. Lwfem3 = 4.6-4.9. Htrs3/flg1 = 0.8-0.9. Htrs5/3 = 1.2-1.4. Flag 28-33: trg(0.5-1)x5.  
..... **D. terebrans (Ratzeburg, 1844)**
- 25 Tergite 2 minutely punctate and somewhat aciculate, metasoma from tergite 3 rather aciculate. Valve with upper margin gradually sloping down to apex (figure 51). Coxae, trochanters and trochantelli red. Tarsomere 3 of hind tarsus 1.3-1.6 × as long as first flagellomere.  
Ha usually black. Head with temples parallel-constricted. Scape and pedicel black, palpi cream to light-brown. Pterostigma fuscous to yellowish-grey. Legs red. Hind tibia fuscous, basal 0.1 usually not pale. Trg1 rugulose. Fem3 fuscous at apex. Strong median longitudinal carinae 0.7 – 0.8 × as long as propodeum. Hypopygium very shallowly incised. Fwl = 9.1-15.0. Lwtrg1 = 1.8-2.5. Lwtrg2 = 1.8-2.0. Trg1/htrs1 = 0.9-1.0. Trg1/fem3 = 0.8-0.9. Lwfem3 = 4.8-5.9. Htrs5/3 = 0.9-1.1. Flag 38-42: trg0.5x4-0.5x5.  
..... **D. imperator (Kriechbaumer, 1854)**
- Tergites 2 and 3 punctate, without aciculation. Fore and middle coxae cream, hind coxa red to black. All trochanters and trochantelli yellowish-cream. Tarsomere 3 of hind tarsus 0.9-1.1 × as long as first flagellomere . . . . . 26
- 26 Valve long and slender, with upper margin sloping down to the apex and forming a somewhat pointed distal margin (figure 52). Second tergite 1.5-2.0 × as long as wide. Hypopygium shallowly incised.  
Flagellum with 33-37 flagellomeres and as long as mesosoma + tergites 1-5(6). Pterostigma yellow-opaque. First tergite on median raised part somewhat punctate, laterally rugulo-punctate. Median longitudinal carinae short, about 0.3-0.4 × as long as propodeum. Ha yellow. Head with temples parallel. Underside of scape and pedicel yellow-white. Hind tibia fuscous, ventral 0.7 and basal 0.1 cream. Fwl = 5.0-9.3. Lwtrg1 = 2.1-3.0. Trg1/htrs1 = 1.1-1.3. Trg1/fem3 = 0.8-0.9. Lwfem3 = 4.2-5.1. Htrs3/flg1 = 0.9-1.0. Htrs5/3 = 1.2-1.5.  
..... **D. pterelas (Say, 1829)**
- Valve shorter and broader with distal margin rather straight or convex and about perpendicular to the longitudinal axis of the valve (figure 53). Hypopygium more strongly incised . . . . . 27
- 27 Pterostigma fuscous. Second tergite 2.1-2.6 × as long as wide. Distal margin of valve straight (figure 53).  
Flagellum with 33-35 flagellomeres and as long as mesosoma + tergites 1-3(4). Head with temples parallel to weakly constricted.



Underside of scape and pedicel yellowish to black. Hind tibia fuscous, ventral 0.7 and basal 0.1 cream. Median longitudinal carinae  $0.6-0.7 \times$  as long as propodeum. Hind coxa usually black.  $Fw1 = 8.0-9.8$ .  $Lwtrg1 = 2.3-2.7$ .  $Trg1/htrs1 = 1.2-1.4$ .  $Trg1/fem3 = 0.8-0.9$ .  $Lwfem3 = 4.6-5.3$ .  $Htrs3/flg1 = 0.9-1.1$ .  $Htrs5/3 = 1.2-1.4$ .

