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European *Abia* species feeding on Dipsacaceae, with description of the larva of *A. fulgens* Zaddach, 1863 (Hymenoptera, Symphyta, Cimbicidae)

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Abstract. – The larva of *Abia fulgens* Zaddach, 1863 (Symphyta: Cimbicidae) is described. One of its hostplants is *Knautia maxima*. Favoured habitats are moist meadows, not fully exposed to the sun. Adults and larvae each exhibit two annual peaks of abundance. *K. maxima* is also newly recorded as a host of *A. candens* and *A. sericea*. A key to mature larvae of European *Abia* species feeding on Dipsacaceae is provided, as well as new characters for separation of *A. fulgens* and *A. candens* adults. Apart from 4 or 5 *Abia* species, the only species of Symphyta known at present to be a specialist feeder on Dipsacaceae is *Macrophya erythrocnema*, here recorded for the first time from *Dipsacus fullonum*.

Résumé. – **Les espèces européennes *d'Abia* inféodées aux Dipsacaceae, avec description de la larve *d'A. fulgens* Zaddach, 1863 (Hymenoptera, Symphyta, Cimbicidae).** La larve d'*Abia fulgens* Zaddach, 1863, est décrite. Une de ses plantes-hôtes est *Knautia maxima*. Les habitats favorables sont les prairies ou pentes humides relativement protégées du soleil. *K. maxima* est également rapportée pour la première fois comme plante-hôte pour *A. candens* et *A. sericea*. Les observations montrent deux pics d'apparition, tant pour les adultes que pour les larves. Une clé d'identification des larves des espèces européennes d'*Abia* se nourrissant sur Dipsacaceae est fournie, ainsi que des caractères nouveaux permettant de séparer les adultes d'*A. fulgens* et d'*A. candens*. Hormis les 4 ou 5 espèces d'*Abia*, la seule espèce de Symphytes connue pour être inféodée aux Dipsacaceae est *Macrophya erythrocnema*, dont *Dipsacus fullonum* est citée ici comme plante-hôte pour la première fois.

Key-words. – Hymenoptera, Symphyta, *Abia*, larvae, key, host plant, Dipsacaceae, parasitism.

The subfamily Abiinae of the Cimbicidae contains approximately twelve European species, with two others in North Africa. Four species of Abiinae are found in the Nearctic (SMITH, 1979), one probably having been introduced from Europe, but the greatest number (about 26 species) occurs in the Eastern Palaearctic and Oriental Regions (TAEGER & BLANK, 2008). The European species can be divided into two groups, according to their hostplant associations. Species of one group, formerly usually placed in the genus *Zaraea* Leach, 1817 (referred to in this paper as the *Abia lonicerae* species group), are attached to Caprifoliaceae (mainly *Lonicera*) as larval hosts, whilst species of the other (here termed the *A. sericea* species group) are restricted to several genera of Dipsacaceae. Although morphological characters of adults enable the separation of the species feeding on Dipsacaceae as a more or less coherent group (TAEGER, 1998), this approach can not be applied to the Nearctic, East Palaearctic and Oriental species. Furthermore, very little is known about the biology of species from the latter regions. In Europe five species belong to the group of *Abia* attached to Dipsacaceae: *A. candens* Konow, 1887, *A. fulgens* Zaddach, 1863, *A. nitens* (Linnaeus, 1767), *A. sericea* (Linnaeus, 1767) and *A. spissicornis* Konow, 1902 (TAEGER, 1998). *A. sericea* is the most widely distributed of these and its larva was the first to be identified (CAMERON, 1875). Subsequently, the larva of *A. candens* was described by KANGAS (1960) and that of *A. nitens* by LISTON & SPÄTH (2006). *A. spissicornis* is recorded only from Greece and known from very few adult specimens. It is not yet clear whether this nominal

taxon is distinct from *A. sericea*, and nothing is known about its hostplants or immature stages. The main purpose of the present paper is to record information on the newly discovered larva of *A. fulgens*.

