Some notes on the variability of *Cheilosia insignis* Loew, 1857 (Diptera, Syrphidae), with suggestions for adapting existing keys

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Verlinden, L. (2000): Some notes on the variability of *Cheilosia insignis* Loew, 1857 (Diptera, Syrphidae), with suggestions for adapting existing keys. – Volucella 5, 103-113. Stuttgart.

Cheilosia insignis is a much more variable species than existing keys suggest. Some alterations are proposed to take this aspect into account; a few other and more stable characteristics are described.

Zusammenfassung

Cheilosia insignis ist viel variabler als in den meisten Schlüsseln angegeben wird. Es werden einige Ergänzungen und zusätzliche verlässlichere Merkmale beschrieben.

Introduction

The appearance of the latest revision of the subgenus *Nigrocheilosia* by Barkalov and Ståhls (1997) must have been warmly welcomed by most workers in the field ; it no doubt led to the checking of doubtful identifications. Yet, as was remarked by Schmid in his review of these authors' paper ("Volucella 3"), the accompanying keys are often impracticable without constant reference to the diagnoses and descriptions of the species in the main part of the text. The authors must have been aware of this problem, but with so many species to treat (and many of them appear more than once), the keys were in danger of becoming impossibly long.

Things are complicated even more by the instability of characteristics in many species. Provisions were made for this and several taxa were given two or more entries in the keys. But is it possible to make provision for all deviations from the "norm" without producing a text, which is so long and complicated that it becomes impracticable? The scope of the problem was brought home to me while re-examining, in detail, all specimens in my collection of a single species, *C. insignis,* which is treated in most keys as if its identification were a straightforward matter. In reality so few specimens completely tally with the characteristics in these keys that some potential improvements to the keys almost suggest themselves. References to colour characters, in particular, which are rather unreliable in many hoverflies, should be replaced by use of more stable morphological characteristics whenever possible.

C. insignis has rarely been mentioned in the literature; it is rare in Switzerland (Goeldlin et al. 1994), published records from Austria, Poland and Germany are old and scarce; it was not known from France or from any other country in N.W. Europe (ancient Belgian records were not correct); in fact all recent records are from the periphery, N.W.Spain and the Balkans (Dirickx 1994). I cannot explain this scarcity of records: I took nearly two dozen specimens in 7 different localities in 3 different mountain ranges in France (Jura, Vercors, Hautes Alpes) between 1995 and 1999. Anyway, it seems that very little material is available in most private and public collections, and some of our most active colleagues have never caught a single *insignis*; Barkalov & Ståhls had to make do with only 5 males and 6 females for their revision. Obviously this lack of material explains why so little provision has been made for the rather disconcerting variability in this species.

How is *Cheilosia insignis* identified in some of the keys that are still in use ?

What all keys have in common is that *insignis* is allocated to group A of Sack/ Becker (the eyes are bare in both sexes), and within this group to the recently instated subgenus *Nigrocheilosia* (legs entirely black). The difficulties start right here. In one of the males in my collection the bases of the fore and mid tibiae are distinctly lighter. This occasionally occurs in other species of the group and Sack wisely made a provision for this: "p ganz schwarz, höchstens die Kniespitzen heller". Matters are more seriously complicated by the fact that in two out of ten females all tibiae are brownish yellow (1/ 4 in one, 1/6 in the other, a bit less in the hind tibiae). Even if the light parts are less bright and less extensive than in most species of group A with bicoloured legs, this feature cannot be ignored, as there seems to be at least one other species in this group, *C. caerulescens,* that may have almost entirely dark tibiae (Speight 1999). Nor is the occurrence of bicoloured legs in *Nigrocheilosia* restricted to *insignis*: e.g. a female *C. loewi* in my collection shows the same anomaly; Stubbs & Falk (1983) also found it in *C. pubera.*

Male *Cheilosia insignis:*

Barkalov and Ståhls (1997): as in all other keys the user is taken straight to *insignis,* from couplet 1 (1b. 3rd antennal segment ... orange yellow) to c. 46, where the choice is between species 8-11 mm long, in which the mesonotum has hairs of equal length (to 47), and species that are smaller and have unequal length hair on the mesonotum. In c. 47 the choice is between *insignis* (3rd antennal segment with distinct upper corner, bright yellow; mesonotum with yellow hairs only) and *venosa* (3rd antennal segment rounded, brownish in most part; mesonotum with black and yellow hairs).