..... **D. scutellaris (Thomson, 1877)**

– **Pterostigma pale. Second tergite  $1.8 \times$  as long as wide. Distal margin of valve more convex.**

Flagellum with 35 flagellomeres and as long as mesosoma + tergites 1-3. Head with temples parallel. Underside of scape and pedicel yellowish. Hind tibia fuscous, ventral 0.6 and basal 0.1 cream. Hind coxa reddish brown. Median longitudinal carinae weak about  $0.1 \times$  as long as propodeum.  $Fw1 = 10.0$ .  $Lwtrg1 = 2.1$ .  $Trg1/htrs1 = 1.2$ .  $Trg1/fem3 = 0.9$ .  $Lwfem3 = 4.7$ .  $Htrs3/flg1 = 1.1$ .  $Htrs5/3 = 1.1$

..... **D. cognator (Thunberg, 1824)**

## Previously undescribed *Dolichomitus* species

In the course of the investigation three new species were found.

### Introduction

In his paper on the synonymy of European species of the *Ephialtes* complex, Perkins (1943) synonymized *Ephialtes crassiceps* Thomson, 1877 with *E. dux* Tschek, 1868. In his paper, it is suggested that this was based on examination of the female type specimens, but according to Fitton (1982) there is no type material of *E. crassiceps* present in the Thomson collection. So maybe Perkins based his decision on the description of *E. crassiceps* only. For the characterization of the species, Thomson (1877) gives the following short sentence: 'niger, pedibus ruficentibus, capite pone oculos subdilato, coxis fuscomaculatus'. Probably the black marked coxae are the basis for Perkins' synonymy as this occurs in very few Western Palearctic *Dolichomitus* species. This synonymy has widely been accepted, for example by Yu and Horstmann (1997). Kasparyan (1981), in his key to the Russian *Dolichomitus* species, used the names *crassiceps* and *dux* for two different species. As pointed out by Mevi-Schütz et al. (2006), the name *crassiceps* was used by Kasparyan for the species that corresponds to the lectotype of *E. dux*. Mevi-Schütz et al. (2006) therefore used the name *crassiceps* for a species in which the female always has completely red coxae. Because *crassiceps* Thomson, 1877 should be treated as a junior synonym of *dux* Tschek, 1868 the species with the red coxae represents a hitherto undescribed species which is described below.

### *Dolichomitus quercicolus* n. sp.

Holotype female [Germany] Nürnberg 9.5.2000 [R. Bauer] in collection ZSM

**Description of the holotype** Front wing 13.7 mm long, pterostigma fuscous. Mesosoma 4.7 mm, metasoma 11.5 mm, and ovipositor 21 mm long. Mandible with lower tooth longer than upper tooth. Malar space about one third as long as width of base of mandible. Flagellum with 34 segments and as long as mesosoma + tergites 1-3, all segments elongate. In lateral view gena about two thirds as long as compound eye. In dorsal view head parallel behind the eyes. Vertex with some scattered punctures behind the ocelli. Distance between compound eye and ocellus about  $1.5 \times$  diameter of an ocellus. Distance between hind ocellus and occiput about  $3 \times$  diameter of hind ocellus. Head rather polished. Face punctate, distance between punctures  $2-3 \times$  their diameter, frons less densely punctate. Cheek and vertex with some widely scattered punctures. Mesoscutum shiny with strong notauli in anterior third and with fine scattered punctures. Scutellum with widely scattered punctures. Epicnemial carina weakly reaching front of mesopleurum. Mesopleurum with scattered punctures. Propodeum with median dorsal carinae  $0.6 \times$  as long as propodeum. First tergite  $1.6 \times$  as long as wide at apex, second tergite  $1.3 \times$  as long as wide. Median raised

part of first tergite rugulo-punctate at base and punctate at apex. Lateral part of first tergite rather weakly rugulose. Second tergite with strong antero-lateral furrows, densely punctate, at the centre punctures touching one another. On tergites 3-5 lateral swellings less densely punctate than centre of the tergites. Tergites 5-7 aciculate. Nervellus broken at upper third. Dorsal lobe of lower valve of ovipositor with 4 grooves, the basal 3 grooves reclivous and the fourth groove slightly inclivous (figure 18).

**Colour** Head, mesosoma and metasoma black. Clypeus and palpi brown. Mandibles black. Legs, including coxae and trochanters red, hind tibia and tarsus fuscous. Upper hind angle of pronotum yellowish.

