Mediterranean species related to *Paragus hermonensis* Kaplan, 1981, with the description of *Paragus gorgus* spec. nov. (Diptera, Syrphidae)

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Paragus atlasi Claussen, 1989, *P. bradescui* Stănescu, 1981, *P. hermonensis* Kaplan, 1981 and *P. sexarcuatus* Bigot, 1862 are compared and diagnostic features are provided for each species. It is established that *bradescui* Stănescu (November 1981) is the senior synonym of *antoinettae* Goeldlin de Tiefenau & Lucas, 1981 (15 January 1982) (**syn. nov.**). *P.* (*Paragus*) *gorgus* Vujić & Radenković **spec. nov.** is described, based on material from gorges and submediterranean hills in Yugoslavia, Macedonia, Greece, Italy and Germany. This species is closely related to *P. hermonensis*. Maps are presented showing the known geographic range of each of the species discussed.

Zusammenfassung

Paragus atlasi Claussen, 1989, *P. bradescui* Stănescu, 1981, *P. hermonensis* Kaplan, 1981 und *P. sexarcuatus* Bigot, 1862 werden miteinander verglichen. Für alle Arten werden diagnostische Merkmale angegeben. *P. bradescui* Stănescu (November 1981) ist ein älteres Synonym von *P. antoinettae* Goeldlin de Tiefenau & Lucas, 1981 (15. Januar 1982) (**syn. nov.**). *P.* (*Paragus*) *gorgus* Vujić & Radenković **spec. nov.** wird auf der Grundlage von Material aus Schluchten und submediterranem Hügelland aus Jugoslawien, Macedonien, Griechenland, Italien und Deutschland beschrieben. Die Art ist nahe verwandt mit *P. hermonensis*. Die Verbreitung beider Arten wird auf Karten dargestellt und diskutiert.

Introduction

Paragus Latreille, 1804 is an aphidophagous genus of the subfamily Syrphinae and the only member of the tribe Paragini. It is widely distributed on all continents, except South America. This distinct genus has been revised by Stuckenberg (1954a, 1954b), Goeldlin de Tiefenau (1976) and Vockeroth (1986). Three related West Palaearctic taxa were described almost simultaneously during 1981: *P. hermonensis* Kaplan, 1981 (in Kaplan & Thompson 1981), *P. bradescui* Stănescu, 1981 and *P. antoinettae* Goeldlin

de Tiefenau & Lucas, 1981. In their paper, Goeldlin de Tiefenau & Lucas (1981) also reinstated *P. sexarcuatus* Bigot, 1862, describing the previously unknown male of this species and redescribing the female. Later, Claussen (1989) described *P. atlasi*, an additional species of this complex. There has subsequently been considerable confusion between these closely related taxa in the literature, including suggestions that they may not all be distinct species. The existence of an additional undescribed species in this complex, in the Balkan Peninsula, has been established by examination of the type material of the other species and further material from their type localities. This species is described here, as *P. gorgus* Vujić & Radenković spec. nov.. The taxonomic status of other related taxa from the Mediterranean is critically reassessed, demonstrating the existence of five species with very similar morphological characters: *P. atlasi*, *P. bradescui*, *P. gorgus*, *P. hermonensis* and *P. sexarcuatus*.

Features of the *Paragus hermonensis* group of species

There is still no key which deals with all the European species of the genus *Paragus* and identification is at present dependent primarily on features of the male terminalia – females of some of the species cannot be satisfactorily separated (Speight 1998). The males of *hermonensis* group species key to *P. majoranae* Rondani, *P. albifrons* Fallén and *P. flammeus* Goeldlin de Tiefenau, in the revision made by Goeldlin de Tiefenau (1976, p. 82-83). These latter species are also closely related to the *hermonensis* group, with which they form a larger monophyletic group. *P. albifrons*, *P. flammeus* and *P. majoranae* are not included in the analysis carried out here because of their clear taxonomic status.

The males of species related to *P. hermonensis* are characterised by the following features:

- anterior edge of basolateral lobe of aedeagus oval in lateral view (figs. 1, 4, 9, 35) (on the contrary to distinctly concave part between marginal teeth; for example as in *P. flammeus* and *P. albifrons*: in Goeldlin de Tiefenau 1976, p. 93, figs. 12, 13); armed with marginal teeth (at least two);
- lingula with large lateral denticulate folds (figs. 3, 6, 14, 38);
- posterior end of aedeagal apodeme without distinct ventral spine (fig. 1: z) (present in *P. majoranae* and *P. albifrons*: in Goeldlin de Tiefenau 1976, p. 93, figs. 10, 12);
- gray pollinose submedial vittae on mesoscutum (figs. 18, 19, 22, 23) (absent in some related taxa, as in the recently described *P. kopdagensis* Hayat & Claussen);
- pollinose bands on tergites 2-4, at least on tergite 4 (except in *P. atlasi*, which is included in this analysis because of presence of all the other characters).

The females of *hermonensis* group species key to *P. majoranae* and *P. albifrons* (*P. atlasi*, *P. bradescui*, *P. gorgus* and *P. hermonensis* in part) or *P. strigatus* Meigen (*P. hermonensis* in part, *P. sexarcuatus*) in Goeldlin de Tiefenau (1976, p. 83-84). The separation of females is still uncertain in some cases. The main diagnostic characters

of these group of taxa are: face with dark medial vitta, in lateral view approximately parallel with eye margin, mesoscutum with gray pollinose submedial vittae, scutellum partly pale apically; tergites usually predominantly dark (at least with pale areas on tergite 2 and 3, that not reach the lateral sides on tergite 3), if tergites predominantly pale then pale colour present also on tergite 5.

