

Sigalphus anjae spec. nov. (Hymenoptera: Braconidae: Sigalphinae) from southern Vietnam

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Key words: Hymenoptera; Braconidae; Sigalphinae; *Sigalphus anjae*; new species; Oriental; Vietnam. A new species of the genus *Sigalphus* Latreille, 1802, *S. anjae* spec. nov. from southern Vietnam is described and illustrated. A key to the known species is added.

Introduction

Among Braconidae from southern Vietnam collected during the 2007 Vietnam expedition, two specimens were found belonging to a new species of the genus *Sigalphus* Latreille, 1802 (Braconidae Nees, 1812: Sigalphinae Haliday, 1833). The new species is closely related to the more northern distributed *S. gyrodontus* He & Chen, 1994, known from southern China (Hainan) and northern Vietnam.

The genus *Sigalphus* is a small genus known from the Old World (except the Australian region, but known from Wallacea), North and Central America. Nearly half of the *Sigalphus* species occur in SE Asia (He et al., 1994; van Achterberg, 1995; Sharkey & Janzen, 1995; He et al., 2000). The species are rarely collected despite their size, and are in collections easily recognisable because of the conspicuous shape of the metasoma (figs 1, 5, 6). As far as is known, all species, except one gregarious 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). Terminology used in this paper follows van Achterberg (1988).

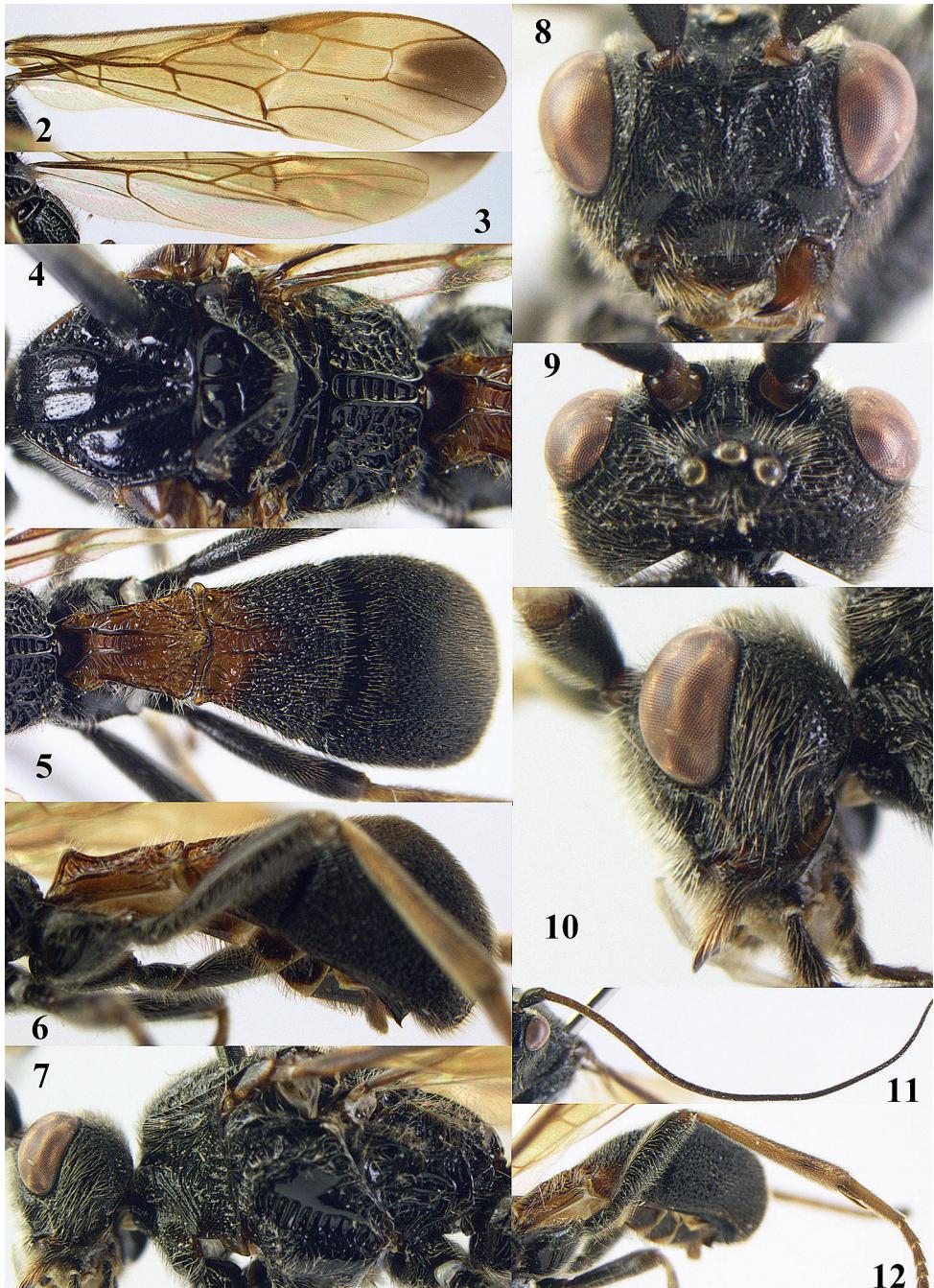
Key to species of the genus *Sigalphus* Latreille