Sack (1930, 1932) leads straight to a couplet featuring *maculata* (now *Portevinia maculata)* and *insignis* (3. Fühlerglied hellrot). The latter is defined as follows: "Abdomen ohne graue Flecken. Fühler groß, mit nackter schwarzer fast auf der Mitte eingefügter Borste. Körper olivenbraun glänzend, rotgelb behaart".

Brădescu (1991) simply translates Sack, omitting the characteristics of the arista. However, after "antennes grandes" he refers to a drawing from Bankowska reproduced here in fig. 19. This, unfortunately, is the picture of a *female's* head with an unusual profile, a broad and swollen frons and an exceedingly large third antennal segment, where the arista is placed very far forward.

Bańkowska (1963) also follows Sack and couples *insignis* to *maculata* as the only species in the group combining black legs and entirely orange-yellow 3rd antennal segment. In *maculata* there are grey abdominal spots, but not so in *insignis.* After this lapidary statement there follows a brief diagnosis, which lists some useful and valid features (and others which do not tally with the material in my possession, or which are superfluous because they can apply to nearly all *Cheilosia* males). Body length is given as 7-10 mm (cf. Barkalov and Ståhls above).

Van der Goot (1981) places *insignis*, again coupled with *P. maculata*, at the very head of the key, after *C. angustigenis*. A bright reddish yellow third antennal segment is common to the two species, but in *insignis* the eyes are contiguous and the abdominal tergites do not bear any grey spots. Body length: 10 mm.

Bothe (1984) is the first to mention the top corner of the third antennal segment and adds "Schildchen mit einzelnen längeren schwarzen Haaren". He has no separate key for males and females.

Female *Cheilosia insignis:*

Barkalov & Ståhls: third antennal segment very large, front sinuous, completely orange.

Sack: 3. Fühlerglied sehr gross. Borste schwarz, nackt, fast auf der Mitte des Oberrandes sitzend. Körper olivbraun, rotgelb behaart.

Brădescu: 3me article antennaire fortement développé, arista noire, nue, placée au milieu du bord supérieur, corps à pilosité jaune rouille.

van der Goot: (third antennal segment reddish yellow, very large).

Bańkowska: (third antennal segment very large). And further in the diagnosis: (Frons with short yellowish pile. Vertex with black pile. Arista long, black, pubescent. Mesonotum with short greyish yellow pile. Scutellar bristles light-coloured & short). More characteristics are given, but it is not specified whether they belong to the male, the female, or both.