Material examined

The analysed material belongs to the collections of: the Telaviv University (coll. TA), Israel (the paratypes of *P. hermonensis*: 1♂,1♀); Staatliches Museum für Naturkunde Karlsruhe (coll. SMNK), Germany (1♂ paratype of *P. gorgus*); Natural History Museum of Sibiu (coll. SM), Romania (the holotype and several paratypes of *P. bradescui*); Natural History Museum in Belgrade (coll. BG), Yugoslavia (holotype and allotype of *P. gorgus*) and the Institute of Biology (coll. NS), University of Novi Sad, Yugoslavia (paratypes of *P. gorgus* and 3♂, 1♀ of *P. bradescui*); Mr. Claus Claussen (coll. CC), Flensburg, Germany (1♂, 1♀ paratypes of *P. hermonensis*; 2♂ paratypes of *P. gorgus*); Mr. Dieter Doczkal (coll. DD), Malsch, Germany (2♂ of *P. hermonensis*; 2♂ determined by Kassebeer as *P. antoinettae*, 1♀ of *P. sexarcuatus*); Mr. Tore Nielsen (coll. TN), Sandness, Norway (1♂ of *P. sexarcuatus*).

Paragus bradescui: Romania (Giurgiu, Pasărea, SM); Yugoslavia, Serbia (Suva planina, Ljuberadja, 3.05.1988, 1♂, leg. Vujić, coll. NS, first record of species for F.R. Yugoslavia); Slovenia (Kopar, kota svetog Marka, 11.05.1955, 1♂, leg. Glumac, det. Glumac as *P. albifrons*; coll. BG; published in Glumac, 1956a; first record of species for Slovenia); Croatia (Trogir, 07/08.1978, 1♂, leg. Nonveiller; Rovinj, 24.04.1983, 1♂ 1♀, leg. Vujić, coll. NS; records published in Šimić, 1986); France (Corsica, U. Ajaccio Calcatoggio/Liscia, 23.08.1992, 1♂, 26.08.1992, 1♂, leg. Kassebeer, coll. DD, determined by Kassebeer as *P. antoinettae*).

Paragus hermonensis: Israel (Hermon mountain, 2♂, 3♀, coll. TA); France (Valence, Beaufort, Escoulin, coll. MF, 8-22.08.1987, 2♂, leg. Risch & Sorg, coll. DD); Yugoslavia, Montenegro (Petrovac, 6.08.1956, 1♂, leg. Glumac, det. Glumac as *P. quadrifasciatus* Meigen, coll. BG, published in Glumac, 1956b; first record of species in F.R. Yugoslavia).

Paragus sexarcuatus: France (Corsica, Acso, 600-900m, 5.07.1996, 1♂, leg. Lambeck, det. Goeldlin de Tiefenau, coll. TN; Calvi, Punta revellata Stareso, 1.-30.05.1994, 1♀, leg. van den Berghe, det. Doczkal, coll. DD).

Paragus gorgus Vujić & Radenković **spec. nov.**

Types: Holotype, male: Yugoslavia, Serbia (gorge of Lazareva river near Zlot village, 13.07.1996, leg. Radišić M., coll. NS). Allotype, female: Yugoslavia, Montenegro (Durmitor, Komarnica, 19.07.1997, leg. Mićić, coll. NS). – Paratypes: Yugoslavia, Serbia (Dubašnica: the same locality and date as holotype, 1♂, leg. Radišić P.; 14.07.1996, 1♂, leg. Vujić; 25.07.1997, 1♂, leg. Vujić; Malinik, 18.05.1996, 1♂, leg. Dožić), Montenegro (Durmitor: Crno jezero, 11.08.1984, 1♂ 1♀, leg. Vujić; Donja Bukovica, 28.08.1984, 1♂, leg. Vujić; Zminje jezero, 14.08.1984, 1♀, leg. Vujić; kanjon Komarnice, 22.08.1984, 2♂, leg. Vujić, 31.07.1994, 1♀, leg. Radišić M., 23.08.1994, 1♂, leg. Radnović S. Kanjon Morače: 4.04.1990, 1♂, leg. Vujić. Skadarsko jezero: Virpazar, 13.07.1983, 1♂, leg. Šimić. Prokletije: Krošnje, 28.07.1994, 1♀, leg. Radišić M.); Macedonia (Kožuf, 14.05.1990, 1♂, leg. Vujić); Greece (Olimp, Prionia, 18.07.1998, 2♂, leg. Vujić); Italy (Südtirol, Partschins, 800m, 20.07. 1966, 2♂, leg. Hbth., coll. CC, determined by Claussen as *P. hermonensis*); Germany (Istein, 16.-21.06.1931, 1♂, leg. Leininger, coll. SMNK, determined by Doczkal as *P. hermonensis*).