**Variation** For the variation in the (relative) dimensions of various body parts see the identification key. Sometimes the dorsal lobe bears 3 grooves instead of 4 and then there are two reclivous grooves. The front edge of the dorsal lobe is variable in its development / visibility.

**Male** Face more closely punctate than in the female with distance between the punctures partly less than their diameter. Mandible with lower tooth longer than upper tooth. Shiny frons and vertex with some scattered punctures. Head parallel behind the eyes. Upper hind angle of pronotum yellow. Mesopleurum and mesoscutum as in female. Median longitudinal carinae on propodeum about  $0.6 \times$  propodeum. Sculpture on tergites 1-3 as in female. Tergites 6-8 smooth, polished, without punctures. Whole metasoma rather shiny. Hypopygium strongly incised. Valve with distal margin rather straight (figure 41). Legs red with fore and middle trochanters and trochantelli yellowish red. Hind tibia and tarsus fuscous, hind tibia sometimes somewhat paler at extreme base.

**Variation** For the variation in the (relative) dimensions of various body parts see the identification key.

**Diagnosis** Female specimens rather closely resemble *D. dux* but can be separated from that species by the structure of the mandible in which the lower tooth is larger than the upper one, the reclivous grooves on the dorsal lobe of the lower valve of the ovipositor and the red trochanters and trochantelli. Males differ in the shape of the valve, the longer lower tooth of the mandible and the shiny fore trochanter.

**Paratypes female** [Germany] Schwanberg 16.5.2000 [R. Bauer], [Germany] Nürnberg 25.5.2001 [R. Bauer], [Germany] Schwanberg 10.6.1989 [R. Bauer], [Germany] Nbg [Nürnberg] 25.5.1977 [R. Bauer], [Germany] Ebrach 12.6.1973 [R. Bauer]. All in collection ZSM; Germany Bayern Großschwarzenlohe 31-viii-2009 leg. C.J. Zwakhals, wood pile, in collection Natural History Museum London; Germany Bayern Großschwarzenlohe 31-viii-2008 leg. C.J. Zwakhals, wood pile, in collection National Natural History Museum Naturalis Leiden; Germany Bayern Großschwarzenlohe 31-viii-2009 leg. C.J. Zwakhals, wood pile, in the author's collection.

**Hosts** Locality labels of reared specimens present *Phymatodes testaceus* (Linnaeus) and *Pyrrhidium sanguineum* (Linnaeus) (Coleoptera, Cerambycidae) in oak (*Quercus*) as hosts.

**Phenology** The species can be found from mid May until mid September, flying around oak and wood piles with oak. Many specimens seen from Austria, Belgium, Bulgaria, France, Germany, Luxemburg, The Netherlands, Poland and Russia. The name *quercicolus* refers to the strong association with oak.

*Dolichomitus excavatus* n. sp.

Holotype male [Germany] Einbeck 21.5.1956 [R. Hinz] in collection ZSM.

**Description of the holotype** Front wing 8.7 mm long, pterostigma pale. Mesosoma 3.2 mm, metasoma 10.5 mm long. Mandible with equal teeth. Malar space  $0.25 \times$  width of base of mandible. Flagellum with 31 elongate segments, as long as mesosoma + tergites 1-4. Scape yellow beneath. Head convexly narrowed behind the eyes in dorsal view. Distance between compound eye and ocellus equal to the diameter of an ocellus. Distance between hind ocellus and occiput about twice diameter of an ocellus. Frons and vertex rather polished with some small, scattered punctures. Face closely punctate and covered with dense white setae. Palpi yellowish. Ventral surface of fore trochanter and trochantellus matt, not polished as in most other *Dolichomitus* species. Fore trochanter rather excavate. Fore femur in ventral view with sides rather parallel, not clavate as in *D. mesocentrus* (figure 58). Middle coxa in dorso lateral view rather excavate and with a short, broad tubercle, somewhat like a raised lamella (figure 56). Mesopleurum punctate. Epicnemial carina weakly reaching front of mesopleurum. Mesoscutum smooth with small punctures about  $3-4 \times$  their diameter apart. Scutellum more closely punctate. Median longitudinal carinae  $0.6 \times$  length of propodeum. Tergite 1  $1.9 \times$  as long as wide, tergite 2  $2 \times$  as long as wide. Median raised area of tergite 1 weakly rugulose, lateral area rugulose. Tergites 2-4 closely punctate. Tergite 2 with strong antero-lateral furrows. Tergites 5-7 weakly punctate, rather aciculate. Hypopygium strongly incised. (figure 65) Valve pointed, see figure 34. Nervellus broken at upper third. Black, clypeus reddish-brown, palpi cream. Upper hind angle of pronotum yellowish. Coxae red, middle coxa on outer lateral side yellowish. All trochanters and trochantelli yellowish. Fore and middle legs yellowish red. Hind femur red. Hind tibia fuscous, basal 0.1 and ventral 0.8 cream. Hind tarsus fuscous.