A. fulgens occurs mainly in the major ranges of Central European mountains (Pyrenees, Alps, Carpathians: see list of countries in TAEGER *et al.*, 2006) and Caucasus (ZHELOCHOVTSEV & ZINOVJEV, 1995). In Western Europe, outlying occurrences are recorded for some lower mountain ranges such as the Massif Central (BERLAND, 1947), Vosges (CHEVIN, 1990) and Swabian Alb in Southern Germany (JANSEN, 1988). According to Chevin and Noblecourt (personal communications), *A. fulgens* is known from the French départements of Ain, Alpes de Haute-Provence, Hautes-Alpes, Ariège, Aude, Cantal, Corrèze, Côte d'Or, Drôme, Haute-Garonne, Isère, Jura, Lot, Moselle, Puy de Dôme, Pyrénées-Atlantiques, Hautes-Pyrénées, Pyrénées-Orientales, Savoie, Haute-Savoie and Vosges.

MATERIAL AND METHODS

All field work on *A. fulgens* and collection of material was undertaken by the first author. Study sites were located in the Pyrenees, in Ariège. The 3 main sites, where adults and larvae were locally very abundant, were located along the road D618 between Lacourt and Soueix (42°54'45''N, 001°12'20''E, altitude 465 m.: hereafter referred to as Lacourt), in Bethmale (42°51'56''N, 001°05'34''E, altitude 1000 m.) and Aulus-les-Bains (42°47'14''N, 001°20'20'', altitudes from 790 to 1060 m.). But material was found also at other sites such as Bonac-Irazein, Ercé and Ustou. Identification of adult specimens was by the second author, using material in the collection of the Senckenberg Deutsches Entomologisches Institut, Müncheberg, Germany (DEI) for comparison. Identity of the larva of *A. fulgens* was proved by rearing: 1 female emerged 11th April 2008 from a larva collected at Lacourt in October 2007, 1 female emerged 4th August 2008 from a larva collected at Bethmale. Both specimens and cocoons are preserved in the personal collection of the first author.

RESULTS

Hostplants of* Abia sericea *species group. – Hostplant associations confirmed by observations of the authors are marked with a *.

A. candens: *Knautia arvensis* (L.) Coult. (KANGAS, 1960), *Knautia maxima* (Opiz) Ortmann*, *Succisa pratensis* Moench. (LISTON & SPÄTH, 2006: observations by K. J. Grearson).

A. fulgens: *Knautia maxima**. Some similar damage was also observed on *Knautia godetii* Reuter, but, as no larva was found feeding on this plant, there is no evidence that it should be considered to be a host.

A. nitens: *Scabiosa columbaria* L.*, *S. canescens* Waldst. & Kit.* (LISTON & SPÄTH, 2006).

A. sericea: *Knautia arvensis* (STEIN, 1883), *Knautia maxima**, *Succisa pratensis* (CAMERON, 1875; STEIN, 1883; LORENZ & KRAUS, 1957 and others), *Dipsacus sativus* L. (Honck) (ERMOLENKO, 1972: 163), *Dipsacus laciniatus* L. (RECTOR *et al*., 2006: 11). Records in the literature of *Fragaria* as a host seem to originate in the publication by KONOW (1901). Both *Fragaria* and *Fraxinus* species (*lapsus calami* arising from earlier mention of *Fragaria*?) are also mentioned as hosts in some more recent works, but this is certainly wrong.

***Description of larva of* A. fulgens.** – Fig. 1-10. Length full-grown 27-35 mm. Head with pale and short setae, dense only on lower face. Particularly abdominal annulets 2, 4 and 7, postspiracular, subspiracular and surpedal lobes with large, very conspicuous, pale basiconic glandubae (fig. 9). In the first instar these glandubae (or spines) are absent, or so small that they were not detected.

Fig. 1-5. – Larva of *Abia fulgens* (Zaddach). – 1, Lateral view, Bethmale, Ariège, France, 28.VI.2008 (length 25 mm). – 2, Dorsal view, Aulus-les-Bains, Ariège, France, 10.IX.2007 (length 32 mm). – 3, cocoon. – 4-5, Head.

Colour pattern. Upper head of mature larva dark violet, but pale lower face sharply contrasting with upper; yellowish white, except for a large dark subtriangular marking on upper frons (figs. 4-5). The form of the marking on frons varies slightly between individuals,

but the sharp line of change from dark to pale seems to pass always through the stemmatum. In the first instars the head is entirely brown, becoming brown-violet (fig. 6-8). The mouthparts are brown marked.

