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Chloridea ononis D. & S. : Evidence for an autochthonous population in the Swiss Alps (Lepidoptera, Noctuidae)

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Summary

Observations of imagines and larvae of *Chloridea ononis* D. & S. in the Swiss Central Alps (Tavetsch valley) over a period of twelve years (1977-1989) strongly suggest that an autochthonous population of this south-east European and Asian, migratory noctuid moth exists in the investigated area. In Central Europe, this breeding site is probably the northernmost reported so far and supports the assumption, that *Chloridea ononis* is also autochtonous in suitable habitats further north. Observations on oviposition and previously unrecorded larval host plants (*Sempervivum arachnoideum, Knautia arvensis, Dianthus silvester*) are also reported and discussed. It is suggested that the spectrum of larval host plant species changes during the larval development of *Chloridea ononis.*

Zusammenfassung

Beobachtungen von Imagines und Raupen von *Chloridea ononis* über einen Zeitraum von 12 Jahren legen nahe, dass diese südosteuropäisch-asiatische und als Wanderfalter bekannte Noctuide in den Schweizer Zentralalpen (Tavetsch) autochthon ist. Für Mitteleuropa ist dies vermutlich die nördlichste bisher bekannte autochthone Population. Diese Beobachtungen unterstützen die Vermutung, dass *Chloridea ononis* in geeigneten Habitaten weiter nördlich ebenfalls bodenständig ist. Beobachtungen über Eiablage und über bisher nicht bekannte Larvalfutterpflanzen (*Sempervivum arachnoideum, Knautia arvensis, Dianthus silvester*) werden ebenfalls mitgeteilt und diskutiert. Vermutlich ändert sich das Artenspektrum der Wirtspflanzen im Verlauf der Larvalentwicklung von *Chloridea ononis.*

Introduction

Chloridea ononis (Denis & Schiffermüller, 1775) is a noctuid moth which flies by day as well as by night (Forster & Wohlfahrt 1971, Koch 1984). Its distribution ranges from southern Europe eastwards

over South Russia and Central Asia to Southwest China (Spuler 1910, Seitz 1914, 1938). In Central Europe, it is only rarely found (Forster & Wohlfahrt 1971, Koch 1984). Forster & Wohlfahrt (1971) claim that there are no autochthonous populations of *Chloridea ononis* north of the southern border of the Alps, but Koch (1984) suggests that this species could also breed in suitable warm habitats further north. *Chloridea ononis* is a migratory species (Forster & Wohlfahrt 1971, Koch 1984) and specimens from Central Europe are mostly believed to be of migratory origin (Bergmann 1954). This paper reports the existence of a population of *Chloridea ononis* in the Swiss Central Alps (Tavetsch valley) which is most likely autochthonous and which is to my knowledge the northernmost in Central Europe reported so far. Observations on oviposition and previously unrecorded larval hosts are also reported and discussed in this paper.

Materials and Methods

The observations reported here were made in the Tavetsch valley in the Swiss Central Alps (46° 40' N ; 8° 44' E), at an altitude of 1600 m. Observations of imagines of *Chloridea ononis* were made during a field survey which was conducted during the whole growing seasons of the years 1977-1979 (Erhardt 1985a, b). After an interruption of observations from 1980-1982, caterpillars of *Chloridea ononis* were detected in 1983. From 1983-1989 the investigation was concentrated on searching for larvae (mid July-mid August). No special techniques were applied since larvae can easily be detected in the field when they are feeding on floral tissue.
Larvae were bred in 1983 and 1984 in the lowlands (city of Basel) and were kept under natural climatic conditions. Pupae overwintered and a total of 8 imagines hatched during the period April 30th to June 4th.
Field observations had again to be interrupted in 1985 and 1986 due to stays abroad.

Results and Discussion

1. *Geographical Distribution*

Imagines of *Chloridea ononis* were observed in all growing seasons from 1977-1979 (Table 1). The occurrence of the imagines on the same south-facing slopes during this observation period and the restriction of the observations to the hottest habitats in the valley suggested that the observed specimens had not migrated, but had completed their

life cycle in these habitats in the Tavetsch valley (Erhardt 1985a). This assumption was confirmed when I detected caterpillars of *Chloridea ononis* in 1983 at the same locality where I had observed the imagines four years ago. Caterpillars were since observed in all subsequent years (1983-1989) with the exception of 1985 and 1986 when observations were interrupted (Table 1).

These observations strongly suggest that an autochthonous population of *Chloridea ononis* exists in the Tavetsch valley. They contradict the statement of Forster & Wohlfahrt (1971) that *Chloridea ononis* is restricted in Central Europe to regions south of the Alps and support the assumption of Koch (1984) that there are also autochthonous populations of *Chloridea ononis* on suitable sites further north.

Table 1. Field observations.

