The biology of the noctuid moth Abrostola asclepiadis Schiff. (Lepidoptera, Noctuidae) in Sweden

JONAS FÖRARE

Förare, J.: The biology of the noctuid moth *Abrostola asclepiadis* Schiff. (Lepidoptera, Noctuidae) in Sweden. [Biologin hos nattflyet *Abrostola asclepiadis* Schiff. (Lepidoptera, Noctuidae) i Sverige.] - Ent. Tidskr. 116 (4): 179-186. Uppsala, Sweden 1995. ISSN 0013-886x.

This article describes the biology, phenology and distribution of *Abrostola asclepiadis* Schiff. (Lepidoptera: Noctuidae) in Sweden, gathered during a long term study on its population ecology. Whereas larvae of other *Abrostola* spp. in the world are known to feed on plants among the Urticales, such as *Urtica* spp., *A. asclepiadis* uses *Vincetoxicum hirundinaria* Med. (Asclepiadaceae), a perennial plant with a number of toxic substances. My experimental data corroborates the view that *A. asclepiadis* is monophagous on its host plant.

A. asclepiadis is a regionally uncommon and local species. This is most likely due to the patchy distribution of its host plant. The moth has a high ability for dispersal and thus a good capacity of finding its host. Its distribution in Sweden follows the distribution of *V. hirundinaria*, viz. in eastern parts of the south and southcentral part of the country. However, in the southernmost province, Skåne, where the host plant also occurs, the moth has never been found. This anomaly may be related to interhabitat distances in the province being too great for breeding populations to persist. Egg densities are often low and offspring mortality is high, generally more than 90 %. The main mortality agents are generalist predators, most notably ants. The impact of *A. asclepiadis* on its host plant is generally low or negligible.

Jonas Förare, Dept. of Entomology, Swedish University of Agricultural Sciences, P. O. Box 7044, S-750 07 Uppsala, Sweden.

Introduction

The genus *Abrostola* Ochs. (Lepidoptera, Noctuidae, Plusiinae) consists of about 35 species and is represented in the Palearctic, Oriental, Nearctic and Ethiopian regions. The genus is grouped in a tribe (Abrostilini) together with one other genus, *Mouralia*, that occurs in the Neotropical region (Kitching 1987). The tribe is considered primitive in relation to other Plusiinae; e.g. larvae differ from others in the subfamily by having thoracic legs on abdominal segments 3 and 4, most likely a plesiomorphic trait.

Host plant affiliations are known only for a few *Abrostola* species, but according to presently available information, the genus generally seems to be associated with plants in the Urticales, often of the genus *Urtica*. This applies to species in Japan (Ichinosé 1962), Europe (Skou 1991) and North America (Eichlin & Cunningham 1978). In Scandinavia, there are three *Abrostola* species, two of which feed on *Urtica dioica* L., namely *A. tripartita* Hufn. and *A. triplasia* L. (sensu Mikkola & Honey 1993). However, the third species, *A. asclepiadis* Schiff., feeds on *Vincetoxicum hirundinaria* Med., belonging to the Asclepiadaceae. On the Swedish mainland it is the only leaf-feeding insect species on this plant (except for casual visits by larvae of the polyphagous noctuid moths *Euplexia lucipara* L. and *Diarsia brunnea* Schiff. and the arctiid moth *Diaphora mendica* Cl.). On the islands of Öland and Gotland also the tortricid moth *Sparganothis pilleriana* Schiff. may be found on the plant (another tortricid moth, *Clepsis senecionana* Hübn. has also been recorded (B. Gustafsson, pers. comm.)).

Vincetoxicum hirundinaria is a perennial plant, that contains toxic compounds like the cardiac glucoside vincetoxin, and many alkaloids (Hoppe 1975). The plant grows on cliffs, rocky outcrops