Discussion

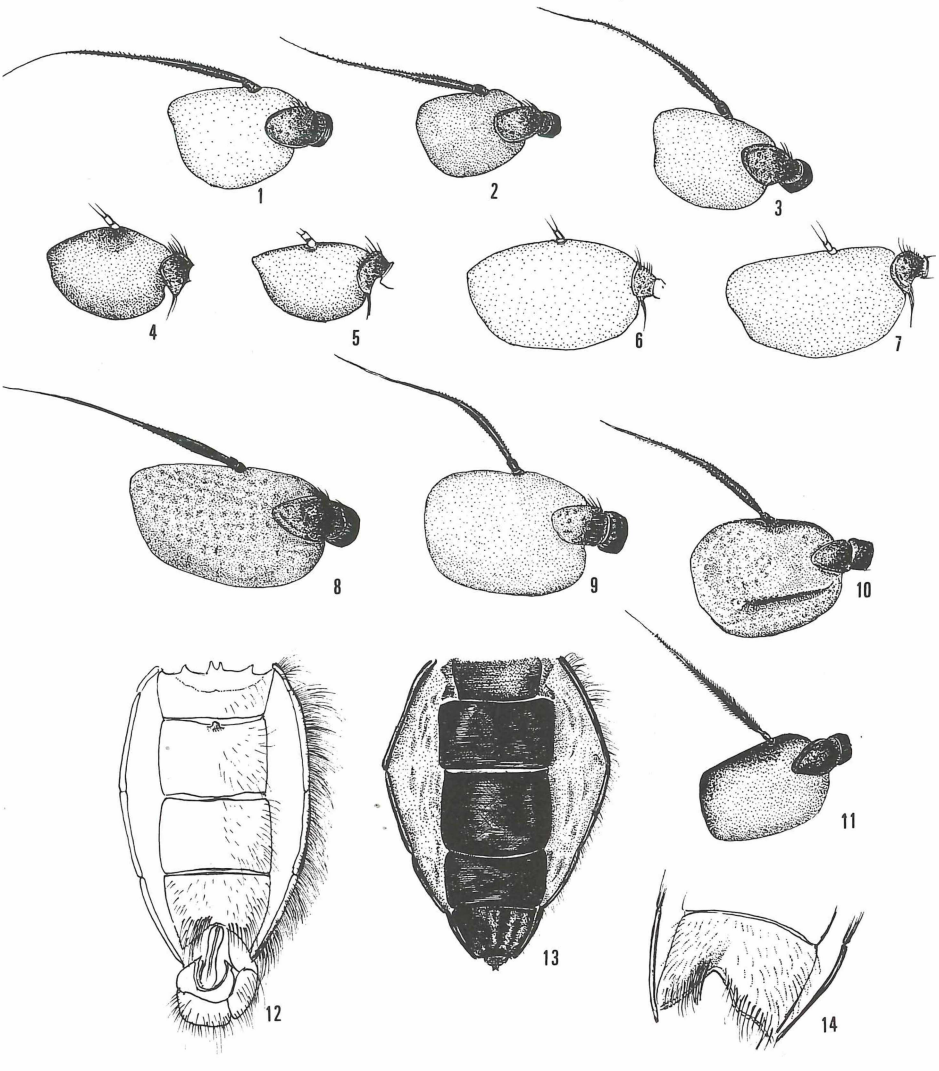
In how far do the specimens – male and female – in my collection tally with the definitions in these keys ?

♂ (11 individuals, 6 of them from the same population):

Antennae: obviously the third antennal segment must be the most original trait of the species: it is mentioned first in all keys and some of its characteristics are described

in most. – Colour: this is defined as bright yellow (as in *chrysocoma*?), bright red, a fiery red, but all authors agree that, in contrast to other *Nigrocheilosia*, the segment is not partially darkened. However, not only do I find that the colour ranges from orange-yellow (cf. female *pagana*) to a very dusky orange-brown (cf. female *laticornis*), but in four specimens the margins are partially obfuscated, the darkened parts varying from a dark brown semicircular patch near the arista to a brownish zone bordering the entire segment (figs. 1-5). – Arista: this is remarkably similar in all specimens: long, blackish brown, shining, thickened over the basal third. The distal third is filiform (and transparent brown in one male) and covered (most evidently in the middle part) with a very short pubescence. The arista is placed rather more to the fore than usual, somewhere between 1/3 and 1/2 of the length of the upper margin (cf. figs. 1-5). – Shape: as the top corner (Barkalov & Ståhls; Bothe) was not mentioned by the other authors we may assume it is either absent in some individuals, or that is not a well-marked trait. I can recognize a sort of rounded (not pointed) top corner in 6 specimens, but it is often distinguishable on the exterior surface only (figs. 4, 5). If this top corner is visible, then a slight concavity ("front margin sinuous") normally becomes apparent lower down, but again this is often visible only on the exterior side. It should be added that this front margin is nearly always recurrent, so that the general shape of the segment is roughly semicircular. – Second segment: whereas most features of the third antennal segment are very variable, the second segment is always bicoloured: dark brown at the base and gradually changing to a dark orange distally, more clearly perceived on the interior surface. Though this trait is not limited to *insignis*, it is uncommon and may therefore help to identify specimens that have lost the fragile third segment.

