

Two new cases of myrmecophily in the Lycaenidae (Lepidoptera) : Biology of *Cigaritis zohra* (DONZEL, 1847) and *Cigaritis allardi* (OBERTHÜR, 1909) in Morocco

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Summary

The biologies of *Cigaritis zohra* (DONZEL, 1847) and *Cigaritis allardi* (OBERTHÜR, 1909) have been studied at localities between 980 and 2080 m in the Moroccan mountains over a period of several years. Both species appear to be myrmecophilous. Larvae of *C. zohra* feed on only one plant species while those of *C. allardi* feed on at least four. The two species are associated with ants of the genus *Crematogaster*. However, only the larvae of *C. zohra* actually penetrate the ant nests.

The biologies of the lycaenid species *Cigaritis zohra* (DONZEL, 1847) and *Cigaritis allardi* (OBERTHÜR, 1909) have been studied in Morocco. The observations on *C. zohra* were made at sites located in the Middle Atlas and those concerning *C. allardi* in the Middle Atlas, the High Atlas, the Anti Atlas and the Zaër-Zaïane mountains (Fig. 1, Table 1).

The larvae of *C. zohra* feed only on one species of plant : *Coronilla minima* L. (Fabaceae) while those of *C. allardi* feed on at least four : *Genista quadriflora* MUNBY (Fabaceae), *Cistus salvifolius* L., *Fumana thymifolia* (L.) VERLOT and *Helianthemum hirtum ruficomum* (VIV.) M. (Cistaceae) (Table 1).

C. zohra and *C. allardi* are mentioned for the first time to be myrmecophilous. Both species are associated with ants of the Genus *Crematogaster* (Formicidae, Myrmicinae) : *C. zohra* with *C. laestrygon* (EMERY, 1869) and *C. allardi* with *C. auberti* (EMERY, 1869), *C. antaris* (FOREL, 1894) and probably *C. scutellaris* (OLIVIER, 1791) (Table 1).

The life cycles are presented in Table 2 (*C. zohra*) and Table 3 (*C. allardi*). The length of larval development approaches 11 months for both species. All larval instars and pupae are tended by ants.

The first and second instar larvae of *C. zohra* rest either on the host plant or in access galleries to ant nests. Larvae of the following instar rest exclusively in access galleries while the last instar larvae enter the nests where they mix with the ant brood, hibernate, and then pupate in the spring.

Table 1
Host plants and associated ants of *C. zohra* and *C. allardi*
related to observation localities. ? : unknown ; (...) : probable

SPECIES	STATION N°	MEAN ALTITUDE (METERS)	LOCALITY	GEOGRAPHICAL SITUATION	HOST PLANT	ASSOCIATED ANT
<i>CIGARITIS</i> <i>ZOHERA</i>	1	1580	IFRANE	CENTRAL MIDDLE ATLAS	<i>CORONILLA MINIMA</i> L. (FABACEAE)	<i>CREMATOGASTER LAESTRYGON</i> (EMERY, 1869)
	2	1900	MICHLIFFEN	»	<i>CORONILLA MINIMA</i> L.	<i>CREMATOGASTER LAESTRYGON</i>
	3	1930	TIZI N'TRETTEN	»	<i>CORONILLA MINIMA</i> L.	<i>CREMATOGASTER LAESTRYGON</i>
	4	1650	ANNOCEUR	»	(<i>CORONILLA MINIMA</i> L.)	(<i>CREMATOGASTER LAESTRYGON</i>)
	5	2080	TIZI N'TAGHZEFT	»	?	(<i>CREMATOGASTER LAESTRYGON</i>)
<i>CIGARITIS</i> <i>ALLARDI</i>	6	1430	ITO	»	<i>FUMANA THYMIFOLIA</i> (L.) VERLOT (CISTACEAE)	<i>CREMATOGASTER AUBERTI</i> (EMERY, 1869)
	7	1450	AZROU	»	<i>GENISTA QUADRIFLORA</i> MUNBY (FABACEAE)	<i>CREMATOGASTER AUBERTI</i>
	8	1070	SOUK EL HAD	»	(<i>FUMANA THYMIFOLIA</i>)	(<i>CREMATOGASTER AUBERTI</i>)
	9	1000	EL HARCHA	ZAER ZAIAINE COUNTRY	<i>CISTUS SALVIFOLIUS</i> L. (CISTACEAE)	<i>CREMATOGASTER AUBERTI</i>
	10	2060	TIZI N'TEST	CENTRAL HIGH ATLAS	<i>HELIANTHEMUM HIRTUM RUFTCOMUM</i> (VIV.) M. (CISTACEAE)	<i>CREMATOGASTER ANTARIS</i> (FOREL, 1894)
	11	980	TASSADEMT	OCCIDENTAL HIGH ATLAS	?	(<i>CREMATOGASTER SCUTELLARIS</i>) (OLIVIER, 1791)
	12	1190	TIZOURHANE	ANTI ATLAS	?	(<i>CREMATOGASTER SCUTELLARIS</i>)