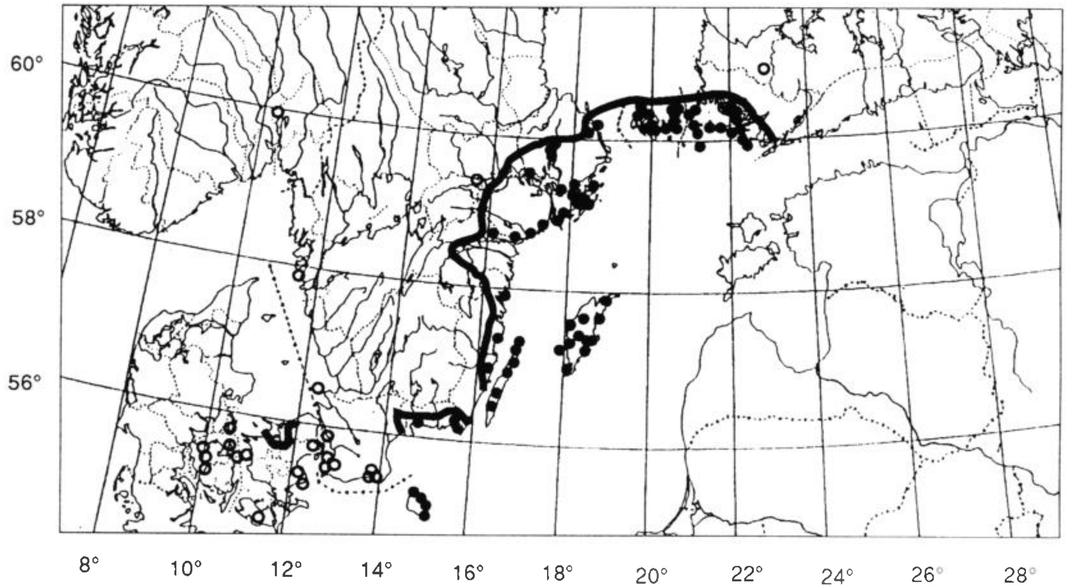

*Fig. 1. The range of **Vincetoxicum hirundinaria** (solid line (cf Hultén 1971)) in Fennoscandia and Denmark. Empty circles denote isolated occurrences of the plant. The filled circles denote localities where **Abrostola asclepiadis** has been found. Marks include multiple records. Records on findings from Denmark and Finland according to Nordström et al. (1969).*

*Utbredningsgränsen för tulkört **Vincetoxicum hirundinaria** (heldragen linje) (jfr Hultén 1971) i Fennoskandien och Danmark. Tomma cirklar markerar isolerade förekomster av växten. Fyllda cirklar markerar fynd av tulkörtsfly **Abrostola asclepiadis**. Markeringar inkluderar fall med många rapporter från samma lokal. Fynd från Danmark och Finland enligt Nordström et al. 1969.*

and wood margins from the Mediterranean region eastwards to the Caucasian foothills and northwards through Europe to the countries surrounding the Baltic Sea. In Fennoscandia it has a patchy distribution along the Swedish Baltic Sea coast up to about 60° N, over the Åland islands to southwestern mainland Finland (Fig. 1). On the Swedish islands of Öland, Gotland and the Danish island of Bornholm the plant is abundant, often occuring in large stands (Fig. 1, cf Sterner 1922, Hultén 1971). In Skåne, the southernmost province of Sweden, and in Denmark the host plant is relatively scarce and the patches are separated by long distances.

The distribution of *A. asclepiadis* in Fennoscandia follows that of the host plant, from Bornholm to the northern limit of the plant distribution (Fig. 1). However, no observations of the species have been made either in Skåne or on the larger Danish islands.

Material and methods

Flight dates and number of captures for *Abrostola asclepiadis* in Sweden were obtained from enquiries sent to Swedish lepidopterologists and museums. The thus compiled dataset covered the period 1926 to 1990, with some later additions.

Studies on larval development and feeding preferences were performed in the laboratory. For the development studies ab ovo reared larvae, originating from parents from the provinces of Uppland and Gotland were used. The parent moths had been collected as larvae, allowed to pupate in the laboratory and were overwintered in a rearing cabinet (temperature around 3° C). During the mating trials, several males and females were kept in a large cage, together with cut host plants. Eggs were collected daily and transferred to petri dishes together with moist filter paper and leaves picked from potted host plants, all originating from the same patch outside Uppsala. Eggs were kept in

