

**OBSERVATIONS ON OVIPOSITION BEHAVIOUR OF THE LATTICE
BROWN BUTTERFLY *KIRINIA ROXELANA* CRAMER 1777
IN KERKYRA (CORFU), GREECE**

¹ANNE F. SORDINAS & ²DAN (G. W.) DANAHAR

¹*Aghia Marina, Kalafationes, Corfu, Greece.
anne@corfubutterflyconservation.org*

²*35 Coldean Lane, Brighton, BN1 9GD.
dan@corfubutterflyconservation.org*

Abstract

Observations on the oviposition behaviour of *Kirinia roxelana* (Satyrinae) are discussed. It is concluded that high summer temperatures are probably the primary driver for the evolution of this aspect of this butterfly's survival strategy.

Keywords: *Kirinia roxelana*, climate, survival strategy, substrate, host plant, ova, oviposition, diapause, Kerkyra, Corfu.

Introduction

The oviposition behaviour of species from the butterfly subfamily Satyrinae varies considerably. For example, the ova of the Balkan Marbled White *Melanargia larissa* do not adhere to any substrate, (http://www.pyrgus.de/Melanargia_larissa_en.html) and so it is improbable that the adult butterfly would attempt to attach them to a host plant. This is also true of its sibling species the Marbled White *M. galathea* (Thomas & Lewington, 2010). Similarly, the Great Banded Grayling *Brintesia circe* releases ova onto vegetation both while perched and during flight (Settele, 2008). In contrast, other Satyrines attach ova directly on selected host plants. Hobbs (pers. comm.) observed a Delattin's Grayling *Hipparchia volgensis* deliberately climb deeply into the tussock of a grass *Brachypodium* spp. to lay just one ovum on a single blade of the grass on Kerkyra during October. On 27 September 2024, Sordinas observed three female Delattin's Grayling ovipositing on young grasses between large stones. This laying strategy could afford protection for newly hatched larvae from grazing animals.

Observation

The sighting of a Lattice Brown butterfly *Kirinia roxelana* reported here demonstrates a further example of this variation in Satyrinae oviposition behaviour. It took place at 10:15 hrs on 22 August 2022, at 850m above sea level, on the slopes of Mount Pantokrator in northern Kerkyra. The terrain consisted of scree with sparse trees, at a time of year when the ground cover was dry and comprised primarily of parched grasses, interspersed with Jerusalem Sage *Phlomis fruticosa* (Plate 1). Initially, the butterfly flew around the pines and cypress trees before alighting onto the trunk of a Brutia Pine *Pinus brutia*. The bark of this tree had a rough surface with deep undulations (Plate 2). The butterfly proceeded to deposit four ova underneath a protrusion of the bark at a height of approximately 1.5m, on the south-west facing side of the tree (Plate 3). This site selection allowed the butterfly to easily curve her abdomen underneath the bark protrusion to secure the ova. This location was also



Plate 1. Habitat of the Lattice Brown *Kirinia roxelana* and location of the oviposition sighting of 22 August 2022, Mt. Pandokrator, Kerkyra, Greece. Photograph: ©Tony Gould.

protected from the extremes of direct sunlight and harsh wind. Interestingly, the butterfly did not scout the ground vegetation for potential host plants before the laying commenced. The ova of *K. roxelana* are spherical, just under 1mm in diameter and



Plate 2. The substrate used for oviposition by *Kirinia roxelana*, the bark of *Pinus brutia* Photograph: ©Tony Gould.

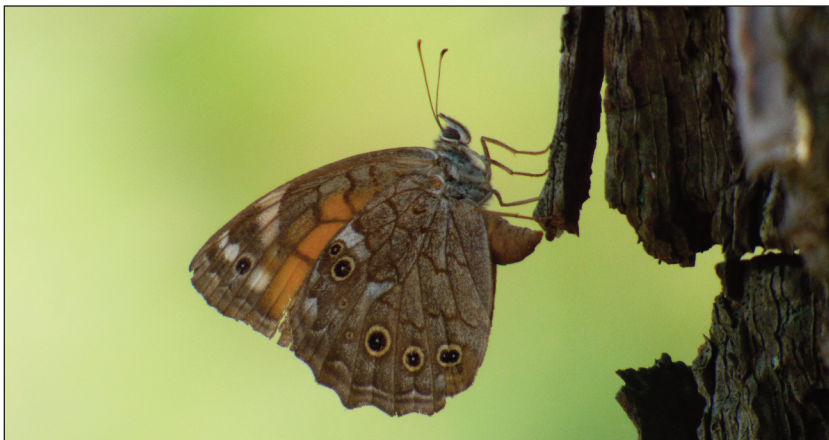


Plate 3. Oviposition of *Kirinia roxelana*, 22 August 2022, Mt. Pandokrator, Kerkyra, Greece
Photograph: ©Tony Gould.

white with orange blotches when fresh (Plate 4). The larvae hatched seven days later and entered diapause after eating their eggshells. They began feeding at the beginning of January 2023, five months later.



