Sigalphus meridionalis spec. nov. (Hymenoptera: Braconidae: Sigalphinae) from France

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Key words: Hymenoptera; Braconidae; Sigalphinae; *Sigalphus meridionalis*; new species; Palaearctic; France.
A new species of the genus *Sigalphus* Latreille, 1802, from France is described and illustrated. A key to all known valid species is added.

Introduction

Among Braconidae from South France collected by Mr M.J. Gijswijt, an aberrantly coloured specimen was found of the genus *Sigalphus* Latreille, 1802 (Braconidae Nees, 1812: Sigalphinae Haliday, 1833). The species is closely related to the widely distributed *S. irrorator* (Fabricius, 1775), and probably is restricted to the Mediterranean region. When I visited The Natural History Museum (London) in October 2001, enabled by a SYS-RESOURCE grant, a second specimen from France was discovered in the BMNH collection.

The genus *Sigalphus* is a small genus known from the Old World (except the Australian region), North and Central America. As far as known all species, except one Nearctic species, are solitary koinobiont endoparasitoids of larvae of Noctuidae.

For the recognition of the subfamily Sigalphinae, see van Achterberg (1990, 1993, 1997), for a key to the genera of the subfamily Sigalphinae, see van Achterberg & Austin (1992), and for the terminology used in this paper, see van Achterberg (1988).

Key to species of the genus *Sigalphus* Latreille

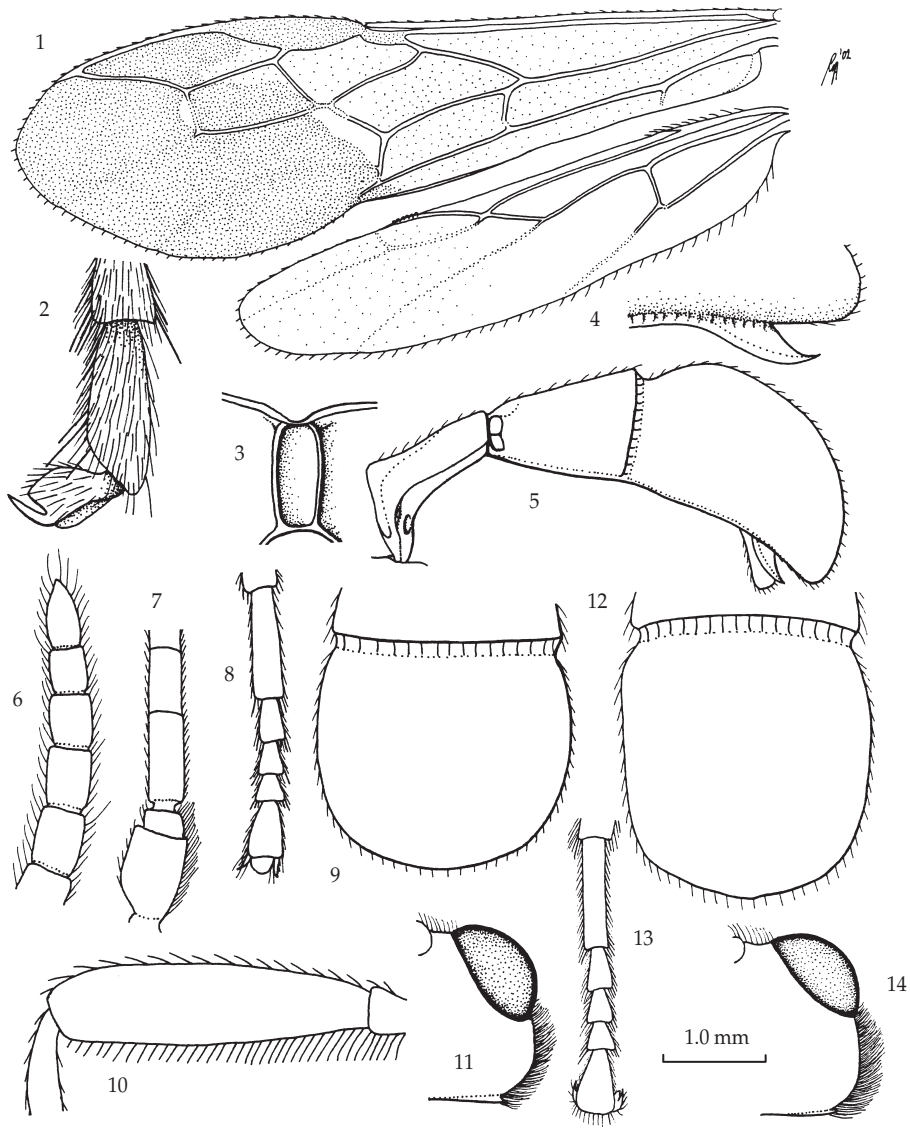
1. Head and mesosoma reddish-brown; Afrotropical 2
- Head and mesosoma black, but propodeum and metanotum may be reddish 3
2. Head medio-dorsally and apex of hind tibia black; vein r of fore wing about one-third as long as vein 3-SR; southern Africa ..... ***S. fulvus*** Brues, 1926
- Head and tibia completely reddish-brown; vein r of fore wing about one-seventh as long as vein 3-SR; Malagasy ..... ***S. testaceus*** Granger, 1949
3. Third metasomal tergite with pair of slender, distinctly acutely protruding lamellae apico-ventrally, tooth-like (figs 4, 5, 21, 23); pterostigma slightly wider (figs 1, 15); propleuron with transverse subapical depression or ridge medio-posteriorly (fig. 19); (*S. irrorator*-group; Palaearctic) 4
- Third tergite with pair of robust, roundly protruding lamellae apico-ventrally, lobe-like or without lamellae (Afrotropical spp.); pterostigma slightly narrower