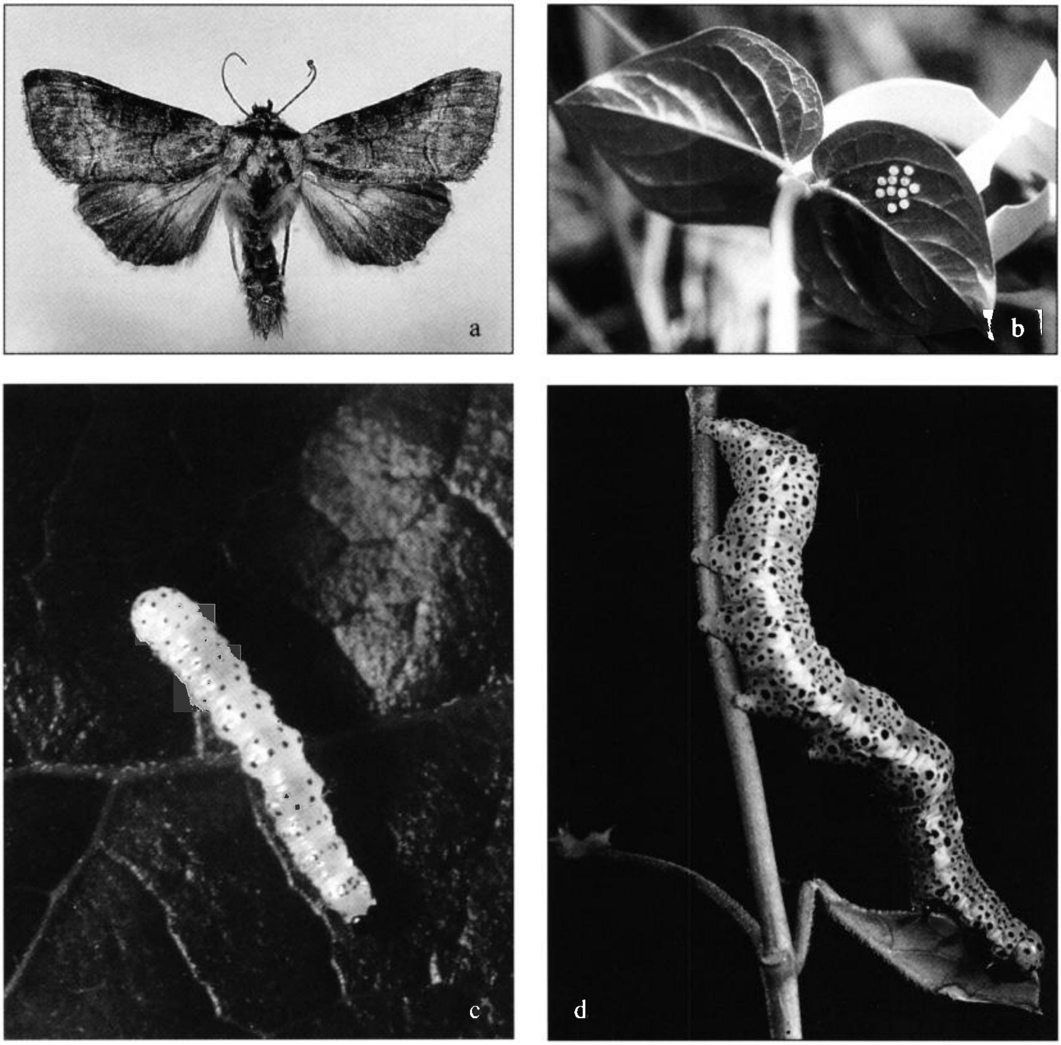

Fig. 2. ***Abrostola asclepiadis****: a) adult moth (actual wingspan 32-36 mm), b) eggs on a* ***Vincetoxicum hirundinaria*** *leaf, c) a newly eclosed second instar larva (actual size approx. 7 mm), d) a fifth (last) instar larva (actual size 30-40 mm). Photo: J. Förare.*

Abrostola asclepiadis*: a) adult fjäril (verklig vingbredd 32-36 mm) b) ägg på tulkörtsblad, c) nykläckt 2:a stadielarv (naturlig storlek c:a 7 mm), d) femtestadielarv (sista larvstadiet, naturlig storlek 30-40 mm).*

rearing cabinets at four constant temperatures from 15 to 30 °C. After hatching, fresh leaves were provided every second day in the beginning and every day later in development. All leaves were photocopied before and after the larva had fed on them. The copied leaf images were then used in an area meter (Delta Technologies™) to calculate the leaf area consumed by each larva.