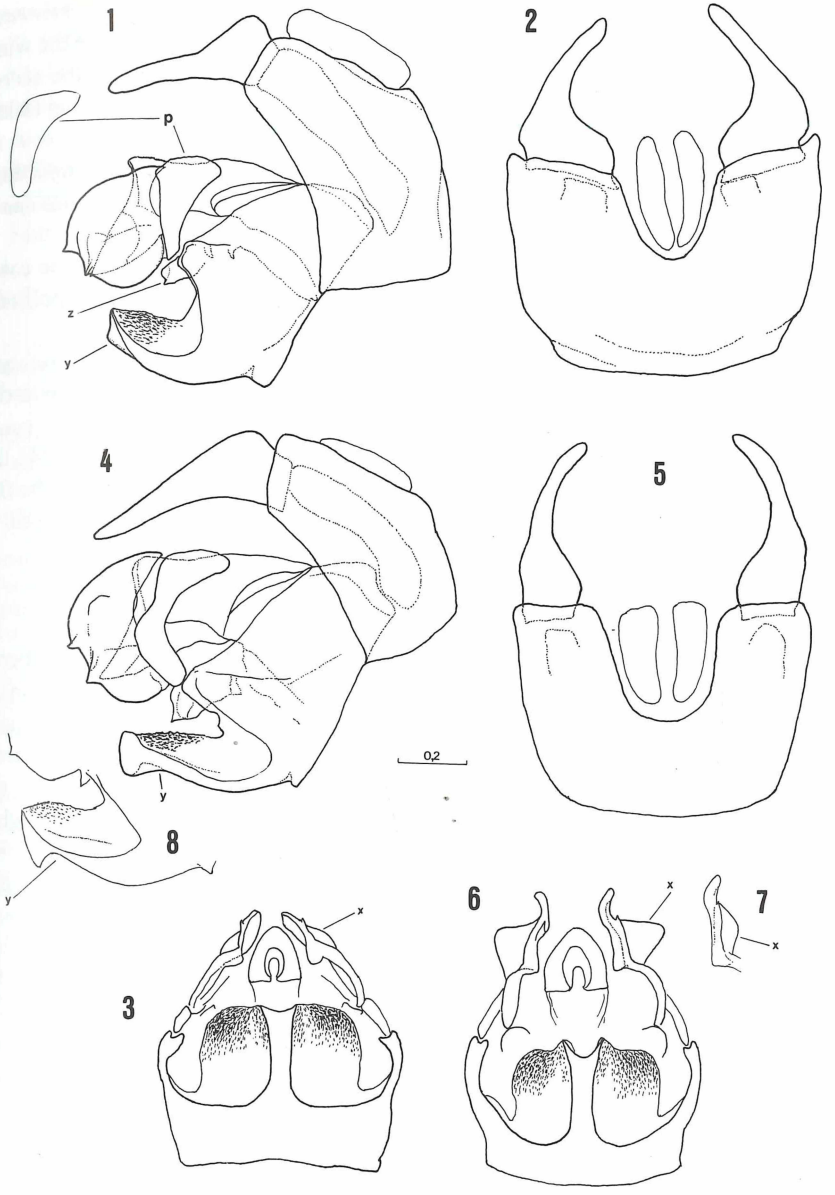
The holotype and allotype are deposited at the Natural History Museum in Belgrade, Yugoslavia (coll. 595773, Inv. No. 23 - holotype and 24 - allotype). Most of the paratypes are preserved in the collection of the Institute of Biology, Novi Sad, Yugoslavia (coll. NS), except 3 males (coll. CC, coll. SMNK).

Etymology: The name is derived from the Latin word gorgo, the name of a person from Greek mythology.

Diagnosis

The species belongs to the subgenus *Paragus*. It is characterised as a member of the *hermonensis* group by possession of three pairs of silvery pollinose bands on black tergites and a pair of long pollinose submedial vittae on the mesoscutum, which extend beyond the transverse suture (figs. 22, 23). The main diagnostic characters are in the structure of the male genitalia:

- lateral bulges on basolateral lobe of aedeagus (fig. 3: x) much smaller than in *P. hermonensis* (figs. 6: x, 7: x) and the basolateral lobe of aedeagus (fig. 1) itself smaller and more oval than in *P. hermonensis* (fig. 4);
- aedeagus in ventral view slightly lower than the top of the basolateral lobe (fig. 27); in *P. hermonensis* clearly lower than the top of the basolateral lobe (figs. 25, 26);
- lingula shorter with the ventral margin of its apical half small and convex in lateral view (fig. 1: y); the area between the lingula and other parts of hypandrium (fig. 1) much larger than in *P. hermonensis* (figs. 4, 8), and quadrilateral;
- epandrium of *P. gorgus* in lateral view (fig. 1) longer in relation to surstyli than in *P. hermonensis* (fig. 4); surstyli of *P. gorgus* (fig. 2) broader basally than in *P. hermonensis* (fig. 5).



Figs. 1-8: Male genitalia. – **1-3.** ***Paragus gorgus*** (Montenegro, mountain Durmitor). – 1. lateral view (p = paramere; z = posterior end of aedeagal apodeme, y = apical part of lingula); – 2. epandrium, dorsal view; – 3. hypandrium, ventral view. – **4-8.** ***P. hermonensis*** (4-6, Israel, mountain Hermon; 7-8 France, Valence). – 4. lateral view; – 5. epandrium, dorsal view; – 6. hypandrium, ventral view; – 7. lateral lobe of aedeagus, ventral view (x = lateral bulge); – 8. lingula, lateral view (y = apical part). – Scale in mm.

Separation of females is difficult, but according to the description of *P. hermonensis*, females of *P. hermonensis* (Kaplan & Thompson 1981, p. 209, fig. 19) have the wings more extensively bare of microtrichia than *P. gorgus*, which has 3/4 of the second costal cell and almost 1/2 of second basal cell covered with microtrichia (wing as in *P. majoranae*, as presented in Kaplan & Thompson 1981, p. 209, fig. 20).