(fig. 1); propleuron without distinct transverse subapical depression or ridge 9

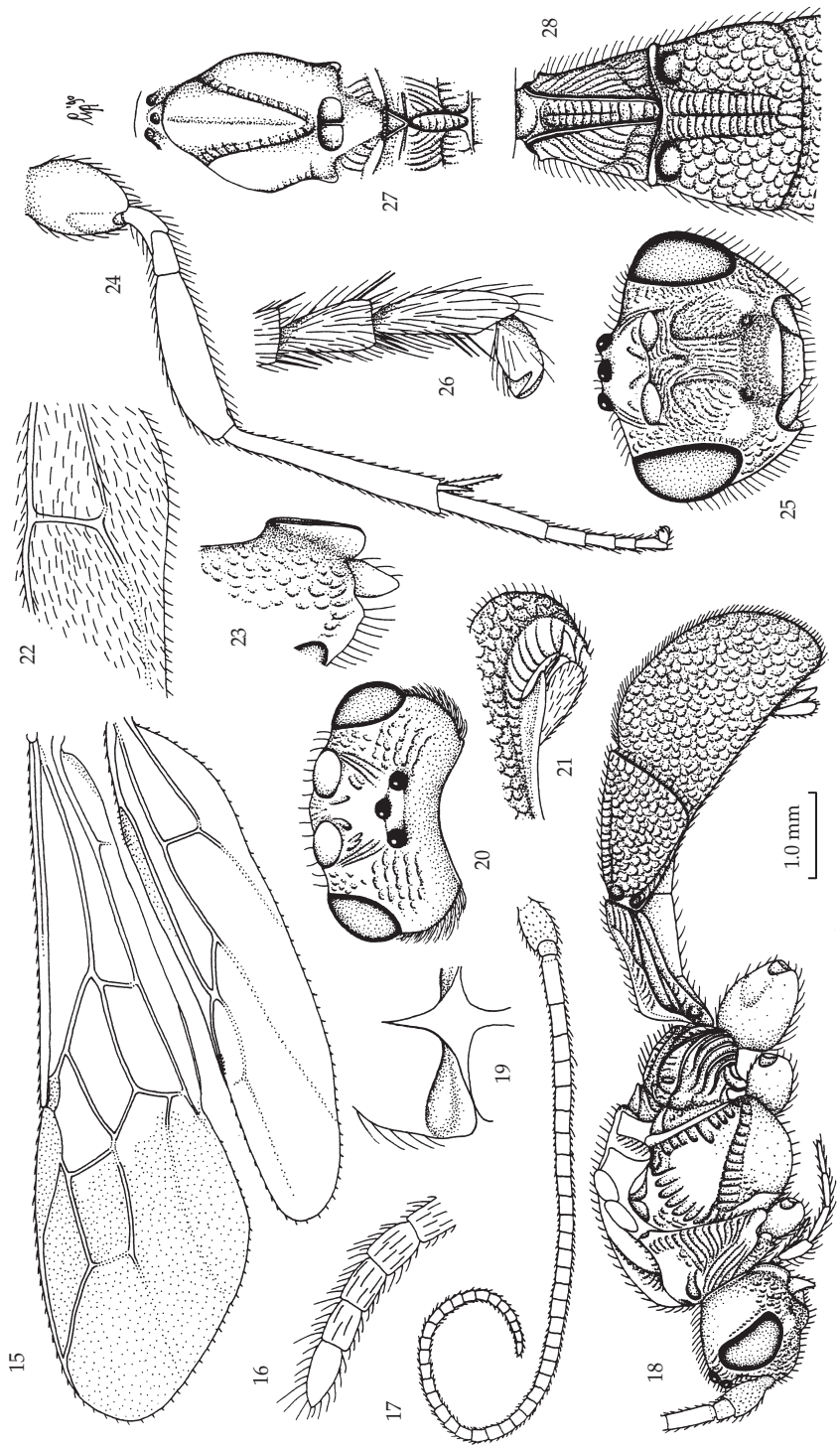
4. Third and fourth antennal segments reddish-yellow, rarely dark brown; pterostigma yellowish to rather infuscate brown; face more or less convex (almost tuberculate in *S. flavistigmus*); vein r of hind wing situated at basal 0.4-0.5 of marginal cell of hind wing; [first and second metasomal tergites reddish-yellow] 5
- Third and fourth antennal segments black; pterostigma more or less dark brown (but yellowish-brown in *S. meridionalis*); face mainly flat, at most somewhat convex near median carina; vein r of hind wing situated at basal 0.3-0.4 of marginal cell of hind wing 6
5. Vein cu-a of fore wing interstitial; vein r of hind wing situated near middle of marginal cell of hind wing; vein 2-M of hind wing distinctly curved apically; hind tibia entirely reddish-yellow apico-dorsally; China ..... ***S. flavistigmus*** He & Chen, 1993
- Vein cu-a of fore wing distinctly postfurcal; vein r of hind wing situated near basal 0.4 of marginal cell of hind wing; vein 2-M of hind wing straight or nearly so apically; hind tibia narrowly darkened apico-dorsally; Mongolia ..... ***S. mongolicus*** Tobias, 1974