Data on the batch size were collected from a random set of egg batches (Förare 1995). For the studies on feeding preferences, field collected eggs were used and kept as indicated above. Leaves provided as food were picked from field collected plants.

Field studies were conducted on the island of Gotland in the Baltic Sea, in Uppsala (N 59° 49', E 17° 39') in the province of Uppland, and in Tullgarn, south of Stockholm (N 58° 58', E 17° 35') in the province of Södermanland.

Results and discussion

Phenology and voltinism

The adult moth (Fig. 2 a) is usually on the wing in June and July. No variation in flight date between different parts of the distribution range (cf Fig. 1) could be discerned from my data set. The mean flight date was around the first of July (Fig. 3). However, sampling efforts varied between years and only a few years contain data from all parts of the distribution range, which makes a geographical comparison difficult. My own observations of egg laying during the years 1988-1994 around Uppsala suggest the same temporal distribution during most years.

The developmental period of about six weeks from egg to pupa (see below) means that normally there will only be time to complete one generation in Sweden per year. Even if eggs were laid already in early June, autumn weather would usually be too cool for successful larval development and pupation of a second generation. However, there are findings from 1978 on the island of Öland that suggest that a second generation may occur occasionally . Adult moths were caught as early as the beginning of June and as late as the second week of September (K. Tunsäter, pers. comm.). Further south in Europe, more than one generation frequently occurs. For instance, Hungarian collectors have observed two generations in central Europe (Peter Andersson, pers. comm.). However, Hacker (1989) suggests that the Greek populations of the moth are univoltine.

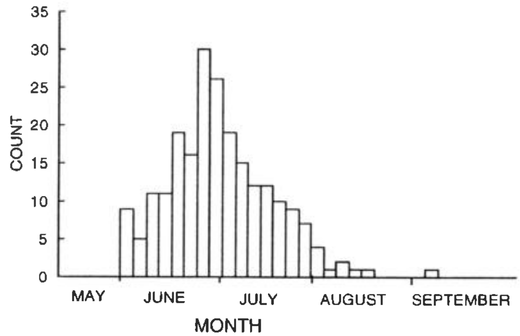

*Fig. 3. Number of captures of **Abrostola asclepiadis** per four day intervals in the investigated sample from 1926-1992 .*

*Flygdatum för tulkörtsfly **Abrostola asclepiadis**, grupperade i fyra dagars intervall i det undersökta materialet från 1926-1992.*

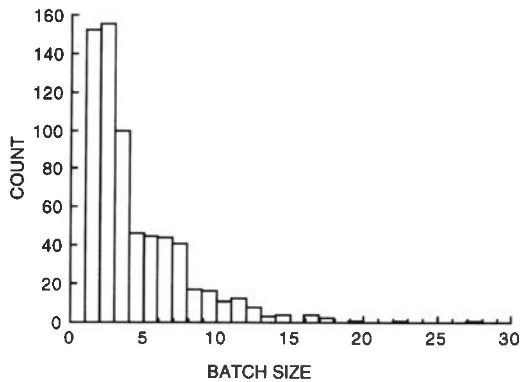

*Fig. 4. Egg batch size for **Abrostola asclepiadis**. Data from batches found around Tullgarn and Uppsala in southeastern Sweden 1990-1994.*

*Kullstorleken hos tulkörtsfly **Abrostola asclepiadis**. Data från kullar påträffade kring Tullgarn och Uppsala 1990-1994.*

Oviposition

Females oviposit underneath *V. hirundinaria* leaves (Fig. 2 b). In captivity, no individual female has laid more than 255 eggs (pers. obs). In the field, egg batches are usually small, containing 1-5 eggs, but occasionally batches with more than twenty eggs have been found (Fig. 4). The larger egg batches are most frequently found on small host plant shoots. Furthermore, small and shaded host plant patches receive higher egg densities than large and exposed ones (Förare 1995). In one summer, I found more than two hundred batches (more than a thousand eggs) in a small patch at Tullgarn, consisting of about one thousand plant shoots.