Body with a regular sequence of black and orange markings (fig. 1, 2, 9a-b). Annulet 7 with a black spot on dorsal midline, bordered below on each side by a bright orange patch, with a second lower orange spot on the spiracular line of annulet 7 of the abdominal segments. The prothorax is almost completely orange and all body segments bear numerous elongated black streaks. On abdominal segments these black markings present on all annulets except 1 and 6. The main black markings are on annulets 2 (a large ellipsoid one above the spiracle) and 7 (2 parallel irregular patches above the lower orange spot), with others between annulets 2/3, 3/4 and 4/5. Suprapedal lobes of abdomen with irregular paired black markings. The body pattern of black markings, totally absent in the first instars (fig. 6), becomes more and more complete each time the larva moults (fig. 7-8), but varies slightly in extent between individuals. Ground colour of upper body is dark greyish-green or bluish-green to around the level of the spiracles, whitish below this. Before moulting and as a pre-pupa, the larva assumes an almost beige ground-colour.

Diagnosis (mature larvae). – Colour pattern of the body (fig. 1-2) of *A. fulgens* is very different from other known species of the *sericea* group and is of high diagnostic value. Distribution, and especially form and size of glandubae on the abdomen differ significantly from *A. sericea*, as described by LORENZ & KRAUS (1957), *A. candens and A. nitens.* In *A. fulgens* the glandubae are more elongate than in the other species and much more conspicuous, because they are white and contrast strongly with the dark pigmentation of the dorsal trunk. Most of the glandubae on the dorsal trunk in the other species are dark, like the surrounding integument. Dark colour of upper head is similar to *A. sericea* and *A. candens*, but in these the dark area is more extensive (reaching below the stemmata) and gradually shades to pale white on lower parts. The largely pale (yellow-brown) colour of the head of *A. nitens* distinguishes it from all other known larvae of the *A. sericea* species group. Setae on upper head are denser in *A. sericea* and *A. candens* than in *A. fulgens*.

KEY TO MATURE EUROPEAN *ABIA* LARVAE FEEDING ON DIPSACACEAE

1. Upper head with slate grey ground colour marked with black patch on upper temples. Dorsal midline with or without black spots. Suprapedal lobe with paired black markings, or entirely pale **2**

– Upper head largely pale yellow-brown, at most with small brown markings on upper frons and or temples. Each abdominal segment with a black spot on dorsal midline of annulet 7 and five further black markings below this excluding a spot or paired markings on the suprapedal lobe. (fig. 15). Hostplants: *Scabiosa columbaria, S. canescens* ..... ***Abia nitens*** (Linnaeus, 1758)

2. A black patch on the dorsal midline of each abdominal annulet 7, sometimes also smaller spots on annulets 2 and 4. Suprapedal lobe marked with black **3**

– No black spots on dorsal midline of abdomen. Suprapedal lobes entirely pale. Yellow patch on annulet 7 bordered by 2 elongate black flecks. Anterior black marking placed more dorsal of the yellow area, posterior black fleck more ventrally. (fig. 11-12). Hostplants: *Succisa pratensis, Knautia arvensis, K. maxima* ..... ***Abia candens*** *(*Konow, 1887)

3. Annulet 7 with one pair of yellow markings, subdorsally. Below yellow marking, a single large, heart-shaped black patch reaches across annulets 7-2; on flank of annulet 5 a tiny black spot, and exceptionally another just below the stigma. Dorsal midline of abdomen with a black spot only on annulet 7. Prothorax without yellow markings. Head dark to below level of stemmata, shading to whitish around mouthparts. (fig. 13-14). Hostplants: *Succisa pratensis, Knautia arvensis, K. maxima, Dipsacus laciniatus, D. sativus* ..... ***Abia sericea*** (Linnaeus, 1767)

– Annulet 7 with two pairs of yellow markings: one subdorsally (larger) and one at approx. level of spiracles. Below upper yellow marking, a series of 6-7 attenuate black vertical streaks. Dorsal

midline of abdomen with a black spot on annulet 7 and smaller ones on annulets 2 and 4. Prothorax extensively orange. Head dark to level of stemmata, sharply changing to (yellowish-) white below except for a subtriangular dark patch on upper frons. Fig 1-10. Hostplant: *Knautia maxima* .... ***Abia fulgens*** (Zaddach, 1863)