Note.— Dr S.A. Belokobylskij (St. Petersburg) kindly checked the holotype of *S. mongolicus* Tobias, 1974, for the inclusion in this key.

6. Hind tibia without basal blackish band, remainder (except apical quarter) yellowish or ivory; third metasomal tergite with dense golden setosity; apical third of fore wing much darker than basal third of wing (fig. 15), strongly contrasting; third metasomal tergite more elongate subquadrate or widely oval in dorsal view (fig. 12); propodeal areola usually narrowed anteriorly (fig. 27); [fourth segment of fore tarsus of female moderately slender to robust (fig. 13); third metasomal tergite in lateral view moderately to strongly convex, dorsally often nearly at same level as second tergite (fig. 18)]; N & C Palaearctic ..... ***S. irrorator*** (Fabricius, 1775)
- Hind tibia basally with blackish or black band, and remainder completely or largely blackish or dark brown; third tergite with dense whitish or greyish setosity; apical third of fore wing variable, if much darker than basal third of wing, and strongly contrasting then third tergite more short quadrangular to subcircular in dorsal view (fig. 9); propodeal areola parallel-sided anteriorly (fig. 3) 7
7. Fourth segment of fore tarsus of ♀ robust (fig. 8); vein 1-SR+M of fore wing yellowish; apical third of fore wing distinctly darker than basal third of wing (fig. 1); hind femur ventrally (fig. 10) and mesopleuron dorsally and ventrally moderately densely setose; SW Palaearctic (France) ..... ***S. meridionalis*** spec. nov.
- Fourth segment of fore tarsus of ♀ moderately slender; vein 1-SR+M of fore wing dark brown; apical third of fore wing slightly darker than basal third of wing; hind femur ventrally and mesopleuron dorsally and ventrally conspicuously densely setose; E. Palaearctic (China, S Korea) 8
8. Hind tibia (except its blackish apical third) largely pale brownish-yellow; second tergite mainly blackish or dark reddish-brown medially; laterally vertex very coarsely punctate-rugose; [OOL = equal to POL (thus not twice as long as given in original description), POL about twice diameter of posterior ocellus (1.6 times in *S. flavistigmus*); temple in dorsal view somewhat longer than eye; medial area of second metasomal tergite wide parallel-sided (fig. 1462 in He et al., 2000); first tergite comparatively slender basally (fig. 1462 l.c.); vein 3-SR of fore wing 1.4-1.9 times