Plate 4. Ova of the Lattice Brown *Kirinia roxelana*, laid on 22 August 2002 on *Pinus brutia*, Kerkyra, Greece. Photograph: ©Anne Sordinas.

Similar occurrences

In July 1990, Dennis (1991) made similar observations on the oviposition behaviour of *K. roxelana* at Aghios Stephanos in north-eastern Kerkyra. In this case, the ova were also laid at 1.5m above the ground but the oviposition occurred on the northern side of an olive tree. Lafranchis (2019) has also reported on the oviposition behaviour of *K. roxelana*. However, these sightings both in Epirus, Greece, involved two

additional and unrelated tree species; *Prunus domestica* (at 1.2m) and on *Platanus orientalis* (at 2m).

Phenology

The Corfu Butterfly Survey (CBS) is a citizen science initiative organized by Corfu Butterfly Conservation (CBC) and has been running since 01 January 2021. It was designed to record the location and date of sightings of butterflies on the island. Although not generated from standardised transect data this information illustrates the seasonal occurrences of each butterfly species and has been found to be robust for such purposes (https://corfubutterflyconservation.org/species.php?name=Kirinia_roxelana&sp=roxelana). Data collected in the first four years of the CBS revealed that Lattice Brown adult sightings first peaked in the spring, during the last week of May (total monthly sightings = 185 [40%]), with approximately the same number of individuals seen in June (184 [39.9%]). Sightings decrease during July (20 [4.3%]) before showing a gradual increase in August (34 [7.4%]) and peaking again in the late summer, during the first week of September (36 [7.8%]). October is the last month of the year when sightings of this species are made, with very few individuals recorded (3 [0.7%]) (Figure 1).

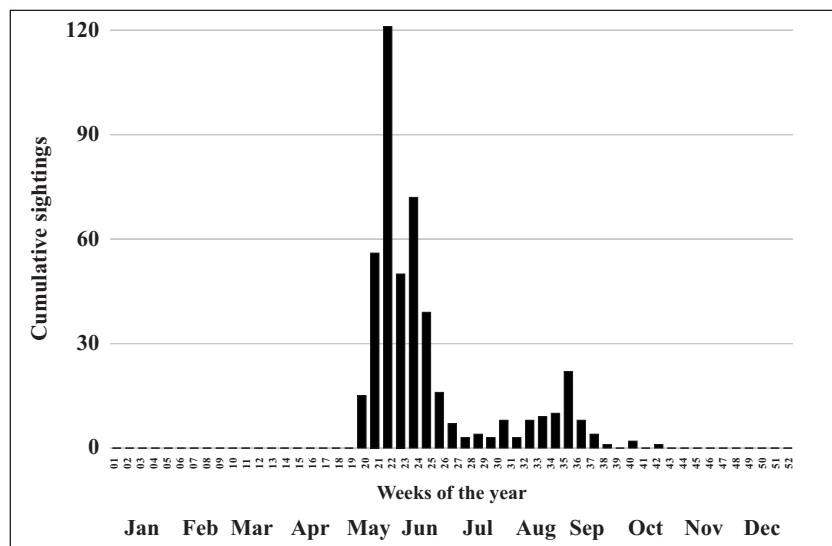


Figure 1. The seasonal occurrence of Lattice Brown *K. roxelana* adults recorded by the Corfu Butterfly Survey, displayed as the total number of sightings per week, covering the period 01 January 2021 to 31 December 2024.

Discussion

In studies of butterfly egg-laying patterns and phenology, Wiklund (1984) noted that species which overwinter as ova (and presumably unfed early instar larvae) tend to avoid ovipositing on the host plants. Dennis (1991) suggests that this may occur because the host plants could be blown away or decay during the winter months. At

the Mediterranean location where the current observations were made, high summer temperatures had reduced the availability of good quality host plants. Presumably, these would regenerate when favorable environmental conditions allowed, perhaps later in the year, producing a resource-rich habitat for the young larvae of *K. roxelana*. It appears that larval feeding is triggered by increases in humidity and decreases in temperature, when host plant regrowth would be expected to start (Tolman & Lewington 1997).