Phenology. – Records of mature larvae from field observations at the Ariège sites indicate, at least for altitudes from 500 to 1100 m., two clear peaks of abundance, in June/July and September/October. These peaks correlate with peaks of activity for adults in May/June and July/August, although a few adults can be found outside these periods. Similarly to observations on *Abia nitens* by LISTON & SPÄTH (2006), there was a long period of larval activity in 2008 during which larvae of all stages occurred together in the same localities, corresponding with the temporally rather scattered appearance of adults. This was especially the case in autumn, but further investigations are needed before any conclusions can be drawn from these observations. Similar behaviour in *Abia nitens* was observed by LISTON & SPÄTH (2006). Larvae of *A. fulgens* were collected up to 1400 m., but higher areas were not prospected. Some larvae were observed still feeding at the very end of October 2008.

Behaviour, distribution, habitat requirements of the larvae. – On being touched, larvae react like most Cimbicidae by secreting a clear fluid from the lateral body glands. This "reflex bleeding" seems not to be repeated by larvae disturbed several times. In addition, active larvae react to tactile stimuli by curling up and falling to the ground. Young larvae are particularly sensitive, even if touched or moved only gently. More mature larvae, or resting larvae, may show no touch reaction, or only the "reflex bleeding". The younger larvae seem to prefer to feed and rest amongst the lower rosette leaves of the host, but older ones can be found feeding on all parts of the host plant (except the flowers). Larvae of *A. fulgens* are, as *A. nitens*, temporary feeders (LISTON & SPÄTH, 2006) and feed significantly less than 33 % of the time. When resting, older larvae can have either a coiled or stretched attitude, either on the host plant or on a neighbouring piece of plant material (not necessarily the host plant), under a leaf, on a stem or branch, etc. As described by LISTON & SPÄTH (2006) for *A. nitens*, older larvae can then be found at a significant distance from a host plant (50 cm or more), moving from or to a resting place or a (new) host plant. This behaviour may partly be driven by the need to find food: at some sites, defoliation of isolated plants caused by local abundance of larvae was observed. Although larvae of *A. fulgens* are clearly temporary feeders, we can not decide if this species is a two-phase feeder (whose larvae feed day and night) or a one-phase feeder. Larvae were observed feeding during the day in the field and under rearing conditions, but feeding during the night was only observed under rearing conditions. Additional field observations at night should be conducted to clarify this. Larvae in the field were observed feeding actively in various conditions of light and temperature, but they seem to prefer cool and overcast weather, and even dew or light rain seem not to discourage them from feeding. On most occasions, the maximum activity of larvae was observed in the morning (between 8 and 11 am). The most favourable sites, where abundance of larvae was highest, were located in wet slope areas, protected from direct sunshine during several hours of the day, especially during the morning. When these sites are exposed to the sun, the larvae generally move to a more shaded niche in denser vegetation to feed or to rest, even though resting larvae were sometimes found exposed in the sun. This affinity for moist sites seems to be shared with *A. sericea*, according to STEIN (1883), and possibly also *A. candens* (adults mostly in damp areas). At one locality (Lacourt), within a distance of less than 100 meters, larvae of three species (*candens, fulgens, sericea*) were collected during the same period in September 2008. The behaviour of all three species was similar. The only difference was that larvae of *A. sericea* and *A. candens* remained mostly hidden in the lower rosettes whereas *A. fulgens* larvae were more exposed and visible. But this difference may not be significant, as the

population levels of the three species were dissimilar (larvae of *fulgens* abundant; larvae of *sericea* scarce; only two larvae of *candens*). The density of *fulgens* larvae can vary greatly between sites. This is certainly determined by factors other than the abundance of the host plant. Abundance of larvae varied between complete absence to several hundreds, sometimes at distances of less than a hundred meters. Locally, more than ten larvae occurred per plant.