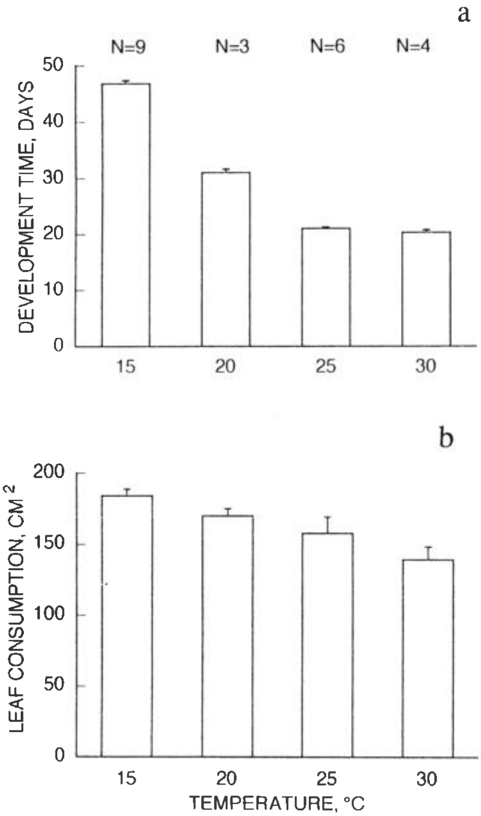

Fig. 5. a) Development time from egg to pupa, and b) the amount of leaf area consumed by larvae of ***Abrostola asclepiadis*** *from hatching until pupation at four different constant temperatures in rearing cabinets. Bars show mean ± SE. N is the sample size. The light regime used was 17 hours light: 7 hours dark.*

a) Utvecklingstid från ägg till puppa och b) mängden bladyta som konsumerats av larver av tulkörtsfly ***Abrostola asclepiadis****, från kläckning till förpuppning vid fyra olika konstanta temperaturer i odlingskammare. Staplarna visar medelvärde ± medelfel. N anger provstorleken. Färska blad gavs varannan dag, fram till sista larvstadiet, då de gavs dagligen. Fotoperioden var 17 timmar ljust och 7 timmar mörkt /dygn.*

Larval development and behaviour

Eggs hatch after about ten days at average Swedish summer temperatures (a daily mean temperature around 16° C). The five larval instars (cf Fig. 2 c-d) are completed in about five weeks.Thus at normally prevailing temperatures, the total development time will be a little more than six weeks (cf Fig. 5 a). First and second instar larvae are active at all times during day and night. When feeding, they make small holes in the central parts of both young and old leaves and are fairly sedentary on the plant where eggs were deposited. If disturbed, they spin off on silken threads from the leaves. From the third instar, larvae feed almost exclusively at night. Larvae in the last two instars move around more actively while searching for food, concentrating their feeding to young foliage at the top of the plants. They feed singly and consume large portions or entire leaves. If disturbed, they defend themselves by wriggling their body, or releasing a droplet of liquid from the mouth. Larvae consume about 170- 200 cm^2 of leaf area to complete larval development at 15° C, less at higher temperatures (Fig. 5 b). Most of the foliage is consumed in the last instar. The amount of foliage required to complete development corresponds to that on a plant shoot of average length (about 50 cm). The larvae pupate mainly in August in leaf litter and moss.

Adult behaviour

I have not observed nectar feeding by the moth, nor can any records be found in the literature. Moths occur at very low densities (Förare 1995) and are difficult to observe at night, and no moths have been caught by the author on the flowers of *V. hirundinaria*. Only one record is known to me - a female moth was caught on *Silene vulgaris* (H. Elmquist, pers. comm.).

Monophagy of A. asclepiadis larvae

A. asclepiadis larvae have never been reported to feed on anything but *V. hirundinaria*. However, the close association between other *Abrostola* spp. and plants in the Urticales in various regions of the world prompted me to test whether *A. asclepiadis* could feed on Urticales and whether the *Urtica*-feeding species *A. tripartita* could feed on *V. hirundinaria*.