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. Propleuron with transverse subapical depression medio-posteriorly (fig. 48 in van Achterberg & Austin, 1992); third metasomal tergite with pair of slender and apically acute lamellae apico-ventrally (fig. 47 l.c.); pterostigma slightly wider (fig. 37 l.c.); (*S. irrorator*-group; Palaearctic) 4



Fig. 1, *Sigalphus anjae* spec. nov., ♀, holotype, habitus, lateral aspect.

- Propleuron without distinct transverse subapical depression, at most slightly depressed; third tergite with pair of comparatively wide lamellae and if apically acute apico-ventrally then about as long as wide basally (*S. anjae*) or without lamellae (Afrotropical spp.); pterostigma slightly narrower (fig. 2) 10
- 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



Figs 2-12, *Sigalphus anjae* spec. nov., ♀, holotype. 2, fore wing; 3, hind wing; 4, mesosoma, dorsal aspect; 5, metasoma, dorsal aspect; 6, metasoma, lateral aspect; 7, head and mesosoma, lateral aspect; 8, head, anterior aspect; 9, head, dorsal aspect; 10, head, lateral aspect; 11, antenna; 12, hind leg, lateral aspect.

- 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 apically or nearly so; hind tibia narrowly darkened apico-dorsally; Mongolia *S. mongolicus* Tobias, 1974
- 6. Hind tibia (except apically) yellowish or ivory, without basal blackish band; third metasomal tergite with dense golden setosity; apical third of fore wing much darker than basal third of wing, strongly contrasting; third metasomal tergite more elongate subquadrate or widely oval in dorsal view; propodeal areola usually more narrowly sessile; [fourth segment of fore tarsus of female moderately slender to robust; third metasomal tergite in lateral view moderately to strongly convex, dorsally often nearly at same level as second tergite]; N & C Palaearctic *S. irrorator* (Fabricius, 1775)
- Hind tibia completely or largely black or dark brown, basally with blackish band (but narrowly yellowish in holotype of *S. hunanus*); 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; propodeal areola distinctly sessile 7
- 7. Apical third of fore wing distinctly darker than basal third of wing; hind femur ventrally and mesopleuron ventrally and dorsally moderately densely setose; fourth segment of fore tarsus of ♀ robust; vein 1-SR+M of fore wing yellowish; SW. Palaearctic (France) *S. meridionalis* van Achterberg, 2003
Note.— Dr Mark Shaw (Edinburgh) showed me two specimens intermediate between typical *S. irrorator* and *S. meridionalis*; obviously, the validity of this species needs to be reconfirmed as soon as longer series will become available from the mediterranean part of SW. Europe.
- Apical third of fore wing slightly darker than or similar to colour of basal third of wing; hind femur ventrally and mesopleuron ventrally and more or less dorsally conspicuously densely setose; fourth segment of fore tarsus of ♀ moderately slender, but robust in HT ♀ of *S. hunanus*; vein 1-SR+M of fore wing dark brown but yellowish in *S. hunanus*; E. Palaearctic (China, S Korea) 8
- 8. Hind tibia (except its blackish apical third) largely pale brownish-yellow; second tergite widely 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 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 or nearly so; second tergite completely orange reddish medially, at most somewhat infuscate; laterally vertex at most moderately to coarsely punctate-rugose 9
Note.— *S. anomis* You & Zhou, 1991 and *S. nigripes* He & Chen, 1993, may be synonyms of *S. hunanus*, as noticed by He et al. (1994). According to Sharkey & Janzen (1995) they are synonyms of *S. irrorator*; after examination of their types the following two species are considered to be valid.
- 9. Vein 1-M of fore wing yellowish-brown; basal seventh of hind tibia pale yellowish; laterally vertex very coarsely sculptured and with deep grooves [HT ♀] *S. hunanus* You & Tong, 1991