The female of *P. gorgus* is also similar to *P. albifrons*, *P. bradescui* and *P. majoranae*, which may occur sympatrically with *P.gorgus* at some localities. These species can be distinguished as follows:

- females of *P. albifrons* have no pollinose bands on the tergites (in some cases, they exist only on the lateral sides of tergite 3), in contrast to the three pair of pollinose bands found on tergites 2-4 in females *P. gorgus* (fig. 24);
- females of *P. gorgus* have longer pollinose submedial vittae on the mesoscutum, extending beyond the transverse suture (figs. 22, 23), while in *P. bradescui* and *P. majoranae* these vittae characteristically only reach as far as the transverse suture (figs. 18, 19); *P. gorgus* has distinct, white, pollinose triangles on tergite 2 (fig. 24), that are absent or very weak in *P. majoranae* (figs. 20, 21); the dark medial vitta on the face of *P. gorgus* is broader than in *P. bradescui* and a dark subapical annulus is present on the hind tibia in *P. gorgus*, but absent in *P. bradescui*.

Description

♂: Head: Face moderately produced, entirely yellow except for the brownish tubercle and black oral margin, covered with predominantly whitish hairs. Frontal triangle small, yellow with whitish pile except for some brown hairs around the frontal lunule; frontal angle 85°. Vertical triangle shiny-black, with white pollinosity anteriorly; hairs on the anterior 1/3 mixed black and yellow, predominantly black on the ocellar triangle and yellow posteriorly. Occiput metallic-black with a blue reflection, covered with white hairs and pollinose on the ventral 2/3, shiny and with yellowish hairs on dorsal 1/3. Eye contiguity approximately as long as 7 facets. Antenna dark-brown dorsally, light-brown ventrally; 3rd antennal segment 3.5 times as long as wide; arista light-brown.

Thorax (figs. 22, 23): Black with brownish-gold reflection. Mesoscutum with fine, dense puncturation and two white pollinose submedial vittae that extend beyond the transverse suture; hairs predominantly yellow except some brown ones. Scutellum black except for a yellow apical spot, covered with mixed brown and yellow hairs, without teeth on its outer margin. Squama white with yellowish margin and fringe. Haltere with light-brown stem and pale-yellow capitulum. Wing with dense microtrichia, 3/4 of second costal cell and almost 1/2 of second basal cell covered in microtrichia; spurious vein extending beyond or to discal cross-vein; stigma brown. Legs: mainly orange with pale-yellowish hairs. Coxae and trochanters brown. Fore and mid femora brown on basal 1/2; hind femur brown on basal 4/5. Hind tibia with rather broad brownish annulus. Fore and mid tarsi orange; hind basitarsi brownish dorsally.

Abdomen (fig. 24): Dorsum black, with dense puncturation and short black hairs,

except for white pilosity on the 3 pairs of white-dusted bands. Sterna shining, brownish-black, with fine, white pile.

Male terminalia (figs. 1-3, 27): Epandrium, cerci and surstyli simple (in some examples the dorsal margin of the surstyli is slightly curved); lingula flared and short; the area between the lingula and the other part of the hypandrium broad and quadrilateral; basolateral lobe of aedeagus oval and with 2 small marginal teeth; paramere broad apically and only slightly curved in lateral view (fig. 1: p).

Size: Body length 4.9-5.9 mm; wing length 4.1-5.0 mm.

	atlasi	***bradescui***	***gorgus***	***hermonensis***	***sexarcuatus***
pollinose bands on tergites	absent	present	present	present	present (tergit 4)
pollinose submedial vittae on mesoscutum	short, at most reach the transverse suture (as on fig. 18)	reach the transverse suture (as on fig. 19)	long, extend beyond transverse suture (figs. 22, 23)	long, extend beyond transverse suture (figs. 22, 23)	short, at most reach the transverse suture (as on fig. 18)
ventral margin of apical half of lingula in lateral view	large and concave (as on fig. 8: y)	large and concave (figs. 9, 15)	small and convex (fig. 1: y)	concave (figs. 4: y, 8: y)	convex (fig. 35)
baserolateral lobe of aedeagus in lateral view	wider than high (as on fig. 4)	large, about 1,5 times as wide as high (figs. 9, 30-34)	small, as wide as high (fig. 1)	wider than high (fig. 4)	large, about 1,5 times as wide as high (fig. 35)
ventral edge of baserolateral lobe of aedeagus	narrow in ventral view (as on fig. 25) with two teeth in lateral view	broad in ventral view (figs. 28, 29); with more teeth in lateral view (figs. 30-34)	narrow in ventral view (fig. 27); with two teeth in lateral view (fig. 1)	narrow in ventral view (fig. 25, 26); with two teeth in lateral view (fig. 4)	narrow in ventral view (fig. 37); with more teeth in lateral view (fig. 35)
lateral bulges on basolateral lobe of aedeagus	small	absent (figs. 28, 29)	small (fig. 3: x)	large (figs. 6: x, 7: x)	absent (fig. 37)
position of aedeagus in ventral view	clearly lower than top of basolateral lobe	clearly lower than top of basolateral lobe (fig. 28)	slightly lower than top of basolateral lobe (fig. 27)	clearly lower than top of basolateral lobe (fig. 25)	clearly lower than top of basolateral lobe (fig. 37)
surstyli	broad basally (as on fig. 2)	narrow basally (fig. 13)	broad basally (fig. 2)	narrow basally (fig. 5)	asymmetric (fig. 36)

Table 1: Morphological differences between males of *Paragus atlasi* Claussen, *P. bradescui* Stănescu, *P. gorgus* Vujić & Radenković spec. nov., *P. hermonensis* Kaplan and *P. sexarcuatus* Bigot.