Newly hatched first instar or newly eclosed third instar larvae were fed leaves from *V. hirundinaria* and *U. dioica*. For first instar larvae, all survived the normal host plant for each species, whereas larvae fed leaves of the other species' host plant all died (Tab. 1). *A. asclepiadis* larvae were also presented with leaves from other plants; *Lamium album*, a member of a genus also claimed to be associated with *Abrostola* (Hampson 1913,

*Tab. 1. Survival (%) of first instar larvae of **A. tripartita** and **A. asclepiadis** fed leaves of different plants (see text). Broods were split between treatments. The temperature was 20° C and the light regime 17L:7D.*

*Överlevnad (i procent) hos förstastadielarver av grönvitt nässelfly **Abrostola tripartita** och tulkörtsfly **A. asclepiadis** uppfödda på blad av olika växtarter. Äggkullarna delades upp mellan behandlingarna. Temperaturen var 20°C och fotoperioden 17 timmar ljus, 7 timmar mörker/dygn.*

	Plant species									
	Vincetoxicum hirundinaria		*Urtica dioica*		*Lamium album*		*Asclepias curassavica*		*V. hirundinaria ssp. fuscatum*	
Moth species	%	n	%	n	%	n	%	n	%	n
A. asclepiadis	100	9	0	9	0	11	0	9	80	10
A. tripartita	0	22	100	13	-	-	-	-	-	-

Gullander 1971) and *Asclepias curassavica*, an American asclepiad species. No larvae survived on either plant. However, *A. asclepiadis* larvae managed relatively well on leaves from a cultivated *V. hirundinaria* subspecies occuring in Norway (plants grown from seeds collected in Oslo) (Tab. 1).

The same mortality rates were obtained with third instar larvae. *A. asclepiadis* larvae died when they were transferred from *V. hirundinaria* to *U. dioica* leaves, while all control animals remaining on *V. hirundinaria* survived. The analogous result, all surviving on *U. dioica* wheras all dying on *V. hirundinaria* was obtained for *A. tripartita* (Tab. 2).

In none of the above experiments with non-host leaves were feeding attempts by any larva ever observed. Larvae kept moving around the petri dish and were all severely starved when they died.

Although these experiments cannot rule out the existence of alternative host plants, I find it highly likely that the Scandinavian population of *A. asclepiadis* is strictly monophagous on *V. hirundinaria*.

In relation to this, I have not found any experimental evidence or observations suggesting that any nutritional differences among *V. hirundinaria* plants growing in different environments affect development. Larvae fed cut leaves from shaded or sun-exposed plants did not differ in development time or final (pupal) weight (Förare 1995). Furthermore, no field or laboratory observations indicate the existence of resistant host plant clones. In patches monitored for several consecutive years, almost all host plant tufts have displayed feeding marks at least in some year. Similarily, in the laboratory, larvae have never rejected leaves from any *V. hirundinaria* plants offered.

*Tab. 2. Survival (%) of third instar larvae of **A. asclepiadis** and **A. tripartita** fed foliage from different plants. Larvae in the experimental group were fed leaves of their ordinary host plant from hatching until having eclosed at the third instar, when food was switched. Temperature was 17° C, light regime 20L:4D*

*Överlevnad (i procent) hos tredjestadielarver av grönvitt nässelfly **Abrostola tripartita** och tulkörtsfly **A. asclepiadis** uppfödda på blad av olika växtarter. Larverna i experimentgruppen föddes upp på sin ordinarie värdväxt till och med andra hudömsningen, då de istället fick den andra artens. Larverna i kontrollgruppen utfodrades även fortsatt med blad från sin ordinarie växt. Temperaturen var 17° C och fotoperioden 20 timmar ljus och 4 timmar mörker/dygn.*

	Plant species from instar III			
Moth species	*V. hirundinaria* %	n	*U. dioica* %	n
A. asclepiadis	100*	6	0*	19
A. tripartita	0**	16	100**	15

*) *V. hirundinaria* during larval instar I-II
**) *U. dioica* during larval instar I-II

Dispersal and colonizing ability

Flight tests have revealed considerable dispersing abilities. Some individuals flew for enough time to cover more than 20 kilometers at low wind speeds (Förare 1995). At Tullgarn on the south-eastern Swedish mainland, an *A. asclepiadis* population was shown to colonize and occupy most of the patches in a 12 km^2 area in seven years (Förare 1995). Despite this, interpatch distances may be too long in Skåne to keep up breeding populations (cf Harrison et al. 1988). Large populations can be found on the island of Bornholm (e.g. Hoffmeyer 1949), less than 50 km away from the coast, and *A. asclepiadis* is probably capable of colonizing from that distance. Thus, I would not rule out the possibility that the species has at some time colonized some of the patches, but that these attempts have failed due to unfavourable circumstances.