- Vein 1-M of fore wing dark brown; basal seventh of hind tibia blackish; laterally vertex moderately coarsely sculptured, without deep grooves; [OOL about as long as POL (up to 1.3 times); temple in dorsal view somewhat shorter than eye or about equal; medial area 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. anomis* You & Zhou, 1991
Note.— *S. nigripes* He & Chen, 1993, is a synonym of this species, as noticed by He et al. (1994).
- 10. 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 11
- 11. Vein M+CU of hind wing 1.5-1.8 times as long as vein 1-M; New World 12
- Vein M+CU of hind wing 1.1-1.2 times as long as vein 1-M or less; Old World 13
- 12. 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
- 13. Sides of first metasomal tergite distinctly concave near its basal third (fig. 5); base of hind tibia narrowly ivory (*S. rufiabdominalis*; *anjae*; fig. 12) or widely ivory or yellowish (*S. chrysopharis* and *S. masoni*); second tergite at least partly reddish yellow anteriorly; second tergite without strong transverse rugae between carinae posteriorly (fig. 5) or with some strong oblique carinae; basal 0.4 of fore wing subhyaline or slightly infuscate 14
- Sides of first tergite straight; base of hind tibia dark brown; second tergite black; second tergite with strong regular transverse rugae between carinae up to posterior margin; basal half of fore wing dark brownish; (Oriental China, Vietnam)
..... *S. gyrodontus* He & Chen, 1994
- 14. Second tergite with two converging carinae, meeting the median crest posteriorly or without pair of crests, its surroundings densely reticulate, without distinct transverse rugae; basal half of hind tibia widely yellowish or ivory dorsally, contrasting with its dark apical half; marginal cell of fore wing subhyaline; basal half of third tergite black; second tergite entirely orange brown or brownish yellow with a black T-shaped area; third tergite somewhat bulging basally above level of second tergite in lateral view; basal half of fore wing slightly infuscate; tegulae black, dark brown or yellowish medially 15
- Second tergite with two parallel carinae medio-basally, connected by strong transverse rugae and medially with a median carina in between (fig. 5); basal half of hind tibia (except for its narrow ivory basal band) dorsally slightly paler dark brown than its apical half, not contrasting with apical half; marginal cell of fore

wing rather infuscate (fig. 2) to completely pale yellowish; basal half of third tergite reddish yellow; second tergite entirely reddish yellow or only anterior third orange brown; third metasomal tergite strongly bulging basally over level of second tergite in lateral view or gradually bulging (fig. 6); basal half of fore wing weakly yellowish brown; tegulae dark brown medially 16

15. 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; tegulae black medially; Oriental (Indonesia: Sulawesi) *S. chrysopharus* van Achterberg, 1995