♀: Similar to the male except for normal sexual dimorphism and the following characteristics: face with broad brownish-black medial vitta that is about 1/3 as wide as the face; frons shining black with thin white pollinose vitta along eye margin. Size: Body length 4.8-5.1mm; wing length 3.9-4.5mm.

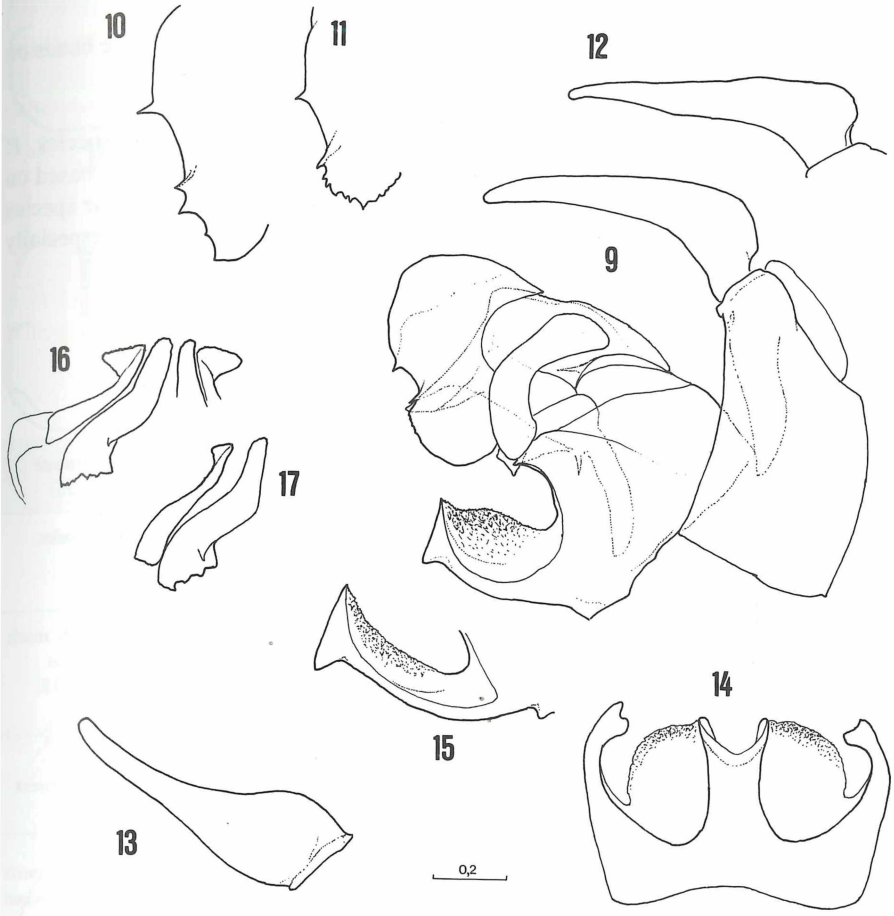
Discussion

In the paper in which *Paragus hermonensis* is described, Kaplan & Thompson (1981) indicate that among the material from Israel (p. 200, figs. 5 and 7) there existed a specimen which "differs (from *P. hermonensis*) in the shape of the ventral lobe of basolateral lobe of the aedeagus (fig. 8). As this male is unique, we are unsure whether it represents a new species or an aberrant individual of *hermonensis*" (p. 200, fig. 8, single male from Israel, Upper Galilee, Nahal Amud). Two additional related taxa were described almost simultaneously during 1981: *P. bradescui* Stănescu, 1981 and *P. antoinettae* Goeldlin de Tiefenau & Lucas, 1981. According to the Catalogue of Palaearctic Syrphidae (Peck 1988) *P. bradescui* is a synonym of *P. hermonensis*. Later, Stănescu (1991) reinstated *P.bradescui* as a good species and cited the unique specimen referred to by Kaplan & Thompson (1981) as a specimen of *P. bradescui*. Most recently, Claussen (1989) described *P. atlasi*, another species of this complex.

On the basis of the material we have examined, together with the descriptions and additional data concerning *P. atlasi* provided by Claussen (Claussen, pers. comm.), five closely related species can be satisfactorily recognized in this group: *P. atlasi*, *P. bradescui*, *P. gorgus*, *P. hermonensis* and *P. sexarcuatus*. *P. sexarcuatus* has a slightly isolated position in this group, based on the predominantly pale colored abdomen, which contrasts with the mostly dark abdomen of the other species. But male *P. hermonensis* with completely pale tergites 3-5, present among material from France, indicates that this character has only weak diagnostic value in this group of species. Based on the male genitalia characters, *P. sexarcuatus* clearly belongs to the *hermonensis* group. The main morphological differences between males of the five species are summarised in table 1.

