

Description of the larva and puparium of *Paragus absidatus* Goeldlin de Tiefenau, 1971 (Diptera, Syrphidae)

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The larva and puparium of *Paragus absidatus* are described from specimens collected among aphids on a *Gentiana punctata* plant located in the Vallée d'Ossau of the French Pyrenees. The early stages of this species are compared with those of the four other European species with early stages described. Characters thought to distinguish *Paragus* early stages are supported by *P. absidatus* which, like other *Paragus* larvae, has the dorsal and lateral margins of the body coated in tapering, fleshy projections and a row of four similar projections below the posterior breathing tube. The larva of *P. absidatus* is most similar to that of *P. pecchiolii* Rondani. It is distinguished from that species by the upright, triangular-shaped vestiture coating the integument of the larva and puparium.

Key words: *Paragus*, larva, Europe, Syrphidae.

Zusammenfassung

Larve und Puparium von *Paragus absidatus* werden nach Exemplaren beschrieben, die zwischen Blattläusen an *Gentiana punctata* im Vallée d'Ossau in den französischen Pyrenäen gefunden wurden. Sie werden verglichen mit den vier europäischen *Paragus*-Arten, von denen ebenfalls Jugendstadien bekannt sind. Wie die Larven der anderen *Paragus*-Arten ist auch die von *P. absidatus* durch sich verzweigende fleischige dorsale und laterale Fortsätze charakterisiert; eine Reihe von vier solchen Fortsätzen befindet sich auch unter dem Stigmentubus. Die Larve von *P. absidatus* ähnelt der von *P. pecchiolii* Rondani, unterscheidet sich von dieser aber durch die aufrechte, dreieckige Behaarung des Integuments von Larve und Puparium.

Introduction

In Europe about 20 species of the distinctive yet enigmatic hoverfly genus, *Paragus* Latreille, are known. Several new species have been added in recent years (Speight et al. 2005). The larvae are predators, mostly of soft-bodied Homoptera (Goeldlin de Tiefenau 1974). Adults are readily distinguished by their small size being less than 5 mm

long, yellow faces and well developed first abdominal tergite.

The larval stages of only four species have been described: *albifrons* (Fallén, 1817), *haemorrhous* Meigen, 1822, *pecchiolii* Rondani, 1857 (= *P. majoranae* sensu Goeldlin, nec Rondani [Sommaggio 2002]) and *quadrifasciatus* Meigen, 1822 (Goeldlin de Tiefenau 1974). Dixon (1960) also provides a description of the larva of *P. haemorrhous*. *Paragus* larvae appear to be distinguished from other predatory syrphids by the dorsal sensilla which are borne on tapering, fleshy projections, by the presence of a row of four, equally long, fleshy projections on the posterior margin of the larva below the posterior breathing tube and by the presence on the posterior spiracular plates of tall dorsal spurs and prominent cones bearing the spiracular openings (Rotheray & Gilbert 1989, Rotheray 1993).

In this paper we describe the third stage larva and puparium of a fifth species, *Paragus absidatus* Goeldlin de Tiefenau, which was found in 2001 during a survey of syrphid species occurring in a valley of the French Pyrenees.

Materials and Methods

Larvae were collected from the "Vallon d'Estrémère" (Vallée d'Ossau, National Park of the Pyrenees, Department of Pyrénées-Atlantiques, France) which is a small valley of approximately 200 ha, ranging from 1750 m a.s.l. above the *Abies* - *Fagus* forest to 2600 m a.s.l. The main slopes are west oriented but some are north or south oriented. Soils are calcareous on northern slopes and acidic on southern slopes. Hence, the flora is very rich (over 100 species not including Gramineae, Cyperaceae and Bryophyta). While surveying syrphids with a hand net on 21.vii.2001, an aphid colony (Aphididae, species not identified) was found on a *Gentiana punctata* plant (Gentianaceae). Three white and spiny larvae were present in it and were collected with some aphids and *Gentiana* leaves and reared. One specimen was preserved in 70% alcohol and the two others kept alive. They reached the pupal stage on the 1.viii.2001 and a male and female *Paragus* emerged on 9.viii.2001. They were identified using keys and descriptions in Goeldlin de Tiefenau (1976).

Early stage characters were examined with a binocular microscope. Drawings were made using a drawing tube attached to the microscope. Descriptive and other terms follow Rotheray & Gilbert (1999).