Pilosity of the mesonotum: Length: the pile on the mesonotum is fairly long (on the anterior part about as long as the fourth front tarsomere, but increasing in length towards the scutellum). In only 2 out of 11 males it may be called subequal and nearly uniformly light-coloured, but even here a limited number of hairs are seen to protrude from the rest of the pile. In the other males the pile is obviously uneven and a very variable number of obviously longer light-coloured and black hairs are present. These black hairs are normally only found at the sides, behind the humeri (cf. *C. lenis*) and/or before the scutellum; in one small and dark male there are numerous black hairs all over the mesonotum. As in the case of some other *Cheilosia*, e.g. *proxima*, the unequal length of the pilosity on the mesonotum is most evident on the posterior part, before the scutellum: there we see a dense "undercoat" of short grey pile, from which a much thinner covering of visibly longer hairs is protruding. Black bristles near the side margins of the mesonotum are often numerous and well-developed. – Colour: in all 11 males the pile on mesonotum and scutellum is grey, varying from silvery grey to fairly dark iron-grey. No doubt specimens with yellow and rust-coloured pile do occur as well. – Scutellar bristles: variability is disconcerting here: in a few individuals there are some (2 to 8) black bristles, of variable length and thickness, but rarely strong. These



Figs. 1-9: ***Cheilosia insignis***, antennae. – 1-5. male (1-3 interior view, 4-5 exterior view); – 6-9. female (6-7 exterior view, 8-9 interior view). – **Fig. 10:** ***Cheilosia hercyniae***, female antenna, interior view. – **Fig. 11:** ***Cheilosia faucis***, female antenna, interior view. – **Figs. 12-14:** ***C. insignis***. – 12. male abdomen viewed from below; – 13. female abdomen viewed from below; – 14. male, sternite IV.

usually go together with a very variable number of dark grey and/or black longer and slightly stronger hairs that can be more or less easily distinguished from the rest of the pile on the scutellum. These particular hairs are present also when black bristles are lacking altogether.

Common characteristics not mentioned in the above keys:

Head: Figs. 15 & 16 show that the head profile is rather variable, but it is at least slightly concave below the antennae and the central knob is somewhat more pronounced than the mouth edge. The face is quite strongly shining, apart from some traces of dusting laterally in some males. Sometimes the lower part of the face is projected downward (fig. 15). The eye margins are broad and (for the greater part) undusted, but unlike in *C. laticornis*, e.g., their ciliation is not particularly long or dense. Nor is the pile long or dense on the lower part of the occiput and on the genae.

Thorax: the hair patches on the sternopleuron (fig. 17) are relatively small and widely separated. The wings are (especially in more mature specimens) yellowish-brown along the fore margin, particularly so basally, and on the disk the veins are more or less clearly bordered with yellow [1]. The halteres are a brownish yellow, but the knob is always blackened.