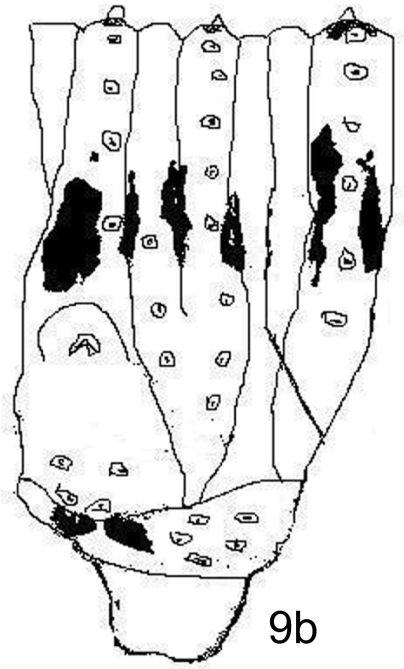

Fig. 6-10. – Larva of *Abia fulgens* (Zaddach). – 6-8, First stages. – 9a-9b, Lateral views, photo and schematised drawing of abdominal segment 2 (anterior at left). – 10, Larva parasitised by Nematodes, Bethmale, Ariège, France, 28.VI.2008.

Fig. 11-15. – Mature larvae of *Abia* species. – 11-12, *Abia candens* (Konow), Lacourt, Ariège, France, 21.IX.2008. – 13-14, *Abia sericea* (L.), Lacourt, Ariège, France, 1.IX.2008. – 15, *Abia nitens* (L.), Mamming, Lower Bavaria, Germany, IX.2002.

Parasitism. – Several parasites were observed or reared. *Compsilura concinnata* Meigen, 1824, and *Exorista larvarum* (L., 1758) (Diptera, Tachinidae) were reared from *A. fulgens* larvae collected in Bethmale. *E. larvarum* was also reared by the first author from larvae of

A. sericea and *C. concinnata* from larvae of other Symphyta: *Craesus alniastri* (Scharfenberg, 1805), *Hemichroa crocea* (Geoffroy, 1785) and *Tenthredella livida* (L., 1758). Several *A. fulgens* larvae, also collected in Bethmale in 2008, were parasitised by nematodes, not yet identified but probably of the family Mermithidae. Fig. 10 shows a parasitised larva. The outline of the long thin worm(s), can be seen inside the larva. Some heavily parasitised larvae (several nematodes in each host) showed abnormal colouration, especially lack of orange markings, or alteration of the black body pattern. Nematodes were observed leaving their host when the larva was mature, or even after the cocoon was made. Very few records of parasitism of sawfly larvae by nematodes have yet been reported (SIEBOLD, 1858), and this seems to be the first for an *Abia* species.

Identification of adults. – Existing keys to adults of this group (GUSSAKOVSKIJ, 1947; TAEGER, 1998) do not work very well for the identification of *A. candens* and *A. fulgens*. The extent and degree of development of surface sculpture on the head and abdominal terga, often used as a main character for separating these two species, is highly variable in *A. fulgens*. In the specimens examined (both sexes), the colouration of the stigma and the first radial cell in the forewing were however found to represent reliable distinguishing characters:

- Forewing stigma entirely pale, at most with slight darkening at extreme base; radial cell 3R1 infuscate: *A. candens (*Konow).

- Forewing stigma bicoloured; margins of basal half blackish, apical half yellow; radial cell 3R1 hyaline: *A. fulgens (*Zaddach).

In cases of doubt, females of *A. fulgens* are easily distinguished from all other species by the distinctive shape of the serrulae of the lancet (KANGAS, 1946b: 83, fig. 1).

Sex ratio and behaviour of adults. – As reported by TAEGER (1998) and Chevin (personal communication), males of *A. fulgens* are rather scarce. In the French Pyrenees, only 1 male has been recorded (1 additional male is known from Andorra), but more than 150 females; in the Massif Central, 2 males and 24 females (ration 1:12) and in the French Alps, 22 males and 84 females (ration 1:4). In other European species of the *sericea* group, males are about as abundant as females.

In warm and sunny conditions, adults (females) were observed feeding on white-flowered Apiaceae (especially *Heracleum sp., Thysselinum palustre* (L.) Hoffm. and *Angelica sylvestris* L.), locally in large numbers. It is easy to photograph or collect such specimens. The only male observed by the first author was mating, the female feeding on the flower and the smaller male attached only by contact with tip of abdomen. As no adult was observed on flower-heads in the cool of early morning, the habits of *A. fulgens* may differ in this respect from *A. nitens* (LISTON & SPÄTH, 2006).