Figs 1-11, *Sigalphus meridionalis* spec. nov., ♀, holotype; figs 12-14, *Sigalphus irrorator* (Fabricius), ♀, Netherlands, Naaldwijk. 1, wings; 2, outer hind claw; 3, areola of propodeum; 4, lamella of third metasomal tergite, lateral aspect; 5, metasoma, lateral aspect; 6, apex of antenna; 7, base of antenna; 8, 13, fore tarsus, dorsal aspect; 9, 12, third tergite, dorsal aspect; 10, hind femur, lateral aspect; 11, 14, setosity of temple, dorsal aspect. 1, 5, 9, 11, 12: 1.0 × (= scale-line); 2, 6: 5 ×; 3, 4, 7-10: 2.0 ×, 13: 1.7 ×; 14: 0.9 ×.



Figs 15-28, *Sigalphus irrorator* (Fabricius), ♀, Netherlands, Naaldwijk. 15, wings; 16, apex of antenna; 17, antenna; 18, habitus, lateral aspect; 19, apical half of propleuron, ventral aspect; 20, head, dorsal aspect; 21, lamella of third metasomal tergite, latero-ventral aspect; 22, detail of veins cu-a and 2-CU of hind wing; 23, ventral half of temple, lateral aspect; 24, hind leg; 25, head, frontal aspect; 26, outer hind claw; 27, mesosoma, dorsal aspect; 28, first and second metasomal tergites, dorsal aspect. 15, 17, 18, 24, 27, 28: 1.0 × (= scale-line); 16, 26: 5 ×; 19, 23: 2.6 ×; 20-22, 25: 2.0 ×.

vein 2-SR; posterior half of precoxal sulcus finely crenulate or smooth; face not convex in holotype)] ..... ***S. liaoningensis*** He & Chen, 2000

- Hind tibia completely black; second tergite completely orange-reddish medially, at most somewhat infuscate; laterally vertex at most moderately coarsely punctate-rugose; [OOL about as long as POL (up to 1.3 times); temple in dorsal view somewhat shorter than eye or about equal; medial arrea of second tergite distinctly narrowed posteriorly; first tergite comparatively robust basally; vein 3-SR of fore wing 1.5-2.0 times vein 2-SR; posterior half of precoxal sulcus smooth or nearly so] ..... ***S. hunanus*** You & Tong, 1991

Note.— *S. anomis* You & Zhou, 1991, and *S. nigripes* He & Chen, 1993, are synonyms of this species, as noticed by He et al. (1994). According to Sharkey & Janzen (1995) they are synonyms of *S. irrorator*.

9. Third tergite without lobes ventro-apically; third metasomal tergite about as long as second tergite; first tergite somewhat longer than its apical width; [precoxal sulcus absent]; southern Africa ..... ***S. neavei*** (Turner, 1917)
- Third tergite with pair of lobes or with a protruding lamella ventro-apically; third tergite 1.4-1.8 times as long as second tergite; length of first tergite variable; Palaearctic, Oriental; New World 10
10. Vein M+CU of hind wing 1.5-1.8 times as long as vein 1-M; New World 11
- Vein M+CU of hind wing 1.2 times as long as vein 1-M or less; Old World 12
11. Metasoma orange-brown; first subdiscal cell of fore wing slender; second metasomal tergite without median carina and with pair of antero-lateral depressions large triangular and deep; carinae of lamella of third tergite not protruding, resulting in a smooth border; vein m-cu of hind wing absent; gregarious; ..... N. America ..... ***S. bicolor*** (Cresson, 1880)
- Metasoma black; first subdiscal cell of fore wing robust; second tergite with median carina and with pair of antero-lateral depressions smaller and shallow; carinae of lamella of third tergite protruding, without smooth border; vein m-cu of hind wing present; solitary; C America ..... ***S. romeroi*** Sharkey, 1995
12. Sides of first metasomal tergite distinctly concave; base of hind tibia narrowly ivory (*S. rufiabdominalis*) or widely ivory or yellowish (*S. chrysopharus* and *S. masoni*); second tergite at least partly reddish-yellow; second tergite without strong transverse rugae between carinae posteriorly or with some strong oblique carinae; basal 0.4 of fore wing subhyaline or slightly infuscate 13
- Sides of first tergite straight; base of hind tibia dark brown; second tergite black; second tergite with strong regular transverse rugae between carinae posteriorly; basal half of fore wing dark brownish; Oriental China, Vietnam (one specimen in RMNH collection) ..... ***S. gyrodontus*** He & Chen, 1994
13. Second tergite with two converging carinae, meeting median crest posteriorly or without pair of crests, its surroundings densely reticulate, without distinct transverse rugae; third tergite somewhat bulging above level of second tergite in lateral view; marginal cell of fore wing subhyaline; third tergite entirely black; tegulae black medially; basal half of hind tibia widely yellowish or ivory, contrasting with its dark apical half; [basal half of fore wing slightly infuscate] 14
- Second tergite with two parallel carinae medio-basally, connected by strong transverse rugae; third metasomal tergite strongly bulging over level of second tergite in lateral view; marginal cell of fore wing rather infuscate; only apical half of third