Enemies

Mortality of *A. asclepiadis* eggs seems mainly to be due to the action of generalist predators and parasitoids (Förare 1995). Egg mortality is usually low, but can reach high levels in some years (Förare 1995). The main predators seem to be ants (*Formica*, *Lasius* and *Myrmica* spp.). The ants tear the eggs loose from the leaf surface. Chrysopid larvae (*Chrysopa* spp.), anthocorid bugs (*Anthocoris* sp.) and mites have on several occasions been observed to suck out eggs, usually leaving the empty shell, but sometimes tearing it loose while feeding and dropping it afterwards. No specialized egg parasitoids have been found on *A. asclepiadis*. However, I have reared two species of parasitic wasps, one *Trichogramma* sp. (Trichogrammatidae) and one *Telenomus* sp. (Pteromalidae) from *A. asclepiadis* eggs, from both my study areas. The egg parasitoids usually cause a mortality of a few percent.

Young *A. asclepiadis* larvae (instars I and II) are attacked by mainly the same predators as the eggs. Early larval mortality is high, very few larvae (usually 0-5 %) from hatched eggs survive to the second or later instars (Förare 1995). Larger larvae are also attacked by ants, but also by predacious pentatomid bugs (*Picromerus bidens* (L.)) and parasitoids. The latter, however, seem to be uncommon (causing mortality of less than one percent) judging from several hundred collected larvae. I have hatched eight *Phryxe vulgaris* Fall. (Diptera, Tachinidae), from larvae collected at the island of Stora Karlsö, near Gotland, and two specimens of *Microplitis* sp. (Hymenoptera, Braconidae) from larvae collected around Uppsala. Predation on older larvae also seems to be low. Whereas a *Formica* ant can catch and carry larvae up to the third instar, capture of a last instar larva requires the cooperation of several ants (pers. obs.).

Egg and larval predation thus are important factors in reducing the population size of *A. asclepiadis* (Förare 1995). Generally only a few of the larvae reach the final instar. Accordingly, seldom more than 1 % of the available foliage is ever consumed (Förare 1995), and hence *A. asclepiadis* will generally have a small or negligible effect on its host plant population. Occasionally, however, very local defoliation may occur, where most leaves get consumed in portions of patches or on isolated plants. Similar observations of high larval densities at sites where the hostplant is scarce, have been made in Hungary (Ronkay, pers. comm.).

Furthermore, predation of larvae seems to be weather dependent. A higher proportion of larvae survive in warm summers (Förare 1995). But in sun-exposed patches a summer that is too warm can also lead to plant wilting. Severe drought occurs intermittently where the host plant grows on shallow soil. Under those circumstances very few larvae will survive (Förare 1995).

Conclusions

A. asclepiadis is considered a rather uncommon and local species by many insect collectors, and in the literature the same view prevails (Hoffmeyer 1949, Skou 1991). Apart from an outbreak on the island of Usedom in the southern Baltic Sea in 1904 (Hoffmeyer 1949), there are no reports of high population densities.

This pattern of abundance most likely stems from the patchy distribution of the host plant. *A. asclepiadis* adults have good dispersal abilities, which probably explains that the species can be found throughout most of the range of *V. hirundinaria*, to its northern limit. Nevertheless, colonized patches generally end up with low egg densities and the mortality of offspring is high, mainly due to heavy predation by generalist predators. Therefore, in most patches only a fraction of the available foliage is consumed.

Acknowledgements

The author is indebted to many Swedish collectors for practical assistance and provision of collection data. Special thanks go to Håkan Elmquist, Hans Meijlon, Kjell Tunsäter, Nils Ryrholm, Hans Hellberg, Nils Hydén and Ingvar Svensson. Christer Solbreck, Stig Larsson, Christer Björkman, Naomi Cappuccino and Nils Ryrholm provided valuable comments on the manuscript. Richard Hopkins corrected my English. This work has been supported by grants from the The Swedish Natural Science Research Council, The National Swedish Environmental Protection Board and the Oscar and Lili Lamm foundation.

References

Eichlin, T. D. & Cunningham, H. B. 1978. The Plusiinae (Lepidoptera: Noctuidae) of America north of Mexico, emphasizing genitalic and larval morphology. - Technical Bulletin, United States Department of Agriculture, Agricultural Research Service. no 1567: 1-222.