When disturbed or attacked, adults often curl the body, move wings to an extended position, and sometimes fall to the ground. This was observed both in cool and overcast conditions (adults on leaves) and in warm and sunny situations (adults on flowers).

No oviposition has so-far been observed, even though a few females were found positioned on large leaves near the ground, either on the leaf edge or near the midrib of the leaf. No conclusion on oviposition behaviour can be drawn from these observations.

DISCUSSION

The attractive appearance of adult *Abia* has encouraged several entomologists to study them more closely (most notably A. Semenov-Tian-Shanskij in Russia and E. Kangas in Finland). Nevertheless, examination of their juvenile stages and biology has lagged considerably behind the attention given to adults. Species of the *A. sericea* group are of interest in northern

and central Europe to those concerned with nature conservation. They are regionally endangered organisms and their presence indicates a degree of naturalness and therefore a certain value to nature conservation for the sites where they are found. Furthermore, at least one species (*A. sericea*) is a candidate for use in biological control of invasive *Dipsacus* species in North America (RECTOR *et al.*, 2006).

In the Symphyta, apart from members of the *Abia sericea* species group, only *Macrophya erythrocnema* Costa, 1859 (Tenthredinidae: Tenthredininae) seems to exhibit a specialised attachment to hostplants belonging to the Dipsacaceae. PSCHORN-WALCHER & ALTENHOFER (2006) found *Knautia arvensis* to be a host of *M. erythrocnema* and two females of this species in the collection of the Zoologische Staatssammlung, Munich (ZSM) were reared by Dr. R. Hinz from *Dipsacus fullonum*. According to the collector's diaries, these emerged from several larvae collected on 29.8.1958 in a quarry near Einbeck, Lower Saxony, Germany, from "*Dipsacus silvestris*" (*D. sylvestris = D. fullonum*).

Apart from the sawfly species mentioned above, only larvae of a few highly polyphagous Tenthredininae have been recorded as feeding on Dipsacaceae. Most frequently mentioned in the literature is *Tenthredo atra* L., 1758 from *Succisa pratensis* (e.g. by LORENZ & KRAUS, 1957). The original observation can be traced back to CAMERON (1876: 89-90), who reared *Tenthredo dispar* Klug, 1817 (now placed as a synonym of *T. atra*) from *Scabiosa succisa* (= *Succisa pratensis*). However, it is interesting that STEIN (1885) thought that *T. dispar* might represent a distinct species. Note that "*Scabiosa*" recorded in the literature as a host of *T. atra* simply results from careless interpretation of the different hostplant nomenclature used at the time of Cameron. The taxonomy and host associations of the various "colour forms" at present regarded as synonyms of *T. atra* would be an interesting subject for investigation, to which modern techniques (sequencing of genetic material) could usefully be applied (and to many similar taxonomic problems in the Symphyta). PSCHORN-WALCHER & ALTENHOFER (2006) also tentatively mention *Knautia arvensis* as a possible host of *Tenthredo schaefferi* Klug, 1817. This requires confirmation, because larvae of *Tenthredo* of the *arcuata* species group are otherwise known only to feed on Fabaceae.

KANGAS (1960: 54) noted that the larva of *A. candens* develops much more slowly than those of two *Abia* species of the *lonicerae* group (*A. mutica* Thomson, 1871, and *A. aenea* (Klug, 1820) [= *bigens* Kangas, 1946]). Two *A. candens* larvae reared by Savina developed significantly more slowly than larvae of *A. fulgens* and *A. sericea*. This apparent difference might however result from a particularly negative response of *A. candens* to (artificial) rearing conditions, and requires further investigation.

The plant families Dipsacaceae and Caprifoliaceae, together with the smaller Valerianaceae and Adoxaceae, represent the order Dipsacales in Europe. The limited sawfly fauna on Dipsacaceae, of 4 or 5 European species, compares with a larger and taxonomically more diverse assemblage of Symphyta whose larvae feed on Caprifoliaceae. In total, 18 European species are monophagous or narrowly oligophagous on Caprifoliaceae (LORENZ & KRAUS, 1957; LISTON, 1995; LACOURT, 1999). These are:

- Pamphiliidae: 1 *Pamphilius* species (*Lonicera*);
- Cimbicidae: approximately 7 *Abia* species (*Lonicera*, *Linnaea*);
- Tenthredinidae Blennocampinae: 1 *Hoplocampoides* species (*Lonicera*);
- Tenthredinidae Tenthredininae: 4 *Macrophya* species (*Sambucus*, *Viburnum*);
- Tenthredinidae Nematinae: 5 *Nematus* (*Paranematus*) species (*Lonicera*).