Females of this group of species can be partly separated on the basis of Goeldlin de Tiefenau's (1976) key, additional data and remarks:

- the female of *P. atlasi* keys to *P. albifrons* in Goeldlin de Tiefenau (1976); these two taxa are related by the absence of gray pollinose bands on the tergites. Females of these two species cannot be satisfactorily distinguished at present.
- the female of *P. sexarcuatus* keys to *P. strigatus* in Goeldlin de Tiefenau (1976). Goeldlin de Tiefenau & Lucas (1981) redescribed the female of *P. sexarcuatus* and listed differences between the females of the two species in a table (Goeldlin de Tiefenau & Lucas 1981, p. 397, tab. 1).
- the females of *P. bradescui*, *P. hermonensis* and *P. gorgus* key to *P. majoranae* in Goeldlin de Tiefenau (1976). Characters to distinguish females of these species are presented in Table 2.



Figs. 9-17: ***Paragus bradescui*****, male genitalia**. – 9. lateral view (Serbia, mountain Suva planina); – 10, 11. lateral lobe of aedeagus, lateral view (10 Croatia, Trogir; 11 France, Corsica); – 12. surstylus, lateral view (France, Corsica); – 13. surstylus, dorsal view (Croatia, Rovinj); – 14. lingula, ventral view (Serbia, mountain Suva planina); – 15. lingula, lateral view (Croatia, Trogir); – 16, 17. paramere and lateral lobe of aedeagus, anterior view (16 Croatia, Rovinj; 17 Serbia, mountain Suva planina). – Scale in mm.

The variability of other characters cited in the original descriptions of the species has proved to be too great to ensure reliable determination. Characters which fall into this category are as follows:

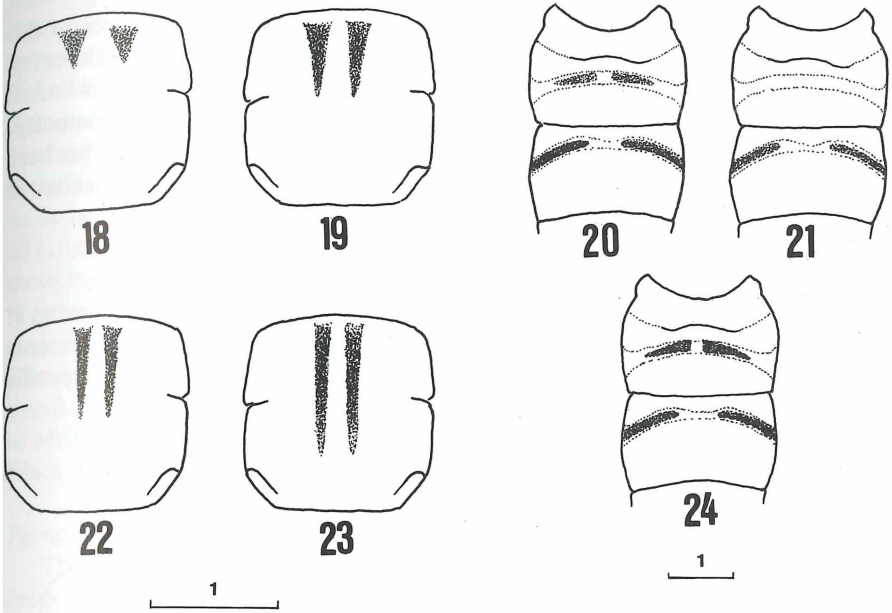
- extent of microtrichial coverage of wing (Kaplan & Thompson 1981),
- width of frons and hind femur, colour of scutellum, shape of pollinose bands on abdominal tergites (Goeldlin de Tiefenau & Lucas 1981),
- shape of abdominal tergites 5-8 (Stănescu 1981).

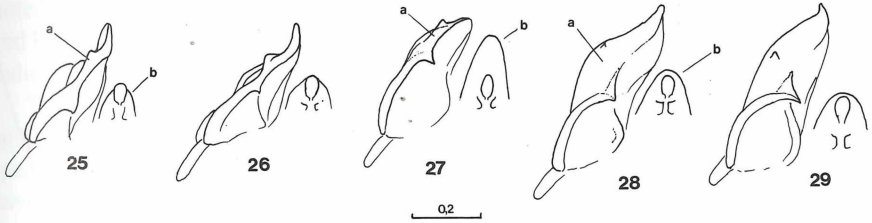
It is possible to separate the females of one pair of closely related species, *P. bradescui* and *P. majoranae*, from the other, *P. gorgus* and *P. hermonensis*, based on the combination of characters given in Table 2, but correct separation of the species comprising each pair is practically impossible in the case of some specimens (especially in the absence of sympatrically-collected males).

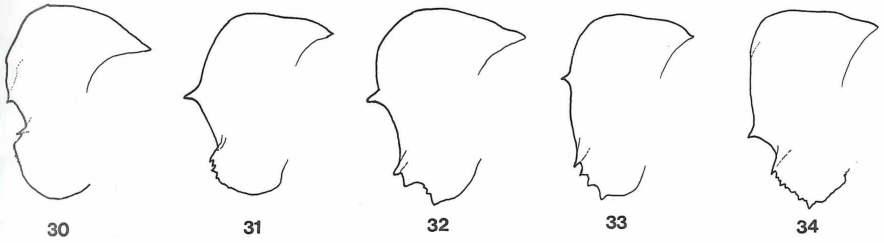
	bradescui (n=4)	***gorgus*** (n=5)	***hermonensis*** (n=3)	***majoranae*** (n=35)
dark medial vitta on face	narrower R=0,5-0,6	broader R=0,9-1,1	broader R=1,0	mainly broader, variable R=0,5-1,0
pollinose submedial vittae on mesoscutum	reach the transverse suture (as on fig. 19)	long, extend beyond transverse suture (figs. 22, 23)	long, extend beyond transverse suture (as in figs. 22, 23)	short, mostly reach the transverse suture (fig. 18, 19)
dark subapical annulus on hind tibia	absent	present	present	present, but ocasionally absent

Table 2: Morphological differences between females of *Paragus bradescui*, *P. gorgus*, *P. hermonensis* and *P. majoranae* (the number of specimens examined is given in parentheses; R = ratio between maximum width of dark medial vitta on face and width of lateral yellow stripe on face).