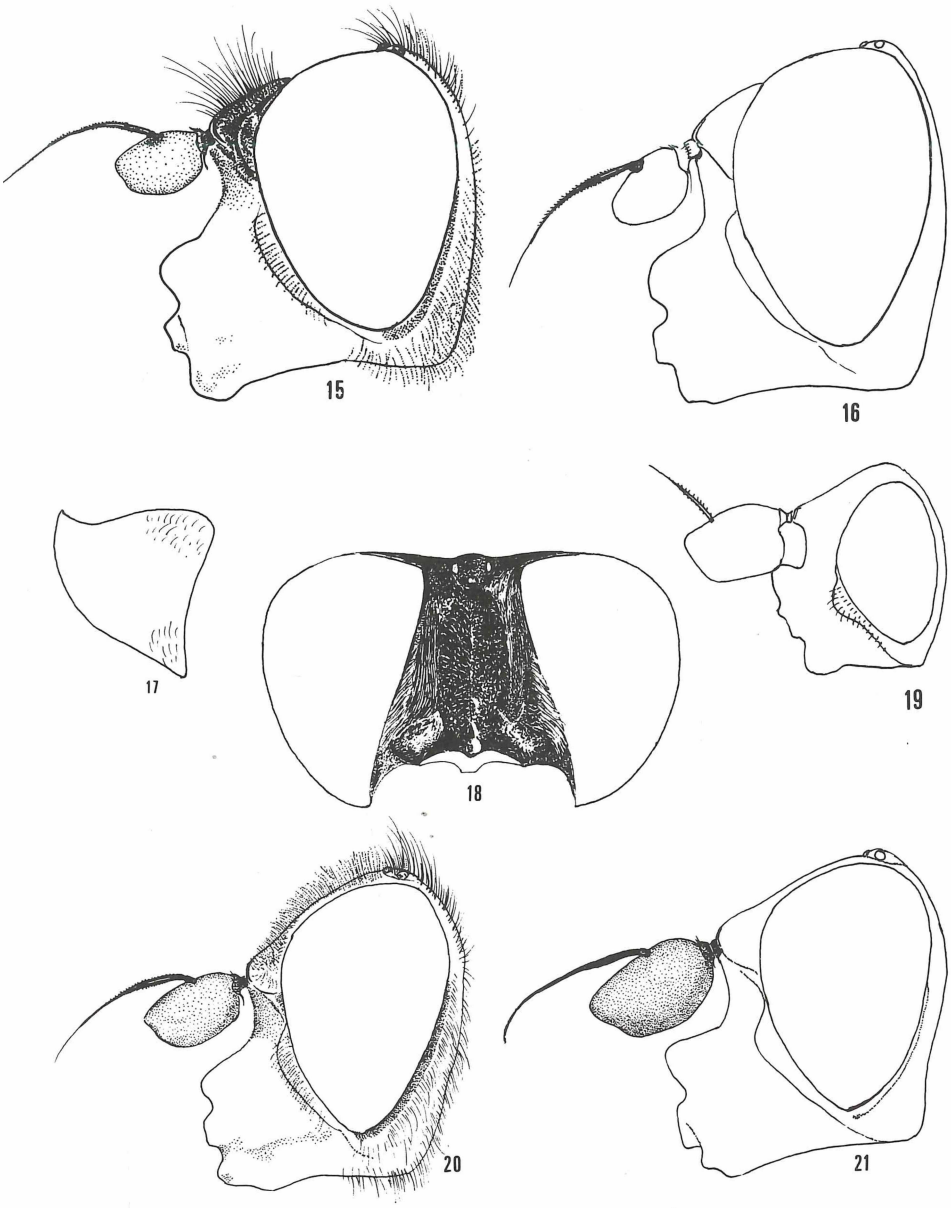
Abdomen: the pile on the abdominal tergites varies not only in colour (from light grey to a warm brown-red) but also in length and density, particularly so distally and laterally. Tergite V may be covered with long and dense adpressed hairs, somewhat reminiscent of *Xylota sylvarum*. The sternites are practically parallel-sided (fig.12) and more or less dusted, especially the first. The fine light pile on the sternites is much longer laterally. Sternite IV offers a useful characteristic (fig. 14): its hind margin is excised and arched in the middle (to accommodate the long and slender surstyli). On either side of this rounded keel-like projection there is, near the hind margin, a band of adpressed, backward pointing, brownish bristle-like hairs, which are grouped very densely on the right-hand side (figs.12, 14). But even this feature shows some variability: the entire hind margin of the sternite (including the rounded "keel") may be bordered with thicker black bristly hairs.