**Variation** for the variation in the (relative) dimensions of various body parts see the identification key.

**Diagnosis** The species is particularly characterized by the structure of the middle coxa in which it slightly resembles *D. mesocentrus*.

**Paratypes males** [Germany] Ebrach 2.5.1993 [R. Bauer], [Germany] Goslar a. H., Grauhöfer Holz 6.v.1934 E. Bauer, [Germany] Rodenstein 1.5.1986 [R. Bauer], [Germany] Göttingen 3.8.1947 [R. Hinz], [Germany] Einbeck 21.5.1956 [R. Hinz], [Germany] Bildhausen, Krs. Kissingen 17 August 1946 leg. G. Heinrich, [Germany] Göttingen 10.5.46 [R. Hinz], all in coll. ZSM; [Germany] Einbeck 21.5.1956 [R. Hinz] in coll. Natural History Museum, London.

**Female** unknown. As stated before, in general there are many more females than males present in insect collections so one would expect to find females of *D. excavatus* as well. Up until now no female specimens could be associated with the male. Maybe the female very closely resembles *D. mesocentrus* females. A few *D. mesocentrus* females have been found with 3 instead of 4 grooves on the dorsal lobe of the lower valve (figure 29). As they were not captured or reared together with males of *D. excavatus* n.sp. males it is uncertain if they represent a different species. The name *excavatus* refers to the excavate middle coxa of the male.

*Dolichomitus milleri* n. sp.

**Description Female** Front wing 9-11 mm long, pterostigma fuscous. Mesosoma 3.7 mm, metasoma 8.5 mm long. Mandible with lower tooth blunt and much broader and longer than upper tooth, as in figure 61. Malar space about one third the width of base of mandible. Flagellum with 37 segments and as long as mesosoma + tergites 1-4, all segments elongate. Head slightly widening behind the eyes in dorsal view, in lateral view gena as long as compound eye. In dorsal view head 1.5 as wide as long with vertex as long as eye. Distance between hind ocellus and compound eye twice the diameter of an ocellus. Distance between hind ocelli and occiput about  $6 \times$  hind ocellus diameter. Head polished. Face punctate with distance between punctures  $2-3 \times$  their diameter. Frons smooth, polished with some minute widely scattered punctures. Vertex almost impunctate. Mesoscutum and scutellum polished and almost impunctate. Notauli strong in anterior third of mesoscutum. Propodeum slightly rugose. Median dorsal longitudinal carinae weakly developed, very short and only present at the base. Epicnemial carina rather weak, reaching upper quarter of mesopleurum. Mesopleurum polished and almost impunctate. Ovipositor sheath  $1.5-1.6 \times$  as long as front wing. Dorsal lobe of lower valve of ovipositor with strongly reclivous grooves and not delimited apically (figure 15). First tergite  $1.3 \times$  as long as wide at apex, second tergite as long as wide. First tergite slightly rugose, both centrally and laterally. Second tergite in basal two thirds with rather coarse punctures, their interspaces about equal to their diameter. Second tergite with long basolateral grooves that cut off basolateral corners. Apical third less punctate and smooth at apex. Third tergite closely punctate in basal half to basal two thirds, punctures touching one another. Fourth tergite closely punctate in basal third to basal half. Tubercles on tergites 3-5 punctate like the rest of the segments. Metasoma rather polished. Nervellus reclivous and broken between upper third and half. On the hind coxa the distal dorsal depression is continued to the base.