16. Precoxal sulcus largely smooth (in examined holotype); second tergite and basal half of third tergite entirely reddish yellow; third metasomal tergite strongly bulging basally over level of second tergite in lateral view; distance between apex of marginal cell of fore wing about 0.6 times vein 1-R1; vein cu-a of fore wing distinctly inclivous basally, angle with vein 2-CU1 distinctly less than 90°; vein m-cu of fore wing diverging posteriorly from vein 1-M; pterostigma rather slender; (Palaearctic China) *S. rufiabdominalis* He & Chen, 1994

- Precoxal sulcus completely coarsely crenulate (fig. 7); second tergite (except orange brown basal 0.4 triangular patch) and basal half of third tergite entirely black (fig. 5); third tergite gradually bulging basally over level of second tergite in lateral view (fig. 6); distance between apex of marginal cell of fore wing 0.4-0.5 times vein 1-R1; vein cu-a of fore wing subvertical basally, angle with vein 2-CU1 about 90° (fig. 2); vein m-cu of fore wing subparallel posteriorly with vein 1-M; pterostigma rather wide (fig. 2); (Oriental; S. Vietnam) *S. anjae* spec. nov.

Sigalpus anjae spec. nov.
(figs 1-12)

Material.— Holotype, ♀, (RMNH), “S. Vietnam: Đồng Nai, Cát Tiên N.P., Dong trail, Mal. traps, c. 100 m, 9-30.iv.2007, M.P. Quy & N.T. Manh, RMNH'07”. Paratype, 1 ♂ (IEBR), topotypic and with same data.

Diagnosis.— From Vietnam two species are known: *S. anjae* from the tropical lowland part of southern Vietnam and *S. gyrodontus* He & Chen from the subtropical submontane parts of northern Vietnam. The new species has the sides of the first metasomal tergite distinctly concave near its basal third (fig. 5; straight in *S. gyrodontus*), base of hind tibia narrowly ivory (fig. 12; dark brown in *S. gyrodontus*), second tergite reddish yellow or yellowish brown anteriorly (black in *S. gyrodontus*), second tergite without strong transverse rugae between carinae posteriorly (fig. 5; with strong regular transverse rugae between carinae up to posterior margin in *S. gyrodontus*) and basal 0.4 of fore wing slightly infuscate (dark brownish in *S. gyrodontus*).

Holotype, ♀, length of body 10.2 mm, of fore wing 8.8 mm; whole body (especially face and temple with rather long whitish setosity, but setae of second and third tergites dark brown.

Head.— Antenna with 52 segments, length of third segment 1.5 times fourth segment, length of third, fourth and penultimate segments 3.2, 2.2 and 1.6 times their width, respectively (fig. 11); length of maxillary palp 1.3 times height of head; in dorsal view; length of eye 1.1 times length of temple; temple coarsely punctate posteriorly and coarsely rugose ventrally, densely and moderately long setose (fig. 9); OOL:diameter of ocellus:POL = 14:5:9; frons largely smooth and nearly flat medially; rugose laterally and largely setose; vertex coarsely punctate-rugose and slightly convex; face densely coarsely punctate, sublaterally rather longitudinally depressed, medially with longitudinal ridge (fig. 8); clypeus convex, punctate and its ventral margin straight; occipital flange large (1.5 times basal width of mandible) and wide (fig. 8); behind stemmaticum occipital carina absent; malar suture distinctly impressed; length of malar space 1.1 times basal width of mandible; mandible strongly twisted apically.