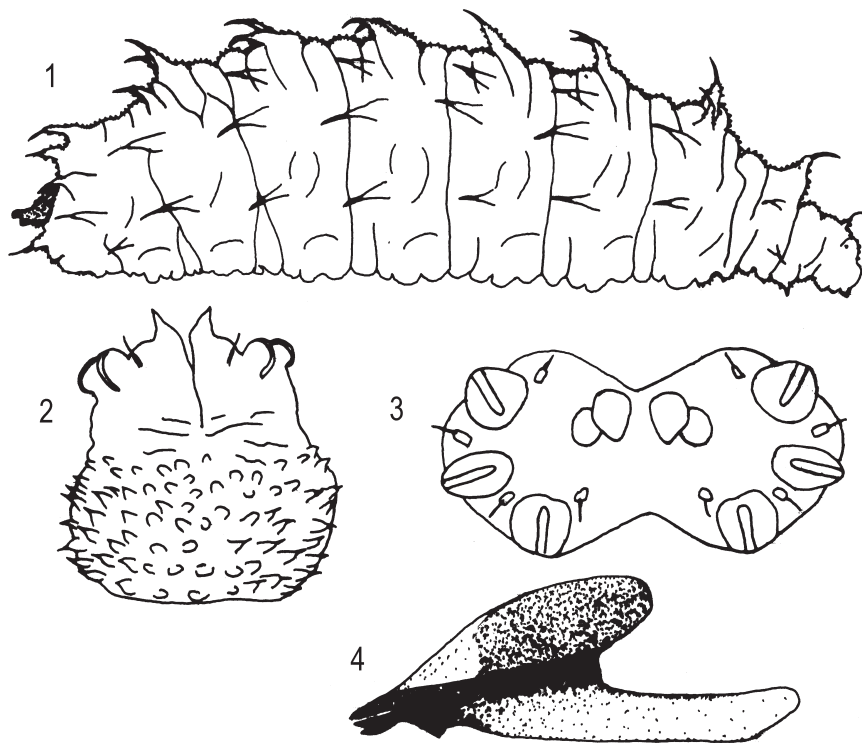
Description of the third stage larva and puparium of *Paragus absidatus*

Overall appearance (fig. 1): A mottled white, grey and brown larva, tapering anteriorly and truncate posteriorly with dorsal and lateral sensilla borne on conspicuous, elongate, fleshy projections. These projections coated in setae. Dorsum of posterior margin below the posterior breathing tube with a row of four similar projections. Vestiture of triangular shaped setae. Sensilla pair one on the 7th abdominal segment with approximated bases.

Shape and dimensions: 8 mm long, maximum width 2 mm; in cross-section subcylindrical; tapering anteriorly, truncate posteriorly.

Head: external part fleshy with antennae and maxillary organs on a pair of shared, basal projections; infolded apically to meet the head skeleton; head skeleton (fig. 4): length 0.75 mm; height 0.3 mm; arrangement of sclerotised components typical for predatory syrphines with sclerotised and anteriorly directed and pointed labrum and labium and inclined, elongate mandibles (Hartley 1963, Rotheray & Gilbert 1999); ventral cornu longer than dorsal cornu; dorsal cornu round tipped.

Thorax: vestiture becoming longer and denser from front to back and shorter on ventral surface; anterior margin of prothorax thickened with disc-shaped projections; lateral lips sclerotised and hook-like; lateral and ventral sensilla of prothorax blunt-tipped; anterior spiracles sclerotised, cone-shaped and about as tall as basally wide; ventral sensilla of mesothorax on elongate projections.



Figs 1-4: Larva of *Paragus absidatus* Goeldlin de Tiefenau. – 1. Whole third stage larva, dorsal surface uppermost, anterior end to the right, length 8 mm; – 2. Posterior breathing tube, dorsal view, width 0.45 mm, length 0.45 mm; – 3. Posterior breathing tube, apical view, width 0.44 mm; – 4. head skeleton, anterior end to the left, length 0.75 mm.

Abdomen: vestiture comprising triangular-shaped setae up to 0.06 mm long becoming shorter towards ventral margin and vestiture absent on ventral surface of segments 2-8; abdominal segment 1 with vestiture only absent on locomotory prominences which bear sensilla 9-10; sensilla 1-8 all on long projections, up to 0.45 mm long, the sides of which are coated in circles of vestiture; sensilla pair 3 as long as sensilla pair 2; sensilla pair 11 anterior to sensilla 9 and 10 and not on a locomotory prominence; abdominal segment 7 with sensilla pair 1 approximated; posterior margin of anal segment with a dorsal row of 4 fleshy projections; ventral margin of anal segment with a four-lobed grasping bar.

Posterior breathing tube: 0.45 mm basally wide; 0.45 mm long (fig. 2); in lateral view, tapering and narrow above a broader base coated in tapered nodules; each half of the narrow apical section smooth and bearing at the apex, an inclined spiracular plate and separated by a deep incision reaching to the broad base; spiracular plates with 3 pairs of straight spiracular openings on conspicuous carinae and separated by single interspiracular setae (fig. 3); spiracular openings about equally apart; dorsal spurs elongate, taller than carinae bearing spiracular openings.

Puparium: length 5 mm; height 2 mm; width 2 mm; pale brown; pear-shaped; pupal spiracles absent.

Discussion

Only the early stages of four species have been described of the twenty or so species of European *Paragus*: *albifrons*, *haemorrhous*, *pecchiolii* and *quadrifasciatus* (Goeldlin de Tiefenau 1974, Dixon 1960). Descriptions of *Paragus* early stages older than these papers tend to be generalised and are of little use for identification and comparative purposes.