**Colour** Head, including clypeus, mesosoma and metasoma black. Mandibles slightly reddish at base. Palpi yellowish-brown. Scape, pedicel and flagellum black. Upper hind corner of pronotum yellow, tegulae yellowish. All parts of legs red. Hind femur dorsally infuscate in about apical quarter. Hind tibiae and tarsi fuscous, tibia pale at basal 0.1.

**Male** Similar to female in general structure and coloration. Front wing 6.7-8.0 mm. Flagellum with 33-36 segments and as long as mesosoma + tergites 1-3 ( $0.5 \times$  tergite 4). Scape and pedicel black, flagellum black with light brown underside. Median dorsal carinae on propodeum longer than in female and rather strongly diverging. Mandible as in figure 61. Valve as in figure 40.

**Holotype female** Germany, Bayern, Wessobrunn 28-V-2008 leg. C.J. Zwakhals, Dead standing *Alnus*. It was caught flying around a dead, standing *Alnus*.

**Paratype** Female [Russia] Voronezh Region, Chop Nature Reserve, Black Alder 70L. Parasite *Xiphydria camelus*. Leg. W. Trofimof 5.5.73. in the collection of the Zoological Institute Russian Academy of Sciences, St. Petersburg.

**Paratypes male** [Russia] Voronezh Region, Chop Nature Reserve, Black Alder 90L. Parasite *Xiphydria camelus*. Leg. W. Trofimof 5.5.73. in the collection of the Zoological Institute Russian Academy of Sciences, St. Petersburg; [Germany] Nürnberg 16.5.2001 [leg. R. Bauer] in the collection of the ZSM; Roumanie [Romania], Comana Vlasca, A.L.Montandon in the collection of the Natural History Museum, London. The holotype has been deposited in the ZSM.

The name *milleri* is after Elfi and Jürgen Miller, naturalist-photographers, who brought me to the site were the holotype was captured.



**Diagnosis** *Dolichomitus milleri* n.sp. is closely related to *D. mordator*. The main differences are in the structure of the vertex and mesoscutum, which are strongly punctate in *D. mordator*; in the frons, which is trans-striate in *mordator*; and in the structure of the metasoma. In *D. mordator*, tergites 2-5 are strongly and closely punctate over their entire surface and dull. In *D. milleri* n. sp. the metasomal tergites are only partly punctate and much more polished.

### **Dolichomitus species described by Constantineanu and Pisica**

Constantineanu & Pisica (1970) erected for the *D. imperator* species group the new genus *Paucdolichomitus*. Since then, that genus has been synonymized with *Dolichomitus*, cf. Yu & Horstmann (1997), and that interpretation is followed here. They also described five new species under *Dolichomitus* and *Paucdolichomitus*. Dr. R. Constantineanu kindly made it possible to study the type specimens. These type specimens can be recognised by the red dot on the name labels. The result of the current study is:

*Paucdolichomitus baiamarensis*. Lectotypus *P. baiamarensis* C&P det Oehlke 88. [Romania] Valea Usturoi-Baia Mare 21.7.1964. This is a junior synonym of *Dolichomitus pterelas* (Say, 1829), **syn. nov.**

*Paucdolichomitus birnovensis*. [Romania] Birnova 26.6.1927. Mesosoma and metasoma are brown instead of black, but otherwise it is identical with *D. pterelas* (Say, 1829), **syn. nov.**

*Dolichomitus dobrogensis*. [Romania] Canaraua Fetii, Baneasa, Dobrogea 14.6.1962. In contrast to the description, the lower tooth of the mandible is somewhat longer than the upper tooth. This feature, and the structure of the dorsal lobe on the ventral valve, characterises the species as a species close to *D. quercicolus* n. sp.