K. roxelana butterflies oviposited on a different species of tree in each of the cited accounts, as well as the observation reported here. Presumably, the species of tree was immaterial, because they were not the host plants for this butterfly; perhaps the adult butterfly only uses the bark substrate as a secure location to provide predatory and environmental protection for the ova and larvae.

In all cases, the oviposition took place about 1 to 2 metres above ground level. Ova laid at this height may experience reduced predation pressure from ground living invertebrates, whilst also being at a height that can be successfully negotiated by first instar larvae, without draining their energy reserves before they can locate suitable host plants. Although, there was no evidence that host plant proximity contributed to the female's selection of the tree on which the ova were laid, perhaps because it was so superabundant.

Dennis (1991) suggested that sub-bark locations provide protection against desiccation in the summer drought. Given that the aspect was different in two of the cases discussed in the current paper, it could be that ova laid at an appropriate height may be shaded by the tree's canopy, again reducing the likelihood of desiccation. In such cases aspect would become unimportant.

Wiklund (1984) also found that where superabundant host plants are used by species such as the Satyrines, they tended not to lay their ova on the leaves upon which the larvae later feed. Dennis (1991) implied that this strategy may reduce *K. roxelana*'s parasite load because most parasites would search the host plants to find the butterfly's early stages. Additionally, the proximity of seasonally superabundant host plants gives overwintered or aestivated larvae of *K. roxelana* easy access to this resource.

Furthermore, *K. roxelana* is renowned for its habit of concealing itself within the canopies of trees and shrubs. Dennis (1991) proposed that adult butterflies would be more conspicuous when ovipositing nearer the ground and therefore, would be more vulnerable to predation pressure, so *K. roxelana*'s oviposition behaviour may give it a better chance of survival.

The phenology data generated by the CBS shows that the greatest number of sightings took place in May and June. This probably corresponds with the need to find a mate before the high ambient temperatures of mid-summer make mate acquisition too challenging, because the thermoregulatory behaviour needed to maintain a constant body temperature would continuously interrupt courtship. Furthermore, the CBS data suggests that the oviposition reported here (in August), as well as that observed by Dennis (1991) in July, took place when the numbers of recorded adult sightings are low. At this point in the year most individual butterflies usually appear to be aestivating in dense vegetation or in gaps in the rock. We

speculate that Lattice Brown butterflies recorded from this point of the year onwards are more likely to be female than male, given that the primary functional role of the males should have been completed.

Conclusions

It seems likely that the evolution of *K. roxelana*'s oviposition strategy is primarily driven by the harsh summer temperatures of its Mediterranean habitat. Under these conditions the host plants eventually dry up and may be blown away. Therefore, the butterfly lays its ova on the bark of trees because this is a permanent and secure substrate where the species may spend its diapause during environmentally unfavourable conditions. This strategy allows the larvae to easily access their host plants at the end of this period because the host plants are so abundant.

Acknowledgements

We thank Tony Gould for his help in the field and for providing photographs. We are also grateful to Giannis Gasteratos for identifying the Brutia Pine *Pinus brutia*, Ralph Hobbs for showing us the results of Delattin's Grayling's oviposition behaviour and Gillian Elsom for the identification of the host plant upon which the Delattin's Grayling laid its ova. We are also grateful to Sarah A. Corbet and Roger L. H. Dennis for their comments on a draft of this paper.

References

- Thomas, J. & Lewington, R., 2010. *The Butterflies of Britain and Ireland*. British Wildlife Publishing.
- Settele, J., Otakar Kudrna, Alexander Harpke, Ingolf Kühn, Chris van Swaay, Rudi Verovnik, Martin Warren, Martin Wiemers, Jan Hanspach, Thomas Hickler, Elisabeth Kühn, Inge van Halder, Kars Veling, Albert Vliegthart, Irma Wynhoff, Oliver Schweiger 2008. *Climatic Risk Atlas of European Butterflies*. Pensoft
- Dennis, R. L. H., 1991. *Kirinia roxelana* Cramer, 1777 (Lepidoptera: Nymphalidae, Satyrinae) oviposition on an arboreal substrate. *Entomologist's Gazette* **42**: 239-241.
- Lafranchis, T. 2019. Notes on the biology of some butterflies in Greece (Lepidoptera: Papilionoidea). *Entomologist's Gazette* **70**: 113-134.
- Tolman T. & Lewington R., 1997. *Butterflies of Europe*. Princeton University Press.
- Wiklund, C., 1984. Egg-laying patterns in butterflies in relation to their phenology and the visual apparency of their hostplants. *Oecologia* **63**: 23-29.
-
-