The apparently greater use of Caprifoliaceae as hosts by sawflies is however not very surprising, because the Dipsacaceae is most species rich in the Mediterranean region whereas the Caprifoliaceae is better represented in cooler regions which also happen to support a

much larger number of species of Symphyta. Furthermore, as discussed already by LISTON & SPÄTH (2006), predation pressure may also have acted differently on the development of the sawfly fauna attached to these plant families, because of their different architecture and general habitat requirements (Dipsacaceae: herbaceous plants, growing mostly in open areas; Caprifoliaceae: shrubs or climbers, mainly found in scrub or woodland). In this respect it is interesting that the Valerianaceae, which like the Dipsacaceae is represented in Europe only by herbaceous species, is not known to support any mono- or oligophagous sawflies. However, *Macrophya albicincta* (Schrank, 1776) uses *Valeriana officinalis* L. as a host in addition to *Sambucus spp.* (main hosts?) (CHEVIN, 1975) and *Viburnum opulus* L. (HALSTEAD, 1994).

The observations on the newly discovered larva of *Abia fulgens* presented above indicate that in many respects its biology is similar to *A. candens* and *A. sericea*. All three species share *Knautia* as one of their larval hosts, although *A. candens* and *A. sericea* also use *Succisa pratensis*, whereas *A. fulgens* has so far only been found on *Knautia*. As shown in the present study, these three *Abia* species may even occur at the same sites, which typically, through large areas of Europe, are meadows with moderate to good water and nutrient supply. With respect to the habitat niche which it occupies, *A. nitens* is clearly the most distinctive of the European species in the *Abia sericea* group, because of its adaptation to very warm, dry, nutrient-poor conditions (LISTON & SPÄTH, 2006). Possibly it is also the most narrowly oligophagous of these species. Within its European range, which is the most extensive in the group (TAEGER *et al.*, 2006), *A. sericea* perhaps shows regional differences in its hostplant association. RECTOR *et al.* (2006) and ERMOLENKO (1972) found respectively in Bulgaria and parts of the Ukraine that *Dipsacus* species are used as hosts. Unfortunately, available data are insufficient to allow a statement on whether only *Dipsacus* is used as a host in warmer regions of Southern Europe, or whether the more northern populations do not use this as a host. Adult specimens reared from *Dipsacus* in Bulgaria, provided by B. Rector, were morphologically indistinguishable (including sculpture, proportions of antennomeres, structure of lancet) from Central European *A. sericea*, except that Bulgarian females tend to have extensively brown abdominal sterna (one of the characters which according to KONOW (1902) should distinguish *A. spissicornis* from *A. sericea*). Photographs of larvae collected on *Dipsacus* in Bulgaria revealed that the colour pattern was identical to Central European larvae of *A. sericea*.

All species of the *A. sericea* group so-far studied display two peaks of abundance of both adults and larvae, but whether this represents simple bivoltinism has not been proved for any species. As discussed by LISTON & SPÄTH (2006) for *A. nitens*, the phenomenon is for the moment better referred to as a polymodal emergence pattern. By contrast, species of the *A. lonicerae* group seem to be univoltine, except for *A. fasciata* (Linnaeus, 1758) (KANGAS, 1946a; CHEVIN, 2001).

Finally, not least in view of the current interest in finding potential biological control agents to combat invasive *Dipsacus* species in North America (RECTOR *et al.*, 2006), it seems worthwhile mentioning that two Eastern Palaearctic taxa (ZHELOCHOVTSEV & ZINOVJEV, 1995: under *Abia s. str.*) also belong to the *sericea* species group and are therefore probably also monophagous / oligophagous on species of Dipsacaceae: *A. berezowskii* Semenov, 1896 (? = *A. sericata* Zhelochovtsev, 1935) and *A. semenoviana* Gussakovskij, 1947.

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