*Dolichomitus mucronatus*. [Romania] Birnova 10.5.1954. Holotypus *Dol. mucronatus* C&P det Oehlke 88. The location and date as presented in the description are probably mistakes. According to the description the species is particularly characterized by a tubercle on the clypeus. This 'tubercle' turned out to be a piece of dirt that readily disappeared after some cleaning. The identity of the specimen is *D. terebrans* (Ratzeburg, 1844), **syn. nov.**

*Dolichomitus romanicus*. Lectotypus *Dol. romanicus* C&P det Oehlke 88. [Romania] Valea Usturoi-Baia Mare 21.7.1964. This is a junior synonym of *D. agnoscendus* (Roman, 1939), **syn. nov.**

### **Status of *Dolichomitus mesocentrus afghanator* Aubert, 1984.**

Aubert (1984) described a subspecies of *D. mesocentrus* from Afghanistan: *D. mesocentrus afghanator*. The holotype female, deposited in the Musée cantonal de zoologie Lausanne, was studied. It runs to couplet 13 in the key and then more or less to *kriechbaumeri*. It differs from *kriechbaumeri* mainly in the following characters: Dorsal lobe of ovipositor without strong front edge and with 4 grooves, of which only the basal 2 are reclivous. Tergite 1 with only the central part with some coarse punctures but lateral part rugulose. Head, mesoscutum and scutellum less densely and more finely punctate.

It represents a distinct species, not a subspecies of *D. mesocentrus*, which means that the valid name becomes *Dolichomitus afghanator* Aubert, 1984 **stat. nov.**

### **Some additional information**

Numbers of examined specimens are listed, except for the more numerous species (i.e., with more than 10 specimens seen).

*Dolichomitus aciculatus*. Material examined: 24 females and 4 males from Austria, Germany, Italy and Norway.

*Dolichomitus atratus*. The inclusion of the male in the key is of a somewhat tentative nature, mainly based on the size, colour of the scape and exclusion of other possibilities. There were no males available that had been reared together with female specimens. Material examined: 8 females and 7 males from Albania, Bulgaria, France, Germany, Russia and Spain.

*Dolichomitus cephalotes*. Material examined: 11 females and 7 males from Austria, Germany, Hungary and Poland.

*Dolichomitus cognator*. The type material is preserved in the Museum of Evolution of Uppsala University, Uppsala and could be studied by the kindness of Dr. H. Mejlon. It consists of two females and one male. The females belong to *Ephialtes manifestator* (L.). As already noted by Roman (1912), the description of *cognator* refers to the male specimen, which represents a *Dolichomitus* species. It bears a red label: 'Uppsala Univ. Zool. Mus., Thunbergsaml. nr. 25367, Ichneumon cognator [male] Sv. TYP' and a white hand written label 'Ephialtes cognator Thbg' It is herewith designated as lectotype and has been labeled accordingly. The reddish brown coloration of the mesosternum which is emphasized by Roman is just a kind of change of coloration that can occur occasionally in other *Dolichomitus* species as well. At first it could not be matched with any of the known species.

In *Dolichomitus*, matching males with females is often difficult because they share relatively few morphological characters. The similarity is usually limited to the black body, the colour of the pterostigma, the shape of the mandible and the general sculpture of the metasoma. The colour of the coxae can differ between males and females. In this case the pterostigma places *cognator* in the species group with a pale pterostigma. The shape of the valve resembles the valve of *D. messor*, but by the polished and punctate fore trochanter it strongly differs from *D. messor*. In the species group with pale pterostigma there is only one species for which no male is known yet: *D. speciosus* (Hellén, 1915). Both types of *D. speciosus* and *D. cognator* are from Scandinavia and it is likely they represent the two sexes of the same species. Therefore *D. speciosus* (Hellén, 1915) is here considered to be a junior synonym of *D. cognator* (Thunberg, 1824) **syn. nov.** Material examined: 1 male and 5 females (including the holotype of *D. speciosus* deposited in the Zoological Museum Helsinki) from Finland, Italy and Sweden.

*Dolichomitus curticornis*. Material examined: 60 females and 8 males from Austria, Bulgaria, Germany and Poland.

*Dolichomitus diversicostae*. Material examined: 88 females and 5 males from Austria, Germany, Finland, France, Italy, Poland, and The Netherlands

*Dolichomitus dobrogensis*. Material examined: 12 females and 5 males from Bulgaria, France, Greece, Italy, Poland, Romania, Switzerland and Turkey.