➔ **Figs. 18-21: *Paragus majoranae.*** – 18, 19. mesoscutum, dorsal view; – 20, 21. tergites 1-3, dorsal view. – **Figs. 22-24: *Paragus gorgus.*** – 22, 23. mesoscutum, dorsal view; – 24. tergites 1-3, dorsal view. – **Figs. 25-29: Lateral lobe of aedeagus (a) and aedeagus (b) in ventral view.** – 25, 26. *P. hermonensis* (25 Israel, mountain Hermon; 26 France, Valence); – 27. *P. gorgus* (Serbia, mountain Malinik); – 28, 29: *P. bradescui* (28 France, Corsica; 29 Romania). – **Figs. 30-34: Lateral lobe of aedeagus in lateral view.** – 30-34. *P. bradescui* (30 Serbia, mountain Suva planina; 31 Slovenia, Kopar; 32 Croatia, Trogir; 33, 34 France, Corsica). – Scale in mm.





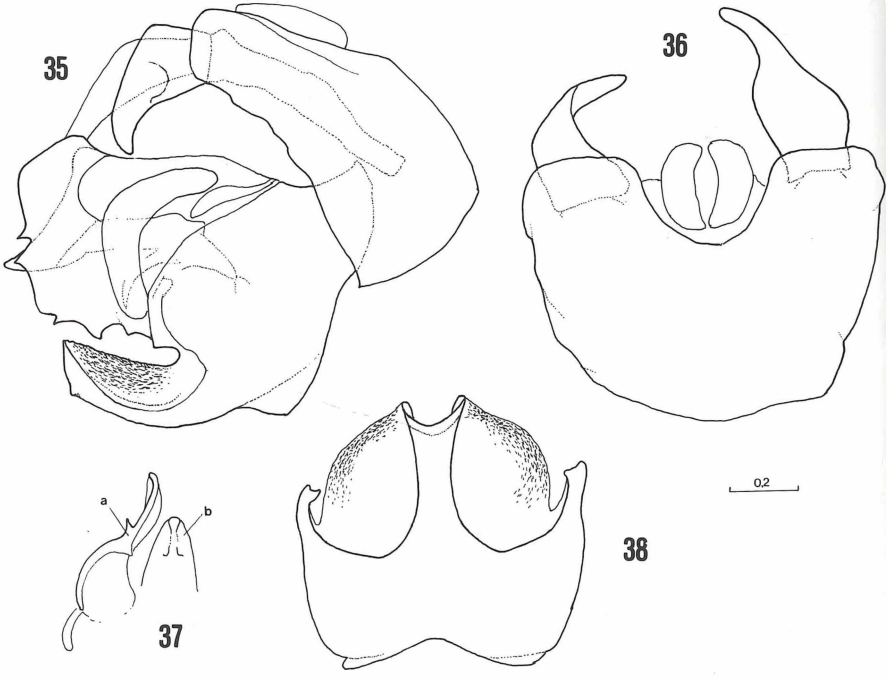


Paragus atlasi and *P. sexarcuatus*

Males of these two species can be separated easily from other species of this group: *P. atlasi* by absence of pollinose bands on the tergites and genitalic characters and *P. sexarcuatus* by its asymmetric surstyli. The known range of *P. atlasi* is limited to a few west Mediterranean localities (Morocco: Claussen 1989; France: Sarthou & Speight 1997, Speight et al. 1998) (map 2). The presence of *P. sexarcuatus* has been confirmed only on two Mediterranean islands: Corsica and Sardinia (Goeldlin de Tiefenau & Lucas 1981) (map 1).

Paragus bradescui and *P. antoinettae*

Examination of the type material of *P. bradescui*, and material determined as *P. antoinettae* (det. Kassebeer, DD) from Corsica (type locality), indicates that the only differences between the male genitalia of these two taxa seem to be on the intraspecific



Figs. 35-38: *Paragus sexarcuatus*, male genitalia (France, Corsica). – 35. lateral view; – 36. epandrium, dorsal view; – 37. lateral lobe of aedeagus (a) and aedeagus (b) in ventral view; – 38. lingula, ventral view. – Scale in mm.

level (figs. 9-17, 28, 29, 30-34). The degree of variability in the form of the basolateral lobe of aedeagus, well demonstrated in the examined material (figs. 30-34), is equivalent to that which occurs within various other *Paragus* species e.g. *Paragus kopdagensis*, *P. bicolor* etc. Most of the other morphological characters exhibit no significant differences between *P. bradescui* and the Corsican specimens. The material of *P. bradescui* examined has shown the presence of an almost continuous range of variation in the form of the basolateral lobe of aedeagus (figs. 9-11, 30-34) and lingula (figs. 9, 15) from the condition figured for *P. antoinettae* (Goeldlin de Tiefenau & Lucas 1981, p. 392, fig. 2) to that figured for *P. bradescui* (Stănescu 1981, p. 150, figs. 1-3). Both of these taxa were described in 1981. The description of *P. bradescui* was printed in November 1981, while that of *P. antoinettae* was published on 15 January 1982. On this basis the synonymy of *P. antoinettae* with *P. bradescui* is proposed. All available data (Dirickx 1994; Hayat & Claussen 1997: as *antoinettae*; Sarthou & Speight 1997) on the distribution of *P. bradescui* are presented on map 2. The range of this species extends to Mediterranean islands and includes a narrow zone around the Mediterranean and Black Seas, with few continental records.