Mesosoma.— Length of mesosoma 1.5 times its height; side of pronotum coarsely punctate-rugose posteriorly and medially, sparsely finely punctate dorsally and anteriorly; pronope and lateral pronope deep and pit-shaped; subposteriorly propleuron only slightly convex, without distinct transverse ridge and largely punctate; mesosternal sulcus rather shallow and sparsely crenulate; prepectal carina complete, moderately strong ventrally, reaching precoxal sulcus, coarsely punctate near dorsal part of carina and at epicnemial area; precoxal sulcus deep and entirely coarsely crenulate; patch above precoxal sulcus glabrous and smooth, mesopleuron finely punctate ventrally and coarsely crenulate dorsally; pleural sulcus coarsely crenulate; metapleuron narrowly smooth anteriorly and dorsally, remainder very coarsely vermiculate-rugose (fig. 7); notaui deep and coarsely crenulate and connected to crenulate lateral groove, posteriorly remaining just separated from each other; mesoscutum rather flat and largely smooth, punctulate and with shallow median depression, with distinct depression medio-posteriorly; scutellar sulcus very deep, 0.7 times as long as scutellum and with one long carina (fig. 4); scutellum flat, and sparsely punctulate, with medio-posterior depression obsolescent, as row of small punctures; side of scutellum with few crenulae; metanotum not protruding medio-posteriorly (fig. 7), with short median carina anteriorly; propodeum coarsely punctate-rugose, medially with a comparatively narrow parallel-sided areola with few weak transverse crenulae (fig. 4).

Wings.— Fore wing: r:3-SR:SR1 = 6:34:37; apical half of subbasal cell rather sparsely setose and basal quarter nearly glabrous; area basally of 2A glabrous; 1-SR+M and SR1 slightly curved (fig. 2); 1-CU1:2-CU1 = 5:43; 2-SR:3-SR:r-m = 17:34:14; distance between apex of marginal cell of fore wing 0.4 times vein 1-R1; vein cu-a of fore wing subvertical basally, angle with vein 2-CU1 about 90° (fig. 2); vein m-cu of fore wing subparallel posteriorly with vein 1-M; pterostigma comparatively wide (fig. 2). Hind wing: r at basal 0.4 of marginal cell; basal cell evenly setose; subbasal cell partly glabrous; 2-SC+R shortly longitudinal (fig. 2); with 5 hamuli; 1-M slightly curved; M+CU:1-M = 25:22.

Legs.— Hind coxa sparsely punctulate; length of femur, tibia and basitarsus of hind leg 4.2, 7.4 and 5.8 times their width, respectively; length of hind tibial spurs 0.5 and 0.6 times hind basitarsus; fore tarsus moderately slender (fig. 12); hind femur densely and rather long setose ventrally (fig. 12).

Metasoma.— Length of first tergite 1.3 times its apical width, its sides concave behind spiracles, its surface very coarsely reticulate-rugose, antero-medially with strongly protruding dorsal carinae and without median carina between complete dorsal carinae; laterope large and deep; second (except crenulate basal triangle) and third tergites densely reticulate-rugose, but basal half of third tergite very finely so; second tergite with pair of large depressions anteriorly, divided by a pair of longitudinal carina, medially with subparallel area with transverse coarse rugae and a median carina, not reaching apical rim; third tergite wider than second tergite and comparatively short in dorsal view (about 0.9 times as long as wide: fig. 5), and in lateral view distinctly convex and somewhat bulging (fig. 6); third tergite gradually bulging basally over level of second tergite in lateral view (fig. 6), apically with a pair of acute triangular lamellae (fig. 6) and laterally with a curved smooth rim; length of ovipositor sheath 0.09 times length of fore wing; ovipositor sheath wide, densely setose, nearly parallel-sided (fig. 6).

Colour.— Black (including palpi; fig. 1); first tergite and basal triangle of second tergite orange brown; tibiae (except for ivory base) and tarsi ventrally yellowish brown and dorsally dark brown; tegulae and large patch at apex of fore wing dark brown; pterostigma and veins 1-SR+M, m-cu, 2-SR, 3-SR and r yellow; parastigma and remainder of veins largely brown; remainder of wing membrane yellowish (fig. 2).

Variation.— The male paratype is very similar to the female holotype; it has 53 antennal segments, most of apex of fore wing dark brown, tibiae (except basally) and tarsi largely dark brown and mesosternal sulcus nearly smooth. Length of fore wing 9.0 mm, and of body 10.5 mm.

Distribution.— South Vietnam.

Etymology.— Named after my cousin, Anja van Vliet (Oudewater) for her interest in entomology.

Acknowledgements and abbreviations

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