In this paper we describe the early stages of a fifth species, *P. absidatus*. The early stages of this species are very similar to those of other syrphines and possess the key distinguishing syrphine characters of a head skeleton with sclerotised and pointed labrum and labium with inclined, pointed mandibles, grasping bar at the apex of the anal segment and an overall colour pattern (Rotheray & Gilbert 1999). The known *Paragus* larvae and puparia, including that of *P. absidatus*, are readily distinguished from other syrphine genera by the presence of elongate, fleshy projections bearing sensilla which coat the dorsal and lateral margins of the larva and are retained in the puparium. Other syrphine genera with dorsal projections include *Dasysyrphus* Enderlein, *Didea* Macquart and *Eriozona* Schiner (Rotheray 1993). However *Paragus* larvae can be distinguished from these genera by the presence of a row of four equally long, fleshy projections on the posterior margin of the anal segment below the posterior breathing tube. The possession of fleshy projections bearing sensilla on the ventral surface of the mesothorax is a character that *Paragus* larvae share with *Eupeodes* Osten Sacken and *Scaeva* Fabricius and supports a close relationship with these genera as opposed to a relationship close to pipizines on the basis of shared characters of the posterior breathing tube (Rotheray & Gilbert 1999).

Comparing larval and puparial descriptions and figures of *P. albifrons*, *haemorrhous*, *pecchiolii* and *quadrifasciatus* in Goeldlin de Tiefenau (1974) with the larva and puparium of *P. absidatus* studied here, the early stages of the latter species are most similar to *P. pecchiolii*. Both species have the projection bearing sensilla 2 on abdominal segments 1-7 about as equally long as that bearing sensilla 1 and the projections bearing sensilla 1 on the seventh abdominal segment are so approximated that their bases are touching. Neither of these characters appear to be present in the early stages of other *Paragus* species in which the projection bearing sensilla 2 is usually shorter than those bearing sensilla 1 and the projections bearing sensilla 1 on the seventh abdominal segment are separate.

The early stages of *P. absidatus* appear to be distinguished from those of *P. pecchiolii* by the vestiture. The vestiture of *P. absidatus* is relatively large and conspicuous consisting of upright, triangular-shaped setae whereas that of *P. pecchiolii* appears to consist of inconspicuous nodules (Goeldlin 1974).

The functional significance of similarities and differences in the states of dorsal projections and vestiture in *Paragus* larvae are difficult to assess. However, if they are functional, they are most likely to have been affected by crypsis (Rotheray 1986). It is possible that crypsis against background features of aphid host plants may explain differences observed between *Paragus* larvae.

References

- Dixon, T.J. (1960): Key to and descriptions of the third instar larvae of some species of Syrphidae (Diptera) occurring in Britain. – Transactions of the Royal Entomological Society of London 112, 345-379.
- Goeldlin de Tiefenau, P. (1974): Contribution a l'étude systématique et écologique des Syrphidae (Dipt.) de la Suisse occidentale. – Mitteilungen der Schweizerischen Entomologischen Gesellschaft 47, 151-252.
- Goeldlin de Tiefenau P. (1976): Révision du genre *Paragus* (Dipt., Syrphidae) de la région paléarctique occidentale. – Mitteilungen der Schweizerischen Entomologischen Gesellschaft 49, 79-108.
- Hartley J.C. (1963): The cephalopharyngeal apparatus of syrphid larvae and its relationship to other Diptera. – Proceedings of the Zoological Society of London 141, 261-280.
- Marcos-García, M.A. (1986): Citas de interes del genero *Paragus* Latreille, 1804 en la Peninsula Iberica y descripcion de *Paragus vanderghooti* sp.nov. (Diptera, Syrphidae). – Actas de las VIII Jornadas A e E, 765-772.
- Marcos-García, M.A.; Rojo, S. (1994): *Paragus hyalopteri* n.sp. an aphidophagous hoverfly (Dipt.: Syrphidae) attacking the mealy plum aphid (Hom: Aphididae). – Entomophaga 39, 99-106.
- Rotheray, G.E. (1986): Colour, shape and defence in aphidophagous syrphid larvae (Diptera). – Zoological Journal of the Linnean Society 88, 201-216.
- Rotheray, G.E. (1993): Colour Guide to Hoverfly Larvae (Diptera, Syrphidae). – Dipterists Digest No. 9, 1-156.
- Rotheray, G.E.; Gilbert, F.S. (1989): The phylogeny and systematics of European predacious Syrphidae (Diptera) based on larval and puparial stages. – Zoological Journal of the Linnean Society 95, 29-70.
- Rotheray, G.E.; Gilbert, F.S. (1999): Phylogeny of Palaearctic Syrphidae (Diptera): Evidence from larval stages. – Zoological Journal of the Linnean Society 127, 1-112.
- Sommaggio D. (2002): *Paragus gorgus* Vujić & Radenković, 1999: a junior synonym of *P. majoranae* Rondani, 1857, and reinstatement of *P. pecchiolii* Rondani, 1857 (Diptera, Syrphidae) – Volucella 6, 53-56.
- Speight, M.C.D.; Castella, E.; Sarthou, J.P.; Monteil, C. (2006): Syrph the Net on CD. Issue 5. The database of European Syrphidae. Dublin (Syrph the Net Publications).

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