Paragus hermonensis

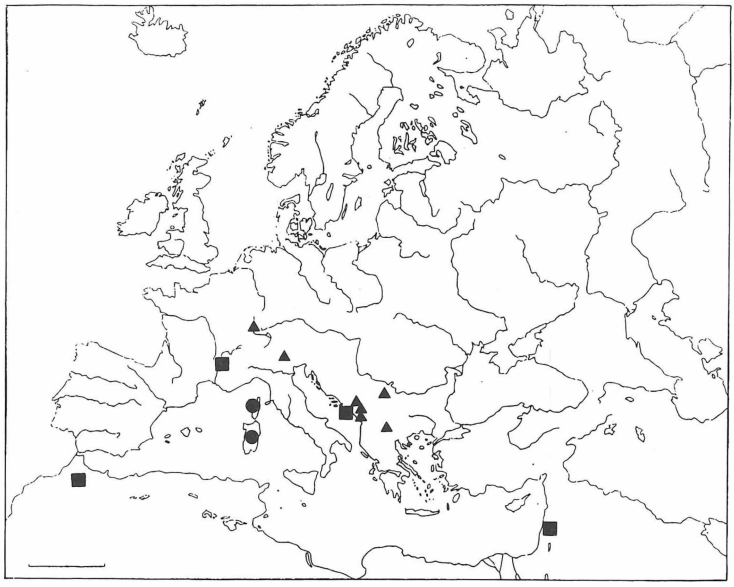
The known range of *Paragus hermonensis* (map 1) occupies submediterranean areas near the sea coast (Israel: Kaplan & Thompson 1981; Marocco: Claussen 1989; France: Speight 1993; Yugoslavia: new datum). The datum from Lake Como (Italy) cited in the original description is unchecked and may relate to *P. gorgus*. It should be noted that morphological differences observed between West (Marocco and France) and East Mediterranean (Yugoslavia, Israel) populations of *P. hermonensis* are possibily indicative of the existence of two separate taxa in these areas.

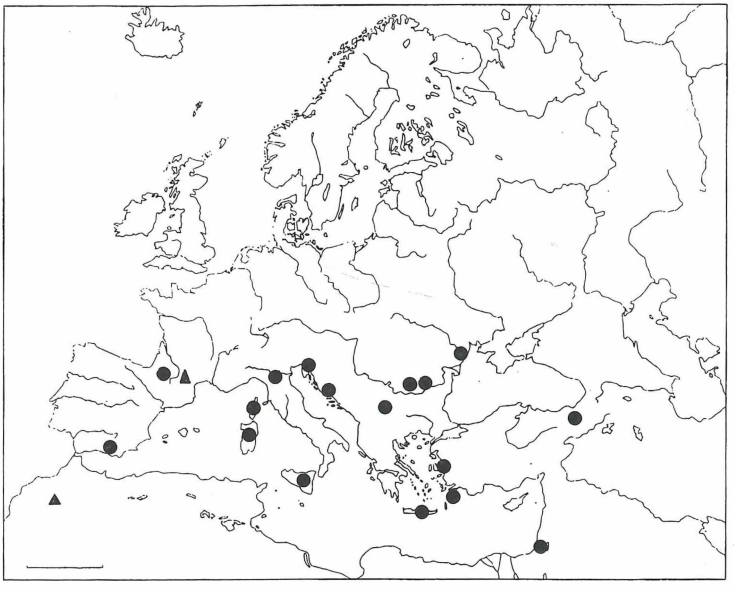
The differences are mainly in the male genitalia: "western" specimens have the apical part of the lingula broader (fig. 8: y; Claussen 1989, p. 367, fig. 5) than "eastern" specimens (fig. 4: y; Kaplan & Thompson 1981, p. 200, fig. 7); "western" specimens have slightly smaller lateral bulges on the basolateral lobe of the aedeagus (fig. 7: x, 26) than "eastern" specimens (figs. 6: x, 25).

Unfortunately, we have had only three males of "eastern" and two males of "western" *hermonensis* available for examination. This is insufficient to establish clear and constant differences between two supposed taxa. At this moment it is better to consider all populations under the same name.

Paragus gorgus

Speight (1998) mentioned that "Šimić's (1986) figure of the male terminalia of a *Paragus* species she recognizes as *P. hermonensis* would appear to show the terminalia of *P. atlasi*". But, the comparison of this material from Durmitor mountain (Yugoslavia, Montenegro) with the type material of *P. hermonensis* and *P. atlasi*, shows that the specimens cited as *P. hermonensis* for Yugoslavia (Šimić 1986, 1987) belong to *P.*





Map 1: Distribution of *Paragus gorgus* (▲), *P. hermonensis* (■) and *P. sexarcuatus* (●).
Map 2: Distribution of *Paragus bradescui* (●) and *P. atlasi* (▲).

gorgus, as described in this paper. *P. gorgus* occurs on several mountains and gorges in east Serbia, in Montenegro and Macedonia on the Balkan Peninsula, and on the localities in Italy and Germany shown on map 1.

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