*Dolichomitus dux*. Material examined: 25 females, including the lectotype, and 3 males from Austria, Finland, France, Germany, Norway and Poland.

*Dolichomitus kriechbaumeri*. In 1951, in the southern part of The Netherlands, *D. kriechbaumeri* was reared from wood poles infested with the buprestid beetle, *Anthaxia manca* (Linnaeus). Recently it was reported from the buprestid, *Sphenoptera tappesi* Marseul, infesting trunks and twigs of peach and plum trees in eastern Turkey (Bolu 2008). This could mean it is specialized on larvae of Buprestidae and not on Cerambycidae.

*Dolichomitus lateralis*. Material examined: 1 female paratype deposited in the Natural History Museum London and 1 male.

The male is the specimen reported by Horstmann (2003). It was reared from *Acalles cinereus* Wollaston (Curculionidae) in *Euphorbia mellifera*. The species is only known from Madeira.

*Dolichomitus messor* / *populneus*. As noted already by Hinz (1961), males of these two species can be much more easily separated than the females. This resembles the case of *D. messor* and *D. cognatus*.

*Dolichomitus milleri* n. sp. As this species possesses a similarly strongly modified mandible as *D. mordator* it could be a parasitoid of Buprestidae as well.

*Dolichomitus mordator*. Material examined: 7 females and 5 males, including the holotype deposited in the Musée cantonal de zoologie Lausanne, from France, Italy and Spain. The holotype was reared from the buprestid, *Poecilnota variolosa* (Paykull) (Aubert, 1965). In Aubert's collection, additional specimens are present that were reared from the buprestid, *Coraeus florentinus* Herbst, all from *Quercus ilex*. This may suggest the species is specialized on Buprestidae larvae, like *D. kriechbaumeri*.

*Dolichomitus nitidus*. Material examined: 3 females, including the holotype deposited in the Deutsches Entomologisches Institut (DEI) in Müncheberg, all from Germany. For this species no host records are known, but in the ZSM there is a female specimen which was reared from twigs of *Carpinus betulus*.

*Dolichomitus scutellaris*. Material examined: 10 females and 7 males from Austria, Finland, Germany, Italy, Norway and Poland.

*Dolichomitus sericeus*. Material examined: 3 females and 3 males from Finland, Poland and Switzerland.

## Acknowledgements.

I am grateful to many persons who helped in various ways, e.g., by providing equipment, through stimulating discussions and by lending specimens for study. They are: C. v. Achterberg (Naturalis, Leiden, The Netherlands), S. Bordera (Universidad de Alicante, Spain), G. Broad (Natural History Museum, London, UK), R. Constantineanu (Iasi, Romania), R. Danielsson (Zool. Museum, Lund, Sweden), E. Diller (ZSM, München, Germany), V. Gusarov (Natural History Museum University of Oslo, Norway), W. Hogenes (Zool. Museum, University of Amsterdam, The Netherlands) Y. Jongema (Wageningen Universiteit, The Netherlands), R. Jusila (Zool. Museum, University of Turku, Finland), D.R. Kasparyan (Zool. Inst. Russ. Acad. Science, St. Petersburg, Russia), S. Klopstein (Naturhistorisches Museum, Bern, Switzerland), J. Kolarov (University Plovdiv, Bulgaria), P-N. Libert (Somal, Belgium), H. Mejlom (Museum of Evolution-Zoology, Uppsala, Sweden), J. Oehlke (DEI, Germany), G. Pagliano (Museo Regionale di Scienze Naturali, Torino, Italy), M. Riedel (Bad Fallingbomst, Germany), P.L. Scaramozzino (Universita di Pisa, Italy), J. Sawoniewicz (Bialystok, Poland), S. Schmidt (ZSM, München, Germany), M.R. Shaw (National Museums of Scotland, Edinburgh, UK), H. Vårdal (Swedish Museum of Natural History, Stockholm, Sweden), L. Vilhelmsen (Zool. Museum, University of Copenhagen, Denmark), M. Vizek (Naturhistorisches Museum, Wien, Austria), L. Witmond (Veendam, The Netherlands), K.W.R. Zwart (Heelsum, The Netherlands). C. van Achterberg and G. Broad commented on an earlier draft and G. Broad kindly corrected the English text.