Förare, J. 1995. Population dynamics of a monophagous insect living on a patchily distributed herb. Ph.D.-thesis, Swedish University of Agricultural Sciences, Uppsala.

Gullander, B. 1971. Nordens nattflyn. Stockholm (Norstedts förlag).

Hacker, H. 1989. Die Noctuidae Griechenlands. Herbipoliana, Buchreihe zur Lepidopterologie, Band 2.

Hampson, G. F. 1913. Catalogue of the Lepidoptera Phalaenae in the collection of the British Museum. Catocalinae continued, Mominae, Phytometrinae. Vol. 13. London.

Harrison, S., Murphy, D. D. & Ehrlich, P. R. 1988. Distribution of the Bay checkerspot butterfly, Euphydryas editha bayensis: evidence for a metapopulation model. - Am. Nat. 132: 360-382.

Hoffmeyer, S. 1949. De danske ugler. Aarhus (Universitetsforlaget).

Hoppe, H. A. 1975. Drogenkunde. 8th ed. Berlin (de Gruyter).

Hultén, E. 1971. Atlas över växternas utbredning i Norden. 2nd ed. Stockholm (Generalstabens litografiska anstalts förlag)

Ichinosé, T. 1962. Studies on the noctuid subfamily Plusiinae of Japan. - Bulletin of the Faculty of Agriculture of the Tokyo University of Agriculture and Technology 6: 1-127.

Kitching, I. J. 1987. Spectacles and Silver Y's: a synthesis of the systematics, cladistics and biology of the Plusiinae (Lepidoptera: Noctuidae). - Bulletin of the British museum (Natural History) 54(2): 75-261.

Mikkola, K. & Honey, M. R. 1993. The Noctuoidea (Lepidoptera) described by Linnaeus. - Zool. J. Linn. Soc. 108: 103-169.

Nordström, F., Kaaber, S., Opheim, M. & Sotavalta, O. 1969. De fennoskandiska och danska nattflynas utbredning. Lund (CWK Gleerup).

Skou, P. 1991. Nordens ugler, Danmarks Dyreliv bind 5. Stenstrup (Apollo Books).

Sterner, R. 1922. The continental flora of south Sweden. - Geogr. ann. 4: 221-444.

Sammanfattning

Denna artikel beskriver biologin, fenologin och utbredningen hos tulkörtsflyet *Abrostola asclepiadis* Schiff. (Lepidoptera, Noctuidae) i Sverige. Medan larver av andra *Abrostola*-arter är kända från värdväxter inom Urticales, såsom *Urtica*-arter (brännnässlor), lever *A. asclepiadis* på tulkört (*Vincetoxicum hirundinaria* Med.; Asclepiadaceae), en perenn växt som innehåller många giftiga substanser. Mina födoförsök styrker dock att *A. asclepiadis* är monofag på tulkört.

A. asclepiadis är regionalt ovanlig och lokal, troligtvis mest för att dess värdväxt har en begränsad och uppsplittrad förekomst. Arten har dock en god spridningsförmåga och täcker värdväxtens svenska utbredning i södra och sydöstra Sverige ända till nordgränsen. Ett undantag utgörs av Skåne, där arten aldrig observerats. Jag tror att anledningen är att avstånden mellan tulkörtslokalerna är för långa för att upprätthålla livskraftiga populationer. Äggtätheterna på växtlokalerna är ofta låga och dödligheten hos avkomman hög, i allmänhet mer än 90%. Dödligheten orsakas främst av generella fiender, framför allt myror. Tulkörten påverkas sällan i någon omfattning av angreppen från *A. asclepiadis*, pga den låga populationstätheten hos fjärilen.

Tidskriften Parnassiana efterlyses!

Äger någon av ET:s läsare häften av tidskriften Parnassiana, utgiven under perioden 1930–1939 (Neubrandenburg) av den svenske lepidopterologen Felix Bryk, eller kan i övrigt upplysa om förekomst av denna i Sverige? Undertecknad mottar tacksamt upplysningar om detta. (Parnassiana finns ej tillgänglig i något svenskt bibliotek.)

Erik von Mentzer, Örnstigen 14, 183 50 Täby, tel. 08-758 29 71