Table 2

Life cycle of *C. zohra*. A - adult ; E - egg ; L₁, L₂ ... - larval instars ; L_u - last instar larvae ; P - pupae ;
 1 - host plant ; 2 - access galleries to ants nests ; 3 - brood chambers of the ants nests.
 This life cycle is based on observations of a single individual. Adult flying period of the species : April and May

MONTHS	05	06	07	08	09	10	11	12	01	02	03	04
STAGE	A	E L ₁ L ₂	L ₃ to L _{u-1}	L _u								P
RESTING-PLACE OF LARVAE* AND PUPAE		1 1 or 2 2	2	3								3
PRESENCE OF TENDING ANTS	0	0 + +	+					+				+

* when not feeding.

Table 3

Life cycle of *C. allardi*. Legend as Table 2, except : 4 - cavities or galleries located in the ground near or at the foot of the host plant ;
 5 - Shelters different from 4, generally under stones, more or less distant from the host plant.
 Adult flying period of the species : March to June

MONTHS	05	06	07	08	09	10	11	12	01	02	03	04
STAGE	A	E L ₁ L ₂	L ₃ to L _{u-2}	L _{u-1}								P
RESTING-PLACE OF LARVAE* AND PUPAE		1 1	4	4								4 5
PRESENCE OF TENDING ANTS	0	0 + +	+					+				+

* when not feeding.

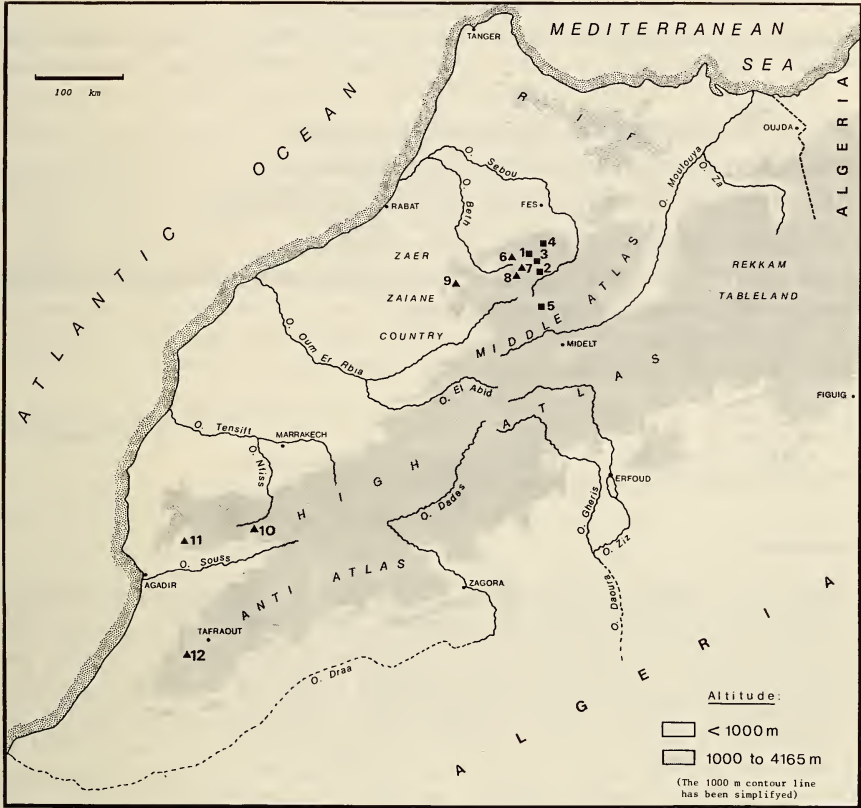


Fig. 1. Observation sites in central and northern Morocco. Square : *C. zohra* ; Triangle : *C. allardi*.

On the contrary, *C. allardi* larvae never penetrate into ant nests. First and second instar larvae rest on the host plant. Following instars rest in cavities or galleries located in the ground, near or at the foot of the host plant. Larvae hibernate in these places in the penultimate instar. They quit them in the spring to pupate in other shelters situated under stones.

In conclusion, these two species, although closely related, present differences in their biology. The main difference is the degree of association with ants : The larvae of *C. zohra* enter into the ant nests, whereas those of *C. allardi* never penetrate them.