Body length: 7.8-11.5 mm (average and median: ca. 10 mm). Barkalov & Ståhls (1997) mention a specimen only 6.5 mm long (though this is ignored in their keys).

♀ (10 specimens):

Antennae: Third segment: its size is stressed in all keys, but this feature is shared by the females of several other bare-eyed *Cheilosia (soror, hercyniae, pagana, laticornis,* even *hypena*, though the latter has a hairy face and is normally placed in

[1] As a decisive trait this colour mark may be unsuitable: with so little material available we cannot be sure that wings are always tinted yellow. For instance, in most keys *C. loewi* is characterised by yellow wing bases. Exceptionally these are brown, however. Therefore at least one other feature proper to this species should be added, e.g. scutellar bristles very short; face: central knob less prominent than mouth edge.



Figs. 15-21: ***Cheilosa insignis.*** – 15-16. Head profiles of the male; – 17. Sternopleuron of the male; – 18. Frons of the female; – 19-21: Head profiles of the female (19 after Bankowska 1963).

group B). In most female *insignis* the large size is indeed conspicuous (cf. fig. 21), but less so in others (fig. 20). Its colour seems less variable than in the males and is usually a bright orange or even vermillion, but it may be a quite dusky orange, too (fig. 8). Obfuscation of the margins does occur, but is much less pronounced than e.g. in *hercyniae* (fig. 10), some *pagana*, or in *nivalis* and *faucis* fig. 11). As in the male, the top corner and/or the sinuous fore margin (cf. Barkalov & Ståhls), if present, are more obvious on the exterior surface (figs. 6 & 7) than on the interior (figs. 8 & 9). In most specimens these features are far from obvious. With one exception (fig. 9) this fore margin is evidently recurrent, whereas for instance in *faucis* the reverse is true. The species which is most like *insignis* in many respects (head profile, pilosity, narrow sternites, even the silvery dusting and the numerous shallow round impressions on the third antennal segment...) is *hercyniae*, but there the longitudinal groove on the inner side of the third antennal segment (fig. 10) is very characteristic. And of course the light-coloured parts of the tibiae are (always?) more extensive and a brighter yellow than in the untypical *insignis* females with bicoloured legs. – The arista is quite like the male's in length, shape and pubescence (whereas in female *faucis* and *nivalis*, which have a rather similar habitus, it is strongly pubescent). So is its unusually forward position, but this feature is again shared by *hercyniae*, and – to a lesser degree – by *faucis* and *nivalis*. – Second segment: nearly always bicoloured as in the male: black at the base, and gradually changing into orange distally. In one very light-coloured female it is entirely orange.

Other features of the head: the frons (fig. 18) is broad and strongly diverging. Its sides are marked by strongly punctured depressions rather than longitudinal grooves. The central part is either flat or slightly concave, sometimes with a metallic sheen (like *derasa*); the middle groove is either absent or incomplete and very weak. The lunula varies between bright orange (in very light specimens) and black; in most females it is partly or entirely brown. In some females there is a deep and well-marked pit behind the lunula, which may be weak or even absent in others. The short pilosity is almost entirely light-coloured and irregular, but there may be a variable number of black hairs before the ocellar triangle; the latter, like the vertex, carries a number of long black hairs (fig. 20). As can be appreciated by comparing figs. 20 & 21 the facial profile is quite variable: the upper demarcation of the central knob may be sloping or almost horizontal. Other characterstics of the head are quite similar to the male (dusting, eye-margins and their pile ...).

Thorax: The pile on the mesonotum is short, erect and more uniform than in the male, subequal on the anterior part, with a variable number of longer hairs (sometimes partly black) before the scutellum. In all 10 females seen it is grey, varying from silvery to mouse-coloured. The scutellar bristles (or more often: longer hairs on the rim) are as variable as in the male. The haltere is a brownish orange, its knob sometimes slightly darkened. The inferior surface of the femora is covered in short and weak yellow setulae, sometimes mixed with a few stronger black "thorns" distally.