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Accepted: 10 May 2010

## Samenvatting

### Identificatie van West-Palearctische *Dolichomitus*-soorten (Hymenoptera: Ichneumonidae: Pimplinae)

In dit artikel wordt een determinatietabel gegeven tot de West-Palearctische *Dolichomitus*-soorten. Voor het hier gepresenteerde werk zijn zo'n 3500 dieren bestudeerd en aan 400 daarvan is een groot aantal metingen verricht die de basis vormen voor de numerieke informatie in de tabellen. *Dolichomitus excavatus*, *D. milleri* en *D. quercicolus* worden hier beschreven als nieuwe soorten.

*Dolichomitus*-soorten zijn in het algemeen vrij grote, slanke sluipwespen met een lange ovipositor en zwart met rode poten als algemeen kleurpatroon. De ovipositor wordt in rust aan beide zijden bedekt door een lange 'flap' die dienst doet als tastorgaan. Met hun ovipositor kunnen de dieren doordringen in hout en daarin levende keverlarven parasiteren. Daarbij leeft de sluipwesplarve ectoparasitair en zuigt de keverlarve eerst als deze volgroeid is geheel uit. De ovipositor bestaat uit een centraal boven deel en twee glijdend daarmee verbonden onder delen (valven). Tussen deze drie delen bevindt zich in de lengte een kanaal waardoor het ei naar buiten wordt geperst. De onderste valven bezitten aan het einde groeven en min of meer tandvormige structuren waarmee ze houvast kunnen vinden in het hout. Door de valven beurtelings te verschuiven kan de sluipwesp de ovipositor het hout in wrikken. Dit proces wordt vaak 'boren' genoemd, maar is het niet. Alleen de legbuis gaat het hout in en de flappen niet. Die rusten soms op het hout bij de plaats waar 'geboord' wordt, maar ze worden ook wel recht omhoog gestoken. De structuren op de ovipositor spelen een belangrijke rol bij de determinatie van de soorten. Bij *Dolichomitus* omvat de onderste valve op de plaats van die structuren de centrale valve en daardoor is de ovipositor op die plaats verbreed (zie figuur 8 en 9). Vooral het aantal en de vorm van de groeven op die verbreding zijn belangrijk voor de determinatie. Zo kunnen groeven voorover hellen (inclivous - zoals in figuur 22), rechtop staan, of achterover hellen (reclivous - zoals in figuur 18).

Omdat mannetjes geen ovipositor bezitten zijn ze veel kleiner en onopvallender dan wijfjes en wellicht mede daarom zijn ze veel minder aanwezig in insectencollecties. Ze missen uiteraard ook de ovipositor structuren die bij de wijfjes voor de determinatie worden gebruikt en daarom ontbreken ze vaak in vroegere determinatie tabellen. Hier wordt nu ook een tabel voor de mannetjes gepresenteerd. Daarbij speelt de vorm van de valven een belangrijke rol (zie figuren 30-53). Zo hebben beide sexen weinig kenmerken met elkaar gemeen en is het 'matchen' van de sexen soms niet eenvoudig. Daartoe leveren bijna alleen de structuur van het propodeum en de sculptuur van het abdomen bruikbare informatie. Het propodeum is ogenschijnlijk het achterste deel van de thorax en wordt in oude literatuur wel als metathorax aangeduid. In feite is het een deel van het eerste achterlijfssegment, maar bij het tellen van de segmenten van het abdomen wordt het versmalde deel, de petiolus als eerste segment genomen. Op het propodeum kunnen bij de Ichneumoniden allerlei lijsten (carinae) aanwezig zijn, maar bij *Dolichomitus* zijn er hoogstens twee centrale longitudinale carinae. De mate waarin deze ontwikkeld zijn kan een belangrijke rol spelen bij de determinatie en bij het koppelen van de sexen.