Year	Observed Date	imagines number	Number of observed larvae	Host plant
1977	19.6.	1	—	—
1978	30.6.	1	—	—
	2.7.	1	—	—
1979	20.6.	2	—	—
	23.6.	1	—	—
	25.6.	2	—	—
	10.7.	1	—	—
1980-1982			observations interrupted	
1983	—	—	ca. 10	*Dianthus silvester*
1984	20.7.	1♀ ovipositing		*Knautia arv.* (2 eggs), *Semperv. arachn.* (1 egg)
			ca. 10	*Dianthus silv.*
			1	*Knautia arv.*
1985-1986			observations interrupted	
1987		—	4	*Dianthus silv.*
			1	*Knautia arv.*
1988		—	6	*Dianthus silv.*
1989		—	5	*Dianthus silv.*
Total 1977-1989		10	ca. 35	*Dianthus silv.*
			2	*Knautia arv.*

2. *Biology : Voltinism, oviposition and larval hosts*

Chloridea ononis is generally bivoltine (Bergmann 1954, Forster & Wohlfahrt 1971, Koch 1984). However, the observation dates

(table 1) and the fact that all bred pupae overwintered indicate that the observed population of *Chloridea ononis* is univoltine. This pattern fits well with other Lepidoptera species which occur over large geographical and/or altitudinal ranges and which are bivoltine under favourable climatic conditions, but become univoltine at the border of their geographical or altitudinal range.

On one occasion (20.7.1984), an ovipositing female was observed. This female oviposited on still unopened inflorescences of *Knautia arvensis* (L.) Coulter em. Duby and *Sempervivum arachnoideum* L., two larval foodplants not mentioned so far in the literature (Rebel 1910, Spuler 1910, Seitz 1914, 1938, Bergmann 1954, Forster & Wohlfahrt 1971, Koch 1984). Two eggs were laid at the base of two unopened florets in the same inflorescence of *Knautia arvensis* (Fig. 1), and one at the base of a flower bud in the inflorescence of *Sempervivum arachnoideum* (Fig. 2). In captivity, the young caterpillars readily accepted the young floral tissue of *Knautia arvensis* and *Sempervivum*


1


2


3


4

Fig. 1. Eggs of *Chloridea ononis* (arrows) on an unopened inflorescence of *Knautia arvensis*
Fig. 2. Egg of *Chloridea ononis* on an unopened inflorescence of *Sempervivum arachnoideum*.
Fig. 3. Larva of *Chloridea ononis* feeding on flower and seeds of *Dianthus silvester*.
Fig. 4. Adult larva of *Chloridea ononis* feeding in captivity on *Dianthus barbatus* L.

arachnoideum. However, most of the older larvae I observed in the field were feeding on flowers and seeds of *Dianthus silvester* Wulf., one of the dominating plant species at the site (Fig. 3, Table 1). This third larval foodplant has again not been reported so far in the literature. In captivity, the caterpillars also accepted flowers and seeds of other *Dianthus* spp., e.g. *Dianthus barbatus* L. (Fig. 4).

It is of interest that *Knautia arvensis* and *Sempervivum arachnoideum* were still in acceptable condition, i.e. in bloom, when most of the larvae of *Chloridea ononis* were found on *Dianthus silvester*. Also, the chances of finding caterpillars on *Knautia arvensis, Sempervivum arachnoideum* and *Dianthus silvester* appear to be similar for all three plant species, since larvae can easily be observed when they are feeding on the floral tissue of their host plants. If anything, larvae are more easily overlooked on *Dianthus silvester* than on the other two larval hosts, since they can hide in the calyx tubes of the flowers. It is also intriguing that the observed female was not seen to oviposit on *Dianthus silvester* although this plant species is distinctly more abundant at the study site than *Knautia arvensis* and *Sempervivum arachnoideum* and is used so frequently as host plant by the observed larvae. In addition, plants of *Dianthus silvester* had flower buds and open flowers and appeared to be in condition for oviposition when the ovipositing female was observed. An explanation of this apparently contradictory situation could be that females of *Chloridea ononis* have a specific oviposition behaviour and may oviposit only on dense and still unopened inflorescences not present in *Dianthus silvester* and that a shift in the larval foodplants from *Knautia arvensis, Sempervivum arachnoideum* and possibly also from other plant species with similarly structured inflorescences to plants with larger flowers such as *Dianthus silvester* takes place during the larval development of *Chloridea ononis*. However, more field observations are needed to prove this assumption.

The fact that none of the larval hosts in the Tavetsch valley is reported in the literature raises another point of interest. So far, *Ononis* spp., *Salvia pratensis* L., *Linum usitatissimum* L. and *Silene nutans* L. have been reported as larval hosts of *Chloridea ononis* (Spuler 1910, Rebel 1910, Seitz 1914, Bergmann 1954, Forster & Wohlfahrt 1971, Koch 1984). Except for *Silene nutans*, none of these plant species occurs at the site where *Chloridea ononis* was observed in the Tavetsch valley. *Ononis repens* L. and *Salvia pratensis*, although present in the Tavetsch valley, are not abundant and *Linum usitatissimum* is completely absent. Although *Silene nutans* is present at the observation site, I have not yet observed caterpillars feeding on it. This could be

due to the fact that *Dianthus silvester* is much more abundant than *Silene nutans* at the investigated site. Accepting *Dianthus silvester* as a substitute for *Silene nutans* does not seem to be too difficult for the caterpillars of *Chloridea ononis*, since both of these plant species belong to closely related genera in the same subfamily (Silenoideae) of the Caryophyllaceae. Given these conditions, it could well be that the spectrum of larval food plants changes at the border of the geographical range of *Chloridea ononis*. Another explanation for the reported observations could simply be that the spectrum of larval hosts of *Chloridea ononis* is generally larger than so far reported.

This example shows also how limited our knowledge on the life cycle of many of our moths still is.

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