Abdomen: as in the male the punctuation and the pilosity of the abdominal tergites are very variable in density. The sternites are again narrow in comparison to the width of the tergum and parallel-sided (fig. 13).

Body length: 7.7-10.5 mm (median and average: ca. 9.5 mm). According to Bankowska : 7-10 mm (sex unspecified).

Suggestions for alterations to existing keys

♂

1. Legs black or (rarely) knees narrowly yellowish or brownish

2. Third antennal segment relatively large, entirely orange-yellow to dusky orange or with more or less darkened margins; often with rounded top corner and front margin slightly sinuous (exterior surface); arista placed more to the fore than usual. Second antennal segment always orange distally.

3. Face shining, nearly undusted, except for a band just below the antennae. Eye-margins broad with normal ciliation.

4. Mesonotum sometimes with subequal light-coloured pile, mostly (posterior part) with pile of unequal length; usually a (variable) number of longer black hairs are present, particularly laterally and posteriorly. Sternopleuron with hair patches small and widely separated.

5. Tergites with light-coloured pile of quite variable density.

6. Sternites relatively narrow and parallel-sided. Hind margin of sternite IV strongly arched and excised medially and covered with dense bristle-like hairs pointing to the rear. Surstyli long and narrow.

♀

1. Legs black or (rarely) with tibiae more or less broadly brown proximally.

2. Third antennal segment often very large, its front margin nearly always recurrent and often sinuous exteriorly; an eventual top corner is usually visible only exteriorly; normal colour bright orange or red and only seldom weakly darkened along the margins. Second antennal segment at least distally orange.

3. Frons broad, strongly divergent; longitudinal grooves weak or absent; central zone flat or slightly concave, with short and erect whitish pile, usually mixed with a few black hairs, mainly near the ocelli.

Eye margins broad but with normal ciliation. Face undusted.

4. Mesonotum with short, erect, light-coloured and dense subequal pile, often mixed with a few longer black hairs.

5. Sternites narrow and parallel-sided.

Habitat and flight period

Vujić, as quoted in Speight (1999), mentions – for Montenegro – a flight period between late April and May and defines the preferred environment as "humid, montane beech forest and from the upper levels of unimproved, alpine grassland upward to the rock and scree zone." He describes the adult habitat and behaviour as "flying low over the ground, settling on stones and rocks in the sun, beside streams and snow patches."

According to Schmid (in litt.) recent records from Germany suggest a preference for grassland with bushes (around 1000 m, late April) or stunted pine trees near the tree limit (1700 m, early June). My own observations in France show a similar picture. In the French Alps (the inner ranges near the Col de Vars and the Col de Larche, which have a low annual rainfall of 600 mm and relatively much sunshine) the flight period extends to mid June at least; captures were made on north-facing slopes in very open *Larix* forest combined with extensively used pastures with deciduous bushes and often crossed by tiny rivulets in places, between 1600 and 2100 m (June). In the Vercors and southern Jura (late May-mid June) *insignis* was flying in small clearings of stunted beech and mixed woodland on the level and almost flat "summits" of these massifs at a height of ca. 1600 m in the Vercors, at 1200 and 1350 m in the southernmost French Jura "monts". Rainfall is high here, but owing to the permeable soil surface water is virtually absent Here both males and females were flying or hovering low over the grassland, in the sunshine and sheltering from the wind. On the Molard du Don (1200 m) 8 males and 3 females were caught and many more seen, all within half an hour or so. The forest floor was covered with a carpet of *Anemone ranunculoides*, with a scattering of other precocious limestone plants such as *Lathyrus vernus*, *Pulmonaria*, which are of little use as a food source to hoverflies. Near the Col de Larche and in the Risoul Forest near the Col de Vars other anemone species were abundantly present like *Anemone narcissiflora* and *Pulsatilla alpina*, so there is a possibility that the larvae live in the rhizomes of various anemones.

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