tergite black; second tergite entirely reddish-yellow; tegulae dark brown; basal half of hind tibia (except for its narrow ivory basal band) slightly paler dark brown as its apical half, not contrasting with apical half; [precoxal sulcus largely smooth in holotype; basal half of fore wing yellowish-brown]; Palaearctic (China) ..... ***S. rufiabdominalis*** He & Chen, 1994

14. Metasoma orange-brown, but about apical third part of third tergite blackish; second tergite more robust and comparatively transverse; second tergite with pair of converging carinae meeting median crest and median crest connected to some strong oblique carinae; anterior half of precoxal sucus finely crenulate; [tegulum dark brown and humeral plate yellowish medially]; S Palaearctic (Nepal) ..... ***S. masoni*** Sharkey, 1995

\- Metasoma black, but second tergite brownish-yellow except for black T-shaped area; second tergite more slender, and less transverse; second tergite only with a strong median crest, and surrounded by dense reticulation and no strong oblique carinae; precoxal sulcus smooth; Oriental (Indonesia: Sulawesi) ..... ***S. chrysopharus*** van Achterberg, 1995

Sigalphus meridionalis spec. nov.
(figs 1-11)

Material.— Holotype, ♀ (RMNH), "**France**: Drôme, Bourdeax, on *Salix* & *Populus*, 8.ix.2000, M.J. Gijswijt". Paratype, ♀ (BMNH), "France, Valescure, 2.vii.[19]69, K. Guichard", "*Sphaeropyx irrorator* F., det. C.R. Vardy, 1969".

Holotype, ♀, length of body 8.2 mm, of fore wing 7.2 mm; whole body (especially face and temple with long and dense whitish setosity, of third tergite with pale yellowish sheen.

Head— Antenna with 50 segments, length of third segment 1.3 times fourth segment, length of third, fourth and penultimate segments 2.7, 2.1 and 1.3 times their width, respectively (figs 6, 7); length of maxillary palp equal to height of head; in dorsal view length of eye 0.9 times length of temple; temple coarsely punctate posteriorly, punctulate anteriorly and coarsely rugose ventrally, densely and moderately long setose (fig. 11); OOL:diameter of ocellus:POL = 10:5:9; frons largely smooth and nearly flat medially; rather punctate-rugose laterally and largely setose; vertex coarsely rugose or punctate, with irregular grooves, rather flat; face densely coarsely punctate and rather convex medially but depressed near tentorial pits and area above it; clypeus evenly convex, punctate and its ventral margin straight; occipital flange medium-sized, concave; occipital carina widely interrupted medio-dorsally; malar suture widely and rather shallowly impressed; length of malar space 1.2 times basal width of mandible; mandible strongly twisted apically.

Mesosoma.— Length of mesosoma 1.2 times its height; side of pronotum coarsely punctate posteriorly and medially, coarsely striate anteriorly and largely smooth dorsally; pronope shallow; propleuron with distinct transverse ridge subposteriorly and partly punctate; mesosternal sulcus deep, crenulate; prepectal carina complete, strong ventrally, reaching precoxal sulcus and with some coarse punctures near dorsal part of carina and dorsally at epicnemial area; precoxal sulcus deep and its posterior half

largely smooth, anteriorly coarsely crenulate; remainder of mesopleuron finely punctate ventrally and smooth dorsally; patch above precoxal sulcus glabrous; pleural sulcus coarsely crenulate; metapeuron narrowly smooth anteriorly and dorsally, remainder very coarsely vermiculate; notauli deep and distinctly crenulate, remaining just separated from each other posteriorly; mesoscutum rather flat and smooth, but its middle lobe punctulate laterally and with shallow median depression, without distinct depression medio-posteriorly; scutellar sulcus very deep, with one long carina; scutellum flat and sparsely punctulate, with long crenulate medio-posterior depression; side of scutellum with few crenulae; metanotum somewhat protruding medio-posteriorly (fig. 3), without distinct median carina; propodeum coarsely punctate-rugose and anteriorly mainly smooth, medially with a comparatively wide parallel-sided areola with few weak transverse crenulae (fig. 3).

Wings.— Fore wing: r:3-SR:SR1 = 3:19:22; apical half of subbasal cell sparsely setose, but basal half nearly glabrous; area basally of 2A glabrous, except for 3 setae; 1-SR+M and SR1 slightly curved (fig. 1); 1-CU1:2-CU1 = 3:26; 2-SR:3-SR:r-m = 12:19:8. Hind wing: r at basal 0.4 of marginal cell (fig. 1); basal cell evenly setose; subbasal cell partly glabrous; 2-SC+R shortly longitudinal (fig. 1); with 6 hamuli; 1-M slightly curved; M+CU:1-M = 30:24.

Legs.— Hind coxa sparsely punctulate; length of femur, tibia and basitarsus of hind leg 4.0, 6.8 and 4.5 times their width, respectively; length of hind tibial spurs 0.45 and 0.60 times hind basitarsus; fore tarsus robust (fig. 8); hind femur moderately densely and rather long setose ventrally (fig. 10).

Metasoma.— Length of first tergite equal to its apical width, its sides straight, its surface very coarsely reticulate-rugose, antero-medially with strongly protruding dorsal carinae and with median carina between complete dorsal carinae; laterope large and deep; second and third tergites densely reticulate-rugose; second tergite with pair of large depressions anteriorly, divided by a longitudinal carina, medially with subparallel area with transverse coarse rugae and a median carina, surrounded by coarse reticulation; third tergite slightly wider than second tergite and comparatively short in dorsal view (about 0.8 times as long as wide: fig. 9; in *S. irrorator* about as long as wide: fig. 12), and in lateral view distinctly convex and somewhat bulging (fig. 5); third tergite with a pair of apically acute triangular lamellae (fig. 4) and with a curved smooth rim; length of ovipositor sheath 0.06 times length of fore wing; ovipositor sheath wide, nearly parallel-sided (fig. 5).

Colour.— Black; including legs and palpi, but basal half of hind tibia with basal black band and remainder dark brown; humeral plate dark brown; pterostigma and veins 1-SR+M, m-cu, 2-SR. 3-SR and r yellowish-brown; parastigma and remainder of veins largely dark brown; wing membrane slightly brownish, but apical third of fore wing largely dark brown (fig. 1).

Variation.— The paratype is very similar to the holotype, but has the blackish basal band of hind tibia distinctly differentiated, because it is followed by a narrow yellowish-brown part, the remainder consists of a wide dark brown part and a blackish-brown apical quarter; fore wing medially and basally rather infuscate, resulting in less contrast between distal apical third of fore wing and other parts. Length of fore wing 8.4 mm, and of body 10.1 mm; antenna incomplete; precoxal sulcus only anteriorly crenulate as in holotype.

Distribution.— France.

Note.— In Europe occur two species: *S. meridionalis* and *S. irrorator* (Fabricius, 1775) which are very similar except for the colour of the hind tibia. However, the last species has also the pronope deep, the third metasomal tergite about as long as wide (fig. 12), the fore tarsus somewhat more slender (fig. 13), the paired deep depressions at the base of the second tergite without longitudinal carina (fig. 28), the setosity of the temple longer (fig. 14), the areola of the propodeum more or less narrowed anteriorly (fig. 27), the precoxal sulcus usually largely or completely crenulate (fig. 18) and the setosity of the third tergite golden yellow.

Acknowledgements and abbreviations

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